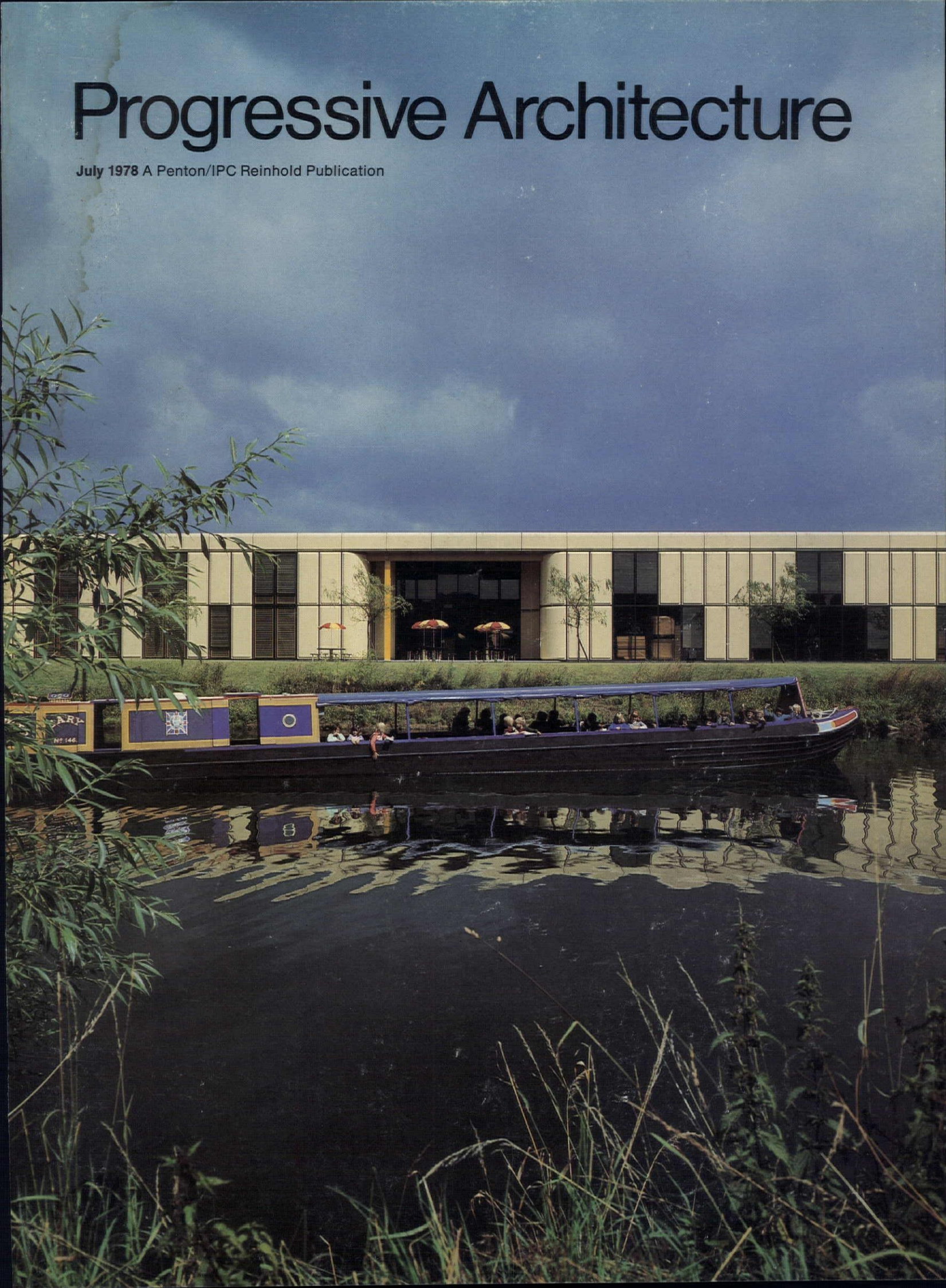
Progressive Architecture

July 1978 A Penton/IPC Reinhold Publication



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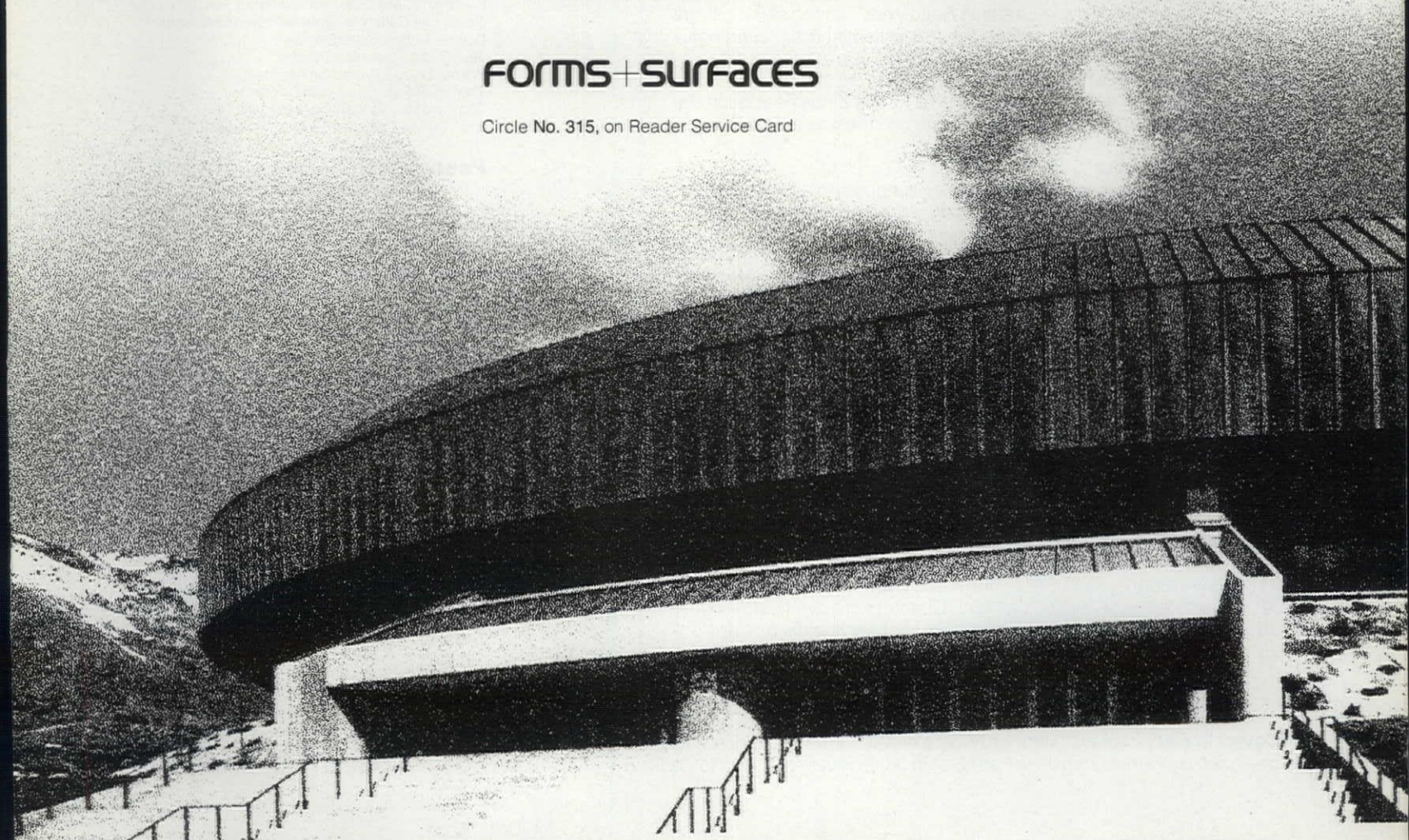

Hydroformed weathering steel on Weber State College, Ogden, Utah. Architects: Fowler, Ferguson, Kingston & Ruben, Salt Lake City, Utah.

July 1978

Progressive Architecture

Cover: In Bath, England, Herman Miller's new furniture manufacturing plant designed by Farrell/Grimshaw Partnership faces River Avon. Photo: Jo Reid.

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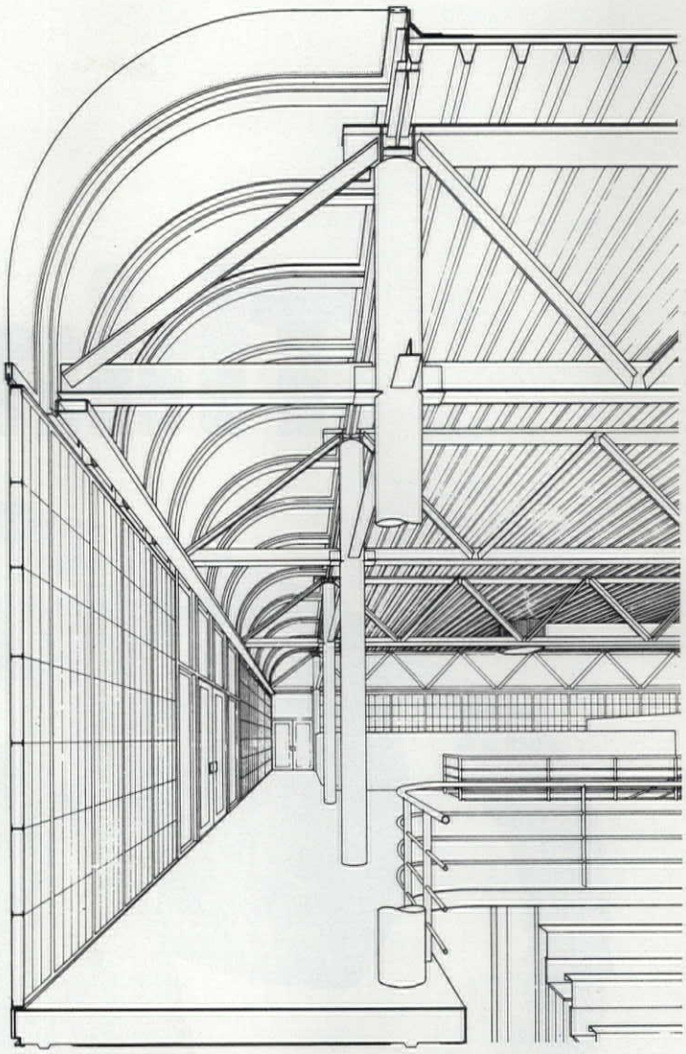
ABP ABC MPA

The voice of the pipe column

July 1978



Gym, St. Mary's College, C.F. Murphy Associates (p. 58).

All architecture communicates. Many of us tried to evade this fact while under the spell of Modernist dogma. We aspired to an architecture of pure abstractions—geometry, proportion, rhythm, etc.—realized through structural means that were straightforward and visible.

Disillusionment with modern principles has touched off a rather urgent search for *content;* we are now witnessing an explosion of symbolism, metaphor, and allusion, which P/A has encouraged and still supports—in principle.

There are even those who assert that architecture is solely a medium of communication. But clearly, all buildings serve other vital roles, and many of them should *say* nothing more profound than the number at the bottom of this page.

In the face of a shift in sensibilities recognized even by the AIA (P/A June 1978, p. 23), caution is now more than ever in order. The need for content in architecture is real, we believe, but the response to that need threatens to get out of hand (June Editorial, p. 7). After decades of being starved for symbolism, the public may be in for a glut of historical references and embellishments—much of it hastily concocted and indigestible.

But what about that substantial body of architects who remain staunchly Modernist, who still rely largely on the structure and fabrication of buildings as determinants of their form? Now that our eyes have been opened by the proponents of various Post-Modernist positions, it is obvious that "abstract" architecture like the High-Tech examples that figure largely in this issue does, in fact, communicate. (That point should have been perfectly obvious from Le Corbusier's 1923 *Vers une Architecture,* with its photos of ships and industrial structures, but other theorists were trying to jam his signals.)

Current High-Tech design—the best of it—makes eloquent statements about today's technology, about a desire for order and clarity. Such buildings say that this is an industrial society (however we might wish it to be post-industrial); that this is a society in which metal, glass, and plastic remain economically competitive with wood and masonry (and cheaper than adobe); that the order of repetitive spatial-structural-mechanical modules can be intellectually and aesthetically satisfying; and that transparency can make this order manifest.

All of this is essentially what Mies and his colleagues were striving to express. The difference is that many of those who are doing such work today—and many of us who are looking at it—are conscious of this content.

