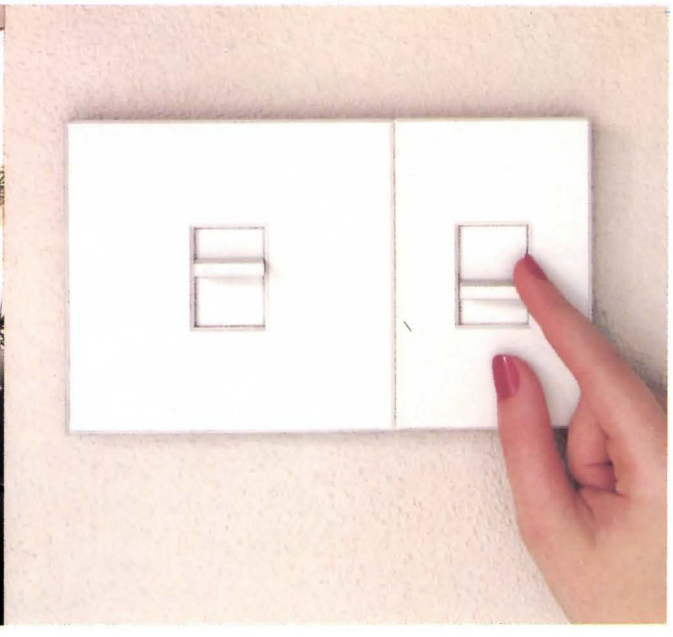

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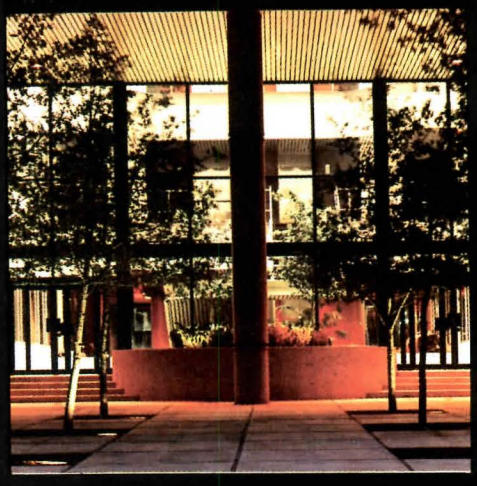

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EVENTS

July 2-4: Morristown National Historical Park 50th Anniversary Celebration. Contact: Lynn Wightman, National Park Service, U.S. Department of the Interior, Morristown National Historical Park, Washington Place, Morristown, N.J. 07960.
July 15-16: San Francisco Forum on Architectural Issues: "The Spirit of Place." Contact: Association of Collegiate Schools of Architecture, San Francisco Forum, 1735 New York Ave. N.W., Washington, D.C. 20006.
July 18-20: Conference on Quality Assurance in the Building Community, Dallas. Contact: Shilstone & Associates, Inc., 8577 Mander Lane, Dallas, Tex. 75231.
July 19-21: Course on Building Energy Performance Analysis using the DOE-2 Computer Program, Continuing Education in Engineering Program, University of California, Berkeley.
July 23-27: Association of Collegiate Schools of Architecture Summer Institute, "Teaching Innovations in Architectural Technology," Cambridge, Mass. Contact: Peter Beck, ACSA, Summer Institute, 1735 New York Ave. N.W., Washington, D.C. 20006.
July 25-Aug. 4: Course on Principles of Construction Specifications Writing, Department of Engineering, University of Wisconsin, Madison.
July 25-30: Fifth Annual Convention & International Ceramic Tile Exposition, San Diego. Contact: Ceramic Tile Distributors Association, 630 N. Craycroft Road, Suite 202, Tucson, Ariz. 85711.
July 28-Aug. 1: American Society of Interior Designers National Conference and International Exposition of Designer Sources, Boston. Contact: ASID, 1430 Broadway, New York, N.Y. 10018.
Aug. 15-19: Conference on "To Build and Take Care of What We Have Built with Limited Resources," Stockholm, Sweden. Contact: CIB [International Council for Building Research Studies and Documentation], Congress Secretariate, The National Swedish Institute for Building Research, Box 785, S-801 29 Gävle, Sweden.

LETTERS

Indoor Pollution: Your excellent article in the April issue (page 64) on health hazards in sealed buildings can benefit from an update and a clarification. Sealed fluorescent buildings were built abundantly *before* energy became an issue. The "energy efficiency" of these buildings is not the problem, the buildings are. When the final meager contact with the outdoors is cut off (fresh air), the buildings will obviously get worse.

To me, energy has always had two meanings: (1) energy as BTUs to be saved, (2) but much *more important*, energy as paradigm for a new consciousness that sees the working environment, the building systems, the filtering building shell, and the rhythmic climatic cycles as an inter-related sequence of matching available resources with human needs.

Contrary to energy conserving buildings referred to, this new architecture is "climate-adapted." Interaction with the climate results in abundant clear daylight, fresh air through opening windows, a sense of spaciousness, and the use of natural materials. Consequently, the potential health hazards of sealed buildings are eliminated.

It is most appropriate that this excellent article appears now, as AIA voices a new direction. Your article needs to be published for building *owners,* also.

Michael M. Sizemore, AIA
Atlanta

Portland Building Dissent: I had the pleasure of serving on this year's national AIA honor award jury, which, as always, is a privileged experience. The tradition of zestful divisions of opinion is established as basic to the nature of the award selection process. However, with any juror, there occurs on rare occasions a painful, breast-bursting need to record one's disassociation with a decision, and the only means of dissent I have is with this letter.

I want it to be known that there was one strong objector among the jurors to the awarding of the Michael Graves Portland Building an AIA national honor award. As part of the evaluation process, I was required to visit the building, which firmed my conviction that in total the building was too architecturally flawed for an award. There are many more of the 600 submissions that were routinely superior to the Portland Building.

I have no desire to add further to the Niagara of discussion on the idiosyncratic exterior decor. The question of that being an architectural watershed is in escrow. That aside, the building is simply a very ordinary piece of architecture! The structure makes no overtures or concessions whatsoever to its users. Its interiors are funereal, refractory, even heartless. Nothing speaks of people or delight. At ground level, a gloomy loggia guards the darkened building from the street, as the small-pattern windows and high rails guard the interior from a wondrous skyline; then, there is that monumental parking entrance graced on both sides by obscure, 3x7-foot pedestrian entrances, fronting a delightful park, etc.

There is little joy there. One occupant of the Portland Building described a new jail, being completed at the other side of the park, with skylights, openness, warmth, and questioned why the functions of the two buildings could not be exchanged. Similar anecdotes are many, but as it can happen with juries, the notoriety of a building demanded that it not be overlooked. There were compelling discussions regarding "symbol of the city," "urban boundaries," "new language," etc. So many beautiful words, but so little music there. But how about simply workable, lovable architecture?

The hard pragmatism of the building was dolefully dramatized to me when one of the administrators I interviewed related that the building "yielded one acre more floor space than the program required." My depression deepened with the question of why any humane architect would not have used this opportunity to provide this "people warehouse" some user concessions, of which it has none! Absolutely none!

I know that in a total sense the Portland Building is no better or worse than most currently erected and that I am being especially harsh with some of its failings and puffery. My real concern—and my voice—are raised on behalf of all students and those professionals who look to publications and to honor awards for their horizons. I encourage them to guard their perceptions and to look deeper than skin.

George J. Hasslein, FAIA
San Luis Obispo, Calif.

Portland Building Explanation: George Hasslein's letter [preceding] is a genuine and pertinent critique of Michael Graves' Portland Building. However, I must add that there are times when one is compelled to recognize a moment, an idea, a commitment that is clearly stronger than the manifestation. The jury acknowledged the criticisms and agonized over the purpose of the awards. Graves' building is comparable to most first realizations of invention. The meanings and interpretations are more powerful than the reality.

The conclusion was a five-to-one vote in favor of moment over matter. Not to have recognized the building would have been unrealistic and antihistorical.

Charles Gwathmey, FAIA
New York City

The writer chaired the '83 honor awards jury.—*Ed.* *Letters continued on page 8*

Corrections: Credits for the Anroc project described in the news article about AIA's Phoenix design conference (March, page 31) are as follows: architect of record, Cooper, Eckstut Associates and Gruen Associates; master plan by Cooper Eckstut Associates with Vernon Swaback Associates, consultant; architect for the first building, Cooper, Eckstut Associates and Gruen Associates, with Vernon Swaback Associates as consultant.

The executive desk designed by Ed Zucca and featured in the April issue (see *Furnishings: Craftsmanship,* page 84) was commissioned by Gensler & Associates through New York City's Gallery at Workbench.

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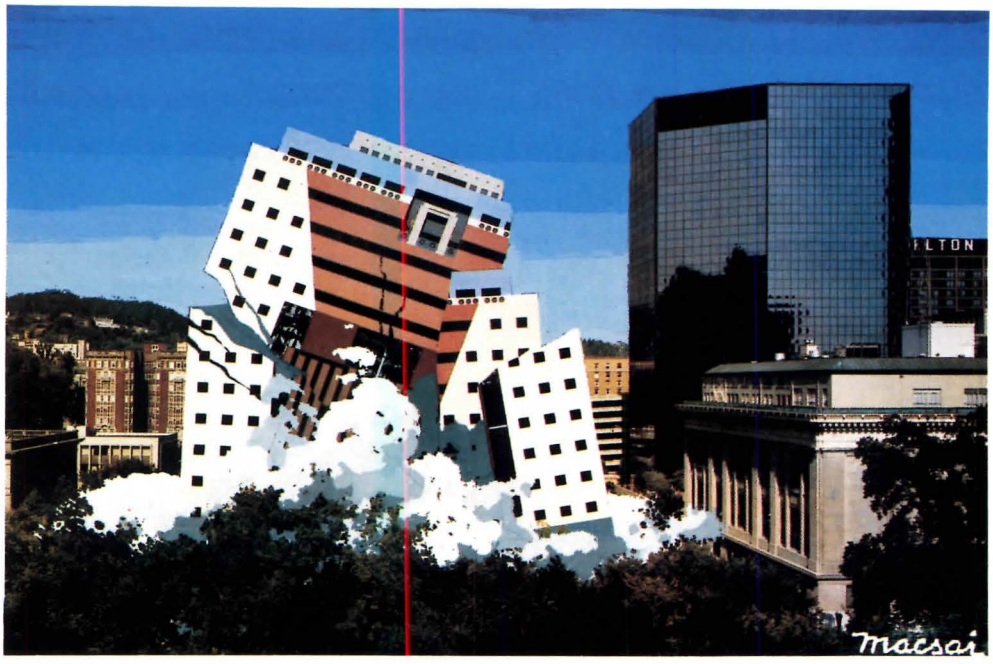

Portland Building Suggestion: This [above] is my contribution to the debate about the Portland Building by Michael Graves. It is merely a symbolic gesture and is in no way a suggestion to Portland's city employees what to do to a building in which they are committed to work. Its resemblance to the famous Pruitt-Igoe photograph is not accidental; if Pruitt-Igoe was the end of an era, I hope that the Portland Building is too. *John Macsai, FAIA*
Chicago

Phoenix Findings: I learned long ago that if you can't say something good about a place or person, then don't say anything. I'm not sure what the AIA urban design and planning committee's function is, but there's no way a group of professionals could scrutinize an area the size of Phoenix, Scottsdale, Tempe, and Mesa in four days—and in the rain at that (see March, page 31). We would all be better off if they spent their time and the Institute's funds on real issues confronting society. I do agree with many of the panel's findings, and there is a lot of room for improvement, but let's not try to change the Phoenix metropolitan area to look like one of the other major cities that our committee came from. You see, I have a home in Scottsdale and love the surrounding area. *Travis T. Oliver, AIA*
Santa Ana, Calif.

Exchange Students' Opportunities: I would like to bring to the attention of the U.S. architectural community the contents of a letter [excerpted below] from the Association for International Practical Training. The purpose of the AIPT is to arrange international practical exchange opportunities for university students in engineering, agriculture, mathematics, and the sciences. This list also formerly included architecture.

I think I hardly need to make an argument for the value of international exchange for the U.S. architectural profession. I am a graduate student in architecture at U.C. Berkeley wanting the experience of working in Africa. For most of the past year I have been doing secondary-source research to adapt some American architectural principles to the African context; I would like the opportunity for practical experience before I seek a long-term job with an international organization. Surely, many of my counterparts in Africa would want to benefit from working in the U.S. *continued on page 90*

Awards

I.M. Pei Named Fifth Recipient Of Pritzker Architecture Prize

Ieoh Ming Pei, FAIA, widely acclaimed as one of the great designers to emerge since World War II, has been named the fifth recipient of the international Pritzker architecture prize. Established in 1979 by the Hyatt Foundation, the award provides $100,000 and a Henry Moore sculpture.

In announcing the award, Carleton Smith, as spokesman for the jury, said, "Ieoh Ming Pei has given this century some of its most beautiful interior spaces and exterior forms. The significance of his work goes far beyond them: for his concern has always been the surroundings in which his buildings rise. I.M. Pei has refused to limit himself to a narrow range of architectural problems. His work over the past 40 years includes not only palaces of industry, government, and culture, but also some of the best moderate- and low-income housing. Through his skill he has elevated the use of materials to an art."

Born in Canton, China, in 1917, Pei came to the U.S. at the age of 18 to study at MIT, where he received a B. Arch. in 1940. He then went on to Harvard and studied under Walter Gropius, Marcel Breuer, and other apostles of Bauhaus modernism. He received his M. Arch. in 1946.

For 10 years beginning in 1948 Pei worked as director of architecture with the New York City real estate and development firm of Webb and Knapp, Inc., headed by William Zeckendorf. It was during these years that he was involved in the planning and design of many large urban renewal projects, including parts of Washington's southwest renewal area and Philadelphia's Society Hill. Here Pei learned to deal with the economic realities and to design projects of high quality on a low budget.

Of that experience Pei has said, "It was 10 years out of my life as a designer, but looking back, I wouldn't swap that experience for anything. I learned things that serve me well today—the big picture, the flow of economic, political, and civic decisions, the importance of seeing land as a precious raw material to be carefully used since urban land is worth millions, and of being able to sense the influences

that bear upon that land as well as what you want to do."

As for labeling his style, Pei calls himself a second generation modernist, although he once said, "The talk about modernism versus postmodernism is unimportant. It's a side issue. An individual building, the style in which it is going to be designed and built, is not that important. The important thing, really, is the community. How does it affect life?"

The early buildings done by Pei and others that would eventually become associated with I. M. Pei & Partners (founded in 1958) clearly reflect this bent for the language of the modern movement—Mile High Center in Denver, the Denver Hilton, the Place Ville Marie in Montreal. These led to other significant civic and urban commissions, such as the Christian Science Center in Boston, the master plan of Boston Government Center, the Dallas City Hall.

An evident break in the more traditional designs came in 1967 with the National Center for Atmospheric Research, a highly sculptural building. Others followed: the Johnson Art Center in Ithaca, N.Y., the East Building of the National Gallery in Washington, D.C., the John Fitzgerald Kennedy Library in Dorchester, Mass. With these buildings came an exploration of the use of exposed concrete (the firm has been called one of the most skillful in crafting concrete). One of Pei's most recent projects is the Fragrant Hill Hotel, near Beijing, China, which clearly shows Pei's sensitivity to China's cultural heritage. In it he has sought to interpret that heritage in contemporary terms.

Pei has said, "It is not a question of how you create a building that relates the architect's personality, but a question of how it can be made to relate agreeably with people, with a particular place, and bring out their qualities. . . . I would enjoy doing a very personalized building now and again, but I can assure you that I get much more satisfaction out of doing the others. By that I mean doing work that can affect a lot of people, their lives and the harmony of their lives, their outlook and the humanity of their outlook. To the extent my personal imprint comes through, fine. But it is not intended that it should."

Besides the Pritzker prize, Pei has received numerous awards, including AIA's gold medal in 1979, the gold medal for architecture from the American Academy of Arts and Letters in 1979, and the Arnold Brunner Award from the National Institute of Arts and Letters in 1961. I.M. Pei & Partners received AIA's firm award in 1968.

Jurors for the '83 Pritzker were J. Carter Brown, director of the National Gallery of Art; Japanese architect Arata Isozaki; 1979 Pritzker prize laureate Philip Johnson, FAIA; J. Irwin Miller, chairman of the executive and finance committees, Cummins Engine Co.; 1982 Pritzker prize laureate Kevin Roche; and Thomas J. Watson Jr., chairman emeritus, IBM Corporation. Besides Pei, Johnson, and Roche, the other Pritzker prize winners are Luis Barragán of Mexico (1980) and James Stirling of Great Britian (1981).

'83 Reynolds Prize Awarded To Rhode Island Student

The 1983 Reynolds Aluminum prize for architectural Students has been won by John Walker Bass, a student at the Rhode Island School of Design, Providence, R.I. Bass's winning design, titled "Sol Lewitt Foundation," incorporates an aluminum panel system over a structural steel frame.

Bass's project is a museum and archives for Lewitt, an artist whose works in painting, sculpture, and drawing have explored the use of grids as organizing themes. Bass paid particular attention to the use of panel grids in his design. The jury praised the project's use of "aluminum as it was juxtaposed against several masonry mate-

continued on page 14

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Awards *from page 11*
rials organized in opposition to the lightweight metal."

As winner, Bass will share a $5,000 prize with the Rhode Island School of Design. C. Timothy Fish of the Georgia Institute of Technology received honorable mention for his design of an emergency housing system. Fish will share a $1,000 prize with his school.

The Reynolds prize, sponsored by Reynolds Metals Co. and administerd by AIA, has been awarded annually since 1961 for "the best original design in which creative use of aluminum is an important contributing factor."

This year's jurors were Stanley Tigerman, FAIA; Roy F. Knight, AIA, dean of architecture at the University of Tennessee at Knoxville; and three students: Wesley Jones of Harvard, Nora Klebow of Washington University, and Dennis Potts of California Polytechnic State University.

The Institute

Patty, Hall, Mariani, von Dohlen Win; Board Acts on Policies

Bruce Patty, FAIA, of Kansas City, Mo., was elected first vice president/president elect of the Institute last month at the national convention in New Orleans. Elected vice presidents were Gaines B. Hall, FAIA, of Dothan, Ala., Theodore F. Mariani, FAIA, of Washington, D.C., and Robert J. von Dohlen, FAIA, of West Hartford, Conn. Henry W. Schirmer, FAIA, of Topeka, Kan., was re-elected for another two-year term as treasurer, and Harry W. Harmon, FAIA, of Long Beach, Calif., continues as secretary.

Patty, a founding principal of the Kansas City firm of Patty Berkebile Nelson Associates, chaired the 1979 national convention in Kansas City. He becomes first vice president this December and successor to George Notter, FAIA, as president in December 1984. Mariani is president of the Washington firm Mariani & Associates; von Dohlen heads Russell Gibson von Dohlen in Farmington, Conn., and Hall, chairman of the New Orleans convention, is vice president of Span/Hall/Ritchie in Dothan. Schirmer has a small Topeka practice and is a principal in The Coxe Group, management consultants. Harmon is executive vice chancellor of the California State University System.

Meanwhile, at its meeting prior to the convention in New Orleans, the AIA board of directors approved the recommendations of the 1983 planning report and adopted a comprehensive housing policy and an architecture for justice policy.

This year's planning report is directed toward the goals set forth by Direction '80s. It includes both long-term priorities for the Institute (three to five years) as well as recommendations for next year.

Through a series of meetings at various AIA chapters and at Grassroots, the planning committee found that the single concern most often expressed by the membership was "that the public does not understand the role of the architect and its importance to the creation and modification of the built environment." The committee suggested that "the surest way to expand the constituency for architecture is for architects themselves to work with other citizens on significant public projects," including resolving local planning and zoning issues, preserving the environment, siting community facilities, participating in community design centers, conserving energy, preserving landmarks, and rehabilitating neighborhoods.

The committee also suggested that the theme of AIA for 1984 should be "American architecture and its public," which will be developed through exhibitions, conferences, and other events.

In its investigation, the committee found "some uncertainty about the meaning and content of the profession's body of knowledge," as put forth in Direction '80s. It therefore divided the body of knowledge into three areas: information about construction technology, or how to build; information about the broader social purpose of construction, or what to build; and practice and design experience. "Each of these areas contains a vast amount of information, which must be assembled and managed if it is to be easily accessible to the profession." The means the planning committee suggested is the computer.

For the short term, the committee recommended that an advisory committee on information management be created. For the long term the recommendations include developing a cross-referenced data bank comprised of "relevant" elements of AIA's library as well as practice and design information, all linked via computer to AIA state offices and as many local offices as possible. Also, the Institute will work with universities to devise effective ways to allow computerized retrieval of information on "what to build," and the Institute will attempt to evaluate "important new items of construction technology hardware."

The report called for the Institute to sponsor a series of regional and national conferences on "lifetime education for architecture practice." It also recommended that AIA survey the profession to determine the skills graduates should have and "transmit the results to all schools of architecture." It called for the Institute to explore new techniques of "lifetime" professional education, with the "aim of offering greater diversity, greater availability, and lowered cost." The committee also recommended the development of an "action plan" for public education in architecture, that the Institute encourage colleges to offer an undergraduate major in architecture, and that AIA's *Sourcebook,* a resource for environmental design educators, be expanded.

The committee called for establishing an information relay desk for components at national headquarters and a pilot program to test the concept of dispatching AIA staff members to state and local components for specific time periods. The committee called for a task force to undertake a "structure study," and for the AIA Foundation to establish a membership program.

In the housing policy AIA says that it "recognizes the importance of good housing as a necessity of life, as a sanctuary of the human spirit, and as a valuable national resource. . . . Implicit in the evolution of housing policies to meet the needs of a rapidly changing society must be the recognition that many Americans continue to experience serious housing deprivation. Slums and blighted neighborhoods, restricted opportunities for ownership, shortages of decent, affordable housing, and discrimination remain national problems." The policy addresses research and technology, planning costs, urban housing revitalization, mortgage credit, housing assistance, energy conservation and the use of renewable energy resources, and housing standards.

Through the architecture for justice policy, AIA "seeks to establish compre-

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NEWS CONTENTS

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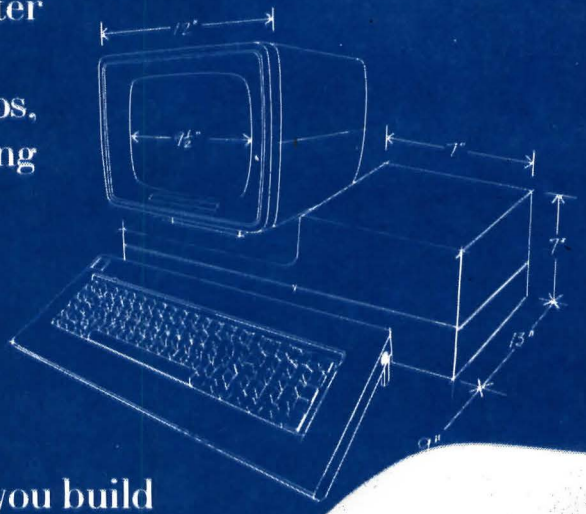

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The Institute *from page 14*

hensive planning for the justice system, both long range and short range, which promotes continuity, public involvement, interagency and intergovernmental cooperation, quality in service delivery systems, cost effectiveness, and recognition of socioeconomic trends and conditions that may affect implementation of programs." The policy also expresses support for the establishment of accreditation for justice system operations and facilities with uniform standards, and the involvement of architects in justice planning as well as in the design of "innovative physical facilities standards and advanced practices."

In other action, the board voted to support the landmark designation of Lever House in New York City and oppose development plans that "would alter or destroy this building or significantly alter the site."

The total in contributions to the AIA/Political Action Committee between Nov.1, 1982, and April 15, 1983, were announced as $17,036. Disbursements this year have been to Representatives Fortney "Pete" Stark (D.-Calif.), Elliott Levitas (D.-Ga.), Joe Moakley (D.-Mass.), Doug Bosco (D.-Calif.), Barney Frank (D.-Mass.), Norman Sisisky (D.-Va.), and Paul Tsongas (D.-Mass.). It was also announced that current AIA membership (including associates and emeritus members) totals 41,470.

Convention Rejects Disarmament Priority; Local Protests Grow

Delegates at AIA's convention last month in New Orleans defeated a resolution calling for highest priority to be given by the Institute's government affairs department to securing nuclear disarmament. However, AIA will join with the Washington, D.C., based organization Ground Zero in advancing disarmament, as announced by AIA Executive Vice President David Olan Meeker Jr., FAIA, at the convention.

In the two years that AIA conventions have debated issues of war and peace, design professionals, especially on the two coasts, have formed a growing number of local organizations to oppose the nuclear arms race and accelerating defense spending.

In the East, the most visible group to date has been the Architects for Social Responsibility (ASR), based in New York City. Sidney Gilbert, AIA, who heads his own practice in New York, founded the group. He recalls that after completing his first "real building," he estimated that it was worth only two U.S. Cruise missiles, "And that bothered me. So I bought the AIA mailing list and sent a personal letter to 1,700 architects." In the letter Gilbert shared his concerns and volunteered to organize a meeting for those interested.

Gilbert says he got about 100 responses. "Most were terrific," he recalls, "but there were one or two that said 'Mind your own . . . business.' Philip Johnson, when he was asked to join, said 'Architects have no social responsibility.' Well, that's very nice, but it doesn't mean anything."

The first meeting of ASR was held in Gilbert's office in May 1982, and the group managed to organize over 200 architects for the World Peace march in New York City last June 12 (see July 1982, page 24). Since then, ASR has been involved in consciousness-raising efforts regarding military expenditures.

"We have developed a program with the New York City planning boards," says Gilbert, "helping them to clarify the relationship between the cost of capital construction programs and defense spending."

The program equates expenditures for improvement projects around the city with their equivalents in military hardware. As an example, says Gilbert, "the maintenance and redevelopment of Central Park, Bryant Park, Madison Square Park, and Union Square Park is equal to one F-16 fighter plane."

James Stewart Polshek, FAIA, dean of Columbia's graduate school of architecture and planning, is ASR's executive committee chairman. He says that compared to the Physicians for Social Responsibility and the Lawyers Committee on Nuclear Policy, ASR is distinctive in that it is represented by some of the leaders of the profession. ASR's board of advisers, still in formation, has among its members Edward L. Barnes, FAIA, Ronaldo Giurgola, FAIA, Michael Graves, FAIA, Charles Moore, FAIA, and Robert Venturi, FAIA.

The danger of nuclear weapons, says Polshek, "is a very real issue for architects. The symbols of culture for 3,000 years have been buildings, either as memory or actuality."

ASR participated in the recent citizens lobby for nuclear disarmament in Washington, and there are plans for an art auction this summer to raise funds. It is also planning a traveling exhibit for the general public, a program to alert students against the Federal Emergency Management Administration's Summer Shelter Program (which ASR describes as a "thinly disguised air raid shelter feasibility study for which the government is offering architectural students summer jobs"), and the establishment of various information resources for the public and profession. ASR is also in the process of distributing posters and buttons to boost awareness and membership.

ASR's national liaison committee chairman, Tician Papachristou, FAIA, is working to help architects in other parts of the country establish groups. Papachristou says that he would like those groups to remain independent. "Part of the charm and effectiveness of this movement has been its diversity and grassroots quality. There are a lot of little discussion groups that exist that are spontaneous and independent. We don't want to eradicate those and bureaucratize them. We'd like to keep this as fluid and free as we can."

Klaus Mueller, AIA, of The Architects Collaborative in Cambridge, Mass., says that formulation of an organization patterned on ASR is under way there. "We just have a few members at this point," says Mueller, who wants to involve Harvard and MIT students as well. Mueller says that in a recent discussion group, "students brought up the question of whether architects should use or specify materials of big conglomerates who also make defense weapons. I think that's something we certainly have to ask ourselves."

Another group, also based in New York City, involves architects, planners, and engineers—about 40 in all—who are work-

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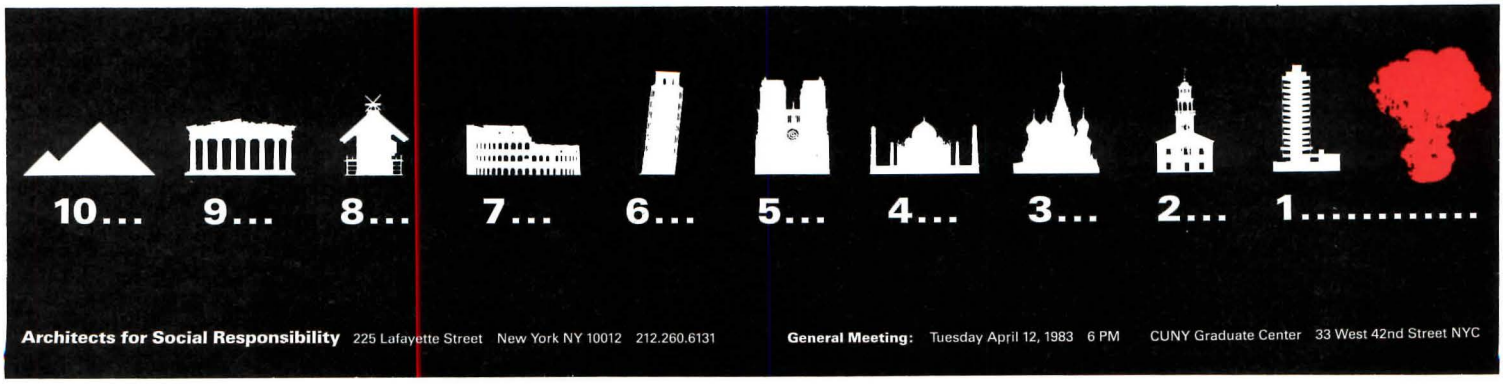

Illustration from membership application, Architects for Social Responsibility.

The Institute *from page 16*
ing on a handbook to help community organizations understand the federal budget, where their tax dollars go, and how they might be better spent.

C. Richard Hatch, AIA, says that the group's energies have gone into producing results rather than swelling ranks. "We debate all the time on what we should call ourselves, because we're a motley crew. I guess the current name is Environmental Professions for Nuclear Disarmament."

Hatch explained that the group is "really not a membership organization—we don't spend our time trying to get more members. We decided that we better produce some things of use to the city and to community organizations before we try to recruit others." One of the projects under way is a workbook for communities to understand the federal budget and how decreases in defense spending might result in community resources.

On the West Coast, a group similar to ASR started in October 1981 by planner Rose Marie Rabin has drawn together faculty and students of several architectural schools in California. Sam T. Hurst, FAIA, one of the group's advisory board members, says that the group has attempted to embrace a wide range of design professionals. "We tried to make it inclusive, so our name is Architects Designers Planners for Social Responsibility, ADPSR, which is rather unwieldly, but inclusive."

ADPSR has been in contact with ASR, the two joining forces in the New York march last June. It currently has about 130 members and regularly sponsors lectures and is in the process of helping other groups in the West to organize.

Hurst says that the group has elected an advisory board that includes prominent architects, planners, designers, and architectural faculty. Among them are Robert Harris, AIA, Charles Kanner, FAIA, Raymond Kappe, FAIA, and Harvey Perloff.

AIA Foundation Establishes Building Energy Data Bank

The AIA Foundation has announced the creation of a "Building Energy Information System" for use by architects and others to incorporate energy related data in building design. The BEIS marks a step in the Direction '80s program to emphasize AIA as a "knowledge-based national institute."

The first set of data to be stored in the system will be that collected from 21 public and private buildings around the country that are monitored by the Department of Energy for passive solar energy performance. Future data will come from other DOE laboratories conducting research on energy use in buildings.

The focus of the BEIS will be on "end use" energy consumption. The system will collect, analyze, and store information on how energy is used in a building, be it for lighting, heating, cooling, hot water, mechanical equipment, etc. The foundation says that the information will be available to architects conducting their own analysis of a given project or comparing their project to one similar in size and energy use.

The BEIS is designed, however, so that any building performance data may be eventually incorporated, covering all aspects of building design and use. The foundation is now exploring various methods of disseminating the information. Currently being considered is computer timesharing, floppy discs, and written information supplied through individual inquiries.

Practice

Buildings Meeting Current Codes Survive Coalinga Earthquake

When an emergency team of California architects and structural engineers arrived in Coalinga 36 hours after the May 2 earthquake, the downtown appeared to be bombed out. Houses built on piers were now squatting askew on the ground. And everywhere there was confusion of rescuers and rescued, "like a big movie set, with people milling around and big lights and lots of Army people," says Paul Neel, AIA, who, as president of the California Council/AIA, led the eight-person team to the central California town.

The downtown buildings, braced by their party walls, didn't give way entirely, but their fronts and backs came off and fell into the streets. Built in the early part of the century before seismic building codes were enacted, the structures were mostly two-story, unreinforced masonry construction with clearspan trusses. Merchants lost all of their inventory, much of it undamaged, because bulldozers had to be brought in to destroy the remaining structures. "The situation was just too dangerous for them to go in and retrieve it," according to Neel.

The architects and engineers, as experts sent to Coalinga by the state's office of civil preparedness, were allowed into areas cordoned off to residents and the press. In addition to Neel, the team consisted of Warren Thompson, AIA, Christopher Arnold, AIA, Robert Hench, AIA, Anthony Pings, AIA, structural engineers Bud Bruelick and Kim Sera, and Paul Welch, executive director of the California Council/AIA. Early this month, a second group, a California Emergency Design Assistance Team, was to return to Coalinga for three days and nights to help the city prepare a plan for seeking disaster assistance funds.

When the first team arrived on the morning of the second day after the earthquake, it found that older houses sustained more damage than newer ones. Like many in the Midwest, they were built on piers three feet above grade with concrete steps leading up to a wide, pillared front porch. The earthquake had crumbled the piers and literally shaken the houses to the ground, Neel says, leaving concrete steps sticking into the air.

In general, structures built to uniform building code standards came through with only minor damage, mostly to the interiors, observes Neel. "The lesson to be learned in the newer buildings was that things inside that weren't tied down were destroyed," he says. Fluorescent lights became particular hazards when their plastic lenses shook loose and turned into saucer-like projectiles. Then the tubes fell out and crashed to the floor. Bookcases not secured to walls fell over, and heavy objects like telephones and potted plants were hurled around.

Neel finds it amazing that no one was killed in the 28-second quake, saying that this is partly explained by the fact that it started with a slow roll, "and the maximum ground acceleration was about 15 seconds into the quake. That gave people time to get under tables or into doorways, and some out into streets. Of course, if you hadn't gone far enough into the street, you would have received tons of bricks on top of you."

When Neel and the others arrived in Coalinga, an oil town with a population under 7,000, many residents had gone to the community college, which had sustained little damage and on whose playing field the Army had set up tents and kitchens. Along the residential streets, others were taking belongings out of their houses and loading up their cars. "And then they just sat there, usually on the front porch, with no place to go, afraid to stay in their houses. So they slept on the lawn," says Neel.

