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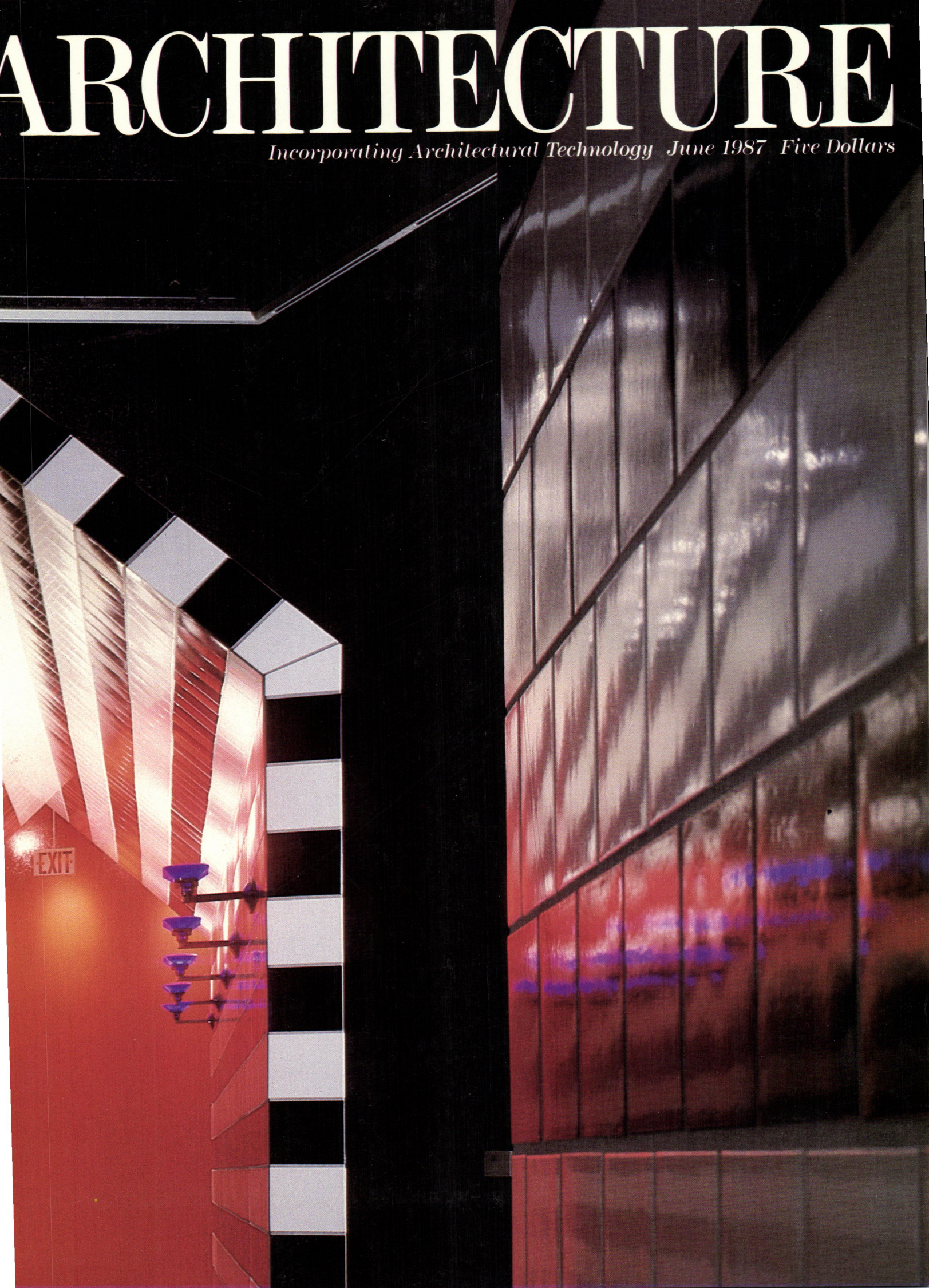

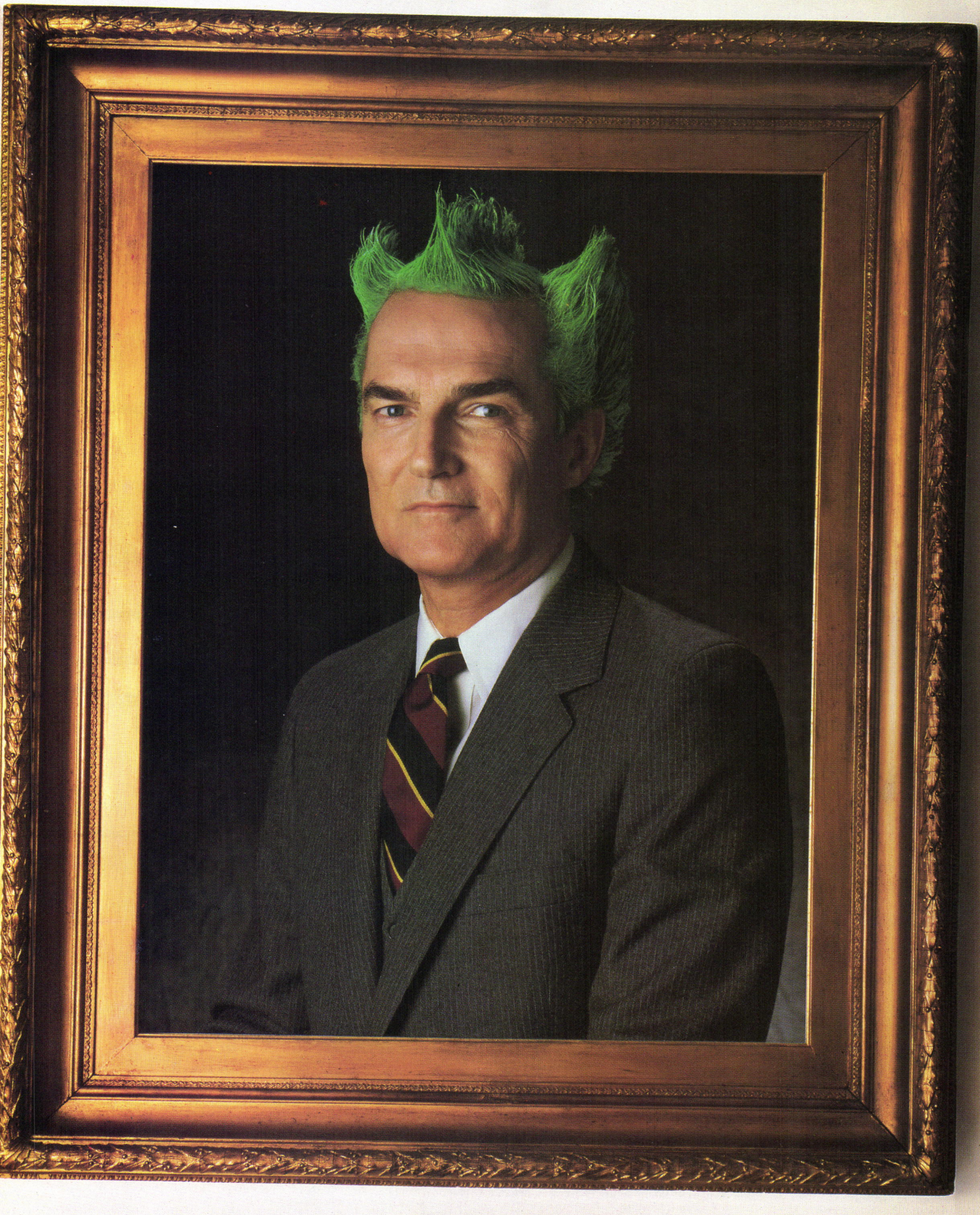

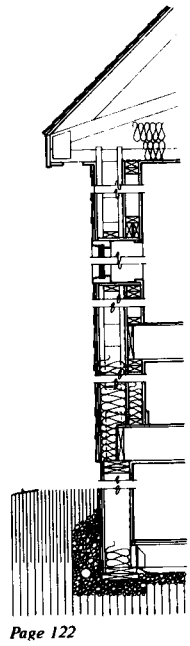

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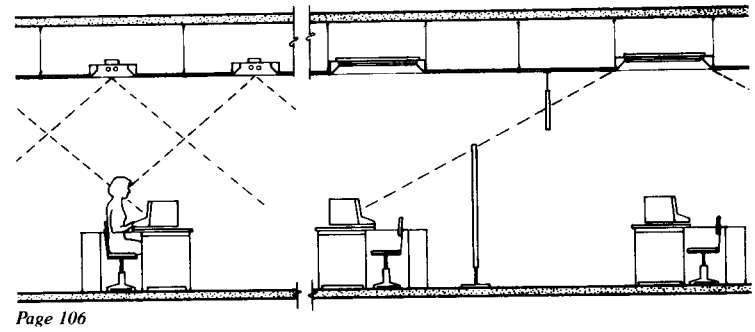
Cover
Detail view of circulation tunnel of the Advanced Computer Technology Center in Cupertino, Calif., by STUDIOS (see page 48). Photograph by Paul Warchol.

Technology & Practice



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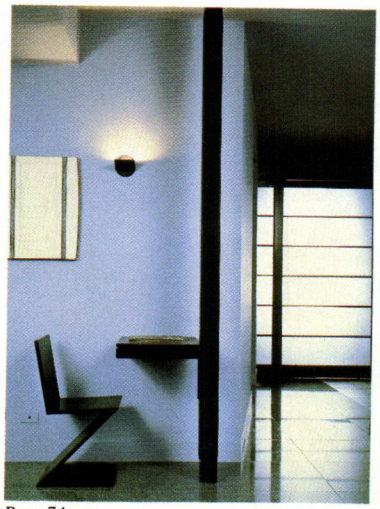

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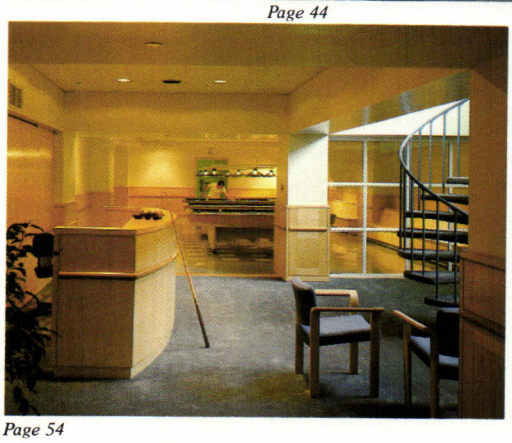

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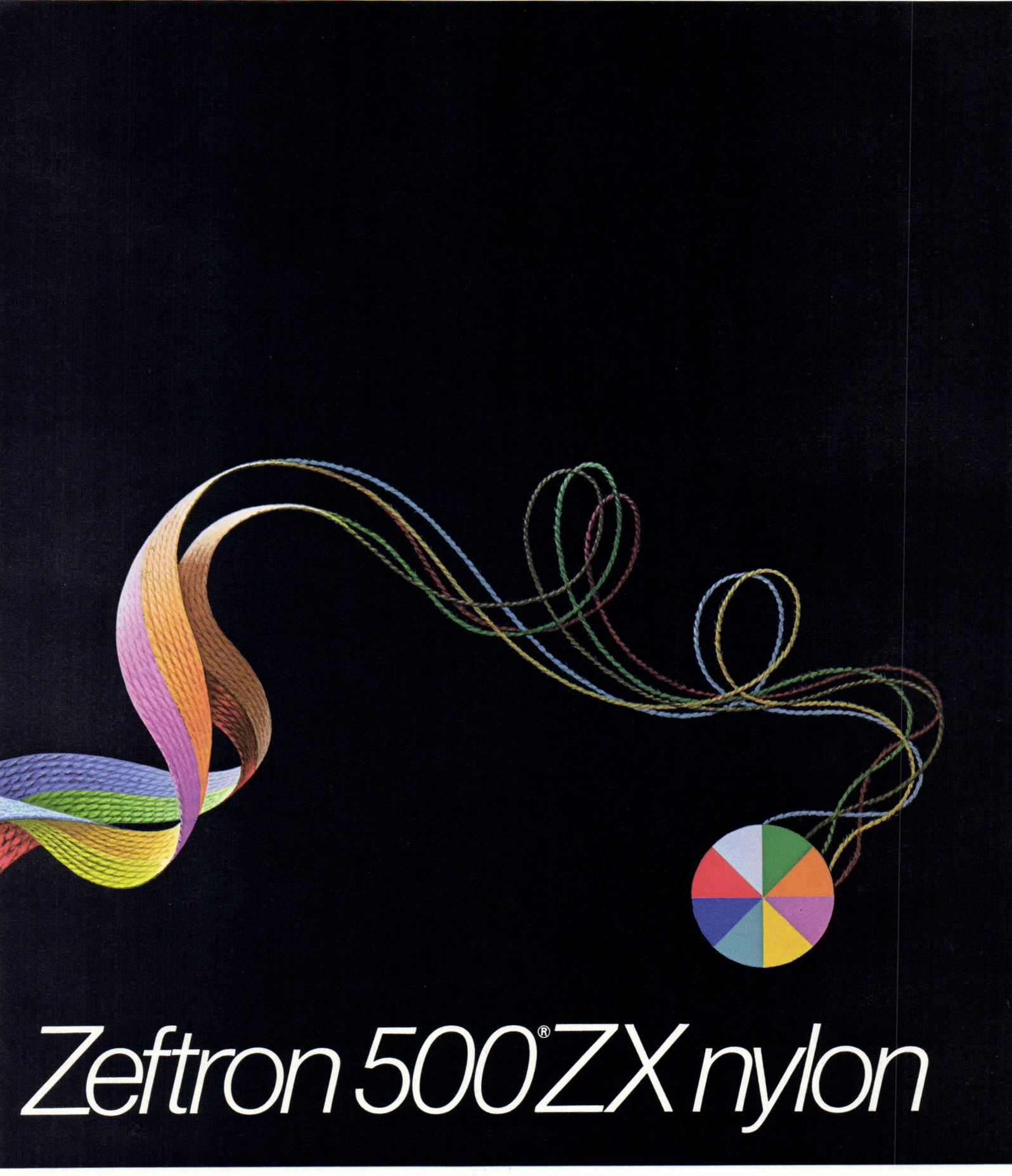

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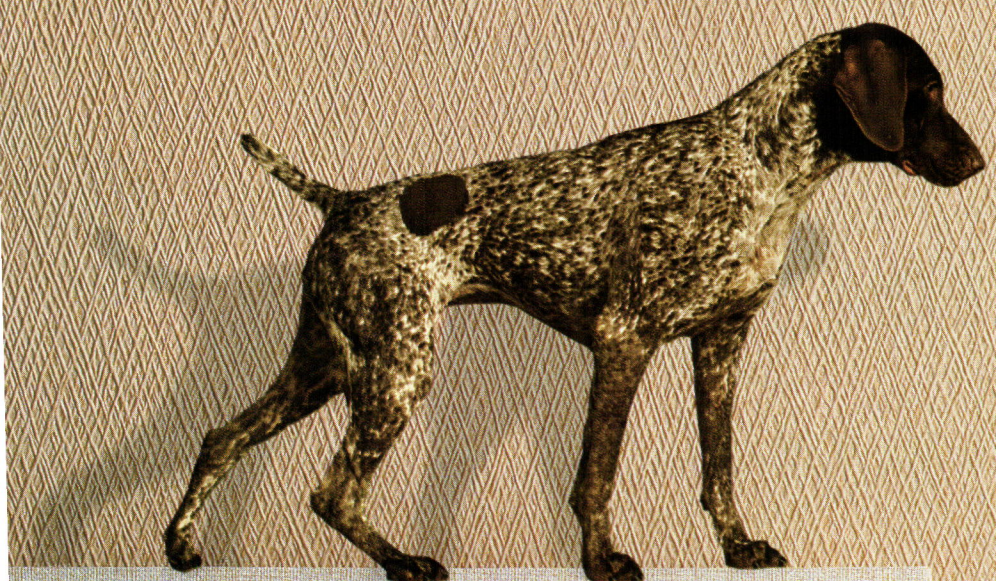

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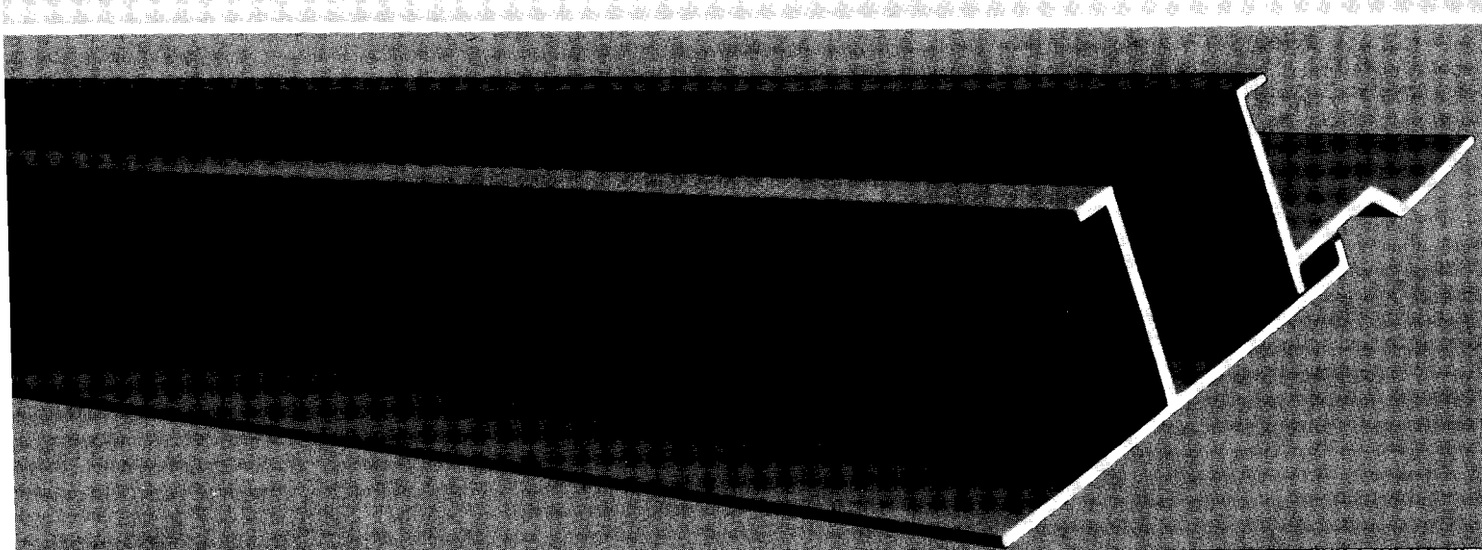

seems very strong, but when examined in its urban context it fits like a glove."

The Spiral building, a combination of

slightly angled to create a narrow entrance plaza. This layered facade has a gridded aluminum surface defined by an ascending zigzag pattern of openings,

• The Boulder Creek Branch Library in Santa Cruz, Calif., by Peter Calthorpe, AIA, of San Francisco, cited by the jury

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Through July 26: "American Art Deco"

Ralph Rapson, Teacher: I applaud the ACSA/AIA award jury and its selection of Ralph Rapson, FAIA, for the Topaz

ings on the National Register. Also miss-
ing are the significant activities of local

Up to now, specifying built-in ppliances has not been a articularly pleasant experience.

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Awards *from page 15*
for creating a "relaxed and rustic atmosphere conducive to reading and to thought." Located on a naturally landscaped site with large redwood trees, the library has a roof with a series of varying-sized gables, clerestories and skylights, and bay windows with areas for seating.

- The Broward County Main Library in Fort Lauderdale, Fla., a joint venture designed by Gatje, Papachristou & Smith and Miller Meier Kenyon Cooper of New York City.

The 265,000-square-foot library has a structural system of poured concrete beams and columns with long-span concrete tees to provide an eight-floor open stack area. Windows facing south, east, and west are shielded with sunshades and recessed balconies. A pedestrian passage links an adjacent park on the north side of the library to the nearby riverside and the site of a proposed museum. The jury praised the architects for "a spectacular offset opening on each floor, creating a natural interior lighting effect, while at the same time making all areas of the library unusually accessible from any level."

- The Fairwood Library in Renton, Wash., of the King County library system, by Mithun Bowman Enrich Group of Bellevue, Wash., cited for the "classic open-plan" library design that provides a "convenient, accessible, and flexible community library with strong architectural character."

The library's pitched roofs, glass-enclosed reading bays, and skylights define the variety of functions within the open plan. The interior millwork details, colors, and columns echo the exterior bay window canopies and gables.

- The Fisher-Watkins Library and Learning Center at Cushing Academy, Ashburnham, Mass., by The Stubbins Associates, described by the jury as "a blend of outstanding design, a functional layout and the solution to the problem of building a modern library and preserving the architectural integrity of a historic, traditional building." The 14,895-square-foot building is underground and is connected to the existing school buildings by a below-grade entrance.
- The Susan Colgate-Cleveland Library and Learning Center at Colby-Sawyer College, New London, N.H., by The Burley Partnership of Waitsfield, Vt.

Two pre-Civil War dairy barns were converted and enlarged to house a 110,000-volume college library. The restored silo serves as the main entrance, and the hand-hewn timber frames of the barn structure were maintained. The original barns have been "wrapped" to provide insulation and structural support. Books are stored in areas with less natural light, and reading areas are in the new shed and have large windows. "The result is a warm, friendly facility that respects the integrity of the original structures while solving well the circulation and growing space problems," wrote the jury.

Nine Buildings Recognized by Building Stone Institute

The Building Stone Institute has honored nine buildings in six separate categories in the 1987 Tucker awards for architectural excellence in "concept, design, construction, and use of natural stone." The awards jury included Richard Bergmann, FAIA (chair); Howard N. Horii, FAIA; and Stephen P. King, AIA.

The Lincoln Memorial, designed by Henry Bacon, in Washington, D.C., was recognized in the category of a stone building completed at least 40 years ago and still in use today.

Three buildings were cited in the nonresidential category. One thousand one Pennsylvania Avenue (see Nov. '86, page 64) is a full-block, commercial building designed by the Washington, D.C., firm Hartman-Cox Architects. Located midway between the Capitol and the White House, the building responds to the monumentality of Pennsylvania Avenue and to the smaller-scale commercial buildings on the side streets.

The second nonresidential winner is Alpine Square (below), in Walnut Creek, Calif., by the San Francisco firm Kaplan/McLaughlin/Diaz. A 100,000-square-foot office building is arranged around a landscaped courtyard entry and a three-story atrium, all set above two levels of underground parking.

Also cited was 500 Park Tower in New York City (see May '86, page 206), by James Stewart Polshek & Partners, a mixed-use commercial and residential building on a 75x100-foot site adjacent to and utilizing the air rights of the 1960 glass-and-aluminum headquarters designed by Skidmore, Owings & Merrill for the Pepsi-Cola Corp. The architect linked the two buildings, maintaining the floor-to-floor heights of the Pepsi-Cola building in the first 12 stories of the new office space and adding a 28-story cantilevered tower. The jury said that the building "does not grandstand and works well contextually with the buildings surrounding it."

A vacation house in Penobscot Bay, Me. (see May '86, page 200), by Peter Forbes & Associates of Boston, was cited in the residential category, as a "very simple project that is, at the same time, sophisticated and beautifully executed, in addition to being extremely well sited." The house is composed of two pavilions, each defined by concrete piers at the corners and anchored by large chimneys.

Two restoration projects were honored in the awards program. The Albany, N.Y., Union Station, a Beaux-Arts train station completed in 1899, was converted to corporate offices by Einhorn Yaffee Prescott and renamed the Norstar Plaza. The jury said, "The architect showed great respect for the existing fabric of the building and handled the challenge with a great deal of care."

The Boston Design Center, by Earl R. Flansburgh + Associates of Boston, was cited for combining "traditional materials and form into a new and meaningful composition." The 1919 Army warehouse building was turned completely on its axis to relate the new design center to the street and to create a new pedestrian entrance. A two-story lobby was created to serve as a transition space between the existing eight-story building and the public plaza.

The awards program also honored two landscape projects. The Ritter Park playground in Huntington, W.Va., by Bohlin Powell Larkin Cywinski of Wilkes-Barre, Pa., was intended to be reminiscent of both children's building blocks and mysterious ruins or follies.

The grand stairway by Albert Veri & Associates of Providence, R.I., is part of Kennedy Plaza, Providence's central open space, which is surrounded by city and federal government buildings, office buildings, and major transportation terminals. The stairway provides a pedestrian link between the street level and the newly renovated Union Station and provides a space for lunchtime outdoor performances and weekend concerts.

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herman miller

Practice

New EPA Requirements for Asbestos Abatement in Schools

Inspection of more than 100,000 school buildings for evidence of cancer-causing asbestos fibers will be required before the end of 1988 if the newly proposed rules of the Environmental Protection Agency go into effect as expected. Following inspection, clean-up and maintenance are likely to cost the schools $3.2 billion over the next three decades.

The new rules, required under the Asbestos Hazard Emergency Response Act passed by Congress last October, would require both public and private school systems to inspect for dangerous levels of asbestos fibers in all education buildings. Should a hazard be found, the local school system would then be required to hire certified contractors to alleviate it. The remedy, which could range from complete removal of all asbestos-containing materials to sealing off contaminated areas to repairing damaged materials, will be left up to the school system. But whatever approach is selected, it must begin before October 1988, or stiff penalties will be imposed. Failure to comply alone can cost $5,000 per day, but if an intentional disregard is discovered, or if federal inspections are not allowed, a school system and its administrators may be liable for criminal penalties of $25,000 per day.

All school buildings containing asbestos must be inspected every three years and must have a maintenance and control program that prevents the asbestos from becoming a hazard. The presence of asbestos-containing materials does not, in itself, create a high health hazard that necessitates immediate removal. Asbestos does, however, need to be watched for early signs of degradation of the parent material, which is an indication that the asbestos fibers might become friable and break off into the air.

The EPA estimates that about 33,000 schools—public and private, elementary and secondary—contain asbestos in a friable state, presenting a health hazard to more than 16 million schoolchildren, teachers, and other occupants. Upon completion of remedial measures to remove or contain the asbestos in these buildings, the proposed rules will allow reoccupancy if exposure levels are no greater than one one-hundredth of an asbestos fiber per cubic centimeter of air as measured by optical microscopy. The standard level becomes more strict with more sophisticated measuring techniques that are to be phased in over the next three years. Still, objections to even these low levels of exposure are expected. The relative risk of the reoccupancy standard must be completely addressed by EPA before Oct. 17, 1987, when the proposed rules are finalized.

Regardless of the reoccupancy level, there will always be some reason for concern, according to Liam Keane, president of Enviro Dynamics of Arlington, Va., a firm that studies environmental and occupational health issues. "As with any known carcinogen, it is not possible to establish a safe level of exposure to asbestos," says Keane, "but the risk at these levels of exposure is quite low—much lower, in fact, than the risk of being exposed to cigarette smoke over the same period of time."

The proposed rules are a good first step toward resolving the problem of asbestos in schools, but there are still some technical difficulties, says Roger Morse, AIA, with Entek Environmental Service of Troy, N.Y. As they are written, the proposed rules are not protective enough of workers, both those who maintain the schools and the contractors who will replace or repair the asbestos. The requirements for cleaning up the asbestos in the schools and for operating schools where asbestos is located are misapplied, in Morse's opinion. But, he says, the biggest oversight of the proposed rules is that they do not call for on-site monitors who report directly to the school system on the sufficiency of any asbestos abatement work under way.

Despite efforts by the Reagan Administration to block spending for asbestos abatement, Congress has appropriated $50 million this year to assist schools in inspection and abatement. All along, the Administration's position has been that asbestos problems should be handled by the states. But Congress overrode that position when it passed the hazard response act in 1986. The current rules proposed by the EPA require that school systems submit their asbestos management plans to their state governors. The states can use their own certification programs for asbestos-removal contractors, or they can use EPA-approved contractors. But either way, the contractors must be qualified and accredited. In the past, unqualified contractors often were hired to remove asbestos because there was no standard to measure their work against. They frequently made the problem worse by unsafe removal and disposal practices.

For architects and others involved in work on existing buildings, this proposed rule is the first of three steps addressing the numerous obstacles that buildings with asbestos present. Virtually none of the major insurance companies provide liability coverage where asbestos is concerned. In the few instances where asbestos-abatement coverage is provided, annual premiums are likely to be around $50,000, and the liability limits range from $500,000 to $1 million, with no guarantee of renewal, according to Morse. Some designers working on buildings where asbestos has been found allegedly set up "shadow companies," which specialize in asbestos abatement, to help circumvent the liability limits for their design firms. Whether or not the architecture firms, as well as the shadow companies, would be held liable for damage has not been tested.

The architect can avoid the issue, according to Morse, by leaving asbestos abatement design responsibilities to an environmental consultant and serving only to assemble the documents, as would be the case with mechanical or structural design, for example. Morse believes this will limit the architect's potential liability.

Alternatively, the architect could undergo the training necessary to specify asbestos abatement procedures and details. This approach keeps the designer in charge of the work, but does not necessarily resolve the liability issues.

Under the law passed by Congress last October, the EPA must work to resolve the liability issue. AIA is represented on an EPA task group that will study the expense and unavailability of asbestos-abatement liability coverage to determine whether inadequate insurance is inhibiting inspections for asbestos and whether the accreditation of contractors has affected the cost or availability of insurance. The task group must report on the effects of these issues on schools, contractors, and designers by April 1988, and a final EPA report is due to Congress by October 1990. The implication is that the task group's recommendations will have broader application than just for schools. Younger people apparently are more susceptible to asbestos-related diseases and potentially can be exposed to asbestos for more of their lifetime than adults. Thus, the liability issues for schools are likely to be the toughest to resolve.

The law also requires by October 1988 a study of public buildings to determine the extent of their asbestos-containing materials. The task group for this study, on which AIA is represented, will try to determine the extent of the exposure hazard to occupants and whether these buildings need inspection requirements similar to those that apply to schools. The group also must recommend the best response in circumstances where a hazard is found.

The EPA intends that the studies and the proposed regulations for schools provide a framework for addressing hazards in all buildings and provide a model program for training asbestos inspectors and contractors.—ELENA MARCHESO MORENO

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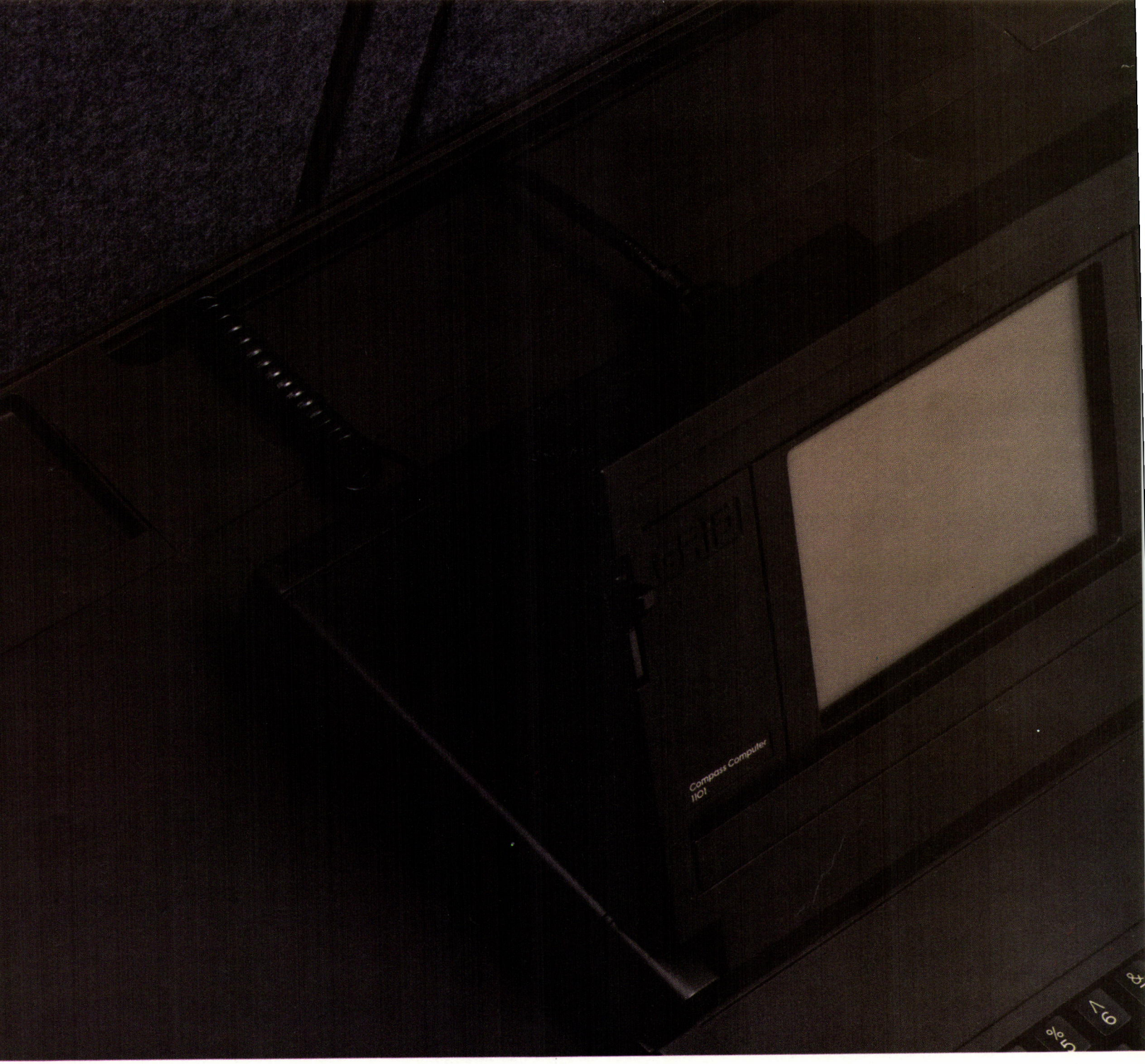

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BOCA to Consider More Participation by Architects

For the first time since its inception in 1915, the Building Officials and Code Administrators Inc. (BOCA), which sponsors the Basic/National Building Code, is considering a proposal to allow architects direct participation in the final vote of the BOCA model codes change process. The proposal, which will be put to ballot at the BOCA annual meeting June 21-26 at Radisson Mark Plaza Hotel in Alexandria, Va., would allow architects to form local chapters that would send voting representatives to the final code hearings.

To discuss the issue of voting rights for design professionals, AIA's building codes and regulations committee sponsored a multidisciplinary roundtable in 1986 on the subject of voting rights for design professionals in the code change process. In format, the debate followed a BOCA panel discussion held last summer in which seven building officials agreed unanimously that the current voting process should not be amended to include design professionals.

In contrast, the committee selected a multidisciplinary panel, with each member a recognized expert in the BOCA code group: Carl Baldasarra, P.E., with Schirmer Engineering; Ward Caddington, deputy fire chief of special operations for Prince Georges County, Md.; William Dupler, building official and supervisor of engineering and construction for Arlington County, Va.; Jim Messersmith, P.E., of the Portland Cement Association; and Ralph Rowland, FAIA, past chairman of the committee.

The panel concurred unanimously that design professionals should be given a direct vote in the codes change process, a privilege currently exercised by fire officials and building officials only. According to Messersmith, direct participation by architects would be beneficial to the overall codes change process, and BOCA itself would benefit from design professionals' input. Caddington added, "The architect plays a significant role in the building process, and the place to iron out problems is in the plan review stage, rather than in the building development phase."

The panel also agreed that the major objections to giving the architects the right to vote, namely building officials having diminished control over public safety and architects forcing a block vote, were most likely unfounded. Baldasarra commented, "Ultimately, I think it will be a positive thing, but it shouldn't be considered as a panacea solution to the relationships that exist now between the design team and the enforcement team. That will always be an issue of personality and professionalism. I do think that voting will eventually encourage more professionals to participate and will result in a technically based code rather than the empiricism that occurs quite a bit throughout the process. . . . Within the model codes, the building officials probably have some concerns—that they may lose control and that the code is going to be weaker. But I can't think of any case where that would really occur."

Rowland concurred, and added: ". . . architects and engineers are licensed by the states in the interest of public health, safety, and welfare—the same purpose for which building officials and fire officials are appointed. . . . There is no question that there is confrontation here and there, but their reason for being, as far as the states are concerned, is very much the same. . . . [However,] many building officials are concerned with architects's drawings coming in for plan review, presumably prepared with applicable codes in mind, but with serious code deficiencies. . . . As public officials, they are very much concerned with anything that might undermine their authority to require that public safety regulations be properly satisfied. It's up to us, as architects, to convince building officials that we are very much concerned with life and building safety and that we are very much interested in code development that brings about a standard safety. . . . One of the ways we can do it is to participate in greater numbers than in the past, to really show an interest in the subject."

On the issue of block voting, Rowland said, "I think that a block vote by architects under this system is highly unlikely. In the first place, architects tend to be individualists and generalists. To me, the idea that a group of architects could be coordinated to have a rather narrow view of a public safety issue would be almost unthinkable." Dupler pointed out the advantage of the proposal for activity on the local level. "I think this proposal will help encourage design professionals to participate more because it would provide an impetus for local chapters to develop committees. The committees will send representatives [to the hearings] if they know they have a vote."

David Collins, chairman of the committee, concluded: "We are hoping that our position will be communicated on the floor of the [BOCA code change] meeting in support of the bylaw change."

—M. Stephanie Stubbs

Government

Debate Intensifies Over Laws To License Interior Designers

The debate over the licensing of interior designers is growing as more states introduce legislation to regulate the practice of interior design and the use of the title "interior designer." Opponents argue that licensing laws encourage interior designers to perform work that is beyond their educational background and the scope of their expertise. Interior designers say they are calling for licensing to establish a legal professional status and to prevent totally unqualified persons from referring to themselves as interior designers.

A certification process for interior designers—whether it be voluntary or involuntary—is not a new concept. In 1972 the National Council for Interior Design Qualifications was founded to establish educational and professional qualifications for interior designers and has since developed a two-day qualifying examination for licensing. Prospective members of the American Society of Interior Designers are currently required to take the NCIDQ examination.

In 1982 Alabama became the first state to establish a law restricting the use of the title interior designer. Connecticut and Louisiana have since passed licensing laws restricting the use of the title. There are two types of licensing laws—a title law that prohibits anyone not licensed from using the title interior designer, and a practice act that prohibits the performance of professional interior design services by someone who is not licensed.

The 28,000-member ASID has a licensing policy that requires any proposals to "come before the national board of directors for approval, and it must be approved before a chapter can utilize its facilities or its funds to support it." In addition, the policy only endorses "interior design acts of a title nature, except in jurisdictions where local conditions require otherwise."

In February of this year, Washington, D.C., passed the country's first interior design practice law, which prohibits both the practice of interior design and use of the title by individuals not meeting specific requirements of education, experience, and examination.

The licensing laws in both Connecticut and Washington, D.C., exempt registered architects, who may use the title interior designer and may perform interior design services. However, architects in Alabama and Louisiana are prohibited from using the title interior designer but are allowed to practice interior design.