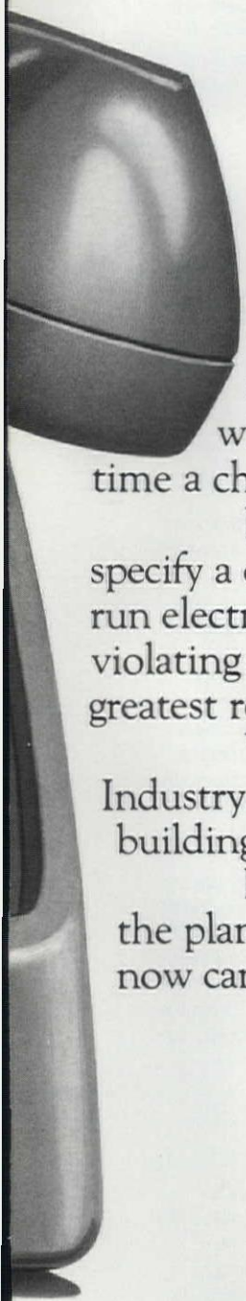
These High-Tech buildings can be seen, on the one hand, as die-hard bastions of Modernist sensibilities in an era of search for the Post-Modern. They can—equally well—be seen as one valid strand out of many interwoven ones that are leading toward whatever will follow Modern design as we've known it. The awareness among the architects represented here of other valid current approaches argues for the second interpretation.

Either way, these apparently Modernist High-Tech works embody certain virtues of spatial organization, clarity, and refinement of detail which have characterized most of the world's great epochs of architecture. They stand for the rational, the abstract, and the universal in their eternal competition with the subjective, the evocative, and the particular. Even in our renewed enthusiasm for the latter set of these opposing qualities, we cannot ignore what these High-Tech works have to say—or the admirable economy of their statements.

John Morris Dixon

Think of it as

air conditioning.



Telecommunications systems require the same planning as air conditioning and all the other "service" systems in a building design. For example, statistics show that each year an average of 4 out of 10 phones will be moved, even if your tenants don't. Designing communications flexibility into a building project during the very earliest stages of planning will save you money right from the start, and again every time a change is necessary.

Planning such a system is complex. Should you, for example, specify a ceiling zone or an underfloor duct distribution system? Can you run electrical and communications wires in the same conduit without violating electrical codes? Which design alternative will provide the greatest return on investment and long-term rentability?

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Views

More light on Kahn

I just finished "Opus Posthumous" (P/A, May 1978, p. 76) and decided to write my first letter to the editor. I thought it to be one of the best pieces of architectural criticism I have read. The reaction to what Chapel Street has become (not that it was ever very great) was perfect. I have always questioned the significance of Kahn's Chapel Street façade (the court is lovely). Also, the necessary note that light from above does not always a great space make was wonderful.

Ron Filson
Urban Innovations Group
Los Angeles

Thank you for Martin Filler's calm and thoughtful analysis of Louis Kahn's Yale Center for British Art (P/A, May 1978). It is the most sensible piece of architectural criticism I've seen in some time, and it's past time that we begin to wonder about Kahn's affected primitiveness.

Donald Hoffmann
Kansas City, Mo

Tough criticism is one thing, but the derisive tone that characterizes Martin Filler's review of Kahn's Mellon Center for British Art is unwarranted. Mr. Filler has wielded his hatchet before; in the case of Venturi & Rauch's Penn State Faculty Club (P/A, Oct. 1977, p. 56), his entire analysis was dominated by an irrational reaction to a particular shade of green. Clearly he has cast himself in the role of Angry Critic, out to knock Certified Important Architects from their lofty pedestals. Unfortunately his criticisms are more a matter of petty prejudice than thoughtful analysis.

Mr. Filler credits Vincent Scully's 1962 biography with catapulting Kahn to an undeserved prominence ("in one easy step," certainly the first time anything in Kahn's career has been described as easy), ignoring the enormously influential Richards Medical Research Building of 1957–61; at any rate, one book, even by Scully, does not make a career. As for English country houses, his examples are curious, for even Chiswick's toy-like exterior houses a great octagonal domed hall that is undeniably monumental. His characterization of the bay system as "uncompromising" seems largely a matter of perception; certainly it is not carried out with the relentless consistency one would expect, say, of Mies.

But where he really goes overboard is in the matter of those skylights. One of Kahn's abiding interests was space suffused by modulated natural light, and virtually all of his mature buildings employ some kind of skylight or monitor. The paintings in the Mellon collection were *created* under natural light; in this context, the example of 19th Century toplit galleries like Soane's Dulwich College Picture Gallery becomes especially appropriate. Mr. Filler not only dismisses Kahn's experiments with light, but actually ventures the notion that natural light is a meager substitute for artificial light. His "human experience" surely differs from mine.

What strengths and weaknesses this building may have are difficult to distinguish from the various prejudices the reviewer is unwilling or unable to overcome. Perhaps the cause of objective criticism would be better served by sending a less blatantly hostile correspondent and leaving Mr. Filler to the kind of space he so obviously prefers: eight feet high, with plenty of artificial light—by skillful designers, of course.

Michael Blasberg
New York, NY

[As the above letters indicate, some readers may find "thoughtful analysis" precisely where others decry a lack of it. We appreciate the positive letters, naturally, and take some issue with the critical correspondent, who seems to be indulging in the kind of overstatement he reads into Filler's article. We do not agree that the Kahn piece was "derisive," or that the issue of the green paint "dominated" the otherwise favorable reaction to the Venturi & Rauch club; and surely nothing we said implied that Kahn's reputation was "undeserved." On some of the other issues, there is room for constructive argument, and we appreciate their being raised. If any reader perceives Martin Filler to be "angry" or "hostile," that is unfortunate. He is not.—Editors]

No-shrink concrete

I enjoyed very much the article titled "Innovation in Concrete" contained in the May, 1978 issue of *Progressive Architecture*.

Under the paragraphs on prestressing you did neglect to mention the usage of shrinkage-compensating cement concrete when reinforced to chemically compensate for drying shrinkage cracks. A copy of ACI Standard 223-77 is attached for your review.

T.Y. Lin was also one of the original group to recognize the advantages of shrinkage-compensating cement concrete.

William P. Liljestrom, President
Chemically Prestressed Concrete Corp.
Hacienda Heights, Ca

[The problem of shrinkage and its counterpart, excessive bleeding, represent difficult and sensitive problems for both concrete and grout. Control of these problems has been vital to both prestressed and post-tensioned concrete manufacture. ACI Standard 223-77 is available to architects by writing directly to ACI at the address listed in the May Technics article.—Editors]

Fallingwater feedback

I am writing this letter in protest to the pavilion being built as a visitors' center at Fallingwater (P/A, May 1978, p. 51). And I am regrettably aware that it is too late to do or say anything that would stop its construction. How anyone, at Bear Run, who has experienced Fallingwater could have allowed this building to be built is hard for me to believe.

I live in Cleveland, and daily I see truly fine structures destroyed by corporate progress, neglect and "for the benefit of the people." I often wonder if others in the future will ever experience some of the spaces, things and even tastes that I and others hold special in our lives today. But as I see things disappear, never to return, I always know deep down inside that there still are special things that exist—and they will be around for others to see and be inspired by. Places like Fallingwater by Wright still exist. The gardens at Dumbarton Oaks still exist. Restaurants that serve real hamburgers still exist. The inch and the foot still exist.

Yes, I am a romantic fool—but then I wonder what people see or even what I see when I discover that some of those very special things to me are practically ignored by others. It is true that Fallingwater is not being physically destroyed, but the paradox of this new pavilion as a pre-experience to Fallingwater is disheartening.

I am saddened. I am upset. I am even embarrassed to think that this is the best experience that could be offered to 70,000 people each year before they enter into Fallingwater. And I want someone to know that I think it is a damn shame that this building is being built. A damn shame.

Richard Bozic,
Architectural Designer
Cleveland

Although it has been ten years since I've led tours for the Western Pennsylvania Conservancy through "Fallingwater," the impact of the new visitors' pavilion brought the experience sharply to mind.

I won't comment on the design of the pavilion, but rather on the idea of building the pavilion in the first place. The idea of increasing visitor comfort is clearly not what Mr. Wright had in mind.

He placed the main attraction itself over the waterfalls, not across from them, so that great discomfort was required to see the falls. This insured that the view would remain fresher than if constantly (and easily) seen through a window.

Unlike most current visitors to the site, Mr. Wright was almost 70 years old when he climbed over the rocky site to plan the house. His design won contempt and ridicule for the original owners. If the Conservancy suffered the same fate for pandering instead to creature comforts, rather than site sensitivity, they would have few friends.

Will future site developments include covering the hard stone floors of "Fallingwater" with shag carpeting (in earth tones) or escalators descending to the base of the falls for the best-of-both view?

Since the pavilion "will not be visible from the house at any season," the house is luckier than the visitor!

Timothy G. Hare, Architect
New York, NY

Credit due

The photo of a California houseboat in the Books column of the May P/A (p. 120) actually shows a houseboat designed by John M. Campbell of Agora/Architects and Planners. The photo should have been credited to Glenn Christiansen. Our error was in interpreting the book itself, which is unclear on these credits.

Progressive Architecture announces its 26th annual P/A Awards program. The purpose of this competition is to recognize and encourage outstanding work in architecture and related environmental design fields in the design phase, before it is executed. **Submissions** are invited in the three general categories of architectural design, urban design and planning, and applied architectural research. Designations of **first award, award, and citation** may be made by the invited jury, based on overall excellence and advances in the art.

The jury for the 26th P/A Awards program: **Fred S. Dubin,** PE, MArch., president, Dubin-Bloome Associates, New York and Hartford, Ct. and partner, Fred S. Dubin Associates International, Rome, consulting engineers and energy management consultants; **Barry Elbasani,** architect, vice president, Elbasani, Logan, Severin, Freeman, Berkeley, Ca; **Jules Gregory,** FAIA; partner, UNIPLAN, Princeton, NJ; **Weiming Lu,** urban design program manager, Department of Urban Planning, City of Dallas; **Anthony Lumsden,** AIA, principal for design, Daniel, Mann, Johnson & Mendenhall, Los Angeles; **Constance Perin,** cultural anthropologist and planner, author of *Everything in its Place: Social Order and Land Use in America* (Princeton, 1977) and member, National Architectural Accrediting Board; **Werner Seligmann,** architect, Werner Seligmann & Associates, Cortland, NY, and dean, Syracuse University School of Architecture; **Bernard P. Spring,** FAIA, dean, School of Architecture and Environmental Studies, The City College of the City University of New York.

Judging will take place in Stamford, Ct. during September 1978. Winners will be notified — confidentially — before Oct. 1. **First public announcement** of the winners will be made at a presentation ceremony in New York in January 1979, and winning entries will be featured in the January 1979 P/A. Recognition will be extended to clients, as well as professionals responsible for the work. P/A will arrange for coverage of winning entries in national and local press.

Eligibility

1 Architects and other environmental design professionals practicing in the U.S. or Canada may enter one or more submissions. Proposals may be for any location, but work must have been directed and substantially executed in U.S. and/or Canadian offices.

2 Entries in all three general categories must have been commissioned by a specific client. Only work initiated on the client's behalf — *not* in fulfillment of academic requirements — is eligible.

3 Architectural design entries may include buildings or complexes, new or remodeled, scheduled to be under construction in 1979 — that is, not completed in 1978 and scheduled to commence before 1980. Entries in this category must include detailed design of at least one construction phase.

4 Urban design and planning entries may include only proposals or reports accepted by the client for implementation before the

[continued on next page]

P/A 26th Annual Awards Program

for projects not yet completed

in architecture planning and research

end of 1979. Feasibility and implementation strategy should be documented.

5 Research entries may include only reports accepted by the client for implementation before the end of 1979. Submissions should deal with programming, design guidelines, or post-evaluation for a *type* of project or problem. Research methodology and ways of disseminating findings should be documented.

Entry form: 26th P/A Awards Program

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

Entrant:
Address:

Telephone number:
Project:
Location:
Client:
Category:

Entrant:
Address:

The undersigned confirms that this entry meets eligibility requirements (paragraphs 1-5) and that stipulations of publication agreement (paragraphs 6-7) have been and will be met. Entry has been reviewed for compliance with submission requirements (paragraphs 8-15).

Signature _____

Name (typed): _____

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Progressive Architecture
600 Summer Street, Stamford, CT 06904

Your submission has been received and assigned number:

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Publication agreement

6 If the submission should win, the entrant agrees to make available further information, original drawings, or models, as necessary, for publication in the January 1979 P/A. The entrant will also provide appropriate slides for the presentation ceremony and reproducible black and white graphic material for press releases.

7 In the case of architectural design entries only, the entrant agrees to give P/A the first opportunity among architectural magazines for feature publication of any winning project upon completion.

Submission requirements

8 Each submission must be firmly bound in a binder no larger than 11" x 17", binders 9" x 12" or smaller preferred.

9 Submissions must include illustrations and drawings necessary to a full understanding of the proposal — all legibly reproduced. *No original drawings, actual models, or slides* will be accepted.

10 Each submission must include a one-page synopsis, in English, on the first page inside the binder, summarizing the intent and principal features of the entry. Synopsis should take up economic, environmental, energy, and user need aspects of the proposal, as pertinent. Synopsis must conclude with a statement on *why this submission deserves recognition.*

11 Each submission must be accompanied by an entry form, to be found on this page. Reproductions of this form are acceptable. All four sections of the form must be filled out — using typewriter, please. Insert entire form, intact, into *unsealed* envelope attached *inside back cover* of submission.