There had been fires, and the water mains had broken, leaving no potable water. But a brewery sent many cases of bottled water, and the newsmen with their transmitting equipment helped with com-

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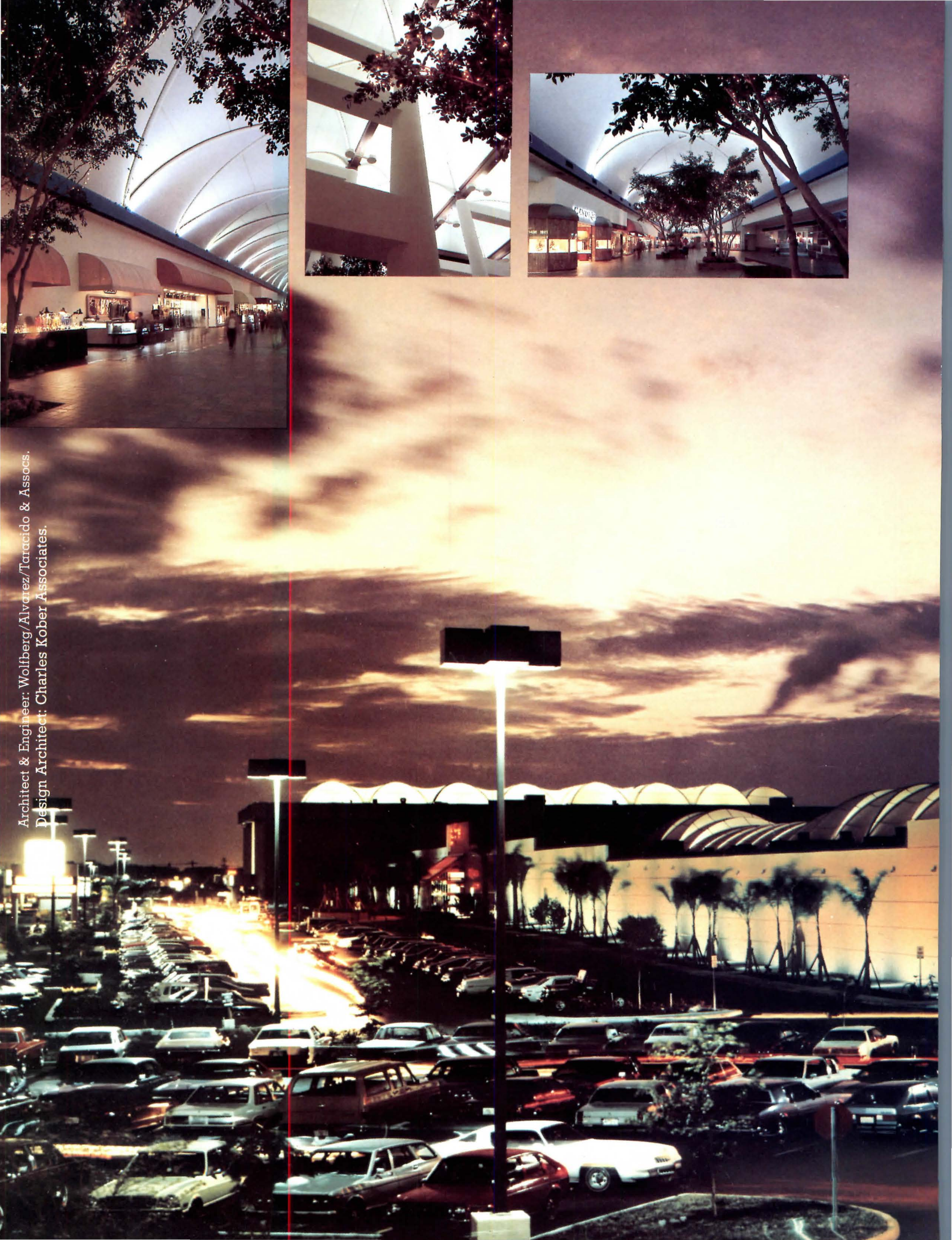

Architect & Engineer: Wolfberg/Alvarez/Taracido & Assocs.
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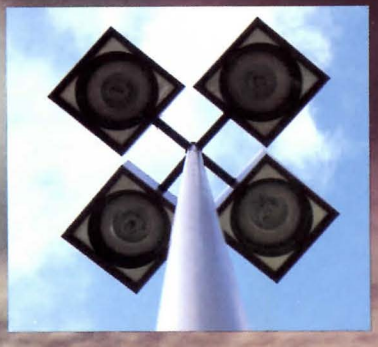

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Practice *from page 21*
munications until the telephone wires were restrung.

Asked the most important thing he learned during his visit to the earthquake damaged city, Neel says that unreinforced masonry buildings "will come down, no question about it," in earthquakes of similar magnitude, while "buildings designed to code with good earthquake safety measures stand a good chance of receiving less damage."

American Architecture Center Formed at Columbia University

Columbia University in New York City has announced the establishment of a new center for the study of American Architecture. The center will be a "national scholarly resource focused exclusively on the past, present, and future of American building," as described by the university.

The center is made possible with a $5 million gift from Temple Hoyne Buell, AIA, a Denver architect and developer and Columbia alumnus. It will be housed on Columbia's campus in East Hall, which will be renamed Temple Hoyne Buell Hall. The center will also bear his name.

Buell's gift will provide for the restoration and renovation of East Hall, create an endowed professorial chair in American architecture in Columbia's graduate school of architecture and planning, and support a wide range of regional efforts throughout the U.S. to study American architecture.

The center will sponsor lectures, exhibitions, and colloquia. The first of these were held in conjunction with the establishment of the center. Architectural historian Vincent Scully delivered four lectures in the annual Milstein lecture series in March and April.

"American Architecture: Innovation and Tradition," is the theme of an exhibition consisting of more than 350 images and a text that illustrate the architectural characteristics of six regions of the country. The exhibit will travel throughout the U.S. and then be shown in Europe and the Far East. A three-day symposium on the same theme was also presented (see following story).

A board of advisers for the center includes Henry-Russell Hitchcock, Ada Louise Huxtable, Edgar Kaufmann, jr., Phyllis Lambert, I. M. Pei, FAIA, Adolf K. Placzek, James Stewart Polshek, FAIA, and Vincent Scully.

Polshek, who is dean of Columbia's graduate school of architecture and planning, is serving as the center's acting director. He and the board of advisers are now in the process of selecting a permanent director and formulating the center's direction. Polshek says he sees the center contributing to the degree to which "scholarship and a larger world view of architecture informs the practice of architecture." Polshek says it is hoped that the center will take advantage of the increasing number of young architects with "superior education," both quantitatively and qualitatively.

Polshek says that a variety of people would make use of the center. "My view would be to gear it more toward people in practice. But that might not be the majority view. I would hope that would be the case because it would make the center quite distinctive. There really is nothing like that in America."

The center's location at the university will contribute to an interdisciplinary approach to architecture, says Polshek. "I could see all sorts of things including collaboration with the French department, since so much of American architecture was born in France and is strongly related to it."

Polshek adds that the nature of the center will depend on the imagination of the director and the board of advisers. "The thought is to get as many people as possible together, in a constructive way, to influence what's done, but to keep the center as part of the graduate school." Polshek says that the center will remain closely connected with the school and its faculty.

Polshek points out that the board of advisers represents various approaches to architectural practice and scholarship. "Scully, Kaufmann, and Hitchcock represent scholarship, Pei is a practitioner, Huxtable is a journalist, Phyllis Lambert runs a center in Canada comparable to this one for North America and is an architect as well, Placzek represents librarians and archivists, and I represent practice and the relationship with academics."

A distinctive facet of the center will be its link with other institutions around the country, forming an information-sharing network. Currently, the University of Texas at Austin and the Art Institute of Chicago will represent the Southwest and Midwest, respectively. Polshek says that the center intends to have similar links to institutions in the Far West and South.

The directors of these affiliated centers will be on the board of directors of the national center, opening up possibilities of exchanges "of anything from documents to visiting professor rights. There is definitely a network aspect to it," says Polshek. The affiliated institutions will be financially independent.

The University of Texas at Austin recently received a gift of $200,000 from the Meadows Foundation for its regional center. It will be displaying the traveling exhibition and is in the process of organizing its own.

The regional center will be housed in Battle Hall, which holds the school's collection of architectural drawings and an extensive architectural library. Architectural historian Blake Alexander and associate professor Lawrence Speck will be codirectors.

The Art Institute of Chicago, which has its own extensive architectural library and a collection of architectural drawings, models, and artifacts, has informally agreed with Columbia to be affiliated with the center, but has taken no other action at this point.

Columbia Symposium Attempts To Distill an American Identity

"American Architecture: Innovation and Tradition" was a suitably vague topic for the symposium that inaugurated the new Buell Center for the Study of American Architecture at Columbia University in April. Since this was the first function of an institution that is self-consciously the first of its kind, it was evident that the underlying theme would be a question almost too big to ask: What makes American architecture American?

The sessions, which were attended by about 270 persons, including architectural historians, historians, and architects, may not have provided any thoroughly satisfactory answer to the question. The answers came in fragments, and perhaps the general conclusion of the prestigious meeting was that America is a continent of fragments, most with little relationship to one another.

In the lecture that opened the conference, Vincent Scully predicted that Americans may never again reach the level of urbanism achieved in pre-Columbian Mexico and in the pueblos of the Southwest, largely because their forms were dictated by the land itself. The contemporary American landscape is arbitrary, based on grid-iron plans and ideas brought from Europe.

One way of looking at America is that it is what Europeans did when they got the chance—the Western imagination unfettered on what it viewed as an empty canvas. Thomas Van Leeuwen, a Dutch architectural historian, saw the skyscraper, that most American of building forms, as the realization of long-held European aspirations.

"When Europeans at the turn of the century looked upon the skyscrapers of New York, they did not see something that was shockingly new, but the revival of something shockingly old," Van Leeuwen said. This was the tower of Babel, an image that had been in the Western mind for millenia, and has a strong expression in European art.

Scully compared the skyscrapers of lower Manhattan to the church spires of

continued on page 26

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Practice *from page 24*

a New England village, which seek to define a skyline. He contrasted them with the tall buildings of Chicago, which were on a regular grid and conceived as massive, block-defining palazzi, stretched taller in order to get in more rentable floors. Commercial and technological innovation underlay both types of tall buildings, of course, but as Donald Hoffmann, of the Kansas City *Star* noted, the packaging of these structures was more interesting to their creators than their structure. "Chicago often gets read backward from Mies," he said. "The best Chicago architecture is embraced by color, romance, and mystery."

The structural grid of these American buildings made a tremendous impression on the pioneers of European modernism. But most of the participants were more interested in another grid, the one that was imposed on the vast American landscape, whether on the scale of a city or on the entire countryside. "The prairies were broken into a Cartesian grid," said architect Denise Scott Brown. "In America the only thing whose location is predestined is the corner store." She spoke of the "jarring sense that everything is dropped in from something else."

This is an abstract view of the landscape, which is shaped not by the land itself but by the process of development. Scott Brown is willing to accept this commercial approach and the sometimes surrealistic environment it produces.

But Dolores Hayden, author of books on utopian and feminist architecture of the 19th century, replied that the incoherence of the developer-produced environment should not be accepted. She condemned Scott Brown, who had spoken of Las Vegas and Levittown, for her "romantic view of the taste of Bugsy Siegel and Bill Levitt." Hayden said that Americans should re-examine alternative traditions, such as those of Shakers, American Indians, and the rural New England Greek revival of the first four decades of the 19th century, which she termed the strongest American architecture. She suggested the coherence she found in the rural Greek revival was the result of coming from an honest response to the environment, without the distortions of commercial development.

Many of the speakers were looking toward an innocent time, but they tended to define it differently. Most used the word "vernacular" to refer to it, but this proved to be a very slippery term. It was stretched to encompass everything from a kind of post-Sea Ranch folksy picturesque to wooden Victorian houses, suburban split levels, and mobile home parks. Indeed, before the conference was over, Charles Gwathmey, FAIA, referred to the luxurious, extremely modernist style he uses in beach houses as "a vernacular."

The consideration of the meaning of vernacular proved to be one of the strongest aspects of the entire symposium. Landscape architect J. B. Jackson, in one of the keynote speeches, gave an extremely unsentimental account of the subject. While tracing vernacular dwellings—in particular the houses of people who did not work their own land—from medieval Europe to mobile home camps in contemporary America, he tried to discredit many misconceptions about vernacular buildings. He said that such buildings were not timeless and Arcadian. They have changed substantially through history, and, since the 14th century, most have been built not by their occupants but by specialized craftsmen, who often brought their materials from some distance. Moreover, Jackson said that the buildings rarely had a strong relationship with their environments.

The principal characteristics of American vernacular buildings, Jackson argued, are that they are not built to last, that they are seen as steps to something better, and they often make use of unorthodox technology. "A vernacular house never quite fits the people who live in it," he said. "There are lots of additions and adjustments."

His view of the vernacular had little to do with visual qualities, and it would certainly seem to apply such urban forms as Philadelphia trinity houses and New York City tenements, and by analogy to some suburban tract housing. "You should not look to the vernacular to look for prototypes of polite architecture," Jackson said. "No matter how nicely you treat it, it will never be elegant." He concluded with slides of buildings he promised that nobody would like, and he was right. "Don't worry about how trailers look," he concluded. "Worry about the conditions in which people live in them."

Admiration for the vernacular, whatever it might be, is probably one way in which architects and historians engage in that American exercise of looking for a lost Eden, or at least for a time when things fit together better than they seem to now.

But the bleakest words, and virtually the last words of the symposium, were uttered by Kevin Roche, after he, Gwathmey, and Alan Greenberg showed their latest work. "Architects have given up everything that is important—interiors, landscape, development," he said. "We are becoming decorators of curtain walls. . . . We are all collecting lint from our navels when we should be thinking about our responsibility to society at large. . . . We don't have a real architecture in our time, only fragments. It's a disgrace."
THOMAS HINE □

Mr. Hine is architecture critic for the Philadelphia Inquirer.

For many years this magazine has made a policy of not regularly publishing new buildings. In part this was to give it an identity as different as possible from the other major magazines serving the architectural profession, whose stock in trade is showing new work.

But given our absorption in architecture, buildings inevitably have played an increasingly important role in the magazine: in the evaluation series, in packages such as January's on underground architecture; in the annuals on U.S. and then world architecture; in December's discovery issue.

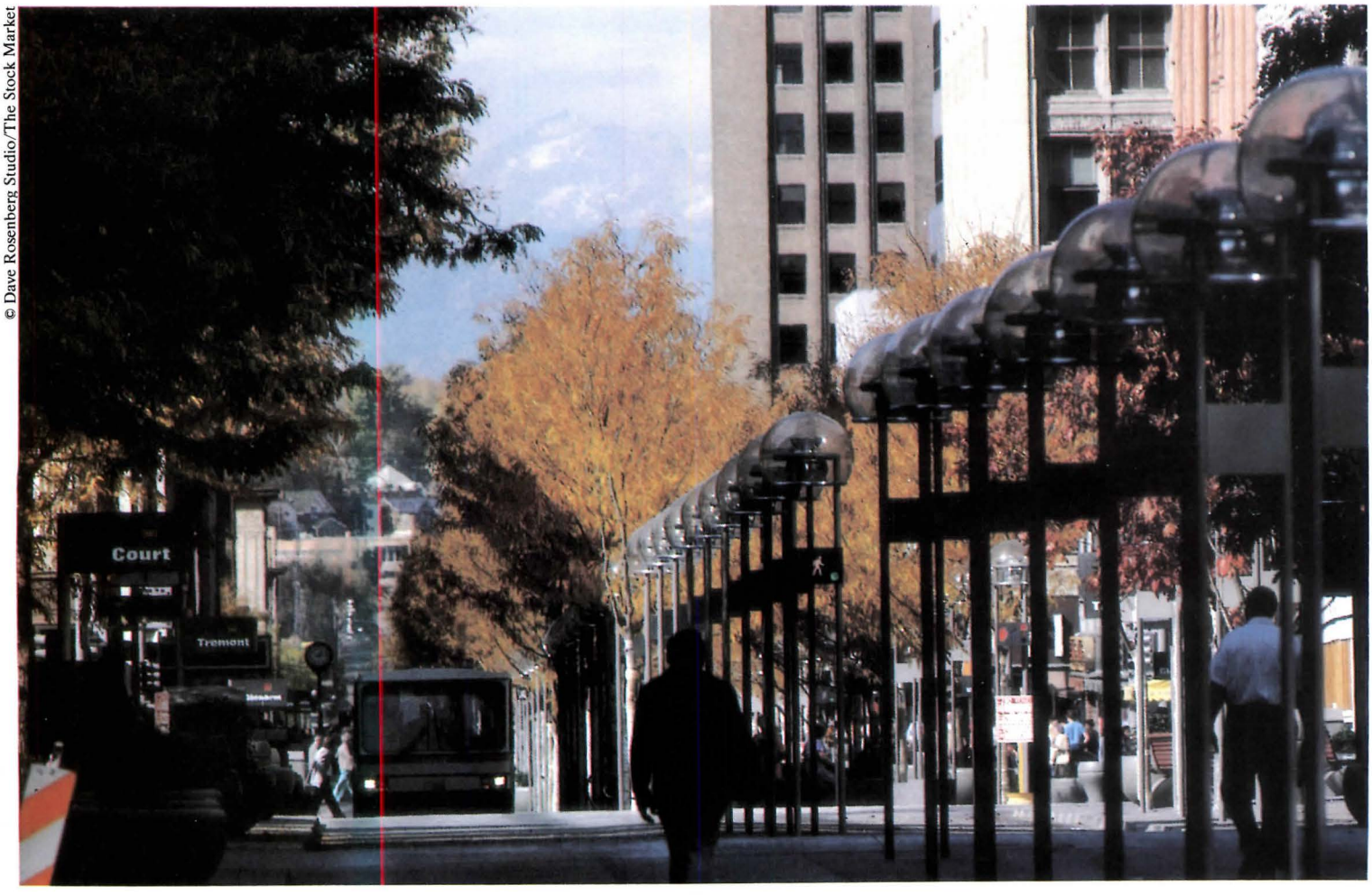
Now we are ready to take the next step: publication of new buildings in regular issues. The first of them will appear in July, along with our new logo (see page 82).

They will be buildings chosen for their quality but also because we believe they are instructive or illuminating about issues confronting today's architecture.

Our coverage of them will be analytical, not merely descriptive. And if we feel they are flawed, while interesting, we will talk about their flaws as well as their virtues.

We are taking this step partly because we feel that there is a lack of, and need for, this kind of coverage. Thus it should not diminish our differentness.

Also, the editorial content will be expanded so that the building coverage supplements but does not supplant our coverage of a wide range of other things such as, in this issue, landscape architecture and urban design, daylighting, and an intriguing remnant of history. *D.C.*



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Courtesy of I.M. Pei & Partners

Finely Furnished Shopping Spine

I. M. Pei & Partners' 16th Street transit mall in Denver. By Nora Richter Greer

During the last decade downtown Denver has changed drastically. Both the energy boom (which has now gone bust) and a dramatic growth in service industries brought the construction of numerous office towers, creating a glassy urban canyon along 17th Street. But what may well be the most important new development is something much different in scale: the transformation of gritty, traffic-congested 16th Street into an inviting pedestrian/transit mall.

And this is no ordinary mall. It is a 13-block span of intricately patterned gray and red granite dotted with specially designed lights, benches, fountains, and 220 trees. It is a rich Indianesque carpet upon which sleek transit vehicles glide. Since it opened last October it has become the focal point of downtown.

The story actually begins in 1975 when plans for an extensive rail transit system were announced. However, the federal government's Urban Mass Transit Authority denied funding for the project, saying that the city was too small for a rail system and that emphasis should be placed on bus transportation. At this point C. F. Murphy Associates produced a master plan that called for making 16th Street a mall with bus terminals at each end. All suburban buses would provide service to one of the two terminals, and from there commuters would transfer to the mall's transit vehicles (more like people-movers than buses) for passage through town. The goal was to take 50 percent of the buses off the downtown streets. Sixteenth Street was chosen because it traditionally has been the center of retailing, commerce, and transportation.

In 1977 five A/E teams that were finalists for the rail project were invited by the Regional Transportation District (RTD) to submit design proposals for the mall. The project was awarded to the team headed by I.M. Pei & Partners. Others on the team were KKBNA, Inc., of Denver (civil/structural engineers); Hanna/Olin Ltd. of Philadelphia (landscape consultant); Phillip E. Flores Associates, Inc., of Denver (landscape architect); Howard Brandston Lighting Design, Inc., of New York City; Barton-Aschman Associates, Inc., of Evanston, Ill. (transportation consultant); and Page Arbitrio & Resen, Ltd., (graphics) of New York City.

The guiding objective behind the design was that it be for a simple, integrated mall—not an episodic one—that complemented rather than distracted from the rich ornament of the street's buildings, whose ages span more than 100 years. Says Harry Cobb, FAIA, of I.M. Pei & Partners, "The distinctive character of 16th Street is established by the extraordinary diversity and animation of the street wall. It is a narrow street, but very lively. We wanted the mall design to be complementary to that diversity. Therefore, we were looking for a few very simple components, which could be seen as integrated and unifying elements."

There are three major elements: paving, lighting, and planting. Among the first decisions was that the mall would be tree-lined to provide protection from wind, sun, and rain. In order to maintain visibility and accessibility to the "street wall" the trees were placed in the middle of the mall, 32 feet apart on the edges of a centrally located "pedestrian promenade." That promenade is 22 feet wide and is flanked by two 10-foot-wide transit path-

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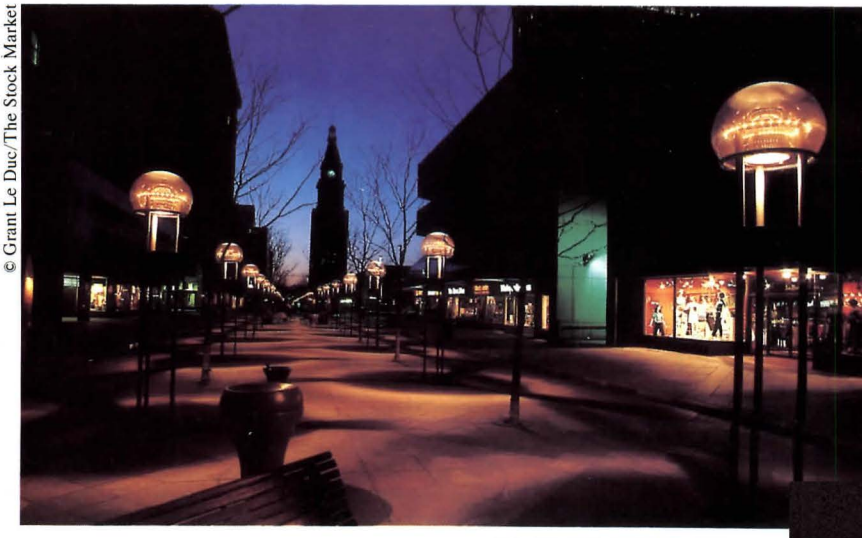

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Across page, view down the mall toward the Rocky Mountains, top, and 16th Street around 1890, bottom. Right, 16th Street before (top) and after with the D&F Tower in the background.

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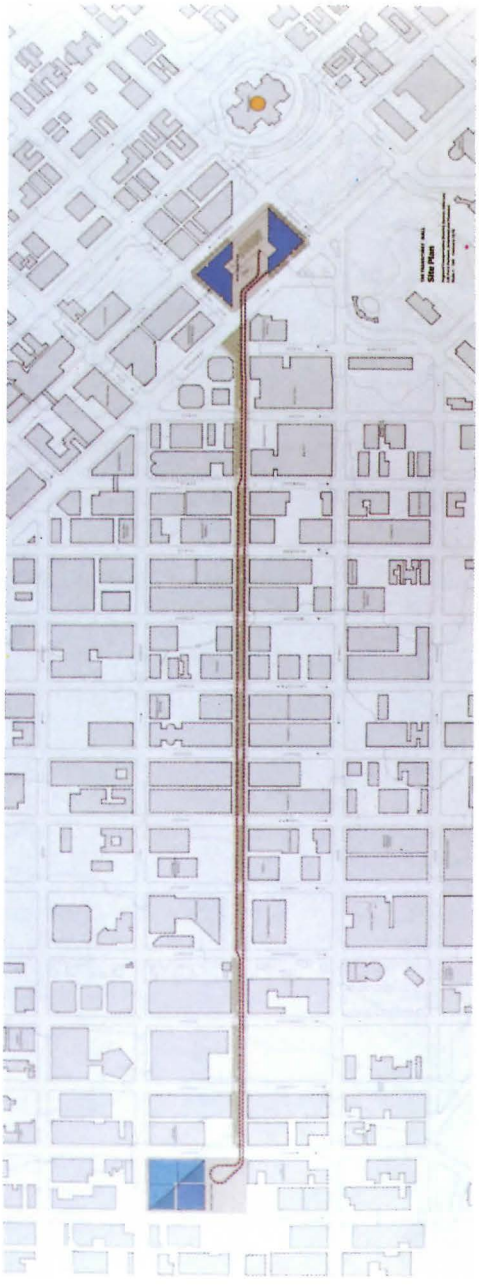


A patterned granite carpet and rows of trees.

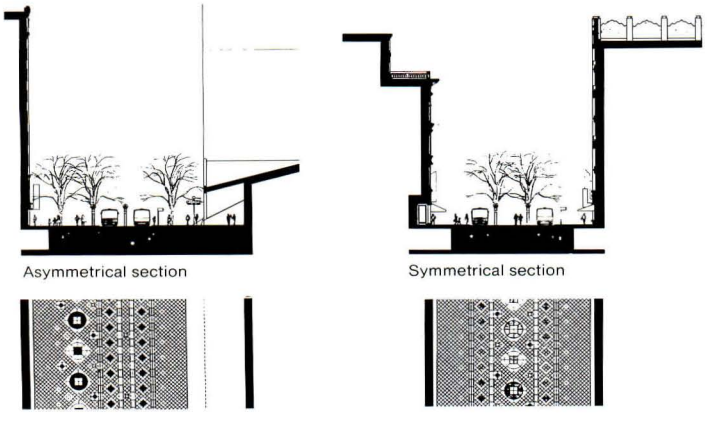
ways, which are slightly depressed. At the edges of the transit ways the existing sidewalks were widened from 15 to 19 feet.

This symmetrical placement is repeated for six blocks in the middle of the mall. On the three blocks leading to the Capitol and Civic Plaza on the southeast and the four blocks leading to Market Street at the northwest end, the organization becomes asymmetrical. Here the transit ways come together and are flanked by trees on one side, which edge a wide sidewalk. This change from symmetrical to asymmetrical was to aid access for the transit cars into the terminals, but also reflects a change in the street wall from retail to commercial. The two ends of the mall also act as "gateways" to downtown.

In choosing the tree types, RTD wanted many different varieties to ensure against the chance of a blight killing all the trees. However, the design team wanted one type of tree for continuity. In the end, after a thorough analysis of several trees (for disease, foliage, special problems, growth patterns, etc.) two types were chosen: honey locusts for the symmetrical blocks and red oaks for the asymmetrical ones.

Finding 220 mature trees (five to six inches in diameter) was no easy task, but they were finally located in a nursery in the Fox River Valley outside Chicago. The trees were bought, shipped to Denver, and held in a nursery for at least a year before they were planted. There the trees could adjust to the climate so that the chances of losing any when planted was greatly reduced. Only three of the 220 trees have been lost. The probable cause for one was cement lime in the tree pit; the other two died after being hit by a truck and a bus, respectively.

In another unusual effort to protect the trees (when planted each is valued at between $2,000 and $3,000), a special drainage and watering system was devised. Underneath each tree lies a bed of gravel, with a drainage pipe running the length of the mall. For watering there is a continuous underground pipe from which two microporous plastic pipes loop around each tree root. The watering is manually controlled according to need. Around each root ball is a concrete box with cutouts on three sides designed to protect the roots from compaction, but also to allow for growth. Since the trees sit so close to the transit vehicle line, one corner is solid concrete to withstand the weight of the transit vehicles. The box is topped with a precast concrete lid with six-inch air and water holes and above that granite paving with one-inch holes. The only visible portion of the planting system is a cast iron ring that can be widened as the tree grows. It is potentially large enough for a 60-year-old tree.



Overview, across page, and the mall's 13-block plan with the Civic Center terminal at top and Market Street terminal at bottom. Above and right, trees, fountains, and lights are precisely placed in the granite's geometric pattern.

Planting the trees was especially difficult. To match the precise geometry of the paving pattern, the trees had to be placed exactly as designed; there was no variance for the construction workers. Laurie Olin of Hanna/Olin says, "We had a fair amount of trouble getting the boxes set right, laying first pieces of concrete out when there is nothing else around except construction equipment. The placement was a matter of eighths of an inch." Finally, a special rig was invented to plant the trees vertically into the pit.

It is perhaps this exactness that makes the mall so appealing and comfortable. The image is so smooth, so graceful that it is hard to imagine that there are 100 distinct shapes of granite, let alone that intricate planting system. Granite was chosen over brick and concrete for its longevity and what was perceived as its ability to wear well in the sometimes volatile weather conditions in Denver. The three shades—charcoal gray, light gray, and Colorado red—are placed in a geometrical pattern that Cobb likens to the back of a rattlesnake, "the unfolding of a snake's skin in which the design is very pronounced in the center without patterns on the edges." This patterning accomplishes two things. It clearly delineates the three different zones: the sidewalks, transit way, and pedestrian promenade. And by making the pattern less busy at the edges there is not a "direct confrontation" between the paving and the coloration of the buildings, in Cobb's words.

The next element to be added was the lighting. Says lighting consultant Howard Brandston: "In thinking about this mall, I realized that it pandered to people and to the wall . . . the wall that is merchandizing, lights. And then we have this very elegant but simple pathway, very nice arrangement of trees, and vehicles that move in a very ordered way through it. The next thing that was needed was another order that respected all of this." Brandston looked upon the task as designing floor lamps for a luxurious carpet.

What resulted is a light that sits atop a tripod stand, for a total height of 11 feet. As Marek Zamdmer, staff architect for I.M. Pei & Partners, says, "*The tripod was used as a way to* avoid a stick of tree, then a stick of light, then a stick of tree, etc." The main light is incandescent and is housed in an aluminum reflector. This light is pointed upward toward the trees, downward toward the pavement, and then it bounces off the

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The mall's 'furniture' includes benches, trash cans, signage, water fountains. Across page, glitter lights turn on first, then the aluminum-cased main lights, and the security lights after hours.

© Marek Zamdmer

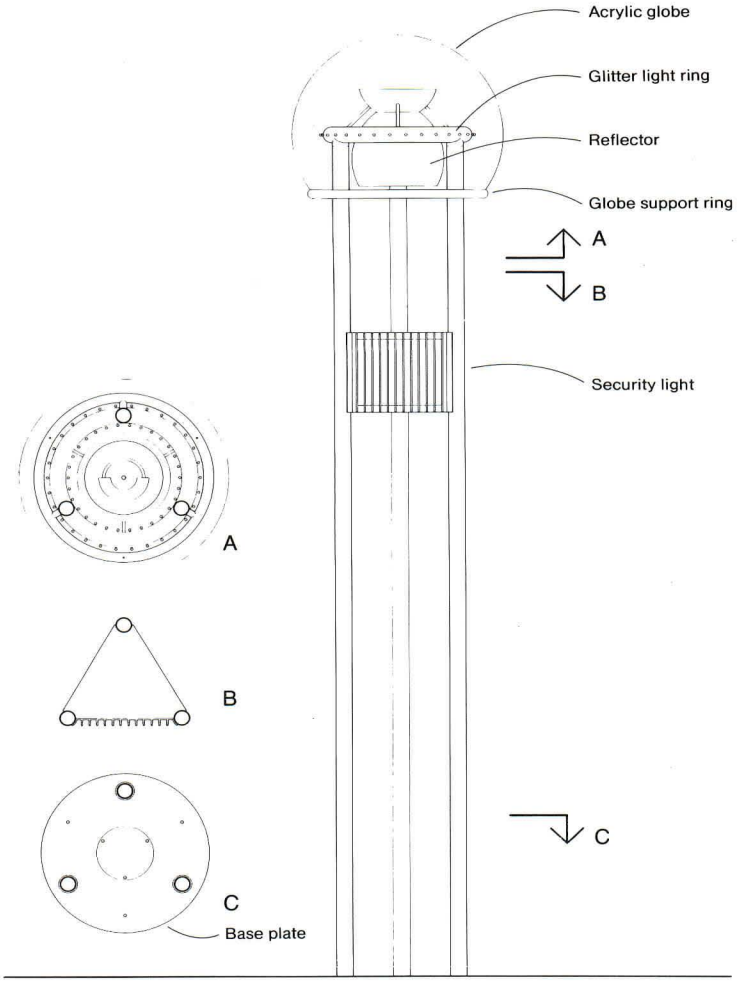
Glitter, water, and an array of objects along the way.

aluminum. Around the aluminum center are placed small "glitter" lights (similar to miniature Christmas tree lights). The whole center is surrounded by an acrylic globe. About midway down the tripod stand is a mercury vapor security light that is pointed toward the storefronts.

The lighting is designed to be sequenced as follows. The glitter lights turn on at dusk. As it grows darker the main lights come on and remain on until the mall "closes." During the evening the sidewalks are theoretically lit by the ambient lights of the storefronts. After hours, the reflector lights shut off and the security lights take over. And in the morning before the sun has adequately lit the mall, the glitter lights are on. These glitter lights are meant to be ornamental and to "echo the glow that generally is in Denver at those times of the day," Brandston says. Overall the lighting system is quite unobtrusive. And the lights are so distinctive that they have been anthropomorphized in a poster celebrating the mall's opening.

Interspersed along the mall are other objects: low, round flower planters, purple heartwood benches (six on each block), cylindrical telephone booths, trash cans, water fountains, signage systems. Each is painted in gray to match the granite. Low fountains mark the areas where the symmetrical blocks change to the asymmetrical ones. These are considered "dry" fountains in that a pool of water is not collected at the base but the water flows into a circular metal grating and into a reservoir beneath the granite surface. The spray is 14 feet in diameter, the boundaries of which are marked by 16x16-inch granite blocks. The only thing on the mall that is not as the designers planned are the electrical control boxes for the lights, which just grew and grew in size, according to Zamdmer, due to the use of electric components instead of digital timers.

During the design process there were long discussions over

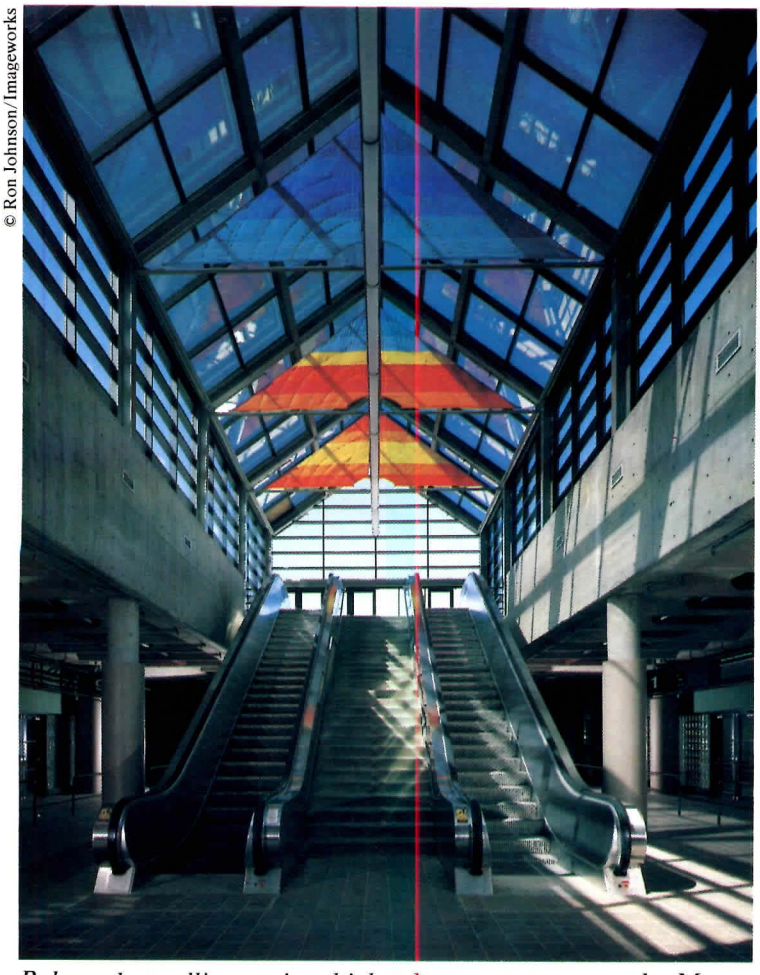


© Michael Shomo

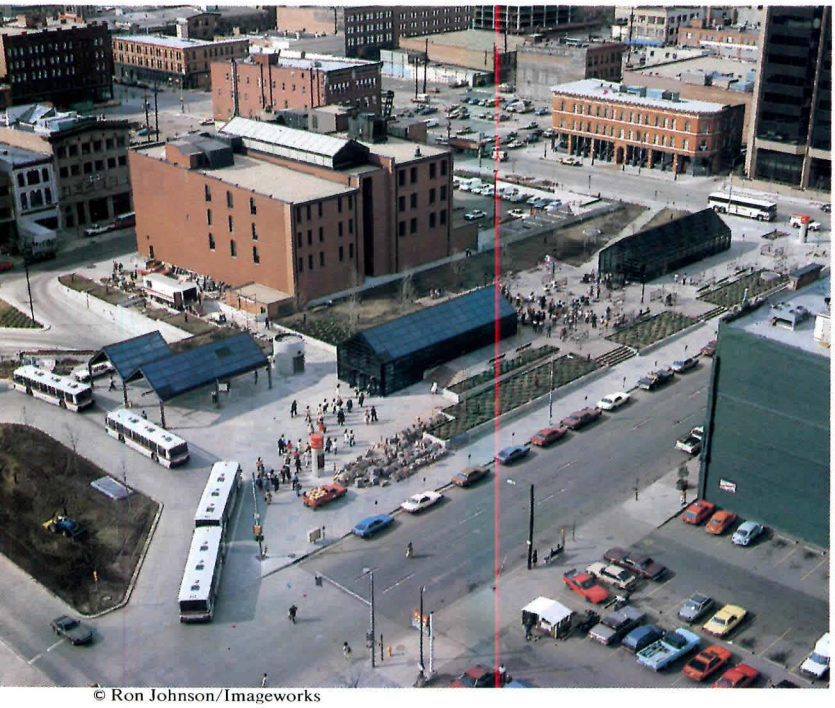
whether to have curbs or to simply slope the pavement for drainage purposes. Olin says, "The question was 'what is the curb for, and if you have one, what should it be like.' . . . And although it sounds like a minor point, it turned out to be central to our whole concept of place, and part of the genius of the solution has to do with how to have a curb and also how to overcome a curb." (The question also raised a controversy among the handicapped. Those in wheelchairs didn't want curbs; the blind insisted on them.) The solution was to have a low curb between the sidewalk and the transit way and slightly slope the edge between the transit way and pedestrian promenade. "The reason we didn't have it there is that we have lights and trees to give you guidance," Olin says. The curb consists of individual pieces of carved granite that fit precisely into the geometric pattern, which Cobb calls "one of the most beautiful details on the mall."