In each of the licensing acts, except for Alabama's, a grandfather clause automat-

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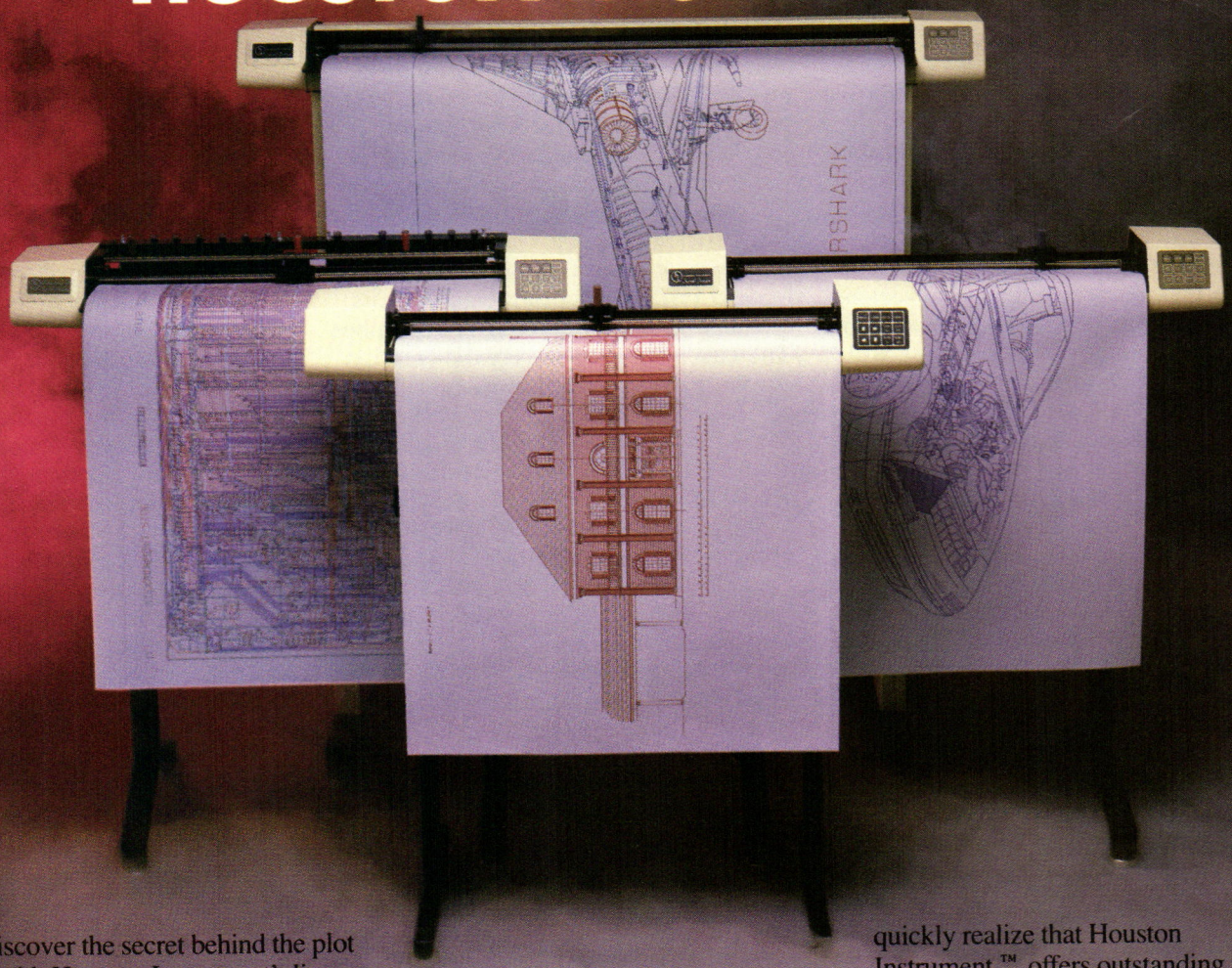

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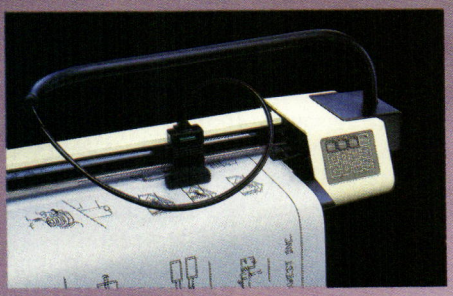

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Government *from page 26*
ically licenses those already practicing in the field. The D.C. bill waives the examination requirement for anyone who has practiced as an interior designer for at least three years immediately preceding passage of the law.

As many as 20 states either have addressed the issue of licensing for interior designers or have legislation pending action. AIA is actively opposed to licensing for interior designers and in 1986 adopted a policy that reads: "AIA holds that in the building construction industry the responsibility for the public health, safety, and welfare demands the education and experience required for the licensing of architects and engineers. AIA opposes any dilution of this responsibility."

Architects opposed to licensing are arguing that interior designers are seeking authority that is beyond their education and training and believe licensing will encourage interior designers to perform tasks for which only architects and engineers are qualified. In addition, the role of interior designers as consultants to architects is changing, and many interior designers now view themselves as independent professionals.

Interior design licensing initiatives have been unsuccessful in past years in state legislatures in Arizona, California, Texas, and Oklahoma. In Maryland, a bill to establish licensing was defeated in 1979, and no new legislation has been introduced. Legislation to regulate interior designers is being considered in Florida, Minnesota, Texas, and New York. Legislation failed to pass this year in New Mexico and Georgia. Although Connecticut has an existing act, legislation has been introduced to strengthen the law and to "require registered interior designers to stamp each document they prepare with a seal prepared by the department of consumer protection."

Nowhere is the debate between architects and interior designers hotter than in New York. New York architects are aggressively fighting the licensing bill, although the legislation has been changed to allow architects to call themselves interior designers and perform interior design services. Six interior design organizations have joined forces to lobby for state licensing laws.

During a recent roundtable debate on licensing, Randolph R. Croxton, AIA, president of the New York Chapter/AIA, said that "licensing is not a means to confer status, deserved or undeserved, on anyone. Licensing is not granted based on whether you are a billion dollar industry or larger. Licensing is created to protect the public and it is granted to those who qualify." Croxton also disagreed with claims by supporters of licensing that a law would make interior designers focus on education and raise the qualification standards. "First comes education and standing—then comes licensing," he said.

—Lynn Nesmith

NEA Sponsors Urban Design Institute for Mayors

Seven American mayors and seven design professionals talked urban design together in Charlottesville, Va., April 20-22. The occasion was a meeting of a new organization, the Mayors Institute on City Design, sponsored by the National Endowment for the Arts.

Each mayor came prepared with a design problem from his or her city for the group to discuss. Working sessions were interspersed among lectures by some of the designers and guided tours through the spring-lit rooms and gardens of Thomas Jefferson's Monticello and his University of Virginia.

The session was the second for the Mayors Institute; another eight mayors attended an earlier meeting in November. The new institute is largely the creation of four persons—Joseph P. Riley Jr., mayor of Charleston, S.C., and current chairman of the U.S. Conference of Mayors; Jaquelin Taylor Robertson, FAIA, dean of the school of architecture at the University of Virginia; Adele Chatfield-Taylor, director of the Design Arts Program of the National Endowment for the Arts; and Joan Abrahamson, president of the Jefferson Institute in La Jolla, Calif.

The institute, which hopes to hold two meetings a year in Charlottesville, was formed on the premise that mayors are, in practice, the chief urban designers of their cities. Its goal is to improve the awareness of both mayors and designers. The institute's sponsors hope that eventually a loose national network of mayors, former mayors, and designers will grow from its sessions.

At the April session, the mayors brought up a variety of design issues—for example, the problem of how and whether to strengthen the links between two downtowns and their working waterfronts (one fishing, one shipping), how best to pedestrianize the streets of a historic downtown district, how to choose the best land use for a decayed Main Street, and how to make a park in a flood plain.

The mayors were John K. Bullard of New Bedford, Mass.; Janice R. Coggeshall of Galveston, Tex.; Baltasar Corrada del Rio of San Juan, P.R.; Robert O. Cox of Fort Lauderdale, Fla.; Joseph S. Daddona of Allentown, Pa.; Don Erickson of Cheyenne, Wyo.; and Barbara Boggs Sigmund of Princeton, N.J. Mayor Riley also participated.

Designers present at the April meeting were Allan B. Jacobs, professor of planning at Berkeley and former director of planning at San Francisco; Phyllis Lambert, director of the Centre Canadien d'Architecture in Montreal; Laurie D. Olin, Philadelphia landscape architect; William L. Porter, MIT professor of architecture and planning; James Dennis Rash, president of the community development arm of North Carolina National Bank; Dean Robertson; and myself. At the November session, some of the same people were joined by planner Edward J. Logue, sociologist Nathan Glazer, author Mary Catherine Bateson, architect Leon Krier, and developer Joseph Breitenecher.

In his introduction to the April session, Dean Robertson said that tall office buildings suck life and value out of adjoining parcels and proposed that American cities should cut all floor-area ratios by 100 percent and establish an eight-story height limit. He decried "non-cities" such as Tyson's Corner, Va., saying: "It doesn't matter how good the architecture is when the built parcels are merely residual areas between road systems." He called such places "the product of a disordered mind" and asked for a return to such basics of urban design as the street, the boulevard, the square, and the "hidden garden."

Laurie Olin used illustrations of his own work and of others to define landscape architecture as the creation of a public realm. He spoke of "using buildings to shape space rather than usurp space" and of creating outdoor places able to "give people the stimulus of society and the tranquillity of themselves." Allan Jacobs said that the starting point for him as a planner is "the conservation ethic. We want to use what we have. There has to be a good reason before you tear anything down." He spoke in favor of master plans, arguing that zoning, for example, is meaningless unless it expresses goals defined by a general plan.

A third session is planned for next September. The institute will also host a seminar this month at the U.S. Conference of Mayors in Nashville.

—Robert Campbell, AIA

Reagan Foundation Withdraws Plan for Library at Stanford

In response to increasing opposition from students and faculty, the Ronald Reagan Presidential Foundation announced that it has abandoned plans to build on the Stanford University campus a library honoring the president and will search for a new California location.

The controversy over building a Reagan library and a public affairs center began shortly after the idea was first proposed in 1981. Three years ago, the trustees of the university agreed to the construction of the library but rejected the public affairs center after faculty members argued that the conservative think tank would erode the school's academic independence.

The unveiling of the mission-style design by Hugh A. Stubbins Jr., FAIA, (see April, page 26) to be located on a 20-acre site of rolling hills on the western edge of the campus brought complaints from local residents who use the site for jogging and

continued on page 32

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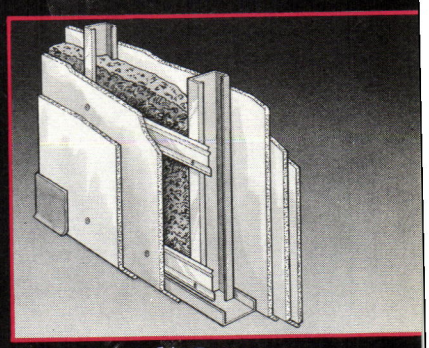

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Government *from page 30*

other recreational activities. However, the most emotional opposition focuses on the appropriateness of having a Reagan library on the campus, not the Stubbins design.

In making the announcement, the Reagan Foundation trustees said the decision not to build the facility at Stanford was based on a desire to have one complex with both the library and public affairs center, which could not be accommodated on the 20-acre site at Stanford.

In response to the announcement, Warren Christopher, president of Stanford's board of trustees, and Donald Kennedy, president of the university, wrote in a joint statement, "We were proceeding diligently and on schedule with our plans for the library and we are naturally disappointed with the decision."

Deaths

William Dudley Hunt Jr.: Architect, Editor, Publisher

William Dudley Hunt Jr., FAIA, former publisher of this magazine, prolific architecture writer, practitioner, teacher, and daffodil farmer died in late April at the age of 65.

A native of New Orleans, Hunt earned an architecture degree from Tulane University, where he was an instructor from 1953-58. He also held a degree in mathematics from Jacksonville State University, where he served as an assistant professor from 1948-53.

Hunt had practiced architecture in New York City, Pensacola, Fla., and New Orleans and was the author of numerous books and articles on architecture.

For five years a senior editor of *Architectural Record,* in 1963 he was named publisher of the AIA JOURNAL, as this magazine was then called, where he remained for nine years. Since 1972, he was architectural editor and consulting editor for John Wiley & Sons. He also owned and operated River's Edge Farm in Gloucester, Va.

Hunt received an honorable mention award from the Association of American Publishers for his book, *Encyclopedia of American Architecture,* published by McGraw-Hill in 1980. His latest book was a travel guide to American architecture, published in 1984.

Elisabeth Coit: Strived to Improve Low-Income Housing

Elisabeth Coit, FAIA, a pioneer in the field of low-income housing, gained national prominence in 1941 with the publication of "Notes on the Design and Construction of the Dwelling Unit for the Low-Income Family," which detailed the residents' use of the dwelling and argued that more attention should be focused on the user in planning urban public housing.

Coit was born in Winchester, Mass., and attended Radcliffe College before graduating from MIT in 1919. She then joined the office of Grosvenor Atterbury in New York City, where she worked until she went into private practice in 1929. In 1942 she was appointed to the Federal Public Housing Authority and later served as the principal project planner with the New York City Housing Authority. After her retirement in 1962, Coit continued to work as a writer, consultant, and speaker and served as the editor of the *Met-NAHRO Reporter* from 1968-84. She was appointed to the New York Landmarks Preservation Commission in 1970. She died in early April at the age of 94.

John M. Huddleston, AIA, a New Orleans architect, was killed in an automobile accident in April. He was 60. Huddleston received his architecture degree from Tulane University and was a graduate of the University of Paris Institute of D'Urbanisme. During his 37-year career, he was responsible for more than 600 buildings, including housing projects for the elderly and several buildings on the campus of Southern University in Shreveport, La.

Clarence F. Johnson, AIA, principal of the firm Charles E. Nolan Jr. & Associates of Albuquerque, N.M., and the former president of the Lubbock (Tex.) Chapter/AIA, died this spring after a lengthy illness.

Raymond H. Julian, AIA, architect, artist, and an authority on liturgical arts, died in February at his home in Salisbury in Wiltshire, England. He had offices in New York City and Charlottesville, Va., and served as a member of the Church Architecture Guild and the Liturgical Arts Society.

Robert B. Liles, AIA, of San Rafael, Calif., designed many early California shopping centers and malls. He was a graduate of the University of California, Berkeley. Active on various AIA committees, he served as president of the East Bay Chapter in 1967. He died April 1 at the age of 78.

Lester J. Millman, AIA, was a Providence, R.I., architect and a candidate for mayor in 1970. He held degrees from Brown University and the Rhode Island School of Design and taught architecture at RISD. Millman was past chairman of the New England Regional Council/AIA and served as a member of the AIA committee on education. He died in early April at the age of 65.

Donald A. Winkelmann, FAIA, a principal in the Seattle firm of NBBJ died in late February. Winkelmann will be inducted posthumously into the AIA college of fellows at the national convention this month in Orlando, Fla.

News continued on page 36

ARCHITECTURE

On the following pages are the winners of our interior design awards program. We congratulate them and thank all of the nearly 200 individuals and firms that entered the program. Many of their entries will be seen in our Interiors section in months to come.

Special thanks to the two practitioners who joined three of us (executive editor Andrea Oppenheimer Dean, senior editor Sharon Lee Ryder, and myself) on the jury. They were Paul Haigh, whose Manhattan architectural practice emphasizes interiors and furniture design, and Pat Conway, president of Kohn Pedersen Fox Conway.

Now a call for submissions of a less specialized sort. In October we will feature buildings of modest size, demeanor, and cost. There are no numerical guidelines. We are simply looking for buildings of quality that attempt no grand gestures and that were built on less than luxury-level budgets. They can be of any type but must be completed, not projected.

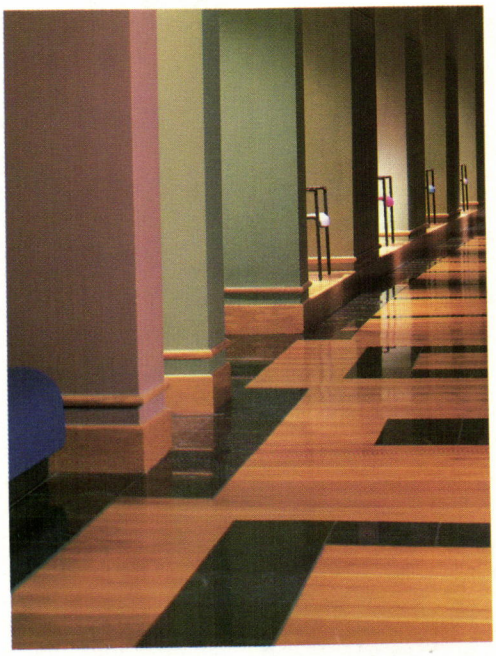
Nor is there any set form for submissions. But the usual photos, drawings, and descriptions should include information on program, budget, and construction cost. Deadline for receipt of material to be considered for the issue is Aug. 1.

—D.C.

Photographs © Paul Warchol

Dialogue Between Spaces and Content

Herman Miller showroom, Dallas, Taft Architects.
By Joel W. Barna



The Herman Miller Co. in Dallas made what looked like a couple of unconventional choices in 1986. The multinational company, which designs, makes, and sells more than $500 million worth of furniture systems annually, moved its Dallas showroom and offices into a 10,000-square-foot area occupying two-thirds of a floor in The Crescent, a posh, mansard-roofed, mixed-use extravaganza just north of downtown, designed by John Burgee Architects with Philip Johnson. Then Herman Miller chose Houston-based Taft Architects to design the interior of the showroom.

Moving to The Crescent struck some as odd because it meant leaving behind the '60s-era Dallas World Trade Center, the furniture-marketing hub of the region. But, says architect Bede VanDyke, project designer in the Herman Miller facilities-management division, The Crescent was a natural choice, offering not only higher visibility but a "hosting capability"—the hotel, restaurant, and meeting facilities within the complex—"that extended our capacity to sell furniture."

Some also questioned choosing Taft Architects. "When you're opening a showroom, people suggest hiring firms that are likely to specify a lot of your furniture," says VanDyke. Although encouraging architects and clients to use their products is the purpose of the showroom, he adds, "We ignored that completely in this case. Taft Architects is not likely to be specifying a lot of Herman Miller furniture, but they were the best architects for the job."

What of the contrast between Herman Miller's sleek modern furniture systems and the gritty, somewhat postmodern work of Taft Architects? No problem, says VanDyke: "Taft had an immediate rapport with us. It was like an orchestra that was in tune at the first meeting. And their commitment to design was very important to us. Their work shows a remarkable consistency, a style. Herman Miller has a different style but the same type of consistency."

For their part, Taft Architects (partners John Casbarian, AIA, Robert Timme, AIA, and Danny Samuels, AIA) call Herman Miller "incredible clients" and credit designers within the company with allowing "the quickest project we ever had through the office and one of the most satisfying."

The Herman Miller showroom has a simplicity that suggests an easy meshing between client and architect, giving little indication of the problems presented by the space and the complexities of the program. The program called for the architects to create two linear display areas for Herman Miller systems, offices for "regional" and "zone" marketing personnel, a kitchen and other services, an audiovisual center, and an adjacent small display area situated under a large semi-ocular window.

The problem lay in harmonizing The Crescent's idiosyncratic curved walls and tall ceilings with the furniture systems to be displayed (and used in the administrative and sales offices), which are based on rectilinear modules.

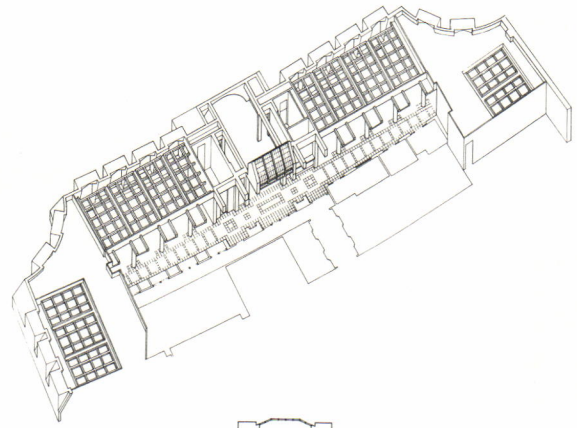
Their "intervention," the Taft partners say, was to create an interplay between the old and the new—a dialogue between the curvaceous building shell and the square and true furniture systems.

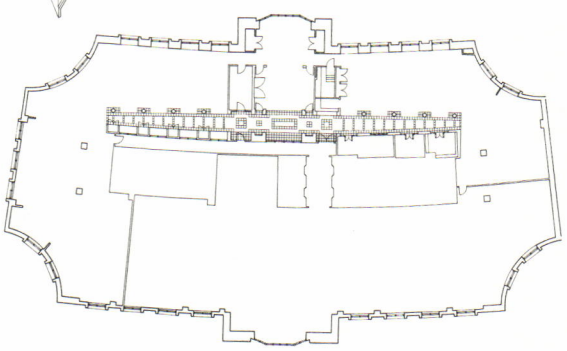
The first step was creating a grid of columns to separate the display areas from the circulation corridors. Says one Taft partner, "You can read [the dialogue] down the gallery that runs transverse to the entrances. The curve of the building is read against the orthogonal columnar system."

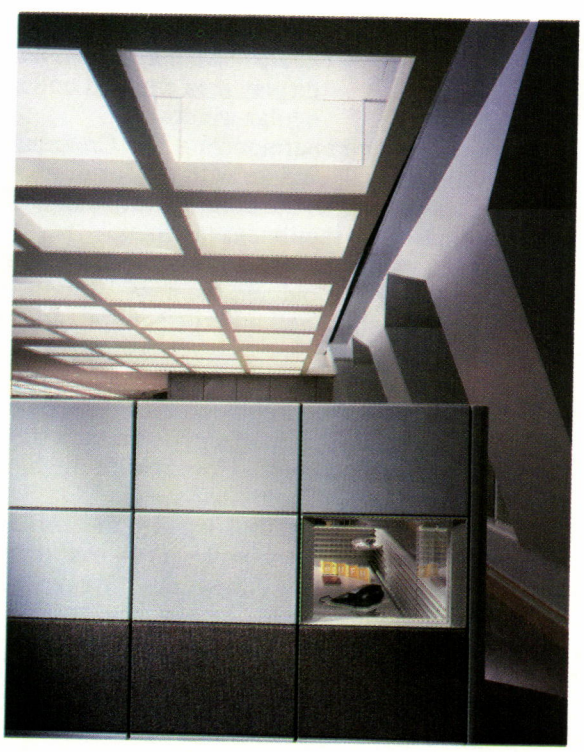
The bowed exterior walls slope into the display areas but in an irregular rhythm, so the architects boxed them in and simultaneously beefed up their dimensions. "We modularized the columns is what it amounts to," one partner says. Colors, derived from the Herman Miller palette, emphasize the distinctions between added framework and building shell. A drywall light grid is suspended from the 12-foot ceilings in the display areas, bringing the module from the displayed furniture into the architectonics of the room and softening its light and acoustical qualities. The Herman Miller "E-Wall" system, which works with a 10-foot-high ceiling, meets the light grid.

From this basic template, smaller grids are set up throughout the project. Above deep window seats, cloth window shades set

Mr. Barna is editor of Texas Architect *magazine.*







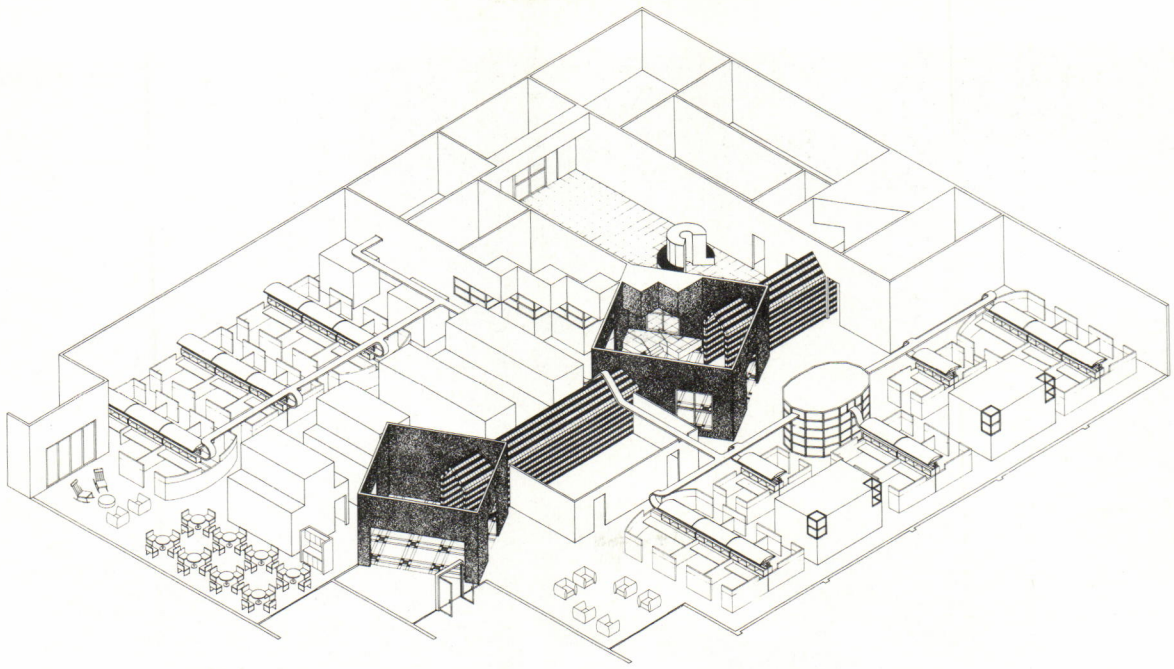
Plan and axonometric show position of showroom on inner half of the crescent-shaped building. Left, modular ceiling system drops two feet below the building standard. Photos above and right are matched views across the circulation spine.

in gridded red-oak frames close over the windows and echo the pattern of the frosted glass doors that separate offices from corridors. Rectangles of wood are set precisely into green marble flooring. The curves of the building are never suppressed, just played upon.

Next to the reception desk in the entry hall, a glassed-in ceiling soars to 24 feet, artificially lit to mimic daylight. This is the entry to a strong cross axis that runs through the audiovisual room (the center of the showroom) and terminates with equal drama in the smallest of the three display areas, under the large, arched window that the architects call "the bomber window." Here, marketing personnel hold training sessions and give focused presentations to groups of prospective buyers. Space in the entry hall serves other functions: lighted alcoves show off special chairs and fabrics, while glazed partitions from the hallway admit light from the display areas into the building corridor outside the showroom, enlivening what would have been a dreary walk to the elevator lobby.

Jurors praised the concept ("It does a lot to make sense of a very strange building"), the detailing, and the architects and client for pulling the furniture systems "off the pedestals [so] you can interact with them."

At the Dallas Herman Miller showroom, an unconventional approach has arrived at an unconventionally appropriate focus—the furniture. □



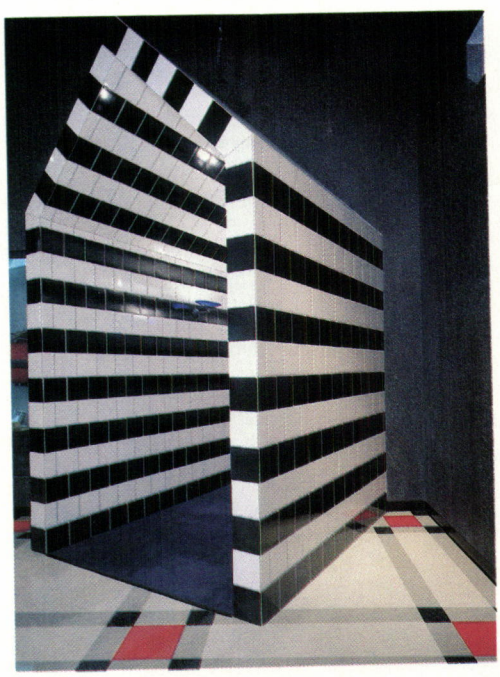
Processional to a Computer Sanctum

Advanced Computer Technology Center, Cupertino, Calif., STUDIOS. By John Pastier

Apple Computer began in co-founder Steve Wozniak's garage, and in some ways the company still has a casual attitude about its real estate. It leases speculatively developed space in various buildings in Campbell and Cupertino, Calif., a pair of adjoining Silicon Valley suburban boomtowns, and hasn't yet built a building of its own.

But on the other hand, it has made some very impressive tenant improvements. Its projects accounted for three of the seven winners in a recent AIA/San Francisco interior architecture awards program, covering the years 1980-86. And a fourth space, the Advanced Computer Technology Center, has hereby won one of ARCHITECTURE's interior design awards.

The ACTC is a 22,000-square-foot facility for new product development, and it also houses Apple's most potent piece of equipment, a Cray X-MP/48 supercomputer. This seven-ton, $14-million machine is the fastest commercial computer model in the world, and its speed is dependent on special freon-cooling of its conducting elements.



The Cray placed stringent demands on the San Francisco architectural firm of STUDIOS, and on Glumac Engineers. This machine requires special mechanical services and consumes as much power as 150 houses, and the computer room and its ancillary facilities had to be designed and built within six weeks of contract signing, well before the other spaces in the building could be retrofitted. Because of this phasing and because the the building required a one-hour fire-rated exit corridor, STUDIOS decided to create an independent subsystem that included the computer room, support spaces, and a central spine. Once built, these connected elements would be capable of autonomous operation while the rest of the building was being reworked. Additionally, the spine would become a sharply demarcated public space within a high-security building.

Since the Cray is such a unique and valuable piece of equipment (its cost was seven times that of the architectural and interior budget), it was given a corresponding place of prominence. It sits in purple custom-painted splendor behind a large window that fronts on a special viewing platform in a rotated square chamber in the middle of the central corridor.

For all its capability, it is a compact machine, and there may be some irony in the royal treatment that it receives. Apple technicians have dubbed it "TMA1," after the monolith found on the moon in Stanley Kubrick's film "2001: A Space Odyssey." And STUDIOS may have dramatized the viewing of the machine because its actual surroundings are rather prosaic. The Cray occupies a small portion of a large room that holds a changing array of less colorful and less impressive-looking support equipment. In this royal court of computerdom, the attendants and courtiers may be faithful and hard-working, but they are also dull and drab. Only the monarch shines.

The corridor that the viewing chamber bisects is gable roofed, clad in loud stripes of glazed black and white tile, and visually terminated by a bright red wall. The corridor has the sort of grab-your-retina impact that is common in shopping malls. Here, the theatrics seem excessive, since there is no competitor's machine on display around the corner, nor would there be any need for esthetic inducement to use the corridor during a fire. The corridor and viewing chamber connect with a skylit atrium/lobby set askew to the grid and finished in black Zolatone.

This attention-demanding centerpiece is not the ACTC's fundamental design accomplishment. Most of the building is devoted to human work spaces coexisting with less centralized

The gleaming corridor, central spine of Apple's ACTC interior, draws viewers into the sanctum of a supercomputer dubbed 'TMA1' for the moonscape monolith in '2001: A Space Odyssey.'

Photographs © Paul Warchol

circulation and machinery, and those spaces are executed with a greater degree of originality and restraint. There were more complicated architectural requirements and more time to design for them, and STUDIOS rose to the occasion.

They began by gutting the building. Removal of the hung ceiling revealed a plywood and heavy timber roof structure. Batt insulation was inserted between the wood members, and this exposed ceiling system was painted white, creating a casually upholstered appearance. Since the ductwork also had to be exposed, it was carefully laid out and painted an unobtrusive shade of blue-green.

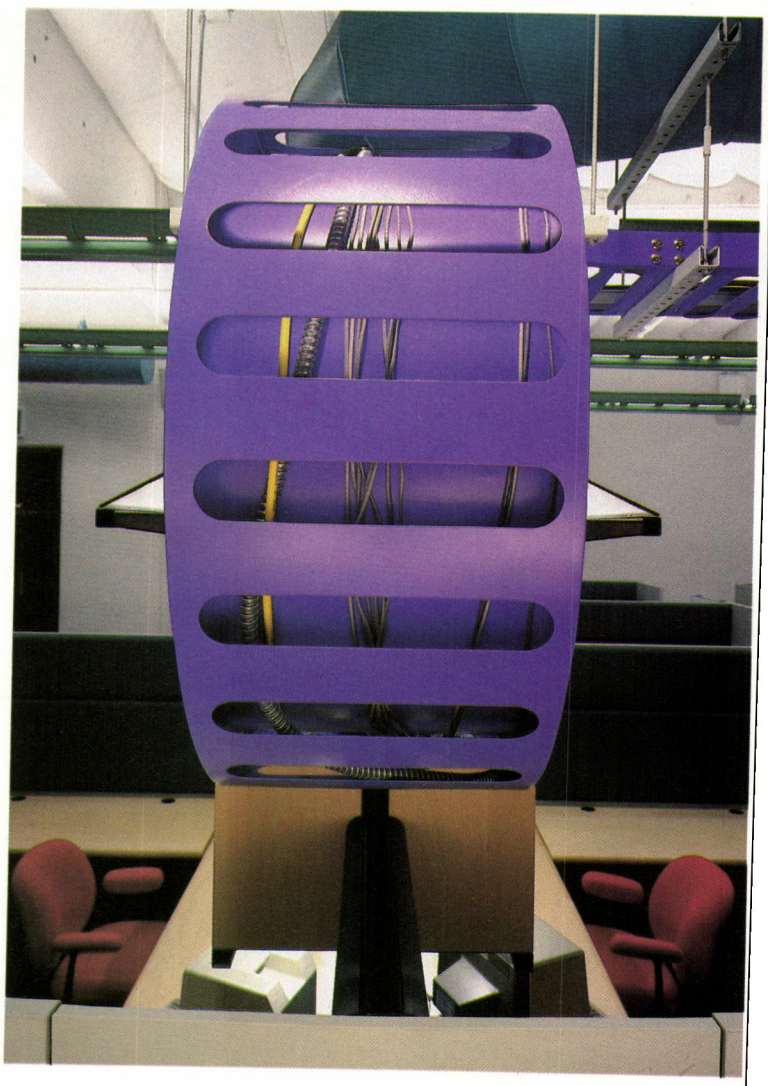
Left, the atrium, set askew to the grid of corridor and viewing chamber, leads through the door at center to the transparent, oval conference room. Below, as 'monarch' of Apple's kingdom, the Cray supercomputer rules in splendid isolation, flanked by the central corridor.

Four conference rooms—wryly named Tomorrowland, Adventureland, Fantasyland, and Frontierland by the occupants—were distributed within an open office layout that was divided in two by the central corridor. Three of the conference rooms are freestanding forms (the most striking one a transparent glass oval), while the fourth is grafted onto the main spine. Two private offices, restrooms, and laboratories are also treated as discrete forms within the office landscape. There is an open lounge in each half of the building, one of which is large enough to hold eight tables for meals, coffee breaks, and other informal gatherings. Finally, the engineers' workstations are arranged in two large, open clusters at opposite ends of the building.

The workstations are the heart of the design. Since each engineer works at one or more computers linked to the Cray, to peripheral equipment, or to each other, provision for a constantly changing array of interconnecting cables was a major program requirement. STUDIOS met this need by creating a two-inch wiring chase within the inner walls of the workstations, and an extensive but highly ordered overhead network of open metal cable trays that loops down at each bank of workstations to merge with the indirect lighting system.

Because their layout is almost tangibly kinetic, these pastel

Below, the exposed ceiling system, with blue-green ductwork and upholstered batt insulation, hovers over freestanding office forms. Below right, and facing page, workstations repose beneath an elaborate supporting network of purple cable troughs that loop and merge with inverted industrial lighting fixtures.



purple troughs are the most conspicuous elements in the work space. Indeed, on first sight, one almost expects to see something chugging along these tracks, since they look like a cross between the file distribution systems found in hospitals and a scaled-down version of an amusement park ride. Here, an organizationally dynamic process is metaphorically represented by a visually dynamic form, and a major activity of the building is given appropriately prominent but also good-humored display.

Otherwise, calm prevails in the work areas. Display-screen viewing requirements dictated indirect lighting, accomplished by bathing the white ceiling with light from inverted industrial fixtures, and by using a second system of linear fixtures and perforated metal reflectors mounted on the workstations themselves. These lights are painted pale green (Apple green, perhaps?) and the workstations are finished in gray and maple. The latter is a stock system made by the local firm of Limited Production Inc., and the various hardware for lighting and cable management is all off the shelf.

Apple considers this installation to be a "somewhat experimental prototype." Clearly, it is one worth repeating, for it seems to be a highly satisfying place to work as well as a jazzy place to visit. □

New Center for a Historic Quadrangle

McClelland Student Center, U. of Pennsylvania, Davis, Brody & Assoc. By Michael J. Crosbie

The University of Pennsylvania's quadrangle dormitories were planned in 1886 by Cope & Stewardson, one of the premier campus architects of the 19th century. Built incrementally over 75 years, the quad now houses 1,600 undergraduates. For the past dozen years, Davis, Brody & Associates of New York City has been restoring the quad, its latest accomplishment being the renovation of McClelland Student Center, well named because it is literally at the center of the guarded compound.

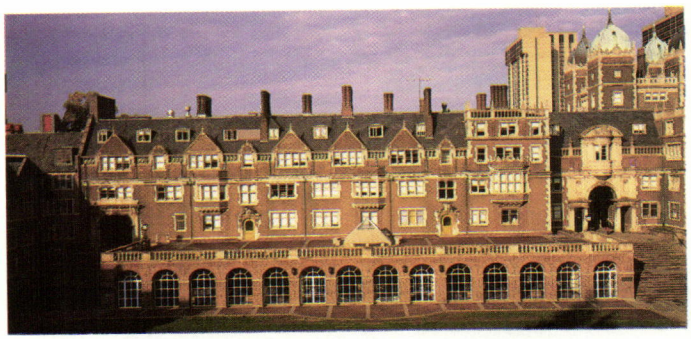
What the architects had to start with was a one-story, terrace-topped basement space of 12,600 square feet that faced east, shadowed by an arcade that led nowhere. It contained a hodgepodge of dark spaces filled with study carrels and occasionally used for parties, and a sliver of sub-basement space with no natural light. The students referred to the general ambience as having all the warmth of a "beat-up old bus station."

The renovated center, symmetrical in plan, is composed of several flexible spaces that can be used separately for small groups or in tandem for gatherings of up to 400 people. The spaces are distributed according to the need for natural light. The sub-basement, formerly accessible only from its north and south ends, now receives natural light from an open, spiral staircase at the center's entrance. Lounge spaces occupy the newly glazed arcade; multipurpose rooms adjoin the lounges and can be fully opened with sliding wood and glass doors to share space with a central, skylit exhibition area. Cozy coffeehouse spaces, accessible through new and wider portals, occupy nooks and old fireplace niches farthest back. The northwest and southwest corners are devoted to offices, kitchens, restrooms, and storage. Also part of the project is a refurbished terrace, completely resurfaced with brick and bluestone (materials found throughout the campus) and furnished with concrete benches. An enigmatic pyramid serves as a skylight for the center's exhibition space.

The choice of materials reinforces the design intent of infusing the interior with light. The walls are panelled in book-matched ash with oak trim—hard woods for the punishment they'll receive. The wood floors are oak with dark-stained oak trim, while the exhibition and coffeehouse spaces are paved with slate, chosen for its durability and polished to reflect light. The sliding doors have the presence of Japanese screens, with frosted glass to admit light without sacrificing privacy.

The new student center has turned out to be a much sought-after place. Students use it for study and informal gatherings, and the university has booked it for alumni dinners and trustee meetings.

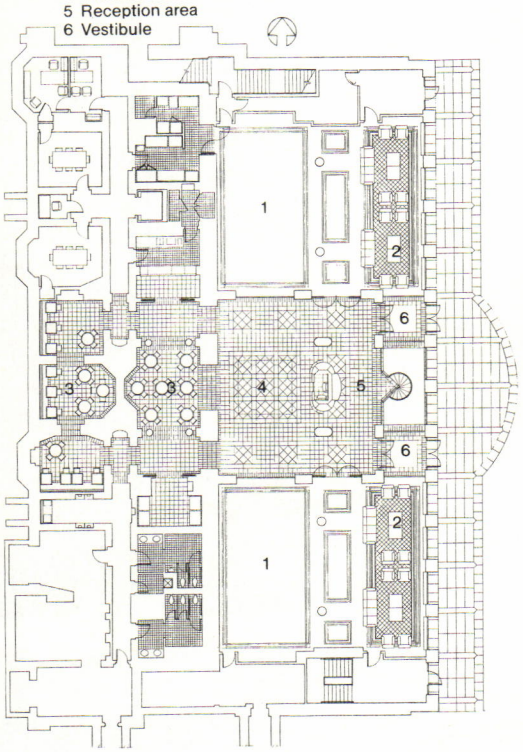
Above, student center as it extends along arcade adjacent to the quadrangle, claiming former exterior space. Right top, infilled arcade and refurbished plaza; middle, skylit exhibit space; bottom, reception and poolroom stair.