12 For purposes of jury procedure only, projects are to be assigned *by the entrant* to a category entered on entry form. Please identify each entry as one of the following: *Education (Higher), Education (Secondary), Education (Primary or Early Childhood), Housing (Single-family), Housing (Multiple-Unit), Commercial, Governmental, Cultural, Recreational, Religious, Health, Planning and/or Urban Design, Applied Research.* Mixed-use entries should be classified by the larger function. If unable to classify, enter *Miscellaneous.*

13 Entry fee of $10 must accompany each submission, inserted into *unsealed* envelope containing entry form (see 11 above). Make check or money order (no cash, please) payable to *Progressive Architecture.*

14 No identification of the entrant may appear on any part of the submission, except on entry form. Identifying titles may be concealed by any simple means. Client and location should be identified. For the sake of anonymity P/A will seal stub of entry form in envelope before judging.

15 Deadline for mailing is August 31, 1978.
Address entries to:
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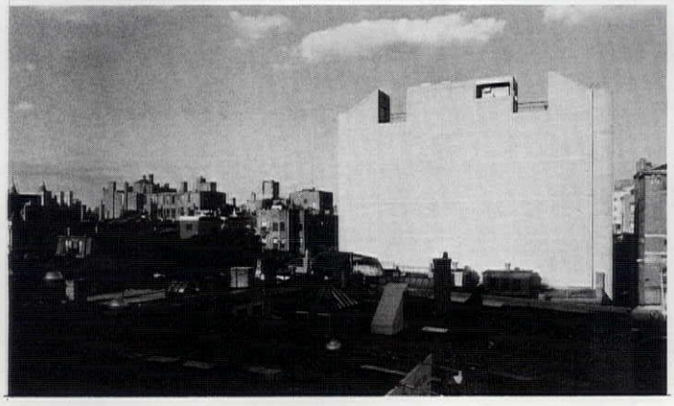
600 Summer Street, Stamford, CT 06904

P/A will take every reasonable precaution to return submissions intact, but can assume no liability for loss or damage.

News report



Boston Architectural Center before . . .

. . . and after the mural by Richard Haas.

Michael Miller

Surprises at BAC and prize for Haas

Artist Richard Haas, recipient of the current Medal from the American Institute of Architects for outstanding contribution in the arts relating to architecture, is by now best known for his Beaux-Arts mural on the west façade of the Boston Architectural Center. An immediate eye-catcher, the realistic rendering has become a Boston skyline landmark particularly visible from west Boylston Street and from the Massachusetts Turnpike. BAC chairman Peter Blake, the artist, and Doris Freedman, president of City Walls Inc., New York, one of the sponsors of the project, planned the mural for more than two years.

The wall painting was initiated as part of a Bicentennial project, "City Scenes '76," cosponsored by the National Paint and Coating Association and City Walls, with funding from the National Endowment for the Arts. The mural was formally dedicated in December, 1977; it was executed by Seaboard Outdoor Advertising, Inc. Haas lives in New York and exhibits with Brooke Alexander Gallery. His works, primarily architectural in subject matter, are included in collections of the Fogg, Whitney, San Francisco, and Fort Worth art museums. He also has taught printmaking at Bennington College, Vt, since 1968.

Federal Triangle: GSA picks finalists

Three parties have been selected by the U.S. General Services Administration as finalists in a competition to perform the master planning for the Federal Triangle in Washington, DC. The Triangle, largest complex of federal employment in the nation, is located on Pennsylvania Avenue between 4 and 15 Sts.

Sasaki Associates of Watertown, Ma, leads one of the teams, which includes the architectural firm of Shepley Bulfinch Richardson & Abbott of Boston and Gindele & Jackson Architects of Poughkeepsie, NY.

Sert Jackson & Associates of Cambridge and Jerome Lindsey Associates of Washington, DC, have formed a joint venture team and are among the three finalists. Consultants to the team are Lozano, White & Associates of Cambridge and the SWA Group of Boston.

Also a finalist is the Washington office of Harry Weese & Associates. The Weese main office in Chicago recently won, as a joint venture, the GSA competition to renovate the Old Post Office in St. Louis. Weese is acting alone in the Federal Triangle competition. Minority firms on the teams include Gindele & Johnson with Sasaki, and Jerome Lindsey Associates with Sert Jackson.

The Federal Triangle project involves resolving spatial and architectural issues surrounding the buildings in the complex, principally the Old Post Office, which is being rehabilitated under a separate contract (P/A, Aug. 1977, p. 44). Problems to be addressed include how to make the buildings more usable by the public, servicing the buildings, and removing

News report continued from page 21

barriers so the buildings are accessible to the handicapped. A major part of the program is implementation of the new Public Buildings Cooperative Use Act in which government buildings are being opened to the general public for both community functions and retail shops.

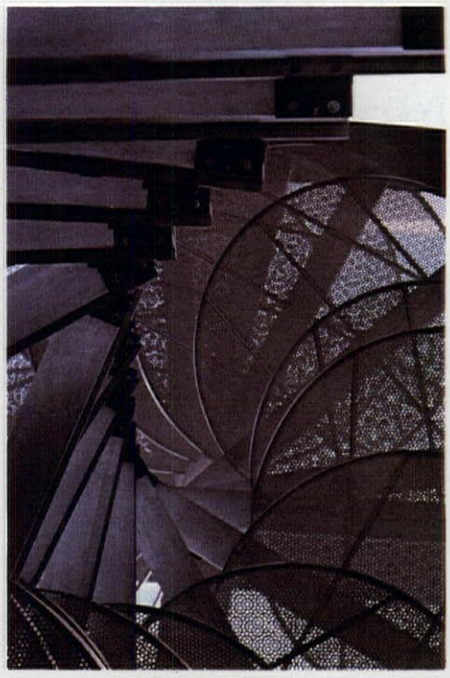
Team selected for St. Louis project

Winner of the St. Louis Old Post Office renovation competition is Patty Berkebile Nelson Associates of Kansas City in collaboration with Harry Weese & Associates, Chicago. The General Services Administration timetable calls for design completion by May 1979, with construction to start the following September.

The $14,970,500 budget provides for rehabilitation and restoration. The mixed-use facility will accommodate about 675 Federal employees; commercial leasing will comprise about 20 percent of the space. The four-story (plus two basements) Second Empire structure by Alfred B. Mullett has 202,142 gross sq ft, with an occupiable area of 112,242 sq ft—the difference being in its granite walls of 5- to 3-ft thickness. Except for part of the first floor, the building has not been heated nor maintained for 15 years.

The winning architectural team proposes a remodeling plan that will divide two courtrooms with 35-ft ceilings into office space. One courtroom will be fully restored. Broad stairways in the light well will extend access to shop space in both basements. A glassed skylight in this space over the first-floor mail room will be restored, and a second skylight built at the roofline—the space between them being a quiet zone above the public circulation areas.

GSA paid each of the three competitors $39,000 for their plan concepts, so that it could combine any features from all three. The other competitors were Eugene J. Mackey & Associates, St. Louis, and Anderson Notter Finegold, Boston; and William B. Ittner Inc., St. Louis, with Kaplan-McLaughlin, San Francisco. [George McCue]



'Slipped Disk' sculpture by Tim Prentice in the AT&T atrium; perforations create moiré pattern.

Prentice sculpture for AT&T facility

Architect-turned-sculptor Tim Prentice of New York feels one of the most critical considerations in designing art for a building is the scale, and he perhaps has an advantage over his fellow artists in this area by reason of his architectural background. "Artists have anxieties when they receive a commission to do a work for a building because they feel their aesthetic must be squeezed into another framework. For me as an architect, the idea of making adjustments is standard fare."

Only a year after Prentice left his New York practice at Prentice & Chan, he was able to test his flexibility in a collaboration. John Carl Warnecke, doing the Long Lines headquarters for AT&T in Bedminster, NJ (see page 68), saw a maquette of a mobile by Prentice and asked him to do the same for the AT&T 60-ft atrium. Enlarging the model into a work that would fill the space, meet the weight limitations, and not crash into the surrounding balconies required running the program through a computer 45 times. The work is based on an indeterminate mathematical equation to produce a catenated hyperbolic curve. The result is a 45-ft-long mobile weighing 5000 lb. The brushed aluminum disks are 6 ft in diameter, and they are perforated both for lightness and to create a moiré pattern as they move past each other.

Prentice calls it "Slipped Disk" because the 300-lb counterweight is vertical in contrast to the others, suspended horizontally. The piece may be moved manually by pushing the counterweight; otherwise, its movement, slow and subtle, is activated by convections in the sun-heated atrium space. Prentice anticipated and appreciates this slow motion, which relates to the permanent users of the building, rather than to visitors.

Damages awarded in curtain wall suit

A Federal District Court awarded $14 million in punitive damages and another $5.2 million in actual damages in a suit involving glass curtain-wall problems in the College Life Insurance Company of America building, Indianapolis.

Punitive damages of $10 million were assessed against Fidelity & Deposit Company of Maryland, bonding company for the general contractor, and nearly $4.2 million against the glass manufacturer, the Libbey-Owens-Ford Company of Toledo. Actual damages of $5.2 million were assessed against the bonding company and LOF, and against the architect, Kevin Roche, John Dinkeloo & Associates, Hamden, Ct.

The jury found not liable the gasket
[News report continued on page 26]

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News report continued from page 22

manufacturer and the local subcontractor. The judgment was rendered in early May following a five-month-long case in Federal District Court for the Southern District of Indiana.

Construction claims hit record high

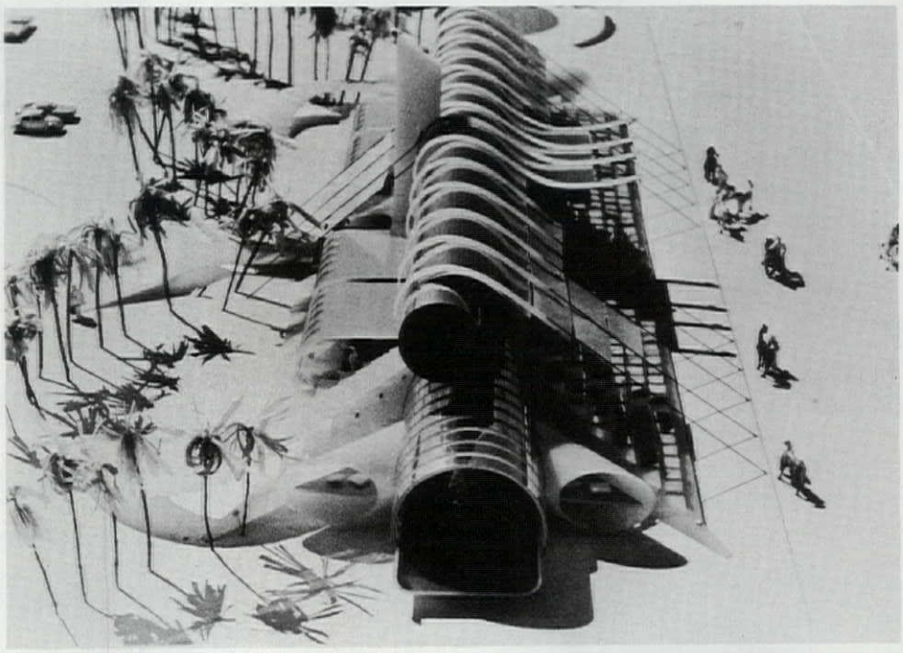
The total value of construction industry claims and counterclaims filed with the American Arbitration Association in 1977 was $134,755,190, the highest total recorded in the 11 years the AAA has released figures. The Los Angeles regional office of the association handled the most cases, followed by Boston and then New York.

The majority of cases involved contractors seeking payment, and owners' claims against contractors for allegedly improper or negligent work. There was a significant increase in the number of cases filed by the owner against the architect or engineer: 79 in 1977 compare to 49 in 1976. The number of cases filed by contractor or subcontractor against the owner decreased to 722 in 1977 from 818 the year before. The total number of cases filed in 1977 was 1789, the second highest total ever recorded.

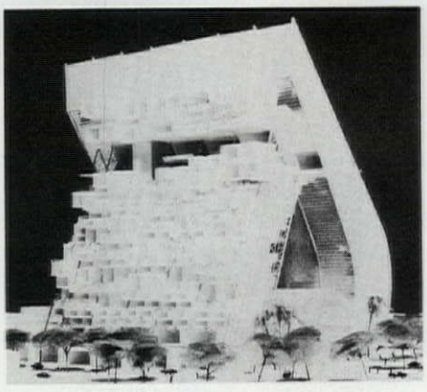
Rader Mileto works in the Middle East

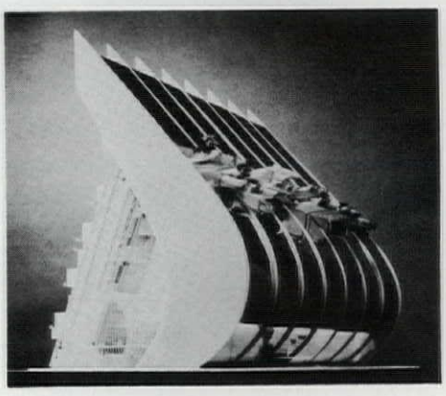
Recent projects by architects Rader Mileto Associates of Rome illustrate the outer limits of resort architecture in the developing world. The Hyatt Regency Caspian, designed when the two principals still were partners with Interplan of Rome, is located on the Caspian Sea in Iran; it includes a shopping center and residential villas in addition to the royal suites and casino. Guest room wings—always fully occupied—connect to the six-story atrium with glass bridges.