The curb height actually works quite well with the transit way vehicles. The 40-foot-long, 9-foot-wide, 10-foot-high vehicles have only one entrance step, which is only 12 inches above ground level. In combination with three wide doors, this provides easy access. Designed by Minicar-Vettor, the vehicles are either diesel or battery driven. The 19-car fleet can accommodate up to 10,000 passengers per hour. During peak hours, the vehicles are to travel in 70-second intervals at a top speed of 15 miles per hour. Stopping at each block, a round-trip will take approximately 15 minutes. The only other vehicles allowed on the mall are ambulances, fire trucks, and police cars, although delivery trucks can use the mall as access to alleys that only have entrances on the mall.

There are two other areas in which the design team "lost," in their own words. One is the paving of the cross streets; the other where the mall meets the bus terminals. "The original plan had granite going across the cross streets. We lost that and now the cross streets are concrete," Cobb says. "I console



Below, the mall's transit vehicles drop commuters at the Market Street plaza for transfer to suburban buses. The terminal, designed by Johnson-Hopson & Partners, is entered through glass pavilions, behind which is the new headquarters for the Regional Transportation District—an older structure rehabilitated by Dominick Associates. Above, glass pavilions cover the terminal's escalators.



Life on the mall by night as well as day.

myself with the observation that in fact it is not so bad to go off the mall and back on because it reminds you what an extraordinary place it is. To cross into the grungy old city every 350 feet and then back onto the mall again isn't so bad."

Originally planned as part of the total package, the design of the terminals was turned over to the Denver firm of Johnson-Hopson & Partners. Budget limitations will cause the paving and lights found on the mall to end before reaching the terminals.

Construction of the mall took, by the 16th Street merchants' standards, two painfully long years, even though it was done incrementally. To save money the mall was to be constructed without major relocation of underlying utility lines, a task made easy due to the fact there were no utility lines where trolleys once ran. The biggest problem was the underground vaults, which existed under approximately half the sidewalks. The ones in use were reconstructed; the others were sealed off. The day the mall opened many of Denver's streets were rerouted.

But the pain felt by the merchants and the $20 million spent will have its paybacks. A preliminary study by the Washington, D.C., firm Gladstone Associates estimated that the mall will stimulate an increase of between $18 and $24 million a year in sales downtown over the next six to eight years. And the mall has already attracted important new development. Near the Market Street end, construction has begun on Tabor Place, which will contain 150,000 square feet of retail space (developed by The Rouse Co.) and a 450-room Westin Hotel.

By day the mall is a lively place. Noontime finds people flocking there from adjacent blocks to eat and shop. The mall becomes an outdoor stage, where people and their activities are the actors. In fact, on a sunny, warm day it is hard to find an empty seat on one of the benches. And, too, the mall has become the arena for major festivals. Opening day ceremonies drew an estimated crowd of over 400,000. Last month a "Spring Fever" festival kicked off the season's outdoor activities.

But the mall also serves a very distinct function at night. After work hours Denver is no New York City or Washington, D.C., for there is little activity downtown. What the transit mall provides is a shuttle between the hotels, located mainly at the Civic Center end, and the retail/entertainment centers on the opposite ends—Writer's Square, Larimer Square, the Performing Arts Center. Says Robert Yeager of the Denver Partnership Inc. (a nonprofit organization that promotes and guides development downtown), "At night the transit on 16th Street gets visitors between the no man's land—the vacant area between the two more lively end blocks." That middle section contains the retail stores that tend to close early and many unsightly (and dark) vacant lots that are used during the day for parking.

A special tax assessment district was developed for maintenance of the mall, which includes property owners on 15th, 16th, and 17th streets, and which may soon be expanded. The tax is collected by the city treasury and turned over to Denver Partnership Inc. for upkeep of the mall.

Current maintenance problems include finding a detergent sufficient to clean tire and grease stains on the granite, fine tuning the lighting schedule to meet the needs of 16th Street merchants, and adjusting the lights on the fountains. The partnership is also responsible for reviewing all proposals for street vendors, kiosks, sidewalk cafes, festivals, more street furniture.

With the mall came new zoning for 16th Street. To avoid the canyon effect of 17th Street, this zoning encourages pushing towers back from the street so that plazas or low-level retail centers are directly adjacent to the mall. Also, a property owner is encouraged to rehabilitate older, lowrise buildings through a transfer of development rights. Only four of the buildings are designated landmarks, six are considered eligible. It is hoped that a strong effort will be made to preserve the scale of 16th Street as it now is: humanly approachable and richly ornamented. □

John Pastier

Evaluation: Park Atop a Freeway

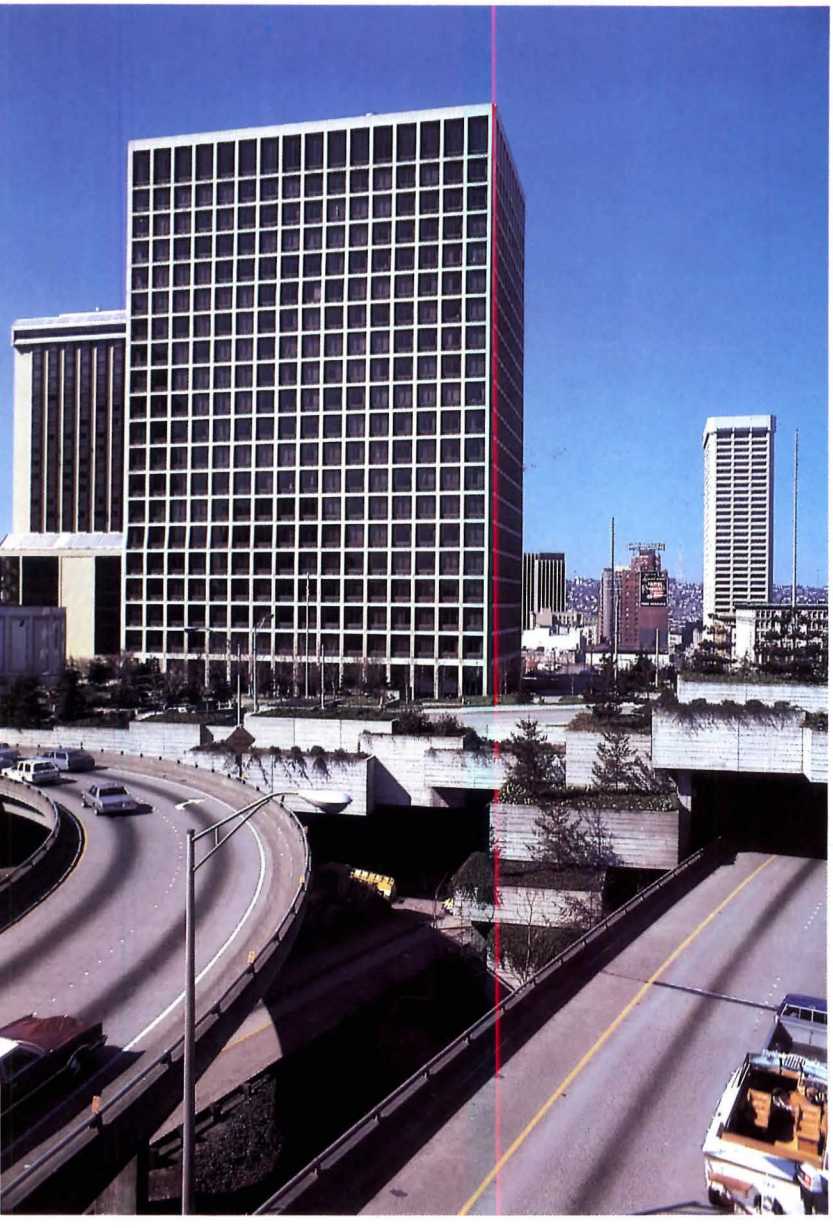
Lawrence Halprin seizes some opportunities in Seattle. By John Pastier

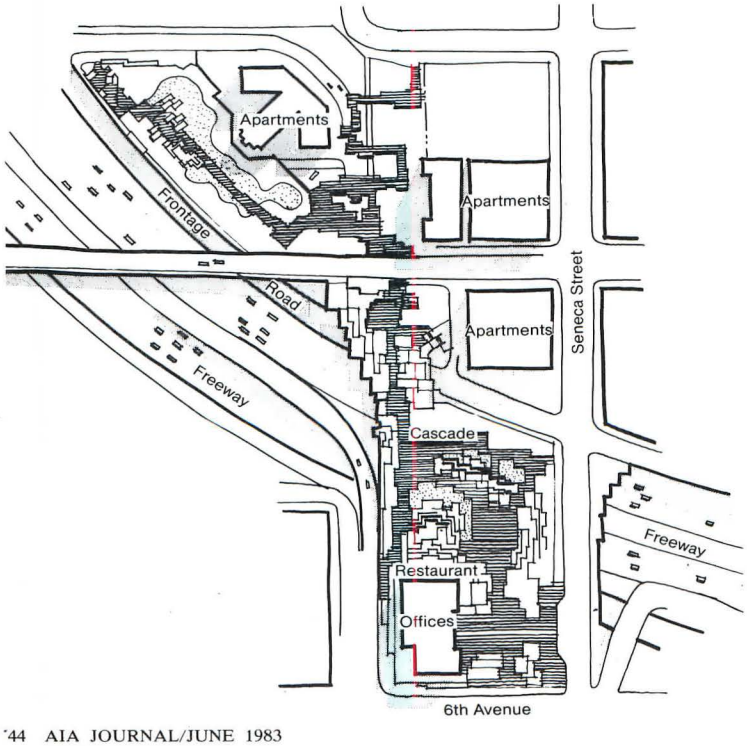
America's urban landscape has been radically transformed over the last generation, shaped mainly by the automobile's capabilities and demands. Private vehicles have woven a loose suburban pattern of vast scale, and they have simultaneously preempted much of the land that they allowed to be developed. Their impact has also been strong in older urban cores where they did not influence the original physical framework, and where their increasing presence has been of dubious benefit. In these cases, an expensive process of retrofitting has been undertaken to widen streets, expand parking, and to superimpose a monumentally disruptive network of superhighways on once-coherent city grids. Although our cities have been spared the damage of war, we have allowed them to be captured and occupied by one of our allies.

The problem is not simple, and its solution may have to await the development of a still unenvisioned replacement for the automobile, since city planners and urban designers have not been able to devise a satisfactory physical accommodation to its demands. Up to now, we have had to content ourselves with palliatives and one of a kind responses to a frustrating syndrome.

Seattle provides a picturesque illustration of this phenomenon. With a diversity of transit modes that includes a center-city monorail, an underground "people mover" at the airport, electric trolley buses, free downtown public transportation, and an extensive ferry system, it has been called a transportation planner's toy shop. Yet even this technologically adventurous city has not been spared from the automobile. With help from the highway lobby, it has defeated more than one attempt to build a rapid transit system. It did erect a double-decked elevated roadway along its downtown waterfront in the 1950s, however, and in 1965-66, after bitter opposition, completed a 12-lane depressed freeway a few blocks inland. Interstate 5 decisively severed the business district from previously connected high-density residential and institutional neighborhoods occupying First and Capitol Hills to the east.

But no sooner was this damage done than steps were planned to assuage it. By 1966 a newly formed civic group called Forward Thrust was formulating an ambitious $2 billion package of civic improvements to put before the electorate. The local contribution to this program would total more than $800 million, and the proposal was the largest single program ever attempted at one time by any American metropolitan region. Its two largest components were $385 million for rapid transit, and $121 million for parks, including landscaping a small downtown segment of Interstate 5. Voted upon in early 1968, only a third of the dozen bond issues gained the necessary 60 percent majority for passage. Rapid transit lost with more than half the vot-





'Its most salient characteristic is complexity.'

ers in favor, but the parks measure won. Barely noticed in the complicated Forward Thrust proposal—its four successful measures encompassed 370 individual projects—the evolution of Seattle's Freeway Park had begun.

At first no one realized the ultimate scope of the park. It was originally seen as a beautification effort: a bit of landscaping to soften part of the freeway's nasty gash. Then someone at the Seattle Park Commission saw Lawrence Halprin's book *Freeways,* in which the San Francisco landscape architect proposed methods of integrating freeways into urban structure. By then, Halprin had gained attention through Ghirardelli Square in San Francisco and his three downtown parks in Portland, Ore., and it was clear that he had ideas that were expanding the boundaries of his profession. Among them were notions of the importance of water, movement, and time in urban and landscape design, concepts that were curiously appropriate for a site bordering a torrential stream of mile-a-minute traffic.

When Halprin was brought into the park project, the only certainty was its "area of occupancy." In 1970 the Park Commission knew where the freeway park would be, but its size, shape, and features were still to be fixed. It was sited at Sixth Avenue and Seneca Street on a curve where the interstate angled through the downtown street grid as it headed north. Seneca Street spanned the freeway, and the immediate vicinity was a maze of traffic channels: The original street network was largely interrupted, and some short new street segments had been built to adjust to the freeway swath. Two flying ramps rose from the freeway's central lanes to give access to downtown, as did other ramps of a more conventional nature, and the lengthy Eighth Avenue overpass spanned Interstate 5 at an odd diagonal angle. In short, the neighborhood of Sixth and Seneca was a textbook example of the fragmentation and confusion that a superhighway can create in a formerly stable urban center.

Confronted with this situation, Halprin was sanguine, saying later that "the trick is to perceive the freeway as part of the cityscape and tame it, rather than complain about it." Short of roofing over several miles of it and then reconstructing the city on that base, there would seem no way of really taming Interstate 5, but Halprin certainly did his best to create transitions between the road and the urban context. He did so largely by expanding the scope of the project, and by treating the expanded problem flexibly and pragmatically. There is not one Freeway Park but several; depending on how finely one divides its sections, there are between six and nine distinct domains in this unusually diverse design. The park was not a pure concept that sprang full grown from Halprin's head, but rather a process of sensing opportunities, persuading clients to pursue them, and knitting the whole together to the extent that circumstances and geometry permitted. In this pragmatic sense, it is a kindred spirit to the urban freeway that spawned it.

As stated earlier, Freeway Park was first envisioned by the organizers of Forward Thrust as a small park along the interstate. Halprin's book alerted local park officials to more comprehensive urban possibilities, and brought about his direct involvement, which in turn expanded the project quite concretely. His most important act of design and salesmanship was to show the desirability of bridging over the freeway rather than just treating one edge. The rationale was to reconnect downtown with First Hill, and this was done by means of a block-wide deck extending north from Seneca to University Street, as well as a narrower, irregularly bounded strip along Seneca's southern side. Additionally, an arrangement was made whereby a private office tower, Park Place, would rise 21 stories on a corner of the larger parcel, occupying land untouched by the freeway, and would contribute to the cost of the park that would adjoin it on two sides, form a roof for its subterranean garage, and add considerably to its value.

Those principles of expansion and integration were repeated

Photographs by John Pastier

Across page, top, Freeway Park cascades into the interstices of Interstate 5; bottom, site plan of the park. Above, an overview of the Central Plaza's 'metaphorical landscape.'

when Halprin convinced the park commission to extend the park to cover the roof of another garage planned on the far side of the freeway, north of the bridge section. To reach this panhandle from the main body of the park meant bridging over one street and going under another in close proximity. Completing the list of park segments was the southernmost portion, a landscaped embankment between Sixth Avenue and the freeway's western edge, extending from Seneca south to Spring Street and penetrated by a sharply curved access ramp. These various segments, some of which were physically separated but adjacent to the others, covered an area of just 5.4 acres. Measured between its extremities, Freeway Park is about 1,300 feet long, yet there are portions less than 60 feet wide.

By now it must be obvious that the park's most salient characteristic is its complexity. It is a complexity not confined to geometry, but one that extends to administrative and physical structure. Ten years passed from its initial formulation to its completion. Its ownership resides in both the Seattle Parks Department and the R.C. Hedreen Co., developers of the adjacent office building. The State Highway Department, King County, and the federal government were also involved in its development. The park's construction had to accommodate the daily flow of 133,000 vehicles below and alongside it, the weight of soil deep enough to sustain large trees, and the water of cascading fountains and irrigated planting. Merely satisfying all concerned parties and complying with the laws of the land and of physics constituted a distinct triumph.

But beyond these structural and administrative accomplishments, there is the matter of design. Here things are not so clear cut. Even though the park has a dramatic central fountain that is a classic Halprin marriage of rugged concrete and rushing water, as a whole it is diffuse and episodic. It was designed as a metaphor of a mountain landscape, yet that approach can be questioned in a highly urban setting. Finally, one may ask how well it meets its goal of reuniting the city, and speculate whether it is a feasible prototype for other downtowns, or just an interesting oddity in the history of urban development.

Freeway Park is oddly shaped and elongated, but its length does not correspond to either a natural pedestrian path or a formal processional sequence into the city center. Rather, it reflects its genesis as a series of separate opportunities taken: It is a smorgasbord of sites that abut one another but do not coalesce. While each of its segments generally shares a vocabulary of forms—linked rectangular and cubistic shapes staggered and offset within an orthagonal orientation—this similarity of visual treatment is not sufficient to overcome the sprawl and

Healing wounds and sewing the city back together.

basic dissimilarity of the park's various parts. In the battle between the underlying disparity of site and the superimposed ordering of design, the disparity was mitigated but not conquered.

Although Freeway Park was meant to stitch downtown back together, it is precisely at its edges that it is weakest. Its northern panhandle, the East Plaza, is a nicely but unremarkably landscaped garage roof remote from the main body of the park. Its isolation has helped make it the site of several rapes. Two other extremities, a landscaped strip along the south side of Seneca Street and the freeway embankment east of Sixth Avenue, are more in the nature of visual open space than active space, and their value seems greater for motorists below than for pedestrians above. The West Plaza is closest to downtown and caps the garage that serves Park Plaza. It is a cut above the other garage roof, but Halprin now finds it weak as a passage between the city and the park center. "If I were designing it today, I would celebrate the way in better—now you ooze in . . . Perhaps an arch would do the job," he muses.

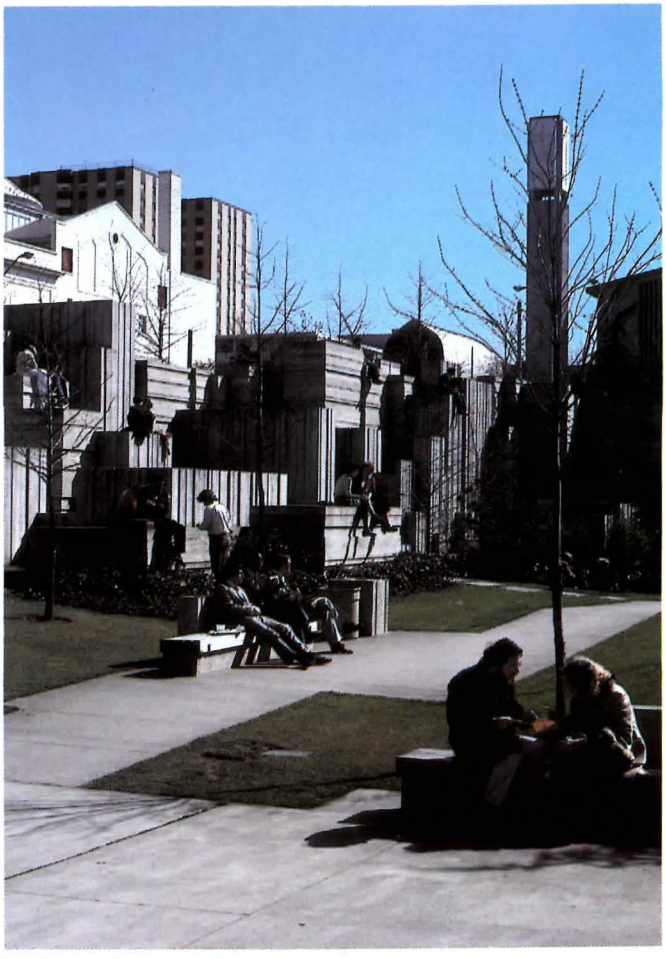
Just as the park's edges are its weakness, its core is its strength. The Central Plaza is anchored by an extravagant metaphorical landscape of concrete crags, plummeting water, cascading pools, and a gorge that descends partly into the freeway's depths. It is modeled on Alpine topography, and Halprin likens it to the distant Olympic Range that Seattleites can see on those glorious days when the skies clear. Angela Danadjieva, the associate in charge of design for the park, worked out the complex central form in clay models rather than drawings, and the result is an impressive piece of monumental sculpture. She shaped the ridge and gorge into an integrated composition of board-formed concrete in high relief. The upthrust solid and descending void are combined in yin-yang fashion, as though matter had been removed below and piled up above. Cast in stepped and interlocking prismatic shapes, it suggests both a rocky landscape and the clustered structures of an urban center.

Both the pinnacle and chasm invite climbing, and not without some risk. Halprin says, "I purposely design things that are dangerous for people to be in—so clearly dangerous that they don't hurt themselves. Biologically, we welcome the quality of danger as long as we can overcome it." This principle seems to work: Children and adults ascend the ridge to find lofty seats or to lie in the fickle Seattle sun. They venture into the watery chasm out of curiosity, Freudian compulsion, or to look through a window that frames a view of the moving cars below. The plunging stream is also meant to drown out the freeway's sound, but this is a debatable gain since it involves more than a doubling of the ambient noise level.

The metaphor of a mountain landscape goes beyond built shapes to include the planting scheme, which Halprin judges as one of his best. The lower levels of the park contain rhododendrons, azaleas, and alders, while the higher ones are planted with kinnikinick, Douglas fir, and upland trees. This arrangement expresses a correspondence between park altitudes (which span a range of 90 feet) and zones of plant life. Halprin is also pleased with the soft color palette of the flowers, and the way that the concrete has taken on a gray patina. Its rough finish has also promoted the growth of the lichen moss that is virtually a local building finish.

The absence of normal street furniture is another point of pride with Halprin. Seating is integral with terracing and structural forms, rather than on separate benches. Lighting is mounted on a few 100-foot-high poles rather than on many conventional fixtures.

All these tactics advance the concept of the park as a landscape of mountain peak and meadow, but that imagery may not be the most responsive design direction to take. One local landscape architect finds Freeway Park insufficiently urban for its setting, and the observation is apt. This park lacks the citi-



Above, some of the amenities of the Central Plaza; right, a few of Freeway Park's mountainous crags. Across page, a sheer cliff of concrete provides an outlook over the park.

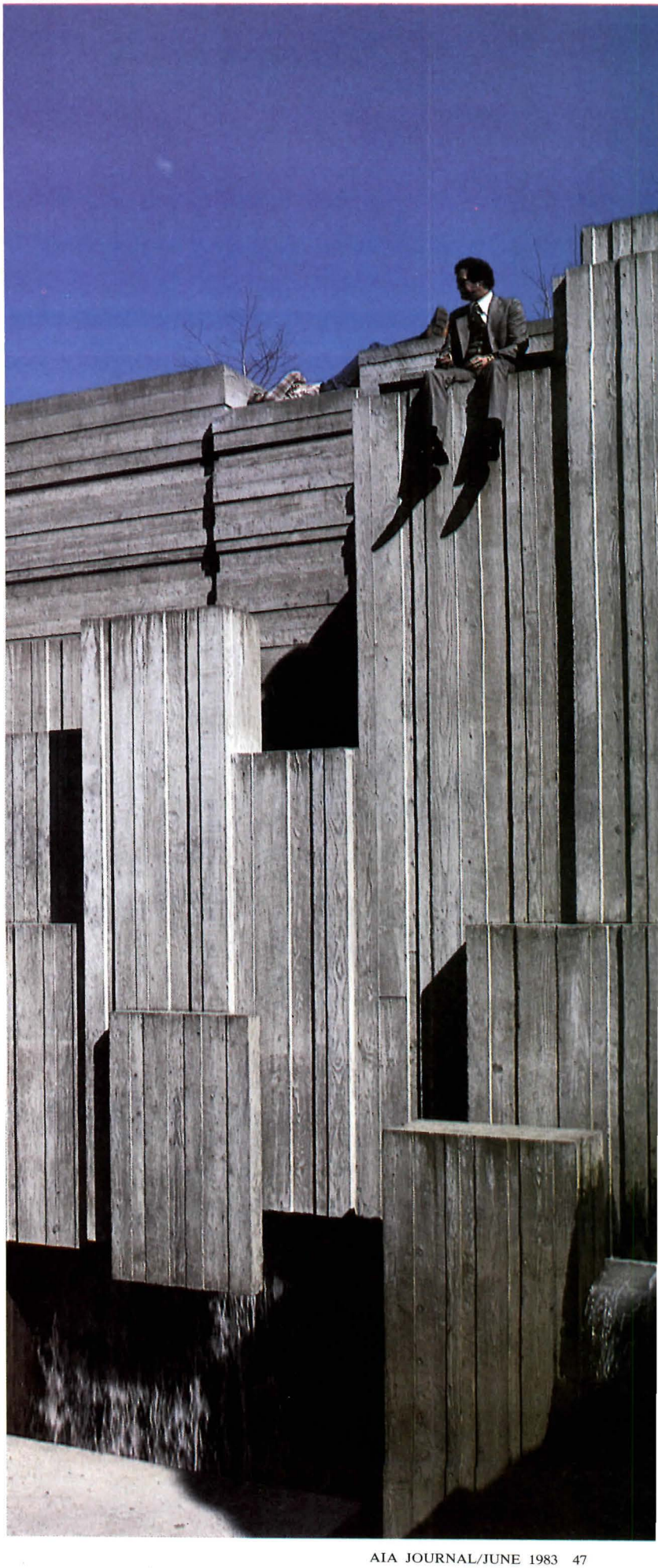
fied qualities of spatial containment, relationship to an architectural frame, and provision for diversity of activity and intensity of human interaction. It is less an ingredient of the city than an escape from it. It treats space more as a boundless sweep than as a formed volume within a specific urban matrix. In these respects, Halprin's ambitious expansions of the park site now seem a mixed blessing, since the resulting configuration proved inherently anti-urbanistic.

Halprin is unhappy with the estrangement between the park and the ground floor of the office building that adjoins it. Park Plaza provides no direct access to the main park space, and the restaurant that fronts on that main plaza does not open up to it or allow for outdoor eating. While this deficiency was beyond Halprin's control, his design might have included structures to make the park more amenable to wider public use. There is no shelter from the frequent drizzle, even though glass-roofed pavilions for that purpose exist in other downtown Seattle parks. There is no newsstand, no refreshment booth, and no vending carts, so that while Freeway Park is a fine place for wading in the pools or undergoing a symbolic wilderness experience, it is not a place to get a hot dog, a cup of coffee, or the latest edition of the daily paper. One of Halprin's two design priorities was "to bring amenity into downtown," but that worthy objective was not defined with sufficient breadth.

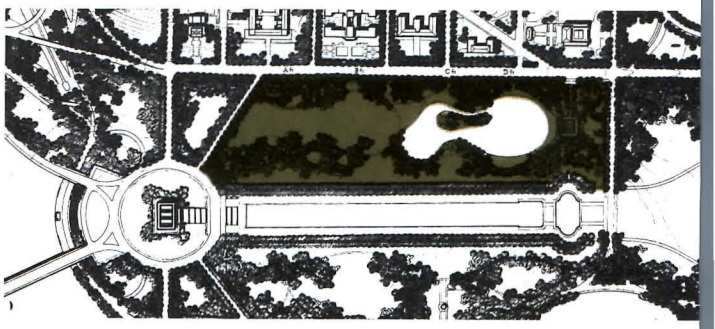
The other design priority was to "heal the wound" caused by the freeway "and connect the two pieces of the city together." This was no small matter, and it would be unrealistic and unfair to expect that a 400-foot-wide landscaped platform could accomplish that goal by itself. Truly tying Seattle's core back together would involve bridging several blocks, and would have to include well-frequented buildings and not just parkspace. When Interstate 5 was being planned in 1961, local architect Paul Thiry, FAIA, proposed decking over seven blocks of the downtown cut. His idea, estimated to cost $9 million, was deemed too expensive to implement. Completed 15 years later, Freeway Park and its two underground garages had cost $24 million and had covered little more than one block of the highway. A laudable and imaginative gesture, it has nevertheless proven to be expensive and more a symbolic urban link than an actual one.

Happily, there is at least one more chapter in the history of the park. Earlier this year, after first seeming to reject the idea in favor of two less central sites, Seattle decided to build a convention center spanning Interstate 5, just north of the park. Although this presents some problems—convention centers tend to be ungainly beasts of buildings—it is an excellent opportunity to strengthen both the park and the notion of rejoining downtown. If designed and executed properly the convention center could reduce the isolation of the East Plaza panhandle, create a clear architectural frame for the Central Plaza's north side, and amplify the linking process begun by the park. More significantly, it will bring thousands of people to the park vicinity, and extend the boundary of the business district in such a way that Freeway Park will be more a part of downtown activity. Finally, the inevitable increase in park patronage and the physical necessity of joining the new building with the park creates an opportunity for broadening the scope of public activity atop that ingeniously crafted concrete deck. Freeway Park will in effect become the convention center's south plaza, and, given its expanded role, could evolve appropriately into a more urban space. One can easily envision part of the convention center's south frontage devoted to the small commercial amenities now missing in the park, along with tables and chairs and either an arcade or a projecting canopy to form a usable pedestrian route sheltered from the rain. Anchored on one edge by the convention center and on half an adjoining side by Park Place, its activity broadened by urban street furniture and a sprinkling of commerce, and taking its city's drizzly climate into account, the new Freeway Park could advance Lawrence Halprin's objectives of amenity and civic integration beyond what was possible the first time around. □

Photographs by John Pastier



Romantic Gardens On the Mall



Thanks to SOM, Kevin Roche, Le Nôtre—and Richard Nixon. By Allen Freeman

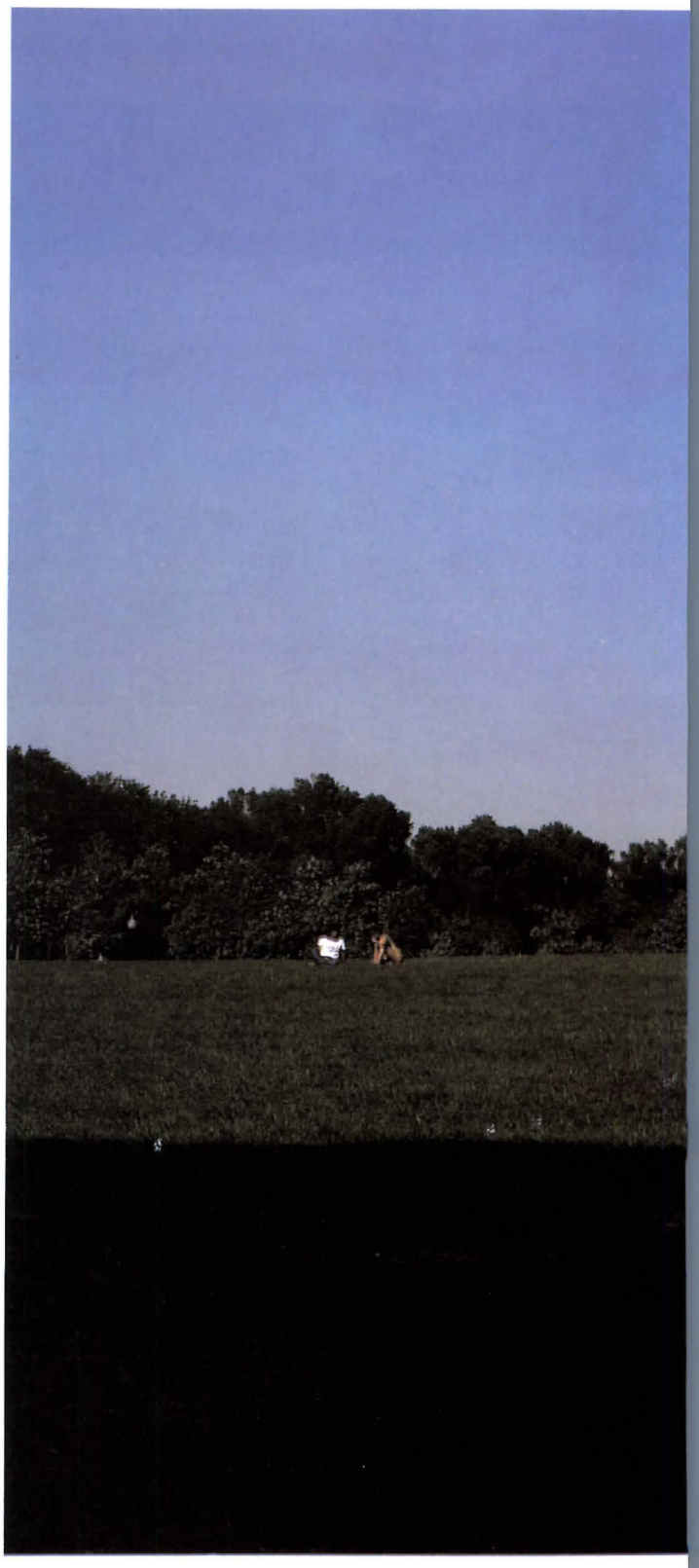
John Ehrlichman remembers it this way: The presidential helicopter was approaching the White House lawn when Richard Nixon turned to Ehrlichman and said, "My God! There are those old buildings I was stationed in during World War II. Look at them—they're a disgrace! Get rid of them. Let's clean them off the Mall." And in the months to follow, every time Nixon drove by or flew over the Mall's remaining "temporary" buildings flanking the north side of the Lincoln Memorial reflecting pool, he would fire off a memo asking why they weren't gone.

Ehrlichman was working on it, he says, but the Navy was resisting "because it was an extraordinarily prime location" three blocks from the White House. When the buildings did come down, Nixon's plans for the site emerged.