Adam Bartos

© Nick Wheeler/Nick Wheeler Photography

1 Multipurpose room
2 Lounge
3 Coffeehouse
4 Exhibition area
5 Reception area
6 Vestibule



© Nick Wheeler/Nick Wheeler Photography

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Right, one of two multi-purpose rooms in student center that can be opened via sliding doors and used in conjunction with exhibit space; below, central seating area in coffeehouse with vending room beyond. Columns are nonstructural. □

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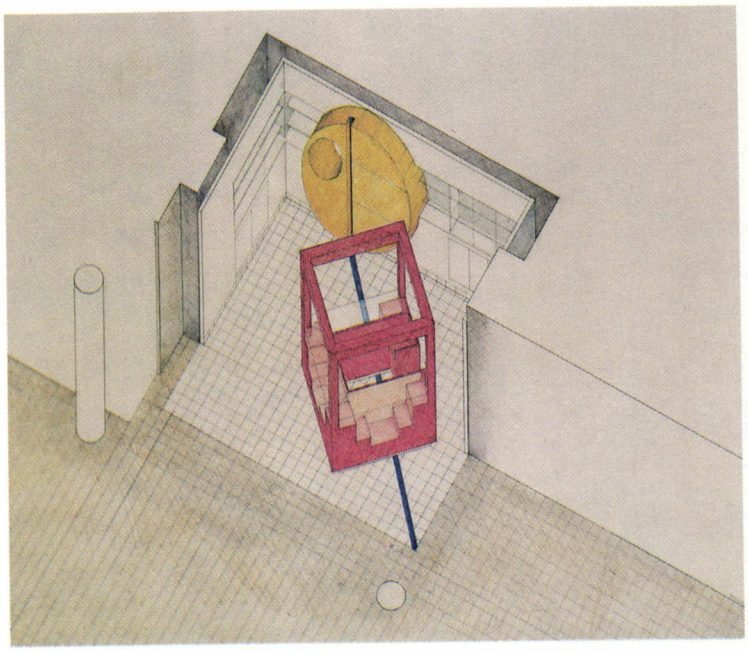
Cube and Circle Inside a Cube

Shop for Total Eclipse, New York City, David & Dikaios. By Sharon Lee Ryder



"It's too simple. It doesn't fit in," said the Rouse people about the bold and strongly colored design for Total Eclipse. Their criticism neatly sums up the dilemma Theo David, AIA, of David & Dikaios Associates, faced in solving his client's problem. For this commercial enterprise, the owner wanted something that would stand out and call attention to itself in the mélange of retailers that make up South Street Seaport. However, the Rouse Co., which owns the marketplace, has its own tried and tested notions about what makes good retail design. The company also has strict design review procedures.

David's design strategy avoided the kitsch and cute usually associated with retailing, opting instead for three strong geometric forms. A white cube defines the extent of the retail space, with a glazed tile floor incising a demarcation from the pedestrian circulation spaces. David plays off the white cube with primary colors: a red cube and yellow circle. The red cube, freestanding and skewed from the grid, is the main display and selling space for the sunglasses, while the yellow circle provides limited storage space and hides the electrical boxes. A blue strip of glazed tile running across the floor and continuing in paint up the wall ties the cube and circle together and emphasizes the diagonal view most people see first as they approach the shop. Although David likens the basic parti to his affinity for constructivist architecture, the image that more immediately comes to mind is one derived from the product—the sun.

Both of the design elements, as well as the three white walls containing display shelving and additional storage, are constructed of wood and painted; the whole 350-square-foot project was finished for a mere $32,000. David also did the signage.

The design failed the Rouse review twice, but perseverance paid off. With the third review the design passed, the only change a minor one in the brightness of the red. The real success of the design was underscored when an Israeli manufacturer of sunglasses approached the owner of Total Eclipse about franchising the design for a series of stores across the U.S. □

Making a Splash with the Client's Product

Negley Paint Co., San Antonio, Chumney/Urrutia. By Larry Paul Fuller

Long known as a family-owned-and-operated inner-city concern, Negley Paint Co. of San Antonio recently joined a growing number of enterprises settling along Interstate 35 within what has come to be referred to in development circles as the Austin/San Antonio corridor. In addition to the acquisition of new facilities and more space, the move was meant to effect a shift in image consistent with the company's determined pursuit of the statewide architecture/interiors market and an expanded emphasis on research and new-product development. Negley's strategy was analogous to the tactical move of the contract furnishings industry that has led to the now widespread phenomenon of showroom as design statement to create product cachet. If it could work for furniture and fabric, why not for paint?

The new facility was conceived as a mostly no-nonsense, two-story tilt-wall box of some 50,000 square feet devoted largely to the manufacturing and warehousing of paint. Negley's higher-profile corporate headquarters—the showplace—would be carved out of the box around the main entry as a 14,000-square-foot, two-level space devoted to sales, administration, and research. The San Antonio architecture/interiors firm Chumney/Urrutia, now two separate firms, received the interior design commission, which was limited to the corporate headquarters portion of the facility.

From the Interstate, the indirect approach by farm-to-market road first reveals the long rear facade of the rectangular building, situated roughly parallel to the freeway. Here, on a virtually blank facade, an attempt at cost-effective mitigation of architectural blandness yields painted-on, '60s-era supergraphics employing a paint-and-roller motif. Well-intentioned and thematically appropriate, this gesture nevertheless serves as an unfortunate first impression that belies the levels of sophistication demonstrated within.

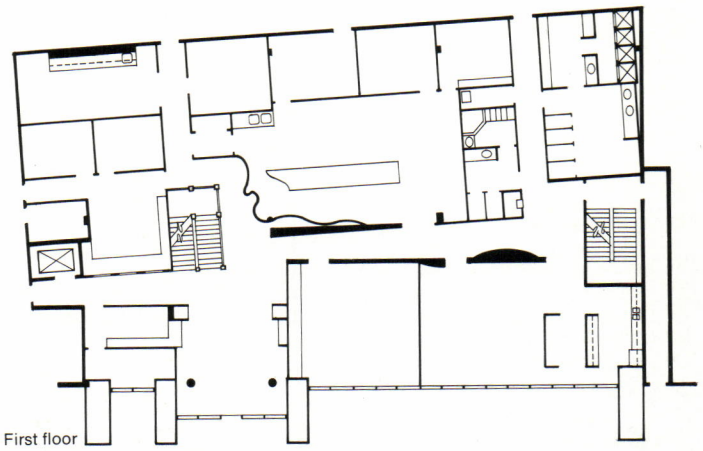
To approach the opposite side of the building—the front—is to discover the "architecture" side. Here an attempt has been made to enliven the box through a benign preoccupation with grids, punched openings, and shifts in scale that culminate with and celebrate the main entrance. This exterior context was a "given" that Chumney/Urrutia used as a point of departure for the interiors.

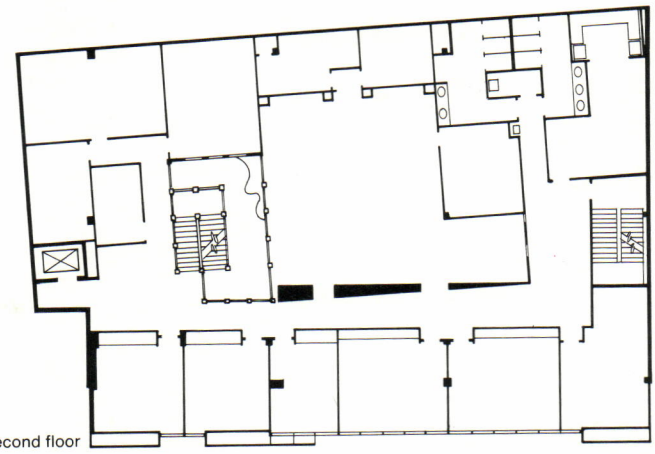
From the perspective of interior designer Judith H. Urrutia, the Negley commission was one of those cases in which it was clear from the outset that attempts to push design beyond the safe, workaday realm of corporate good taste would encounter no resistance from the client. Indeed, her demonstrated ability to produce lively, intensely colorful interiors (Ferguson's Map and Travel Store, Jan. '85, page 50) is what landed her the job in the first place. Ironically, the obvious solution (paint is the theme) seemed almost simplistic. And in less skillful hands, it could have been.

The real success of the design lies not so much in joyous excess as in proper restraint, not so much in the picking of colors—though that was a task well done and well savored—as in the spatial configuration. The basic plan derives largely from

Mr. Fuller is a principal in the Austin-based communications and graphics design firm Fuller Dyal & Stamper Inc.

Opposite and above, first-floor circulation is oriented around stairs. Below, tiles emphasize skewed grid in hall outside lounge.





a frank admission that only part of the space would be for show; the other would be for work, and different kinds of work, at that—work related to producing paint, to selling it, and to administering both processes. Accordingly, the plan creates two physically distinct areas that are also distinct in terms of function, color, and mood.

The front portion of the headquarters space, on both the first and second floors, is devoted to administration and sales. Here the environment is quintessentially corporate, reflected in the use of subdued, grayed color on painted surfaces and utterly tasteful contract furnishings bearing such labels as Knoll and Sunar Hauserman. The rear portion of the headquarters area—devoted to research and development, shipping, and interaction with buyers and specifiers—is more directly related to paint itself and adjoins the manufacturing area still farther to the rear. It is within this product-oriented realm, and the circulation area setting it apart, that paint becomes the overt theme and color becomes the point. Intensely vivid and delicious, these stunning hues range from hot to warm to cool to cold. And of course, all the paint is by Negley, though some of the colors are nonstandard shades mixed to Urrutia's specifications.

Beyond the single-story entry, the second floor has been cut away to accommodate a red-and-black metal stair and to create a double-height volume ringed on three sides by the continuation of the stair railing. Boxed columns accentuate the railing and afford the opportunity for a visual pun—short pieces of half-round molding laid side-by-side and painted black to resemble brush tips. Typically Urrutian, if not entirely original, this is the kind of take-it-or-leave-it gesture one might miss, even after repeated visits to the space. The idea is to provide a depth of visual information that reveals itself over time as part of a rich spatial experience.

Separating the rear product-oriented area from the front administrative area is a corridor marked by an undulating corrugated metal wall painted bright orange. The wall "gushes" downward across the rear of the double-height volume to line and eventually cross the single-story corridor, enlivening primary circulation with a walk-through experience. Use of the material itself borders on cliché, but the form is a powerful presence.

The glistening, free-flowing wall reinforces the notion of liquid versus solid (wet versus dry), one of the conceptual dualities that influenced the overall scheme and makes abundantly clear the demarcation between front and rear, between the corporate entity and its product. Set against the meandering orange surface is a thick, freestanding wall painted a complementary blue. Punched and stepped, this form alludes to the front of the building in the spirit of a caricature.

On the ceiling of the second level, the path of the ground-floor orange wall is echoed by a single neon thread that borders the curving, dropped ceiling above the accounting department. Here the tidy distinction between corporate area and product area breaks down, leaving the accountants in what might be re-

Left, muted tones of the entry set off by black metal balusters and handrails. Right, paint chips and gallon cans on display in the entry. Above, undulating corrugated metal divides first floor.

Above left, front edge of balustrade on second floor aligns with one grid, while waist-high partition that defines accounting area follows second grid. Neon is restricted to circulation spaces. Above, first-floor workbench top picks up floor squares at diminished scale. Right, square skylights and a thread of neon.

garded as inappropriately colorful territory. Urrutia points out, however, that the workstations themselves are corporate in tone and that the neon and color merely enliven circulation areas.

Originally trained as a painter, Urrutia acknowledges in her work the influence of artist Ellsworth Kelly and the hard-edge school of painting with which he is generally associated. Particularly in the Negley project—with its saturated hues, abrupt juxtapositions, and expansive fields of color—the parallels are obvious. Also reminiscent of Kelly is Urrutia's use of delicately constructed imbalances to create an almost subliminal tension within the overall scheme. At Negley, this tension derives in part from the skewing of the rear product-area plan several degrees from the orthogonal grid defining the front administrative area. This front grid is clearly delineated in the form of eight-inch rubber tiles that conform with the main building geometry such that the slight angular shifting of the partitions is perceivable. Similarly, the low, freestanding partitions defining the second-level accounting area not only are skewed but become successively narrower and higher with each segment. And doorways are recessed successively deeper as one moves down the row of executive offices on the same floor. The net effect is a mild disorientation that is more intriguing than annoying.

Although paint is more colorful in its designated realm, it remains discernible as a motif throughout. Surfaces either are painted or refer to the nature of paint through the use of pattern and color. Spatter-like flecks appear on rubber floor tiles, upholstery fabric, and the fabric of furniture panels. On the floor tiles, apparently random variations in color actually respond to the placement of real or artificial skylights overhead. Design measures such as these contribute to an overall sense of cohesiveness, what Urrutia refers to as "the feeling that everything has been thought about and attended to."

In part, it is this feeling of cohesiveness, coupled with the restraint exhibited in the corporate interiors, that keeps the go-wild-with-color approach from being too easy, too shallow. Another redeeming quality is Urrutia's use of interior form as a means of transcending surface application or decoration. A punched wall, a freestanding partition, a deep recess—these become opportunities for reveling in the capacity of paint to assume a third dimension.

Every project has its disappointments. At Negley, one could argue that the once-trendy Memphis chairs in the lobby seem gratuitous and underscaled, if not a little silly. And the meandering rubber-tile pattern on the ground floor loses a lot in the translation to multicolored carpet squares on level two (inevitably evoking memories of taped-together rugs in college apartments). But in the context of a dramatic overall success, this is mere niggling. Aside from its conceptual strength and functional suitability, the space is perhaps most successful in its capacity to engage and confront. "The last thing I'd want," Urrutia says, "is for someone to walk in here, look around, and say, 'This is nice,' then go on about their business." □

Randy Holmes

© Langdon Clay

Reinvigorating a Regional Architecture

Rose house, East Hampton, N.Y., Eisenman Robertson Architects.
By Andrea Oppenheimer Dean

The house for the Rose family is an attempt by Jaquelin Robertson, FAIA, to "reinvigorate a real and clear regional architecture" rooted in the simple saltbox but eroded and amended by a wraparound porch, gables, dormers, fretwork, and lattice—all of simple stock timber trim painted white. "The shingle style and modified vernacular here were never grand stuff," Robertson explains.

Situated in the grandest neighborhood of East Hampton, Long Island, on a two-and-a-half-acre site, the house has an asymmetrical, low-eaved, cottagelike, north-facing front. Clad in shingle and topped by a gambrel roof, it overlooks the main street, with mostly small-paned dormers sheltering its service spaces. The more formal, south elevation faces a broad, manicured lawn punctuated by ancient trees. It is symmetrical and dominated by a wraparound, colonnaded porch intended as the symbolic and functional heart of the house onto which all major rooms open from a series of bays. So far, the house is traditional.

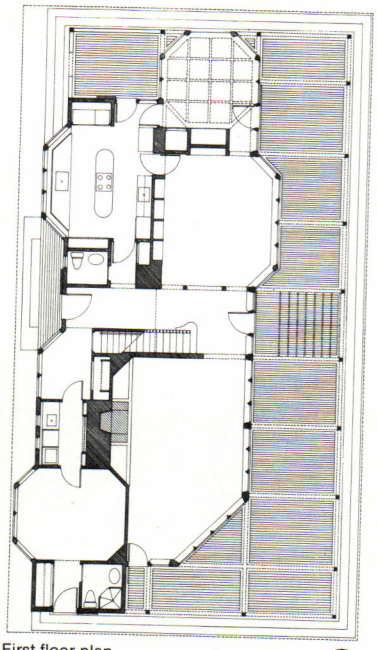
Its mostly open ground-floor plan, however, is modern, its enfilade of spaces separated by large openings with lattice transoms. Fronting the long porch are a living room dominated by a fireplace set in soapstone, a "dining hall" with inset bookcases for scale, and a smaller, octagonal dining room whose coffered ceiling resembles a bookcase hoisted aloft and set face down. To all these spaces the porch brings diffused, patterned, natural light.

The upstairs with its several bedrooms is centered on the "stair hall," as Robertson calls the space at the top of the stair. Its various openings, including two moongate windows, frame views north and south and throw light into the entry hallway and the upstairs corridor.

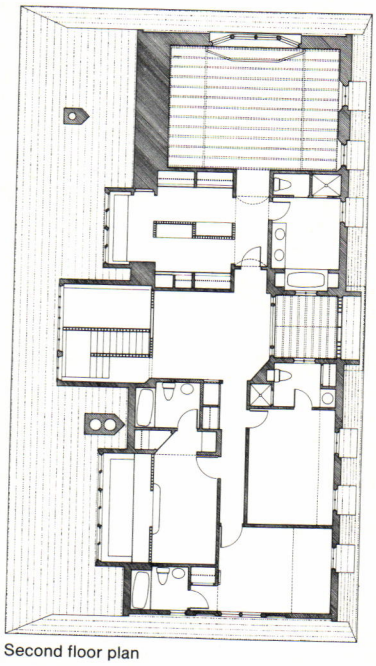
The interior decoration consists mostly of beadboard, wainscoting, simple paneling, moldings, latticework, bannisters, and fretwork, all in white and overscaled for effect. The lattice, for instance, is eight inches deep throughout, and a 12-inch base girdles the house "like a strap that ties everything together," says Robertson. The furniture is a combination of wicker and Shaker—spare but homey.

A fresh, unpretentious intepretation of the vernacular of eastern Long Island, the Rose house prompted one of the jurors to say, "It has a realness about it. You look at it and feel like supper's on the stove."

Above, two views of south elevation with colonnaded porch. Right, from 'dining hall' through permeable, wide openings to corridor and living room with glassy walls.

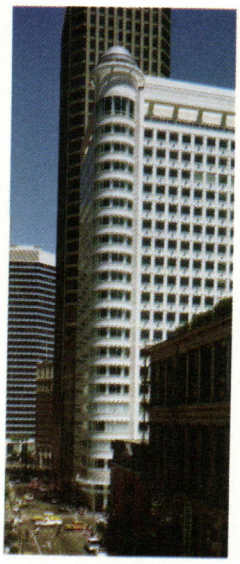


First floor plan



Second floor plan

Top, master bedroom with prominent, heavily framed and mullioned window under gambrel roof. Middle, second-story, south-facing moongate window and, at right angles, openings that bring light into corridor and 'stair hall.' Also opening into 'stair hall,' right, is north-facing, round window, which overlooks stairwell and first-floor corridor, opposite page. □



Greg Murphy

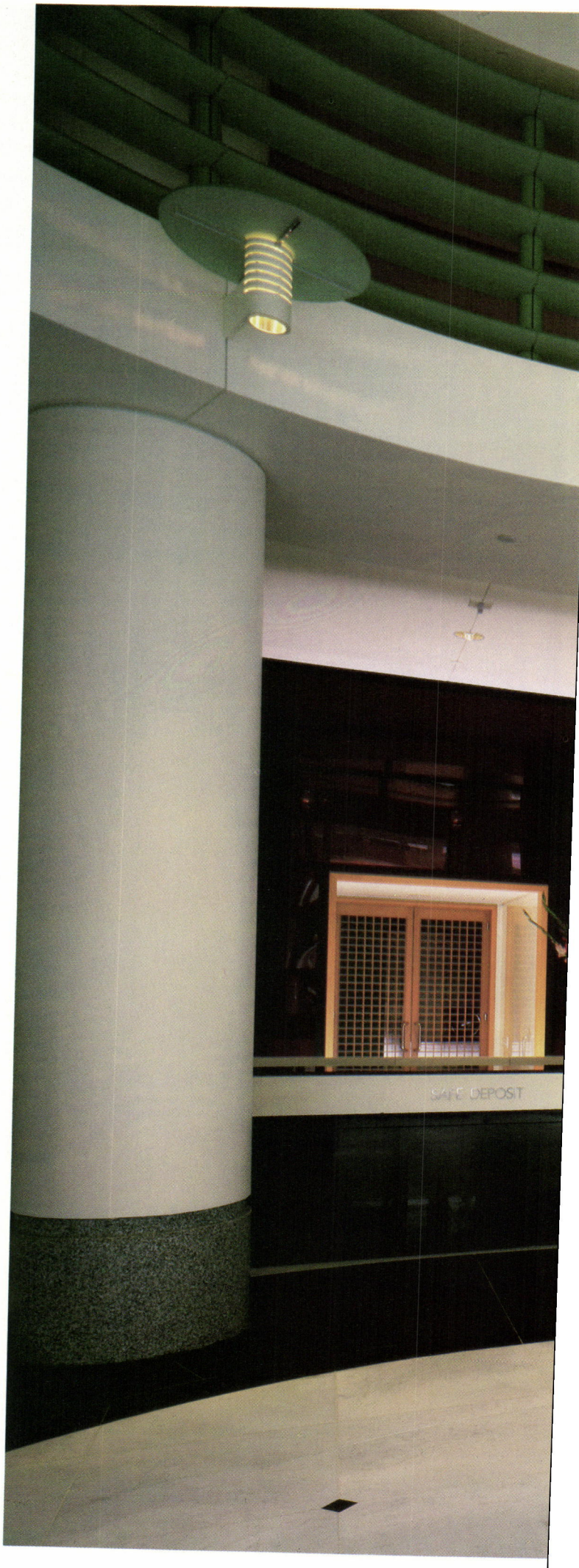
Streamlining an 'International Style Chassis'

88 Kearny St. office building, San Francisco, Skidmore, Owings & Merrill.
By Allen Freeman

Eighty-eight Kearny Street in downtown San Francisco is a gleaming white, 22-story office tower (see Dec. '86, page 50) that successfully weds ground-floor interiors to a memorable streetscape identity. The building, by the local office of Skidmore, Owings & Merrill, suggests but doesn't imitate 1930s streamlining, and the interior design follows through in a slightly lower key.

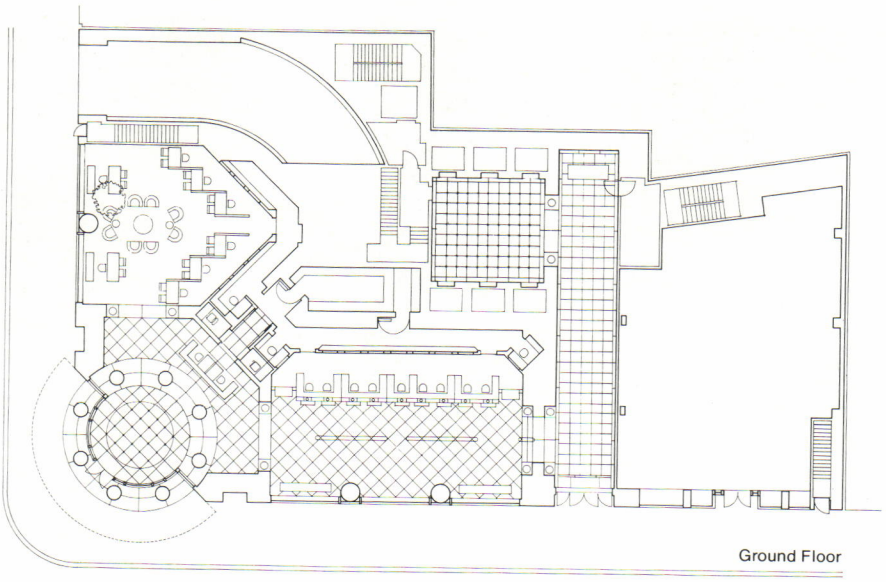
An "International Style chassis with traditional appointments" is how Richard Irving, senior designer for interiors, aptly describes the lobbies and banking rooms. But the little round lobby in the skyscraper's corner turret seems the reverse—a classical rotunda with a sleek finish. Eight columns define the space, and they rise to a shallow dome gilded with gold and silver dots that rain down in a geometric pattern and shimmer with reflections from cars and pedestrians. Here, as in the other rooms, Irving and his colleagues (including design partner Larry Doane, FAIA, and senior designer Allison Williams, AIA) placed strongly contrasting colors—a black and white floor, black desk front—low in the spaces and softer shades above. A glossy, black panel behind a desk opposite the entrance was designed by Debra Nichols of SOM to display interest rates and similar data in lighted digits. Originally cut from the design because of budget, the display, now to be built, will eliminate the clutter of easel boards and the like.

Immediately off the rotunda to the left is a carpeted, sit-down banking room where accounts are opened and loans arranged. It is pentagonal and prow-shaped, in part because the building's parking ramp just beyond infringed and suggested a cut-off corner. The chamfer is mirrored in another corner, and officers'



Above, the turreted skyscraper in downtown San Francisco. Right, the rotunda lobby in the base of the turret, with view into the larger of the two banking rooms. Four of the eight columns around the rotunda are nonstructural.

© Jane Lidz



Ground Floor

desks are staggered along the interior walls that form the prow.

Also connected to the rotunda is the main banking room, a rectangle with one long glazed side receiving strong afternoon sun. To soften the light, five horizontal blue-green translucent plexiglass louvers shield clerestories, sweeping around the perimeter columns like finned capitals. (Louvers do similar service in the other banking room and encircle the rotunda, where they bear a close design affinity with eight simple custom sconces.) A band of densely woven tan silk picks up the line of the clerestories on the three unfenestrated walls of the two banking rooms.

Like the silk, Australian lace wood provides warm accents. As portal frames, the wood is highlighted to bring out its silky long grain by up-lights ingeniously yet simply integrated into low wainscot extensions. As porous screens behind the teller stations, the wood contrasts with cool blue-green walls beyond.

The vocabulary of gray stone wainscoting, wood trim, etc., in the banking rooms treks around to the elevator core deep in the plan. Located off a long hall fronting Kearny Street, it is a cubical counter-volume to the rotunda's cylinder at the edge of the building. The core's square polyester resin wall panels patterned in matte and glossy finishes accentuate its cubical volume, a large lighting dome and simple round etched glass sconces above the elevators are reflected off the wall surfaces, and the stone wainscoting trim climbs up and over the elevator doors.

In the elevator lobby as all through the ground floor, the design reflects thoughtful consideration and mature taste. As one juror commented, these rooms show a level of refinement rarely achieved today. □

Above left, the smaller banking room with desks staggered along walls that form a point. Above, the larger room in view toward rotunda. Right, cubical elevator lobby with round accents.

Rich in Space, Simple in Surface

Anne Klein showroom, New York City, Wayne Berg, AIA. By Sharon Lee Ryder

With little experience in designing showrooms for high-fashion personalities, Wayne Berg, AIA, still wonders, long after the job's completion, how he came to be chosen. To hear him tell it, he almost wasn't. Called in for an interview by clothing designer Donna Karan, Berg and Richard Weinstein, then his partner, found themselves seated next to a three-foot-high pile of portfolios. On top was Charles Gwathmey's, which made for a totally intimidating circumstance for Berg, whose small practice was not nearly so well known.

Karan asked Berg and Weinstein what they would do with the space. Although not wanting to do any work on spec, they sat down in a nearby coffee shop and drew some sketches: a strong diagonal wall intersecting the space, dividing public from private functions, and a rotated square that would play off the 90-degree geometries of the building and the skewed angle of the wall. They made a model of the idea and sold it to Karan, who responded immediately to the simplicity of the concept. She gave Berg and Weinstein the job, but with the proviso that all the work had to be completed within three months, in time for the fall collections. Otherwise Karan's business (as well as the two architects) would be in trouble.

As the concept developed on paper and later during construction, the simplicity of the scheme began to take on an enormous richness. The rotated ceiling grid in the showroom pokes through the travertine wall above the translucent glass entrance door. The implied square is completed by the reception desk in the lobby, while the angle of the travertine tile floor reinforces this same grid. Inside the showroom area, with its strong diagonal and rotated ceiling grid, all orientation to the outside is lost, although the long wall on one side is actually the exterior wall of the building.

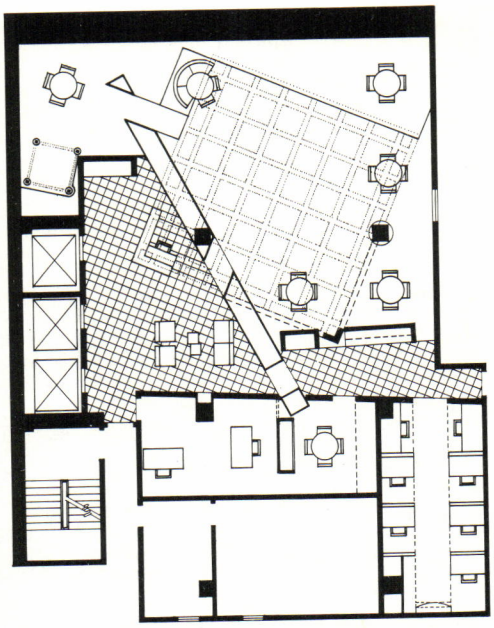
With a scheme so spatially rich, Berg maintained simplicity by limiting the color palette: everything in the showroom and lobby is in warm beige tones of approximately the same saturation. What varies are the materials and, consequently, the surface textures. Floors are carpeted; walls and ceiling are painted in a Zolatone-like finish; wooden bars from which clothing is displayed are bleached ash; the diagonal wall is of travertine; upholstery is suede; banquettes and other seating are made of painted wood. The effect is one of subtle variety. The uniform background shows off the clothing to good effect without competing with it and, when not in use, has enough visual interest to hold its own.

With only 3,500 square feet, the showroom accommodates not more than 20 buyers at a time, seated around small tables in five discrete areas. Clothing is brought out, hung on one of the four parallel wooden bars that surround the room, and mixed and matched for the buyers. The season's collection has already been presented elsewhere, so buyers come here for a closer inspection and individual attention before placing their orders. Karan wanted the showroom to be as much like home as possible, casual and relaxed, an intimate setting in which to see the clothes individually and without the distractions inherent in the lavish productions used to introduce each season's collections. She also wanted a place without structure so that the sales staff could function spontaneously, creating "looks" for the individual buyers from the separates in the collection. The only portion of the design with a predetermined use is an object known as the *tempietto* (little temple), a four-columned affair that displays accessories from the season's line.

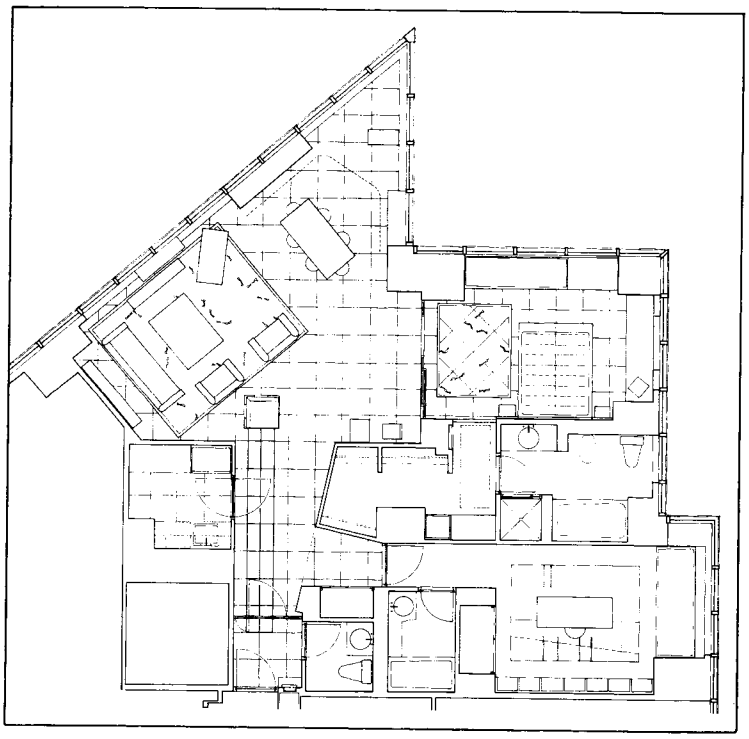
Berg's attitude toward the design of this and other showrooms he's done is that the room is basically a backdrop for the fashion. "When I go into a Sunar showroom, all I see is the architecture, not the furniture. A showroom should talk more about the attitude of the fashion designer and the collection," he says, "not about the person who designed it." □

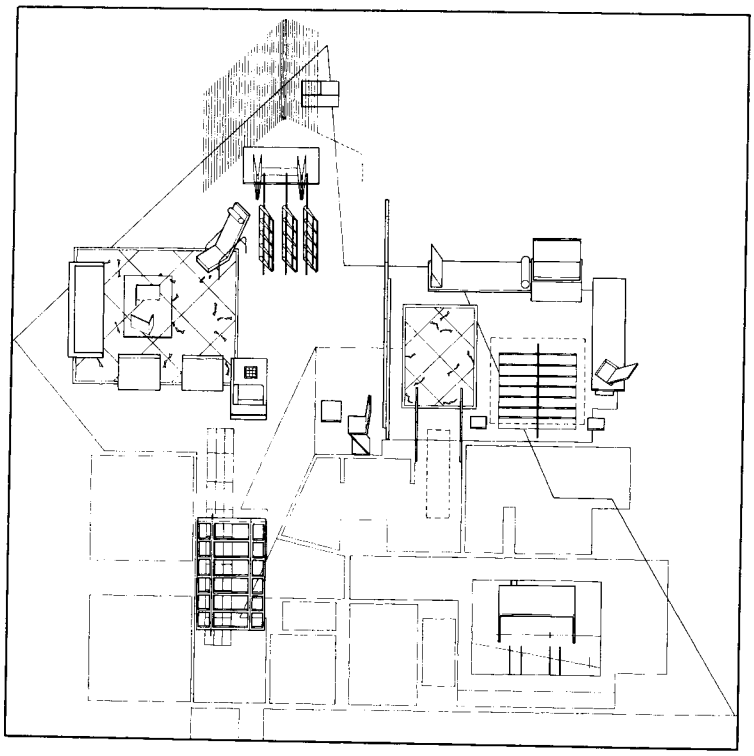
Wayne Berg, AIA

© Paul Warchol



Working with a limited color palette and strong, simple geometries, Berg created a rich visual texture that doesn't compete with the clothes for attention.





'Floating Island' Thirty-five Stories Above the Street

Model apartment, New York City, Tsien/Williams. By Sharon Lee Ryder

The process of design for this model apartment at Metropolitan Tower could best be described as one of subtraction. Unlike many model apartments, this one had no program, no profile of the typical purchaser. Such profiles often are so elaborately detailed that they contain fictitious names as well as preferences in colors and leisure-time activities.

"We were given great freedom to do what we wanted," says architect Billie Tsien, who, with Tod Williams, AIA, designed the apartment. "Then the marketing people came in and told us what to take out."

It was precisely this freedom as well as the dramatic "site" that attracted them to the project. Thirty-five stories above West 57th Street, with sweeping views of Central Park and midtown Manhattan, the space also had one distinctive architectural feature: a glass-enclosed triangular point on one side. Tsien and Williams first encountered the space while it was still under construction, as they ventured precipitously close to its unenclosed, raw concrete edges. Tsien talks of the space as a floating island, one with a degree of serenity they tried to reflect in their design for an apartment.

Although Tsien describes the problem as basically not architectural, the architects were able to affect the architecture much more here than in most other model apartments. Their first decision was to remove a wall between the master bedroom and the living/dining rooms, opening the major spaces to an unparalleled, three-directional view north, east, and south. This decision also allowed them to gain more storage space for the master suite and to construct a new, angled wall in the foyer, which leads the visitor's eye directly to the point of the triangle. New soffit construction along the perimeter of the living spaces reinforces this same dramatic line of the interior space. To give a sense of unity to these spaces, they used a consistent palette of materials: gray terrazzo flooring with a complementary gray on the walls. Sliding, Oriental-style wood screen doors with translucent glass conceal the bedroom when privacy is desired.

The architects used this approach as an opportunity to pursue ideas and themes from earlier work and combine them with specific responses to the particularities of this space. Because they have always been involved with the design of interiors and furnishings, Tsien sees their design as more object oriented, more of details and vignettes than of large-scale gestures. The terrazzo floor has inlays of stainless steel at the entry and next to the dining area; the inlays both define and separate the open areas while creating a strong connection between them. Wool and silk rugs with a copper-colored calligraphic motif are used throughout the apartment. Custom made by V'soske but based on a line designed by the Tsien/Williams team for the company, the rug in the living room is placed beneath a glass-top table with similarly etched designs. The base for this table, handcrafted of brushed aluminum, picks up on the same palette of materials used in the terrazzo inlays as well as in a rotating screen, designed by Williams, which divides living from dining areas. This screen, like the metal mesh curtain that once hung in front of the dining room windows, plays on the idea of transparency, providing more or less privacy, depending on use.

While some of the furniture is purchased—notably the living room and dining room pieces—much of what was used in both the master bedroom and the second bedroom/study is custom designed and done in such a way as to look built in. This strategy takes the object-ness out of the object and creates a unified feeling throughout the apartment.

Although the job took a mere six months from start to finish and didn't involve the usual client hassles associated with residential work, it did involve more than the architects bargained for. When the furnishings were complete, Tsien thought their work was complete as well. "Looks too cold," said the marketing people. "We need more. What about the accessories?" Undaunted by the need for more clutter, Tsien took it as an opportunity to clean out her own apartment and arrived every morning with brown shopping bags full of objects. But, in spite of the additions to and subtractions from their design, what she describes as their vaguely Oriental esthetic still prevails. □

For architects Tsien and Williams, the design of this model apartment is not so much a problem of making architecture as one of designing vignettes and of close attention to detail.

Photographs © Michael Moran

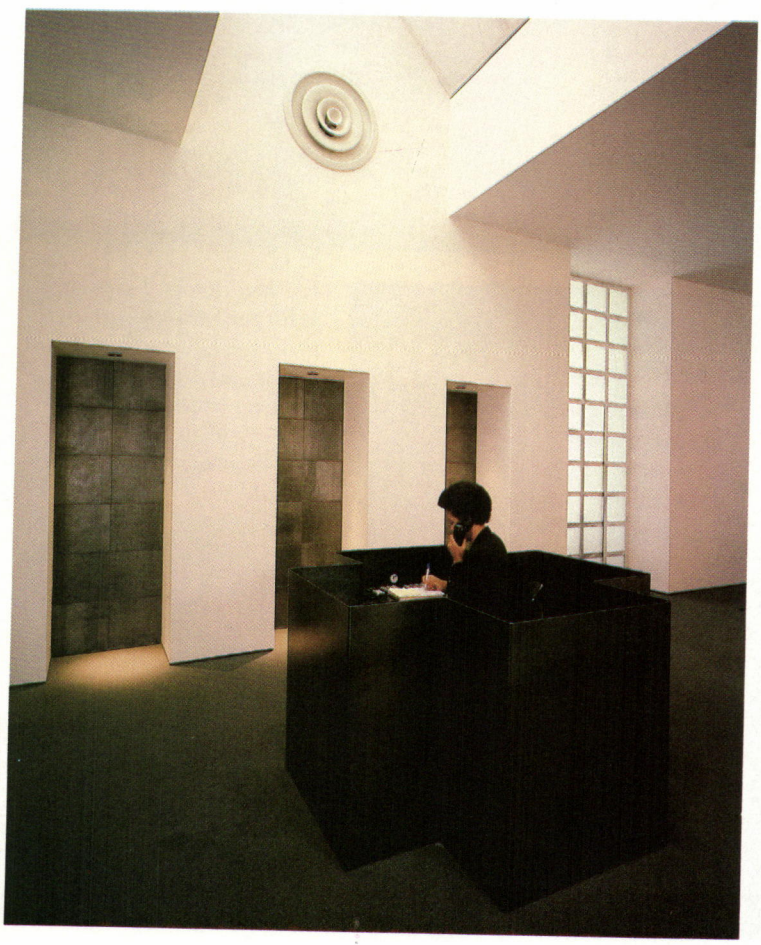
'Office, Palazzo, And Monastery'

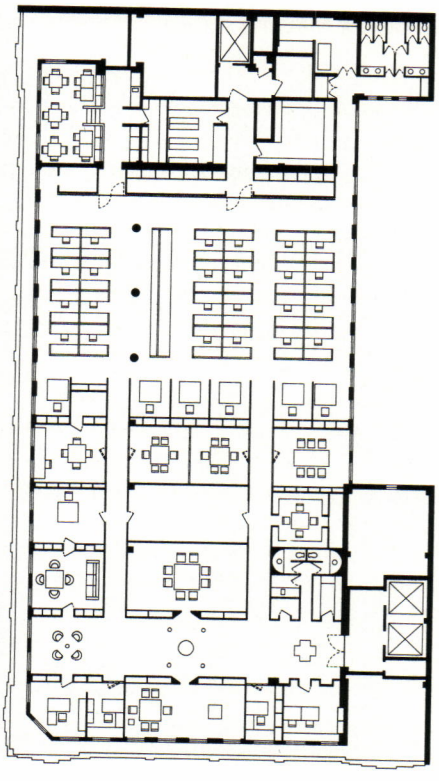
Vignelli Associates studio, New York City.
By Andrea Oppenheimer Dean

Somewhat like a haiku, these new offices by and for Vignelli Associates are a terse, disciplined, and sometimes lighthearted expression of design attitudes that have informed the partnership of Lella and Massimo Vignelli for 27 years. Central to their work has been an orderly, geometric paring to essentials, tempered by a fluid grace and a fascination with materials. Their offices are, in fact, a kind of alchemy, in which common materials are transmuted into noble-looking substances.