Rader Mileto also designed the Shah's winter palace when with Interplan, completed three years ago in Kish Island where future development has been designed to attract a tourist trade. Three hotels are planned, with Rader Mileto responsible for the design of one. This proposed hotel is



Horsemanship Club of Taif (above) by Rader Mileto Associates; Riyadh Center (below).





conceived as a "screen of rooms" surrounding an interior garden court from which "the sea, a flat brilliant strip of beautiful blue, paralleling a strip of shimmering shell powder sand under a canopy of white sun sky can be seen in fragments of lights through the spaces left void between the first floor cabanas." Much of the interior court would be covered with steel mesh supporting shadowing panels of wood and canvas. For Dubai the firm has designed a hotel with an atrium lobby "à la Portman" for the Sheraton chain. The form is a cube, cut and sectioned.

When built, the Horsemanship Club of Taif will be one of the most alien forms yet to appear on the Arabian desert. Its structural system is European prefabricated steel members and insulated, corrugated steel plates fixed on concrete (or sand block) bearing walls. Though races are conducted after dark, spectator seating will be protected from the sun by cable-supported sliding canvas.

Finally, Rader Mileto firm joins with two others—Jamagne and Vander Elst—in designing Riyadh Center for the Capital of Saudi Arabia. Five minutes away from the city center, in an area dominated by government offices, the new project will combine a variety of uses—residential, office, commercial, recreational—in a 28-story complex sheathed with insulated metal panels which become an expanded metal screen in front of window openings. The major interior façade will be covered in panels of mirror glass.

Women's School third session

The Women's School of Planning and Architecture will hold its third annual session Aug. 13–26 at Bristol, RI, near Newport. The theme is "Workplaces and Dwellings: Implications for

[News report continued on page 30]

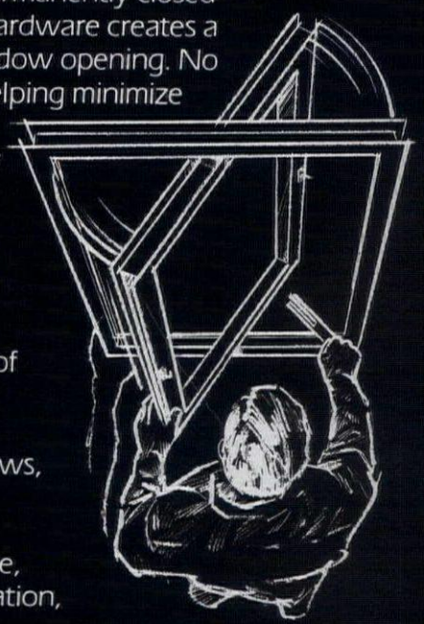
ALL LIVING THINGS SOMETIMES NEED A BREATH OF FRESH AIR.

Kawneer Limit Stop Hardware

To many administrators of buildings where people work, learn or recuperate it has become apparent that a permanently closed window may not be as safe as once thought. The recent history of power failures and "brownouts" are proof that there are times when fresh air is what is really safe. In fact, many life safety codes now specify a ventilation requirement.

Introducing The Prudent Alternative

Kawneer Limit Stop Hardware for vertically pivoted windows is a sensible compromise between the "ultimate" safety of permanently closed windows and the safety of fresh air. Limit Stop Hardware creates a "ventilation position" of four to six inches of window opening. No further. The limit arm restricts further opening, helping minimize the dangers of a fully open window.



The window washing advantages of vertically pivoted windows are not lost with Limit Stop Hardware. A hex key releases the window from its limit arm, allowing the window to be pivoted approximately 175° to a locked washing position. All the advantages of interior window washing, such as reduced labor and elimination of exterior staging, are maintained.

Kawneer Limit Stop Hardware is available exclusively on Kawneer Vertically Pivoted Windows, the same Kawneer windows which offer high performance and ease of operation. For more information, contact your Kawneer representative, or write: Kawneer Architectural Products Information, Dept. C, 1105 N. Front Street, Niles, MI 49120.

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News report continued from page 26

Women." A special capsule weekend session will be held at midpoint for those who prefer not to enroll for the two weeks. The weekend session will have its own speakers and will present a summary of the previous week's meetings and directive planning for the second week. Theme workshops will be past, present, and future developments and an examination of cultural and political contexts. The Women's China Study Group on Environmental Issues, recently returned from China, will present seminars on their trip. The school is open to all women with a committed interest in the environment; care and programs for children also are provided. Applications are available by mail; send a stamped self-addressed envelope to WSPA, Box 311, Shaftsbury, Vt, 05262.

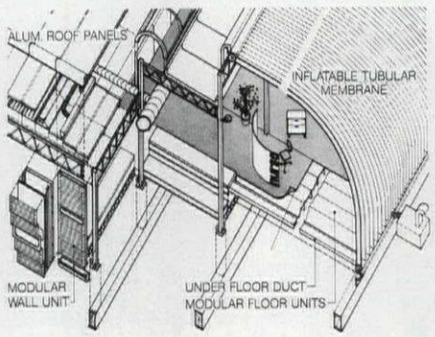
Pennzoil Place wins Reynolds award

The $25,000 R.S. Reynolds Memorial Award for an outstanding building using aluminum has been awarded to Johnson/Burgee Architects of New York and S.I. Morris, Associates, Houston, for the office towers, Pennzoil Place, Houston (P/A, Aug. 1977, p. 66). The prize also included an original work of aluminum sculpture by Fritz Bultman of New York. The presentation was made during the national convention of the American Institute of Architects in Dallas.

Former AIA president John McGinty of Houston chaired the jury. Also serving were Richard Meier of New York, last year's winner, and Hans Hollein of Vienna, the winner of 1966.

Ga. Tech student receives top prize

Roberto Paredes, a fifth-year student at Georgia Institute of Technology, Atlanta, received the annual Reynolds Aluminum Prize for architectural students, a cash award of $5,000, for his health center prototype. The building has inflatable tubular membranes of aluminized fabric; solar collectors are hung in tubes in the walls. Two certificates of excellence also were presented: to Allen Koster, University of California at Berkeley, who was top winner two years ago; and to Gary Kauakami, University of Hawaii. Koster's project is a housing system, and Kauakami's is a solar control system for apartment buildings.



Winning structure by Roberto Paredes.

Bernard Tomson, 1909–1978

Progressive Architecture is saddened to report the death on May 10 of Justice Bernard Tomson, co-author of the "It's the Law" column. Justice Tomson, a recognized expert on architectural law and author of several books on the subject, had been a contributor to P/A for over 25 years (see p. 93).

A graduate of Columbia Law School, he was a founding partner in 1934 of the New York firm of Bernstein, Weiss, Coplan, Weinstein & Lake. In 1976, after serving as a judge of the Nassau County Court, he was elected a Justice of the Supreme Court of the State of New York. His enthusiastic interest in and significant contributions to the architectural profession were recognized in his election as an honorary member of the AIA.

Lloyd Wright 1890–1978

Lloyd Wright, who died May 31 at age 88, was a distinguished architect and landscape designer who was reared in the deep shade of his father, Frank Lloyd Wright, with hardly a name to call his own. He was well over 50 before he gained wide recognition with his 1946 glass-roofed Wayfarer's Chapel. This small Swedenborgian church at the tip of Palos Verdes Peninsula has a Wrightian Gothic frame of laminated wood bents and only enough steel to brace the glass.

Lloyd grew up in the drafting room, picking thumb tacks from his heels and redwood splinters from his fingers before graduating to the philosophical discussions. While studying engineering at the University of Wisconsin, he was summoned by his father to Florence to help with the preparation of drawings for the 1911 Wasmuth portfolio. After a short time in the Boston office of Olmsted & Olmsted, he went with them to San Diego to work on the layout of Balboa Park for the Pacific Exposition. The Olmsteds withdrew, and Lloyd went into the drafting room of Irving Gill—a lasting influence.

Lloyd, who had worked in textured concrete block before FLW, concen-

[News report continued on page 32]

Wayfarer's Chapel, California, 1946 by Lloyd Wright.

Julius Shulman

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News report continued from page 30

trated the ornament and exposed the planar surfaces, as in the 1926 Sowden house. Most of his early houses were scaled to the easel rather than the street. The similarity of some to a blown-up detail of stage scenery is fitting because many of his clients were Hollywood or stage personages. The *tour de force* was perhaps the most direct way to self survival among all the architects linked to FLW—witness the fantasies of Bruce Goff and dramatic flights of John Lautner.

Lloyd moved for some years between architecture and landscaping, working again with the Olmsteds (and Gill) on the new industrial city of Torrance, laying out landscaping for many estates in partnership with Paul Thiene; projecting a scheme for Los Angeles and the "City of the Future."

The work of the office will be continued by his son Eric—houses and restoration on Unity Temple and other FLW buildings. A glass loggia is being built on the Wayfarer's Chapel site. [Esther McCoy]

Designer's Saturday and Student Rally

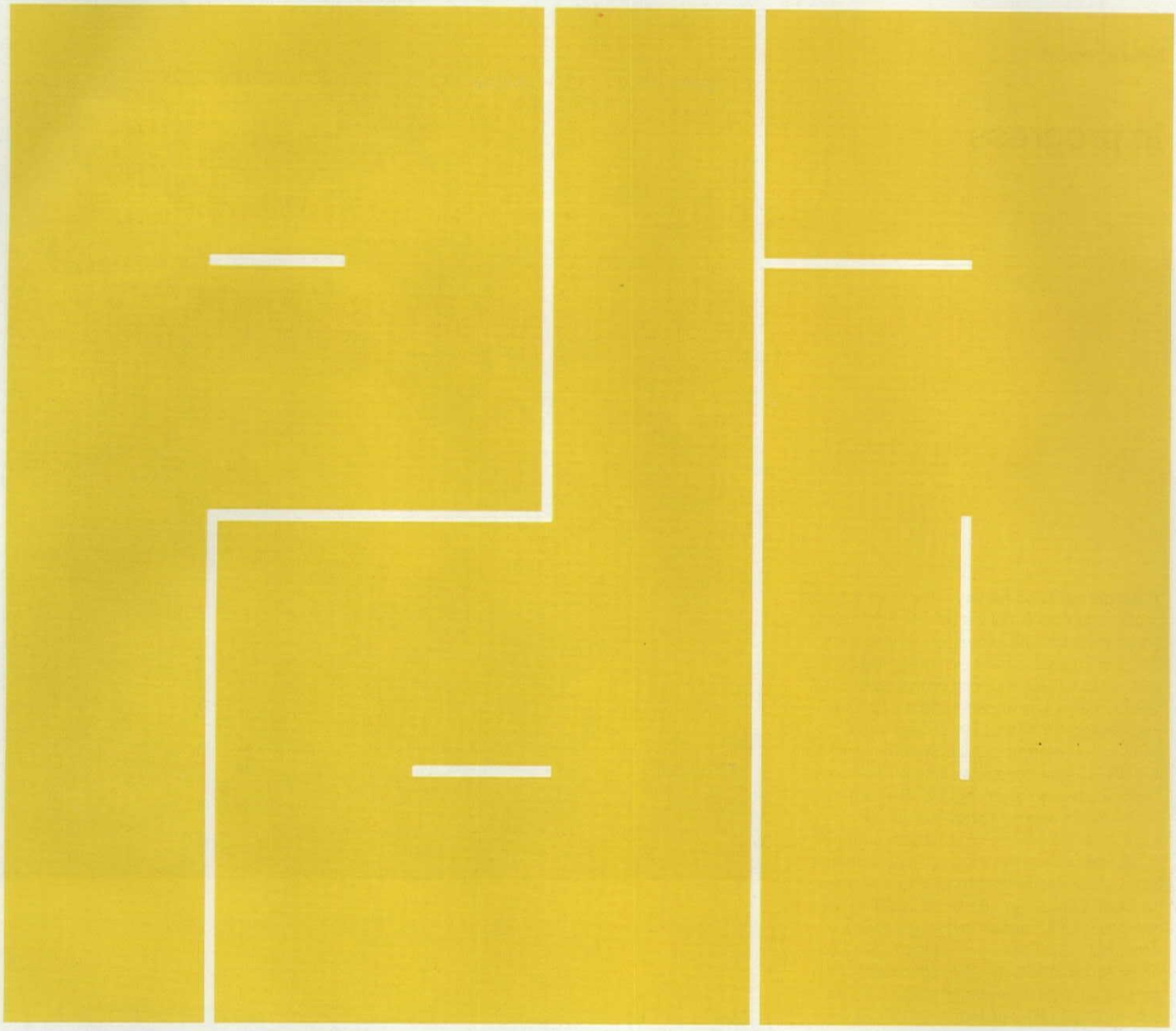
Designer's Saturday will hold its 11th annual gathering in New York in October as the 29 members open their interior furnishings showrooms to visitors. New to the event is a three-day Student Rally that will include preview visits to the showrooms, an all-day seminar, and participation in the gala Metropolitan Museum of Art party concluding the weekend.