David Childs, AIA, then working for Daniel Patrick Moynihan, Nixon's urban affairs adviser, remembers a press briefing intended to drum up interest in the redevelopment of Pennsylvania Avenue. Nixon was supposed to ask questions and then view a large model. But he went right to the model, which encompassed the Mall, and pointed. "What's this area?" Told what it was, Nixon said, according to Childs, "That's great. We just got those buildings torn down."

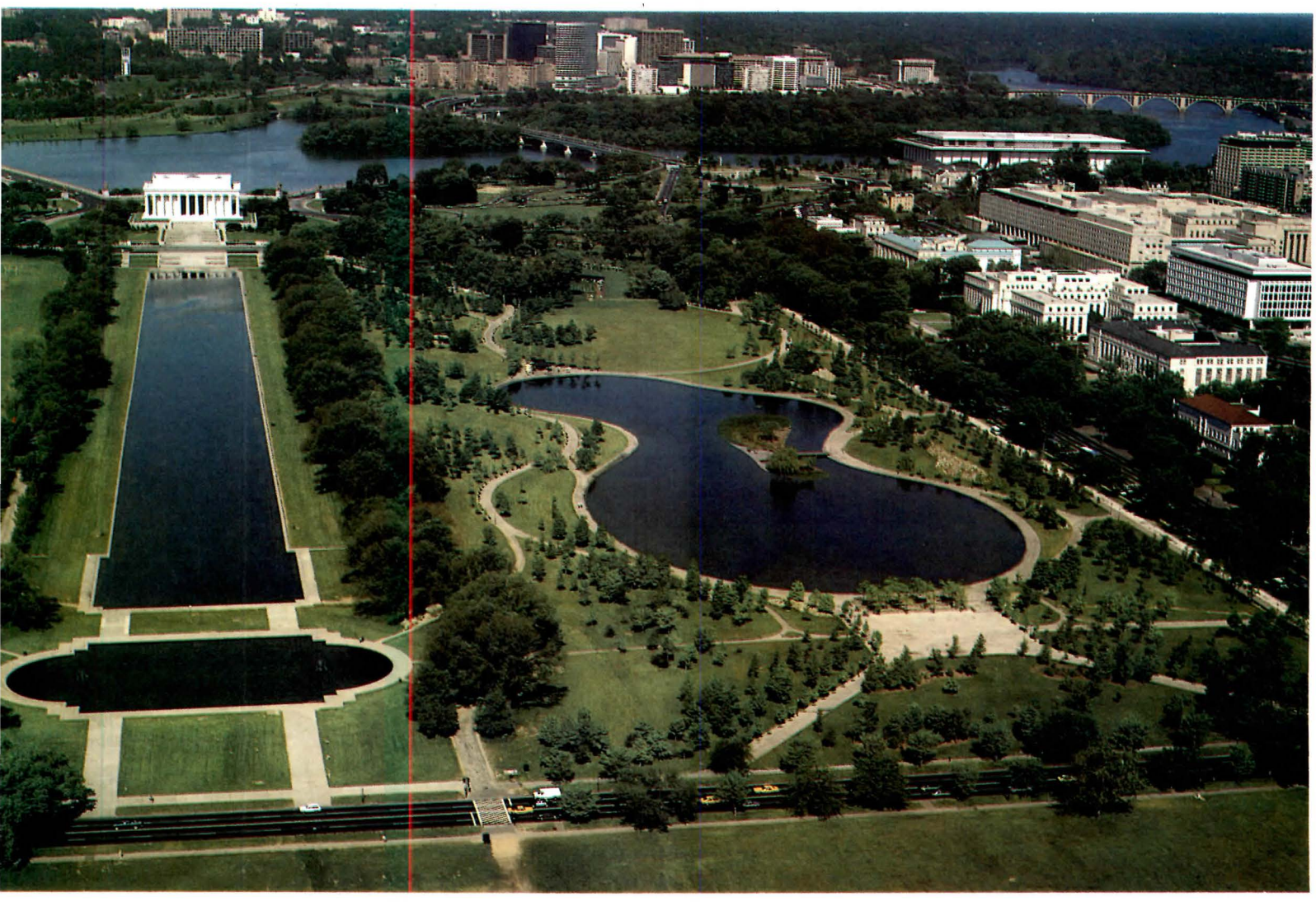
Childs continues: "And then he turned around and noticed me in the corner. I guess I looked to be of student age, because he said,'What do you think? Wouldn't this be a wonderful site for a student competition to design a park?' Of course I said, 'Yes, sir! Good idea!' "

It soon fell to Childs to prepare a competition. But after he commissioned a topographic survey and put together a program, the competition plans were scotched when students got wind of it and denounced it as an administration ploy to divert



Right, landmarks and monuments pop up above one of the gentle rises in the gardens. Below, a confluence of paths at water's edge.

Photographs by Allen Freeman



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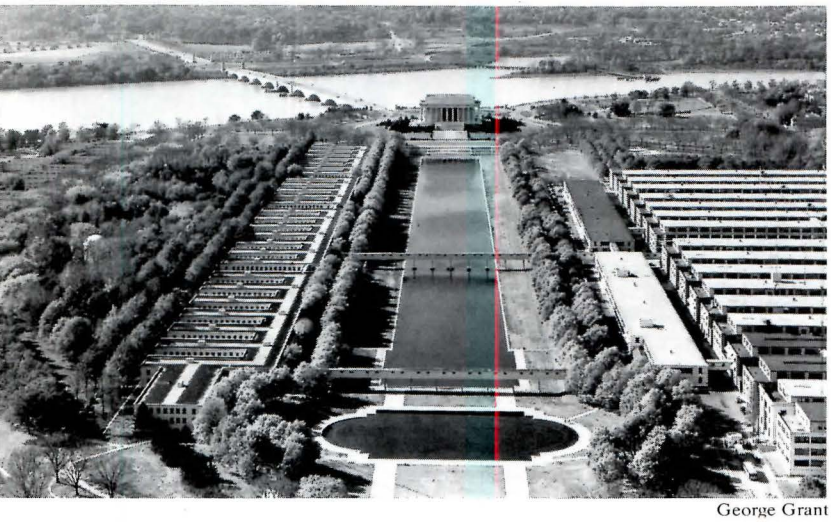


George Grant

Curvilinear forms and a new six-acre lake.

attention from Nixon's Vietnam policies. Later, when Nathaniel Owings secured for Skidmore, Owings & Merrill the commission to design what was to become Constitution Gardens on the site, he offered Childs a position in SOM's small Washington office, and the job of designing the park. Childs accepted and began work for the most politically powerful client in the free world.

As it turned out, Nixon had specific ideas about the design. He referred to it as a Tivoli Gardens, filled with restaurants and things to do—"not a Walt Disney and not a Williamsburg, but sort of a combination of the two," as Childs recalls. Ehrlichman remembers showing the president several sets of drawings as the plans progressed, and says Nixon gave him "sufficient delegation to be able to lean heavily on the secretary of Interior," who was the ostensible client. At one point there were to be two levels of underground parking, including space for 200 buses, and the park was to be a loading point for "tourmobiles," which were to encircle the Mall on a discrete little roadway.

"Nixon was intrigued by the idea of tourmobiles," Ehrlichman says. "He had someone trace on a map of the Mall the paths they would take and if someone got on here, where did he get off, and how the fares would work. And he asked Mrs. Nixon to take an interest in the park, which she did to some extent. I took drawings to her on several occasions. But it wasn't anything that caught her imagination in a strong way. She had a perfunctory participation."

Childs says that he had reservations about the density of activities in the design. He was also dead set against encircling the

Allen Freeman

Allen Freeman

Allen Freeman

area with a wall, an early Nixon concept, and unhappy about the effect of placing a parking cavity under what he felt should be terra firma. "What might look good in drawings in reality would feel a little like being on the top deck of a battleship," says Childs. "There would be those Dantesque entrances into Hell lit with fluorescents, and whirring fans in the middle of the park." And there was the problem of getting the money, to be allocated by Congress from diminishing bicentennial funds, to carry out such an elaborate program. (Concurrently with the park design, SOM was developing a Mall circulation plan for the bicentennial, the most notable feature of which was turning the two parallel inner roads from the Capitol to the Washington Monument grounds into wide, gravel paths.)

As it turned out, the underground parking was prohibitively expensive. But it was the Fine Arts Commission that killed the *Tivoli Gardens* concept, and one of its members, Kevin Roche, who set Childs on the exact course of a more modest design. In a letter to Owings, Roche offered the following:

"The area should be . . . heavily wooded, and under this canopy (or future canopy) quite a few activities could take place and amenities provided; but these should be housed in modest structures, modest in size and modest in aspect with an appropriate sense of fun, lightheartedness, and recreation, expressed by form, structural systems, materials, illumination, display, colors, and signs. (Nineteenth century Paris has a lot to tell us about this kind of architecture.) There should be a minimum of large paved areas around or connecting these structures. There should be no formal plan of these elements as such, but rather they should be thought of as individual experiences or environments set in the woods. One should come upon them, not march up to them in processional or be able to see them all at one glance from an open plaza."

Childs embraced Roche's concept. "Kevin should share credit for this project," he says. "Le Nôtre first, and Kevin Roche second." Louis XIV's architect strongly influenced L'Enfant, the planner of Washington, who had lived at Versailles as a child. More to the point of the Mall today, direct references to Le Nôtre's chateau gardens (the most obvious being the reflecting pool) can be found in the 1902 McMillan Commission plan by Daniel Burnham, Charles McKim, and Frederick Law Olmsted Jr. Le Nôtre at Versailles evinced the baroque notion of reason within chaos, classicism within a Gothic surround. Burnham et al. provided the Mall's City Beautiful classicism; Childs was to fill in the romanticism.

His plan for Constitution Gardens, a 52-acre, rectangular area of the Mall roughly three times as long as it is wide, is regular only at its eastern extreme, the point nearest the Washington Monument. Here, four straight paths focus on a raised, flat space, a platform for an as-yet-unbuilt food pavilion. The platform is on a cross axis with the fountain at the base of the reflecting pool. From the pavilion level, three straight fieldstone walls create stairstep terraces meant for tables.

With one striking exception—the Vietnam Veterans Memorial—curvilinear forms comprise the rest of the park plan. Dominating the center of the gardens is a six-acre lake with an

In the 1943 photo opposite, flying bridges across the reflecting pool connect 'temporary' buildings. WWII buildings at left in the photo came down soon after the war, while WWI-vintage structures north of the pool, site of Constitution Gardens, endured until the early '70s. Above, Frisbee on the south ridge, the Vietnam Memorial, and the now unused 'tourmobile' path.

© Mark Segal

Low key memorial on an island in the lake.

oblong island hugging its northern shore. A path at water level encircles the lake and at its western extreme meets a second major walkway. Within the long enclosure created by this walkway is first a steep rise and then a slight hollow. At the far western end, where the meadow drops away, the angular, dark walls of the memorial are revealed.

While the reflecting pool to the south is hidden from most of the park by a gentle rise forming a ridge, the Washington Monument dominates views to the east. Also popping up on the horizon are the Capitol dome, Old Post Office tower, and Smithsonian buildings. At the opposite end, the Lincoln Memorial, clearly visible in winter, is virtually obscured by still-immature trees. Along Constitution Avenue, the mostly classical buildings flanking the park are similarly blocked by trees.

Maples, beeches, oaks, and gums are densely clustered so that they will grow tall to provide the canopy Roche envisioned. (Arnold Associates was landscaping consultant.) Childs had to fight the client over the density of planting, and says he ended up with twice as many trees as the Park Service wanted, although not as many as he would have preferred.

Earlier, Childs was meeting resistance within the Interior Department over including the most important single element in the design, the lake. The argument was that the park would be next to the reflecting pool and near both the Potomac River and the Tidal Basin. Owings, on one of his frequent trips to Washington as chairman of the Pennsylvania Avenue Development Corporation and consulting partner of SOM, advised Childs to propose two lakes. And when Rogers Morton, the Interior secretary, countered with a "compromise" of only one, "we fought a little to make it look real," Childs says.

One of the Administration's better ideas was for tourmobiles. The wide, lumbering vehicles were to use a tiled path at the garden's edge parallel with Constitution Avenue. Unfortunately, the tiles cracked during use and have had to be taken up. Meanwhile, the rest of the Mall's path system was never built, and the tourmobile operators have abandoned the garden path for Constitution Avenue, leaving an unused, concrete bed curiously redundant to the adjacent wide sidewalk.

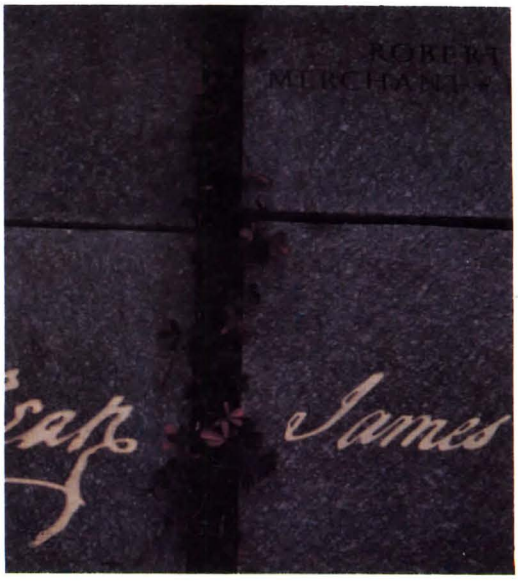
It is a minor blemish, and one that can be remedied by removing the concrete. A potentially greater threat to the integrity of the park is dotting it with memorials. Two are built: Maya Lin's Vietnam Memorial and a more modest one commemorating the signers of the Declaration of Independence. Although the Vietnam Memorial is understated, it is hard to imagine someone spreading a picnic blanket in front of those brooding walls.

The design for the Signers Memorial—by EDAW, Inc., with Joseph Brown as principal in charge—is similarly low key. Sited on the lake's little island, it is an ellipitical grouping of granite blocks, each bearing an enlarged, sandblasted, gold-leaf signature of one of the Declaration's signers. A rock ledge plant grows between the blocks, providing a soft "mortar." Extending in two directions from the memorial is a curving, low fieldstone wall that bisects the island. It is a modest, intelligent design, appropriate for the site. But, as Fine Arts Commission Secretary Charles Atherton, AIA, cautions, "If the trend to build memorials continues, it is going to change the area's relaxed atmosphere into something pretty heavy."

That, of course, is contrary to the intent and achievement of Constitution Gardens. A modest, Victorian park with French ancestry by the prototypical U.S. corporate architecture firm, it is a serene little acre at the core of a monumental city.

Postscript: John Ehrlichman is today living in Santa Fe, N.M., writing books and magazine articles. David Childs now heads the Washington office of SOM. Nathaniel Owings just received AIA's gold medal. And Constitution Gardens, as its trees mature, gets better and better. □

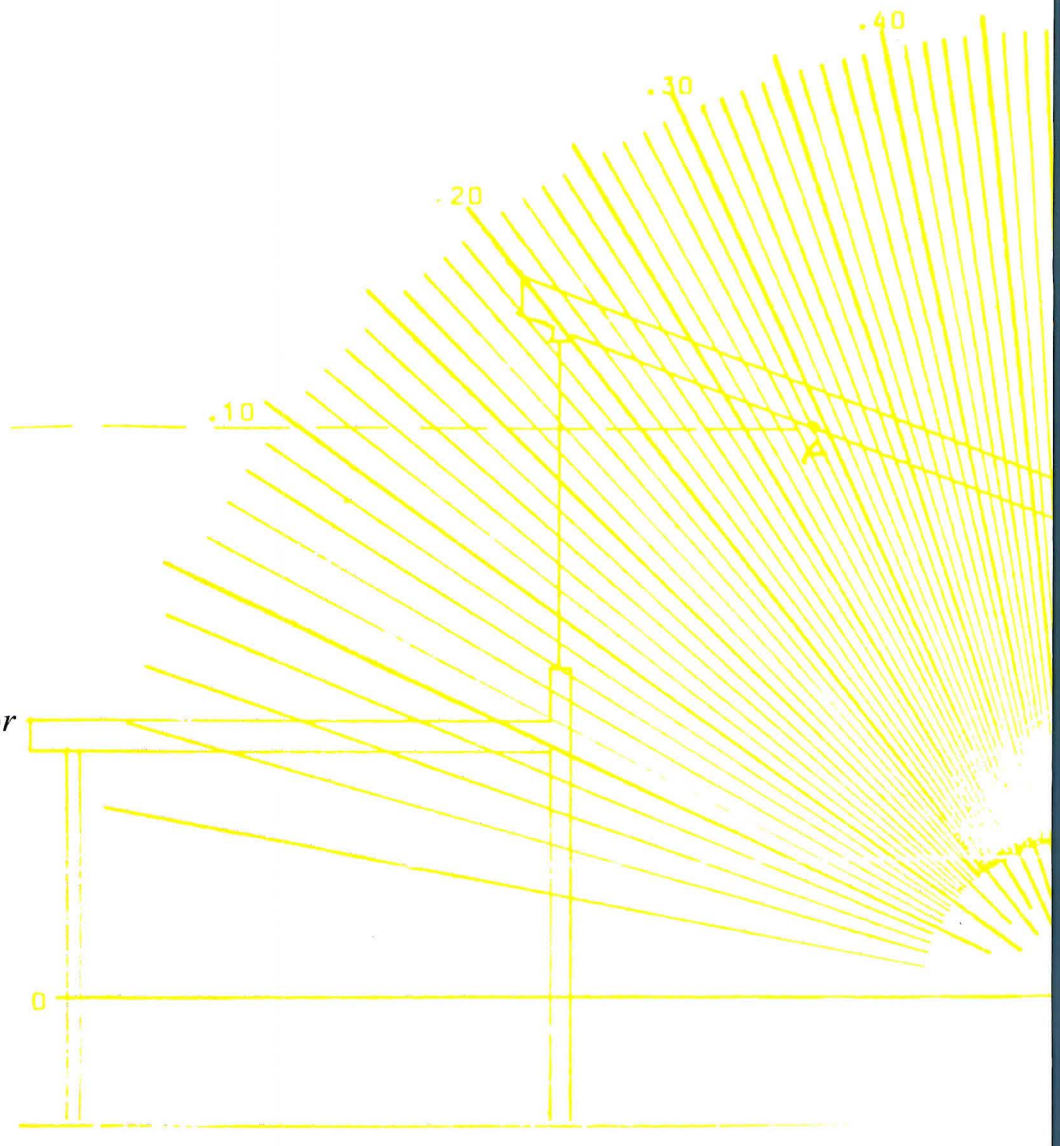
Allen Freeman



Top, a wide footbridge leads to the Signers Memorial on the island, a design of EDAW, Inc. Landscaping features include a serpentine wall for sitting and tulip magnolias. Granite blocks arranged in an ellipse, above, bear names of the signers of the Declaration of Independence. Right, a rock ledge plant, Pontentilla Tridentada, grows between stones.

Daylighting: Research And Design

The two camps meet at a major international conference in Phoenix. By Robert Campbell



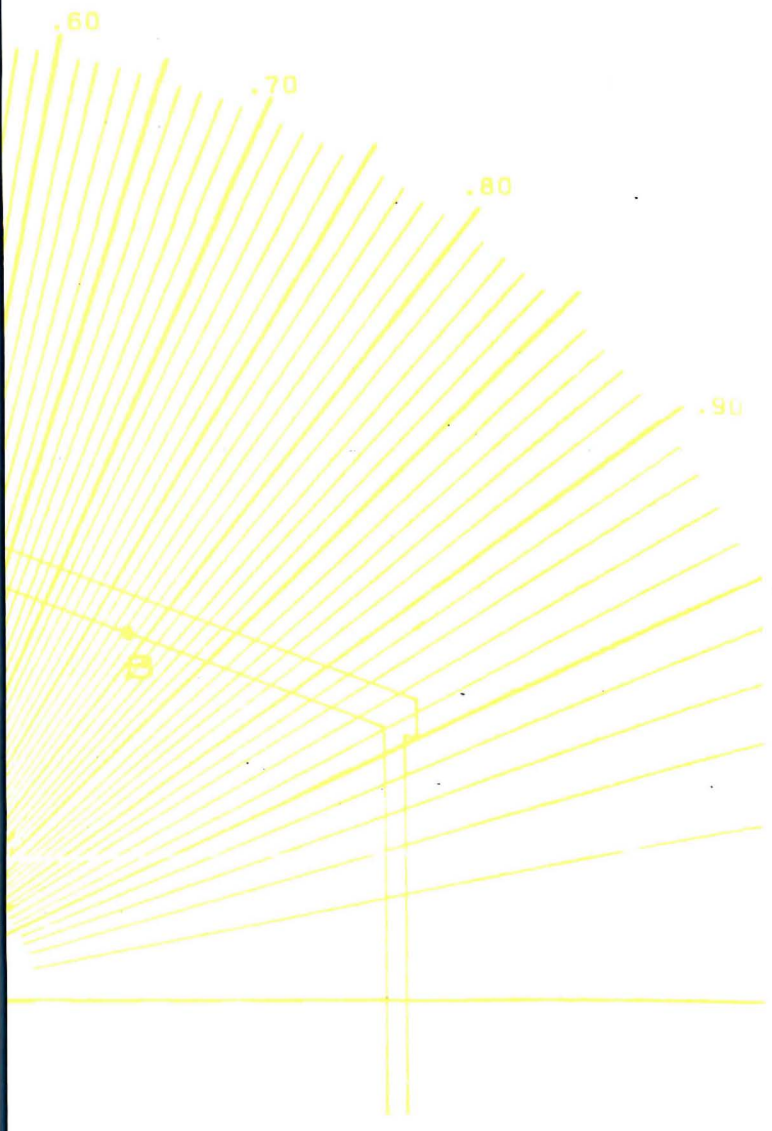
The AIA JOURNAL sent me to Phoenix to cover a conference on daylighting, I realized after the fact, with the same motive as Swift when he sent Gulliver on his travels to the Academy of Lagado. Knowing nothing about daylighting, Phoenix, or anything else I was getting into, I was a good surrogate for all the other architects like me, faced with yet another new technology and another new priesthood espousing it. I was the ideal naive observer. The Charlie Chaplin figure in a world of big guys who all seem to know what they are talking about. Perhaps this is the true role of journalists everywhere.

The 1983 International Daylighting Conference proved to be a kind of anthology of private agendas that I spent much fruitless time trying to sort out. Ostensibly, its purpose was simple. Sponsored by the Department of Energy, which provided the main grant, by AIA, and by various others, the conference was supposed to bring together everyone with an interest in lighting building interiors with natural daylight. It was a kind of recognition that the era of fluorescent ceilings is over and that a lot of attention is now going into finding better ways to bring daylight into buildings, largely for the purpose of saving energy. Essentially, this meant bringing together two types: soft daylighters, who tended to be architects showing slides of Aalto interiors and talking mystically about the sun; and hard daylighters, who tended to be researchers showing slides of charts and graphs and talking about numbers. At Phoenix, it was hoped, the farmer and the cowboy would be friends.

That was the public agenda. Of the private ones, most seemed related to threats by the Reagan Administration to withdraw funding from building research. The daylighting conference was a chance for the research community to fight back by presenting papers and doing all the things that give researchers their credentials and prove they haven't been wasting grant money. It was a chance for them to take their research out of the university lab and into the marketplace of real-world designers, a chance to demonstrate that they weren't doing only "pure research," which the government now notoriously distrusts, but practical stuff architects are starving for.

For the researcher, the balancing act of grantsmanship could be a delicate one: He had to suggest that he had done important work, thus justifying past and present funding, while implying that a great deal remained to be done, thus justifying future funding. "We're at the primitive stage of something very important" proved to be, for many of the presenters, the formula that resolved this dilemma.

The need to justify a particular line of research in order to justify a career was ever-present, and it slightly undercut, as it always does, the credibility of the conference. And you sensed, too, how the careerist imperative is a fragmenting force in the research community because it drives each researcher to seek a topic that isn't already someone's turf, the same force that leads Ph.D. candidates in English to write theses about Thomas Wolfe's letters to his mother. At the daylighting conference everyone seemed to have a grip on a small piece of a large problem and to be trying to build a career on it. In the world of



On these and following pages, two diagrams used in calculating daylight entering a classroom from a clerestory, from a paper presented at the Phoenix conference by Bill F. Jones.

science there may be nothing wrong with that, but what became, for me, the great question of the daylighting conference was this: To what extent does a scientific model of research have anything at all to do with designing buildings? Can there be real input from a world of analysis and scholarly papers, from charts, numbers, and constant redefinitions, into that other world of intuitive, integrative creation? And if so, how?

I have to back up, though, and give some sense of the setting. The choice of the Hyatt Regency Hotel for a conference on daylighting was an act of site selection of deep perversity. The Hyatt is in what passes for downtown Phoenix, which is a largely vacant grid of asphalt on which a few all-glass towers stand like forgotten chess pieces, lonely and silent monuments to the glory of airconditioning. And the Hyatt itself, in its attitude toward the sun, is psychotic. The Hyatt presents you at first with a kind of glorious pageant of daylight—the usual vast, skylit atrium lobby, the escalator rising through this lobby to lift you like an angel in ascent to a light-filled heaven, the glass elevator climbing the hotel facade like a bubble in a tube, the glass restaurant rotating on the roof. This was daylight regarded as a media experience, and that's where it stopped. As soon as we got down to any real-world activity, daylight at the Hyatt became the enemy. The entire daylighting conference took place deep within the hotel in gloomy chambers into which the sun never penetrated. And the hotel bedrooms above were walled in glass which, because there was nothing to shade it, had to be made so dark it reduced the view of the outdoors to a permanent twilight zone. It was schizoid: One moment we were pallid morlocks, grunting in our tunnels, and the next we were children of light winging through the atrium.

The Hyatt gave us, in short, a constant fixed reference point defining contemporary American attitudes toward daylight and defining, perhaps, the problem the daylighting movement is up against. That there should have to be a "daylighting movement" at all seems strange at first. Doesn't everyone love daylight? But the Hyatt was always there to remind us that, no, everyone doesn't, and thus to justify the existence of the movement.

As the conference progressed through its three days, I became more and more struck by the incompatibilities between the researchers on the one hand and the design-oriented architects on the other. Slide after slide came on the screens of the conference, each showing a combination of radial lines and a grid. The speaker would identify the slide as a new kind of sky protractor, or a graph of the effects of a light shelf on an interior over time, or some such research-based fact, but I came to believe this was a con. Only one slide was actually used throughout the entire conference. The rap changed but the slide remained the same. The original is kept, I suspect, in an argon chamber somewhere and duplicates lent out for conferences like this. Without this slide, it was obvious, the entire daylighting movement would collapse.

Obviously, there were technology buffs among the architects present to whom the slides meant a lot. But I was delighted to hear at least one other architect whom I respect propose the Great Slide theory. And as we watched a magnificent talk by Fuller Moore, AIA, on the interiors of Alvar Aalto (see page 58), it occurred to me that Aalto had never had a chance to see the Great Slide. How then did he do such good daylighting? After the conference, I had the rare opportunity to visit Taliesin West near Phoenix and be shown the interior of the drafting room and the living quarters. Taliesin West, of course, is a graduate course in the use of daylighting, taking every possible advantage of solar orientation, bounced ground light, light shelves used for both reflection and shading, skylights, overhangs, and fins. Yet Wright never saw the Great Slide either. As the charts and graphs and numerologies flashed past, you had to ask: Is daylighting really this hard? Does anyone use this technology back in the drafting room?

I asked Jeff Cook, AIA, the noted solar authority at Arizona State University, how Aalto did it. "He had it in his fingertips," Cook replied. Maybe that's the issue: How do you get an understanding of daylight out of the laboratory and into the fingertips? Would Aalto have learned anything from a conference on daylighting?

What seems most needed now, as many of the speakers at the conference pointed out, is not more research but better bridges to practice. Doug Kelbaugh, AIA, a New Jersey architect and teacher, put my own concerns very well at a seminar. "There's too much information," Kelbaugh said. "What we need is an information implosion. Designers don't work with data but with biases and prejudices. We need more thinking and less data collection, more brooding and introspection. Research isn't done when it's done: There isn't enough meaning to all the information."

I've always thought this was endemic to architecture, this problem of converting information and experience into useful wisdom that can be absorbed by designers so that it becomes part of an accrediting tradition. Lawyers publish their cases, biologists publish their experiments, and then all the other lawyers and biologists can read the results and absorb them. In those professions you have the sense of a growing, available, continuously cross-checked body of wisdom. Architecture isn't like that because you can't *publish* in any usable form a work of good

Design . . . 'should be like riding a bicycle.'

design or the lessons that went to make it. Most architects can come to understand a problem by designing a solution to it and *in no other way.* Not by reading, not by applying protractors, certainly not by looking at pictures.

Because of that difficulty in finding a way to publish, architectural research leads a life of its own, often quite isolated from the design process it is meant to improve. And one generation of research succeeds another at a bewildering pace. Fifteen years ago most architectural research was in the area of construction systems. Ten years ago, it was sociology. Five years, active solar. Today, daylighting, and of course other things.

Each of these research topics in the past developed its own priesthood that delivered to architects the sermon that they'd better get on board quick because the boat for the new age was pulling out. Each boat then pulled out, with or without architects aboard, and each boat sank. Research topics tend to have short lives because they follow the grants, and grants tend to follow the perceived crises and political fads of the moment. It's no wonder that so many younger architects have retreated from all forms of scientism into pure formalism. Not that that's any solution, and not that formalism doesn't have a priesthood too.

Some of my own confusions on all these matters, confusions that I'm sure I'm making obvious, were addressed in one of the daylighting conference's two or three really great presentations, made on the final day by Harvey Bryan, AIA, of the Massachusetts Institute of Technology. Bryan is both a design architect and a researcher and has himself invented well-known daylighting design tools such as protractors in the tradition of the Great Slide. He admitted that as a designer he finds he never has the time or patience to use his own tools.

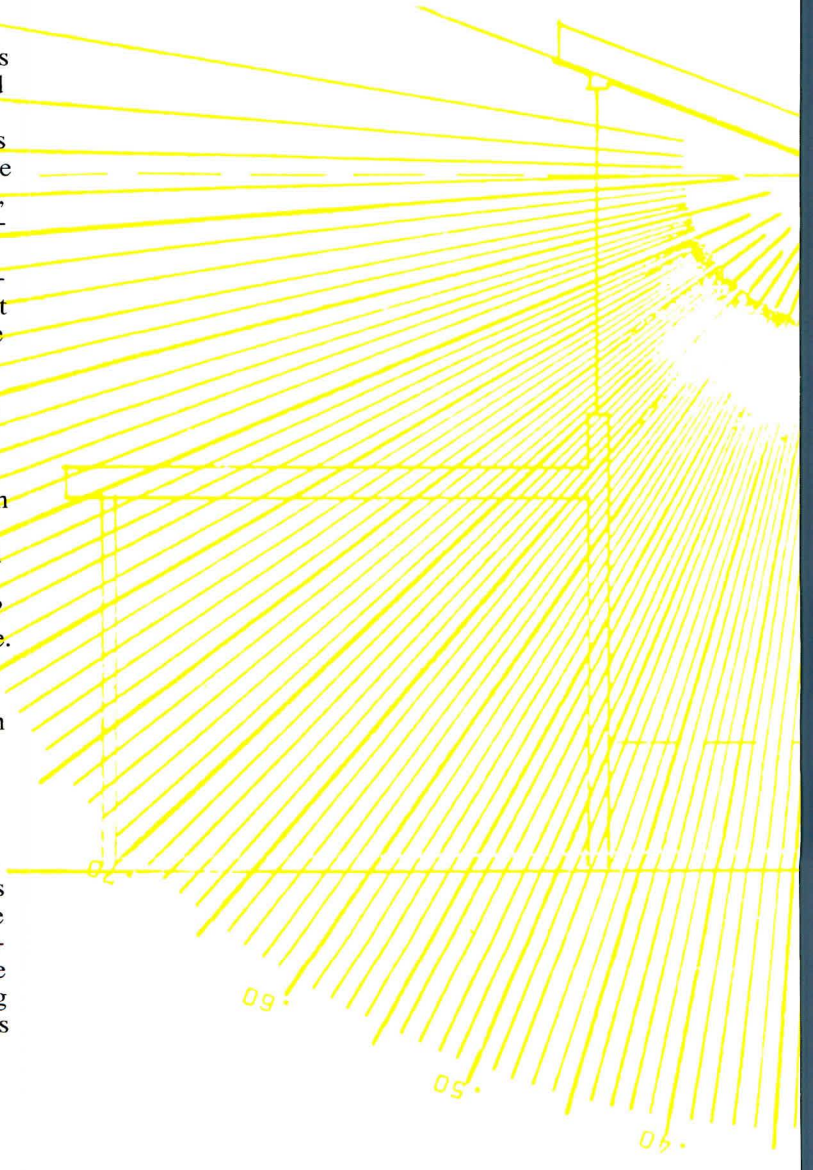
"Few design tools for daylighting are actually being used," Bryan said, "which says something to researchers like me. I don't use my tools because I have internalized all they could do. So I've come to think of them not as design tools but as educational tools, because what they're good for is not making a design but a designer."

Developing this notion, Bryan asked the same question I had been asking myself about Aalto. "What did the 19th century designers know that we don't? Why does their work seem better? In this century we became more and more dependent on science. Modernism gave us freedom, and we used science as a way of rationalizing that freedom. We lost our perception of the simple relationship between daylight and design. Architects began to lose their sensitivity. Design isn't analysis. It should be like riding a bicycle."

A few weeks after Phoenix I ran Bryan down in Cambridge and he made another very interesting point, or maybe we collaborated on it. "Research in science is really a lot like design, but researchers don't understand that. In research, you're always wasting incredible amounts of time, you don't know where you're headed, you're really thrashing around, searching for the question, never mind the answer. But when you do happen to come up with an answer, you think the designer should be able to plug it efficiently right into his process. He can't do that because his process is just like yours, wandering in the woods intuitively searching for the right question. Research and design are both intuitive, iterative. The architect's design process integrates all kinds of inputs into a meaningful whole, and it ought to be seen as a model for emulation by the scientist, not as something for the scientist to clean up or rationalize."

Bryan's conclusion is that daylighting research and quantitative analysis are valuable not so much for their own sake as for their educational value to the person who performs them and thus absorbs them to the point of forgetting them—like riding a bicycle. He thinks all designers should go through that process.

Other speakers corroborated Bryan in some of these points, and it's obvious that the issue of how to make research available and useful to designers is one of general concern in the research community. The use of models to explore daylight three-dimensionally and the role of the technical consultant in the design team were both much talked about. But I left with the sense that the research information, self-propelled, is proliferating a lot faster than the design profession is digesting it.



I came to the daylighting conference with several questions to which I hoped to get definitive answers, and I'll spend the rest of this account trying to deal with them.

Question one: Can *architectural* methods of handling daylight produce any important energy cost savings in buildings?

Answer: No.

This is exactly the kind of simple-minded question architects ask and researchers abhor. Nevertheless it seemed clear that although such architectural devices as skylit atriums and window light-shelves were the sexy stars of the conference, much ogled at, nobody had any real evidence that they offer any payoff. They can greatly improve the quality of light, but all that does is make buildings pleasanter and handsomer, which sometimes leads to higher rents, which in turn is a kind of cost benefit but an indirect one. The real question, of course, is why on earth architects would think that the only way they can defend the notion of making pleasanter and handsomer buildings is on the basis of cost.

Question two: Does that mean that a *technical* (not architectural) solution exists for optimizing energy consumption in buildings? And if so, can we conclude that there is no energy-caused mandate for making buildings in one climate any different from buildings in another?

Answer: Yes and yes.

This is not the answer I hoped for, any more than the first one was. Architecture, if it does anything at all besides shelter us, should help to differentiate the world. But everyone I asked believed that although adobe heat sinks and overhangs are nice in the desert, and saltboxes nice in New England, there really is no *technical* reason in the modern world why such regional variations should continue to exist. And with a new generation of technology about to dawn—with glass that will reflect heat but transmit light, with continuous-dimmed, photocell-controlled electric lighting—this will become ever more true. The technological fix is in. Of course, there may be deep cultural and psychological reasons for regionalism—I believe there are—but if so, we should be talking about those reasons and not pretending that regionalism is energy-mandated.