The effect—surreal, hushed, highly controlled, and visually smashing—hits you full force as you step off the elevator at the top floor of a west side Manhattan industrial building. Underfoot are elegant gray floors, an overlay, as inside, of unpainted epoxy resin composition. A material hitherto reserved for heavy commercial uses, as in the World Trade Center garage, it serves here as a chic substitute for seamless carpeting. The walls, a plastic laminate resembling stone, are similarly gray, and before you are huge double doors clad in squares of lead sealed with beeswax. It's like approaching the keep of an ancient castle

On these pages, central gallery with rolled steel reception desk (below) and steel-top table flanked by light kiosks (right).





or a huge vault for mysterious, certainly precious objects.

The spaces within, which Massimo calls "a combination office and palazzo with a bit of the monastery," follow a symmetrical, rectilinear plan, centered on an entry gallery. There are narrow, deeply recessed, lead-faced doors and deep, slender openings whose depth is underscored by overhead spots. A thematic grid motif is also introduced in the two side corridors by another set of doorways with translucent glass panes framed in hand-brushed aluminum with a painterly quality. The Vignellis, who believe in the integration of art and design, explain that inspiration for these offices came mainly from artists, such as Donald Judd, Richard Serra, and David Smith. In fact, their design has more to do with the quality and relationships of surfaces and shapes than of space.

Lella describes the 75-foot-long, central gallery as "a palace salon in the Venetian tradition with rooms to each side." Among other things, it is a showcase for several new Vignelli pieces, among them a freestanding, waist-high enclosure of hot rolled steel used as a reception desk that is centered under a peaked skylight. Also in the gallery is a table with a gold-leaf-finished base and a top of unfinished, plate steel commonly used, says Lella, in Manhattan's manhole covers. Surrounding the table are four light kiosks of cold rolled steel. Lighting here, as elsewhere, is from skylights—of which the 15,000-square-foot office space has nine—spots and up-lights, which are made of industrial floods with specially designed steel brackets. Color—grays, blacks, white, tans—derives from materials.

In keeping with the palazzo analogy, the gallery opens with deeply chamfered doorways onto Massimo's office and, across from it, his conference room. His office is marked by leaded walls and skyline views, while in his gray-walled conference room all attention is on the light-colored table and white "handkerchief" chairs centered under a skylight, with an elaborate electronic system for controlling sunlight.

By contrast, Lella's nearby office and anteroom read as light, domestic spaces, mainly because of extensive cabinetry using particleboard stained white and finished with matte lacquer to give the appearance of fine-grained stone.

Issuing from the central gallery are two parallel corridors leading to the studios, which have particleboard workstations and are surrounded by wraparound windows. A corrugated, galvanized steel partition (bidonville, Lella calls it) separates the studio area from service spaces.

"We felt," says Lella, "that this was probably our last office and that we wanted it to stand as a statement of our philosophy." And so it does, with eloquence.

Above, Lella's office and anteroom with 1964 Saratoga sofa and particleboard paneling. Opposite, above, corridor issuing from central gallery with hand-brushed, gridded aluminum frames supporting sandblasted glass-paned openings; below, studio with particleboard workstations.

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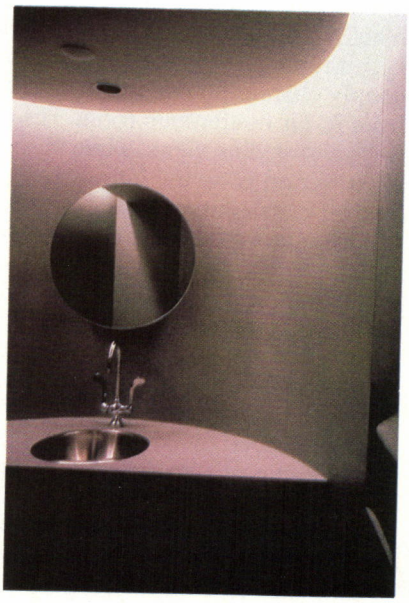
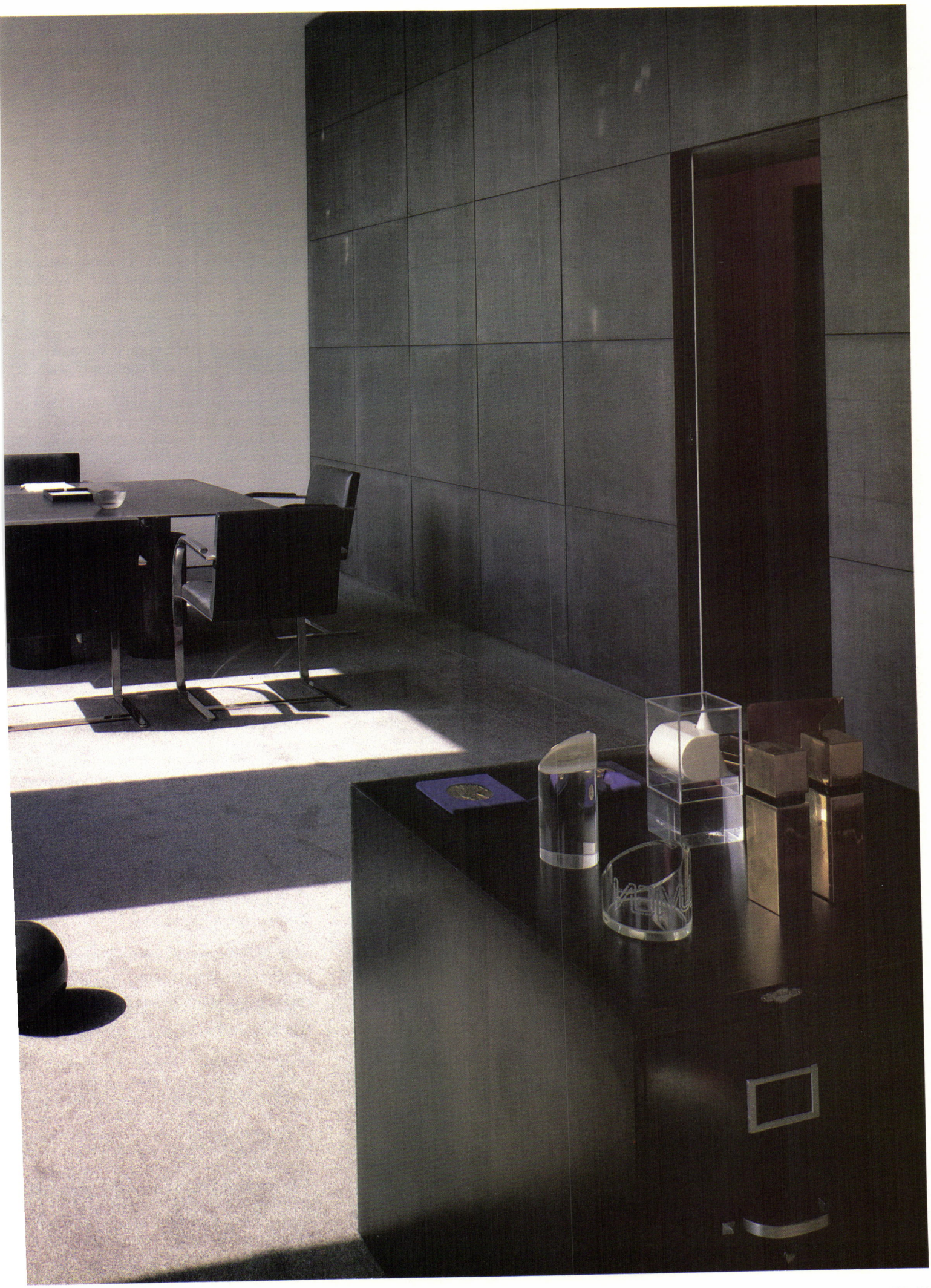
Above, Massimo's conference room centered on table and 'handkerchief' chairs beneath skylight. Right, his office with lead storage wall, steel file and table, specially bracketed industrial up-lights. Below, meticulous detailing, even in restrooms. □



Courtesy of Vignelli Associates



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Looking From the Future Into the Immediate Past-II

Last month, for our 10th annual review of new American architecture, we asked a group of practitioners and close observers of architecture this question: "How do you think that future historians will assess the period 1978-87?" The response exceeded our best hopes, both qualitatively and quantitatively. It also overflowed available space. Rather than cut or cull severely, we decided to publish the responses in two sets. The first was published in May; the second, equally rich, follows.—D.C.

Jefferson B. Riley: 'An adolescent need to dismantle the efforts of our parents before moving on.'

Architectural historians will look back on the decade between 1978 and 1987 and see a period in which architects seemed preoccupied with the superficial. They will comment on our preoccupation with architectural styles and symbols borrowed from other times and places and offering little meaning for most of us beyond mere historic recognition. They will point out that we focused on the two-dimensional to the exclusion of, or at best the obscuration of, a clear and innovative design concept carried out in plan and section and serving human need. They will note the epidemic lack of genuineness in our designs and question whether or not we even knew how to achieve it. They may, then, say of us, as the Koran says of all humankind, that we loved the transitory but neglected the eternal.

That, at least, is the predominant mode and the situation that has prompted the most comment and concern within and beyond today's architectural community. But leaving it at that will hardly do. How tragic it would be if these harsh characterizations became the epitaph of our postmodernist movement. It would mean that our worst fears of being spiritually deficient had been borne out—that we had initiated a new dark age in architecture.

However, there are signs that contradict this general state of affairs, and those signs deserve to be nurtured and advanced. Despite the prevalence of superficial priorities, few architects have found buildings devoted primarily to stylistic concerns to be completely satisfactory, even when those concerns were motivated by the commendable desire to respond to the building's context or to create a sense of place. Indeed, many are seeking in one way or another to transcend the limitations of an essentially two-dimensional architecture and arrive at a genuine multidimensional architecture that seeks to fulfill human needs and by so doing becomes meaningful to its inhabitants. And though the commitment to a meaningful and genuine architecture is constrained at present by the ethos of stylism, it is not, I believe, being crippled by it.

Perhaps one could attribute our preoccupation with the surface appearance of our buildings to the value we place on photographs of them. I prefer to believe, however, that it is attributable to the more pardonable urge to exercise our newly proclaimed freedom from modernism's stylistic hold. The future historians might, therefore, characterize our efforts of the '70s and '80s as almost an adolescent (or developmental) need to dismantle the efforts of our parents before moving on to real growth. But, whereas they may comment on our adolescent behavior, it is my hope that they will direct their attention to the signs of our postmodern movement's coming of age.

And what signs will they see? All thoughtful architects, I believe, are seeking ways to make architecture genuine and meaningful to its inhabitants in terms of our times and culture. Some may continue to explore the use of architectural symbolism but in more relevant ways. Others may revive global sociopolitical ideals for architecture. Still others may concentrate on human scale and proportions in their buildings.

As for myself, I believe that meaning in architecture today lies in the way a building enhances the act of inhabiting. I believe that our designs should have a visual legibility that enables people easily to orient themselves within a building and to create a clear and memorable mental image of the building that organizes its various parts into a coherent whole. This can be done by carefully arranging the paths that link and organize rooms, or establishing landmarks within the building that mark special places and act as beacons, or creating ambiences such as the filtered green light of an outdoor terrace, or the scent of an orchard in flower, or the sound of a cascade, or the warmth of a sun-filled court, or the coolness of an interior room, all of which can be used as landmarks themselves.

We should purposefully produce an emotional reaction in people by manipulating spaces within our buildings. For instance, we can make a constrained hall release into a wide-open room, or make a building come alive through the drama of the immediate view linked to the emerging view of a courtyard or landmark. By using symmetry in the arrangement of spaces, to which we humans have an empathetic response, we can produce calm and repose in the midst of spatial complexity. We can also produce an emotional impact by manipulating a building's contents, its scale, its proportions, its colors, its textures of materials or patterns of sun and shadow upon a wall, its details that reveal the involvement of the human hand, and, of course, its image, style, and character that can respond to the small love affairs we have with places.

We should take care with the response our buildings make to their site and climate in ways that can capture treasured views and exclude unwanted ones, or channel cooling breezes through a building or trap the warmth of the sun to make outdoor spaces habitable in cold weather by heating themselves with the sun. We should design into our buildings a sociability that can affect how they are used by people and how they invite human interaction. For instance, we can carefully locate places to sit next to paths where people walk, or use sun and trees and water and food to attract people to a place. We can provide for celebration within our buildings, whether for full-scale community celebration or solo morning exercises, by providing talismans, or visual points of reference or backdrops for celebration, and enclaves, or enclosures that encourage human expression and encounter. What is meaningful in architecture today is a human scale measured in delight.

We must make architecture more than style and surface treatment and find ways to promote those expressions of human fulfillment that are to be found in a building's plan and section and in its response to its site, all of which constitute its design concept. Only then can we foster the genuine and ultimately give meaning to our buildings. Only then can it be said of us that we sought the eternal.

David Gebhard: 'Most large-scaled buildings still carry forward the banner of the modern.'

Louis de Bourriene recalled in his four-volume *Memoirs of Napoleon Bonaparte* of 1829 the observation, made in the early 1800s by Napoleon, that "history is essentially myth agreed upon." Certainly the varied history of 20th-century architecture bears out Napoleon's caustic but observant comment. Even now, as we approach the final decade of this century, it is impossible to lay one's hands upon a volume that objectively portrays what has taken place in American architecture throughout some eight decades. The great

"classical" writings on 20th-century architecture that come to mind, those by Nikolaus Pevsner, Sigfried Giedion, and Henry-Russell Hitchcock, no matter how beautiful they are as literature, are all apologies for modernism. These authors were playing a characteristic 20th-century game, posing as historians on the one hand, acting as critics on the other.

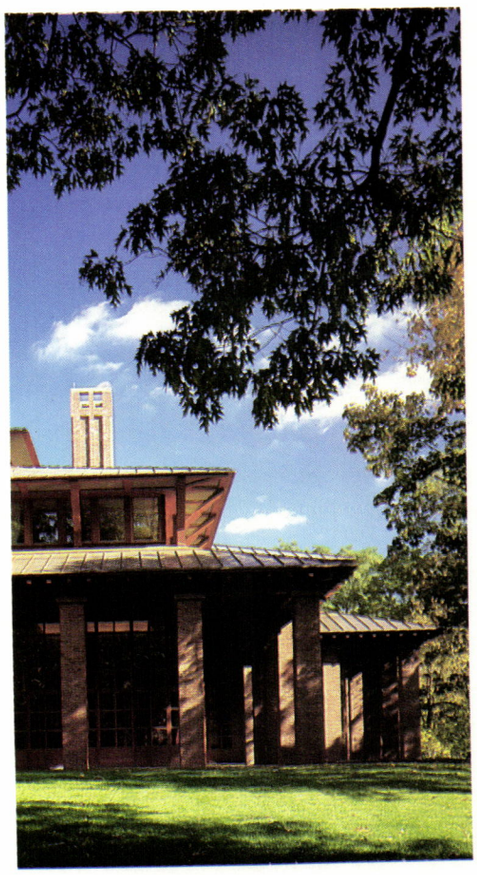
All of these authors' acknowledged classics of architectural history are in a way revealing period pieces; they are as dated as the architects, buildings, and city and regional plans of their time. To be dated, to be of the moment, has more often than not been looked upon as some sort of disease; but the great monuments of thought, of literature, of architecture, and of architectural history are all of their moment and beyond it. Each expressed the rich peculiarities of its time, and in so doing commented on broader, seemingly timeless issues.

For us today to suggest how an architectural historian of, say, the year 2000 would respond to what has taken place in the years 1978-1987 should be seen as a delightful game, a game one should not take too seriously. However, in order to play this game we should posit two conditions of which we should be fully aware. We should know what in fact has been and is going on in the world of architecture; and, equally, we should be critically aware of the current directions of architectural history.

The first condition, knowing what has happened and is happening and what has occurred over the past 10 years, is not easy to satisfy. With few exceptions, the professional architectural journals of this country and abroad are still, as were their immediate predecessors in the 1940s, '50s, and '60s, journals of criticism, not of history. Either consciously or unconsciously they employ the buildings illustrated and discussed on their pages as comments on what they approve of and, by implication, as an index of the direction they hope architecture will go. If one really wishes to know what is being designed and built at a given moment, one must consult other sources: the real estate sections of local newspapers, supplemented by the many national and regional trade journals. A perusal of this material, strongly reinforced by simply going out and looking, quickly reveals not only the design and intellectual layering of American architecture but also the richness of approach and of imagery being used.

A critic examining what is happening now or happened last year in American architecture would assume that everything (or almost everything) is either a version of pictorial, classically inspired postmodernism or a variation on the theme of high-tech. These two sets of images are fashionably dominant at the moment (at least in serious High Art circles). On the other hand, if one really looks around at what is being built, most large-scaled buildings still carry forward the banner (though somewhat tattered) of the modern. Some of these buildings may be more fragile in appearance (thin, tenuous glass skins and the like), and others, encased in masonry, hint at their art deco lineage, but still they are essentially late modern in their styling.

Though there has been an ever-widening interest in the popular vernacular of the earlier decades of this century, one would be hard put to point out any article, let alone book, that has adequately presented the vernacular as it exists. If we go out and sample it, we quickly discover that much of it is characterized by a lighthearted series of traditional images: the American colonial, the medieval (English or French), and the Hispanic (mission or Spanish colonial). Not only



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American Academy of Arts and Sciences, Cambridge, by Kallmann, McKinnell & Woods, published in the 1982 annual.

are most of these small commercial buildings and acres of spec housing carried out in a light-veined manner, most of them fail to convey any strong sense of conviction even to their middle-class users. It could be argued that this lack of conviction is due to the fact that the designers of these projects (and probably their clients as well) have few places to look for inspiration. The number of gifted practitioners of traditionalism over the past 10 years has been small, and these few find their work published seldom, if ever.

There is no reason to think that our historian of the year 2000 will be any less elitist than his or her counterpart today. But, living a decade or so later, our historian may be able to play off the world of High Art architecture, of postmodern and high-tech, with the many popular images of traditionalism and modernism. The historian will also, one suspects, become aware of two tendencies now very much in the fore within High Art architecture: the transforming of architecture into an art object and the almost complete abandonment of the two-century-old tradition of the social responsibility of architecture. How future historians will react to the years 1978-1987 will depend on the Napoleonic myth that each has crafted.

Joseph Esherick: 'A move toward less rigid, less insistent buildings.'

We can already see, now, some of the characteristics of architecture in the past decade. But what we see is not what is at issue here. We are asked to imagine how a future architectural historian might categorize this decade—to look ahead, imagine that future historian, and then look back to the present through the eyes of the historian.

The future historian, in focusing on the 1978-1987 decade, will inevitably see that decade not in isolation but attached to what preceded and what follows; and, as much as the historian will try to be objective, it seems unlikely that it will be possible for our historian not to be influenced by what surrounds him or her at the time the characterizing takes place. But the future is not above being influenced by the present. Tendencies observable now can flourish or wither; this period may be the good old days or the bad old days.

First, it may be useful to try to characterize the '78-'87 era straight off, albeit from a parochial point of view. Up close, one has some difficulty seeing the forests for the tree, and there is a natural tendency to remember distinguished work and to see things in their best possible light.

The most welcome sign of the decade has been a move toward less rigid, less insistent buildings, toward buildings that seem to assume that the users find desirable a certain amount of richness and variety and that they like options both in physical use and in possible esthetic interpretation. There has been a greater concern with fit—with site—with other buildings and the landscape built and natural. With this concern has come a broader attention to craft, to energy con-

Jefferson B. Riley, AIA, is a partner in Centerbrook Architects, Essex, Conn. **David Gebhard, Ph.D.,** teaches art history at the University of California, Santa Barbara. **Joseph Esherick, FAIA,** cofounded Esherick Homsey Dodge & Davis, San Francisco.

other things they fumbled first and have spent a century or so trying to play catch-up on. Perhaps the smart building does not have to be the architect's business after all, but could it, *please,* be a conscious decision this time 'round, not just another comedy of errors and omissions?

This public recognition has spilled over into many other areas. Long regarded as either handmaidens of the aristocracy or hardworking pragmatic types, architects now have become fashionable as individuals, fodder for the gossip column as well as the buildings and shelter sections.

Holzman, FAIA, is a partner in Hardy Holzman Pfeiffer Associates, New York City. He also asked to be identified as successor to Dr. Tyler Owlglass, Ph.D., as holder of the Andy Warhol Chair of Contemporary Design Theory at the Golden State Institute of Technology, Azuza.

servation, and to environmental and ecological issues.

Efforts to restore and preserve old buildings and environments are everywhere. Regional approaches struggle on against powerful homogenizing forces of economic and technological development. Even so

ness and diversity the writer mentions may have been undertaken more as amelioration, in some cases cosmetic, than as fundamental change that might have produced genuine and lasting improvements in the quality of late-20th-century life. One wonders why, with so many

than productive discourses. Indeed, many of the movements seem to have been isolated, and a certain amount of the work appears to be, in effect, a denial of debate. It is curious, particularly in view of the way in which so much was seen as a series

(an old-fashioned notion) but through special projects. We have recently seen architects commissioned to design jewelry, clothing, and even household items for over-the-counter sales in stores, galleries, and museum shops.

Public attention, recognition, and designer labels have led to an expanding role for architects, one that some in the profession accept and even trade on. We are no longer in a cloistered profession, but one with a high public profile. Such indicators suggest the last decade is unique, but clearly they are not the only measure. All we need do is look at the buildings that were made. Forget the press, the hype, the exhibits, and the questions about social responsibility, and examine the buildings.

Only a decade ago, demolition of historic buildings was common. New buildings usually had the character of a gridded cracker box. This is no longer the case. The transition from modern panacea to eclectic relevance, if not complete, is certainly well into maturity. As has been vividly pointed out, architects learn from various sources. During this decade tarnished older buildings and unrealized projects became a source of inspiration. The appropriation of aged details, decorative elements, and even whole facades into a new historicist design idiom has proven a highly successful approach to design. The relationship of context to design in new buildings has reached a new level of meaning. Dogmatic theories based on reductionism, purity, form, structure, and brutality (all to be seen on Sixth Avenue) have been replaced by ad hocism, ambiguity, multivalent interpretations, and fashion (as represented by Seventh Avenue).

This is obviously an oversimplification. Although architects are showing a new awareness of content, appropriateness of design, and proper use of detail elements in a larger order, each new project is still seen as a singular construct (take a look at any rendering). Reference to other architects' current or previous work is still either nonexistent or used solely for intellectual inspiration. Despite the rhetoric, each new building exists for the architect and the public in its own universe. Each new commission is its own tabula rasa. This new freedom allows architects to work in any style, anytime, for any project. In fact, restyling for each project has become a virtue as well as a source of curiosity and excitement.

The results of this decade of regeneration can be seen in almost every city, suburb, urban village, campus, and corporate park across America. Although some individuals may refer to this period as postmodern, "punk," the "parade of hats," or even a period of "lite" architecture, it will long be remembered for reasons most clearly stated by Oscar Wilde: "In matters of grave importance, style, not sincerity, is the vital thing."

Charles Montooth: 'Somewhere back of the glitz, glitter, and pale color, good work has been done.'

The period 1978-1987 has been one of searching, of pushing ahead by architects on several fronts at once. It has been a time for phasing out the post-World War II Miesian influence, which was itself a negation, a truly "less is more" philosophy thrust upon a rich, exuberant American culture incapable of sustaining enthusiasm for such a restrictive approach to architecture. Fifty years earlier, America's experiments with the process of elimination in architecture had seen results that were more positive and longer lasting if not as immediately effective. By the late 1970s architects were seeking more personal means of expression than were available by following the bland, rigid patterns that had dominated the building scene of the postwar decades.

New work by new "names" was forcing architecture back on the same track that was followed by those individual expressionists Richardson, Sullivan, Burnham, and Wright. Architects in the late 1970s appeared to rediscover architecture as more than a means of enclosing space or providing shelter. Architecture, like music, painting, and other forms of art, became again a means of personal expression.

The star architects of the '70s, whose buildings now adorn the skylines of our urban centers, began to compete with each other to produce exciting, eye-catching buildings. Some architects relied upon clever words and slogans more than on bricks and mortar to advance their theses. Others tried returning literally to elements of the past. Features were lifted out of historical context and arbitrarily plastered on new facades.

Historians will recognize the effort as a forced groping rather than a natural response to needs of society or of clients. But this work will be viewed as exciting if not innovative or original—as a turning point, the beginning of a rejection of ideological and stylistic dogma.

Thoughtful, probing scholars will discern a positive direction in the searching for richness of surface, the application of old devices, and the return of substantial construction forms. They will see an effort on the part of architects to create interesting interior spaces. The glass-topped galleria has returned in buildings large and small.

The 1978-1987 era will also be known for innovation in architecture abroad, from the light metal structures appearing in Australia to the suspension system plants of England and the contrasting romantic wood buildings of Hungary. Historians will note the widespread use of such technological advances as thin fabric roofs over enormous spaces, energy-efficient environmental systems, and new ways of lighting, both artificial and natural.

More important, this era will be known as a time when the quiet but elegant work of Fay Jones captured the imagination of the young and won deserved recognition. It may well come to pass that the works of others who have worked quietly along "organic" lines may one day be so celebrated.

The late 1970s gave birth to a concern for buildings in their settings. Were new works compatible with historic neighboring structures? Were additions to existing older masterpieces appropriately designed and detailed, or were they primarily expressions of artistic egos paying little respect to historical precedent? This concern for buildings appropriate to their settings was given a name: "contextuality." And along with the name came scholars to mark its importance.

Finally, future architectural historians will look at the decade and discover this period, 20 years after his death, as the time of a growing recognition of the contribution of Frank Lloyd Wright to the architecture and life of his nation. His early statement of principles eschewing deeds done for fashion, fad, or fame is being better understood by an expanding circle of architects, critics, and scholars.

In the period 1978-1987, as in others, stylistic fads have dominated architecture. It seems likely that they may continue to do so. But somewhere back of all the glitz, glitter, and pale color of recent architecture, good work has been done, mostly without fanfare. Will historians recognize it? I think the better work will stand the test of time while some of the current enthusiasm for columns, facades, and pediments will subside. What the end of the '70s and most of the '80s portends is more important than the decade itself. The promise is for an expanding, quietly provocative architecture based more on human needs and aspirations than on fashion. Once architects realize that it is possible to express their individuality by serving the needs of their clients and society without resorting to brazen or bizarre tricks, then the dream of an American or natural architecture, the direction pointed to us by Frank Lloyd Wright, will become reality.

Gunnar Birkerts: 'A brief detour from the main road of the modern movement.'

The historian of the future, looking back upon our time with the knowledge of outcome—what causes produced what effects—will understand the last decade very differently from the way we do. While we try to square its extravagant promises on paper with its conspicuous practical failure, the historian will see the

decade for what it was—an aberration, a brief detour taken from the main road of the modern movement.

The modern movement withstood the impacts of neo-academicism, neorationalism, historical eclecticism, and neoclassicism. These theories created building forms, and the world saw their inappropriate three-dimensional manifestations. The future historian will find in the failure of postmodernism proof of the inherent strength and necessity of modernism.

From a vantage point in the distant future, the historian will see an evolutionary line. At one end will be the sheltering cave excavated from the hillside; at the other, a fully mastered and humanized technology, an efficient, esthetic, ecologically responsible human habitat in space.

A significant portion of this line will represent the advance of the modern movement, that revolutionary development that began in 1920 (though some say it started with Webb's Red House in 1859), survived the short-lived counter-revolution of the 1960s and '70s, and recovered itself in the late '80s. Founded upon a recognition of social concerns, the modern movement also aimed for a marriage of utility and beauty and embraced the promise of technology. Its temporary eclipse in this country in no way proved that the marriage was doomed.

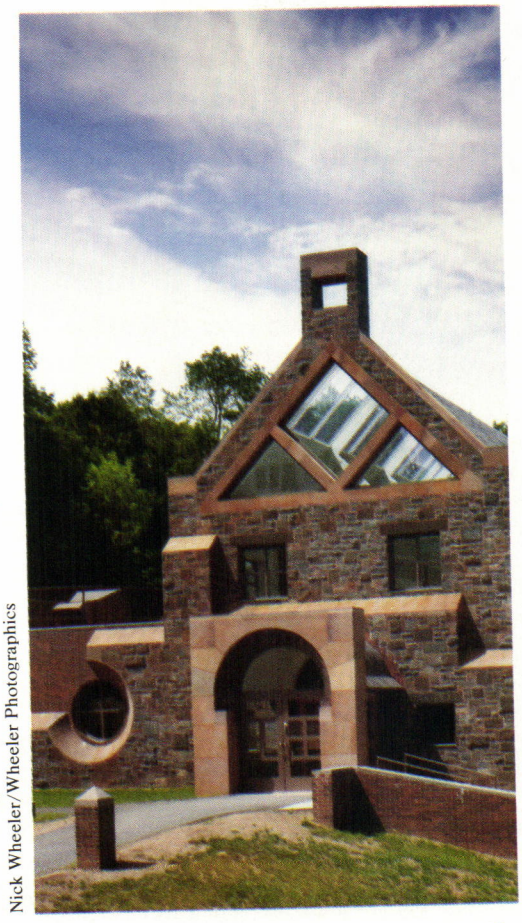
The critic who turns and looks at the European continent will find the strength and direction of the modern movement hardly affected by the events on the American scene. Certain European architects, enticed by American media opportunities, devised proclamations and theories, which resonated and became amplified upon arrival in the U.S. The modern movement was less betrayed on the soil on which it was created.

To understand the last decade, we have to look more at society than at architecture. In many ways it was inevitable that the disturbances would affect our society on every level—the wars fought and lost and the subsequent humiliation, the movements of civil rights, women's rights, and gay liberation, the popularity of Freudian theories, and so on. During this period we witnessed a profound reaction against high technology. The arrival of computers, lasers, biochemistry, and the nuclear explosive device affected many creative minds negatively. In the public mind these fears became part of an irrational argument against technology itself. At the same time, the deep social exhaustion made it seem that we had come to a dead end, that there was no going forward, that everything had been done. Suddenly, for a number of architects and theoreticians, the past was the safest place to be.

Here I want to distinguish between two very different impulses. One recognizes the past for what it is. Buildings are studied, cherished, and restored. This kind of preservation keeps open the lifeline into the past. The other impulse—eclectic, manneristic—is a betrayal of modern architecture. It presumes that stylistic elements can be meaningfully detached from their natural historical context and re-implemented. It acts as if solutions for the present and the future can be contrived through some combination of solutions from the past.

The corporate sector was supportive of the modern movement and also, to some extent, of the International Style. It showed a willingness to support postmodernism, too—that is, until the buildings started to go up. Only then did the corporate sector begin to see what was really involved: lack of integrity, cynicism, and utter forsaking of architecture's revolutionary role.

The architectural historian of the future will find this decade filled with a wealth of pronouncements by architectural theorists, most not able to realize their theories. But some of the philosophical attitudes (e.g., contextualism) emphasized during the decade are valid and will forever remain part of architecture. The architectural historian will find a proliferation of publications on these theories, monographs on architects by themselves and others, and catalogues of exhibitions of worthy and unworthy topics. The historian will find that a great number of architects, including leading practitioners, underwent a metamorphosis during the decade. Having turned traitor and left the modern architects' group, at the end of the decade they purged themselves and attempted to rejoin.



Nick Wheeler/Wheeler Photographics

Dining Hall at Colgate University, Hamilton, N.Y., by Herbert S. Newman Associates. New Haven, Conn., 1986 annual.

Architecture learns a lesson from this decade. The tireless search for novelty that propels the media cannot be allowed to infect architecture. It works in the opposite direction—not for surprise, shock, or new surface but for integrity, durability, and appropriateness.

The historian of the future will see that we returned at last to the main road. We accepted the inevitability of technology. We also salvaged what was useful from the period of turmoil—the validity of a certain historicism, the respect for context. The International Style was recognized as a culprit and rejected from the modern movement. The great American modernist, Frank Lloyd Wright, was reinstated in his rightful position. We shook ourselves free of cynicism and fear and began to move forward again.

John F. Hartray: 'Marching to different drummers, in different directions, and at double time.'

The last decade might be viewed as a vast practical joke on future historians. In any case, we have set a great many traps for them. There are several possible motives for this mischief. The ability of our generation to end history may carry with it a disdain for posterity that we express in a legacy of debt, toxic waste, and misinformation. There also seems to be a general acceptance of the comforting historicist myth that we can control the outcome of history by advance manipulation. We attempt to write it before we have lived it.

For example, former President Nixon has assigned himself to an honored niche in the pantheon of statesmen because he believes, with some justification, that history will find China more interesting than Watergate. His problem is that history may not credit him with the discovery of China due to Marco Polo's prior claim.

Architects are old hands at this sort of magic. We have always justified our projects by editing historic evidence. If designers as varied as Palladio and Giulio Romano could both claim to be carrying on a renaissance based on rigorous archaeological precedent, we should not be surprised at the spectacle of our colleagues hurrying to write down their own personal chapters in history. Future historians will wonder how an age that produced a normal number of popes managed to be blessed with so many important architects. *continued on page 90*

Charles Montooth is a staff architect and teacher at Taliesin West in Paradise Valley, Ariz. **Gunnar Birkerts, FAIA,** practices in Birmingham, Mich. **John F. Hartray, FAIA,** is a partner with Nagle, Hartray & Associates, Chicago.

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SPECTRA 3700 EQUALS

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Spectra 3700 in white combined with standard white lay-in ceiling panels.

It's a simple equation.
Add Spectra 3700 to your specs,
and get spectacular results.

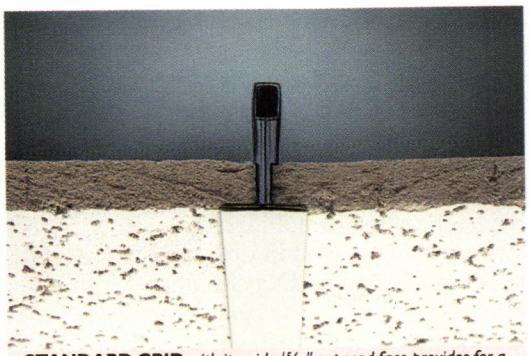
THE REASON?

Spectra 3700 Designer Ceiling System is based on simple arithmetic. Start with its exposed 9/16″ narrow face dimension, and subtract 3/16″ due to the center regress. That gives Spectra a 60% reduction in the amount of visible metal at the ceiling plane as compared to conventional grid with a wider 15/16″ face.

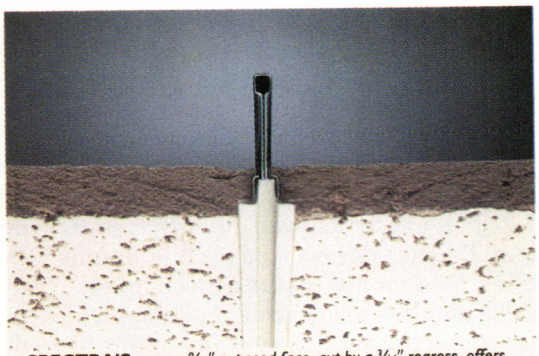
Next add Spectra's uniquely engineered components which allow for the automatic centering of ceiling panels and light fixtures for perfect placement every time. (Don't forget to carry over Spectra's compatibility with NEMA Type G lay-in fixtures, a variety of air diffusers, *and standard square-edge ceiling panels.)*

Now divide it all with the installation efficiency, modular flexibility, and economy previously found in conventional exposed systems. Then figure in Spectra's 18 available colors, including reflective metal finishes.

SPECTACULAR CEILINGS



STANDARD GRID *with its wide 15/16" exposed face provides for a ceiling design that is coarse by today's standards.*
Shown above with standard square-edge lay-in panels.



SPECTRA'S *narrow 9/16" exposed face, cut by a 3/16" regress, offers 60% less visible metal at the ceiling plane for a refined look.*
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Spectra 3700 in a brasscoat finish with contrasting white scored ceiling tiles.

THE RESULT!

pectacular ceilings from a system hat adds creative diversity and conomy for the look of far more xpensive narrow face systems.

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Essays *from page 87*

The secret is that if you write your own history you needn't include others in it. Sharing is out. We can each have a renaissance of our own. It is as if the zeitgeist had been diversified under the antitrust laws.

This unprecedented diversity became inevitable when the profession switched from apprenticeship to formal schooling as the primary means of architectural education. This was a major change because practice and school are very different.

Practice involves making buildings. School is concerned with discussing drawings. Practice doesn't lend itself to revolutions. The money and the diversity of skills required to construct buildings foster conservatism. The youthful hubris of an apprentice architect, even when reinforced with boredom, cannot prevail against the weight of so much reality.

Schools, on the other hand, have little inertia. The fleeting visual impressions of a summer holiday, a Calvino novel, or a cocktail party where one first hears of Barthes, can redirect the ideas of an energetic professor and change the thrust of a departmental curriculum in an instant. This volatile world of academia, where even gravity can be suspended for the sake of an engaging theory, is an ideal incubator for esthetic upheavals.

Our schools were originally developed to support the Beaux-Arts style by providing rigorous training in the orthodox manipulation of the classic orders. After the Beaux-Arts passed out of fashion, the schools remained as launching sites for new design theories. When Walter Gropius landed at Harvard in 1938, the classic style fell to modernism in a bloodless coup. The revolution spread rapidly. Only Princeton held out as a small island of resistance.

It took much longer to establish modernism in the field. For one thing it leaked, and there was really no technology to back up its formal ideas.

Because schools deal in drawings and rhetoric, the early buildings of any new academic style tend to be crude and didactic, like enlarged illustrations of lecture notes. This was as true of early modernist work as it is today. A new style must be refined by craftsmanship before it can fully satisfy us as architecture. Time is required, and there was time to perfect the modern style because the professors who promoted it were ideologues who did not tamper with their new doctrine once it was established.

The second academic revolution has not provided us with this kind of stability, but it would be unfair and unrealistic to expect it when so little else in our public life has a discernible sense of direction. The institutions of the New Deal, which established optimistic, long-term, social goals, are being dismantled with little objection from the public. Even the income tax has been made more regressive. National purpose has been replaced by blind opposition to the purposes of others.

Architects must be optimistic in order to work, but in the absence of a larger social purpose we are marching to different drummers, in different directions, and at double time. Many elaborate theoretical concepts are abandoned after one or two buildings. The "instant landmark" of the press release becomes passé before it receives its inevitable design award. Utopian urban designs are immediately appropriated by film directors as scenery for black comedy.

Of course, some very good work also is being done, but each building comes with its individual set of interpretive instructions. There is no common standard by which to evaluate the work of the period. This may not be so bad. We learn more about architecture if we ignore theory and look at buildings individually. The trouble is that we can't apply what we learn if each project is isolated in a separate new epoch.

The historians who study our age will do well to avoid architecture and to concentrate on simple disciplines such as microbiology, where nature places limits on the proliferation of theory. □

Burning Issues

Conflicts continue over fire safety.
By Karen Haas Smith

"Don't quote me on this—but you can design an unsafe building using the fire codes."
—an architect and fire protection consultant

"Off the record, a lot of these guys [representatives of codes-setting groups] have never been at a fire. Their objective is not so much progress as it is power. All these organizations are provincial and parochial."
—construction trade association executive

"Off the record, if you look at the membership of NFPA [National Fire Protection Association], it's made up of sprinkler manufacturers and others with a vested interest."
—fire protection consultant

"Don't quote me, but the building codes lag behind the fire codes. There's no real understanding of fire and toxicity in building codes. They are administered and promulgated by code officials who don't understand the movement of fire. The building inspector's education process is aimed toward enforcing the present code, not on technology. The fox is minding the henhouse."
—fire protection consultant

By the tone of the remarks above, and the fact that the sources don't want to be quoted, you see how controversial fire-safety issues can be. Opinions often are polarized, but, as usual, the truth lies somewhere in the middle.