Dates for Designer's Saturday are Oct. 6 and 7. The Student Rally, cosponsored by the Institute of Business Designers, will be held Oct. 5, 6, and 7. The 1978 Designer's Saturday Scholarship of $3000 will be presented this year to the Fashion Institute of Technology, which will award three $1500 scholarships to FIT students.

Information on the regular program and the Rally is available from Designer's Saturday, P.O. Box 1103, FDR Station, New York, NY 10022. Special hotel rates and group fares from Los Angeles, Dallas, and Chicago are available.

Calendar

Through Aug. 13. "The Travel Sketches of Louis I. Kahn," The Drawing Center, New York, NY. Subsequent date: **Sept. 22–Dec. 31.** AIA Foundation, Washington, DC.
Through Oct. 1. "Piranesi: The Early Architectural Fantasies," National Gallery of Art, Washington, DC.
July 28–Aug. 4. Institute on energy and design, for architectural faculty, AIA Research Corp. and Harvard Graduate School of Design, Cambridge, Ma, sponsored by U.S. Department of Energy.
Aug. 7–8. Solar Energy Business conference, Washington, DC.
Aug. 16–20. Society of Architectural Historians annual tour, Portland, Me, and vicinity.
Aug. 24–27. SOLARCON SAN FRANCISCO, solar trade show and seminar, Brooks Hall/Civic Center, San Francisco.
Oct. 5–7. Designers' Saturday, New York, will include, for the first time, a special day, Oct. 5, for students to visit the showrooms.
[News report continued on page 38]



Call for Entries: Plywood Design Awards.

Outstanding aesthetic and structural uses of softwood plywood will be honored again by the 1979 Plywood Design Awards.

The program, approved by the American Institute of Architects, is sponsored jointly by the American Plywood Association and Professional Builder magazine.

First Awards of $1,000 plus Citations of Merit may be given in each of four categories: residential/single family, residential/multi-family, vacation homes, and commercial/institutional.

Jurors will be Robert Durham, FAIA, Seattle, Washington; John D. Bloodgood, AIA, Des Moines, Iowa; and Richard Bertman, AIA, Boston, Massachusetts.

December 1, 1978, is the deadline for entries.

For rules and entry forms, mail this coupon to:
American Plywood Association
Dept. PA-078, P.O. Box 2277
Tacoma, WA 98401

Name_____

Number of forms required _____

Address _____

City _____ State _____ Zip _____

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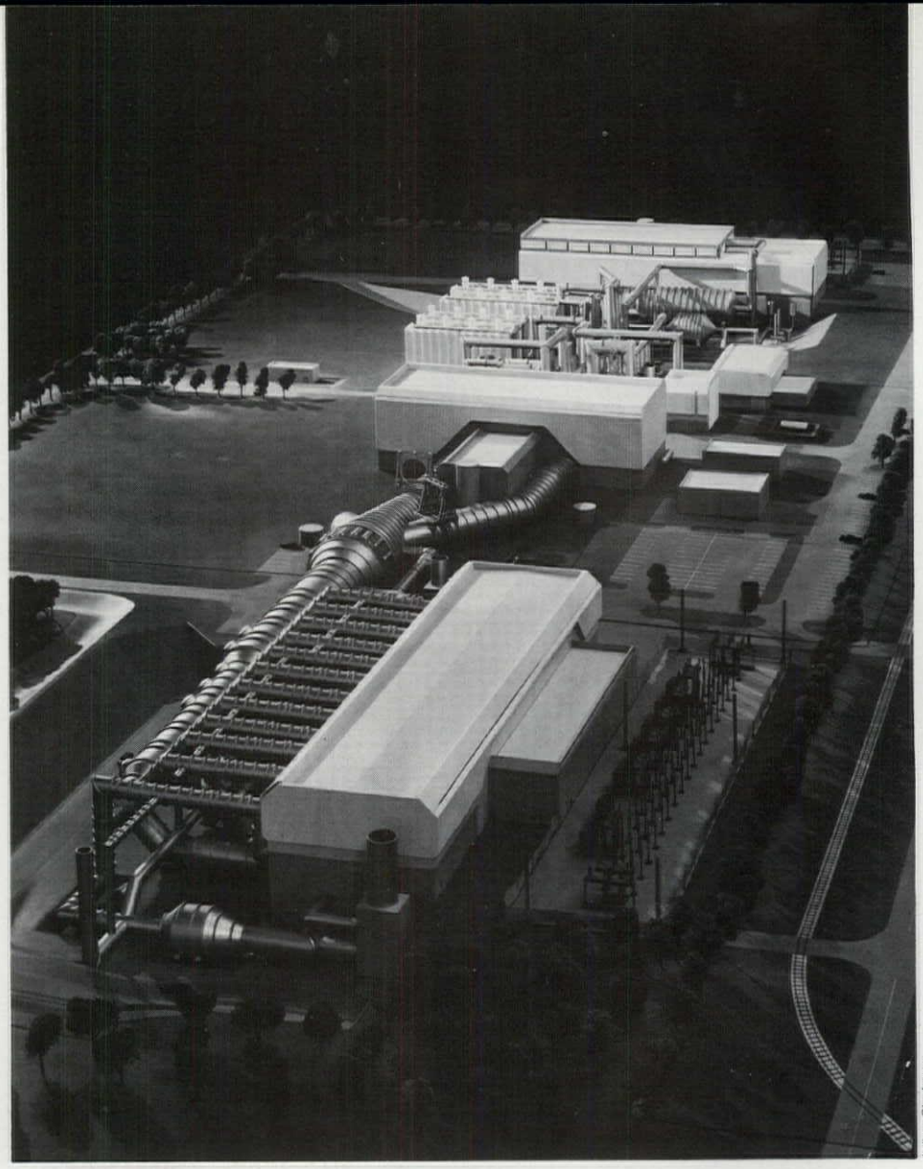
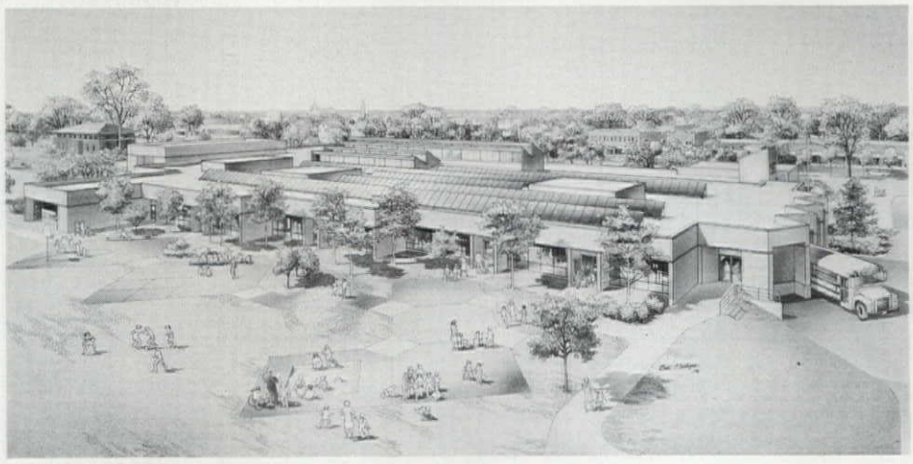


Julius Shulman

1

1 Aeropropulsion facility—The largest single construction project of the U.S. Air Force and the largest domestic project of the U.S. Army Corps of Engineers has been designed by a joint-venture team of Daniel, Mann, Johnson & Mendenhall of Los Angeles and the Norman Engineering Company. The project is the $437-million Aeropropulsion Systems Test Facility (ASTF) under construction near Tullahoma, Tn, for the testing of jet engines. The joint-venture team also is providing engineering support for the construction—a vast undertaking divided into seven procurement packages. General contractor for the building is Morrison-Knudsen Company of Boise, Id, heading a team composed of American Bridge Company, Pittsburgh, and Fischbach & Moore, New York. ASTF will be able to simulate such flight conditions as a temperature range from 1000 F to subzero; 100,000-ft altitudes; and thrust velocities 3.8 times the speed of sound. DMJM describes the facility as a "multibuilding machine" composed of parts so large a single butterfly valve measures 32 ft in diameter.



2

2 Solar-equipped, barrier-free school—When Hanson Park Elementary School, Chicago, opens in September, 40 percent of its student population will be handicapped children. The school, however, has been designed to be an educational asset to these students, in compliance with new legislation providing for barrier-free facilities. In addition, solar collectors will provide from 30 to 60 percent of the school's heat and domestic hot water needs. Architectonics designed the school under the direction of the Department of Facilities and Planning and the Bureau of Architecture, Chicago Board of Education. Two professionals involved in the planning and design were themselves handicapped: Lou Zonka, programming consultant, and Bill Acheson, architect. There are no steps in the building; lever handles replace doorknobs; 45-degree walls are used instead of right-angled corners. Solar lighting also has been tapped by hooded skylights that let in winter sun and screen out summer rays. Evergreens planted on the north protect the building from seasonal winds; deciduous trees on the south allow the winter sun to penetrate.

3

3 Photovoltaic experiment—The General Electric Space Division of Valley Forge, the U.S. Department of Energy, and Sea World of Orlando are cooperating on a project which will provide electrical power and heated water for a new marine exhibits attraction at Sea World. The experiment is designed to have application for commercial and industrial projects. The system of photovoltaic cells (converting sunlight directly into electrical energy) will provide enough electricity to serve 40 average homes. The goal of the program is to supply power at 50 cents a watt by 1986. The cells are arranged in concentrators in a modular system of turntables that rotate to track the sun.

[News report continued on page 41]

Maintenance-free roofs, fascia, mansards

New, pre-engineered application of zinc

South Central Bell Bldg., Phoenix City, Alabama; Architect: Christian, Boozer & Jenkins, Anderson, Alabama; Installation: Georgia Roofing & Sheet Metal, Columbus, Georgia. (All coping, flashing, fascia, inside window frames and roof are of Microzinc 70.)

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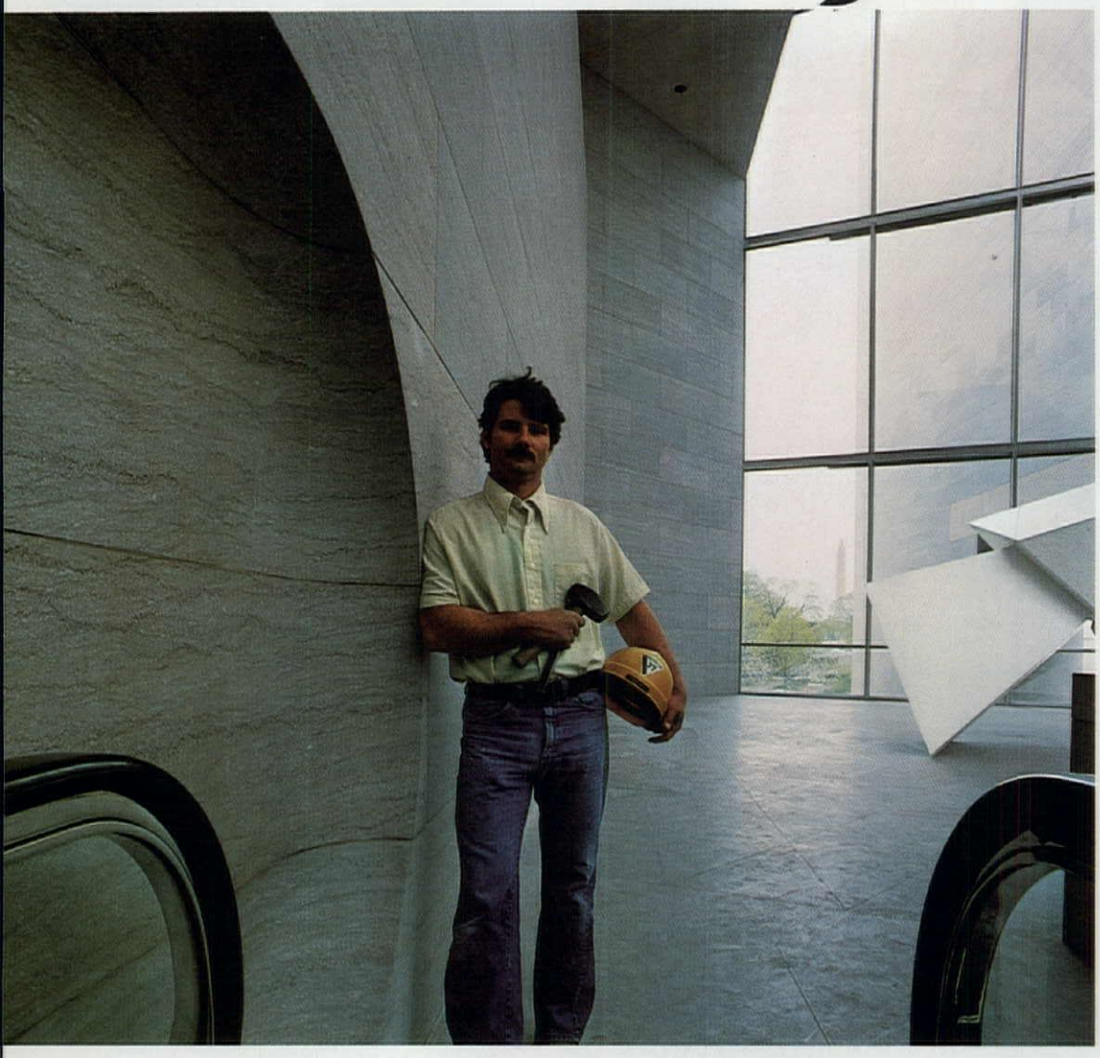


Rich Jarboe, a masonry craftsman for 20 years, knows that good stonemasonry requires both skills and commitment:

"It takes a lot of pride to set stone and marble—to do it right. It's in your heart. It's in your hands. It's what I like to do."