Question three: Is public policy responsible for buildings being so badly designed from the point of view of daylight?

Answer: Largely yes.

Ben Evans, the noted lighting consultant and author of the book *Daylighting,* pointed out to me that the glass-box office building he abhors is largely a function of two facts: that rental space is measured to the glass line, and that there is such a thing as a zoning envelope. The result is that developers put the glass right at the envelope line where nothing, not even a sill, can legally project past it, and voilà: the all-glass building. Evans thinks zoning laws should allow shading devices outside the envelope. Others pointed to the impact of peak-load utility rate schedules and to the need for solar zoning. Again, all these things can make buildings better but not necessarily cheaper.

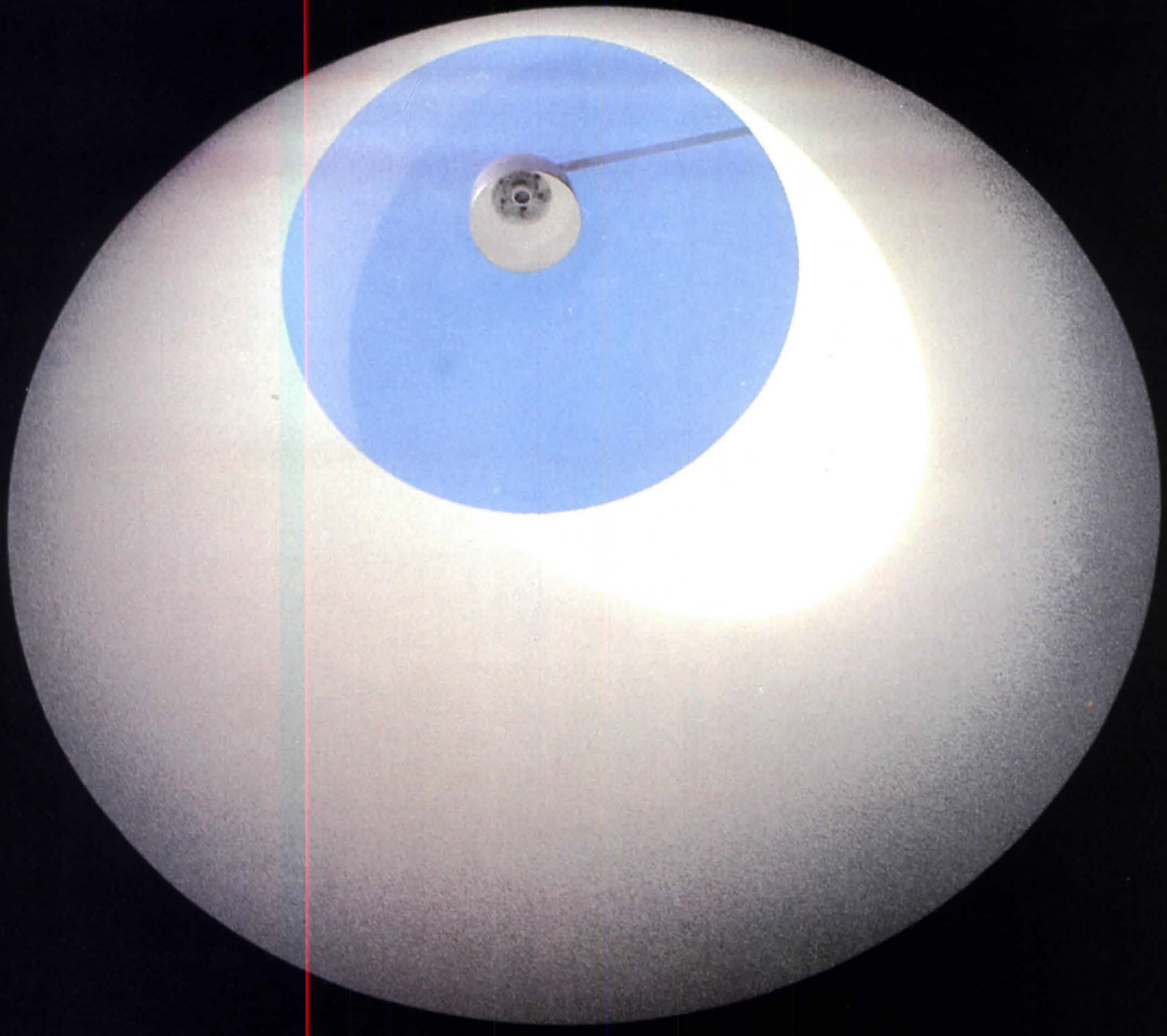
Is that so bad, though?

Of all the talks, the one that dealt most forcefully with the issue of cost versus quality was given not by an architect or researcher but by an owner, Richard Allen of the Building Owners and Managers Association in Phoenix. Allen pointed out that in a typical Southwest office building, if you cut the energy consumption in half you save only 70 cents per square foot per year, or 2 percent of the rent—and the rent is escalated with energy cost anyway. As for the tenant's view, he may spend 100 times as much in salary and overhead on his employees as he spends on the energy part of his rent. The building occupants, and keeping them happy and productive, become much the most important thing.

"Unless you do something for the user," Allen said, "you won't affect the speculative office market. Attractiveness, not economy, is what counts."

An owner was telling architects they shouldn't sell good design on the basis of saving the owner money but rather on the quality of life for the user. Or as Harvey Bryan had said, maybe we've been trying so hard to be rational and quantitative we've lost our simple perceptions.

All this only scratches the surface. International Daylighting was a great conference, endlessly informative and stimulating even where a low-tech architect disagreed with it. □



Daylighting: Six Aalto Libraries

As analyzed at the Phoenix conference by Fuller Moore, AIA.

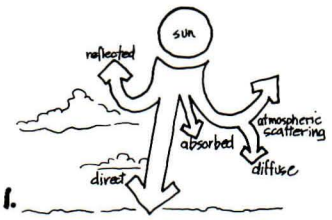
The esthetic qualities of natural light are universally recognized, yet daylighting has become widely presumed a luxury, difficult to justify to economy-conscious clients. But research is now demonstrating certain economic advantages of daylighting in commercial buildings, and its use is likely to spread.

To learn more about natural light in big buildings, I went to a source, Alvar Aalto, visiting many of his buildings and making detailed illuminance measurements in six major Aalto libraries. I came away with a heightened appreciation of the breadth and richness of Aalto's architectural and illumination vocabulary; in most cases, I found the two to be inseparable.

It is doubtful Aalto used lighting calculations to verify his designs. He did make extensive use of large-scale models to visually assess daylighting strategies. But given the nature of the models—typically sectional, without provision for excluding extraneous light—it is unlikely that they were used for lighting measurements.

Today designers who have never heard of the cosine law can intuitively produce successfully illuminated building designs. Others calculate qualities using formulas and tables, never understanding lighting esthetics. At any rate, to comprehend daylighting in general and Aalto's buildings in particular, the designer needs some familiarity with the uses of sunlight versus skylight and a conceptual frame of reference. Such a frame is provided on this page, followed by analyses of the individual Aalto libraries.

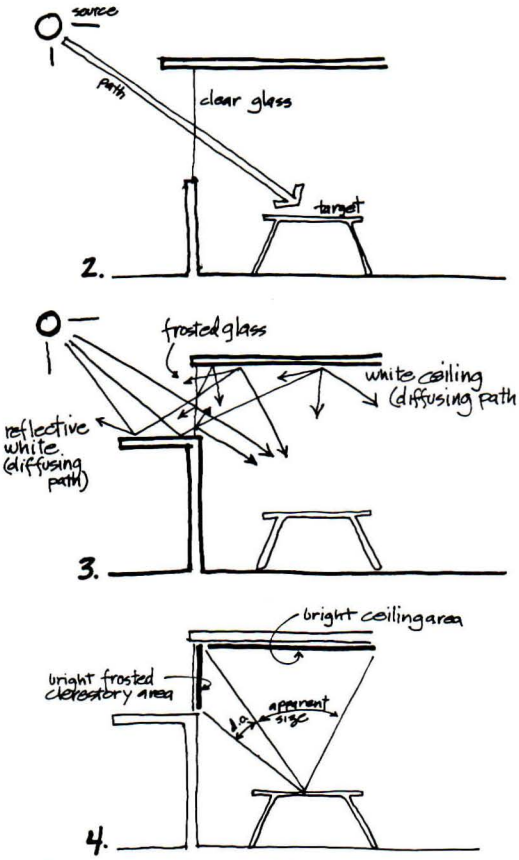
Direct sunlight, because it is very strong



(6,000 to 12,000 foot candles), may be acceptable, even welcome, where visual tasks are not required or are of short duration. In large buildings, the contrast and texture definition can provide visual variety in circulation areas. But direct sunlight should be avoided in situations where tasks are of longer duration and typically immobile. Because of this, illumination engineers typically prefer to exclude direct sunlight completely from commercial and institutional interiors, an unfortunate choice because controlled shafts of sunlight add movement and sparkle.

On the other hand, skylight, an abundant low-brightness source resulting from the refraction/reflection of sunlight as it passes through the atmosphere, is the traditional source of successful daylighting

Mr. Moore is a professor of architecture at Miami University, Oxford, Ohio.



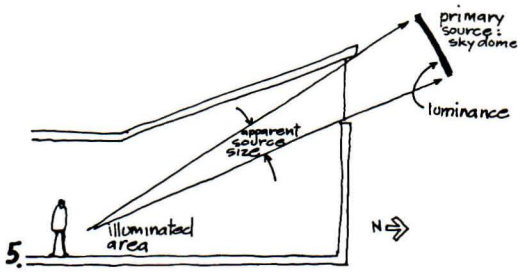
(Figure 1). Artists have historically coveted studio spaces with large expanses of north glazing that exclude direct sun.

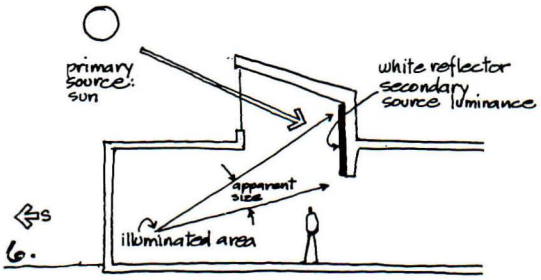
Conceptual approaches to daylighting are varied. One approach, popular with architects, is to consider light in the sequential terms of source, path, and target, with arrows representing light direction (2). But this concept provides an accurate basis for intuitive understanding only when the light eminates from a point source, such as the sun or incandescent lamps, and the path is specular, through clear glazing or bouncing off mirror reflectors, conditions typical of those associated with solar heating and shading design. It is difficult to extend this convention to include distributed sources, such as the diffuse sky vault or a luminous surface, or diffusing path elements, such as translucent glazing or matte white reflectors. This results in such a confusion of arrows, either mental or graphic, that the method becomes ineffective (3).

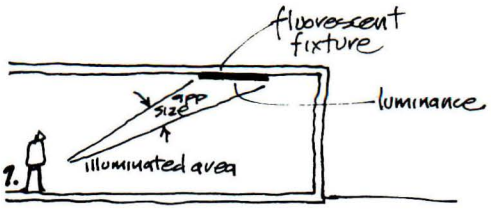
A workable alternative is to consider illumination as what can be "seen" by the target (4 through 7). This approach is based on the amount of light at the target, the result of exposure to all the bright and dim surfaces within the view of the target. More precisely, the light contributed to the target is the product of the luminance of a particular source times its apparent size as viewed from the receiver. Because this concept does not differentiate between various sources, a cloudy sky "viewed" through a clerestory window contributes the same quality and quantity of light to a receiver as an illuminated white wall surface (assuming equal luminance, color, and apparent size). For opaque surfaces, luminance is the product of illumination received on the surface and its color reflectance.

Consider the illumination of an interior location by diffuse skylight in terms of luminance times apparent size. The illumination on a three-dimensional object at this location depends on the luminance of that portion of the skydome that is viewed and the apparent size of the sky visible through the opening. If the target is a two-dimensional surface such as a work table tilted relative to the direction of skylight, then the illumination in that plane is reduced by the cosine of the angle of incidence (the cosine effect).

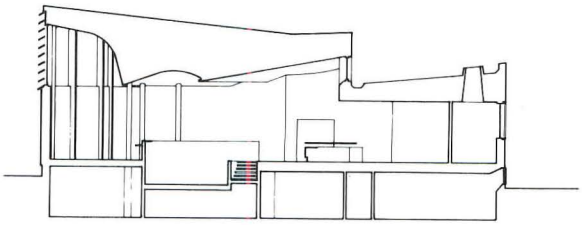
The main objection to the contemporary use of direct skylight for illumination is annual energy balance. Because of the low luminance of the skydome, relatively large areas of north glass must be used for adequate illumination (5). The penalty in heat loss and comfort becomes increasingly significant as heating costs escalate. But a comparable quantity of illumination, as direct sunlight, can be admitted through much smaller openings (on the order of 10 percent of the area required for north openings). While horizontal skylights meet this criterion, south vertical glazing is preferable because of decreased summer/increased winter heat gain (6). Direct sunlight admitted through relatively small glazed openings can be used effectively for illumination if diffused by white reflective or translucent materials.

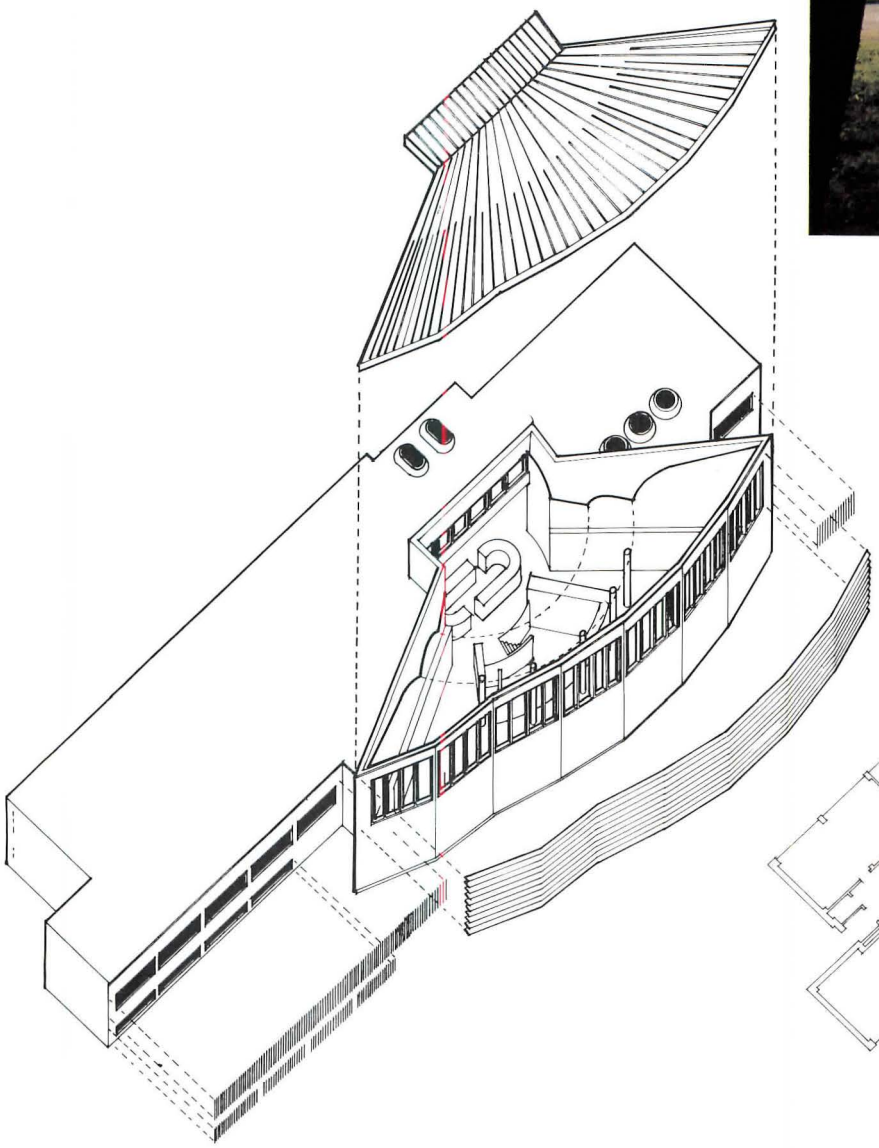


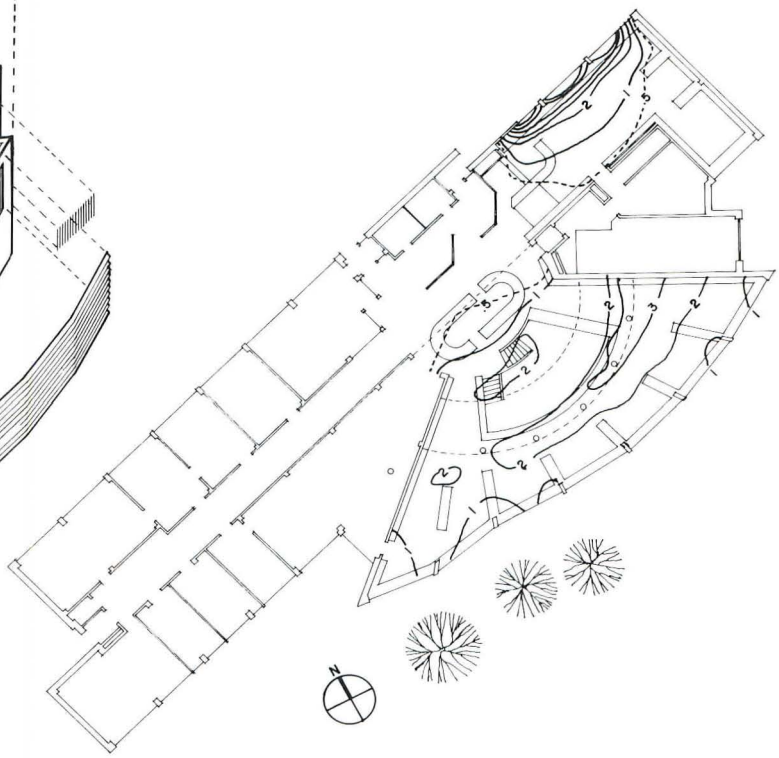




Opposite page, the conical skylight at Wolfsburg Library (see page 63).



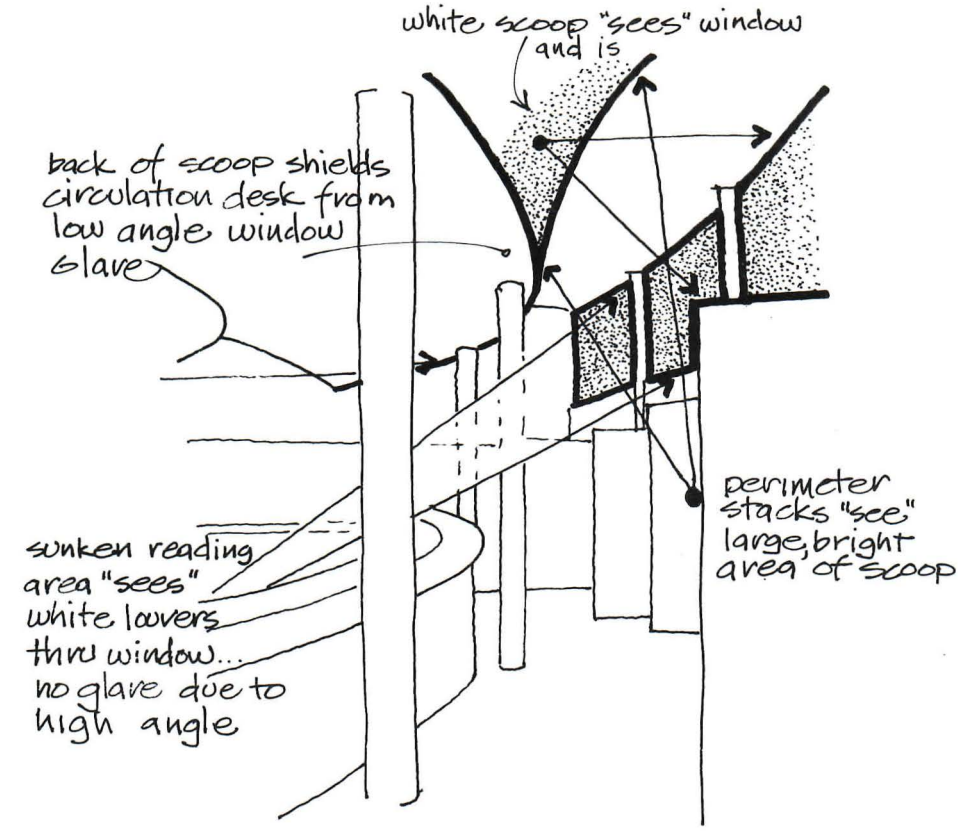




Photographs © Fuller Moore

Alto made extensive use of white reflectors as secondary source "fixtures." The public library in Seinajoki, Finland, is a rich source of examples of his integration of these reflectors into the form of the building. There are four visual task areas in the main reading room: the reading counter (between the columns), the sunken reading area, the stacks, and the charging desk. The large, high, south window has clear glazing, with horizontal, diagonal exterior louvers. The louvers are white on both sides with a cut-off angle of 45 degrees. At angles higher than 45 degrees, no sunlight or skylight penetrates directly, but is instead reflected twice by the parallel louvers. As a result, the high window performs like a translucent diffuser to high light sources. Its large area adequately illuminates the reading areas from above the field of view of the reader, resulting in generous illumination evenly distributed, little cosine reduction, and minimal glare because of the high source location.

At angles below the 45 degree cut-off angle, skylight (and in



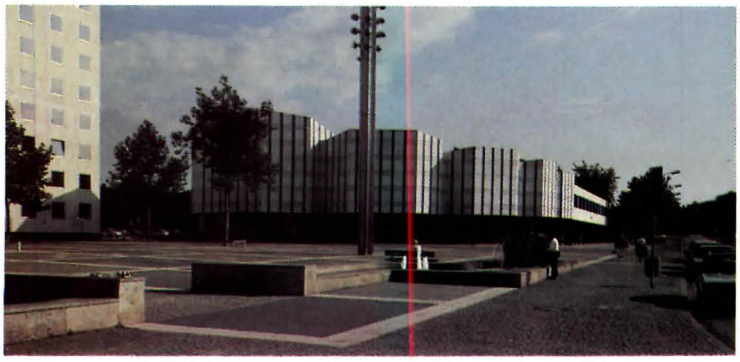
the winter, sunlight) enters directly. Most of the direct sunlight strikes the lower part of the large, curved reflective "light scoop." The lower portion of this scoop has a high luminance level (due to its orientation relative to the window). This bright surface becomes the principal source for the vertical book stacks along the exterior wall. Note the large apparent size of the scoop as "seen" from the stack. It is not as obvious from the section that the stacks perpendicular to the wall receive diagonal illumination from the scoop as well as directly from the window (due to the fan-shaped wall curvature in plan).

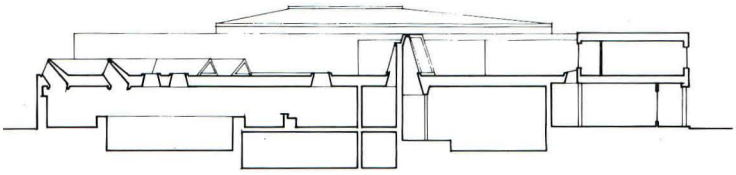
The top of the scoop receives light reflected from both the lower part of the scoop as well as the top to the louvers and exterior ground. The exterior wall (below the window and above the stacks) receives light from the lower part of the scoop. While both the upper scoop and this wall portion in turn contribute to the general illumination of the room, their luminance is important in reducing the brightness contrast around the window.

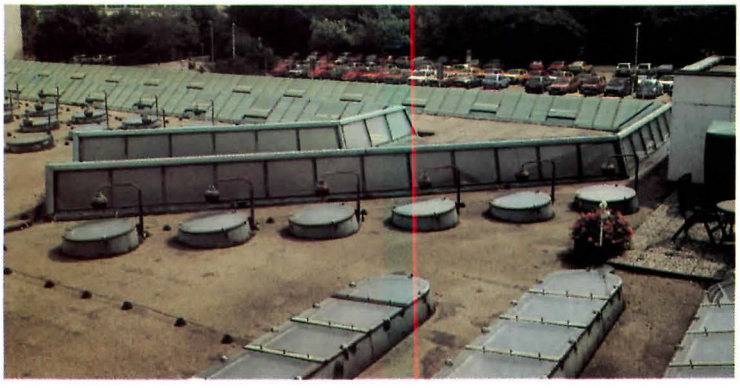
The opposite side of the scoop serves as an eyebrow to screen the circulation desk librarian from most of the low angle glare from the high, south window. The charging desk has poor daylight illumination because most of the south window is obstructed by this eyebrow and the north clerestory is directly overhead. This results in a small apparent size of each source from this location. Apparently the structural requirements of the building prevented placing the north clerestory even farther to the north, which would have increased its apparent size and thus the illumination in this area. However, the sloped ceiling receives light reflected from the snow on the adjacent roof and, to a lesser extent, directly from the sky.

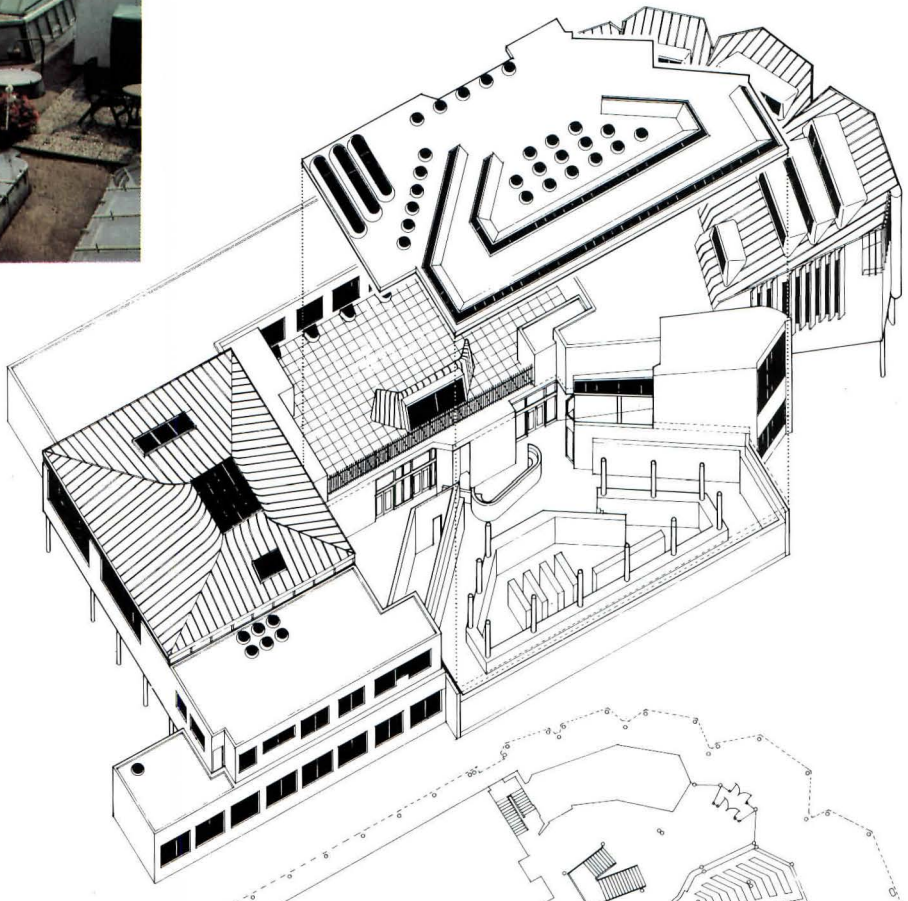
The sunken reading area "sees" two large, bright secondary sources: the high, south window and the north clerestory. The sunken location places both sources high, reducing the cosine reduction from both sources onto a horizontal reading plane, keeping them above the reader's field-of-view to reduce glare.

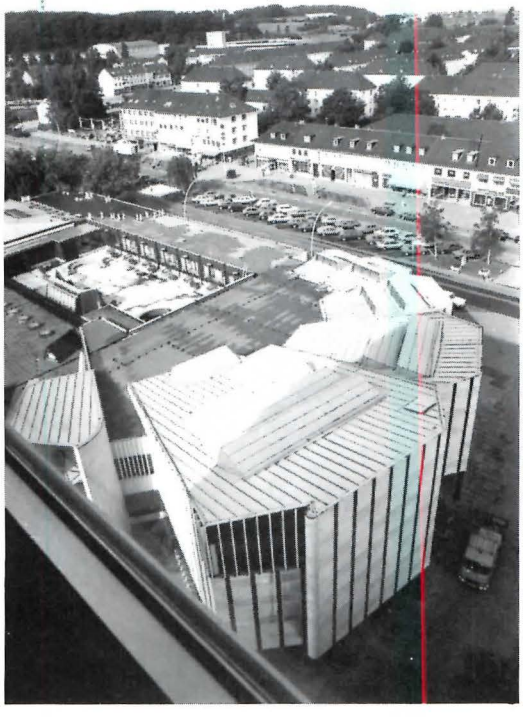
Photographs © Fuller Moore

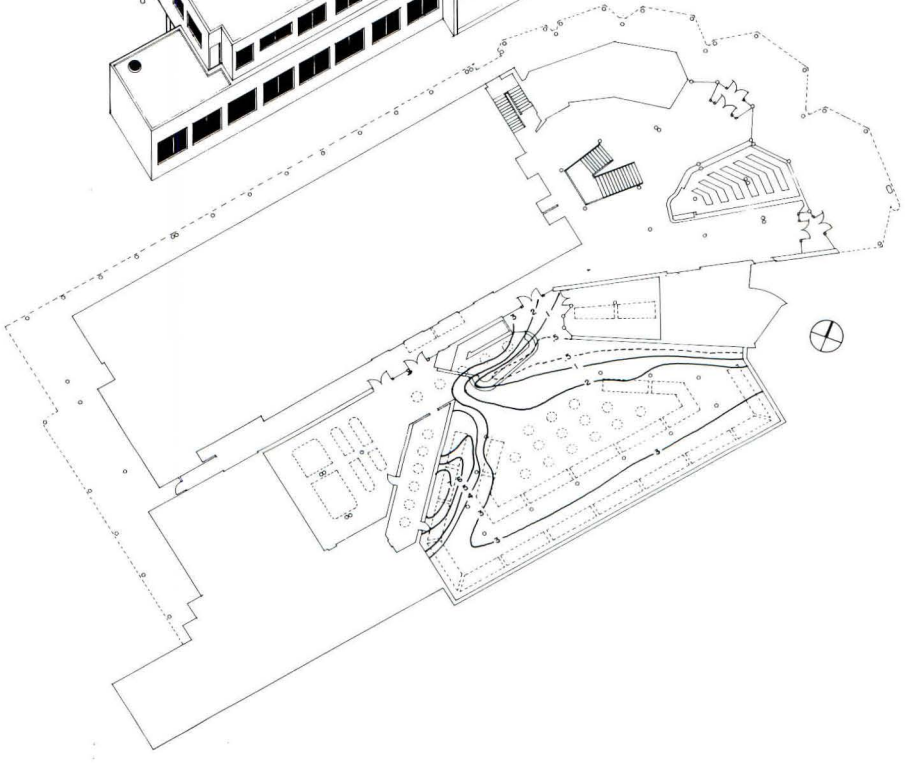


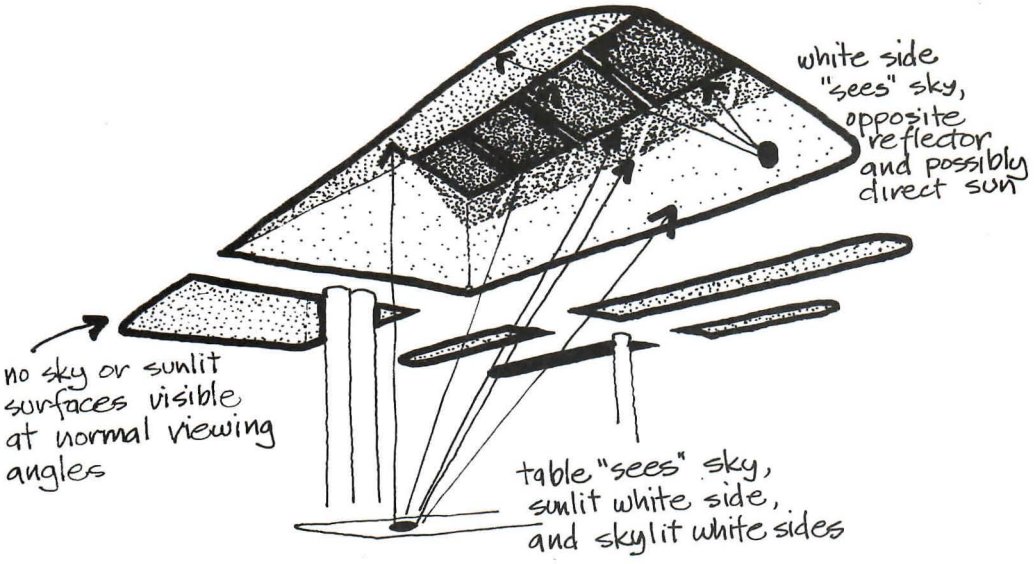


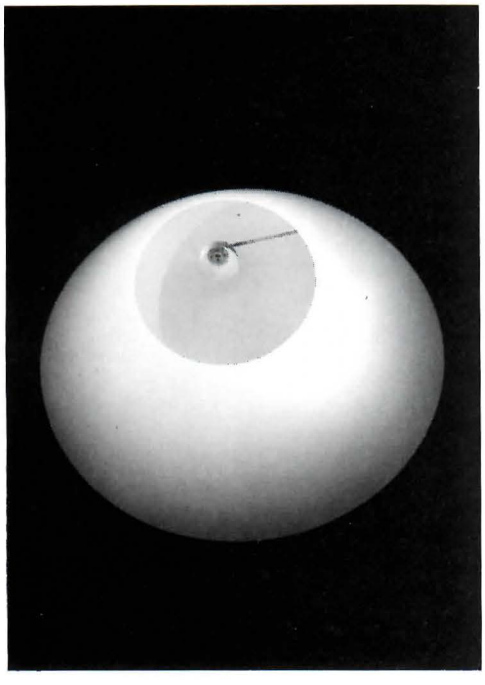












In addition to a fan-shaped plan (such as that at Seinajoki), most Aalto libraries employ a sunken study area located in the center of the main library space. This creates a strong spatial focus. It also allows stacks to be located in the center without blocking visual control from the circulation desk. In those libraries where light is admitted only from the perimeter, the sunken floor configuration keeps the high side light above the field of view of the reader while reducing the cosine reduction of illumination on reading tables.