Fire safety is a bubbling stew of political, economic, and technical issues that gets stirred up every time a major fire hits the headlines, and gets put on hold again when the headlines fade. As an architect, you may not think about fire codes much until you have trouble getting a certificate of occupancy because the fire marshal wants you to tear up a building constructed under a valid building permit. The drawings met all the building codes. Why can't the code officials and fire officials get it together?

The fact is, at a national level, they have—relatively speaking. There was a time in recent memory when the National Fire Protection Association (NFPA)—the organization representing fire protection professionals—and the model building code groups (the Council of American Building Officials and its three constituent groups) were worse than Reagan and Gorbachev. They wouldn't even sit at the same table together.

The long-standing tensions spilled over into a major crisis when the Department of Health and Human Services (HHS) issued regulations for federally funded hospitals requiring that they meet NFPA's Life Safety Code (NFPA 101). Since there were major conflicts between the Life Safety Code and the model building codes that had been adopted by most jurisdictions, hospitals were in a double bind. Designs that met the requirements for local building permits and occupancy certificates would not qualify for federal funding, and vice versa. Since most hospitals relied on federal money to some extent, the situation was a mess.

Détente came slowly at first. The National Institute of Building Sciences (NIBS), which serves as a sort of United Nations of the building industry in Washington, got the two sides to sit down and talk to one another. At first there was plenty of shouting and pounding on the table, but eventually most of the glaring conflicts among the codes were ironed out. Now, just three years later, a building code official, Tom Moses, director/general manager of Reedy Creek Improvement District in Florida, chairs the NIBS fire code committee. Time was when only a "neutral" party would have been acceptable to both sides.

The first chairman of the NIBS fire codes coordinating committee was an architect, Jasper Hawkins, FAIA, of Hawkins, Lindsay & Wilkins in Phoenix, who is prominent in national fire codes organizations and on AIA's building performance and regulations (codes and standards) committee. Hawkins confirms a "substantial improvement in climate" between NFPA and the model code groups. The HHS issue is not entirely resolved—the code groups would like to see the model codes recognized as flat equivalents of NFPA's Life Safety Code, for example—but both sides have learned to work together. "Whatever problems still exist appear to be at the local level," Hawkins notes.

Hawkins recommends that architects use the same approach locally that he used as NIBS coordinating committee chairman on a national level. "Most of the time these problems can be resolved if we emphasize that the differences aren't that great," he says. "We recognized that both sides had an issue, and we called for a meeting to discuss the relative *sameness* of both sides, emphasizing that everyone had the same objective: to save lives and property."

The cajoling worked so well that now you can't get the two sides to admit they still have any conflicts. Asked to discuss the major differences between NFPA's approach to fire safety and that of the model codes, NFPA's assistant vice president for standards coding, Arthur Cote, says, "I don't know that philosophically you would get very many people who are involved in the process to agree that there are any differences." Richard Kuchnicki, of the Council of American Building Officials (CABO), responds similarly. "I don't know that we're substantially different. We all have the same goal, the same philosophy."

Still, one hears comments like the ones quoted at the beginning of this article—comments to the effect that NFPA and the fire protection community are biased toward fire equipment manufacturers, and that the model building code groups are comprised of technically uninformed local building inspectors. Asked how NFPA responds to the bias charge, Cote says, "We have an extremely elaborate process whereby all committee decisions are made by a two-thirds majority, and no more than one-third of the voting group can be from any single interest.

"These things are always in the eye of the beholder. You will hear charges that NFPA favors sprinkling, but you will also hear that the Life Safety Code does not require enough sprinklers."

In addition to the balance requirements at the committee level, NFPA has other checks and balances. All measures reported out of the committees come up for a vote before the general membership. With about 1,000 members at a typical NFPA codes and standards adoption meeting, the NFPA membership is difficult to "pack," although allegedly it has been attempted. Finally, the standards council issues all NFPA standards and documents and has the power to overturn general membership decisions.

NFPA bylaws were changed several years ago to require a six-month waiting period before new members obtain voting rights. The change was made after the steel industry and the plastics industry went to court over charges of packing an annual membership meeting where there was to be a vote on a provision related to thin-walled corrugated plastic conduit. A 1980 court decision found the steel industry guilty and assessed $10 million in damages. The decision was set aside on appeal, but just recently was reversed, and may go to the Supreme Court. The steel industry claims antitrust laws don't apply because NFPA is a quasi-governmental agency by virtue of the referencing of NFPA standards in federal regulations.

In contrast to NFPA's open membership and voting policy, the model code groups allow only code enforcement officials to vote on code change recommendations. This difference leads to charges of parochialism.

"There's no mechanism for investigating and making judgments in the model building-code process," says John Fisher, FAIA, a code analysis and investigation consultant in Portola, Calif. "The process has improved in the last few years, in part because of the Board for Coordination of Model Codes (BCMC), a group that attempts to resolve technical conflicts among the three major building codes and the NFPA Life Safety Code, but BCMC can only suggest changes. Sometimes the changes are misunderstood. And the code officials will bend the regulations to meet public opinion and cost considerations."

The Building Officials and Code Administrators (BOCA) is the only model code group that permits the participation of design professionals on its standing committees. The other two model code groups, the International Council of Building Officials (ICBO) and the Southern Building Code Congress (SBCC), permit design-professional participation only on ad hoc committees. For more than 10 years BOCA has allowed design professionals voting rights on the committee level, and this month it will consider a controversial resolution to allow design professionals full voting privileges in the final disposition of committee recommendations. BOCA has turned down similar voting rights proposals in the past, but this one has a new twist. Just as the building code enforcement officials vote as representatives of local jurisdictions, the design professionals would be allowed to form local chapters with voting representatives. The potential would exist for design professionals to have an equal voice in that model code group if a design-professional group were formed to correspond to each of the 4,500 active BOCA member jurisdictions.

The consequence of the differences in membership structure between NFPA and the model code groups is that NFPA, being more open, generally allows for quicker consideration of technical innovations, while the model code groups tend to be more conservative. NFPA, comprised principally of firefighters and associated interests, focuses mainly on how to protect the building and property in the event of a fire, while the building codes focus more on a fire-safe construction assembly technique.

The extended discussion of institutional issues above may seem irrelevant to day-to-day practice, but it isn't. Several conclusions can be reached from a careful examination of how fire codes and building codes were developed:

- Technical issues are not necessarily paramount in the process of developing codes. Issues such as cost and public opinion also play an important role.
- The people making the decisions about codes are not always well informed about technical issues related to fire protection of building construction.
- Codes still conflict and probably always will.
- As the practitioner with the most influence on the design and the most integrated professional background, the architect plays a crucial role in making sure fire-safety objectives are met.

Most fire protection experts will tell you that there has been tremendous improvement in the fire protection provisions of the codes during the last few decades, and that both the NFPA Life Safety Code and the model building codes are in pretty good shape. Among dissenters on this point are representatives of the cement and gypsum industries, who argue that the expansion of mandatory sprinkler provisions has led to allegedly dangerous trade-offs of passive structural fire-resistance requirements. For example, fire ratings of wall assemblies might go from one hour to a half-hour where sprinklers are used.

The argument for reduced fire-resistive structural requirements is summarized succinctly by Carl Baldasarra, a fire protection engineer for Schirmer Engineering Corp., consultants to insurance companies, owners, and architects. Baldasarra serves as a nonvoting member of BOCA's code changes committee. "How can you justify making sprinklers mandatory and then not recognize that you have created a highly superior building in terms of life safety?" he asks. "It seems unreasonable to demand that building owners spend 75 cents to $1.50 more per square foot [for sprinklers] and not offer them some way to make it up."

But opponents argue that sprinklers can and do fail—at a rate that may be as high as 11 percent—and that current trade-off provisions should be re-examined and their viability determined strictly from a fire-protection standpoint, and not on a cost-equivalency basis.

"The experience record is unclear," says David S. Collins, AIA, who chairs AIA's building performance and regulation committee. "There's been a lot of legislative and enforcement pressure for sprinklers, although there is an argument that you need both in some situations."

"The important thing to realize is that sprinklers are an *active* form of fire protection, while compartmentation and fire-resistive construction are *passive* forms of protection," explains James Barris, consultant and former director of the codes and standards department at the Portland Cement Association. "Each serves a different function, and each system has its fire protection worthiness. One system cannot truly supply the other."

"Sprinkler systems require continuous inspection, maintenance, and repair to keep them operational," Barris says. "In the case of compartmentation, the objective is to prevent fire spread by confining fire involvement within the areas of origin. In contrast, automatic suppression systems are an active form of protection primarily designed to extinguish fires or to establish control until the fire services can actively respond. Conse-

quently, these two diverse functions cannot be equated."

Defenders of the trade-off concept contend that plenty of conservatism is built into the fire-resistance and compartmentation requirements for sprinklered buildings. But critics argue that over the last decade the codes have moved toward virtual elimination of the compartmentation option without sufficient investigation of the results.

Older buildings typically have heavy structural components that provide good fire resistance. Newer, lightweight construction techniques have made compartmentation a relatively expensive option.

Rick Vognild, of the Southern Building Code Congress, says that none of the architects attending a recent codes and standards seminar of the Alabama AIA components reported having used the compartmentation option in recent memory. Others confirm the virtual disappearance of compartmented design.

Barris maintains that when the sprinkler is inoperable in a building designed under the trade-off system the building should not be occupied because it is not in code compliance. The cost of such a shutdown might well exceed the cost of additional fire-resistive construction features.

The code groups now are considering a code change that would mandate sprinklers in all buildings higher than 75 feet, and would expand provisions for mandatory sprinklers to all high-rise building occupancies. Barris points out that the change would result in lower structural fire-resistance requirements for some occupancies, such as hospitals, which already have sprinkler requirements but nonetheless would be allowed structural trade-offs under the changed code.

The smoke toxicity issue took a new twist last year when New York State passed a law establishing a smoke toxicity data bank. As an architect, you should be aware that failure to use the data bank—when it becomes operational—could expose you to negligence charges should occupants be injured by toxic gases emitted from a burning building or its contents. The New York Chapter/AIA and most other building industry groups argued against the New York State regulation on the ground that uniform testing procedures have not yet been established for smoke toxicity. But New York went ahead with the regulation, which requires manufacturers, beginning in November 1987, to submit test results to the state and to affix a decal or sticker to their products giving test result data.

None of the building codes regulates toxicity at this time. NFPA has a toxicity advisory committee, to which it refers questions, and a relatively new technical committee on smoke management that plans to issue manuals and guidelines. "Toxicity is the biggest safety problem we have. There are no standards for that or for smoke control," says Fisher. "We don't have effective research labs dealing with that issue. We're still defining 'toxicity,' still chewing over what's been done before."

Fisher points out that many codes do not require smoke dampers and thus allow the recirculation of smoke through a burning building. NFPA's Cote notes a general movement away from smoke dampers toward operable HVAC smoke management systems. He agrees that designers are given "a lot of latitude" on the smoke-control issue under current codes.

Codes experts note that, while gradual changes in the last five years have led to better coordination of fire codes and building codes, the elevator codes are not well integrated with the building codes. The result is that architects often don't realize they have failed to meet elevator or escalator safety requirements. Most architecture firms don't even have a copy of the elevator codes. A further complication is that many jurisdictions either don't enforce elevator codes or regulate them through a separate agency.

John Fisher cites the example of a relatively new provision in the American National Standards Institute (ANSI) elevator and escalator standard requiring adequate space at the bottom landing of escalators. "Especially where the escalator continues down, there may not be enough space if displays or other obstructions block the path of travel," Fisher says. "This can create a dangerous situation where people will bunch up, especially in an emergency."

You won't find this new provision in the building codes, but you could be held liable for failing to meet it.

In institutional settings where the occupants have special needs, it is especially important to work with the building owner from the outset to set life-safety objectives. "The codes may or may not address these goals," says Baldasarra. "Where occupants are not ambulatory or are handicapped, it sometimes requires the architect to work beyond the minimum code requirements."

"It really is a matter of judgment and experience," notes Richard Lafferty, AIA, of Sargent, Webster, Crenshaw & Foley in Syracuse, New York. "I always ask myself what I would do if there wasn't a code. Judgment means asking, 'What if?' And judgments change over the years, based on your own experience. Twenty years ago we weren't dealing with arson. As for handicapped populations, there is today a whole different awareness of a problem that was not even addressed five years ago. You really can't make choices based on economics."

Architects have both legal and moral responsibility for designing safe buildings. In the case of fire safety, the discomfiting fact is that, aside from the fire protection community and the building codes community, whose strengths and weaknesses are apparent, there are few other constituencies with an immediate vested interest in fire safety.

A major source of controversy over the years has been the role of fire insurance companies in fire research. Noting that the problem has abated, National Academy of Sciences Building Research Board director John Eberhard, FAIA, remembers that "20 years ago, when I was in the Commerce Department and we proposed a Center for Fire Research at the National Bureau of Standards, to my surprise the fire insurance companies opposed it. I later learned that there are two kinds of insurance companies: the mutuals, which use pooled funds, and the private businesses, which tend to make their money from investing the cash. The latter tended to be interested in having the risks stay at a level where they could charge higher premiums."

The federal fire research program finally gained impetus after publication in 1973 of the seminal report, "America Burning: The Report of the National Commission on Fire Prevention and Control," which documented the extent of the fire-safety problems in the U.S. and the intertwining of the institutional fabric.

The United States still has one of the worst fire-safety records of any industrialized country. The most severe safety problems are in low-income housing, which is often wood-framed, with unsafe wiring and heating systems. Yet the code groups continue to respond to every big fire in public buildings with more emphasis on high-rise safety, although those fires cause relatively few deaths compared with deaths from residential fires. Architects can help change the codes and work at the local level to improve enforcement procedures. If you don't, who will? □

C. David Miller

What Firefighters Fear in Buildings

Experience has made them expert diagnosticians of trouble spots.
By Forrest Wilson

Two and a half decades ago, Buckminster Fuller said our buildings were failures because they weighed more than the loads they supported. Technical progress will, he claimed, be calculated in lighter materials and more effective geometries.

True to Fuller's predictions, buildings and assemblies have become steadily lighter. Now there are lightweight metal and plastic substitutes for almost every traditional building element. Plastic building products include protective coatings, glass imitations, furniture, fabrics, and pipe insulation. There are metal studs, nailing plates, joist hangers, and metal moldings. There is a wealth of lightweight sheet materials: plywood, fiberboard, pressboard, sheetrock, chipboard, cement-asbestos, plastic laminates, and sheet vinyls.

Accompanying these products is a new generation of building tools, hand-held and power-operated—drills, sanders, routers, staplers—that lessen the skill required to build and that therefore speed erection. Several companies manufacture automated nailing machines, and among the most successful off-site fabricated elements are lightweight wood trusses manufactured by carpenters in the builder's shop or local lumberyard.

The interior finish of the commercial office building has been transformed. Ceilings are lightweight acoustic tile. Floors are a thin layer of vinyl asbestos glued to a smooth concrete slab.

We are obviously in transition from heavy, solid, earthbound buildings to lighter alloys and composite materials. But our evolving systems have an unanticipated consequence—they are causing firefighters to die in unpredictable and exotic ways. The ultimate acceptability of lighter, more efficient building elements may prove to be the building industry's test of fire.

Each building fire produces surprises. Over the past 10 years the toxicity of burning carpets, drapes, and furniture has forced the cocooning of firefighters in masks and protective gear. It is no longer safe to breathe inside or near a burning building. Even a dumpster fire can be lethal; in one case, the explosion of an aerosol can propelled its steel mixing ball like shrapnel and killed a firefighter.

Hydraulic shock-absorbing cylinders on burning automobiles act like twin aerosol cans. They explode and shoot bumpers, which break arms, legs, and backs. And gas tanks never seem to explode as glamorously as they do on television.

To avert problems with new and unpredictable materials, one Canadian firefighting company now employs a computer that ties directly into a "hazard hotline." The user types in a description of the burning building. Printouts tell the composition of burning material, the manufacturer, and how to contain the fire. The computer also diagnoses toxic symptoms and prescribes antidotes. The company plans to equip a van with a terminal and take it directly to the fire scene.

Of course, laboratory tests are performed on all new products to discover how quickly individual assemblies burn. But test results are not always good indicators of field performance. In actual fires, these assemblies act differently. Moreover, materials are listed as parts of assemblies. Underwriters Laboratories, a major independent testing lab, specifically warns against rating any material independently of an assembly listing. That is, a structure is not made fire-resistive because someone nails gypsum board onto it. Another complicating factor is that lab tests are conducted on assemblies with limited air supply. In an actual building fire, oxygen may be unlimited.

Perhaps the most dependable diagnosticians are firefighters themselves. There are signs, they say, that tell them how a building is reacting to fire. For example, falling plaster may indicate moving joists, a sign that collapse is imminent. In fact, some firefighters claim they can predict by its noises and cracks when a building will collapse. Materials and assemblies that firefighters watch carefully include:

- Metal fasteners. Lightweight nailing plates and joist hangers, firefighters say, do not have to be on fire to fail. Studies indicate that heat causes the points to char the wood in which they are embedded, so that the plates fall off. Trusses can fall in 10 to 15 minutes. Firefighters climbing on roofs to ventilate the building fall into the fire along with the roof-installed mechanical units.

There are many stories of houses framed with glue-laminated wooden joists ignited by a plumber's propane torch. In one, firefighters were on the scene in four minutes, but the fire already had burned through the first-floor composite wooden joists and was beginning on the second. Typical town houses framed with lightweight wooden trusses offer little obstruction to fire's lateral movement. Fire stops are often inadequate or missing. There are flame-spread ratings in the catalogs of commercial building materials, but not in the household market.

- Old ceilings. The three ceiling materials found in old buildings are plaster, wooden matchboard, and embossed steel. Plaster on wooden lath resists the passage of fire, but, when it is old and has lost its moisture, plaster tends to fall early in the fire. This exposes the highly combustible wooden lath, and the fire finds an easily ignited and rapidly burning supply of fuel.
- Insulation. To conserve energy, it has become common practice to install insulation batting above the ceiling on the uppermost floor. In a fire, the insulation causes heat to be retained in steel stringers, which carry heat farther and fail sooner than they would if uninsulated.
- Tin ceilings. Embossed sheet metal, or "tin," ceilings were required by some past codes that assumed, because the material is noncombustible, it would stop the passage of fire. However, metal transmits heat by conduction. In one reported instance, paint ignited by conduction in a tin ceiling fell into flammable merchandise. Fire quickly spread throughout the store.

Tin, like wire lath, causes nasty lacerations to firefighters. Due to the booming restoration market, old tin ceilings in good condition command premium prices and are back again as a popular material.

- Fiberboard. Developed over 50 years ago, fiberboard was

quickly and easily erected as covering and insulation. Joints often were covered with wooden battens. Fiberboard is easily ignited, burns tenaciously, and moves from moderate burning to explosive flashover in a matter of seconds. Firefighters have been killed, even in controlled drills, when they did not recognize the extreme combustibility of this material.

The board can be ignited by the heat from a defective fluorescent fixture. In one instance, a 100-watt bulb started a destructive computer-area fire.

• Combustible acoustic tile. These tiles have been used to deaden sound and to rehabilitate deteriorated plaster ceilings. Studies of pictures of Boston's Coconut Grove disaster of 1942, in which 492 people died, clearly show the ceiling covered with combustible acoustic tile. Thousands of feet of this material have been concealed by remodelings in which suspended ceilings that themselves met code requirements were hung below the combustible tile.

• Combustible voids. Any low ceiling area in an old building should be examined. It will probably conceal a series of combustible voids. In one case, firefighters searched 45 minutes in a century-old building to locate a fire hidden in the highest of four ceilings.

In an older building in which sprinklers are provided below the new ceiling, the voids above are unprotected. A new tin ceiling installed below an old one creates an impenetrable membrane. A fire in a factory building converted into apartments seized control of a labyrinth of interconnected spaces in the hung ceilings. It took 16 fire truck companies to locate the fire.

• Adhesives. A New England hospital corridor had an overhead pipe chase concealed by combustible tile glued to a gypsum board ceiling. The tile had been painted with an intumescent coating; nevertheless, fire that erupted out of a laundry chute roared down the corridor ceiling, killing 16. The combustible adhesive increased the flame spread of the tile tremendously. Las Vegas's MGM Grand Hotel, which burned in 1980, had 12 tons of combustible adhesive holding up the tile. When tile is nailed to furring strips, it creates a hidden combustible top surface over which fire spreads very rapidly.

• Carpeting. Decorating walls and ceilings with carpet has been common practice for many years, but only recently has carpeting begun to be tested for fire resistance. The hazard is therefore often unrecognized.

• Gypsum board. This, the most commonly used ceiling and wall surface product, is a wonderful material that absorbs rather than yields heat energy when tested in pure oxygen, but it is woefully misunderstood.

Taping and nail setting are not simply cosmetic touches; they are a necessary part of the fire-resistance system. Also, the gypsum sheathing contains pinholes that will admit fire to a void above. Nothing can be done except to recognize that fire will penetrate. Moreover, there is a substantial difference in fire resistances of rated and unrated gypsum board.

• Grid ceilings. A ceiling of gridded tile meeting flame-spread requirements was showing light smoke. When the ceiling was opened, a burst of oxygen to the smoldering fire caused a backdraft that blew the ceiling down. Firefighters were trapped by the grid and, like gladiators in an opponent's net, thrashed around in the darkness until their air was exhausted.

• Tilt-up slabs. Tilt-up wall systems have proven fatal. The usual rule of thumb is that, when fire collapses a building wall, the wall will fall one third of its height outward from the base. However, when a tilt-up section releases, it pivots down the full height of the building. On a 30-foot building, the wall may fall outward 24 feet.

It may be impractical and perhaps impossible for architects to design truly fireproof buildings. One thing an architect can do, though, is involve the fire official as early in the design as possible—before the owner sees the design and likes it, before it is too late to change.

Talk is free and saves a lot of headaches later. Fire officials can offer the architect a wealth of personal experience, and the earlier it is tapped, the better. Codes, local amendments, unusual conditions, zoning, type of area growth, water supply requirements—the conditions of the particular jurisdiction that greatly affect design and costs—are available for the asking. Sprinkler the building? How to provide site access? What about the width of roadways? Some designers appear to think fire departments arrive in land rovers.

Fire department officials will want to see that at least minimum firefighting equipment has been put into the building and that fire access is adequate. Access is critical, for it relates to time. Minutes—even seconds—in the early stages of a fire save lives. Does access conflict with landscaping? Where are the hydrants on and off site, and how can hookups be made? Where are sprinklers and standpipes located?

Perhaps the most significant thing to know is that all fire departments do not fight fires in the same way. Some local codes are specific about access; others are not. Each jursidiction searches for reasonable solutions, and the decisions are recorded for future reference. For example, some departments have the first engine lay a hose from the hydrant to the building—a procedure called a "straight lay." Others do the opposite: they drive a pumper to the fire and have a second engine lay the hose from the pumper to the hydrant, in a "reverse lay." Access requirements differ for the two methods. Also, firefighters need access to both front and back of the building. If more access is available, all the better.

The fire department will plan a building-specific strategy and procedures for responding to alarms. Building locations dictate different strategies, and time of day is important. A school at 2 in the afternoon and at 3 in the morning presents different problems. A nursing home at any time involves a uniform strategy, as does a large building.

Fire chiefs delegate strategy planning to station commanders or line officers. Procedures are left to the individual station's discretion, within established guidelines. Because making the right decision is critical, station officials will try to get a lot of information, engendering the common complaint of architects that it takes forever to get plans approved. We have shown some of the reasons, as the fire reviewer sees them. The architect can design a building, the developer build it, and both walk away. The fire department has to worry about the building the rest of its life. □

The author acknowledges the following persons for their assistance with this article: Bryan Duck, firefighter, Laurel, Md.; Bruce W. Hisley, National Fire Academy, Emmitsburg, Md.; Janet Tetley, Fairfax County (Va.) Fire and Rescue Center; George Calomiris, AIA, Washington, D.C.; firefighters in Winnipeg, Canada, Washington, D.C., Fairfax County, Va., and Emmitsburg, Md. Additional information was taken from the article "Ceilings and Suspended Loads," by Francis L. Brannigan, published in Fire Engineering, *March 1987.*

Adding Sprinklers to Buildings

n increasing number of codes are requiring that it be done.

y M. Stephanie Stubbs

his article was adapted from two stories in Factory Mutual Rec-d, the Magazine of Property Conservation, *published by the ctory Mutual System of Norwood, Mass. The Factory Mutual stem is a nonprofit loss-control service corporation, compris-g insurers, Factory Mutual International, and FM engineering d research. Its mandate is to assist policyholders in the pro-ction of their property. We thank Madeleine G. Andersson, ctory Mutual's public relations specialist, for her assistance preparing this article.*

ver the past decade, many states and local muncipalities, such New York City, have adopted legislation through building des and fire codes requiring that all new high-rise buildings corporate automatic sprinkler systems. But in late 1986, the mmonwealth of Massachusetts, recognized as a forerunner stringent fire safety laws, became the first state to pass legis-tion mandating that automatic sprinkler systems be installed *all* high-rise buildings, both new and existing.

The Massachusetts law is tough, and it carries design ramifi-tions not only across the state but potentially for other juris-ctions, including New York City and the state of New Jersey, nich are likely to follow suit. The law requires that every build-g of more than 70 feet in height, constructed prior to January 1975, must be protected with an adequate system of automatic rinklers in accordance with the provisions of the state build-g code. (Exceptions are allowed for certain occupancies, cluding public and private libraries and patient rooms in hos-als.) The head of the local fire department is responsible for forcing the provisions.

The schedule for compliance is indicative of the seriousness the law. Any building subject to the provisions of the law must mply with the following schedule for the installation of auto-atic sprinklers: one-third of building gross square footage must equipped with automatic sprinklers by January 1, 1990, two-rds must be equipped with automatic sprinklers by January 1993, and the entire gross square footage must be equipped January 1, 1997. Provisions are made for building owners to ply to the fire chief for waivers and extensions or modifica-ns of the schedule.

Building codes traditionally have been less strict with existing gh-rise structures compared with new construction. Municipal-s seem reluctant to enact legislation requiring that sprinklers retrofitted in buildings that have been standing for years, on basis that retrofit applications may be economically unfeas-e and impractical. Proponents of sprinklers, however, argue t existing buildings present enough other types of fire pro-tion problems to bring sprinklers into the realm of feasibil-

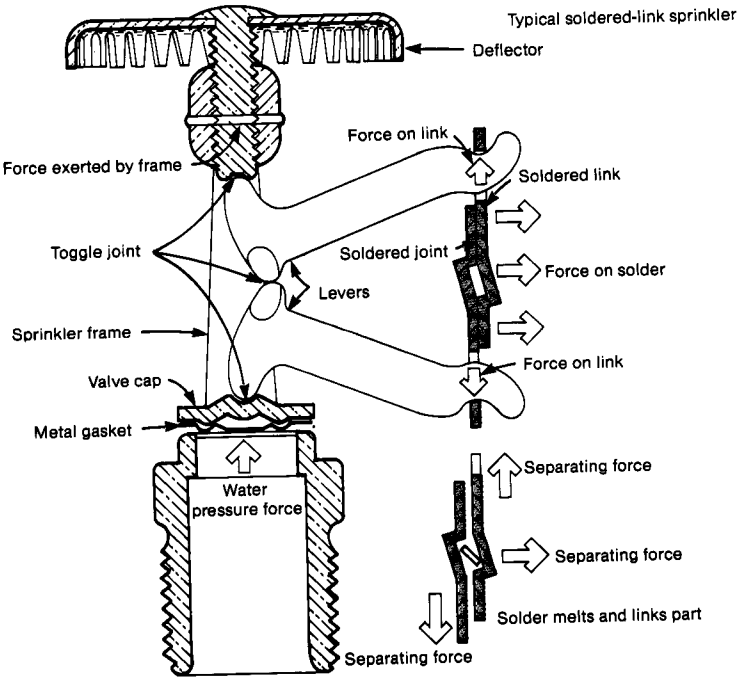
Automatic sprinkler systems, because of their ability to dress a wide range of fire protection deficiencies, can in many es be the "right" solution to rehabilitation problems.

Many building owners are beginning to recognize the bene-of sprinkler protection for existing buildings.

Retrofitting sprinklers takes a large commitment to make it rk," says John McCormick, P.E., fire protection engineer and manager of the Washington, D.C., office of Rolf Jensen & Associates. "For example, we are seeing a major change developing in the hospitality industry. Most of the larger hotel chains are retrofitting sprinklers, as well as fire alarm systems, into their existing buildings. The trend has evolved slowly, since the occurrence of large hotel fires in the late 1970s."

Determining the type of sprinkler protection needed for an existing building requires an individualized analysis of its construction and occupancy, including the following points.

- Exposure—In older buildings, particularly those with plaster ceilings, one of the first decisions the design team makes is whether sprinkler piping can be left exposed. While buildings with large open areas make sprinkler installation relatively simple, additional expense will result if it is necessary to break through ceilings and walls. "Frankly, in occupancies like hotels, one of the architect's major concerns is how to hide the pipes," says McCormick. "One common solution is to run piping down both sides of the corridor and branch it off into each room. That way you don't have to run piping across the hallway." McCormick cautions that covering for piping, such as soffits, must meet current code.
- Ceiling height—Many older buildings have high ceilings, which may be a spatial blessing but are a potential detriment to maximum efficiency of the sprinkler system. Sprinklers are activated by heat, and, if placed too far above the combustibles, may take too long to activate and may not be as effective because of the high clearance.
- Finishes and furnishings—The interior finish and furnishings of an existing building also should be carefully examined, both for excessive combustibility and, in the case of wide equipment



such as large shelves, tables, and ducts, for the tendency to shield a fire from the sprinkler discharge. This may require additional sprinklers below the obstructions.

• Placement—Sprinkler installation itself also may cause retrofit difficulties. For example, interior obstacles may limit the use of lift equipment, commonly used for system installations in new buildings. The installation process may require scaffolding or telescoping platforms. In addition, certain production processes may need to be shut down so that installation work can be conducted, and equipment such as computers often must be covered to guard against work debris.

• Vertical openings—Older buildings being evaluated for sprinkler retrofits may also contain vertical openings, which need to be fire-stopped to inhibit spread of fire from floor to floor.

• Loading—The added weight of the water-filled pipe must be considered in the dead load calculations for the building to ascertain that the roof design capacity is adequate. The dead load capacity generally is determined ahead of time by a structural engineer for the building owner. Buildings located in seismic zones and in flood-prone areas require special sprinkler system designs.

On the positive side, the engineering for a system installation in a completed building can be more precise because all other ceiling piping and ducts are already in place. Routing of sprinkler piping around ductwork, electrical cables, and fuel and production pipelines can be arranged with certainty. Architects considering the retrofit of sprinklers in an existing building should also be aware of the ramifications of sprinkler systems on adherence to other parts of the building code or fire code. To avoid excessive redundancy of protection, many codes offer the benefits of trade-offs if a sprinkler system is installed. For example, building codes almost universally permit the elimination of certain horizontal and vertical compartmentation and enclosures in fully sprinklered buildings.

Codes permit buildings with sprinklers to have fewer fire walls and wider fire-wall openings. Other advantages of sprinkler installation include the savings in overall costs through code trade-offs permitting more economical types of construction, fewer fire walls, less space between buildings, and less restrictive arrangements of occupancy.

Most jurisdictions require that sprinkler systems be design in accordance with the NFPA 13, Standard for the Installatio of Sprinkler Systems. The current edition of NFPA 13, releas in April 1987, contains updated information on both design a installation of sprinkler systems. New subjects covered in the standard include required alarms in high-rise buildings, manc tory installation of sprinklers in library stack rooms, and requir ments for protection of piping against damage in earthquak prone areas.

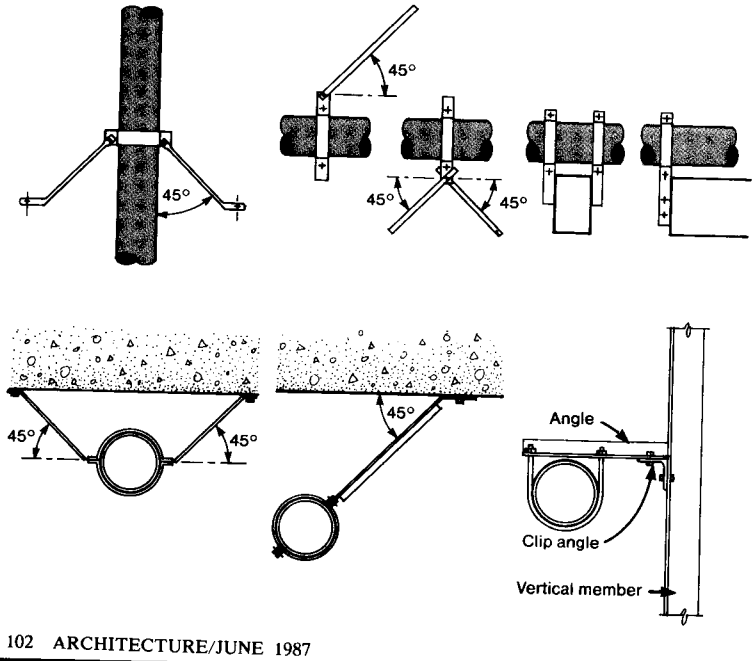
Currently, sprinkler systems are designed in two basic ways by hydraulically calculated designs or by pipe schedule rules. Hydraulically designed systems optimize the available water su ply. In these systems, pipes are sized to provide a prescribed water density distribution with a reasonable degree of unifor ity over a specified area. The primary advantage of a hydraulic ally designed system over a pipe schedule is that of lower ini- tial cost. Most retrofit systems are designed using this metho

In a pipe schedule system, the number of sprinklers fed by given pipe size is determined by schedules given in sprinkler installation rules. Piping may be arranged in any one of sever configurations. The economic advantage of a pipe schedule sy tem is that it can more easily adapt to occupancy changes tha increase the amount of water needed for adequate fire protec tion. Reinforcement of hydraulically designed systems can be relatively expensive.

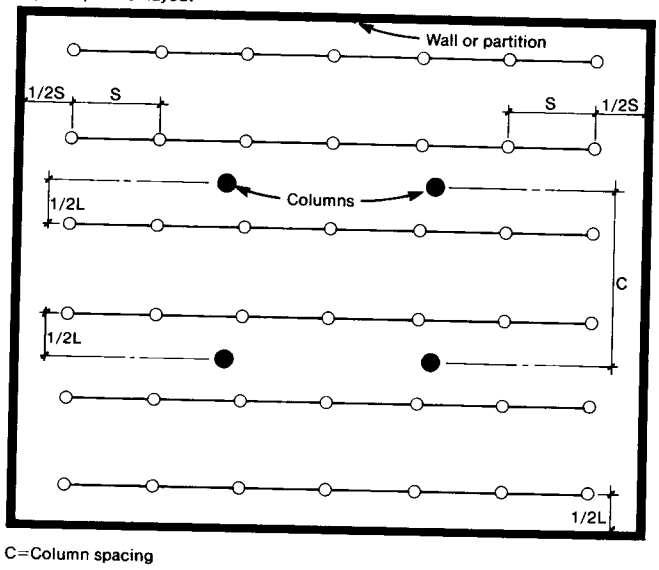
The temperature ratings of the sprinklers and the spacing c the individual sprinkler heads are determined by the occupan being protected, and to some extent by the type of constructio Lower temperature-rated heads and greater per-head spacing c be used at less hazardous locations. Sprinklers with higher ten perature ratings are generally used for more hazardous occupancies.

Whether an existing building's water supply can handle a spri kler system is of primary importance to the sprinkler designe Automatic sprinkler systems imply an automatic water suppl that is, one not dependent on manual operations. Water suppli can be provided by a number of different sources. A public water system that can meet pressure and discharge capacity requirements of the system design would be the most desirab For taller high rises, generally over 15 stories, even a strong pu

Sway bracing



Typical sprinkler layout



C=Column spacing

L=Distance between branch lines, limit 15 feet

S=Distance between sprinklers or branch lines, limit 15 feet

lic water supply will not meet the pressure and capacity requirements on the upper stories because of pressure losses from elevation differences.

Though design of the sprinkler systems for high-rise buildings now generally falls into the realm of the fire protection engineer, the architect should have a basic understanding of what is needed for the system. "The major concern for retrofitting sprinklers is what's available from the street, the city water main," says McCormick. "The domestic water supply normally doesn't provide adequate pressure and flow for sprinklers.

"When the pressure supplied to the building isn't high enough —a fairly common situation—the most prevalent solution is putting a fire pump in the basement. Another, less tenable solution is mounting a fire water-tank, which must be located above the sprinklers, probably on the roof. The tank takes up a lot of space and creates a large dead load, which might cause additional problems for an older building."

In certain fires, automatic sprinklers are more efficient than hose streams directed through windows from outdoors or through heavy smoke. For example, large buildings with few doors and no windows make it difficult to gain access to the area of the fire. "Often, people question us about the degree of water damage that will occur when the sprinklers discharge, thinking that if there is a fire, all the sprinklers in the system will go off," says Craig Studer, a sprinkler designer in Rolf Jensen's Deerfield, Ill., office. "Sprinkler operation, except in deluge systems, is normally limited to a few sprinkler heads in the immediate area of the fire, and the water damage is usually less than the equivalent fire damage. Another misconception the public has is that water from sprinklers, upon hitting the fire, will produce enough steam to obstruct travel paths. Again, this is not true, and the smoke and by-products of letting the fire burn create a much more dangerous situation."

To supplement the sprinkler system, hose stations to aid in manual firefighting should be provided on every floor, thus providing greater versatility of firefighting options at each level. The number of hose stations in each section of the building separated by fire walls should be such that all portions of each story are within 30 feet of a nozzle attached to not more than 100 feet of hose. More hose than that can become cumbersome and unwieldy and actually hamper firefighting efforts.

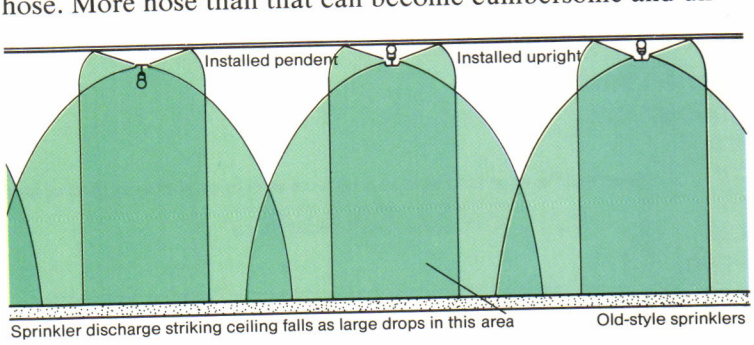
On structures with combustible roofs, or where there are combustible elements on the roof, a hose connection should be provided. A roof outlet also will help firefighters ward off the spread of fire from adjacent buildings.

Whether any fire can be controlled by automatic sprinklers or other means depends largely on detection in its early stages, and the designer should not discount the effectiveness of sprinklers as part of the detection/alarm system. Integrated sprinkler and alarm protection is particularly important in high-rise buildings, as there is an inherent delay in the arrival of the fire department at the fire area. Once local firefighters are notified, they not only have to travel to the scene but often have to load firefighting gear onto elevators, unload one or two floors below the fire, and carry equipment up the stairs to the hose stations. During this time, the fire is growing. Any delay between ignition and firefighting can be disastrous, and hence, proper alarm detection is essential to effective high-rise property conservation.

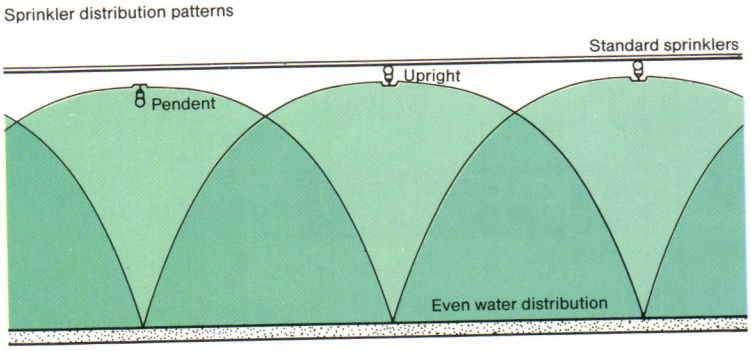
Sprinkler systems, when properly installed, serve not only as round-the-clock fire protection but also as an excellent fire detection system. A supervisory signal, separate and distinct from any other building supervisory signals, should be provided to indicate any condition that might impair satisfactory operation of the sprinkler system. Sprinkler control valves should be monitored, for if they are shut off for any reason, sprinkler protection is incapacitated. Fire-pump power supplies and operating conditions also should be monitored—an impairment to the pump could mean that the flow and pressure requirements at upper floors will not be met, or worse, that no water will be available. Water-level and temperature supervision as well as pressure supervision should be provided on all water tanks.