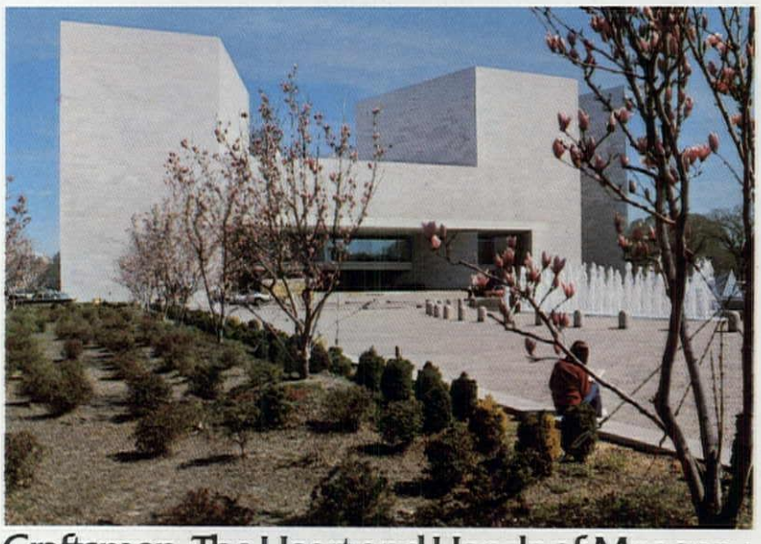
The work that he and other stone masons did on the East Building, an addition to the National Gallery of Art* in Washington, D.C., shows why:

"I brought my whole family here and took them through a two-hour tour of this whole place. When I walk away from this job, I'll be proud of it. I'll stand out there in the street and take a look at it. It's always going to be here for me and my family to see."

People with the kind of pride that Rich Jarboe has in his skills, and the kind of love that he has for the materials he works with ("It's natural stone. It's beautiful. It's easy to take care of.") are the foundation and strength of the masonry system of building.

Masonry craftsmen work with the finest materials ever devised for building—brick, block, stone, marble, tile, terrazzo, mosaics and plaster. Their skills match the materials. Together they create a building system that is beautiful, permanent, requires little maintenance, provides excellent fire protection, has great structural capabilities, is remarkably flexible, helps make buildings more thermally efficient, and is economical.

There are thousands of reasons why your next building should be masonry. Rich Jarboe is one of them.



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Weiskopf & Pickworth, structural engineer.
Atlas Tile & Marble Works, Inc., marble contractor.
Local #2, D.C., Stone and Marble Masons,
International Union of Bricklayers and Allied Craftsmen.

News report continued from page 38

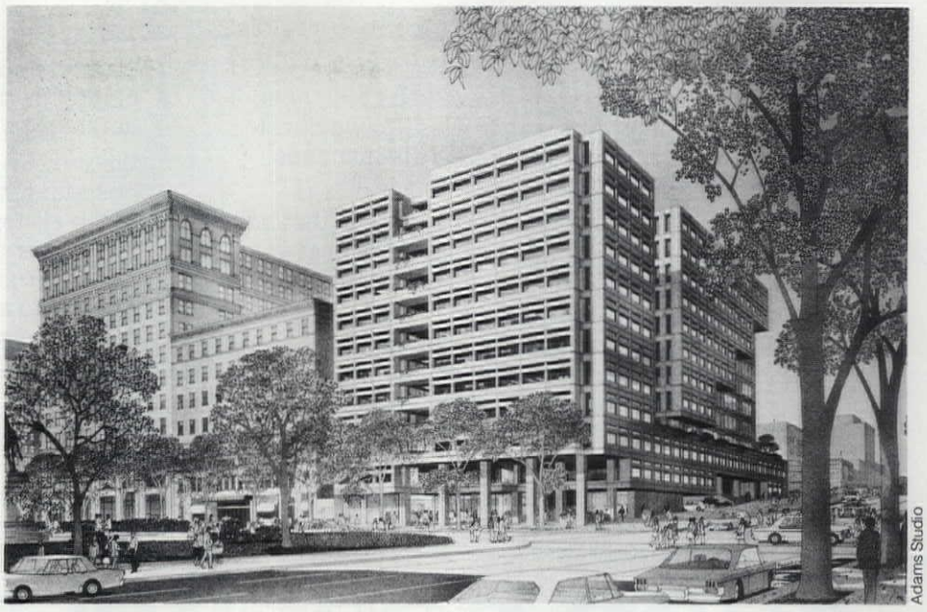
4 Washington headquarters—The National League of Cities, an organization of elected local officials, has announced plans to build a 12-story headquarters in Washington, DC, at Pennsylvania Ave. and 13 St. NW, in the 21-block redevelopment area administered by the Pennsylvania Avenue Development Corporation. The $17 million building will be the first privately funded new structure in the area. Washington architect Frank Schlesinger designed the building, which will have balconies, a terrace on the fourth floor at street side, sun screens to reduce heat load, and a sidewalk pedestrian arcade with shops on two levels. Completion and occupancy are set for early 1980.

5 Façade preserved—The terra cotta façade of Atlanta's Eiseman Building, 1901, will be reassembled in the four-level below-the-street station of Atlanta's rapid transit system now under construction. The station is designed by the Finch-Heery joint-venture team composed of two Atlanta firms: Finch, Alexander, Barnes, Rothschild & Paschal and Heery & Heery. The building was removed from its downtown location known as "Five Points" to make way for the Metropolitan Atlanta Rapid Transit Authority (MARTA) station. The façade's 844 pieces were numbered and stored, and when reconstructed will be a major focal point of the station. An escalator will pass through one of the arches.

6 San Francisco Apparel Mart—Whisler-Patri of San Francisco is the firm which designed the 16-story addition, Pacific II, to the San Francisco Apparel Mart. The new building will be ready for occupancy by 1980, and will bring to the mart an additional 200,000 sq ft of showroom space, three restaurants, a street-level retail mall, and a 1000-seat, glass-topped hall for dining and fashion shows. The terraced roof will be landscaped. An energy-conservation feature of the building will be computer-monitored zone air conditioning.

7 New York school—A $3.5 million addition to P.S. 26 in the Bronx, NY, has been designed by O'Brien & Justin, New York, to replace an 1897 portion of the school destroyed by fire in 1973. The new wing of 46,000 sq ft will be partially air-conditioned.

8 Saudi Arabia teacher education—The Houston firm of James M. Sink Associates has designed a teacher training facility for Saudi Arabia as part of the kingdom's multi-billion-dollar effort to educate its citizens. The college, accommodating 6500 students plus faculty, will be located near the Riyadh International Airport, and will complete the educational loop within the Saudi program. Graduates of the college will become the teachers in the elementary and secondary schools being built. The educational system was developed by a team from the University of Southern California with a $1-million grant from the Saudi government. Phase one of construction will include an academic megastructure and apartment housing for 2000 married and single students. The limestone concrete buildings will be clustered to protect them from the intense heat.



Adams Studio

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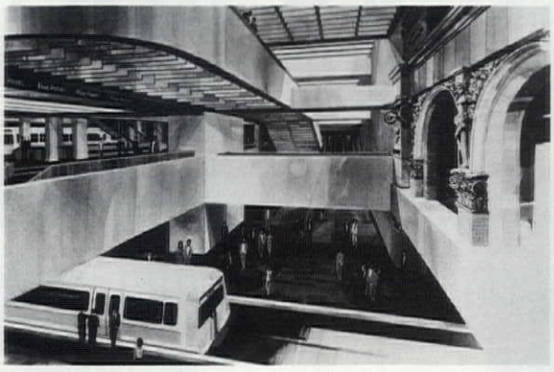

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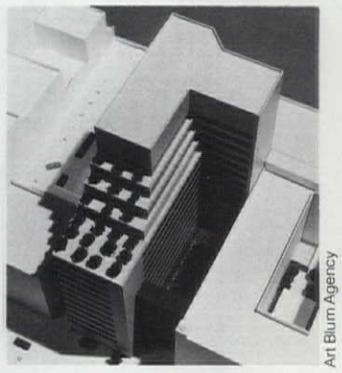

Art Blum Agency

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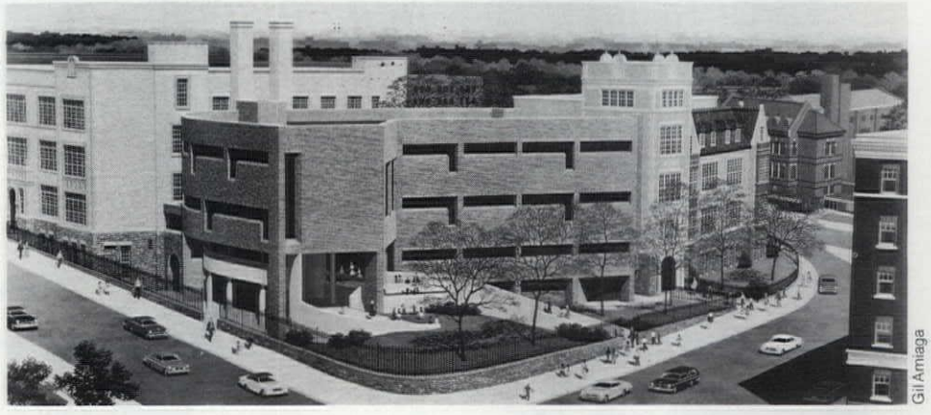

Gil Amiaga

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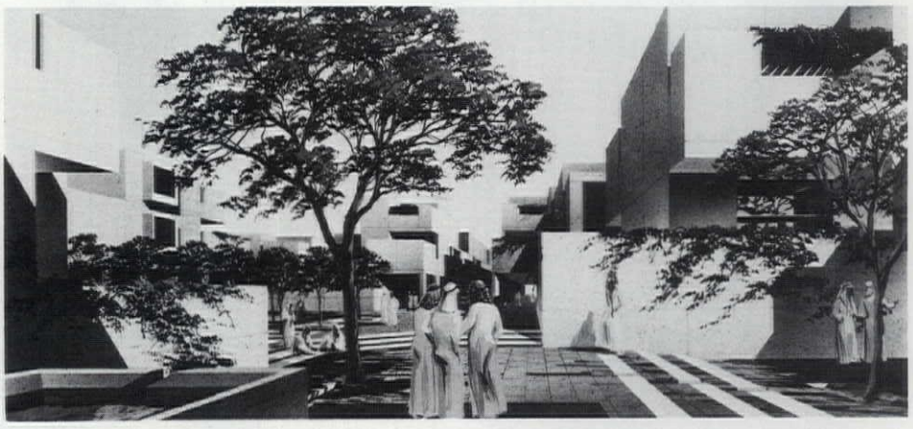