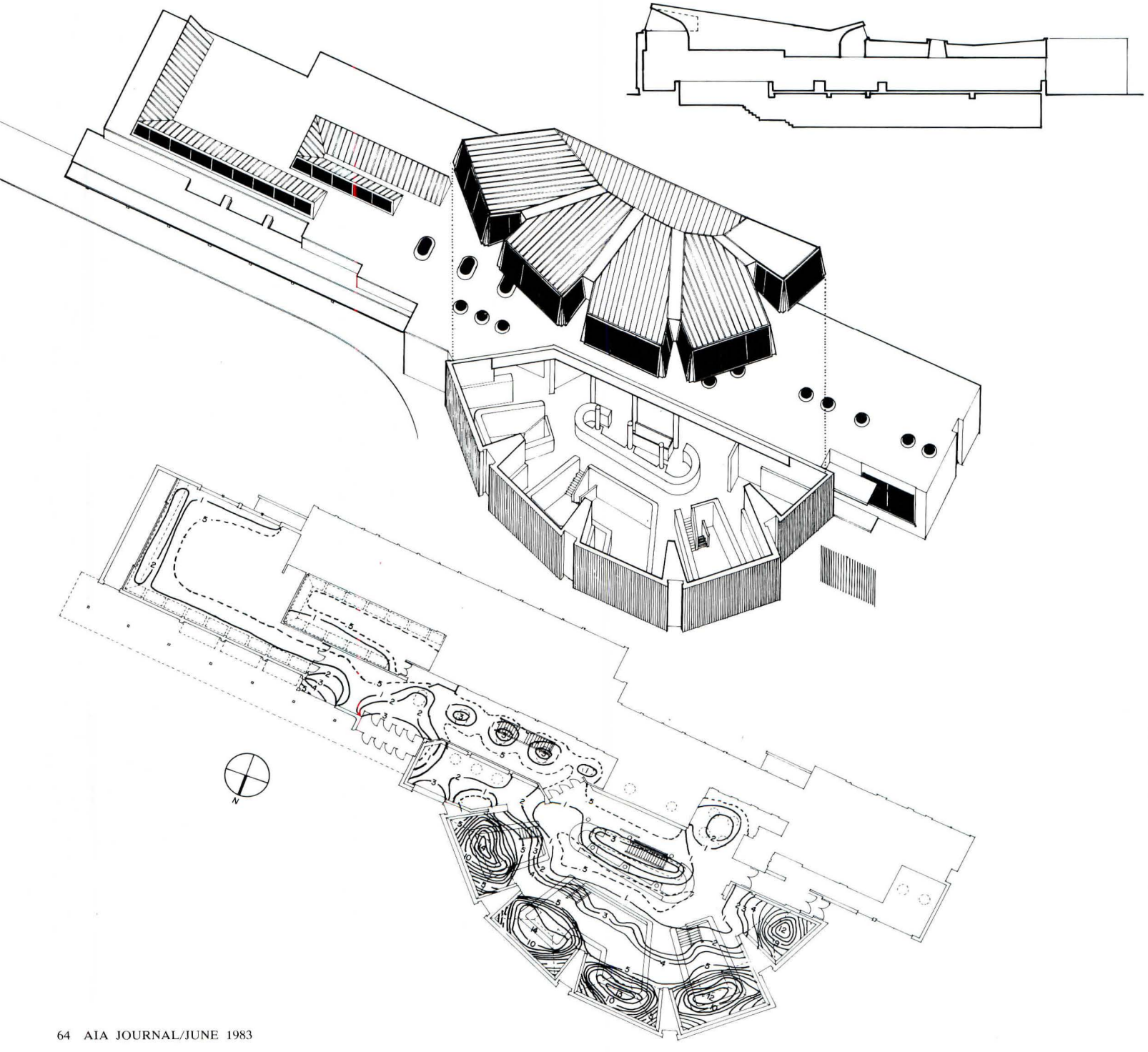
The library in the Wolfsburg, Germany, Cultural Center has such a fan-shaped plan. However, the library is only one of several functions in the larger building, where the dramatic exterior forms and interior spaces are limited to the series of lecture rooms. To maintain a low profile in the library, Aalto used smaller roof monitors with "scoops" to illuminate the perimeter stack area. These are oriented east, southwest, and northwest with 70 degree clear glazing. There are no exterior louvers for sun control.

This multiple orientation of monitors of the same design is presumably a result of the predominantly overcast local climate. Penetration of direct sunlight is minimized on clear days by the pronounced curvature of the scoop. Thus the backs of the scoops receive either direct sunlight or diffuse skylight, and become secondary sources for illuminating the adjacent perimeter stacks.

At Wolfsburg, due to the low ceiling height and the small, shielded configuration of the perimeter scoop, central illumination is supplemented by a field of small, round skylights with clear, horizontal glazing. The ceiling thickness forms a well to minimize direct sunlight penetration. The well is conically shaped, with smooth, white plaster sides. Diffuse light from the skydome is admitted directly. On clear days, however, only the upper part of the well is sunlit. This bright surface, in turn, illuminates the space below, as well as the remaining white surfaces within the well. Because sunlight typically strikes only the uppermost part of the well (unseen at normal viewing angles) and because the lower part of the well is smoothly curved, matte white plaster that appears evenly bright due to the diffuse interreflections within the cone, these wells have the appearance of horizontal luminous disks in the plane of the ceiling. Their true shape is apparent only when the occupant looks up. This same device is found in many Aalto buildings, usually in a single line, such as above a corridor, reinforcing a linear spatial emphasis.

At Wolfsburg, in a separate, smaller reference/periodical reading room, a similar but much larger skylight configuration is used above the reading tables. In order to reduce direct sunlight penetration in these larger variations, the section profile is asymmetrical, with the north surface nearly vertical and a shallow, sloping south surface. The larger recess serves to spatially define the reading area while providing a wider, more even distribution of light.

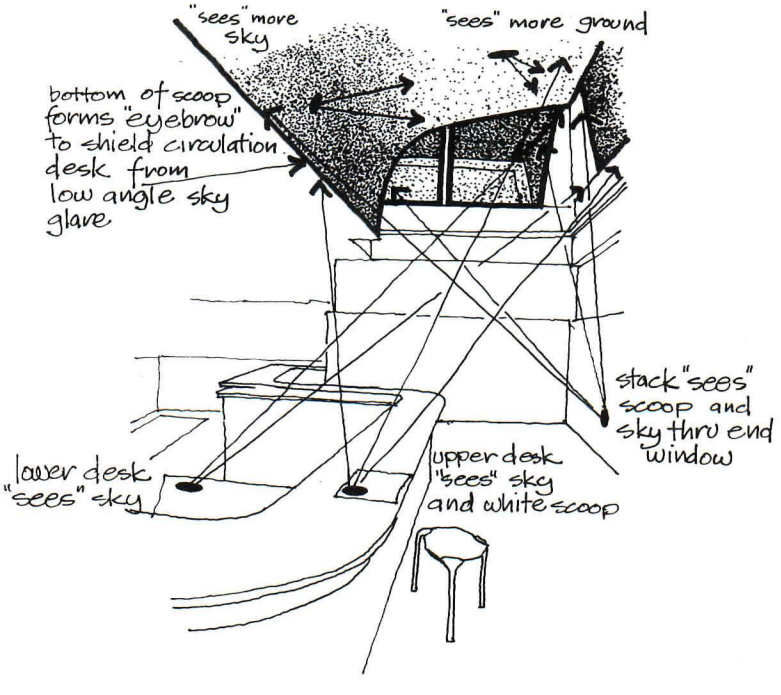
Photographs © Fuller Moore

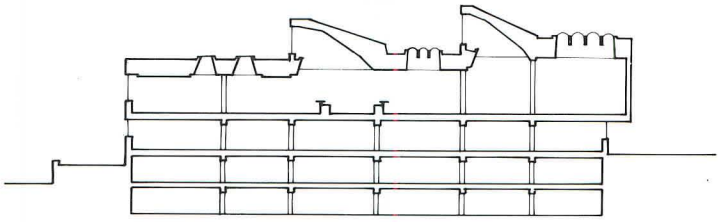


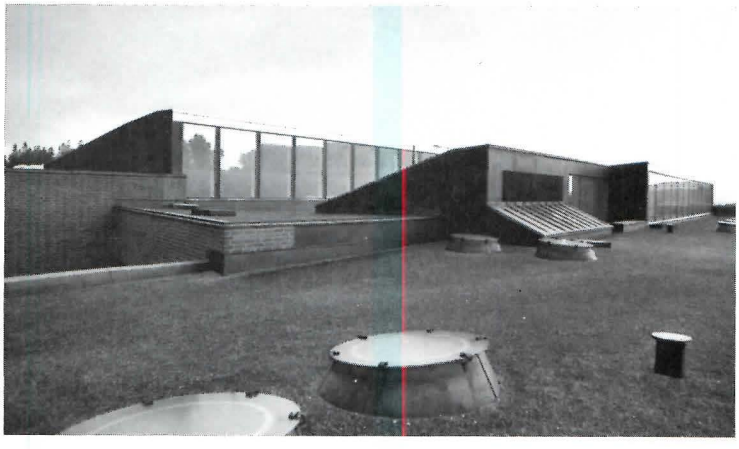
Aalto's largest public library is located in Rovaniemi, Finland. The fan-shaped plan is segmented with separated sunken reading areas. Each is defined and illuminated by a light scoop and high window on three sides. Considering the location—virtually on the Arctic Circle—the glass area is surprisingly large. The north orientation results in excessive winter heat loss, but this exposure and high window placement admits large amounts of diffuse daylight to illuminate these reading areas. The backs of the light scoops also receive diffuse daylight as well as low-angle morning direct summer sunlight.

The result is a relatively uneven distribution of illumination, with the greatest amounts occurring at each sunken reading area. Like the Seinajoki Library, the bottom of the scoops here act as eyebrows, preventing glare—large amounts of bright sky visible at low viewing angles—at the centralized circulation desk. This is achieved at the expense of deep light penetration from the high, perimeter windows.

Elsewhere in the building, deeply configured smaller scoops are used for perimeter, secondary-source illumination of wall-hung exhibits. These scoops project above the flat ceiling in the form of long monitors. These face north, east, and south, are sloped at about 75 degrees, with clear glazing and no overhang. It is interesting that, even at this extreme northern latitude, reflective film has been added to reduce summer solar heat gain on the east and south glazing.

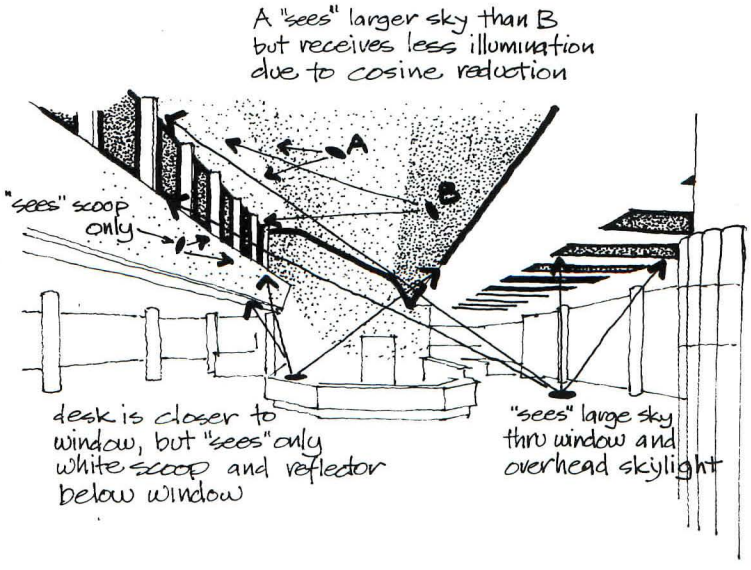


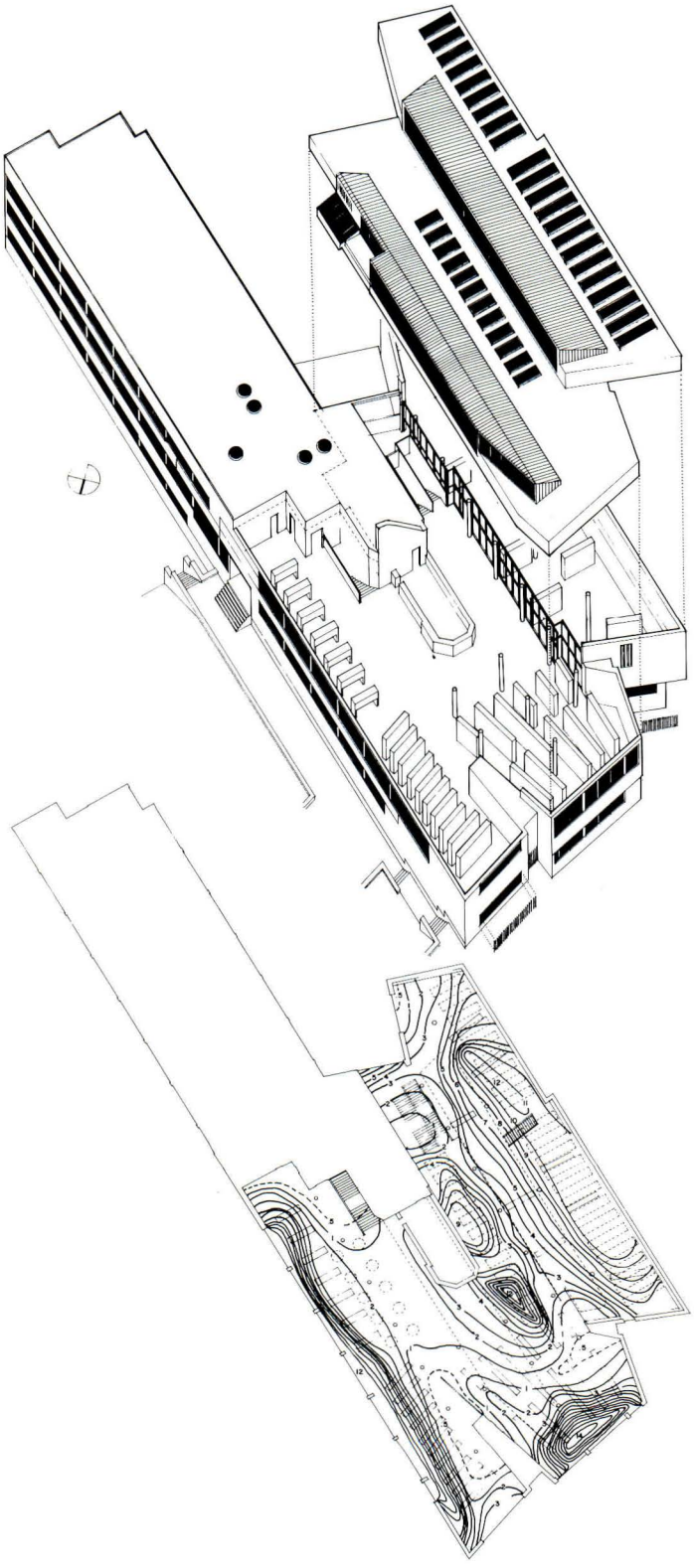




The main library at Otaniemi Technical University, near Helsinki, is larger than other libraries designed by Aalto, which are for community use. Most of the stacks are closed and located in basement levels. The reading area is on the top floor to allow the use of skylights and large northeast-facing roof monitors for illumination. This required the use of stairs for access from the lower entry level.

The two large monitors provide generous, even, diagonal illumination. Notice from the isolux contours in the plan that the areas of highest illumination occur not directly below the scoops behind the monitors, as might be expected, but in adjacent areas to the southwest. This is due to the larger apparent size of the vertical glazing from this location. Additional light is provided by the many long, horizontally glazed skylights located directly above these areas of greatest luminance, where the apparent size of the horizontal glazing is largest.

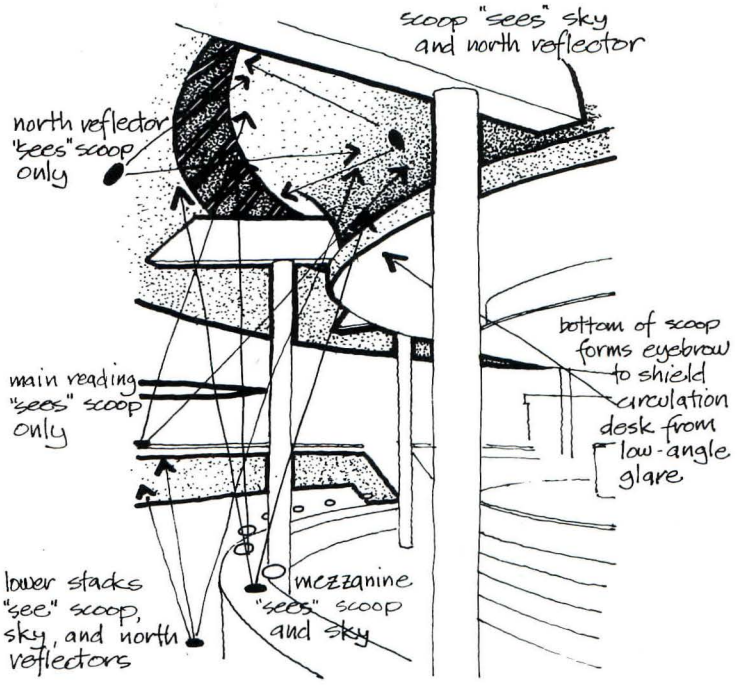




The Nordic House Library in Reykjavik, Iceland, employs a simple but effective strategy of large, vertical clerestories along each side of the reading room. Their high location allows effective illumination to the opposite side of the relatively narrow plan. In addition, the roof of the lower, surrounding rooms below the clerestory is usually snow-covered and effective in reflecting light onto the reading room ceiling. In another climate, the use of such large unprotected areas of glass would admit unacceptable amounts of direct sunlight. Presumably this is less of a problem in the overcast Icelandic climate.

The small, sunken reading room receives additional overhead illumination from the large, clear, prism-shaped skylight directly above. The rationale behind this tall prismatic configuration lies not in an increased ability to transmit low angle sunlight (horizontal glazing would transmit equal light with less heat loss) but in the ability to penetrate thick snow cover. The snow-covered lower portion acts as a white reflector, in the manner of the conical skylight well.

Photographs © Fuller Moore



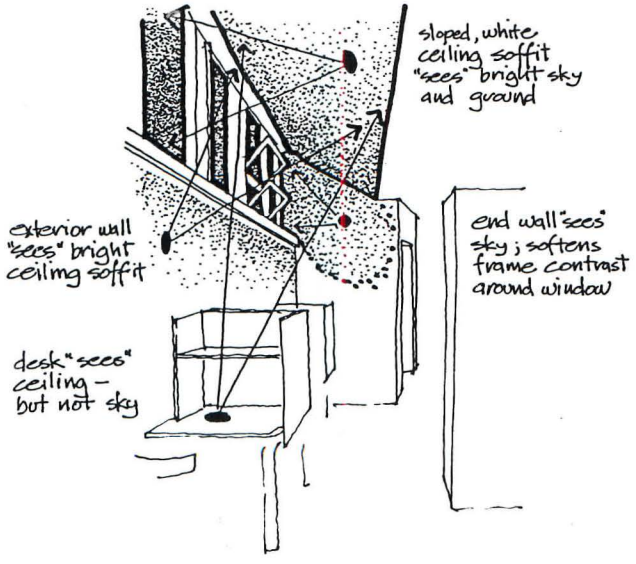
The last library designed by Aalto is located at Mount Angel Abbey, a Benedictine Monastery near Portland, Ore. Using the familiar fan-shaped plan, light is introduced over the center reading area by a north-facing, crescent-shaped roof monitor, with a white scoop behind clear glazing sloped about 60 degrees. The sectional profile is shallow, allowing direct sky illumination in one direction and reflection from the scoop in the opposite direction. This provides generous illumination to the reading stations surrounding the sunken mezzanine crescent and the mezzanine level itself. In addition, adequate light penetrates down past the mezzanine into the basement open stack area to allow selection of books.

Both the sloped soffit and the perpendicular end wall receive light directly from the north sky vault. Their brightness reduces contrast with the sky visible through the window. In addition, the soffit illuminates the carrels below, which receive little direct skylight, and the wall below the window—again to reduce brightness contrast with the sky.

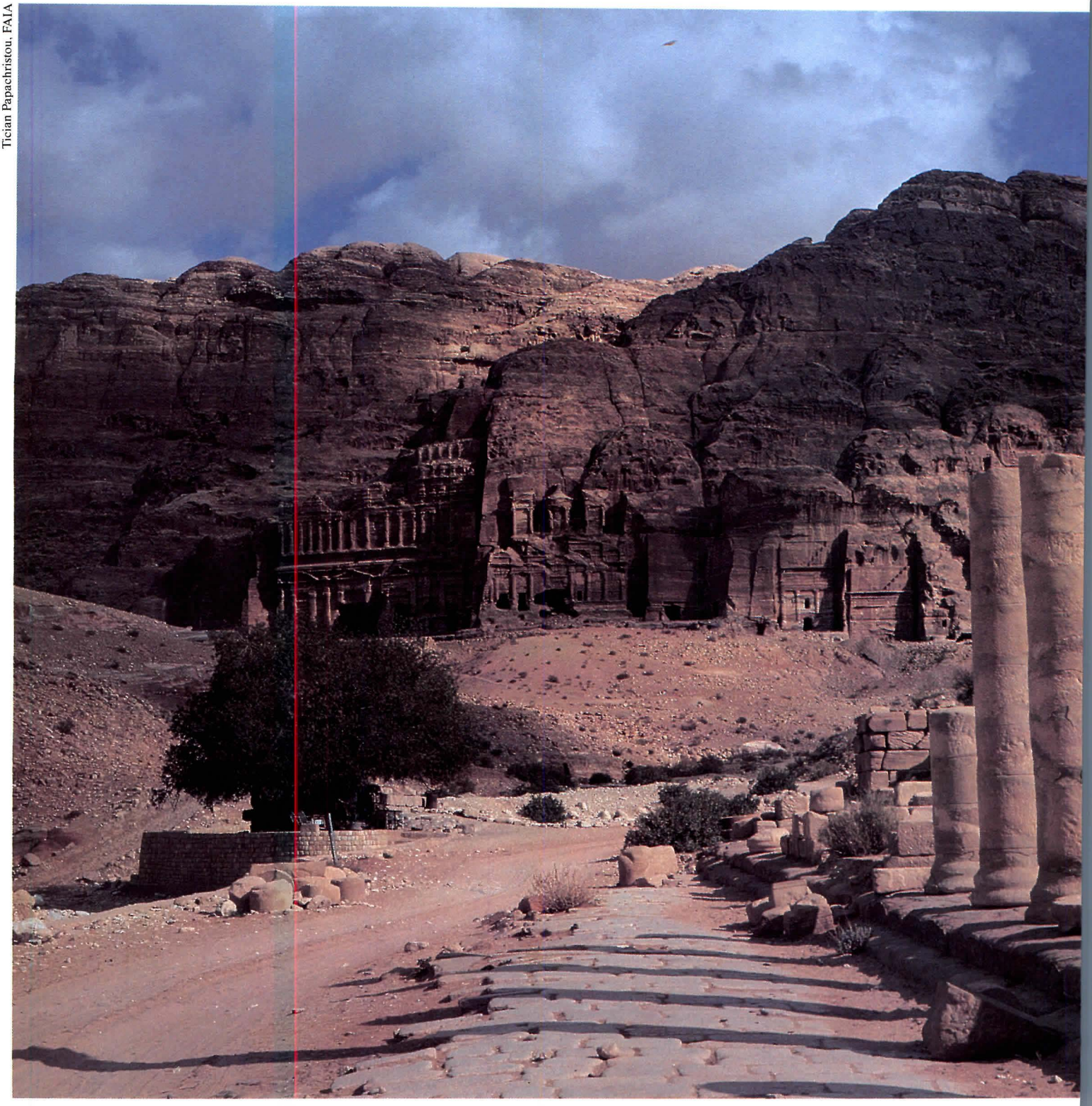
On the main level, stacks radiate out from this center light chamber, allowing visual control from the circulation desk. At the perimeter of the main level, open carrels are illuminated from above by high window light reflected from the sloped ceiling. This statement scoop also washes the wall below the window to reduce the brightness contrast of the sky seen through the windows. A similar sloped ceiling is positioned above corner windows in the small lecture room. In addition to light reflected by the sloped ceiling, each lower wall is washed from the adjacent perpendicular window.

It is easy to be awed by Aalto's buildings (and his reputation) and to dismiss them as somewhat mystical creations of a genius. There is also a temptation to directly transpose these stategies to the design of contemporary buildings. This is unwise. Not only were most of Aalto's solutions heavily influenced by typically overcast, northern daylight environments, they were designed during a time of abundant energy. Little regard seems to have been given to problems of excessive heat loss, or gain.

For contemporary architects designing in an environment of clearer skies and much higher relative energy costs, probably the single most valuable principle to be gleaned from Aalto is the use of white surfaces as diffuse, secondary illumination sources. This principle must now be adapted to the preferred use of sunlight (instead of diffuse skylight) to allow smaller glazing areas. The south-facing roof monitor—with suitable reflective baffles—for top lighting and the light shelf for side lighting are two adaptions of secondary source, reflective diffusers to our high sun angles and present energy costs. □



Tician Papachristou, FAIA



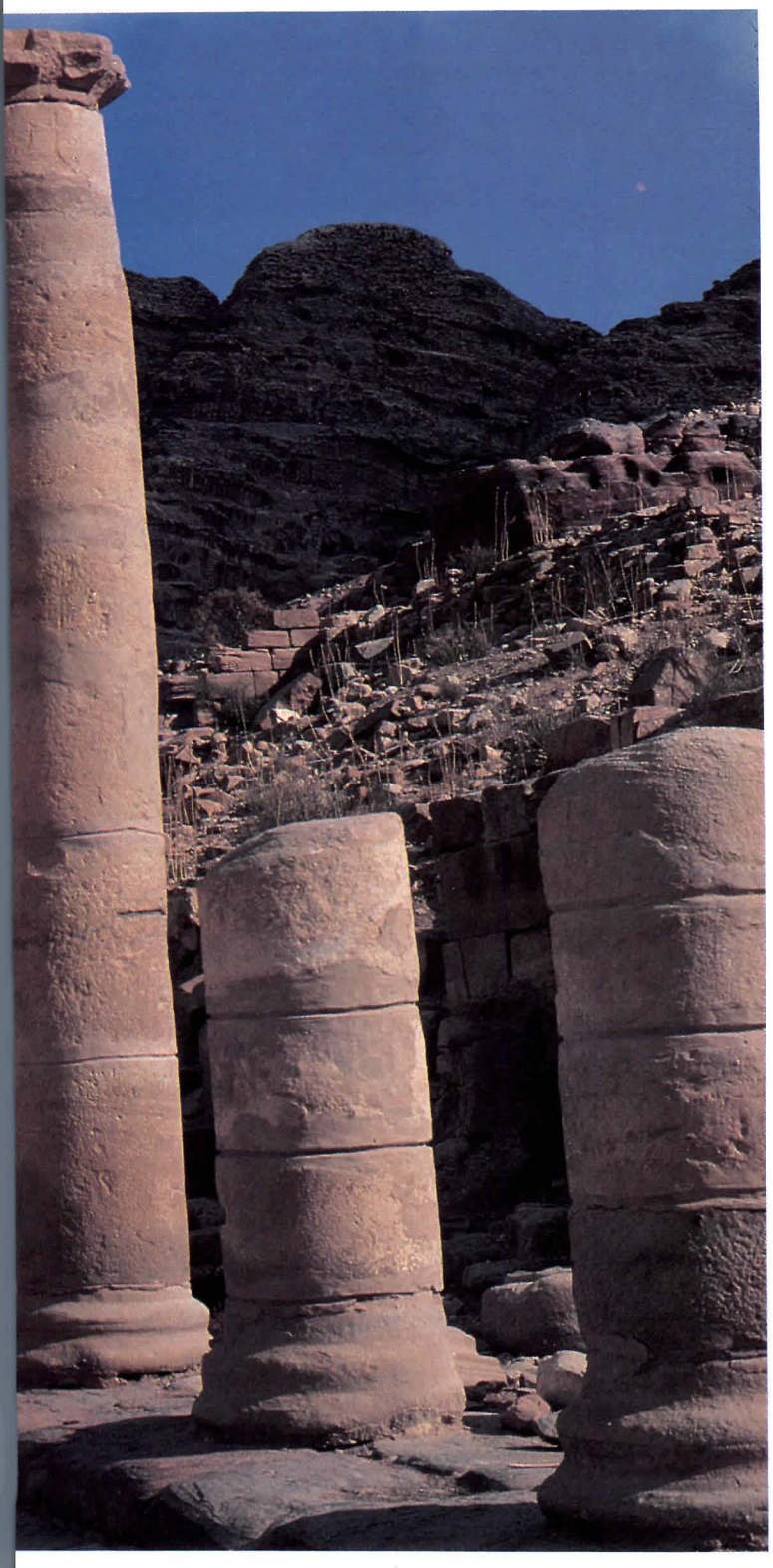
Long-Hidden Wonders of the Petra Valley

An elaborate but impenetrable city hewn from stone. By Christopher Owen, AIA

A single photograph depicting a view through a deep and narrow gorge, at the end of which looms a monolithic peach colored temple, is likely to be all that comes to mind. Understandably so. For nearly 15 centuries the valley and ruins of Petra were forgotten to the world until they were discovered in the early-19th century by a Swiss explorer, John Burkhardt. This gorge or Siq, as it is commonly called, describes the single entrance into the ruins of a virtually impenetrable city that, more than 2,000 years ago and for a period of several centuries, was the capital and principal link of a caravan empire on the trade routes from Arabia north to Damascus, Greece, and Rome.

The first documented settlers in the valley were the Edomites,

Mr. Owen has a private practice in New York City.



a nomadic tribe that originated in Israel and controlled southern Jordan at the time of Moses and the Exodus. Petra valley was settled for its natural fortification and dependable supply of water. The Edomites made no attempt at construction other than catchment channels and cisterns for the purpose of water conservation. Not until the Nabateans, a Semitic tribe traveling north from Arabia, integrated into the region, would there exist an architecture at all.

For the first several hundred years (580 B.C.-300 B.C.), Nabatean efforts were concentrated on enlarging and improving upon the Edomites' skills in water conservation, which eventually evolved into an elaborate system of controls and regulations. Conduit and cisterns were cut into the rock, and lengthy stretches of earthernware pipe crisscrossed the valley. The principal source of water was the Ain Mousa River, which was diverted through the Siq and into the valley, the water being carried along a rock-hewn channel cut into the cliff wall. Remains of this channel and the inset earthernware pipe are clearly visible today. The Nabateans also developed a very fine pottery not unlike porcelain, extremely thin and delicate. Of a peach hue, it was painted with leaf patterns in colors ranging from reddish brown to black. Vast quantities of shards still cover the valley floor.

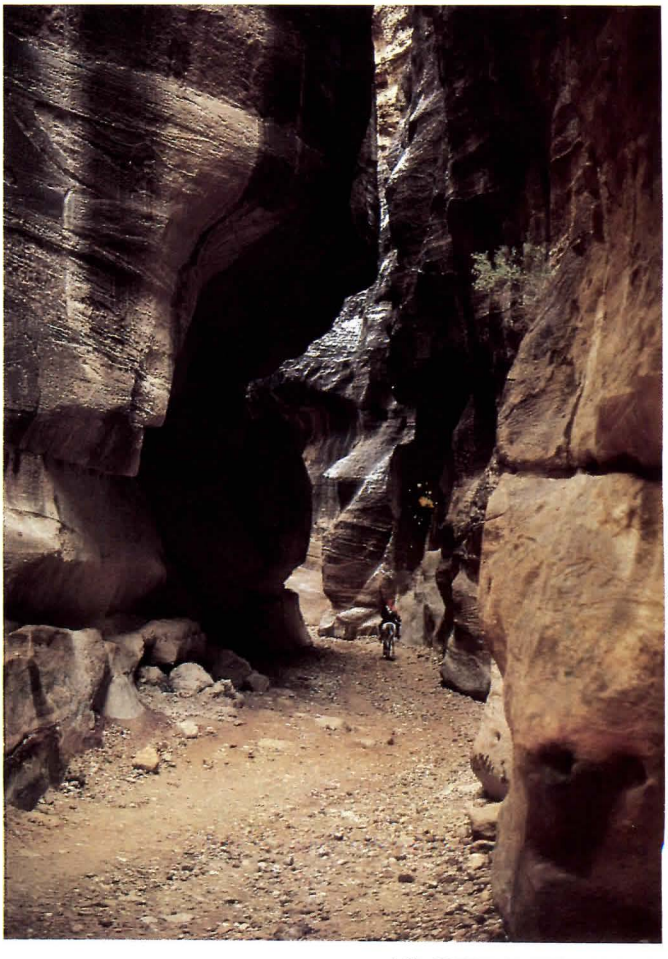
Of all the Nabatean skills, the most impressive is their architecture. In spite of the elapsed centuries and nature's toll, much remains to be seen, considerably more to be excavated. Actual construction or carving began about 300 B.C. and lasted more than 500 years, financed principally from tolls in exchange for protection demanded of the passing caravans. History tells of numerous attempts to conquer the Nabateans and their protected valley, but with the only entrance being the Siq, they were able to defend their position with ease, thwarting all attacks.

After Pompey's conquest of Syria in 63 B.C. the Romans gradually extended their control into Jordan. The Nabateans and their enclosed valley remained autonomous, yet they were largely dependent upon Rome and its habits in trade. Finally in A.D. 106 the Romans discovered Petra's principal source of water, the Ain Mousa River, and simply diverted it. Nabatean control gave way, and their territory, along with the remainder of Jordan, was incorporated into the Roman province of Arabia.

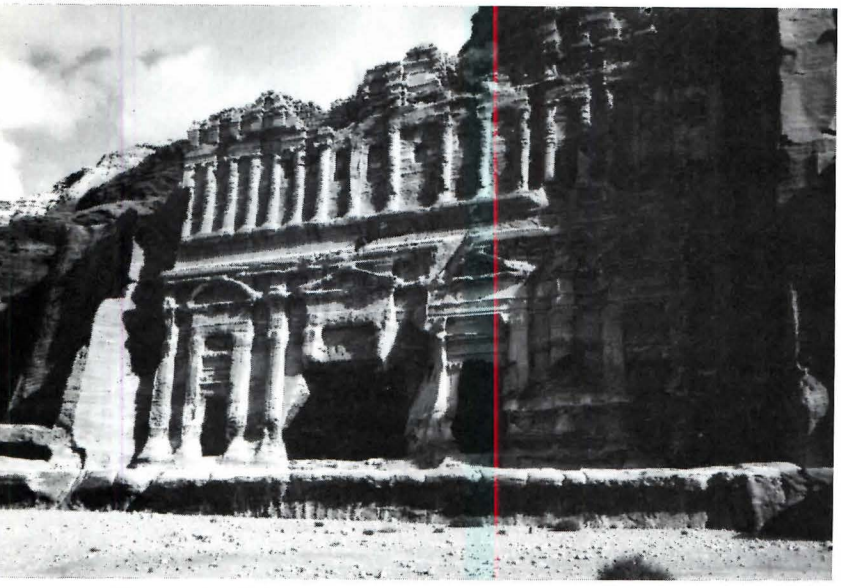
Rome's influence was significant, and a lavish program of construction, reconstruction, and civic planning took place. Central to this was the building of the Colonnade Street with its markets, gymnasiums, palaces, and temples. Several hundred yards away near the Siq the Romans carved out of the valley wall a theater capable of accommodating nearly 4,000 people.

Left, the remnants of the Roman-built Colonnade Street. Below, the Siq, a narrow, two-mile-long slice through the rocks that is Petra's sole entrance. The cover depicts the view when emerging.