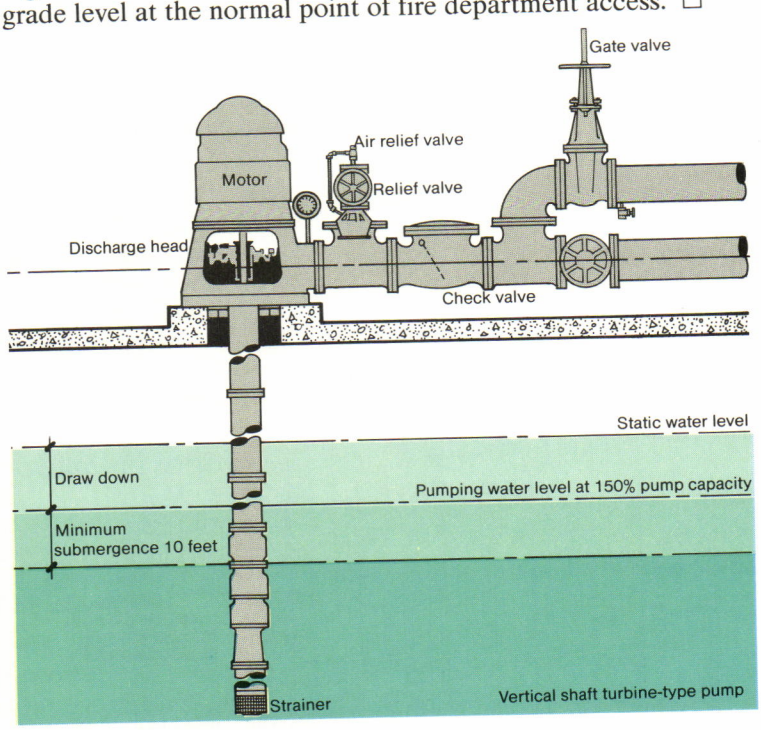
Sprinkler water-flow alarms should be installed on each floor. They serve as constant alarm protection, and also aid in pinpointing the seat of fires, since smoke infiltrating more than one story can result in "fires" being reported on several levels.

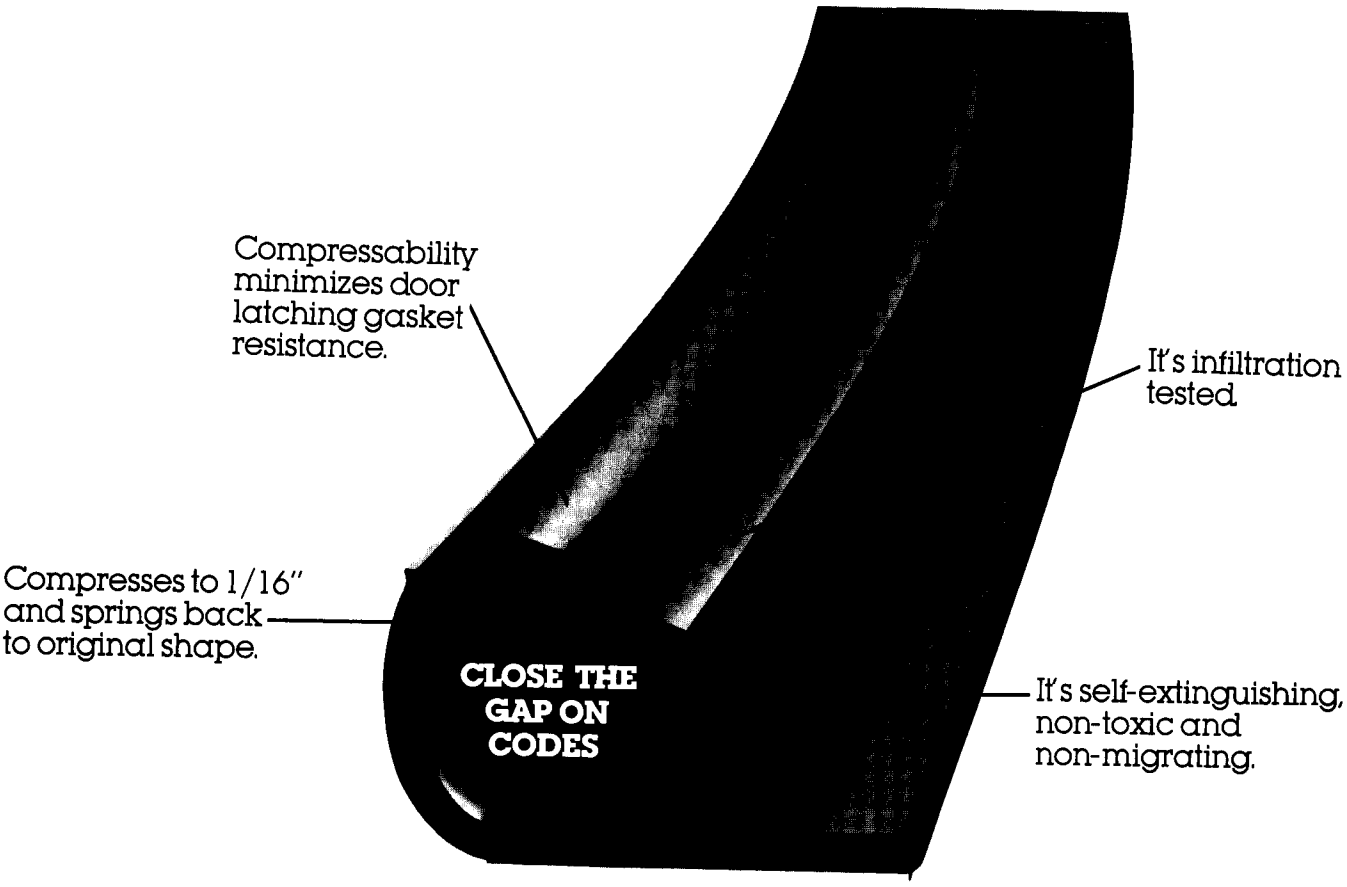
The water-flow device should be set so that the operation of a single sprinkler will actuate the alarm system. The operation of the flow device should be indicated on an annunciator and/or register in the building's emergency communications center, at grade level at the normal point of fire department access. □



Sprinkler distribution patterns







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Lighting Requirements for VDTs

They remain subject to a good many unanswered questions. By Douglas E. Gordon

With video display terminals (VDTs) infiltrating every conceivable workplace environment—from garage back rooms to corporate board rooms—VDT uses span a huge vista. In all the many different computer-screen settings there is at least one commonality, however: lighting that is comfortable for reading from paper documents is uncomfortable for reading from a VDT, and vice versa.

Lighting requirements for VDTs are no easier to meet than the requirements of more traditional office spaces, and probably no harder, either. In both cases there are still serious unanswered questions, such as the effect of light quality and lighting angle on visual comfort and perception. But what makes lighting for VDT users new and different enough to warrant attention is that, unlike light-reflecting paper documents, computer screens are themselves a light source and interact with ambient and task lighting in their own way.

As anyone who has tried to watch television in a sun-washed room can appreciate, the characters on a VDT screen are difficult to see when ambient light levels are high. The main reason for this is that contrast between the VDT characters (which are the light sources) and the background screen is diminished by ambient light reflected off the screen. The more contrast is diminished, the less visible are characters against their background.

The problem of finding a proper ambient light level for VDTs is compounded by the fact that VDT operators often must alternate glances from the light-emitting screen to light-reflecting paper documents. So architects who choose ambient light control as their only VDT lighting approach are restricted to a rather narrow light-level comfort range that encompasses both reading tasks. Too much light means eyestrain from screen glare. Too little light means eyestrain from reading poorly lighted paper documents.

Historically, most lighting systems have been designed for desktop illumination. Designers approached the old standard office environment with the assumption that a worker's line of sight during task performance is depressed approximately 20 to 40 degrees from the horizontal. With most VDTs, however, the required line of sight is at or near horizontal. This is significant because a horizontal line of sight means the light from overhead luminaires is likely to be reflected off a computer screen directly into a VDT operator's eyes.

Before tackling the newly evolving lighting requirements for VDT operations, a designer should first understand some fundamentals of light and human sight. Three terms vital to such an understanding are illumination, luminance, and luminance contrast ratio.

Illumination is the amount of light striking a surface. The metric unit of illumination is the lux (which is steadily overtaking the English footcandle as the standard unit of measurement). One footcandle is equal to about 10 lux. The optimum illumination for VDT operation is about 200 lux. But to accommodate reading of paper documents—for which 500 to 700 lux is an approximate standard light level—a compromise (often 300 to 400 lux) is necessary.

It is important to note, however, that although illumination levels are commonly used to delineate the limits of comfortable lighting, they are not actually measurements of user satisfaction. Other factors in the lighting environment—such as light-spectra range, room configuration, reflectivity of surfaces, distance from the floor, and the spacing between fixtures—contribute to the comfort level as well. A more subjective unit of measurement, visual comfort probability (VCP), rates the likelihood that persons using a given system would not be bothered by direct glare from the fixture design. For example, a VCP of 70 means that 70 percent of those workers seated in the worst location in a given space would not be bothered by direct glare from a lighting system composed of the type of fixture whose VCP is under evaluation.

Luminance is the amount of light reflected or emitted from a surface, and is measured in candles per square meter. Like illumination, luminance is sometimes a misleading rating because it ignores the effects of a rated lamp's surroundings. A coefficient that takes into account the mitigating effects of room finishes, furnishings, and configuration is the coefficient of utilization (CU), which is a measure of the efficiency of a fixture in a specified space. A lamp's CU is based on the percentage of its light that ultimately reaches the work area in question. A fixture with a rating of .50 delivers 50 percent of the lamp's output to the work plane.

Contrast is measured as a ratio of the luminance of an object to the luminance of adjacent objects or background. The luminance contrast ratio can be the comparison of characters to screen background or screen to wall-surface background. Though some guidelines set a range of acceptable contrast ratios for VDT screen lighting, such an approach usually is not practical because of the difficulty of measuring luminance accurately and consistently and because factors other than luminance contrast ratio—such as the size and the angle of reflection of the glare source—contribute to eyestrain. A less accurately quantifiable, but perhaps more appropriate goal in VDT lighting is simply to arrange the work space and lighting so that screens are free of any annoying reflection.

Two kinds of reflection create problems for VDT operators: veiling reflection and specular reflection. Veiling reflection is the unfocused glare of a light source shining on a diffuse reflector such as paper or matte glass. It reduces object visibility by increasing the light level of both object and background, thus reducing contrast between the two. Specular reflections are focused. The mirrorlike specular reflections on a screen may be of light-emitting sources, such as luminaires, or light-reflecting sources, such as nearby objects.

There are several approaches to overcoming VDT screen reflection. The selection of the best approach for a situation depends on work to be performed in the office, office layout, workstation configuration, ambient illumination level, window size and location, and VDT screen characteristics, not to mention whether the office in question is new construction or a retrofit.

The light from nonshielded ceiling luminaires located behind

a VDT station tends to be reflected off the screen into the operator's eyes, while luminaires in front of a workstation may shine distractingly into the operator's peripheral view. Operators can be shielded from direct down-lighting either with louvers or lenses on luminaires or with floor- or ceiling-mounted screens.

With new construction, a more practical solution than screening direct lighting might be to specify indirect lighting. By specifying a specular parabolic wedge louver on ceiling fluorescent lighting, with louvers having a typical cutoff of 45 degrees, the designer keeps reflective angles steep enough that the light doesn't shine or reflect into VDT operators' eyes. Because indirect ambient lighting provides a softer source of illumination than direct lighting, it poses a lower potential for glare.

Reduction of ambient light levels, either through dimmers or fewer luminaires, is another way to reduce glare. In such an approach, task lighting is probably necessary to adequately illuminate paper documents.

Task lighting allows some individual control over intensity and direction of work-space illumination, but it also limits flexibility somewhat. Task lights affixed to the floor, wall, or ceiling dictate what the layout of the office interior is to be, while task lights that sit on the floor or desktop take up otherwise usable space. Another characteristic of task lighting (and one that can be creatively exploited) is a nonuniform office lighting pattern.

Local lighting controls, including dimmers, further accommodate individual workstation lighting needs. Automated controls offer advantages of both local lighting control and lighting modulation for spaces not often used. As with traditional lighting systems, luminaire maintenance is important for keeping indirect and task lights at design levels.

The reflectance of interior surfaces also affects glare levels. A few rules of thumb in specifying interior finishes will help reduce glare levels. Walls and other surfaces with reflectance values of less than 50 percent and work surfaces of matte or nonreflective material in medium-tone colors reduce glare. To minimize visual irritation further, materials should not be black or white or any color combination that likewise produces overly sharp contrasts. Muted interior finish colors and specularly nonreflective tabletops also reduce peripheral distraction.

Windows are another major source of eye-tiring glare. When terminals are perpendicular to windows, the likelihood of both direct and reflected glare is significantly reduced. If terminal reorientation is not practical, emissivity-reducing window film is an option, as is a curtain or other shade.

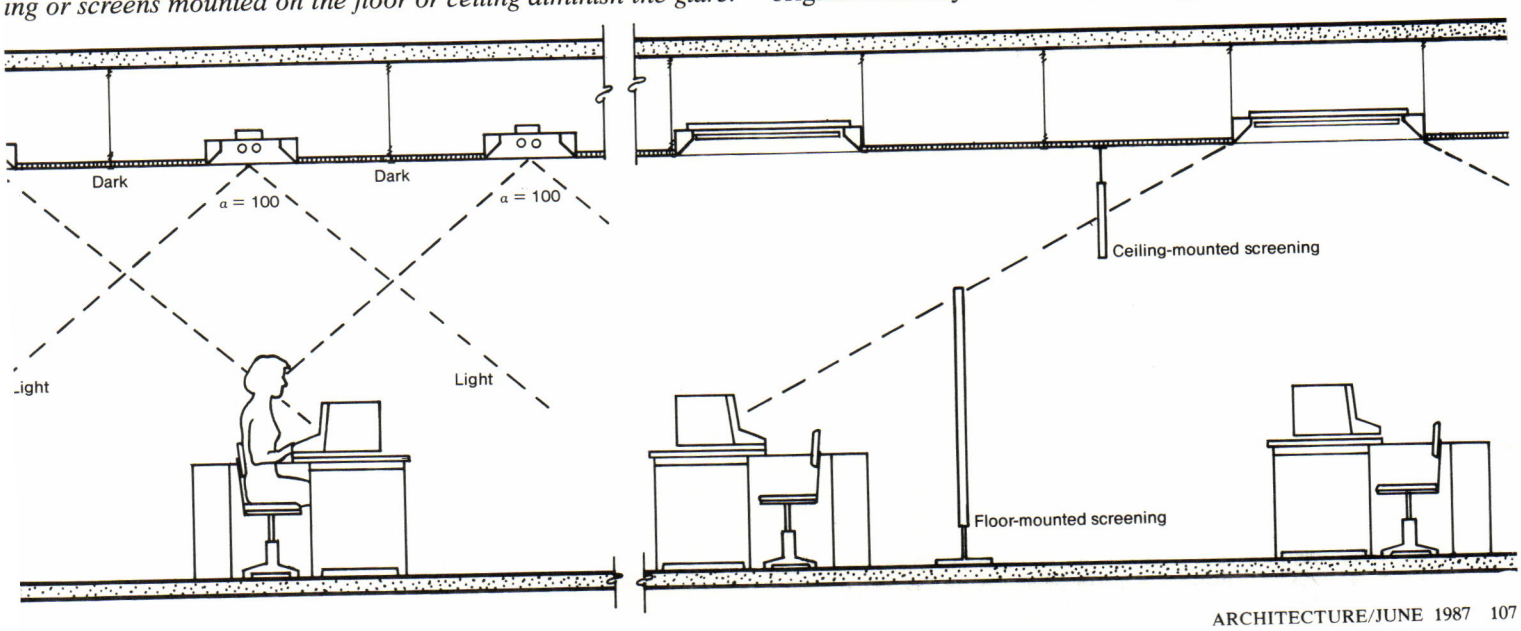
When the ambient light level is lowered to increase screen-to-background contrast, the possibility of dark areas in the room increases. Since shadows can cause as much discomfort to VDT operators as glare spots, reducing the ambient light levels is not always an acceptable approach, especially when persons not operating VDT terminals use the same office space as those who do. One way to keep ambient lighting high enough to satisfy both users and nonusers of VDTs in the same room is to modify the VDT screen itself.

Tiltable screens reduce the amount of light reflected into an operator's face by allowing the operator to adjust the screen angle until the angle of reflection is pointed away from glare sources. By tilting a screen backward 15 to 20 degrees or forward 10 degrees, the operator usually can eliminate annoying reflections. If the VDT screens in question are not tiltable, an adjustable stand will achieve the same result. A drawback to tilted screens is that some persons tend to tilt their heads in kind, negating the effect and resulting in posture-related discomfort.

Many different kinds of VDT-screen filters also are available to improve character-screen contrast. They work by reducing reflected glare to a greater degree than they reduce VDT character luminance.

Neutral density filters are the simplest type of contrast enhancement filter. Though the neutral filter material is transparent to all wavelengths of light, it allows only a limited percentage of that light through. The intensity of light approaching the VDT screen is diminished before it strikes the screen and again when it is reflected back toward the operator's eyes. Light emanating from the computer screen is filtered only once, however, so overall contrast is improved. For instance, if a filter allows 70 percent of outside light to strike the computer screen, after being reflected back through the filter the light is diminished to 49 percent of its original intensity. The light coming from characters on the VDT screen passes through the filter only once, so it reaches the operator's eyes at 70 percent of its original intensity. Therefore, although overall light intensity is

When angle α is greater than 90 degrees workers with vertical screens suffer from reflected or direct glare. Indirect lighting or screens mounted on the floor or ceiling diminish the glare.



lessened somewhat, character-to-screen-background contrast is improved. Still, VDT-screen filters may themselves create a specularly reflective surface unless they have an antireflective treatment, such as matte etching.

Color filters work on the same principle as neutral density filters, except that they allow only one color of light to pass and absorb all others. Color filters, which are usually green, are practical for monochrome VDT screens only. For example, if the monochrome characters are green, a green filter allows the character luminescence through but absorbs other light spectra. Since veiling reflection from ambient light is usually white light, a color filter eliminates most veiling reflections. Like neutral density filters, however, color filters do not inherently reduce specular reflection.

Micro-louvered, or micro-meshed, filters act on the same principle as window louvers. Very fine strands, aligned horizontally or meshed both horizontally and vertically, allow light rays to pass only if they are in alignment with the louvered openings. Character luminance passes straight through the filter outward, but ambient light striking the filter at an angle is blocked. Micro-louvers that are not embedded in plastic give off no surface specular reflection, but they do tend to get clogged with dust and are difficult if not impossible to clean. Micro-louvered filters that are embedded in plastic don't have the cleaning problem but do have a specularly reflective surface. Louvered filters also tend to distort screen images somewhat as the operator moves his or her head.

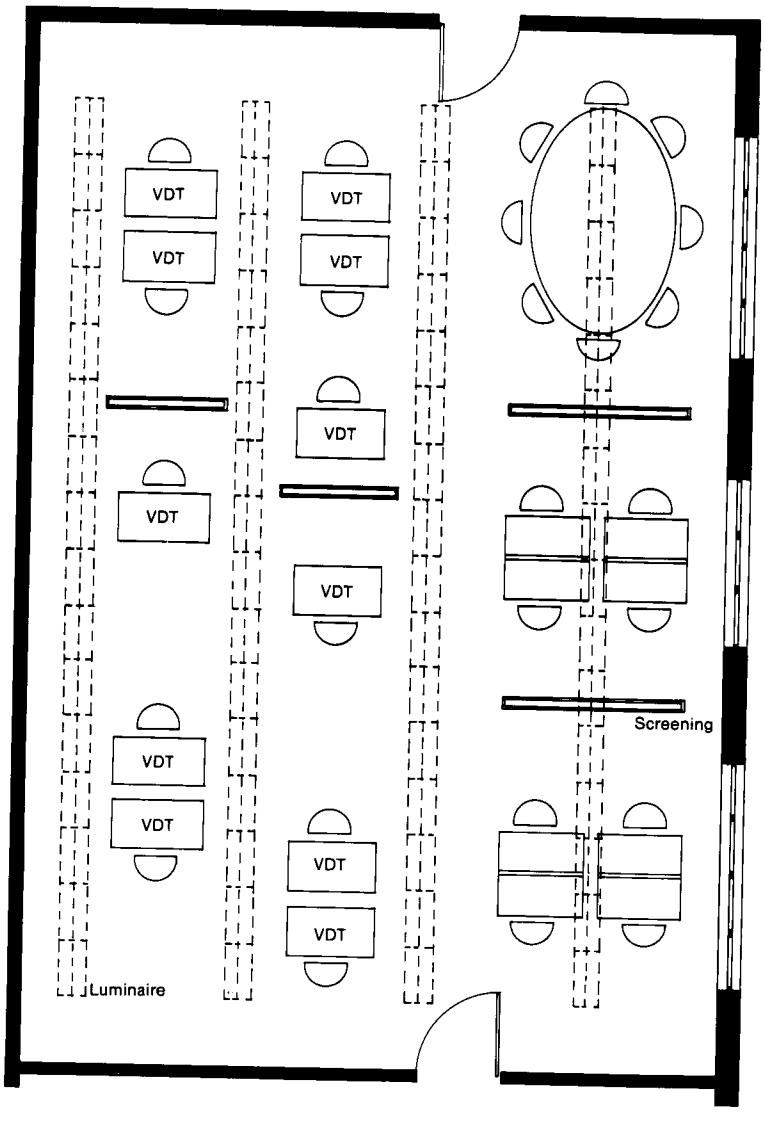
Circularly polarized filters are expensive but very effective in eliminating screen glare. Incoming light is circularly polarized as it passes the filter. The reflected polarized light is then blocked by the polarizing surfaces before it can pass back through the filter. Light from screen characters passes out unimpeded. When combined with antireflective coatings, polarized filters keep over 85 percent of the ambient light from being reflected back at the operator. Significant drawbacks to polarized filters are the ease with which their surface picks up fingerprints and the difficulty of removing the prints.

Though VDT-screen filters are effective in significantly reducing veiling reflections, most do little to reduce specular reflection unless they have a surface treatment that diffuses light. Such matte treatments reduce specular reflection, but the trade-off is a reduction in contrast between characters and screen background. Furthermore, matte surfaces do not entirely eliminate the reflected light, but instead tend to turn specular reflections into veiling reflections. Dust has the same effect, and tends to collect rapidly because of the static charge VDT screens build up. To eliminate the static charge, some filters are grounded.

An alternative to a filter is a VDT hood, which acts as a visor to block down-lighting from ever reaching the VDT screen. Because hoods often leave a shadow line at the screen edges, they are not as effective at blocking out strong ambient light as they are at blocking a single point source.

Ultimately, a successful VDT lighting solution may entail all, some, or none of the strategies described here. A VDT glare problem does not call for a prescriptive response; it calls for a response based on overall performance requirements. These performance goals, in general, include light distribution that creates minimal shadow/light contrast, with a brightness ratio (task lighting to surrounding light level) of no more than 3:1 in the immediate task area and no more than 10:1 in the total visible area; and light sources that produce minimal glare, are free of noise, do not generate an uncomfortable amount of heat, and are simple to maintain. □

VDT operators and nonoperators share space here with terminals placed away from windows to enhance contrast. Terminals are perpendicular to windows and luminaires to avoid glare.



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The Psychology Of Daylighting

A roundup of current research in a growing field of concern.
By Jacqueline C. Vischer

Illustrations by Forrest Wilson

Last fall, some 200 delegates from universities, design firms, scientific research establishments, and government attended the Second International Conference on Daylighting and Design, held in Long Beach, Calif. All the delegates are interested and active in lighting design and, in particular, daylighting.

Harvey Bryan, chairman of the conference and professor at the Harvard Graduate School of Design, sounded the conference theme. "Daylighting is an old and respected science," he said. "People have known for a long time about the therapeutic properties of light, and have tried to reproduce these in artificial lighting systems. A combination of the energy crisis and an interest in conservation, along with technological breakthroughs that enable us to simulate daylight more and more accurately by artificial means, have brought about a renewal of interest in understanding daylight and improving ways of introducing more daylight into buildings."

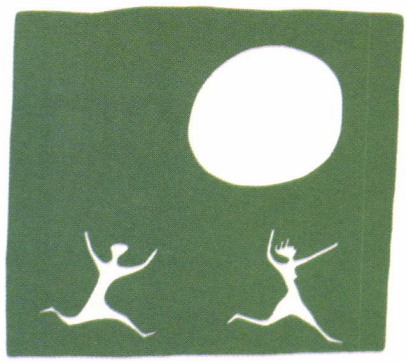
Quantifying the amount of light received through a given window is a far cry from understanding how people sitting, working, or otherwise engaged on the interior of that window will react. Is it simply a question of people liking daylight, as Benjamin Evans suggests in his overview of daylighting design (Feb., page 78)? Or is behavior with regard to daylight a complex mélange of psychological satisfaction, visual comfort, social status awareness, visual task requirements, thermal comfort, view interest, and user control over the physical environment?

One of the best-attended sessions in Long Beach was entitled "Psychological Factors in Daylighting." The discussion underscored the fact that traditional interests in sky measurement, light quantification, and instrumentation are yielding to evaluation of the effects of daylight and daylighting design on people at home and at work. The implicit assumption of designers and researchers that daylighting is a Good Thing and that providing people with windows and natural light is akin to motherhood and apple pie is being replaced by a genuine curiosity about the specific relationships among window design in buildings, the light that comes through the windows, and the tasks, health, and attitudes of people inside. This curiosity has brought about a new wave of research into the psychological aspect of daylighting design, to the extent that it has all the earmarks of a new discipline or field of study. The purpose of this article is to review and summarize some of this research for the designer.

Research into windows has focused on view rather than light quality. A possible reason for this is that occupant reaction to quality of light is a topic that seems to belong to the physiology of vision and thus has traditionally been separated from the field

Dr. Vischer is author of a forthcoming book, Environmental Quality in Offices.

of lighting design. Definite conclusions regarding the trade-off between energy loss caused by the poor thermal qualities of windows and the pleasure and satisfaction windows bring to building users cannot be drawn from the data available. In addition, a point not widely discussed in the literature is that a trade-off must be made between the energy-efficiency potential of large windows—more daylight and less need for electric lighting—and the thermal gain, glare, and other discomfort caused by oversized windows.



Studies of views have indicated that people prefer, first, views that contain natural elements, such as grass and trees, and second, views that contain people. Studies do not agree on which shape of window provides the most satisfaction; one study concludes that tall, thin windows are preferred, and another states that wide, horizontal windows are preferred (Collins 1975).

At the Long Beach conference, Judith H. Heerwagen reported findings from studies that indicated that people in hospital intensive care units with windows recovered faster than a comparable group recovering in windowless ICUs (Ulrich 1984). She suggested that looking at and experiencing nature from inside a building is more than an issue of satisfaction: as we remember our origins as outdoor hunters and gatherers, windows as access to the natural environment meet a profound and undeniable need in human beings that cannot be met by casual landscape design and interior plants and requires more understanding and responsiveness than building designers are used to exhibiting.

Much of the research on windows has focused on human preference, that is, preferred shape, size, and view. Yet people in offices often respond to preference questionnaires by stating that windows are not particularly important (Markus 1967; Cooper, Wiltshire, and Hardy 1973; Harris 1980). Nonetheless, European studies of underground work spaces imply that workers with no windows suffer from various psychological and physical problems (Sommer 1974; Wyon and Nilsson 1980).

Office-building floors are often so deep that 70 percent of the occupants of a floor may find themselves sitting so far away from a window that their work spaces are lit exclusively by electric lighting. Yet because the floor has windows to the outside and people can see them for part of the day, these building users do not complain that their offices are windowless. It is difficult to assess how building users are formulating their preferences in such a context; research has shown that building occupants consistently overestimate the amount of natural light that reaches their own particular work surfaces (McGowan 1985).

A recent study indicated that office occupants' proximity to windows was not necessarily related to their productivity (Wotton and Barkow 1983). Office workers appreciated any kind of contact with windows and did not need to be close to them or to have a specific view or window size. The study also found that occupants' feelings of health and well-being and their job satisfaction were not related to their productivity and might have had something to do with windows.

This important distinction between worker productivity and worker satisfaction is confirmed by Canadian office-building research. Daylighting and window proximity do not appear to contribute to occupants' ability to do their work (by their own assessment) but are significantly associated with their satisfaction with the environment. The traditional research emphasis on preference in window studies may be misleading: first, do people need windows, and second, what kind of windows work best? A contemporary reformulation of these questions might ask what combinations of natural and electric lighting in offices (and other workplaces) are most suitable and favorable for workers' tasks.

One of the conceptual problems with window research is its focus on people's preferences and satisfaction. Whether or not people like a view is just not a very significant research topic. It would seem from physiological evidence that natural light provides people benefits more significant than simple pleasure, and therefore that the function of windows to admit natural light is a more important research direction. According to the New York Academy of Sciences, which held a symposium on the topic in 1984, "photobiology," or the human need for light, is an increasingly important theme in lighting research.

The other window-related research area—the human response to natural light—is a part of the whole study of the physiology of vision. Because of the variability in amount and type of light windows can admit into a building, an important subtopic in the psychology of lighting is glare. Glare, which can occur in both natural and artificial lighting conditions, is defined as a combination of illumination conditions in which visual contrast is so poor that visual patterns can be identified only with difficulty.

The problem of glare is the conflict in visual adaptation: the visual field contains illumination of such disparate lengths that the eye is constantly re-adapting as it views the visual field. The eye can adapt rapidly to a brighter source, but it takes longer to adapt to a dimmer one. The glare situation draws the eye to the brighter source, making adaptation to the less bright area difficult and eventually uncomfortable.

Glare in daylighting design is often considered to be a function of window size relative to overall wall area. Efforts to reduce window-wall luminance differences include painting the wall a very light color or white, increasing the amount of electric illumination at the perimeter of a large area, such as an office, and reducing window size. However, small windows can cause glare if sky illuminance is bright.

Other theorists state that increasing window size is a better solution because the increase in overall light level that results from larger windows reduces the contrast ratio, thereby reducing glare (Illumination Engineering Society 1977). Windows that cause glare can also cause problems of increased solar gain. In such cases, building users seem to prefer to drape their windows rather than move away from them altogether.

For office workers, having a desk by the window is like living in the house on the corner: the location carries inherent status and prestige. In many buildings window proximity is systematically related to social status, with those higher up in the organization tending to have both window access and enclosed offices. An aspect of building-user behavior and daylighting that has yet to be fully explored is the effects of desk location on behavior in workplaces.

Windows have several advantages that electrical lighting systems lack. First of all, people feel they can control their lighting if they have windows. In most offices, the electric light switches control zones or banks of lights on each floor. The

switches tend to be located centrally; this removes them from a worker's control unless a specific switch has been provided for the worker's enclosed space.

A window, on the other hand, has drapes or shades that anyone can adjust; the individual user has control over the amount and timing of changes in the light and heat admitted by a window. Assuming that a sense of control over the environment is a desirable dimension of the building user's experience, the fact that the Canadian building-use surveys showed repeatedly that the one thing occupants feel they have control over is windows reveals a potentially significant contributing factor to building-user satisfaction.

Another reason why research gives rise to the belief that windows are important to occupants for more reasons than just the view to the outdoors is the widely recorded comment that occupants dislike fluorescent light (Heerwagen and Heerwagen 1984). It should be noted that this dislike has little to do with the amount of light they have in the workplace. Many building users will report that they have adequate or more than adequate light for their work in a conventional office lighting environment; but later comments tend to indicate a dislike of the overhead fluorescent lighting, to the extent that some have disconnected their own fixtures and others have requested or acquired some form of incandescent light fixture. Occupants who have, or who feel they have, natural light at work are less likely to complain about fluorescent light and less likely to report fatigue and eyestrain.

One possible explanation for people's preference of natural over fluorescent light has to do with the quality of light rather than window view preferences. One of the qualities of daylight is its changeability. Daylight in most climates varies continuously throughout the day as the sun goes behind the clouds, as clouds move across an overcast sky, or simply as the sun moves and changes the direction and source of daylight. Fluorescent light, even if the system is designed to meet IES standards and the amount of light is more than adequate for the task, does not vary.

However, too much variability is stressful and can increase contrast to such a degree that glare is produced. In response to this concern, lighting engineers traditionally have tried to introduce uniformity into the lighting environment at work. This may be desirable in terms of modern lighting technology, which cannot provide the subtle degrees of variability that are available outdoors. However, this emphasis on uniformly high overhead lighting levels in modern office buildings may be one of the reasons occupants find typical fluorescent lighting systems stressful. A recent research proposal is designed to try to determine desirable amounts of variability and directionality from occupants' behavior in daylighted conditions and to extrapolate these findings to electric lighting systems (Bryan, Clark, and Vischer 1985).

This overview of the state of the art of systematic inquiry into the human component of daylighting design indicates that there are more good questions than there are good answers. Most of the people who design or study daylighting in buildings agree with Evans that there are physiological, psychological, and esthetic benefits associated with daylight. What no one seems very clear about are the tricky questions of how much benefit is associated with how much and what kind of daylight, and how these physical and psychological benefits stack up against real and hidden costs.

The program on psychological factors at the Long Beach conference showed that tangible results are beginning to emerge in various research areas regarding daylighting and human behavior. Some of these results have been quoted in this article; others were reviewed by Evans in his.

But for each new finding a new and interesting set of questions emerges. Although the answers to these many of questions lie in more measurement, it is measurement of a different kind than has been traditionally associated with the daylighting field: measurement of human behavior and attitudes, of the physiological responses of the eye, of the effects of various building design elements on task accomplishment and efficiency, rather than measurement of sky illuminance and indexes of light transmission though different types of glazing. □

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Daylight and the Human Eye

Architects and interior designers have long raised questions concerning the biological consequences of depriving humans of the so-called natural spectrum of light distribution—that is, the natural illuminant under which the human species has evolved. The concern is that artificial lighting, by changing that primordial lighting condition, may produce undesirable biological effects.

Conventional wisdom has assumed that the natural illuminant for Homo sapiens was sunlight and skylight. However, according to Richard Corth, research scientist (now retired) at Westinghouse, this assumption contradicts the known facts. There is little or no evidence that the development of Homo sapiens took place in direct sunlight. Rather, evidence suggests that humans and their primate ancestors evolved in the greenish-yellow light of the forest. Anthropological data now also indicates that Homo sapiens developed in a forest environment, not on the open savanna. Adaptations of the eye, including spectral sensitivity and requirements for color discrimination, coupled with ultraviolet dose requirements for adequate vitamin-D synthesis, confirm this, Corth says.

Additionally, large doses of sunlight have proven harmful to humans, making questionable the assertion that we evolved in direct sunlight. A considerable body of evidence indicates that sunlight is a prime cause of skin cancer, aging of the skin, cataracts, and retinal degradation. "Natural light," whatever that may be, is certainly not sunlight in an open sky. Corth's research now points to filtered light, under a forest canopy, as the type most reasonably termed natural light for humans.

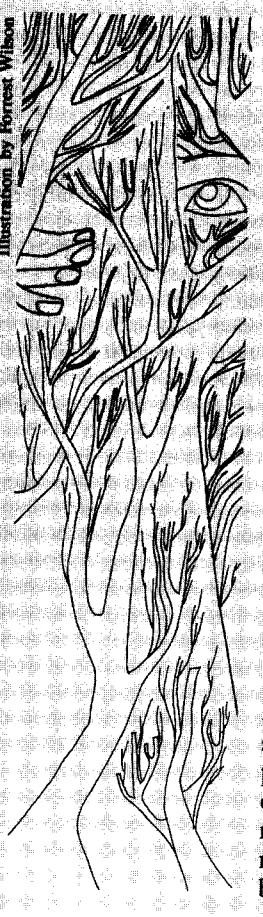

Illustration by Forrest Wilson

The spectral composition of natural light, regardless of whether the illuminant is sunlight, a sunlight simulator, or any of the artificial light sources now in use, should not be an issue of concern to lighting designers, says Corth. The light that enters the eye does not have the spectral distribution of its source, because the spectral composition of light entering the eye is altered by the spectral reflectivity of the colored surfaces in the environment. Unless the observer stares fixedly into the light source, or lives in a totally white or gray environment, he or she never experiences the unaltered spectral composition of the illuminant. Ironically, the distribution of the ubiquitous cool white fluorescent lamp, the subject of the most concern regarding unnaturalness, is similar to that of forest light.

The first primates, small arboreal creatures similar to modern tree shrews, appeared during the Tertiary epoch, some 80 million years ago. During this period, the climate was tropical and extensive forests covered most of the land mass of the earth. The primates evolved rapidly in these forests, and a great number of new species made their appearances. In Miocene times, between 25 million and 40 million years ago, geological changes marked the gradual shrinking of the great forests and the growth of savannas, a mixture of grasses and trees.

It has been postulated that an ancestor of Homo sapiens left the forest for these open-country habitats, which provided the evolutionary pressure that finally created the hominid. But the fossil record contradicts this. Areas where hominid fossils have been found varied from tropical rain forests and subtropical forests to woodland and bush, but not open grassland.

There also is convincing anatomical evidence that the early hominids lived in trees. Recent research has indicated grassland environments were not occupied by the earliest hominids and were, in fact, entered by this group relatively recently. Hominids venturing into open habitats were already bipedal, and their regular occupation of the savannas was not possible until intensified social behavior was well developed.

Thus, for some 80 million years the evolving primates experienced a light ecology that consisted of sunlight filtered through a forest canopy. The spectral composition of forest light includes some light entering the top of the forest canopy, which is absorbed in the foliage; some reflected light; some scattered from the leaf surfaces; and, finally, some light that comes through openings in the canopy unchanged.

Regardless of the variation in the density and spectral characteristics of the foliage, the light that comprises forest illumination is markedly different from the light that enters the top of the canopy. Moreover, all reasonable proportions of transmitted, reflected, and unaltered daylight lead to similar results—a greenish-yellow light with a maximum in the visible spectrum, near the peak of the spectral sensitivity function of diurnal primates, including human beings.

The close correspondence of this spectral distribution and the eye sensitivity of Homo sapiens can hardly be fortuitous. It is revealing that the human visual system displays maximum color discrimination in illumination of the spectral distribution of forest light. The fact that the retinal organization of the eye of Homo sapiens contains a disc-shaped fovea strongly implies adaptation to the forest habitat.

Many studies confirm the equivalence of the human retinal structure with that of the other higher forest primates. That the human retina has not changed would hardly be surprising, even if human evolutionary history did include the effects of open-country habitation. Two factors would militate against alteration of the visual system. Primarily, the structure of the primate visual apparatus is so complex that the comparatively short time postulated for habitation on the savanna could not be expected to produce significant modifications. Secondly, little ecological pressure would affect visual function in the open-country habitat, inasmuch as visual perception of the environment results from light reflected from the surface of objects.

The light coming to the eye on the savanna would therefore consist principally of sunlight reflected from foliage. The spectral composition of such light has a maximum in the yellow-green portion of the visible spectrum, as does forest light. The amount of direct sun and skylight entering the eyes is further minimized by the brow ridge and the recessed position of the eyes in the skull. One need only observe the deep shadows around the eyes of a person illuminated in the open sunshine to see how well shielded the eyes are from that intense illuminant.