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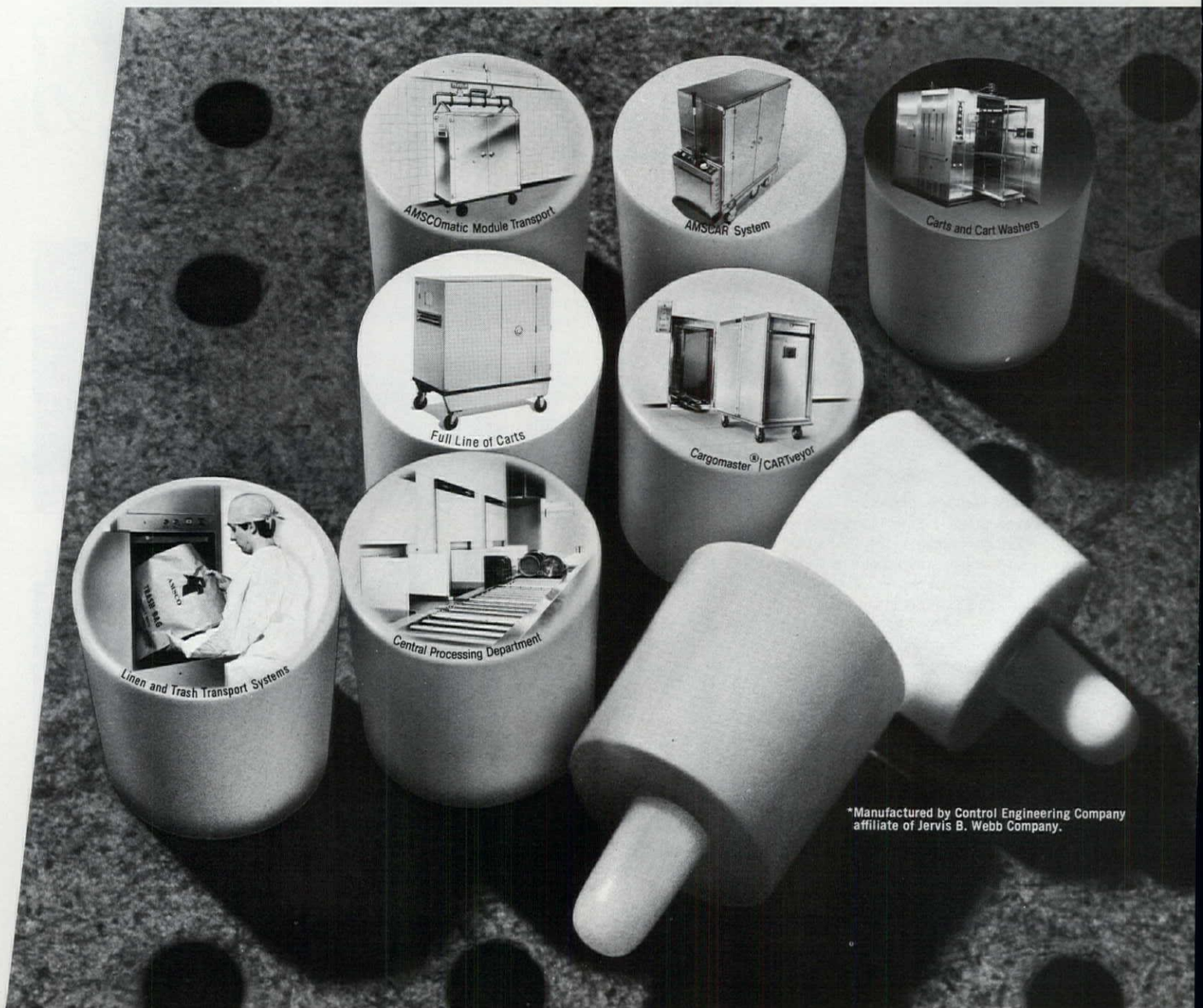

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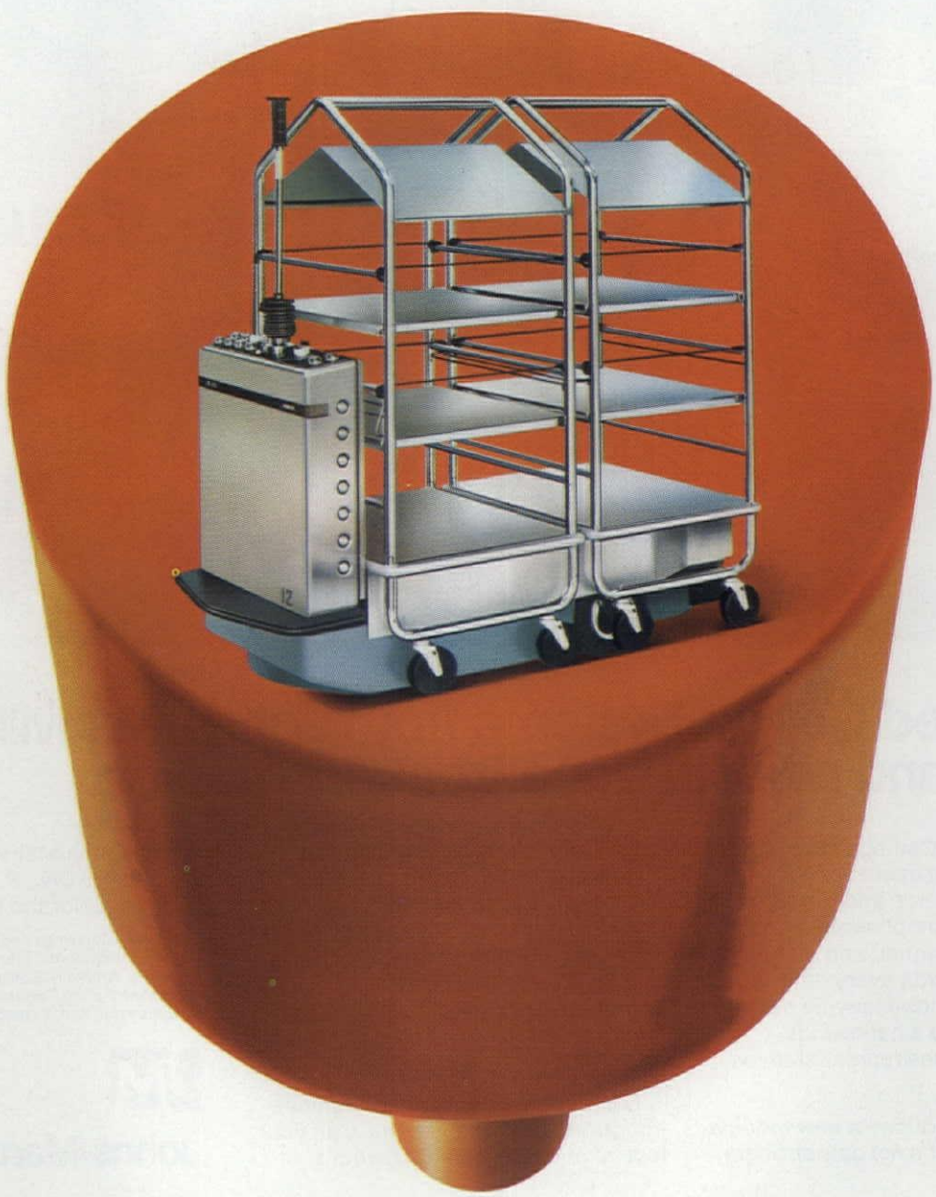

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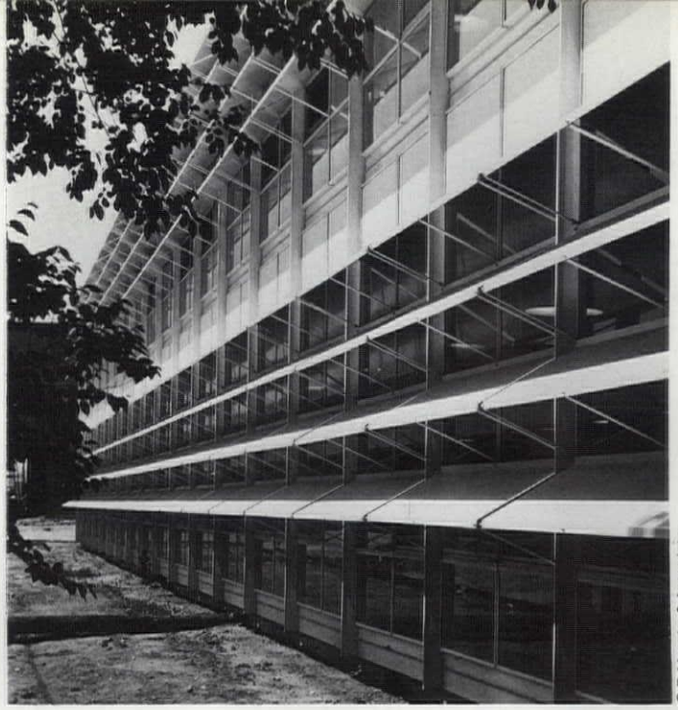
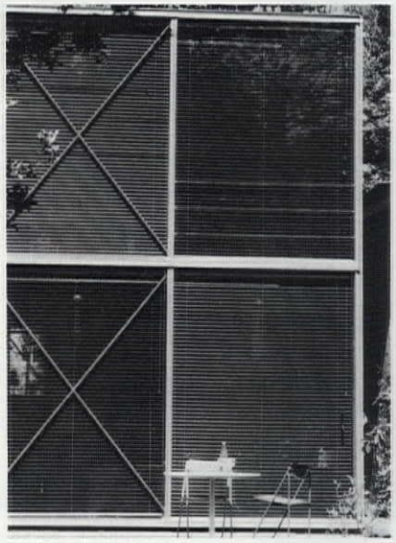
Introduction

How High is Tech?



C.F. Murphy & Associates

Among other things that have come along to refine or replace orthodox Modern Movement design modes, something called "High Tech" clearly has momentum.



Tim Street-Porter

Bill Engdahl, Hedrich-Blessing

While we do not devote this entire issue to buildings which could be described as "High Tech," a large percentage of our pages do go to those this month. Although the exact boundaries around this classification are unclear at best, we feel that these examples embody most of the characteristics. Because it is a "style"—or a composite—more than a tangible fact, High Tech could be said to have roots going a long way back. Was Paxton's Crystal Palace High Tech? Or the Bauhaus? Certainly Piano & Rogers' Centre Pompidou (P/A, May 1977, p. 84), would qualify.

Most, but not all, of what we think of as High Tech at least implies the economy of factory-produced components, applied to or inserted into a strict basic module at the site. As with the works of Mies, the apparent economies may be visual, but not necessarily real, in nature. Clean details may or may not cost extra. So it is with these examples; there is economical High Tech and less economical High Tech, responding to programmatic dictates.

P/A's Awards jury in 1973 (January, 1974 issue) elected to comment on some submissions which it felt constituted a larger body of work. Centered around "the machine aesthetic," this work was loathed by some, loved by others on the jury. So there you go. But glass houses by respondents to Mies, Eames, Johnson, and many others, continue to be built (Hopkins house, p. 50); and they are jewels. Some clients now approach architecture with high design standards, whether the function is manufacturing (Herman Miller, next page), banking (First National of Ripon, p. 54), or recreational/academic (athletic facility and two libraries, pp. 58–67). These are gems as well, with a wide diversity of program and solution, but a common high level of quality in technical resolution. The last example (AT&T, p. 68) brings a space age environment into an educational/display center for a corporation.

The other design features in the issue are not readily identifiable as High Tech, yet they draw upon some of the same principles. There *are* other issues in architecture, but High Tech is alive and well. [Jim Murphy]

Bill Rothschild

Herman Miller Ltd., Bath, England

Trim tech

Barbara Goldstein

A furniture manufacturing facility for an American company was designed to symbolize in architectural terms the design goals of the company's products.

The Farrell/Grimshaw Partnership is among the current young generation of "high-tech" British architects who made their names primarily in the field of industrial and commercial buildings. These architects show that pleasant and inexpensive working environments can be provided, while also creating good, attractive works of architecture.

Although the term "high-tech" is often applied to architects like Farrell/Grimshaw, it works on an emotionally evocative level better than on a functionally accurate one. The building industry still lags far behind the technological advances and ease-of-production methods found, for example, in the automotive or electronics industries. However, if high-tech is taken to refer to architects who build economically and rationally using the techniques of serial production, and eliminating costly site-based labor, the definition works.

In England's current economic climate, the concept of cost-effective building concerns both industrialists and architects. With the country trying to recover from inflation and attempting to encourage capital investment in the manufacturing industries, only architects able to prove a sense of economics as well as design are getting commissions. Because high-tech architects are the direct heirs to the Modern Movement, the problem of designing simply detailed, flexible architecture presents a very interesting challenge. Fortunately, the requirements of cost effectiveness with good design are not irreconcilable.

Because many architects are out of work, they are oversensitive to public criti-

Author: Ms. Goldstein is an American architect and writer, currently based in England, who has worked as an editor for both *Architectural Design* and *RIBA Journal*.

cism of modern architecture. Many react with a move "back to the vernacular." Fortunately, architects like Farrell and Grimshaw have remained true to the principles of a simple, inexpensive, elegant architecture that results from a great deal of design research and skill. The merits of their work are being recognized: last year, the Herman Miller factory won both the coveted *Financial Times* Industrial Architecture Award and the Structural Steel Award.

The Herman Miller Factory at Bath is a very good example of high-tech architecture. It was quickly assembled at a very low cost and has provided the client with an elegant and very flexible building.