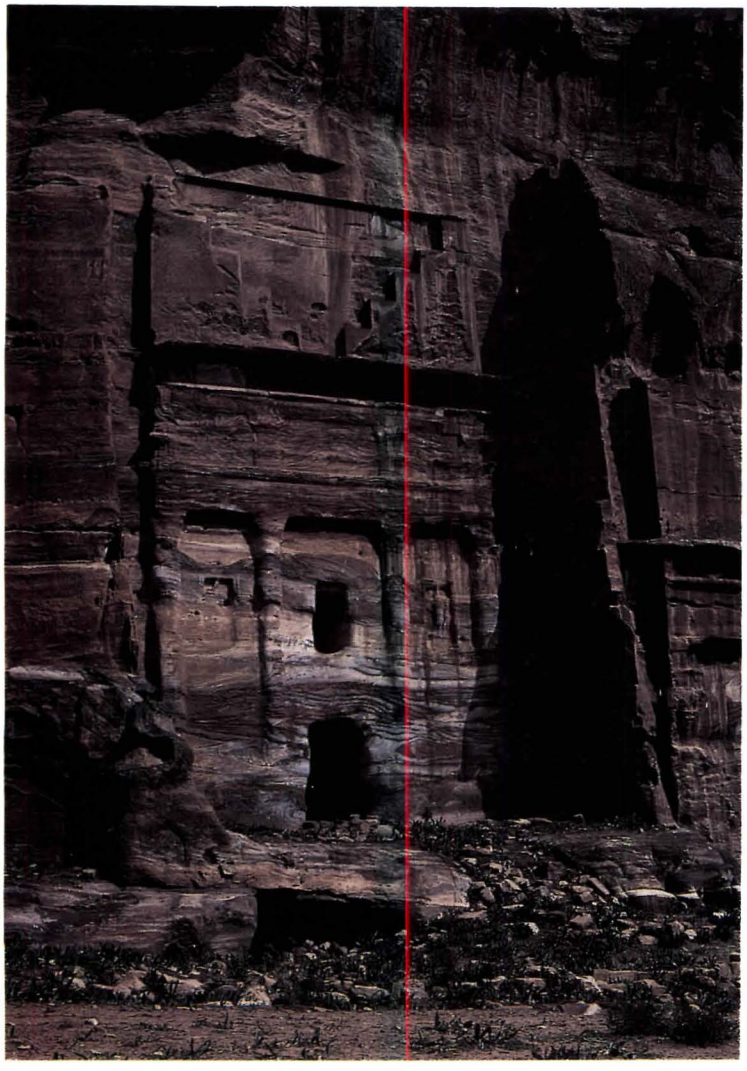
Christopher Owen, AIA



Robert Seitz



Above, the Palace Tomb. Below, the Silk Tomb, named for its subtle stripes. Right, gaping portal of the Corinthian Tomb.



Christopher Owen, AIA

A stunning array of cliffside temples.

The Romans' interest in controlling trade and consequently annexing Petra was eventually to be its downfall. Their ambitions led to the ultimate change in caravan routes, principally by way of Palmyra in Syria. Petra would be forgotten for some 1,400 years until 1812, when John Burckhardt, traveling from Damascus to Cairo, stumbled upon this vast valley of ruins and monoliths.

A visitor first arriving at Petra follows the bed of the Ain Mousa River. Rock outcroppings of immense scale are to be seen on both banks, and several of these are carved into block towers, their purpose unknown. All along the northern bank is a succession of hewn caves and niches. The first and only major tomb outside the valley stands high on the south bank and is in fact two tombs, one above the other. They are neither vertically nor horizontally aligned. The upper or Obelisk Tomb is earlier and has stylistic origins in Egypt, its obelisks representing the four deity images. The Bab el Siq Triclinium Tomb below is pure Nabatean and possesses one central unadorned inner chamber.

Following the riverbed, one soon arrives at an opening in the rock cliff, the entrance to the Siq and Petra itself. The Siq, a result of a natural fault through the entire mountain, is noted for its narrow passage (sometimes less than six feet), its length (about two miles), and towering walls (300 and more feet high, often converging and blocking the sky above). Along one side is clearly seen the remains of the hewn water channel. Having passed several badly deteriorated wall reliefs, one is confronted by the Khasneh, a Faroun Treasure of Pharoah, hence the "Treasury," but most probably never used as such. This is a later structure, with Corinthian capitals, elaborate mouldings, and statuary. It is thought to have been built about 75 B.C. when foreign craftsmen were capable of producing the Hellenistic wonders of the Near East. By virtue of its large size (90 feet high), dramatic location, superb condition, and deep peach color, it has become the most photographed and published of Petra's monuments.

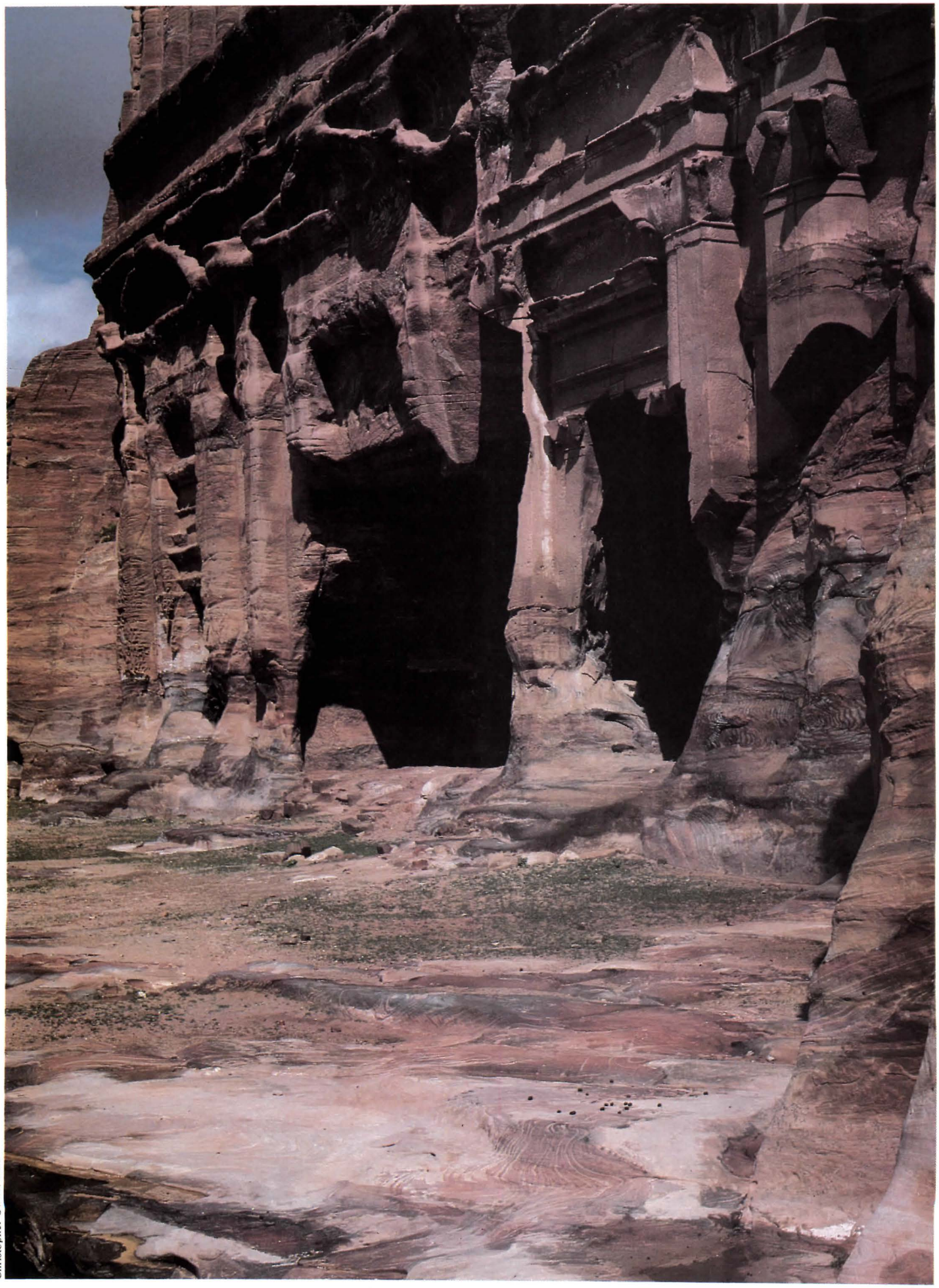
Three unadorned chambers are to be found within, the central and largest 40 feet square. It is conceivable that these chambers were plastered and painted, for the stone is dressed with a close-grooved diagonal scoring that may well have served as a key for a finished surface.

Heading northwest through the outer Siq, one comes upon the Roman theater. Little regard was shown for existing Nabatean structure, for in excavating its rear wall the Romans stripped the tomb facades above, leaving the interior chambers gaping out over the structure. "A theater in the midst of sepulchres," wrote Dr. Edward Robinson in 1828. "One wonders just how compatible the two cultures were during this period of incorporation and reconstruction."

Turning north, the visitor is confronted with a view of the valley's East Wall. Over a length of perhaps an eighth of a mile stretch the most important group of cliffside monoliths to be found in Petra, if not the world. The first is the Urn Tomb. As with nearly all the carved monuments, it is very difficult to pinpoint its age. It has strong Roman characterisitcs yet is essentially Nabatean, which would date it around A.D. 70. There is a deep, open courtyard (a consequence of the sloping cliff) with flanking cloisters behind colonnades and a vast inner chamber below the tomb itself. Evidence remains of its conversion to a Christian cathedral in the fifth century.

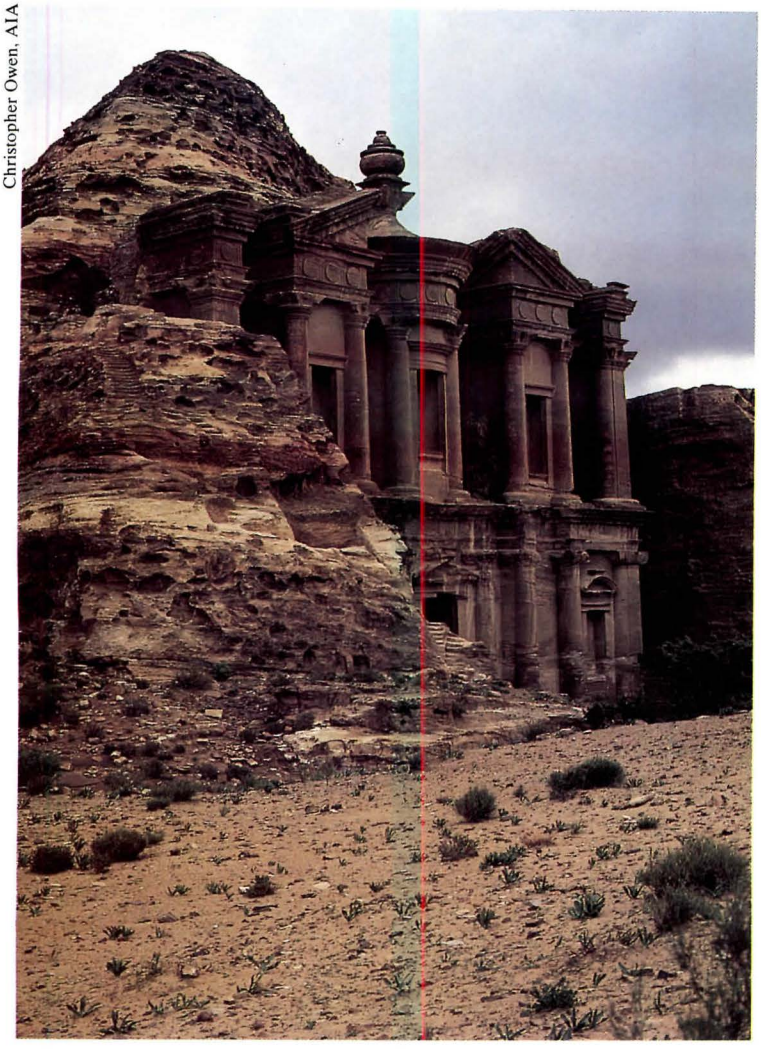
The next tomb of significance is the Silk Tomb, noteworthy for its brilliant natural coloring reminiscent of flowing silk. It possesses a double cornice and has the characteristic cavetto or crow step above the upper cornice, an influence from Egyptian and Persian architecture.

Progressing north, one reaches the Corinthian Tomb. Due to its exposed position, this monument is badly deteriorated. Architecturally it is not a success, for the lower and upper parts stem



Christopher Owen, AIA

Christopher Owen, AIA



A serene monastery high above the valley.

from different traditions, the lower Nabatean, the upper Hellenistic. The doorways totally disregard classical symmetry, inserted as they are in the left-hand bays. Nevertheless, for all its imperfections, it is an imposing sight and serves as a link in the architectural chain of development.

The last of the four tombs, the Palace Tomb, so called for its similarity to Roman Palace design, is once again pure Nabatean. No doubt, its construction straddled Roman annexation. The tomb is noteworthy for its great breadth and complex architectural rhythms. There is certain confusion as one views the various levels together. The massive, clearly articulated ground floor does not align with the two stories that consist of unevenly spaced and engaged half columns. Due to the slope of the wall and the fact that the facade was not started sufficiently deep into its face, the builders ran out of cliff and the upper portion is of cut stone and brick. Much of this has collapsed. The interior, which consists of four huge chambers with only the middle two connecting, would most probably have been plastered and painted in the Nabatean manner.

The remainder of the valley, besides the Roman Colonnade Street and related structures, is dotted with tombs, temples, and monuments. One, the Unfinished Tomb, is of particular interest as it demonstrates the general methods of carving. Work began at the top and proceeded down, similar to that of the 12th century rock hewn churches in Ethiopia.

Far to the west on the valley's summit, roughly an hour's walk and some 600 feet above the valley floor, lies the largest and most serene of the rock hewn monuments, the Deir or Monastery. The facade is 132 feet high and 154 feet wide. The doorway itself, the only aperture illuminating a single chamber, is 26 feet in height. The tripartite upper story is flanked by single projecting pilasters, and a massive base adds to its imposing appearance. The finial atop the central kiosk, like the rest of the structure, is hewn directly from the surrounding rock and stands more than 30 feet high. The monastery was carved during the third century A.D. as a temple to the glory of the Nabatean god Dhu-shara, chief deity of Petra. Crosses carved within indicate its probable use as a church at a later date.

Three hundred yards to the southwest is Mt. Hor, site of the tomb of Aaron, the brother of Moses. □

Above, El Deir Monastery, a single commanding carving. Across page, looking back to Petra from the monastery. Below, the Unfinished Tomb, its columns left as they began to emerge from top to bottom.

Robert Seitz

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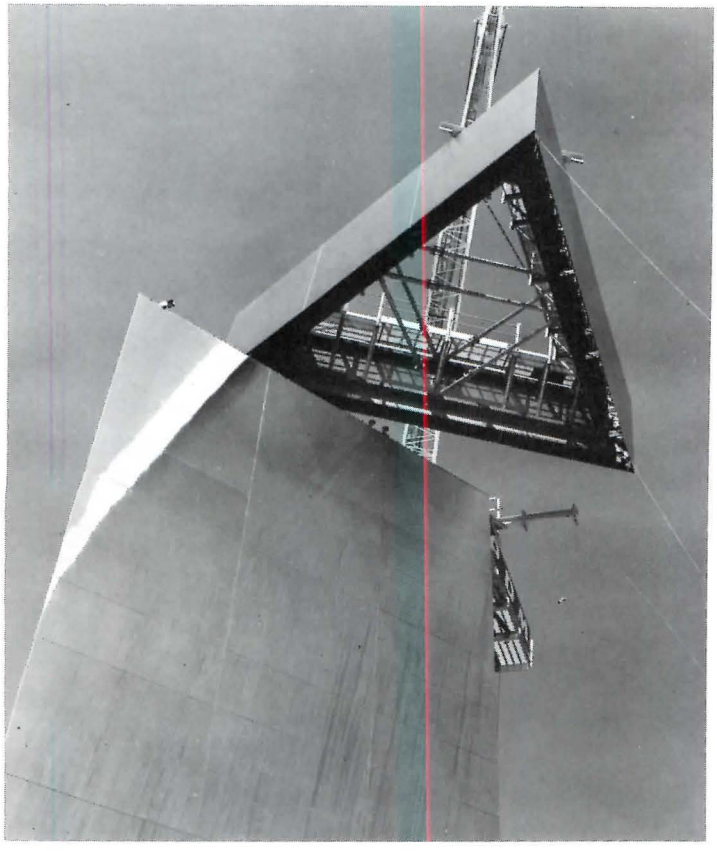
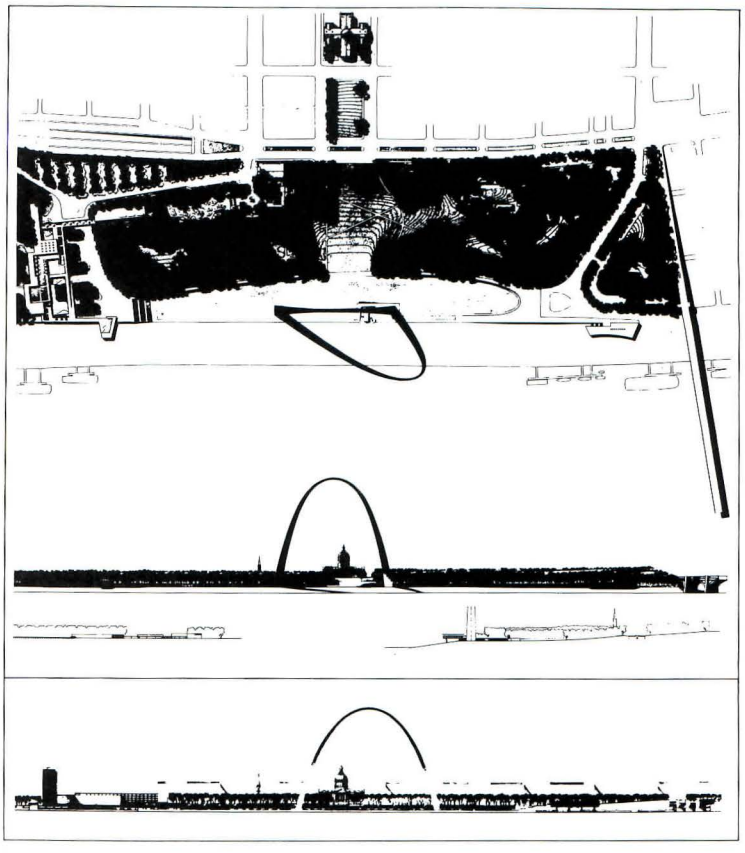




Is It a Catenary?

New questions about the shape of Saarinen's St. Louis Arch. By Michael J. Crosbie

Eero Saarinen's St. Louis Arch, as everyone knows, is shaped like a catenary curve. Well, not exactly.

This misconception, shared by many who know the arch, was brought to light in the aftermath of a contest that ran in the *St. Louis Post-Dispatch* last July 4th. Readers were invited to calculate the distance between the wing tip of the Spirit of St. Louis (flying hypothetically through the center of the arch at a height of 200 feet) and the arch's inner edge.

To help the contestants along, a drawing of the arch was provided, giving all the necessary dimensions. The drawing was actually a photograph of two chains whose ends had been tacked up, forming a pair of catenary curves, one inside the other, replicating the curve of the arch. When the photograph is viewed upside down the chains look very much like Saarinen's famous gateway.

One-hundred-and-seven submissions were received and 40 were correct. The hypothetical plane had cleared the hypothetical arch by 208.81 feet, but it was not the same arch that Saarinen had designed. For the inverted photo of the hanging chains does not mirror the arch as it exists.

William V. Thayer, a math professor at St. Louis Community College, has used the geometry of the arch as a math problem in his class for a number of years. He wrote to the *Post-Dispatch* and pointed out that the arch is not a simple catenary curve, that it is actually shallower, a shape more like a suspended chain with heavier links toward its ends—a "weighted catenary."

Saarinen is at least partially responsible for the confusion over the arch's shape. In an attempt to rectify misunderstanding of the graceful curve, he wrote in 1959: "This arch is not a true parabola, as is often stated. Instead it is a catenary curve—the curve of a hanging chain—a curve in which the forces of thrust are continuously kept within the center of the legs of the arch."

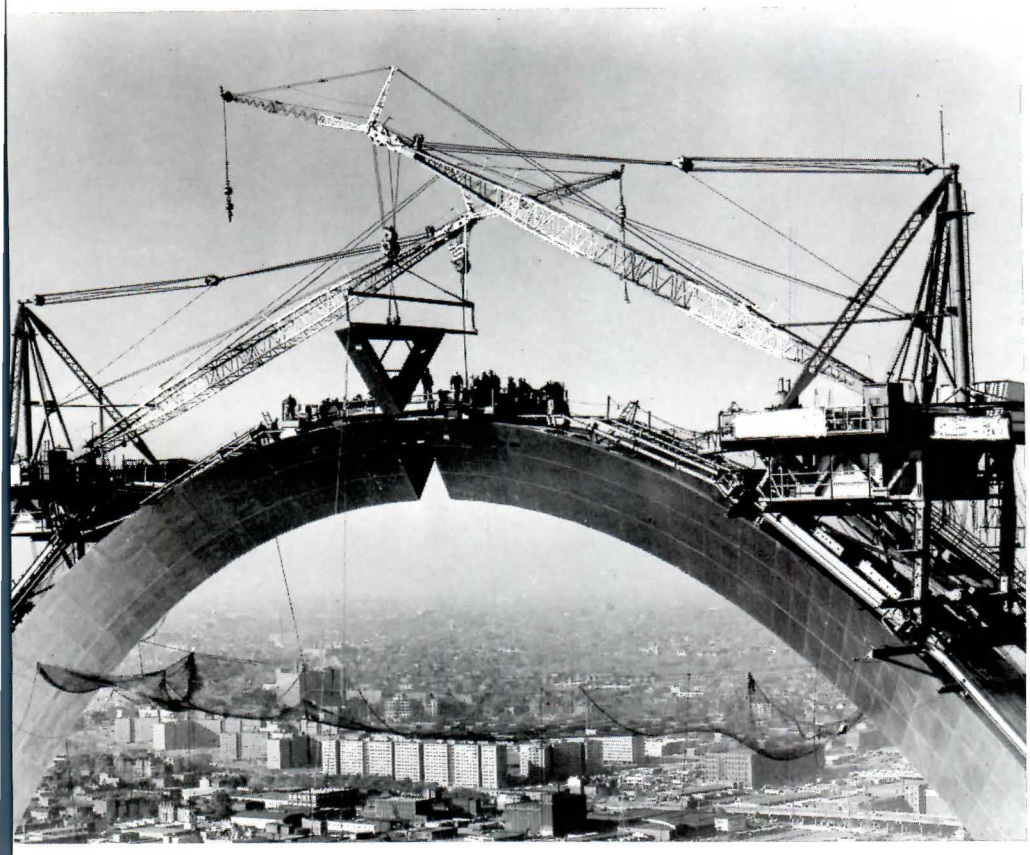
The term weighted catenary describes the arch in only its broadest outlines. To understand geometrically how the catenary curve of the arch is weighted takes more than a required dose of college calculus. But the fact that the curve is not a perfect catenary—a pure form that would seem more attractive to Saarinen—also raises questions as to how the shape was arrived at, and why.

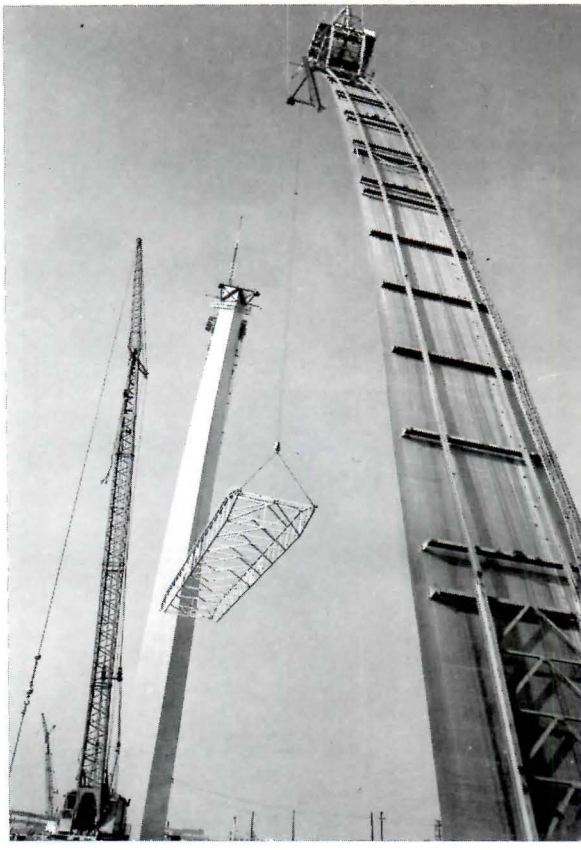
The story of the design of the St. Louis Arch starts a bit over 35 years ago, when Eero Saarinen won the Jefferson National Expansion Memorial competition. That competition drew 172 entrants from around the country. On Feb. 17, 1948, the jury announced that Eero Saarinen & Associates was the winner of the $40,000 first prize. The jury praised the design as suggesting "the historic past of St. Louis as the Gateway to the West. The entire concept, full of exciting possibilities for actual achievement, is a work of genius; and the memorial structure is of that high order which will rank it among the nation's greatest monuments."

Despite its possibilities of achievement, work on the arch did not commence until after Saarinen's death in 1961. A series of snags—including the withholding of federal funds for the memorial and the removal of the railroad from the levee along the Mississippi River—prevented Saarinen from seeing the project realized.

Saarinen worked on the design of the arch off and on from the time of the competition through the remainder of his career, during which time it went through a number of metamorphoses. The competition entry shows an arch 590 feet tall by 630 feet wide, whose steel band was four sided. Refinements made during the second stage included moving the monument further south on the site and changing its cross sectional shape from a trapezoid to an equilateral triangle, giving it a more sculptural appearance. (At one point Saarinen had even considered making the surfaces concave.) The dimensions were finally set at

Photographs by Arteaga Photo





Presentation drawings above show Saarinen's competition-winning entry (top) and an earlier shallower version of the arch.

630 feet from extrados to extrados, and 630 feet from ground to crest. The sides of the triangular bow vary from 54 feet at ground level to 17 feet at the top.

Bruce Detmers, who joined Saarinen's firm in the early 1950s, remembers the trial and error of arriving at the final shape for the arch. "It was a horrendous job to define this thing geometrically," Detmers recalls. Saarinen designed almost exclusively in model form, and a number of materials were experimented with to model the arch, including rubber, rope, and plaster.

"There was a period where we tried heating things," Detmers says. "We took a flat piece of rubber, weighted it, and cut it in certain shapes so that it was heavier at the base and thinner at the top. We tried a couple of those but never could satisfactorily simulate a form."

Model after model followed, ranging in size from a few inches to eight feet high. Saarinen studied their reflections in mirrors, photographed them, and viewed them from all angles. With each he found that they were either too flat on top, too pointed, or too heavy. Saarinen knew that the shape of a pure catenary would make the arch appear very steep from ground level. A wider, weighted catenary form was desired, and for this he enlisted the help of Hannskarl Bandel, who was at that time with the firm of Severud-Elstad-Krueger Associates, the project's structural engineers.

As Bandel remembers it, he worked up half a dozen or so weighted catenary curve formulas and sent them over to Saarinen's office. There they were plotted, and models of each were built. Saarinen studied these models and finally selected one. Its shape was shallower than a pure catenary, and appeared less pointed when viewed from the ground. And, geometrically, the catenary was true to its tapered legs.

If the arch were flexible, Bandel explains, "if you hung it upside down, it would hang in this shape, because the legs become heavier toward the ground, so it would deflect at a latter stage." In other words, if you loaded a chain corresponding to the cross sectional area of the legs as they vary in width, and turned it upside down, it would hang precisely in this fashion. After Saarinen chose the weighted catenary form, the design was set, Detmers remembers. Shortly after, Saarinen died.

The next step was to translate the weighted catenary into a built reality. Bandel recalls that the engineers first thought of constructing a triangular truss and covering it with skin, "but we gave up that idea because of impermanence." What finally evolved was a combination of construction methods. Double-walled, triangular sections (across page, left) were fabricated in a Pennsylvania steel plant. The outside skin was ¼-inch polished stainless steel; the inside skin was ⅜-inch carbon steel, increased to 1¾ inches at the corners. The gap between the skins varied from 3 feet at ground level to 7¾ inches at the top. Both skins were load bearing, tied together with tensioning bolts. For the first 300 feet the double-wall cavity was filled with concrete. Two-hundred-and-fifty-two steel rods ran vertically through each leg and tied into the foundations. After the concrete hardened, the rods were stretched with 71 tons of pull, stressing the lower part of the arch. Above the 300-foot level, vertical steel diaphrams stiffened the inner and outer walls.

Assembly of the arch commenced on Feb. 12, 1963. When the legs reached the 72-foot mark, twin "creeper" derricks, each weighing 80 tons, were strapped onto each leg, and slowly inched their way up, like spiders spinning a strand of steel web. At the 530-foot level, a 60-ton stabilizing strut was lifted into place (above right), which braced the two legs. On Oct. 28, 1965, jacks applying 450 tons of pressure pushed the two legs apart (above left), and the last triangular section slid into place.

The arch was dedicated on May 25, 1968, a score of years after Saarinen and his partners had won the competition. Since then the arch has been visited by millions of people. As an object in time it no less symbolizes the optimism and strength of postwar America, as it does *the gateway to the West.* Critic Allan Temko wrote in his book on Saarinen: "For the modern movement, which has long been wary of monuments, the arch proves that such a celebration need not be a meaningless pastiche, but an act of mind and heart." □

Barriers to Architectural Education

By Robert A. Francis

Architecture, like art, teaches. Therefore, architecture students learn from the built environment in which they are being taught. Yet if this theory is adhered to, the nation's schools of architecture fall short in one critical area: accessibility for the handicapped.

This conclusion is supported by a survey I conducted between August and November 1980 of 33 member schools of the Association of Collegiate Schools of Architecture in the Northeast and East Central regions. That survey revealed that only 10 (or 30 percent) of those schools complied with the federal accessibility standards. These standards were to have been met by June 1980 by "any program or activity" receiving federal financial assistance according to section 504 of the Rehabilitation Act of 1973.

To determine the accessibility of the 33 schools, a checklist of 87 separate design features recommended by the Iowa Chapter/AIA was used. This checklist had been previously used to survey 34 new public buildings to determine if they met the requirements of the Architectural Barriers Act of 1968. (That study concluded that in Iowa the buildings did not meet the "stated intent of Congress.") The checklist is divided into 15 categories, using the standards suggested in the ANSI specification 117.1 document, which is the basis of the federal accessibility standard.

Findings from the survey are summarized below according to the accessibility checklist categories:

- Parking lots: Fifteen facilities (45 percent) had parking spaces reserved for use by disabled persons;
- Walks: Twenty-two facilities (67 percent) had walks less than or equal to 5 percent gradient uninterrupted by steps;
- Ramps: Ramps were used successfully at 10 facilities (30 percent) to make primary entrances accessible or to overcome changes in floor levels inside a building;
- Entrances and exits: Twenty-one facilities (64 percent) had at least one primary entrance usable by individuals in wheelchairs;
- Doors and doorways: Doorways to classrooms in all 33 facilities were wide enough for access for persons in wheelchairs. Office doors in three of the facilities had clear openings less than the 32 inches needed for wheelchair access;
- Stairs and steps: Twenty-two facilities (67 percent) had stairs free of abrupt nosing projecting beyond the stair riser. Eight had handrail extensions of 18 inches beyond the top and bottom steps in stairwells;
- Floors: Twenty-five facilities (76 percent) had level floors. At two of the facilities abrupt changes in floor levels were overcome by ramps;
- Restrooms: Of the 19 questions regarding restrooms, the two most important were whether restrooms were accessible to and usable by disabled persons. Sixteen facilities (48 percent) had sufficiently wide restroom door openings. Eleven of the 16 had toilet stalls with sufficiently wide partition openings to be usable by physically handicapped persons;
- Water fountains: Twenty-four facilities (73 percent) had accessible water fountains;
- Public telephones: Eleven facilities (33 percent) had public telephones accessible to disabled persons;
- Elevators: Twenty-three of the buildings (70 percent) had elevators available for use by disabled persons;
- Controls: Two facilities (6 percent) had switches and controls for light, heat, ventilation, and fire alarms within reach of individuals in wheelchairs;
- Identification: Fifteen buildings (45 percent) had raised letters or numbers properly identifying rooms and offices;
- Warning signals: One facility had simultaneous audible and visual warning signals for the benefit of persons with hearing or sight disabilities;
- Hazards: Low-hanging objects or objects projecting into hallways presented no problems in the facilities surveyed.

To rate the buildings according to their accessibility characteristics, the following system was used. A building was rated excellent if all minimum requirements of ANSI specification 117.1 were met. It was good if at least one primary entrance, an elevator, restrooms, and site features including parking lots and walks were usable by the disabled, but public conveniences including telephones, water fountains, room identification, and controls did not meet the standards of ANSI specification 117.1. A building was average if one primary entrance, an elevator, and restrooms were accessible, but site features including parking lots and walks were not accessible. It was below average if at least one primary entrance was usable, but neither an elevator nor a restroom was accessible. A building was rated poor if no primary entrance was usable by the disabled.

Of the 33 facilities surveyed, three were judged excellent—Ewing Building at the Rhode Island School of Design; engineering technology and architecture building, Temple University; and design, art, and architecture building, University of Cincinnati. Four were good—Education Hall, New York Institute of Technology; architecture building, Lawrence Institute of Technology; Brown Hall, Ohio State University; and art and architecture building, University of Michigan. Three were average: Avery Hall, Columbia University; engineering "D," Pennsylvania State University (condition temporary due to construction); and Solcum Hall, Syracuse University.

Those rated below average were Boston Architectural Center; Main Hall, Drexel University; Gund Hall, Harvard University; Campbell Hall, New Jersey Institute of Technology; architecture building, Princeton University; Greene Hall, Rensselaer Polytechnic Institute; Spring Garden College; Sayes Hall, State University of New York at Buffalo; architecture building, University of Maryland; fine arts building, University of Pennsylvania; Taylor Hall, Kent State University; and Alumni Hall, Miami University. And 11 were rated poor: fine arts building, Carnegie-Mellon University; art and architecture building, Yale University; architecture and planning building, Ball State University (a major addition to this building was completed after the survey was conducted, and the complex would now rate excellent); Science Hall, University of Detroit; Pence Hall, University of Kentucky; architecture building, Notre Dame University; architecture building, City College of City University of New York; fountain building, Cooper Union; Sibley Hall, Cornell University; Rogers Hall, MIT; and Higgins Hall, Pratt Institute.

In conducting the survey, I determined that design characteristics of a building—age, style, original use, extent of renovation, and context of location—influenced both the degree of accessibility and ease of modification of a structure for accessibility.

Mr. Francis is vice president for campus operations, State University of New York at Stony Brook.

The ages of the buildings reflected the great changes in building codes, technology, and materials between 1859 and 1977, when the oldest and newest buildings in the study were constructed. Of the buildings, six were constructed before 1900, 15 between 1901 and 1930, and the remainder after 1930. Buildings were then classified as revival or modern in style. Five of the 16 structures constructed before 1930 were functionally modern because contemporary principles, including lack of applied ornamentation, emphasis on mass produced materials, and concentration on function rather than symmetry of plan, governed the designs. None of the buildings surveyed was an example of the collegiate Gothic style popular in the U.S.

The original use of a structure could have influenced the degree of accessibility or ease of modification for accessibility. Architecture departments located in buildings originally designed for art and architecture or as libraries often had at grade level service entrances for conveyance of heavy materials. Older buildings originally used for general sciences or humanities may not have been designed with movement of materials in mind. The extent of renovation influenced accessibility, particularly if an old structure was renovated recently. And the location of a facility—urban or campus—was important because problems would be different concerning modifications for accessibility. Accessibility design alternatives are limited in the urban context because these buildings are usually not set back from the sidewalk, are flanked by other buildings, and do not have vast open areas surrounding them.

From an analysis of this information it became clear that the extent of renovation had the greatest influence on accessibility, that modern buildings rated better than revival structures, that buildings completed after 1960 received higher accessibility ratings than buildings completed earlier, and that buildings located in a campus setting received higher ratings than urban structures.

What could remedy the schools' shortcomings in this area? First, AIA and ACSA should urge member schools to comply fully with the ANSI specification 117.1, as required by the Rehabilitation Act of 1973. ACSA should also join with AIA to educate faculty and administrators of architecture programs regarding the design needs of the disabled. And aside from the duty to train practitioners to deliver the most accessible buildings possible, faculties of architecture schools should broaden the understanding of society regarding barriers in buildings, assist communities in improving the quality and accessibility of buildings, and model both the planning and delivery of accessible buildings. □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John Engstead

Drafting room, 1955. Seated, left to right: John Howe, Frank Lloyd Wright, Eric Lloyd Wright, Wesley Peters. Standing, Mark Hyman, Eugene Masselink, Raja Aederi, Ling Vo, James Pfefferkorn, Alan Wool, David Dodge, Thomas Casey, Steven Oyakawa, Donald Brown, Kenneth Lockhart, John Amarantites.