—Forrest Wilson

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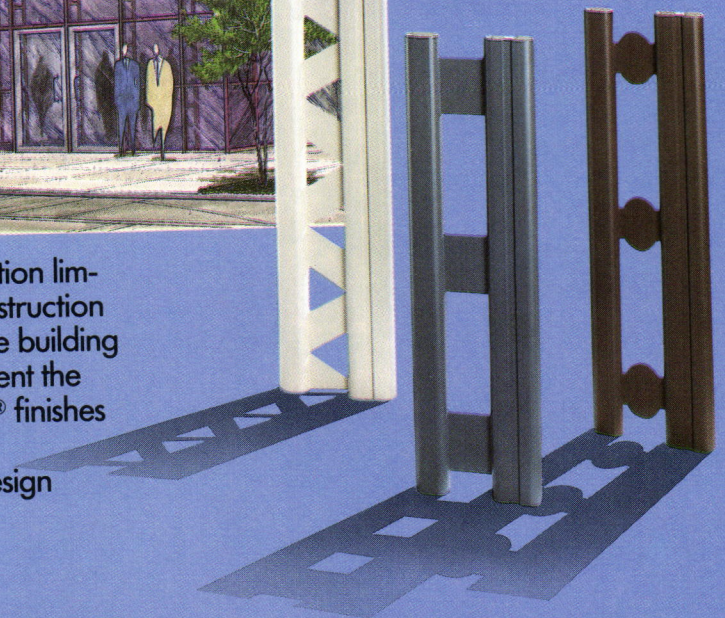

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Circle 37 on information card

The Uses of Computers in Management of Information

By Oliver R. Witte

Much of the work that an architect does, other than pure design, can be described simply as the management of information. The architect is expected to know, or to be able to find out, virtually everything about the building sciences.

Lawsuits often contain language to the effect that "the architect knew, or should have known, that...." That expectation places an enormous informational burden on architects, considering the vast and rapidly expanding body of knowledge about building technology, techniques, costs, standards, products, specifications, construction law... the list seems endless.

Furthermore, the architect's office is "information central" —the place where parties meet to resolve disputes and where records about who told what to whom and when may be maintained. And, in addition to what an architect is supposed to know, there is also a substantial amount of nice-to-know information, such as where the next client is likely to come from.

The job of collecting, synthesizing, and disseminating information can become overwhelming, especially for a small office. Just the volume of paper, after awhile, can accumulate to the point that it creates its own barrier.

Little by little, architects are discovering the ability of the computer to manage information. Typical applications include:

- On-line data bases. Equipped with a computer and a modem, an architect can research vast libraries from the home or office at any hour of the day or night.
- Specifications. Manual systems are being replaced by computer disks that make deletions and alterations quick and easy.
- Electronic catalogs. Product literature is becoming available on the computer screen. Data, pictures, and sources are produced at the touch of a button.
- Marketing. Merely maintaining a list of prospects is now old hat. The sharp marketing directors are using the computer to analyze their techniques to determine which sources and methods work best and which are most profitable.
- Computer-aided design. Information can be extracted from the drawing to generate schedules, analyze combinations of construction costs, and do quantity or area take-offs.

Beyond the scope of this article are computer applications for estimating, financial management, and scheduling.

Programs that manipulate primarily textual information are generally classified as data base management software. Of all the types of software, they have been among the slowest to gain general acceptance. Although the programs are becoming easier to use, they retain a contrary reputation. More significant, they require that someone manually type in all the data that the programs are intended to manage.

The alternative is that users tap into data bases established by commercial vendors. When architects want information about a standard, they need only dial a number and tell the central data base what information they want. The data base computer then flashes the answer back to the architect's computer, where it is read or printed out. Advantages include the assurance of current information and the ability to control costs based on use. You pay only for the time you use.

Popular data base services include The Source and CompuServe. Dialog claims to make available 115 million items from 250 separate data bases.

The problem with commercial data bases is that searching for what you need in these vast storehouses of information can be time-consuming, and the best scientific data bases charge about one dollar a minute. A new user can run up a mammoth

bill just learning how to conduct searches efficiently.

For specialized applications, such as specifications writing, some vendors will mail data disks to subscribers. Subscribers pay the cost of reproducing and mailing the disks. The data is as current as the last updating of the disks. MasterSpec, by AIA, is an example of a subscription data base.

Electronic catalogs are poised to make a sudden and sweeping impact on information retrieval techniques. McGraw-Hill has announced plans to introduce a family of data bases called Electronic Sweet's, starting in January 1989. The collection will debut in three parts—SweetSearch, SweetSpec, and Buyline—and within a year or two it is expected to contain 30 data bases including estimating and cost data, building codes, and agency and association specifications and standards.

Subscribers to Sweet's Catalog will be able to get a $115 compact disk that may be searched with a reader that attaches to the architect's computer. McGraw-Hill is betting that by the time the 1989 catalogs are ready to ship the price of compact-disk readers will have dropped substantially, to $300.

The new memory disk is also referred to as a CD ROM, for Compact Disk, Read-Only Memory. It has vastly greater information storage capacity than the kinds of disks widely used on the current generation of personal computers.

To use SweetSearch, the architect will specify criteria and the system will return a report on manufacturers, model numbers, characteristics, and the page number in the catalog where more information can be found.

On the same disk will be SweetSpec, an expert specification writing system that will emulate MasterSpec, according to a non-exclusive agreement with AIA. SweetSpec will automate the deletion process that now is done manually with MasterSpec. A front-end system guides the user through a series of questions intended to make sure that all pertinent issues regarding a specification are considered. The user then dials a toll-free number and feeds the answers into a central computer. When the user calls back an hour or two later, the central computer produces either the completed specification or a draft that the user can take into a personal computer and edit.

Also on the disk will be Buyline, which permits users to look up names, addresses, and phone numbers of local representatives for major products.

The system, as currently planned, is entirely text. Graphic details will be added a year or two later. McGraw-Hill has no immediate plans to replace its paper catalogs.

William D. Hooper Jr., AIA, senior manager of AIA's professional systems division, said, "We are contributing the MasterSpec language and the knowledge of our specification writers. SweetSpec is creating the logic tree and redigesting the technical information. It appears to have a lot of potential."

At least three companies expect to beat McGraw-Hill to the data base punch. They are Active English Information Systems, Canton, Ill., supplier of System George; Corbel & Co., Jacksonville, Fla., which has acquired StandardSpec of Chicago; and Éclat Intelligent Systems, San Leandro, Calif., maker of MicroSpec, a catalog data base with links to computer-aided design programs.

System George places volumes of text and graphic information on the computer screen for quick location. By making the information more accessible, the architect can avoid wasting time in searches that frequently are futile.

The system puts on the screen national standards, catalog information with pictures, specifications, and standard office drawing notes. The hardware consists of an IBM AT computer with two screens, one in color for graphics and the other for text. The data is drawn from the computer's fixed disk, an external laser/video disc, and a modem connection to a central computer in Canton.

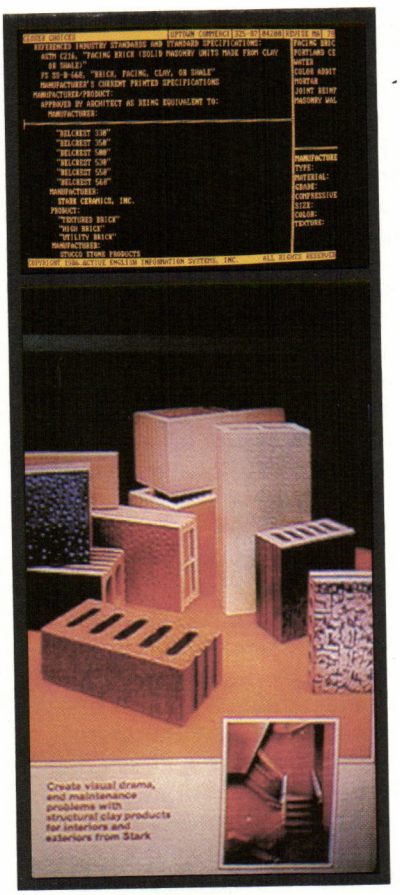
System George will help the engineer generate specifications, but it is more likely to be useful in generating drawing notes and in displaying information needed to issue timely instructions to field work forces. System George follows the 16-division master format of the Construction Specifications Institute, and displays standards by more than 200 associations. It also displays manufacturers' catalog information and monitors the time the designer spends looking at it, so that Active English can charge a fee to the manufacturers. The designer can request further information by using an electronic postcard.

The system normally is leased, not purchased, for $6,500 initially plus $500 a month, which pays for a computer with two screens and software. Updates are issued twice a year.

The Corbel system is described as a rule-based expert specification system. It works much like SweetSpec, requiring the user to answer questions, dial a central computer, and later retrieve either the completed specification or a draft to be edited. The service is estimated to cost $1,000.

Corbel has completed 49 specification sections and must complete between 50 and 75 before offering the system for sale, according to Robert J. Christiansen, vice president of operations.

MicroSpec is part of Éclat's integrated design system, due to be released for sale this month. It is an ambitious system that links computer-produced drawings, a data base, photography,



With the System George specification data base, a text screen guides users through the materials selection process and maintains a schedule. A graphics screen allows the user to peruse proprietary product information.

video images, product catalog information on a CD ROM, and job costing. The firm starts with the premise that an architect is in the data base management business and the drawing is a data base management tool. Touch a part of the drawing and the computer will produce the user's choice of a purchase order, catalog page, or video image of the site.

Éclat views McGraw-Hill's SweetSpec as a handoff to MicroSpec. In fact, Éclat intends to make its system compatible with McGraw-Hill's. After identifying the product criteria with SweetSpec, the architect would go to Éclat for the detailed catalog information.

If data bases created by others seem too expensive, the architect has the option of building a custom system. This is typically viewed as a job for conventional data base programs like dBase, Paradox, Smart, R:base, Reflex, PFS:File/Report, and Filevision. Prices range from $75 to $750.

The marketing department often is the first to make use of these programs. The simplest can be used to manage a mailing list and alphabetize, sort, and print labels. The sorting function is useful to rank prospects by probability of success or date they should be called or by zip code for lower mailing rates.

More powerful programs can juggle information in almost any conceivable way. Most early accounting programs for personal computers were developed from dBase II. Today, the marketing department might want more than just a list of prospects, sorted by some rudimentary criteria. The higher-level programs are relational, that is, they link multiple lists and permit sophisticated analysis of the information in several files.

The chief problem with data base programs is that they can be solutions in search of a problem. It's almost a Catch-22: to make the best use of a data base program requires that the user know precisely how to use it. But until you know the program and its capabilities, it's difficult to visualize what it can do for you. Prior training and follow-up technical support are crucial.

The advantages of linking CADD with a data base program have always held more promise than performance. It's still difficult to find an interactive system that can readily produce a room finish schedule, replace the tile in the executive offices with plush carpeting by typing in a new product number, and update the drawing automatically.

None of the evaluators in AIA's affordable CADD evaluation program report making substantial use of the data base extraction capabilities of their programs. Furthermore, CADD vendors have not been emphasizing these capabilities. Unless an architect is heavily involved in facilities management or construction management, the investment of time and effort currently required by most CADD-related data base programs is viewed as not worthwhile in most cases. Still, vendors, especially furniture and window vendors, are starting to supply libraries of symbols tied to proprietary information for their products.

But data base applications aren't limited to complex data extraction. Even simple forms such as letters of transmittal can be handled effectively with a data base program. Computerizing the application is valuable enough and difficult enough that it may be cost-effective to hire a consultant. The transmittal form used by Hanns Kainz Associates, AIA, a small San Francisco architecture firm, was developed with Paradox by a consultant, Computer Handholding. When the user enters the job number, the program looks in various files to enter automatically the date, time, job, address, and related data. The program then prompts the operator to be sure to enter what is being transmitted, the name of the recipient, the names of people who should get information copies, and the like. "When someone receives a copy of our transmittal letters, they see a familiar form that they know is filled out properly," Kainz said. "It's comforting to know that they know."

Charles R. Newman, AIA, of Naperville, Ill., needed the same capability but generated the format himself. In the process, he developed an intense dislike for the data base program he was using, but he said, "Even with all its bad features, it saved us hours of time." Like many architects who started out with the "best" programs, he has switched to simpler (and less expensive) software—Reflex, in his case—and contends that he is getting virtually everything he needs with a fraction of the effort.

A master detailing system, based on Autocad and linked to a data base, has been implemented by Sasaki Associates of Boston. Mark J. Kalin, AIA, director of information services for the firm, calls it "one of the most technically important and cost-saving uses for computer-aided design in an architectural office." Sasaki also has integrated its computer-aided design system with specifications. The firm uses manufacturers' details and has developed quick methods for studying site furniture in three dimensions.

When Crowley Wade Milstead of Kansas City, Mo., did a housing survey, it used a Smart system for an increasingly common reason: the client, the Corps of Engineers, insisted that the information be entered on a data base manager so that corps personnel could analyze the results.

Michelle A. Cohen, marketing coordinator of Architects Orange in Orange, Calif., had been using a Roladex, a calendar, and a file cabinet to track leads and prospects and produce the reports needed by management. The reports, which used to take a week, now are done in 10 minutes using a Smart data base manager. Her first attempt to computerize was with a simple, inexpensive system, but she found that it lacked flexibility and maneuverability. Now she tracks graphics, slides, and other promotional materials with her data base program.

Strock Architects, of Newport Beach, Calif., subscribes to MasterSpec but supplements it with data maintained on dBase III for sensitive components of special interest to the firm, such as built-up roofing.

Ultimately, the point of collecting information is to be able to extract what you need from it. With data base software, this means generating a report format—a maddeningly difficult process with most programs. With relational data bases, the user often must be prepared either to learn a bit of programming or to hire a consultant. Consequently, very few architects ever develop applications using the relational capabilities. Since most data base program reviews in computer magazines are written by data base experts, the theoretical advantages of a relational capability may be overstated for an architect.

Reports of how working architects are using the information-management capabilities of their computers are still difficult to obtain. Learning how to draw with the computer is a higher priority than learning how to extract and manipulate data from the drawing. Most of the work still is being done by consultants. Although they charge a fee for their templates or report formats, and although the formats might not fit every user exactly, users still find that they are saving time and money. Either data base programs will have to become easier and faster for end users or architects will wind up buying report formats and templates from third-party developers. □

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Improved Techniques Of Superinsulation

It is easy to imagine that superinsulated houses, in which R-values can reach R-60 or even higher, were dreamed up in the early 1970s by architects sitting in their cars, waiting in gas lines imposed by the energy crisis. Fifteen years later, with oil prices currently stabilized, we see few remnants of the crisis. Yet prudent designers, many of them in Canada and the northern United States, are still taking advantage of the energy savings offered by superinsulation. Both analysis and construction techniques for superinsulated houses have improved since they were first designed, and careful attention to materials, proper insulation, vapor and air barriers, and, not least, indoor air quality, can result in cost-effective structures, even in these days of cheap fuel.

Vapor and air barriers. When designing superinsulated houses, the designer should understand that airtightness has more impact on energy efficiency than do levels of insulation. Proper placement of the air or air/vapor barrier is essential. An air barrier can be a single material or layers of materials working as a system, such as drywall, framing lumber, and spunbonded polyolefin. If each layer in the system is properly installed and carefully joined, it will form a continuous air barrier.

Air leakage around penetrations such as doors and windows is the major reason moisture moves into walls, floors, and ceilings. The air barrier can be placed on the outside, the inside, or within the wall or ceiling. If placed on the outside, it must be permeable to water vapor so the wall is able to "breath out" moisture. The air barrier must be installed with a vapor barrier unless they are the same material, such as a polyethylene film.

The function of a vapor barrier is to prevent water vapor from reaching the cold parts of the wall, condensing, degrading the insulation, and possibly rotting the wood structure.

Polyethylene has become the most commonly specified air/vapor barrier, but kraft paper and foil also are used. Whatever the material, to function properly as a vapor barrier it must be nonpermeable and be installed on the warm side of the insulation, thus preventing condensation within the wall. When the warm, moist, inside air is drawn into the wall, it cools and then holds less moisture. If it is cooled enough, the air reaches its dew point, or becomes saturated, and condensation occurs. Placing the vapor barrier on the warm side of the insulation will prevent condensation within the wall.

The 1/3-2/3 rule states that, except in the most severe of climates, as long as a minimum of two-thirds of the insulating value of the wall is outside the vapor barrier, the dew point will never be reached at the vapor barrier. This 1/3-2/3 rule allows placement of plumbing and electrical services inside the vapor barrier, reducing the number of penetrations through it.

The advantage in using a polyethylene film is its dual ability to act not only as a vapor barrier but also as an air barrier. Since polyethylene material varies greatly in quality, it's important that the architect specify a film made from virgin resins. A cloudy film is a good indication that the material is made from reused resins, which will result in an inferior barrier. Specifying cross-laminated polyethylene films is also recommended, since they are stronger than regular polyethylene films and will stand up better to wear and tear during construction. If the contractor is unfamiliar with this type of construction, the architect should stress the importance of a continuous air/vapor barrier. Any accidental rips or tears in the film must be repaired before it is enclosed.

Insulation. Glass fiber batts are the most effective insulation material, at the lowest cost per R-value, available. The batts are manufactured either unfaced or with a facing material that acts as a vapor barrier. Since it's common practice to use a separate polyethylene vapor barrier, unfaced batts are preferable to avoid redundancy. Unfaced batts also make it easier to check for gaps and voids during installation, ensuring consistent and uniform coverage. Keep in mind that when glass fiber batts are compressed they lose a portion of their thermal resistance. Glass fiber batts should be specified to fit the wall cavity—trying to squeeze an 8-inch batt into a 5½-inch wall cavity won't significantly improve the thermal resistance, nor will it prove cost-effective. During on-site inspections, the architect should keep an eye open for batts compressed behind pipes or junction boxes.

Because the systems that use batt insulation require a wide wall structure to allow placement of enough insulation to achieve the necessary R-value, a number of systems have been developed using thinner rigid foam panels, either exclusively or in combination with the glass fiber batts. Rigid foam insulation is more expensive than glass fiber batts or cellulose, but it provides more thermal resistance per inch, making for thinner walls, which are simpler to erect. The foam insulation materials most recommended are extruded polystyrene, used mostly below grade; expanded polystyrene, commonly called beadboard; and isocyanurate and phenolic foams. All are marketed in board form with fireproof coverings, which should be exposed to the interior.

Extruded polystyrene is a waterproof insulation with a high R-value per inch, making it suitable for below-grade applications. But it is expensive, easily damaged during construction, and easily degraded when exposed to sunlight. Expanded polystyrene (beadboard) has the lowest R-value per inch of all the foamboard insulations, but it also is the least expensive. Polystyrene is flammable and will damage easily, and its quality, along with density, can vary from one manufacturer to another.

The isocyanurate and phenolic foamboards have a high R-value per inch and are usually bonded to a foil facing or kraft paper or are reinforced with glass fiber, which in some cases makes a fine air barrier. If they absorb water, the foamboards' overall R-value can be decreased. The contractor should follow manufacturer's directions, especially when installing them below grade.

Many types of superinsulated houses use a combination of these insulation materials. It's quite common to use batt insulation in the wall cavities and a foamboard insulation as an exterior subsheathing.

Indoor air quality. Because superinsulated houses are tightly sealed, the architect must pay close attention to indoor air quality. First, consider the possible sources of pollutants, such as outside air and soil, building materials, appliances, and the building's contents. When specifying building materials, steer clear of products containing urea formalde-

ıyde, asbestos fibers, mercury, and ɔrganic solvents. Careful scrutiny of manıfacturers' literature in the design phase, and of substitutions submitted by the contractor during construction, can eliminate those materials containing chemical pollutants. This is also true of the building's contents specified by the architect, such as furniture and carpets. If building materials containing these pollutants are used, steps should be taken to seal them from indoor air. For instance, material containing urea formaldehyde can be sealed with a vapor-barrier paint. This will reduce the amount of moisture that gets to the material and diminish the amount of the urea formaldehyde gas escaping into the building.

Where the presence of radon is suspected, the architect should require testing prior to design. If radon is found in the soil, steps should be taken to seal the building from air and water infiltration, especially below grade. A polyethylene moisture barrier around the foundation and basement walls and under the floor will isolate the house from any contaminated soil. Groundwater contaminated with radon can be diverted away from the building by means of properly placed drains embedded in gravel.

The architect should impress upon the mechanical engineer the need to isolate the combustion process of appliances from the indoor air. Specify a furnace or water heater with a sealed firebox that can be supplied with outside air directly. This can eliminate the possibility of flue gases being pulled back into the building. Have the engineer specify an induced-draft furnace and a water heater with fans to force gases up the flue.

Proper ventilation is more critical for a superinsulated house than for a traditional house, but unlike in the traditional house, ventilation in the superinsulated house is easier to control and less erratic.

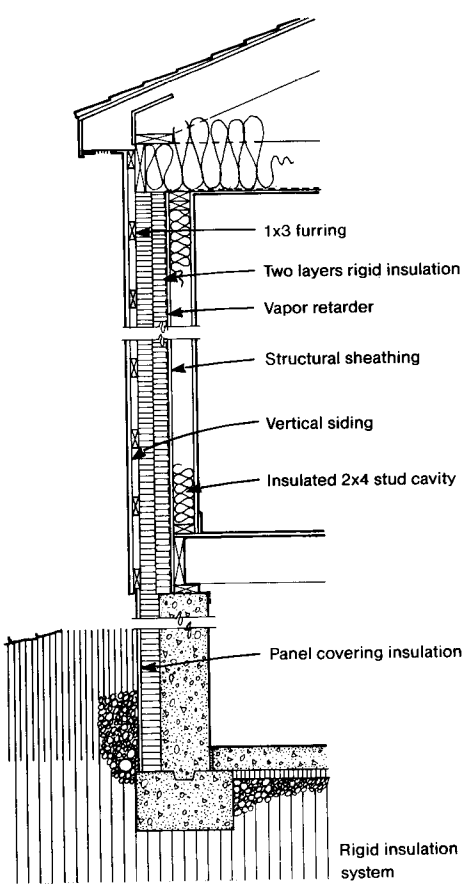
Mechanical systems. In selecting a mechanical system for a superinsulated house, the key is simplicity. In a properly designed superinsulated house, the heating-energy requirement should be low, so installing a complex heating system may not be cost-effective. These are some factors to consider when selecting a mechanical system: whether central or zoned delivery will better serve the design; what type of fuel to use, based on cost and availability; the ability of the mechanical system to interface with the ventilation system; and, finally, the up-front cost of one system over another.

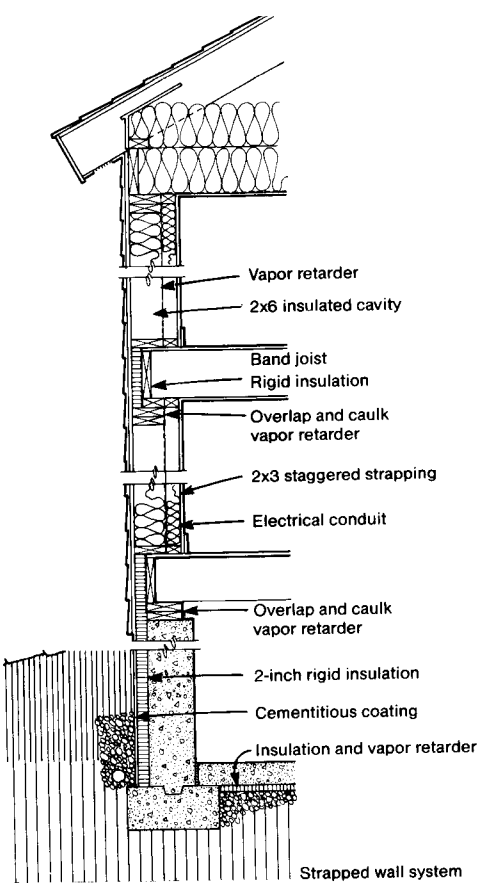
Once the system has been selected, careful sizing is required. The Btu output required is much lower than in a conventional house, so the traditional rule-of-thumb sizing calculations are ineffective and can result in an oversized system. Efficiency will be maximized if a room-by-room analysis is done prior to sizing the mechanical system.

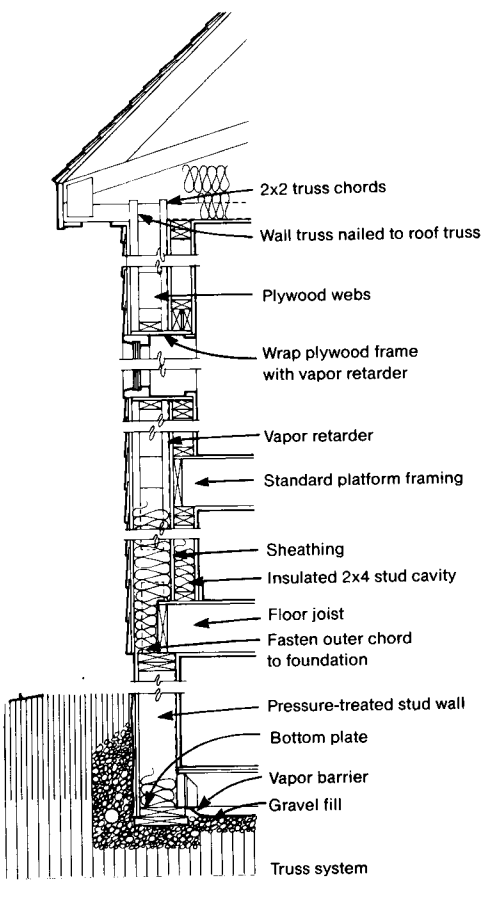
Construction. A contractor with experience in building superinsulated housing is an advantage because of his or her familiarity with the appropriate construction techniques and sequencing. To achieve a continuous air/vapor barrier, the construction sequence requires the outer walls and roof trusses to be erected first, then the air/vapor barrier installed, and finally the interior partitions erected and sheathed. This sequencing splits up the framing, electrical, and plumbing trades, often requiring more than one code inspection.

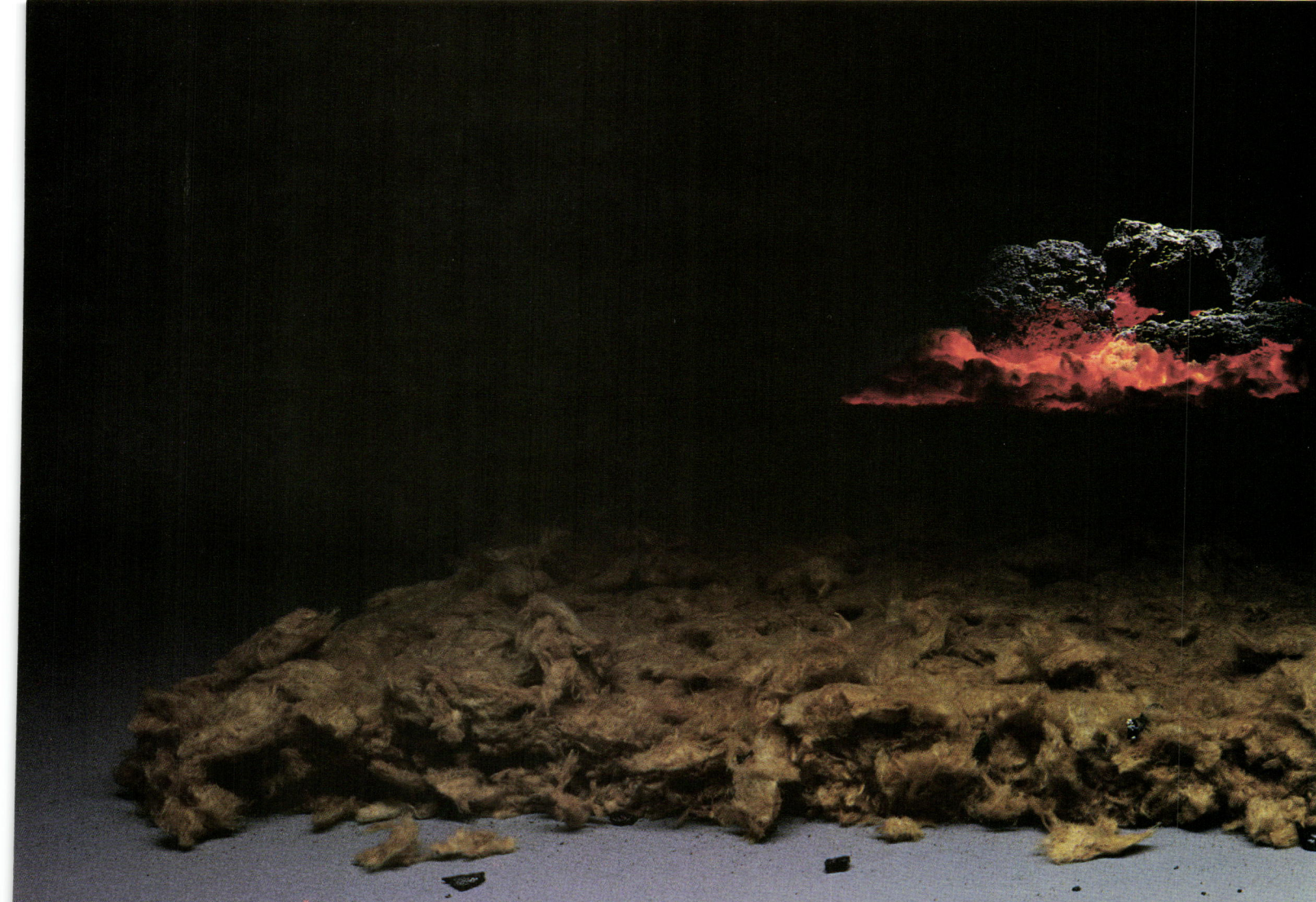
Since the construction techniques can be quite different from those for a conventional house, it might be advantageous for the architect to check local codes for any restrictions and to familiarize the inspectors with the type of construction the architect plans to use.

—Timothy B. McDonald









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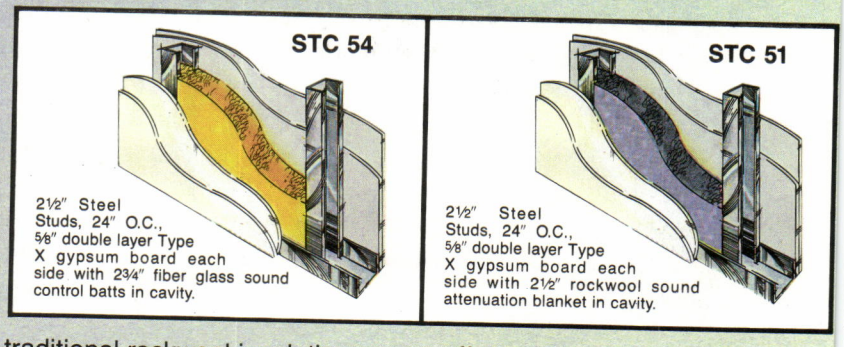
Manville Sound Control Batts are designed for press-fit installation in partitions in a wide range of commercial construction. In these applications, the fiber glass batts provide important benefits when compared to traditional rockwool insulation:



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Louis Kahn: 'Searching for the Architectural Truth'

By Charles W. Moore, FAIA

Louis I. Kahn, l'uomo il Maestro. Edited by Alessandra Latour. (Edizioni Kappa.)
What Will Be Has Always Been: The Words of Louis I. Kahn. Edited by Richard Saul Wurman. (Rizzoli, $45.)

For those of us who knew him, Louis Kahn was the center of our lives. My own years of being around him were in the late 1950s, when he taught some thesis groups at Princeton and I was his teaching assistant. Those late '50s, I believe, were the great Kahn years, when he was searching for the architectural truth with a dedication and a fervor that I've never seen matched before or since. I saw him often in New Haven, a decade later and more, but by then he seemed to have found some of the truths he had earlier been searching for; he would clutch his little notebook as though it contained holy writ, and would look upward to where he seemed to have made some connections not yet established in the '50s.

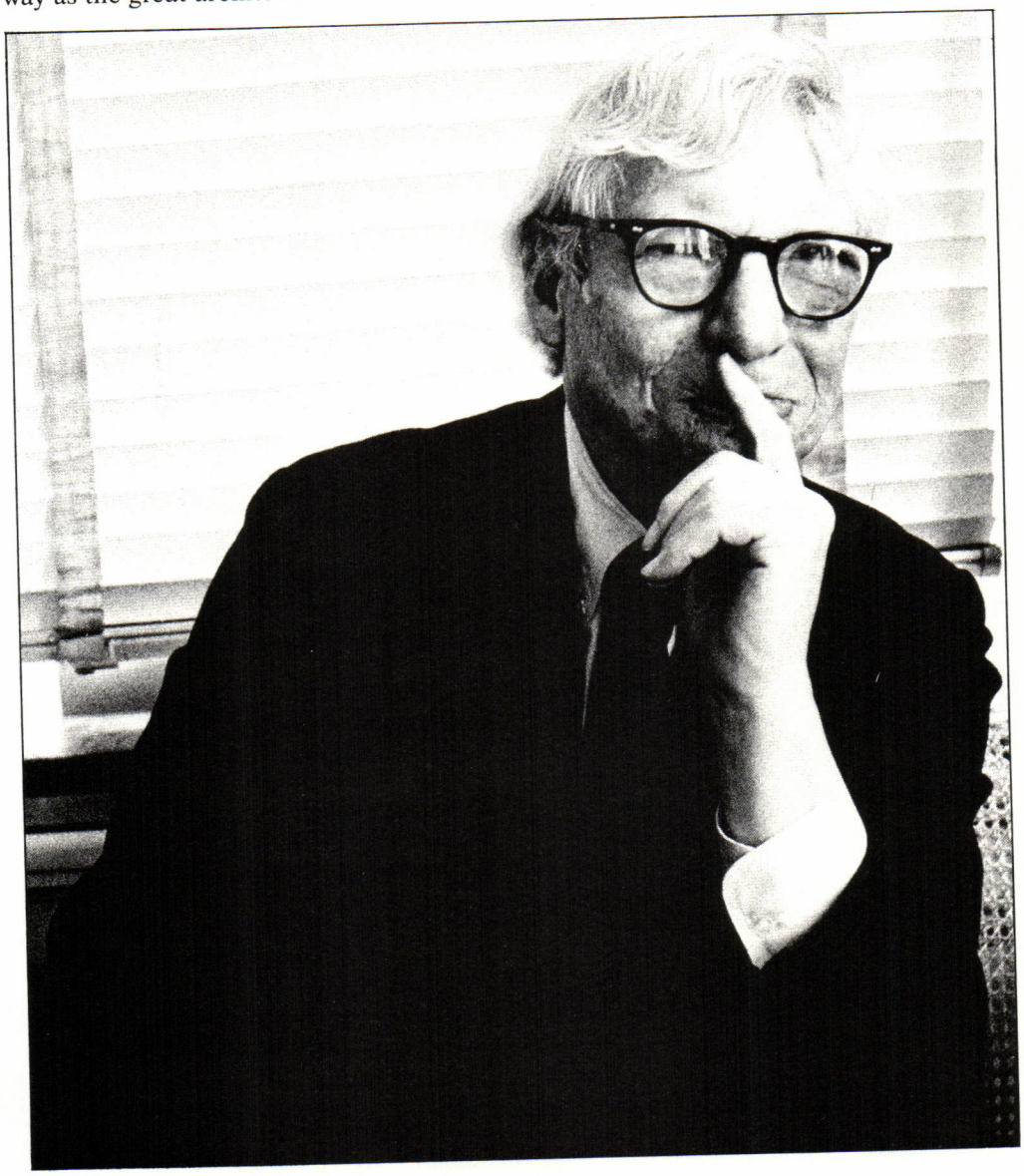
Kahn had said in those earlier days that the reason he thought he was a good teacher (and he was proud of being a good teacher) was that design did not come easily for him: he had to struggle for it, so could appreciate the students' struggles. Maybe, I have thought, after Salk it got easier. Maybe, too, that difficulty that lies at the heart of Kahn's greatness is what makes it so difficult to get at him through books. In successful biographies, the subject takes on new dimensions as the biographer recalls new aspects to his character. In *Louis I. Kahn, l'uomo il Maestro,* edited by Allessandra Latour, a book of interviews made with great seriousness and care, we get the sense instead that we have come upon a Rosho-Mon, or a hall of mirrors, where we are watching numbers of people, mostly in Philadelphia and New Haven, holding mirrors up to themselves as they knew Lou Kahn, while Lou himself slips modestly out the back, and we know him less well than when we started. There are a few fascinating exceptions: William Huff tells more of the story of Kahn's problems with Yale than I managed to learn in 10 years there. And Bucky Fuller's telegram to Esther Kahn when Lou died is included:

"Now Lou is even more vividly present in the thoughts and hearts of all who have known him and even greater numbers who have known his work without having the privilege of experiencing him personally. So long as any of his buildings stand, and most will stand for a long, long time, Lou will be speaking directly to the living humans whom he loved and who all loved him, and when the buildings are gone, forever after will his indirectly assimilated wisdom continue to bless humans."

Each of those who knew Kahn, or didn't know him but think of him anyway as the great architect of our time, has, I've come to believe, his or her very own Lou Kahn, and I for one am not really enlightened by reading about all those others.

On the other hand, in *What Will Be Has Always Been,* collected by Richard Saul Wurman, we have a big and beautiful book dedicated to the words of Louis Kahn himself. For those of us for whom the words recall the man, there is a thrill on just about every page of this giant work. Its faults are the faults of a major effort: you can't find anything, for instance, but then how could you expect to? Kahn's talks were as elliptical as his thought, and the same un-fluency that

continued on page 128



Mr. Moore is affiliated with several architecture firms nationwide and with the University of Texas at Austin.

Books *from page 127*
contributes to making his work and his teaching so important makes the search for the right words tentative and provisional as well. The best bet is probably to employ the same method people used to with the Bible: let the book fall open, and think for a while about what you see. I just did that, and got a paragraph on page 177 about the Kimbell Museum in Fort Worth: "I look at my work with a sense of what is forthcoming. The yet not said, the yet not made is what puts sparks of life into you."

Louis I. Kahn: A Bibliography. Jack Perry Brown. (Garland, $30.)

This 97-page book lists articles, books, dissertations, monographs, and theses completed on Louis I. Kahn and his work. The period covered ranges from 1931 to 1986, and, although the book is not entirely comprehensive, it contains 606 entries. There is also a chronology of Kahn's life and indexes of authors and buildings and projects.

Alfred Roth: Architect of Continuity. Introduction by Stanislaus von Moos. (Zürich, Waser Verlag.)

This liberally illustrated book surveys the varied work of Alfred Roth, Hon. FAIA, a Swiss architect who once taught at Washington University in St. Louis (1949-52) and was guest professor at Harvard University (1953). Born in 1903 and educated in Switzerland, he began his career in Le Corbusier's studio in Paris and since has gone on to win international fame as author, editor of *Werk*, educator, and architect. His buildings are many and varied—residences, schools, factories, and commercial structures, located in his own country, the U.S., Egypt, Europe, and Arab nations. The book, in English and German, includes excerpts from Roth's writings and tributes to him by Bruno Zevi and others.

Philip Johnson/John Burgee Architecture, 1979-1985. Introduction by Carleton Knight III. Edited and compiled by Ivan Zaknic. (Rizzoli, $45.)

In 1967, Philip Johnson and John Burgee combined their architectural talents and business capabilities and since then have gone on to transform city skylines. Twenty-five projects are featured in this book, beginning with the so-called Crystal Cathedral in Garden Grove, Calif. (1977-80), and concluding with Atlanta's projected Atlantic Center, a 50-story building for IBM in a multiblock development. There are lengthy comments about each project—rather straightforward descriptions of the architecture, the site, and the intent, all of which are greatly complemented by photographs in full color and by diagrams and drawings. The book also contains a chronological list of all projects since the founding of the firm, and a selected bibliography.

Earth-Sheltered Landscapes: Site Considerations for Earth-Sheltered Environments David D. DeBord and Thomas R. Dunbar (Van Nostrand Reinhold, $29.50.)

In response to the energy crisis of the 1970s, much attention has been given to earth-sheltered housing, with the Underground Space Center at the University of Minnesota among those in the forefront in research and planning. This book focuses on landscapes around such houses giving detailed attention to such basic natural elements as vegetation and the land, sun and wind, and their potential for energy gain or loss. There are explanations as well for the all-important aspects of site selection and planning. The book is generously illustrated with photographs, drawings, tables, and graphs.

Directory of International Periodicals and Newsletters on the Built Environment. Frances C. Gretes, (Van Nostrand Reinhold, $22.95.)

There are some 1,200 entries in this directory of periodicals on the built environment. The arrangement is by title of the periodical under 14 major subject categories. The bibliographic information about each journal includes address, name of editor, number of issues a year, circulation, where indexed and microfilmed, and brief notes on special features. The compiler is director of information services at Skidmore, Owings & Merrill, New York City. □

PRODUCTS

Sealants and Insulation Designed To Retard Spread of Smoke and Fire

One of the most serious problems associated with fires in high-rise buildings has been the deaths caused by the spread of smoke. The recent fires at the MGM Grand Hotel in Las Vegas, the DuPont Plaza in San Juan, Puerto Rico, and the Stouffer Inn in White Plains, New York, graphically illustrate its devastating results. Typically, smoke migrates through elevator shafts, stairwells, and floor and wall penetrations during a fire, spreading its effects far beyond the site of actual flames.

One product designed to retard smoke migration through elevator shafts and fire escape stairwells is a newly developed fire door seal called Therm-L-Brush II. Therm-L-Brush II is designed to meet all published International Conference of Building Officials (ICBO), National Fire Protection Association (NFPA) 105, and Underwriters Laboratories (UL) requirements for fire door and smoke gasketing. Recent tests run under NFPA guidelines reveal the new seal can contain smoke and gases for up to one hour at 410 degrees Fahrenheit.

Elevator fire doors must "float" so that the sensitive return switch will activate when an object remains between them. The total float space required around these doors effectively creates a "hole" the size of a basketball. Sealing this hole with standard rubber or vinyl gaskets generally causes dragging and can prevent doors from closing. The special filaments used in Therm-L-Brush II are designed to produce little or no drag yet provide a tight, effective, high-temperature seal. The product also provides continuous gasketing against stack effect and the loss of airconditioned or heated air.

3M Fire Barrier products swell to seal penetrations around insulated and plastic pipe, conduit, and cable and to block the spread of flames, toxic fumes, and smoke. When exposed to temperatures in excess of 320 degrees Fahrenheit, the fire-stop material expands rapidly to eight to 10 times its original volume. The full product line includes bulk putty, caulking cartridges, composite sheets, wrapping strips, and a new restricting collar for sealing ceiling penetrations. The products meet all industry codes and performance test standards and are UL classified and Factory Mutual approved.

Thermafiber Safety Pack Insulations provide a melt-point of 2000 degrees Fahrenheit. Safing and curtain wall insulations provide fire containment and protection at floor perimeters. The curtain wall insulation is applied to the inside of spandrel panels to keep fire from breaking through and spreading to floors above. Safing insulation confines fires to the floor of origin by sealing the space between the slab edge and the spandrel wall.

Thermafiber mineral fireproofing is designed to protect kitchen ductwork, structural steel framing, columns, and beams. Sound attenuation fire blankets are installed in partitions or overlaid on suspended ceilings to provide thermal insulation and sound control.

Fire safety FS-15 and FS-25 insulations are used in exterior load-bearing walls to reduce heat transmission.

The UL-classified Hubbell fire-rated poke-through provides power, data, and communication connections in a single unit and is designed for fire resistance in one- to four-hour rated floors. The poke-through installs in a three-inch hole, and incorporates Hubbell's specification grade duplex receptacle. It is also available with the components necessary to interface with IBM's Local Area Network (LAN) cabling system. The unit's one-piece construction comes fully assembled and prewired. The housing, made of brushed aluminum, is able to handle most of the requirements of any workstation, including up to two 25-pair twisted telephone cables.

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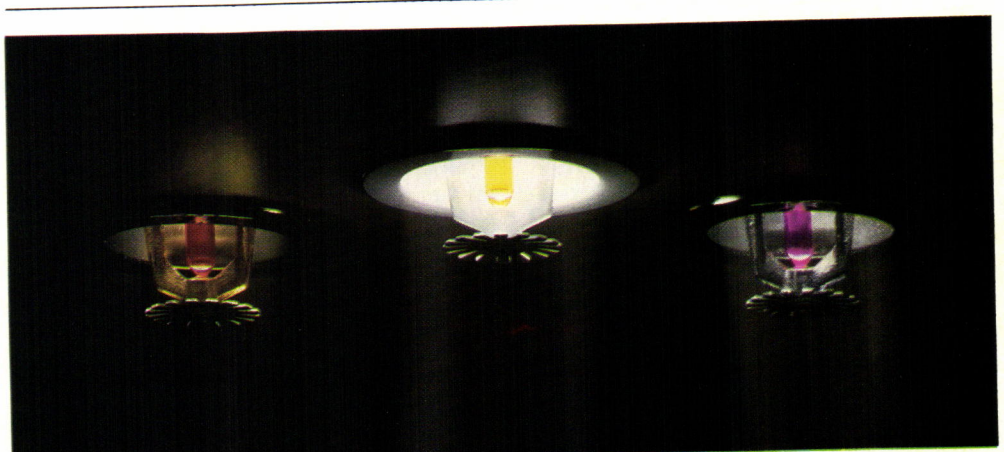
Hubbell, Wiring Service division
Circle 256 on information card

Systems for Early Fire Detection and Communication

Early fire detection, emergency communication, and fire control are key elements in high-rise safety.

The Sentara 324 system by Honeywell is a microcomputer system that automatically and simultaneously takes control when a fire is detected to notify the fire department; alert the occupants and direct them to safe areas by means of prerecorded messages; unlock stairwell doors; return elevators to the lobby; take control of the building's ventilation system to vent smoke and noxious gases to the outside; and pressurize floors above and below the fire, as well as the stairwells and elevator shafts.

Once the fire department has arrived, a fire chief can manually override the sys-



Viking's Decor and Micromatic Sprinkler Lines employ a small bulb sensor with six times the sensitivity of a standard sprinkler. The Micromatic comes in standard or adjustable recessed models and in satin or polished chrome, natural or polished brass, or white finishes. The Decor line features pendent or sidewall models.
Viking Corporation. Circle 262 on information card

Products compiled and written by Amy Gray Light.

tem to silence the alarm, send the fire tone to other areas, and make public-address announcements. The chief can talk to one area while transmitting fire signals to others. A printer records activities as they happen for documentation. As the fire situation changes, fan and damper control switches can be used to change the initial pressurization to more effectively reduce smoke spread and aid firefighting efforts.

The Fenwal Deltapac system detects dust-collector fires through a two-stage detection phase that incorporates a differential temperature sensing device that monitors both incoming and outgoing air temperature in the collector housing. When the outgoing temperature exceeds the normal ambient by a predetermined amount, the system shuts down the air handling system and closes the air dampers to enable the thermal fire detection system to function normally. When the fire detectors reach their alarm point, they release Halon 1301, an extinguishing agent that suppresses the fire on contact.

Another system, called VESDA (Very Early Smoke Detection Apparatus), is designed to detect smoke and burning synthetic materials before conventional smoke detectors. VESDA provides an analog profile of a developing fire instead of an "on/off" signal at a predetermined level.

VESDA consists of an air-sampling network of pipes or tubes, a sensitive detector, and a control unit. Ambient air samples are drawn through the piping network to the detection chamber, where they are measured and compared with "clean" air standards. Deviations from the standard are transmitted continuously to the control unit, where they are displayed on a bar graph. Other features of the system include coverages of up to 20,000 square feet per zone; three detector-sensitivity levels; and trouble signals for airflow failure and detector malfunctions.
Honeywell Inc.
Circle 258 on information card
Fenwall, division of Walter Kidde Inc.
Circle 259 on information card

Fire and Smoke Barrier Doors

Fire doors are an effective method of trapping fire, smoke, and heat in a building by automatically closing when fire or smoke is detected.

LCN Sentronic electromagnetic (SEM) closer/holders close doors by remote or built-in detectors. The UL-listed model holds doors open until the alarm system triggers a power cut. The SEM holder then releases the doors and the standard closer takes over, shutting them. The new SEM line features a spring-loaded positive release, a choice of through-bolted or wood-screw armature mounting, and simplified wiring. The heavy-duty electromagnet is protected against transient voltage surges up to 600 volts. The SEM line is suitable for use on pocket door installations and mounts in three locations: surface floor, surface wall, and recessed wall mounts.

Won-Door FireGuard doors close automatically for up to three hours when sensing smoke or fire; the doors are activated by a backup DC power supply that can be set off by any smoke alarm in the building. The FireGuard has a track and volley system that supports each separate pin and roller. This design allows the spanning of unlimited widths and of heights up to 23 feet. FireGuard also can be specified in curved openings, with a minimum radius of 10 feet. A floor sweep and fire liner provide a seal for blocking smoke and toxic fumes. The FireGuard offers optional hardware designed for easy egress by the handicapped. An optional compact control unit provides door status monitoring from a central location.
LCN Closers
Circle 247 on information card
Won-Door Corporation
Circle 248 on information card

Emergency Exit Signage

Exit signage not tied into a building's electrical system is an important feature for emergency lighting units and exit signs.

One diagnostic system featuring integrated circuits that automatically monitor critical functions every 15 seconds is the Sentry-Cycle unit. Some of the continually monitored functions include low battery, battery disconnect, lamp failure, and transfer failure. Sentry-Cycle's built-in panel display shows instant results so that repairs or replacements can be made before an emergency occurs.

The BetaLux-E is a sealed, wireless exit sign designed to be explosion-proof. Because the sign has no wiring, there are no problems with corrosion, mold, or vapor invasion. Constructed to resist tampering and vandalism, these units are illuminated by Betalight tubes manufactured from borosilicate (hard) glass internally coated with zinc sulfide phosphor and filled with tritium gas. No electrical energy source is required.

A line of low-voltage exit signs designed to be visible in all conditions of survivable smoke is the Plumly X-Scape lighting system. The X-Scape system reverts to a higher power level during actual emergencies, increasing lighting by an estimated 75 percent.

The signs are four-tenths of an inch thick and contain a controlled 5V DC power supply. During normal circumstances the signs operate at a reduced voltage of 3.5V. In emergencies the unit is powered by auxiliary batteries.
Sentry-Lite
Circle 243 on information card
Saunders-Roe Developments Inc.
Circle 244 on information card
Plumly Industries
Circle 245 on information card

Curtainwall Confinement System
The automatic Insta-Wall system is designed to protect high-risk storage and production areas by releasing a flame-resistant curtain that confines smoke and flame when a fire breaks out.

Insta-Wall's 16-gauge steel cabinet contains the curtain and an actuator mechanism that connects to fire-extinguishing systems or to an available smoke detector. It mounts directly to any overhead structure, doorway, or wall opening.

The aluminized glass fiber curtain is chain weighted in the hem to accelerate its drop and to provide a close floor-level seal. Side rings on the curtain guide along special vertical standards.
Singer Safety Company
Circle 250 on information card

Connections Accept One or Two Hoses
Firematic fire department connections feature an exterior connection for buildings with standpipe and hose or sprinkler systems. Made of bronze, the ball bearing swivel connections accept either one or two hose lines and have a built-in bronze clapper that automatically closes the unused inlet. They are equipped with breakable cast-iron caps to prevent debris from plugging the connection.
Firematic Sprinkler Devices Inc.
Circle 252 on information card

General-Purpose Fire Retardant Additive
Microencapsulated fire retardants are sealed in subminiature capsules and mixed into any solution or material. When fire strikes the host solution or material the capsule shells dissolve and release the fire-retardant compound, which acts to retard flame spread or to extinguish the fire completely.

The Phoenix Microcell compound will not interfere with the chemistry of the host material or solution. Phoenix has applications in a wide range of materials including foams, papers, fuels, glues, plastics, plexiglass, and others.
Insulated Technologies Corporation
Circle 251 on information card

Flame-Retardant Window Shades
A line of flame-retardant fabric for use in pleated shades and verticals includes up to 55 colors in four different fabrics.

Verosol flame-retardant products include nonmetallized as well as energy-efficient metallized fabrics. The energy-efficient shades have an ultra-thin aluminum backing that acts as an insulator, equal to an extra ¼-inch pane of glass. In cooler temperatures the pleated shades are said to reduce heat loss by reflecting back into a room heat that normally would escape through the window. During warmer months the shades reputedly reduce directly transmitted solar energy by close to 89 percent.
Verosol USA Inc.
Circle 249 on information card

continued on page 134

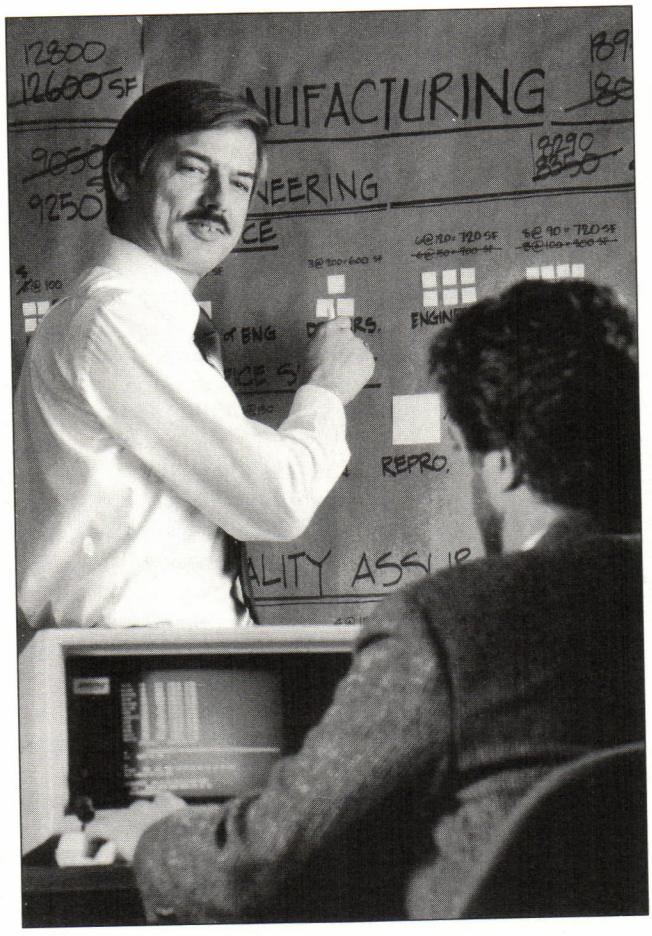
Broaden Your Client Base With Space Forecasting Services!

Space forecasting enables managers to predict what their companies' future space needs will be, and when you offer clients this important service, you establish or strengthen a valuable on-going relationship.

FM:FORECAST is the microcomputer software that lets you provide space forecasting services before a client sees a need for design services and after construction, too.

And, FM:FORECAST has the features you want most:

- It's easy to use—you do space forecasting quickly, following menus that lead you through the complete process.
- It allows "what if" analysis so you can plan for various contingencies by changing only one or two variables.
- It's portable—take it right to the client's office and do the analysis on site.



- It's comprehensive—the software can track detailed information and use a combination of forecasting methods.

Best of all, it's affordable! At $695 ($895 for non-AIA members), FM:FORECAST is the lowest priced space forecasting system around—within the reach of even the smallest architectural firm.

Find out more about FM:FORECAST and how it can broaden your client base and build your profitability. Call toll free **800/424-5080** or return the coupon for an easy-to-use demonstration disk (runs on an IBM PC with 384K RAM) and/or complete information kit.

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☐ Send me only the information package on FM:FORECAST.

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FMAJ0687

Circle 47 on information card

Concealed Sprinkler Heads

Phantom concealed sprinklers are designed to have the "lowest profile in the industry"—a reputed two-thirds less dimensional exposure than other concealed sprinklers. The sprinkler head is hidden behind a cover plate that is installed flush with the ceiling tile. Combustion heat causes the cover plate to fall off, exposing a fusible alloy contained in a bronze tube and sealed by two balls. When the alloy melts, the balls are forced toward each other, releasing a deflector that drops into position and distributes a spray of water. The sprinkler heads are UL listed for ½-inch and 17/32-inch sizes, and FM approved for light hazard application for ½-inch orifice sizes. Cover plates are available in 2¾- or 3½-inch diameters and in a wide choice of finishes.
Star Sprinkler Corporation
Circle 257 on information card

Heat-Sensitive Cable

The TM 1600 thermocouple cable is constructed so that the cable reacts to temperature extremes at the hottest point anywhere along its entire length, unlike conventional thermocouple cables, which are tip-sensitive only.

The TM 1600 cable does not require a power source, and it continuously measures maximum temperature. The cable responds to an almost infinite range of set points, and is reputedly false-alarm-proof. Functioning at an ambient environment from 32 to more than 1,650 degrees Fahrenheit, the cable recovers itself after temperature variations and does not need replacing after exceeding the alarm setting. The TM 1600 comes in any length, with 500 feet the maximum continuous length. Plug-in and 6-inch wire leads are available.
Grinnell Corporation
Circle 246 on information card

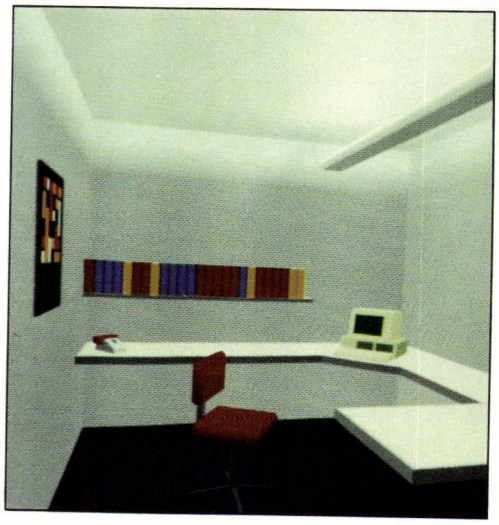
VDT LIGHTING

Lighting for VDT Screens

VDT screens can be equipped to combat glare by the attachment of polarizing or nonglare screens, or by swivel or tilt mechanisms. Another solution to the glare problem is to prevent light from shining directly on the screen in the first place by positioning VDTs away from the light source. A third alternative is to use a lighting system that reduces the room's overall contrast; this usually means an indirect ambient lighting system.

Conservolite Inc. has taken a specific approach to controlling overhead lighting for spaces in which VDT screens are used. By allowing users to adjust individually each overhead fluorescent fixture, the Conservolite system mediates the problem of a high illumination level needed for desktop/paper work and a lower illumination level needed for VDT work in the same space.

The Conservolite system consists of



a self-contained solid-state controller mounted above or inside the light fixture and hooked to a small optical sensor. The sensor, which measures the ambient light level directly beneath the fixture, can easily be manipulated by the user to achieve the light level desired, thus creating a "task lighting" system out of the overhead fixtures.

Conservolite claims that total installation time for each fixture averages 15 minutes and that the system can be installed on standard lamps and ballasts. The system offers the added advantage of decreased energy consumption. The lights operate at lower temperatures because of reduced power consumption, and, consequently, less airconditioning is required.

Peerless Lighting Co. has recently developed its "Softshine Optics" fixtures (above) specifically for VDT work spaces. The fixtures provide a higher perceived-light level than a totally indirect system, yet minimize veiling reflections on VDT screens. The key to the Peerless system is the light's housing and lens (with irregularly shaped, individually designed facets) that widely distribute light to the sides of the fixtures, rather than upward or directly down, thus eliminating the possibility of "hot spots" of glare on computer screens. Tests conducted at Pennsylvania State University and the University of Colorado by Lighting Technologies Group measured the responses of VDT users to various lighting systems in order to gauge their perception to the lighting environment, including glare from lights and surfaces, glare on the VDT screen, overall light distributions, modeling of light, types of light fixtures, and general impressions. In all cases, the VDT users expressed a preference for the indirect Peerless systems over parabolic reflectors. The users also perceived themselves as working more effectively under the Peerless lighting systems.

Peerless also offers guidance to architects on lighting design for VDT office space. One of their services is to provide computer mock-ups that show exactly how a fixture's light will behave on ceilings, wall surfaces and partitions, furniture, and VDT screens. Able to reproduce an image of the room at any angle, the program also permits designers and clients to compare two different light fixtures used in the same space.
Conservolite Inc.
Circle 261 on information card
Peerless Lighting Company
Circle 260 on information card

Glare Filters Available

Three types of Voltfree computer-screen glare filters are available to block glare and reflections and improve contrasts for clearer images and reduced eye fatigue.

The mounting is installed behind the bezel on computer monitors and terminals, against the glass of the VDT screen. The filters conform to the shape and contour of the tube for optimal glare reduction on high- or low-resolution color or monochrome monitors. They are designed to be electrically conductive and to connect internally to ground, eliminating electrostatic charges that cause dust buildup on the screen, and they attenuate very low frequency emissions.

Polaroid Corporation offers a range of both linearly and circularly polarized VDT-screen filters. Linear polarizers absorb unpolarized ambient light to reduce annoying veiling reflections. Circular polarizers with antireflective screen-surface treatment eliminate almost all reflected ambient light.

Linearly polarized light is circularly polarized when it passes through a quarter wave retarder. As the light is reflected off the VDT screen back through the quarter wave retarder, it is again linearly polarized, but at 90 degrees to its original polarization plane, and is stopped by the linear polarizing screen.
Sun-Flex
Circle 242 on information card
Polaroid Corporation
Circle 263 on information card

Troffer Stops CRT Screen Glare

Designed for use with CRT screens and in areas where paintings, photographs, and exhibit cases require reduced glare, the Meter Miser CRT troffer features a ¾-inch parabolic cube louver with an acrylic overlay that provides extremely low brightness with no reflection or stray light.

CRT troffers are prelamped and can be prewired. Available in two versions, "Preformer" is said to feature the best combination of color rendering capability, lumen output, and visual comfort; while the "Saver" version offers equal visual comfort along with optimum energy savings. Both come with energy-saving ballasts and General Electric SP35-Maxi Miser or Watt Miser II lamps. A special louver assembly is offered separately in a retrofit kit.
Graybar Electric Company
Circle 241 on information card

Products continued on page 136

Elegant.

It's Yale's new 7000 StyleLine™ exit device . . . smooth and positive in operation, smart and stylish in appearance.

It's available in rim, mortise and vertical rod applications and in all popular architectural finishes.

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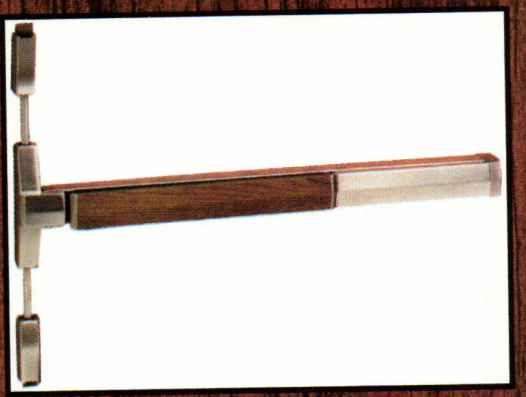


Vertical rod application with woodgrain push bar. All other popular finishes, too.

Circle 48 on information card

NEW AND NOTEWORTHY

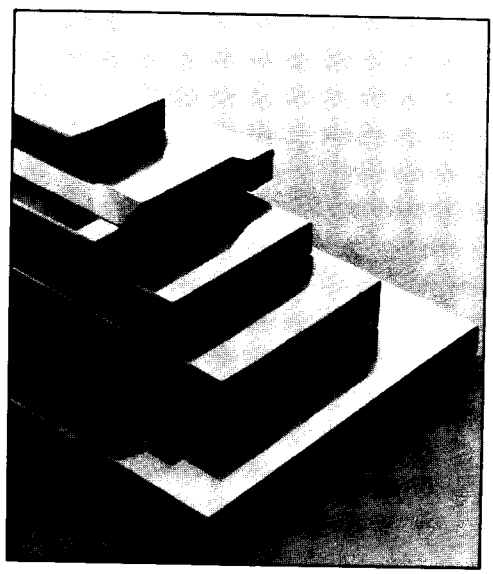
LAN for CADD Market
10-CAD is the first Local Area Network (LAN) for the CADD/CAM market. The LAN is designed specifically for AutoCAD and enables users to share drawings, storage devices, plotters, and printers by linking PCs, XTs, ATs, and compatibles. By using integrated NetPlot management software, users can spool, queue, store, and manage the plotting of their AutoCAD drawings. Users can spool drawings automatically inside AutoCAD to any plotter station on the network.

NetPlot plots directly to the fileserver at network speed, making it faster than a direct plotter connection. At the plotter stations, NetPlot manages the plotter queue and directly controls the plotter without using AutoCAD. 10-CAD users can also send plot files via modem to remote 10-CAD plotter stations over the 10-CAD RS-232 gateway.
ACS Telecom
Circle 264 on information card

Concrete Patch Data
Sealtight Futura catalogue No. 212 describes methods for producing concrete patches. The brochure covers concrete patch composition, uses, working time, initial set, application, and compliance with Specification ASTM C 928, and features a chart with typical compressive strengths.
W.R. Meadows
Circle 265 on information card

Extruded Molding Line
An expanded line of Mettle Molding features new profiles created especially for architectural applications. The lightweight molding design has both inside and outside corners and is ideal for wall and ceiling accents, fascias, and baseboards.

The moldings are offered in brass, copper, and clear aluminum finishes, and solid brass and solid copper finishes supplied on a choice of substrates (or in a coreless design for attachment to an existing substrate). Moldings come in widths up to 12 inches and in standard lengths of 96 or 120 inches. Cut-to-size lengths are also available.
October Company
Circle 266 on information card



Telecommunications System
Integrated, data-base-driven telecommunications control and management systems offered by TelWatch Inc. give users control over their transmission facilities, and one vendor can manage multiple vendors and diverse product elements. Installed systems range in size from a complete Network Control Center (NCC) for monitoring and controlling lines and equipment in one of the world's largest private networks to simple call accounting systems for 20 switches.
TelWatch Inc.
Circle 267 on information card

CREDITS

Advanced Computer Technology Center Apple Computer Inc., San Francisco (page 48). *Architect: STUDIOS, San Francisco.* Principal in charge of design: Erik Sueberkrop, AIA. Project architect: David Sabalvaro, AIA. Designers: Martin Yardley, Mildred Lee. Director of design, construction, and architecture: Roger Buckhout. Property manager: Jim Lohr. User representative: Richard Herndon. General contractor: Ikeda & Associates. Mechanical and electrical engineers: Glumac Engineers. Electrical subcontractor: Butcher Electric. Mechanical subcontractor: Weathersystems. Millwork and special furniture: Limited Production Inc. Acoustical engineers: ACI. Computer installation: CRAY Research Engineers. Lighting: Studios, Glumac, Horton Lees Lighting Design. Floor surfacing: Buchtal Ceramic Tile, VPI Flooring. Lighting: Atelier International Lighting. Carpet: Bentley Carpet. Paint and stain: Fuller-O'Brien. Special equipment: Chalfant Cable Trays. Custom furnishings: Herman Miller, Northwood, Thomas Moser.

Herman Miller Showroom, Dallas (page 44). *Architect: Taft Architects, Houston.* Managing architect: Larry Dailey. Project architect: Suzanne Labarthe. Support: Mark Volpendesta, Robert Bruckner, Steve Hecht, Eric Morris. Facility consultants: Herman Miller Inc. Facilities management group: Doug Zimmerman, director; John Stivers, regional manager; Bede VanDyke, project designer; Sue Lepo, technical coordinator; Paula Vanderwall, support. MEP: BL&P. Lighting: Peter Barna-Light & Space. Graphics: Carol Naughton + Associates. Audiovisual: Herman Miller Inc., Corporate Communications Department, Ralph Nelson Associates. Contractor: Partners Construction Inc. Ceiling surfacing system: U.S. Gypsum, Armstrong Traverton. Doors: West Texas Millwork, ELR Enterprises, Soleil. Floor surfacing: Milliken, Kingsley Square, Harris-Takett, Julien Green. Handrails: R&B Wagner. Lighting: Lightolier, Work-O-Lite, Starline System. Kitchen: Sub-Zero. Wall surfacing: Devoe & Raynolds. Skylights: Kalwall. Hardware: LCN, Soss, McKinney, Sargent, Grant. Paint and stain: Devoe & Raynolds. Partitions: U.S. Gypsum.

University of Pennsylvania, McClelland Hall, Philadelphia (page 54). *Architect: Davis, Brody & Associates, New York City.* Project team: Albert Grossman, AIA, Fred Chomowicz, AIA, Nathan Hoyt, AIA. Design team: Pamela Veit, John Lock, John Romano, John McCoy, AIA, Leon Joseph, Kate Warner, Julie Holmes. Structural engineer: Joseph B. Callaghan. Mechanical and electrical engineer: Robert J. Sigel. Lighting consultants: Jules Fisher & Paul Marantz. Contractors: Haverstick-Borthwick and Jaff Brothers Woodworking. Chairs and sofas: Coronado Senza Bottoni, B&B America. Coffee tables: Intrex, Monoforms. Carpet: Schumacher Carpets, Guild Point. Study area chairs: Stevens Chair, Robert Mallet, Palazzetti. Conference chairs: Rudd, Stacking Conference Chairs. Tables: Howe, Tempest Group. Coffeehouse tables: Johnson Industries, Peter Pepper.

Total Eclipse/Pier 17, New York City (page 57). *Architect: David & Dikaios Associates, New York City.* Partner in charge: Theo David, AIA. Project manager: Michael Fahey. General contractor: KAVI Construction. Client: Optical Perfection Inc. Interior floor surfacing: American Olean. Lighting: Times Square Lighting: Signage: Esto Graphics. Paint and stain: Benjamin Moore.

Negley Paint Company Corporate Headquarters, San Antonio, Tex. (page 58). *Architect: Chumney/Urrutia, San Antonio.* Principal in charge: Judith Urrutia. Design team: Judith Urrutia, James Keane, Mimi Stickley. General contractor: Guido Brothers Construction Co. Walls: Negley Paint Co. Ceilings: Owens-Corning Fiberglas. Hardware: Ironmonger. Lighting: Artemide, Lightolier, Southwest Neon. Plumbing fixtures: Kroin. Seating: Sunar Hauserman, Grace Designs, Kinetics. Systems furniture: Knoll. Tables: Sunar Hauserman. Desks: Knoll. Storage: Storwall.

The Rose House, East Hampton, N.Y. (page 64). *Architect: Eisenman Robertson Architects, New York City.* Project architect: H. Randolph Holmes, AIA. Project team: Martin Brandwein, John Reynolds, Peter Thaler, Kirk Train, Ross Wooley. Interior design consultant: Victoria Borus. Structural engineer: Robert Silman Associates. Mechanical engineer: John L. Altieri, P.E. Consulting

Engineers. Landscape architect: Eisenman Robertson Architects/Roger Roberts Associates. General contractor: Andreassen & Bulgin Construction. Landscape contractor: Roger Roberts Associates. Client: Mr. & Mrs. Marshall Rose. Ceiling surfacing system: U.S. Gypsum. Doors: Andreassen & Bulgin, Freeport Door & Window Products. Environmental control systems: York. Lighting: Marco, Lightolier, Lamplighter Corner. Plumbing fittings and showerheads: Speakman. Saunas and whirlpool baths: Hastings. Shower stalls: R.B. Wyant. Tubs and lavatories: Kohler, Smolka, American Standard. Kitchen and laundry appliances: St. Charles Kitchens, Thermador, Whirlpool. Security and fire detection: Bellringer. Wall surfacing: U.S. Gypsum, Certainteed. Windows: Marvin Windows. Skylights: Pella. Hardware: Baldwin, Soss, Hager, Baldwin, Stanley. Paint and stain: Martin Seynour, Benjamin Moore, Cabots.

88 Kearny Street, San Francisco (page 68). *Architect: Skidmore, Owings & Merrill, San Francisco.* Management partner: Robert H. Armsby, AIA. Design partner: Lawrence Doane, AIA. Project manager: Richard Hampel, AIA. Senior designer, architecture: Allison Williams, AIA. Senior designer, interiors: Richard Irving. Senior designer, graphics: Debra Nichols. Job captain: Joseph Lipkos. General contractor: Swinerton & Walberg Co. Engineers. Graphics consultants: Skidmore, Owings & Merrill. Lighting consultants: The Engineering Enterprise, Dan Dibble. Building developer: Multi-Asian Properties. Owner: Jaymont Properties. Floor covering: Edward Fields, Design Weave, Azrock, Robert Cunningham, American Olean. Walls: Jack Lenor Larson. Paint: Fuller-O'Brien. Polane finished wood panels: Design Workshops. Granite wainscot: Robert Cunningham. Ceilings: Celotex, Donn, U.S. Gypsum. Doors: Design Workshops, D-F-W Company. Hardware: Cookson, Stanley, Rixson-Firemark, Yale, Tydix, Norton. Windows: Cobbledick-Kibbe. Window treatment: Tech Shades. Lighting: Shaper Lighting, Kurt Versen, Lucifer, Lite Control. Signage: Thomas Swan Signs. Bathroom fixtures and hardware: American Standard, Bobrick. Upholstery fabrics: Spinneyback Enterprises, Randolph & Hein, Unika-Vaev, Sunar Textiles. Seating: Herman Miller, Knoll International, Brueton Industries, Brickel Associates, Axiom Designs. Desks: Design Workshops. Tables: Zographos. Storage and filing equipment: Shaw-Walker. Ornamental metal: Devincenzi Architectural Products.

Anne Klein Showroom, New York City (page 72). *Architect: Richard Weinstein and Wayne Berg, AIA, New York City.* General contractor: Herbert Construc-

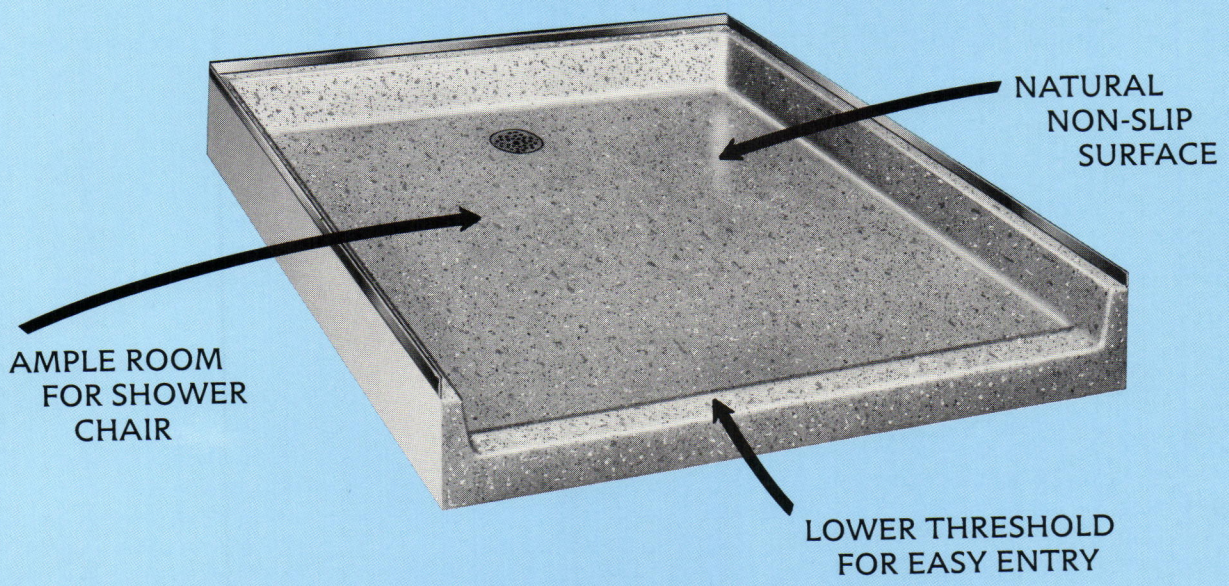
continued on page 138

Credits *from page 137*
tion Company. Ceiling surfacing system: U.S. Gypsum. Interior doors: U.S. Gypsum. Floor surfacing: Atlas Marble, Knoll. Handrails: B&S Lorch Woodworking. Lighting: Edison Price. Wall surfacing: U.S. Gypsum.

Metropolitan Tower Apartment, New York City (page 74). *Architect: Tod Williams/Billie Tsien & Associates with Annie Chu, New York City.* Aluminum screen: Tod Williams. Steel box: Tod Williams. Rugs: V'soske. Cabinetwork: William Somerville. Metalwork: Wainland's. Carved glass: Shefts. Floor surfacing: Armstrong Terrazzo Tile, Design Supply, Wood Flooring, V.A.L. Floors. Shades: Holland Shade. Fabric: Gretchen Bellinger, Jack Lenor Larsen. Lighting: Norbert Belfer Luminaries, High-Tech Applications, Ron Rezek Lighting. Furniture: Brickel Associates, ICF. Artwork: Courtesy of Bess Cutler Gallery, Baskerville Watson Gallery. Drawings: Annie Chu. Paint and stain: Pratt & Lambert.

Vignelli Associates Offices, New York City (page 76). *Vignelli Associates, New York City.* Design team: Lella and Massimo Vignelli, David Law, Michele Kolb, Lev Zeitlin, Robert Skolnik, Robert Traboscia, Briggs MacDonald. Electrical engineer: El Gee Electric. Mechanical engineer: William C. Rose. Structural engineer: John Valerio. Color consultant: Donald Kaufman. General contractor: Vignelli Associates. Subcontractor: Calvin Freeman. Interior consultant: L&P. Skylights: Imperial Glass. Windows: EFPO. Hardware: Schlage, Baldwin, LCN, Rixson-Firemark, Locknetics, Grants, DeJong, Glen-Johnson. Ceiling surfacing system: U.S. Gypsum. Interior partitioning: U.S. Gypsum. Woodwork: Bachmann & Dunn. Paints and stains: Prince Chemical. Wall coverings: Ney Lead Products, Fabral. Workstations: Stephen Whistler. Aluminum and glass partitions: Bernstein Brothers Sheetmetal. Laminate surfacing: Formical, Nevamar. Special surfacing: Zolatone Corporation. Flooring: Crossfield Products. Signage: McPhilben. Bathroom and washroom accessories: Bobrick, Kroin. Library equipment: Garcy. Metal shelving: AA1 Steel Equipment. Furnishings: Poltronova, Knoll, Sunar, Kevi, Ignelzi, Sol-R-Veil, Berstein Brothers, Casigliani, IPI. Refrigeration condensers: York. Air grilles: Titus. Wall heaters: Runtal. Control systems: Honeywell. Water closets: American Standard. Lavatory basins: Kroin, Just Sinks. Toilet seats: American Standard. Kitchen: Dwyer. Automatic sprinkler system: Manhattan Engineer Company. Wiring devices: Leviton, Lutron. Lighting fixtures: Halophane, Mercury, Artimede, Lightolier, Abolite. Communication system: AT&T. Alarm and detection system: Ademco. □

CAUTION:
In self-care facilities, bathtubs can be hazardous to health.



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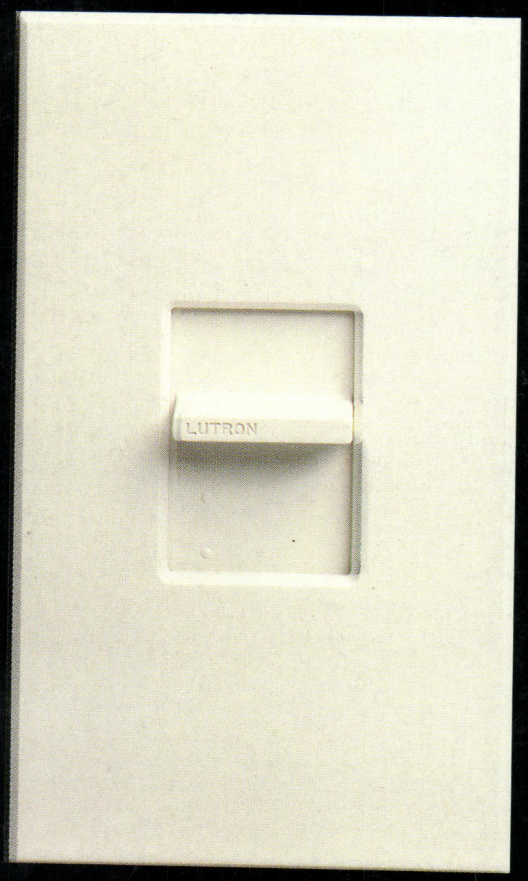
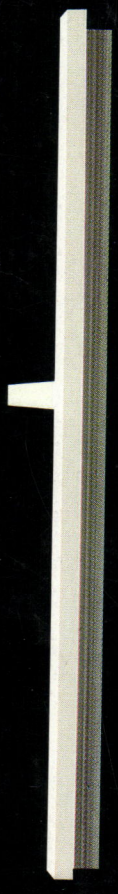
(Nova T-Star)





Undercut back plate gives Nova T☆ a unique floating appearance.

.130″

.295″
(excluding backbox)

Streamlined Elegance—Just Over 1/4″ Thin

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