Epistles to Wright's Apostles (and Others) Offer Insights

By Edgar Tafel, AIA

Letters to Apprentices. Frank Lloyd Wright. Selected, and with commentary, by Bruce Brooks Pfeiffer. (The Press at California State University, Fresno; $17.95 hardbound, $8.95 paperbound.)

In the late 1940s, I sat fortified and apprehensive to be interviewed by the New York State architectural license examiners. The meeting was held in a formal and imposing setting—me at one end of a long table, facing some eight judging architects. They passed my application folder ceremoniously among themselves, each either grunting or sniggering—a few smiling—as their eyes fell upon a certain folder notation. There seemed to be a mystery afoot. When my folder reached the last reviewer and my own eyes saw it, I noticed a familiar red square on the first entry on top of the pile of letters of recommendation. Knowing immediately who it was from, and being unable to restrain my curiosity, I asked if I could hear what Mr. Wright had written about me. The answer in soft, dour tone was: "He says we aren't qualified to judge you."

I, of course, was not surprised, being quite familiar with Frank Lloyd Wright's acerbic attitude toward certification. He had expressed himself on the subject in prior letters. To a potential apprentice (Dec. 2, 1933), Mr. Wright had written: "The whole license business has been a great hide-out for incompetents and quacks and is so regarded by the more intelligent members of the profession. Soon I believe that refuge will be removed and architects will have to stand upon what they have done and can do regardless of the scholasticism that has manufactured parasitic white collarites by the million."

This and scores of other letters are to be found in this volume. The book's title is a trifle misleading since, along with letters to former apprentices, there are letters to Mr. Wright's own family, letters to families and sponsors of apprentices, fund-raising letters, and even epistles of intercession to such illustrious figures as General Douglas MacArthur, Senator Barry Goldwater, and Prime Minister Pandit Jawaharal Nehru. Published to commemorate the 50th anniversary of the Taliesin Fellowship (founded in 1932 as Mr. Wright's experiential and nurturing alternative to traditional formal schooling), the book ends with letters to Taliesin from several apprentices, indicating their continuing devotion and appreciation.

I read these letters from an admittedly partisan point of view, having been among the original 1932 nucleus of Taliesin apprentices (some 35) and remembering so well Mr. Wright's nearly obsessive letter writing. Letters were his everyday contact with the "outside" world. Geography and temperament combined to encourage him to write his letters and send telegrams. Those of us who were within earshot of his office next to the "draughting room" often would hear him mutter, as he dashed off correspondence, "That will tell him!" Often he would read us parts of letters, turn around, and return to his desk to complete them. There are some 1,400 letters in the Taliesin archives (carbon copies of the originals), and there are (or were) many written in longhand. Of my own 25 letters, three are in longhand, along with telegrams. The letters included in this book, ably assembled by Taliesin archivist Bruce Pfeiffer, lack the end complimentary close and, regretfully, Mr. Wright's corrections, and N.B.'s (postscripts) are not shown.

This book, perhaps more than any other, answers the persistent question of "what was Frank Lloyd Wright really like?" Nowhere else can one find and sense his personal feelings, compassion, understanding, and direction, as well as the human personal relationship between master and apprentice (or person to person in letters to nonapprentices).

Through his letters (spanning the 27 years between 1932 and 1959), we meet a Frank Lloyd Wright defying the financial woes and economic near impossibilities of the Great Depression to found a fellowship of apprentice architects and craftspersons who, unlike their counterparts at places like Yale, Mr. Wright believed, would escape the stilting conformities of "mass production," developing as individuals. Of "a lad in question" as a potential apprentice, Mr. Wright wrote that the lad would be better off at Taliesin "because the Fellowship is culture and Yale is merely 'education' of a type that has manufactured helpless white-collarites by the thousand." To another apprentice he wrote (in 1933), "I need not enlarge upon the contempt in which

continued on page 86

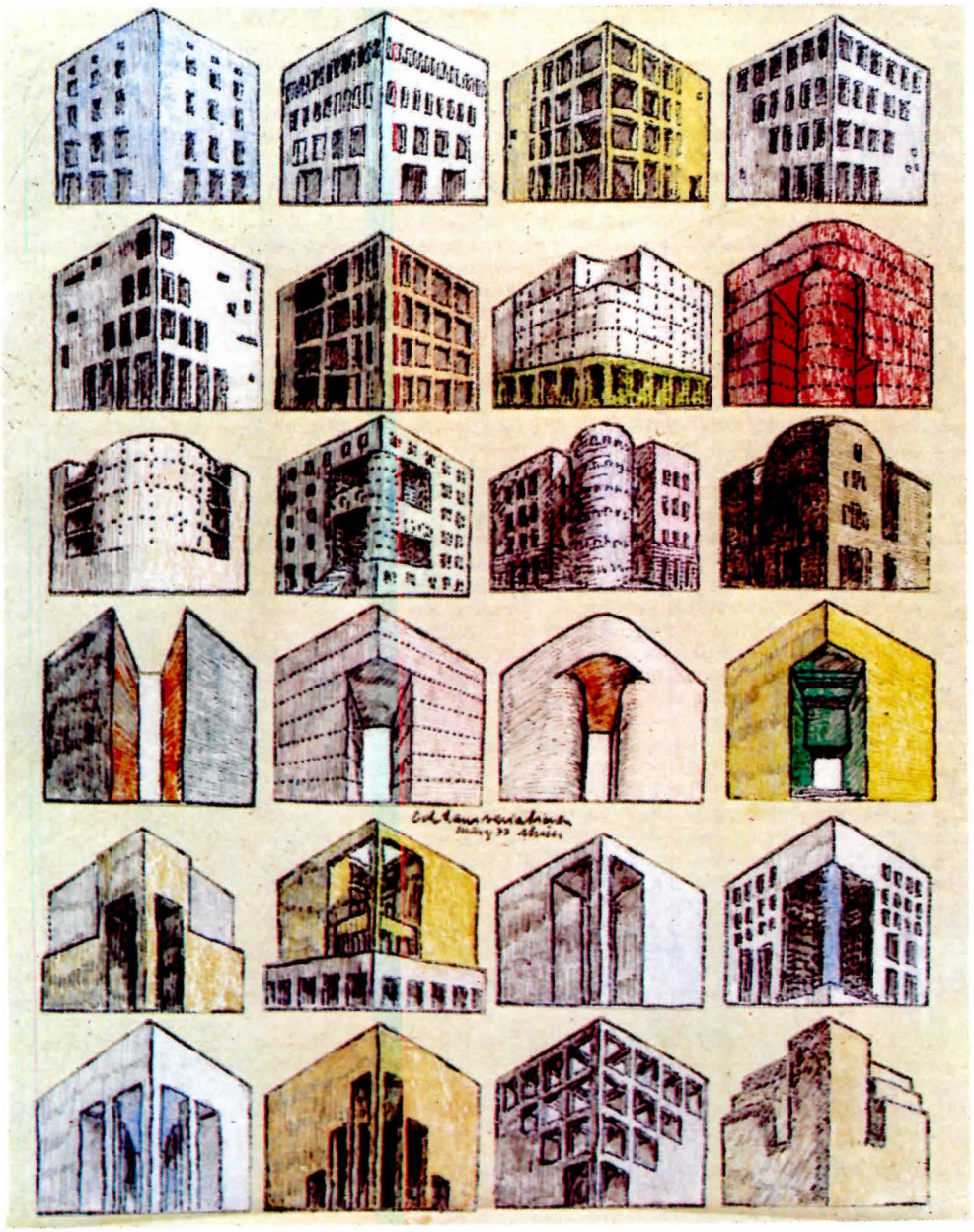
Books *from page 85*

I hold what Yale in the name of the Beaux-Arts does to the young man in Architecture." Another was advised that it was "better to enter the Fellowship with no eye on a degree which is, after all, a scrap of paper." And to "some strangers" inquiring what was being constructed on the Taliesin site in its beginnings, an unrecognized Wright replied, "A refuge from the universities." He often said that Harvard "takes good plums and makes prunes of them."

Although economic realities were ever oppressively present in Mr. Wright's letters and it was as fundraiser and accountant that he was moved to wax rhapsodic in deliciously clever cajoling, they also reveal him as a human and social observer. In 1934, he wrote, "I have never known a radical who did not change when the established order took him up and put power in his hands. . . . Money acts the same way upon them." Another insight is provided by a letter to a young apprentice's mother. He told her that her son "is something of a problem here. While we all like him, I am not sure this is the place for him at this period of his development. He is a maker of things, a restless promulgator of his own ideas." He continued, saying that the apprentice could return if he or his mother wished. "But if he comes he must expect a more rigid discipline of himself than he has shown and he must try to cooperate in a spirit more in keeping with the liberty for all." Mr. Wright knew his apprentices —our shortcomings and our attributes— and his keen insights show through clearly in these letters.

This book is the first of a Taliesin series, and it is hoped that other books will soon appear—Letters to Architects, Clients, Friends, etc. Of future letters yet to be published, I can almost hear Mr. Wright muttering gleefully to himself, "That ought to tell him!" From my own memory, for example, there is the short note he wrote to young Stanley Marcus (of Neiman-Marcus fame) when Marcus had dismissed Mr. Wright in favor of a local architect. After his house was completed, Marcus sent a picture of the edifice which had appeared in a newspaper. Mr. Wright replied: "Dear Stanley: I never thought you could be satisfied with so little." And to a museum director of Gaelic origins who had been particularly trying and difficult, Mr. Wright dispatched a telegram: "You may think you are a great Irishman, but you are small potatoes to me."

Mr. Tafel, a New York City architect and author of Apprentice to Genius: Years with Frank Lloyd Wright, *is a frequent lecturer on Wright's views and contributions.*



Rob Krier on Architecture. (St. Martin's Press, $19.95.)

This paperback of 96 pages contains drawings by Rob Krier, architect of the Ritterstrasse housing in Berlin, a professor at the Technical University of Vienna, and "one of the gurus of contemporary architecture," according to the publisher. Introductory to the drawings are Krier's "10 Theses on Architecture" (which, he says, are principles that have applied since man began to build rationally and to see architecture as an esthetic product); a brief statement on Krier by Friedrich Achleitner (which he calls a "snapshot" of discussions in Vienna where Krier "is playing a central role as a constant 'point of friction,' affectionately jostled, sometimes courted, but generally kept from building"); a despairing essay by Krier on the profession of architecture (which has lost its cultural role, he says); plans, drawings, and models of featured projects; and a bibliography and a list of exhibitions and built works.

The main body of the book, called "The Elements of Architecture," contains Krier's drawings and captions. Vittorio M. Lampgunani has called Krier "the architect of reasonable passion." This quality is seen in his drawings. Among them are drawings for a proposed residential area of 800 apartments in Vienna (1977) where the baroque "Rennweg" barracks stand between two arterial roads. Krier's scheme was to retain the old where possible, with blocks divided so that different architects could work on small units of houses. A greensward is the focus of the complex, rendered in soft greens and blues. His sketches "on the theme of the corner house" are shown at left. "The great variety of architecture in the city," Krier says, "has always been to its enrichment."

Books continued on page 89

Books *from page 86*

The Fabrication of Virtue: English Prison Architecture, 1750-1840. Robin Evans. (Cambridge University Press, $69.50.)

One doesn't have to be a specialist in penal policies or an architectural historian to enjoy and profit from this book. It concerns a new kind of architecture that emerged in England between 1750 and 1850 that was associated with penal reform.

The reformers believed in "the transforming power of architecture." The aim was to prevent mutual corruption among prisoners through solitude; fundamental to the concept was the theory that a prisoner's character would change from vice to virtue if certain conditions were met. Thus, says Robin Evans, ideal conditions were formed for "the perfecting of techniques that sought to make architecture the instigator of virtue."

Evans discusses the conditions in 1750 in such places as Newgate, England's most notorious prison, which was a cesspool of "unbridled pleasures, bestiality, and filth." He covers in detail the early reformation of prisons—from dungeon to cell—tracing the history of solitary confinement. The new prison buildings became, he says, an "architecture against communication." He supplies interesting information on how the reformers rediscovered in the U.S. the "reforming power of solitude," describing, for example, William Strickland's Pittsburgh Penitentiary (1818-27) and John de Haviland's Cherry Hill in Philadelphia (1821-29).

There is a lengthy account of England's model prison, Pentonville, designed by Joshua Jebb and completed in 1842. In this prison the reformation of character became linked with technology, and every detail was conceived "with forethought, care, and precision for the purpose of amending the criminal mind...." Pentonville was among the most advanced buildings of its time because, says Evans, its architect "finally turned an issue of psychology into an issue of mechanics." Within six years, more than 50 new prisons and additions followed Jebb's plan.

But the "uncoupling of architecture and reform" occurred. The new prison buildings "never proved capable of delivering quite what was expected of them; they did not manufacture goodness in quantity."

This thoughtful and thought-provoking book has many lessons in it for those who view architecture as a panacea for social ills. As Evans says so poignantly, it is up to the reader to decide "whether it is altogether an illusion that architecture can silently preside over us."

Introduction to Computer-Aided Drafting. David L. Goetsch. (Prentice-Hall, $21.95.)

Designed for traditional teaching settings or for individual study, this book is intended for use by persons who have conquered conventional drafting skills and desire now to learn how to use computer drafting systems rather than manual tools. Against a background provided as a general introduction to computers, an explanation of how to communicate with them, and a description of computer related mathematics, the author turns to the computer in drafting, illustrating the manner in which the computer is used as a tool in various drafting fields. He describes in detail computer drafting systems and their components and explains the hardware that replaces conventional tools. There is an explanation of the basic concepts in computer-aided drafting and how the drafting is actually accomplished. The book concludes with a chapter on employment as a computer-aided drafting technician. Here are tips on how to get a job, how to keep it, and how to advance in it. Each chapter contains a summary and review of the topic considered, and there are "self tests." The book contains many diagrams, photographs, and other illustrative materials to supplement the text, and a glossary of computer terms is provided. □

Letters *from page 8*

I do not expect that my case will necessarily be remedied, but for the benefit of other applicants, I hope you will encourage U.S. architects to participate in the AIPT program.

Bruce Maxwell
Berkeley, Calif.

The following is from a letter to Mr. Maxwell from M. Jane Quillen of the Association for International Practical Training in Columbia, Md.— *Ed.*

"As of mid-June 1981, we are no longer accepting applications from students in architecture and related fields such as urban planning. The International Association for the Exchange of Students for Technical Experience Program operates on the basis of a reciprocal exchange of employer openings between member countries. Between 1963 and 1981, 260 architecture students who were enrolled in U.S. universities were placed with employers in other countries, while American architectural firms accepted only 140 foreign trainees during the same period.

"As a result of this situation, other national IAESTE committees have become increasingly unwilling to provide places for architecture students from American universities when their own students have little chance of being placed in the U.S. Until American architects provide a reasonable number of openings in this country for foreign students, we cannot, in good conscience, accept applications for architecture students knowing that we are unlikely to obtain architecture placements in other countries. . . ."

DEATHS

Withers C. Adkins, Knoxville, Tenn.
Horatio W. Bishop, La Mesa, Calif.
John S. Bolles, FAIA, Santa Rosa, Calif.
Clifford Coleman, Oxford, Md.
Lee E. Edwards, Los Angeles
Raymond R. Franceschi, Carmichael, Calif.
Joseph Hans, Corpus Christi, Tex.
James K. Haveman, Grand Rapids, Mich.
Ayler J. Holland Jr., Norfolk, Va.
Walter Leach, Gladwyne, Pa.
P. E. Lee Jr., Charlotte, N.C.
Walter P. Manske, St. Louis
J. S. Mill, Los Angeles
David H. Morgan, FAIA, Philadelphia
A. F. Pierce, Houston
Alfred D. Reid Sr., Pittsburgh
Sheila K. Rydell, Tampa, Fla.
Eugene E. Smeallie, Baltimore
Domenie A Tedeschi, Haddonfield, N.J.
Robert D. Vernon, Richmond, Va.

BRIEFS

Energy Conservation Awards Program. Owens-Corning Fiberglas Corporation has set Aug. 26 as the deadline for receipt of submissions in its 12th annual energy conservation awards program open to all registered architects and professional engineers practicing in the U.S. To receive an entry kit, write B. M. C. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower T12, Toledo, Ohio 43659.

Fumihiko Maki at Harvard. Japanese architect and educator Fumihiko Maki is the Eliot Noyes visiting professor at the Harvard Graduate School of Design for the spring semester.

Passive Solar Newsletter. The Passive Solar Industries Council is publishing a new newsletter, *Passive Solar News,* to cover detailed technical developments in the field of passive solar construction. It is available for $9.95 a year from the Passive Solar Industries Council, 125 S. Royal St., Alexandria, Va. 22314.

Harry Seidler Honored in France. Australian Harry Seidler, Hon. FAIA, has been elected to membership in the French Academie d'Architecture.

Lighting Awards Program.
The International Association of Lighting Designers is sponsoring an awards program "to recognize lighting design in architecture and interiors that humanizes the given environment through esthetic achievement, backed by technical expertise." The program is open to architects, interior designers, engineers, and related professionals. The deadline is Aug. 12. Entry forms may be obtained from Stephen Lees, Jules G. Horton Lighting Design, 200 Park Ave. South, Suite 1401, New York, N.Y. 10003.

San Diego Architect Honored.
Clarence Joseph Paderewski, FAIA, has received the California Council/AIA's distinguished service award "in celebration of 50 years of distinguished accomplishments in the practice of architecture."

Photography Contest.
Historic Preservation magazine is sponsoring a photography competition open to amateur and professional photographers. Monetary prizes will be awarded in two categories, architectural and nonarchitectural preservation. Three unpublished photographs may be submitted in each category. Only original 35mm, 2¼x2¼, or 4x5 transparencies will be accepted. All entries must be postmarked by July 31. For more information, contact *Historic Preservation* magazine, 1785 Massachusetts Ave. N.W., Washington, D.C. 20036.

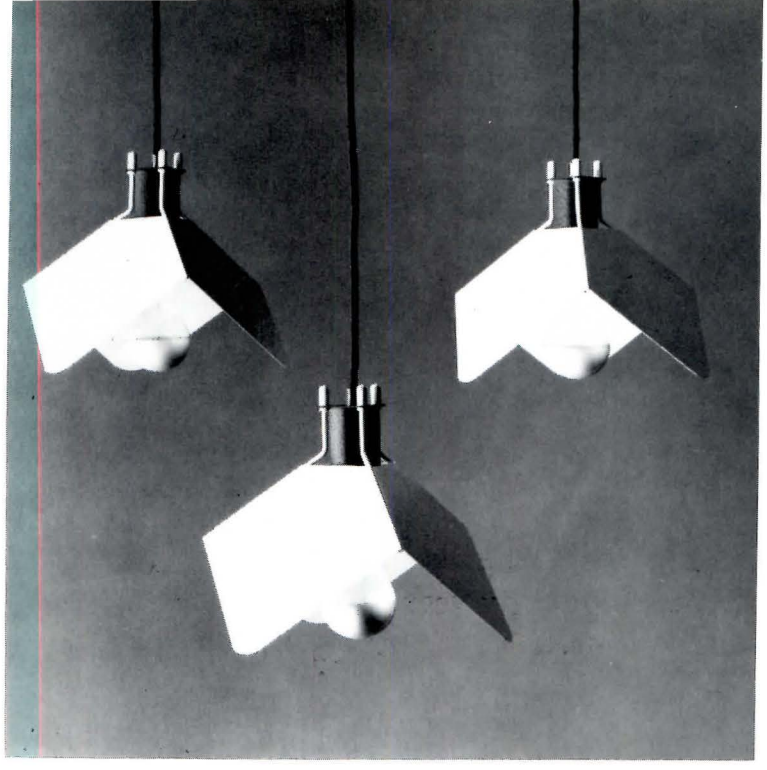
Wood Design Awards Program.
The American Wood Council is calling for entries in its second national design award program for nonresidential wood buildings. Awards will be given to recently completed new buildings and multiple building complexes in commercial, institutional, and industrial categories. Project submissions must be received by Sept. 15. Entry forms are available from the American Wood Council, Suite 500, 1619 Massachusetts Ave. N.W., Washington, D.C. 20036.

Lighting Energy Management Guideline.
The National Lighting Bureau and the Energy Task Force have published "Lighting Energy Management for Colleges and Universities," a 32-page document with information on conducting lighting energy audits and calculating lighting expenses, a glossary, and a listing of sources of assistance. Copies are available for $3 prepaid from the National Lighting Bureau, Suite 300, 2101 L St. N.W., Washington, D.C. 20037.

Laminate Competition.
Formica Corporation is sponsoring a competition open to professional architects and designers for completed room installations or product designs utilizing Colorcore, a new laminate surfacing material. A $15,000 first prize and a $5,000 second prize will be awarded in three categories. For more information and free samples, call (800) 543-3000; in Ohio (800) 582-1396. Inquiries must be postmarked by Dec. 1.

Computer-Supported Design Conference.
Illinois Institute of Technology in Chicago is sponsoring a conference June 23-25 to discuss technological advances in computer-supported design techniques. For additional information, contact Val Lewandoski, Continuing Professional Education, IIT, Chicago, Ill. 60616.

Architectural Research Guide.
The AIA Foundation has published a directory of architectural source materials in Washington, D.C. The 140-page guide lists archives, federal agencies, museums, universities, and libraries that have major collections of architectural drawings and data. It is available for $6.50 from the AIA Foundation, 1799 New York Ave. N.W., Washington, D.C. 20006. □



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Furnishings

As resources for design and objects of design. By Nora Richter Greer

The geometrically shaped Triedro suspension lamps (1) are of lacquered white metal, with goffered black details. Available from the Italian firm Stilnovo, the lamps also come in swiveling table, floor, ceiling, and wall models that are mounted on metal stands and pipes. All models have a silver cup bulb. Also from Italy are two types of Clio seating (2). Manufactured by Cidue, the stools and chairs are metal framed, with a choice of colorful seating covers.

Comforto's new auditorium seats (3) automatically flip up to allow maximum clearance through the rows. They are available with or without arms and with a fold-down urethane tablet arm.

Rose Manufacturing Co. Progressions open-office panel system (4) consists of acoustical, fabric panels with oak storage compartments. The panels come in a variety of heights and widths and can be connected in 12 different configurations. Electrical power distribution can be through three power feeds: floor, wall, and ceiling. The metal base is offered in bright chrome, baked enamel, and several choices of wood veneer on steel.

For the sake of variety the tubular headboard and footboard framing of the Acquariano bed (5) can be easily changed from

2

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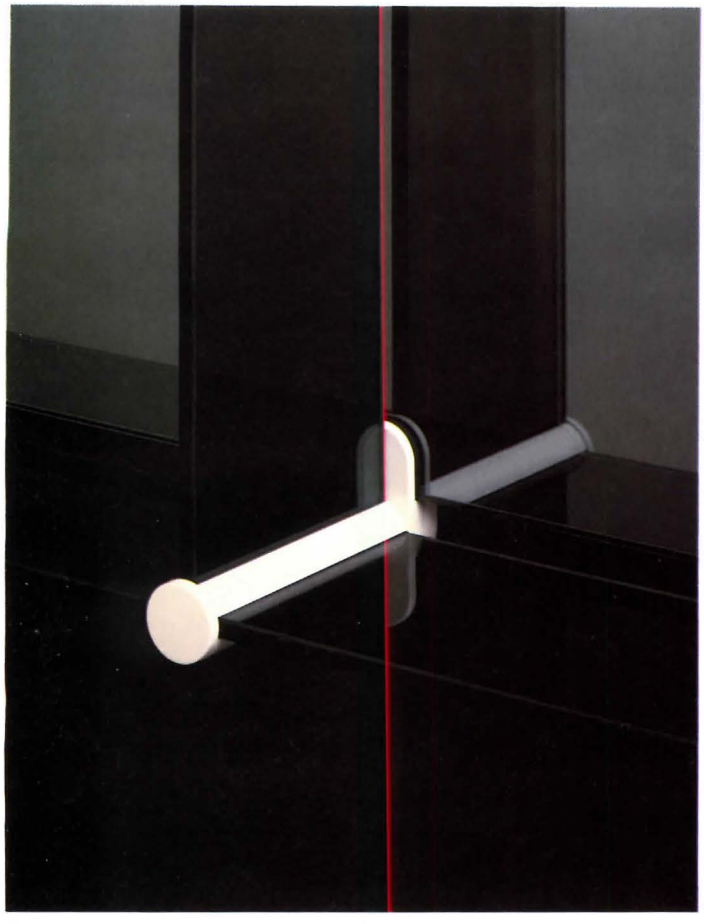

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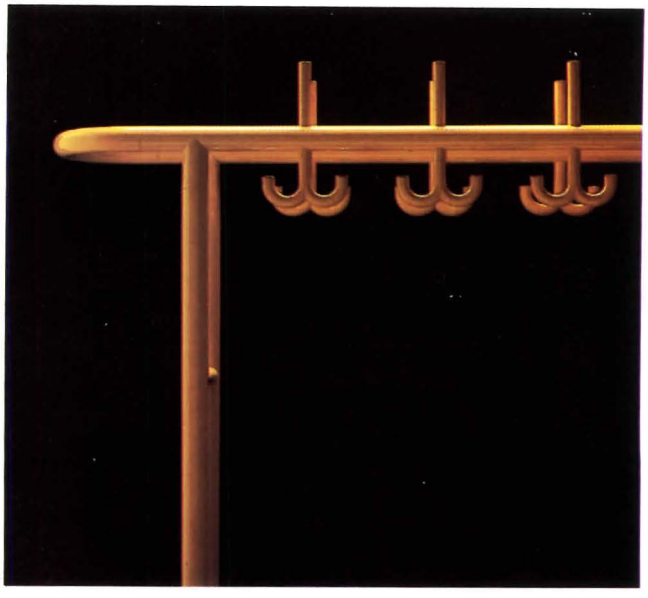

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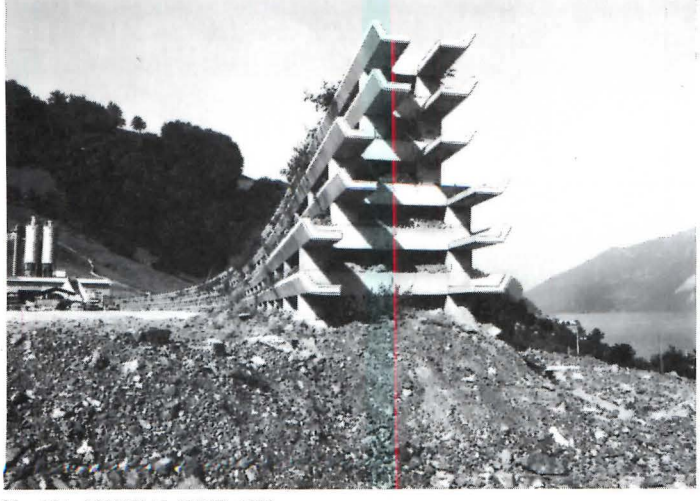
Products

A selection of notable offerings and applications.
By Lynn Nesmith



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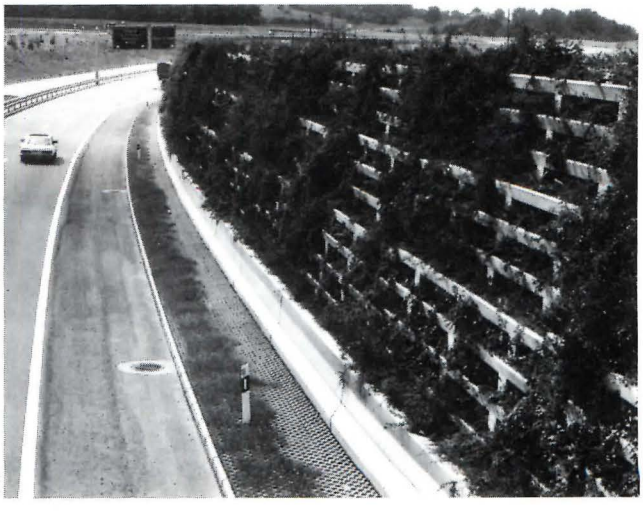

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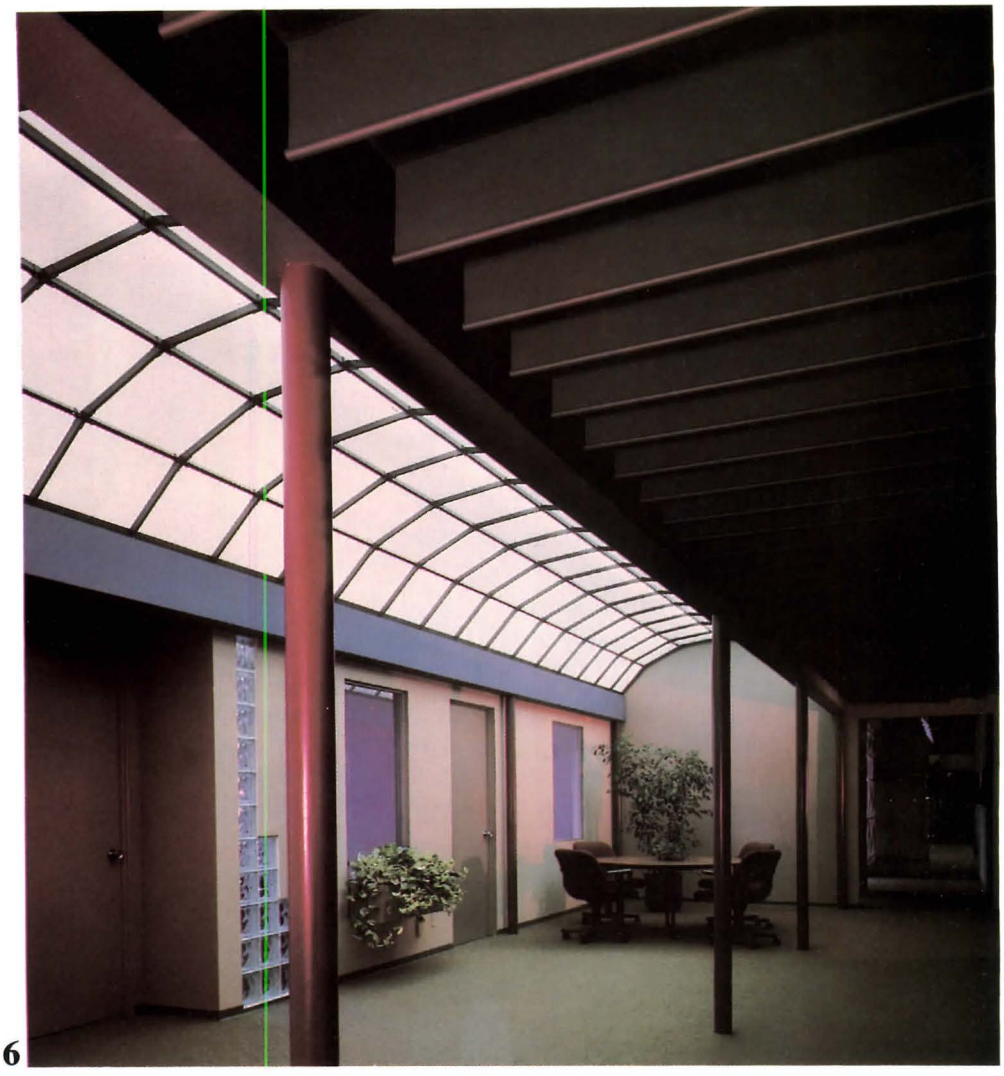
HEWI's color coordinated door hardware, railing systems, and bathroom accessories are constructed of durable thermoplastic nylon with molded-in color and a nonporous surface designed to resist static buildup and dust. The modular System 475 series of bathroom accessories (1) is comprised of shelves and cabinets with crystal mirrors, smoked glass, and nylon components including hooks, towel holders, tray supports, magnetic soap holders, and shower rods and rings. The bright yellow cloakroom (2) features a galvanized steel core with a solid nylon outer tubing. HEWI's mail slot (3), designed by Winfried Scholl, features concealed fastening and theft-proof installation and a self-closing lid. (Circle 161 on information card.)

Evergreen prefabricated concrete components are used to retain earth and absorb sound. Rock revetment units use plants and shrubbery to cover engineering structures and hide bare concrete, brick, or metal walls. The double-sided, freestanding noise barrier wall (4), designed for installation in narrow passes, residential neighborhoods, and urban areas where space is limited, is said to require 10 percent less space than bulldozed earthen structures. Additional modules may be added to an existing system to increase heights. This 15-foot-high retaining wall (5) with full grown planting is constructed of 10 tiers of 18-foot-long components stacked and backfilled on the site. The wall is designed to be self-watering and to incorporate proper drainage and water storage. (Circle 164.)

Integrated Ceiling's corporate headquarters, a 1946 building recently renovated by L.A. Design and Integrated Ceiling's own design staff, utilizes a number of their own ceiling systems throughout the 13,000 square feet of office space. The sales conference area (6) features the Skyvault, a three-dimensional barrel vault, luminous ceiling system with bare lamp fluorescent light sources. The system is designed to fill horizontal spaces from 8 to 12 feet wide in any length. The frame features a charcoal bronze finish with opal white or simulated pattern acrylic panels. (Circle 166.)

Ifö Sanitär's Cascade line of bathroom fixtures (7), introduced in Europe 10 years ago, is now available in this country for residential, commercial, and institutional installations. Each fixture is available in a variety of models and styles in nine standard colors. The toilet is of one-piece construction with an uninterrupted circular inner rim for uniform, continuous release of water without air assist. It requires .8 to 1.6 gallons of water per flush. (Circle 167.)

Products continued on page 98



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Solar Collector.
Solar collector kit by Solar Supply features an aluminum absorber, glass cover with gasket seals, and isocyanurate insulation. The anodized, extruded aluminum frame is designed with a low profile for unobstrusive installation. No special tools or skills are necessary for assembly. (Solar Supply, Denver. Circle 184 on information card.)

Automatic Revolving Door.
Electronically controlled revolving door, Cirkel-Line, is constructed on a circular pillar with four door leaves that rotate around a central shaft. The rotation speed of the door automatically adjusts to the intensity of the traffic. As a pedestrian approaches, the rotation increases from an idling speed to a normal walking pace. (BMT A/S, Hvidovre, Denmark. Circle 183 on information card.)

Fabric Shades.
Track-guided movable shades for interior applications in skylights and greenhouses can be mounted on straight or curved window mullions. They can be operated by cord, pulley, crank, or electric motor. Shades are available in natural canvas, glass fiber sunscreen, or custom fabrics. (Home & Castle, Inc., Canaga Park, Calif. Circle 192 on information card.)

Adjustable Stool.
Fixtures Manufacturing Corporation's Sit-Stand (above) is designed to provide support and seating for people who must stand to work. The seat is adjustable from 27 inches to 34 inches high and bends in any direction. The unit is tip-proof and automatically returns to the upright position when unoccupied. (Fixtures Manufacturing Corporation, Kansas City, Mo. Circle 182 on information card.)

Acrylic Roof Coating.
Rhoplex Elastomeric coating system is designed to allow roof mastic formulators to increase water ponding resistance and improve adhesion in protective coatings. The acrylic coating permits transmission of low levels of water vapor to resist the formation of vapor traps in the building. It can be applied over conventional bituminous built-up roofs, polyurethane foam, galvanized steel, concrete, wood, and asphalt shingles. (Rohm & Haas Co., Philadelphia, Pa. Circle 181 on information card.)

Transparent Insulation Film.
Heat Mirror insulation, a thin, molecular coating, vacuum-deposited on a clear polyester film, is designed to allow visible light rays and solar radiation to pass through while reflecting heat radiation in both directions. Unlike solar control films that give windows a metallic, mirror-like, or dark appearance, Heat Mirror is colorless and transparent. The film was designed for installation by window manufacturers between the two panes of sealed glass. (Southwall Corp., Palo Alto, Calif. Circle 180 on information card.) □

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