However, describing the building as simply high-tech would deny its very recognizable symbolic value; it is in this area that the Herman Miller factory excels. This architectural meaning has been alluded to only vaguely in the architects' description of the building because, like most high-tech architects, they are too busy justifying their work on grounds of economics and production to step back and admit that they also applied some art to the process.

Interaction

"Action Factory" is, however, the affectionate name that Nick Grimshaw gives to the building. It is very appropriate, since Herman Miller's Action Office furniture is produced there, and because the building itself resembles the furniture system, from its elegant cream-colored fiberglass panels to its curved corners. The building says "Herman Miller" while staying within the tradition of other buildings by the Farrell/Grimshaw Partnership.

The architects and client were extremely well matched philosophically. Nick Grimshaw has long been an advocate of the internal flexibility of open-plan offices, and has tried to extend this idea of flexibility to the external skin of his buildings. He has designed a series of industrial and office buildings employing interchangeable or demountable external cladding. Many of these, including Action Factory, have used fiberglass for the panel system, and have combined the opaque sandwich panels with glazed and louvered panels. Now this interchangeability of external panels has become such popular currency in English high-tech architecture, it is difficult to decide who did it first (excluding reference to Jean Prouvé).

All of Farrell/Grimshaw's high-tech buildings share other principles, such as the creation of undifferentiated open space and relative ease of servicing. Two of their recent industrial buildings were built for speculative rental; the final industrial processes of the Herman Miller factory at Bath were not decided until well into the design process. Client demands like these require great design flexibility as a response. The architects, believing that buildings should be a "resource," have circumvented these problems by designing their buildings with sufficient height for palletized storage and a load-bearing capacity for heavy industrial equipment.

The preliminary program, written before the architect was chosen by Managing Director Max De Pree of Herman Miller, is so close to Farrell/Grimshaw's design philsophy that they could have written it themselves. In discussing his choice of architect, in fact, De Pree talks about a certain "chemistry" existing between Grimshaw and himself. The program was couched in five major points—the design image of the company, the wellbeing and participation of the people who would be using the building, the acceptance of change and flexibility, the need for a budget-conscious high quality environment, and the importance of the building in its setting.

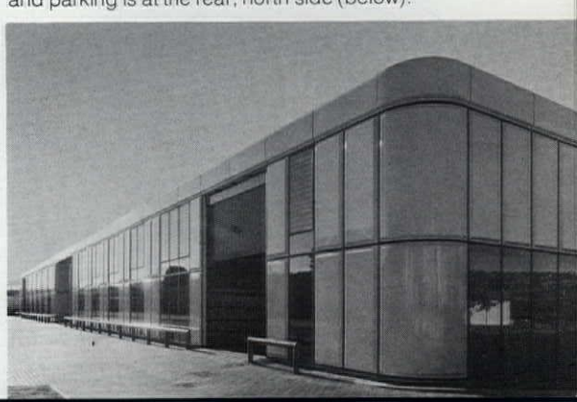
Responsive solution

The building is sited on a designated industrial area along the River Avon. It is linked via a footbridge to another Herman Miller showroom and production building, occupied by the company since 1970, and designed in the 1960s by York, Rosenberg & Mardell. The river façade of the new building has been carefully landscaped with grass, willow trees, and fixed areas of seating.

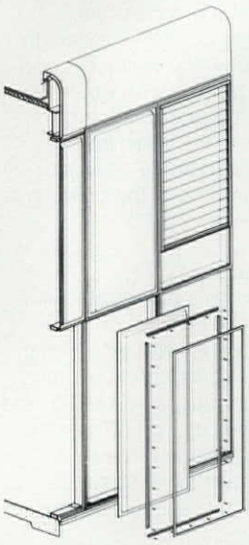
Viewed from most standpoints, the building is a success. At about $26 per sq ft, it compares in price with the cheap, off-the-shelf systems that most industrial clients unfortunately still choose to erect. It is flexible, both internally and externally; its servicing can take place with minimum disturbance to the work process. It is a pleasant place to look at and to look out of.

Internal flexibility has taken a number of important factors into account. First, the building was constructed with a high load-bearing capacity and a clear height of 20 ft from the floor to the underside of the secondary beams. All main services, including water, compressed air, electricity, gas, and sprinklers, can be reached

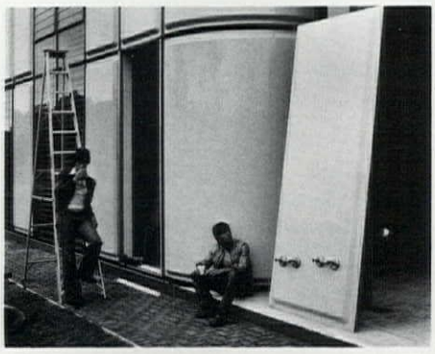
Like Herman Miller's Action Office furniture, which is produced at this plant, the building also uses cream-colored fiberglass panels and curved corners. South side faces River Avon (left); main entrance is at the west (above), and parking is at the rear, north side (below).



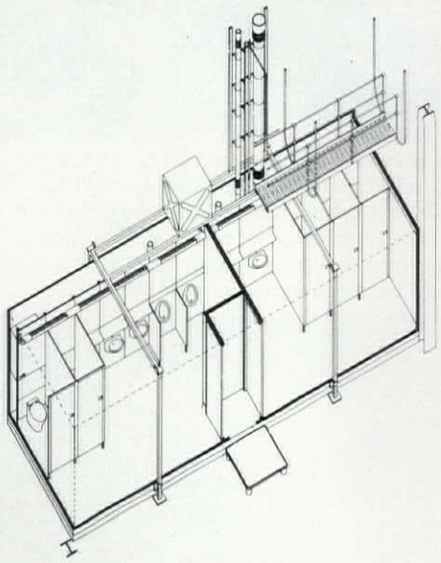
Herman Miller Ltd., Bath England



CLADDING SYSTEM



External cladding system uses fiberglass panels (above, below), glazed or louvered panels (top).



TOILET MODULE

from a centrally located, overhead catwalk. Secondary services are located at predetermined places between the secondary beams, and can drop down to serve the machinery below.

The toilet facilities were somewhat of a preoccupation of both the clients and the architects, who felt that they should not inhibit the building's internal planning by fixing them in certain locations. The problem of flexibility has been overcome here by providing 16 water and drain locations for the toilets, and accommodating the facilities in portable toilet stalls custom fitted with attractive and durable fixtures. They can be disconnected and relocated easily as planning needs change.

Although this dramatic effort to be flexible might seem to be an architectural conceit, the architects' decision had a retionale. At a total cost of about $4600 for 300 sq ft of fitted-out space, the toilets are surely less expensive and certainly more practical than going to the expense of having several different craftsmen install permanent facilities. The large number of drainage points also means that additional wet services can be added as required.

The interior of the building is well lighted—artificially with metal halide light fittings and naturally through the glazed panels that also provide good views of the river. The light fittings were chosen for ease of maintenance. A light bulb can be changed from the factory floor by one man using a simple "apple picking" device. The interior itself is intentionally bland so as not to distract people from their work, but it is punctuated by the catwalk, and services are brightly color coded.

The panels are well-insulated fiberglass sandwiches with a ¼-in. flange around the edge that fits into a standard system of aluminum and neoprene pressure gaskets attached to steel mullions. They are interchangeable with doors, glass, and louvered panels. The fixing system is simple enough to be changed by unskilled labor. The standard ¼-in. thickness of components for the glazing system means that other materials with this sort of edge can be used for cladding the building. Although the initial arrangement of glazing and panels seems very formal, it is likely that it will change with use. Already several doors have been moved from one part of the building to another.

The steel structure of the building is based on a 32 ½′ x 65′ grid, with only two rows of nine columns interrupting the space. The cladding frame, of hollow steel section tubes, spans the height of the building to its primary beams, and spacing rails, located at the top, bottom, and middle, span between the verticals of the cladding frame to provide additional support for the panels. The gasket system is fitted precisely onto the steel sections.

The building's loading docks, located where the site slopes downward, are beautifully detailed to take advantage of the slope. They cut into the building at an angle and take advantage of the higher floor level so that the back door of a truck can flip down on level with the floor of the loading area. Thus the goods can be simply rolled in or out of the trucks, and the trucks parked in the bays seem like part of the building. The building has quite a deep plan and this, together with its highly insulated panels and roof, will contribute to its energy efficiency. It is 60,000 sq ft in area, and presently accommodates 40 workers.

Criticisms

Although very much admired in spirit and intent, the building can be criticized in its details. One of the architects' original ideas was to create an undulating "action wall" that could be easily changed with demand, altering the nature of internal and external space. The indentations are visually successful, complementing the building's curved corners, but their value is more symbolic than functional. Several of the indentations say "welcome" in the form of entrances to the building; others say "protected," as in the riverfront courtyards.

The integration of the building's cladding with its structural system is rather uncomfortable in feeling, although pleasing in appearance. In order to create an indentation in the flat façade, it was necessary to violate the purity of the upper, inward curving panel by slotting it *through* the secondary beam, which seems a rather uncraftsmanlike solution. One wonders why the fascia panels were not extended downwards somehow to meet the wall panels at the bottom of the secondary beams, or why a simpler solution was not sought. This arrangement also raises problems with the soffits between the outside fascia and the inside fascia of the indentations. The problem has been solved by stretching canvas across the gap along the top of the wall panel. Although the red color of the canvas gives the indentations a very cheerful look, it would be nice to have seen a solution that used the same vocabulary as the rest of the building.

Also, it seems extravagant to have to turn a corner with a primary beam to achieve a cured corner panel. This appears to be a solution that has more to do with creating a streamlined exterior than with finding a rational solution in detail. However, these are simply criticisms made out of a desire to see a slightly neater, more integrated solution. In fact, the sight of a primary beam emerging through the indentation, supported asymmetrically by a column, creates visual interest along the façade. The slotted panel, however, raises the question of how easily these indentations could be moved around. It is this sort of design quirk that detracts from the mass-produced ethos of the building, because it makes the structure and cladding too particular.

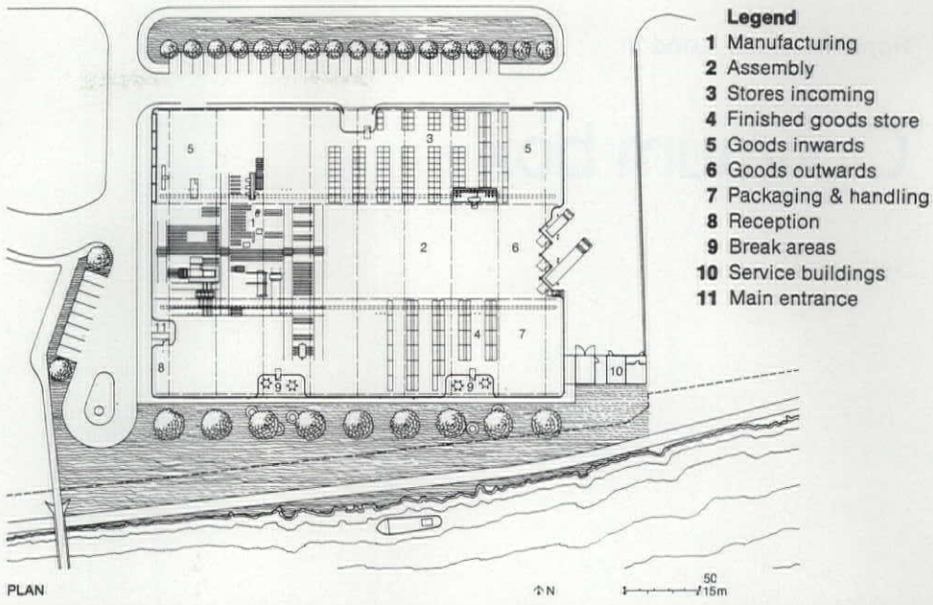
Both the panels and their sophisticated support and gasketry system attain a quality seldom found in fiberglass panel detailing. The architects had a continuing dialogue with the manufacturers of both systems in order to achieve the finish they did. This is a long-standing dialogue, springing from Farrell/Grimshaw's earlier,

easily assembled panel buildings. Although in his early design concept for the building, Nick Grimshaw was exploring the possibilities of using a system of aluminum panels, the fiberglass panels are well manufactured and precise, and probably were considerably less expensive to model than developing a new system in aluminum at this scale.

User response

It is Herman Miller's stated philosophy to encourage a sense of community and participation in their organization. In both their facilities at Bath, this function is carried out by a works council, which represents employees and management, and meets to discuss common problems. The workers are also members of a trade union. The management feels, after more than a year of using the building, that the open planning has encouraged communication and productivity in the factory. The workers, in general, have also reacted favorably to the building's design.

All in all, the factory's characteristics in terms of quality, flexibility, and cost-effectiveness have brought it the praise it deserves. These characteristics, it seems, define a high-tech building. But high-tech or not, the Herman Miller factory at Bath is an admirable model for an industrial building to meet today's needs.



Internal flexibility is important in the open-plan factory; all main services are reached from a centrally located overhead catwalk (above); and toilet stalls (below and left) are portable.

Data

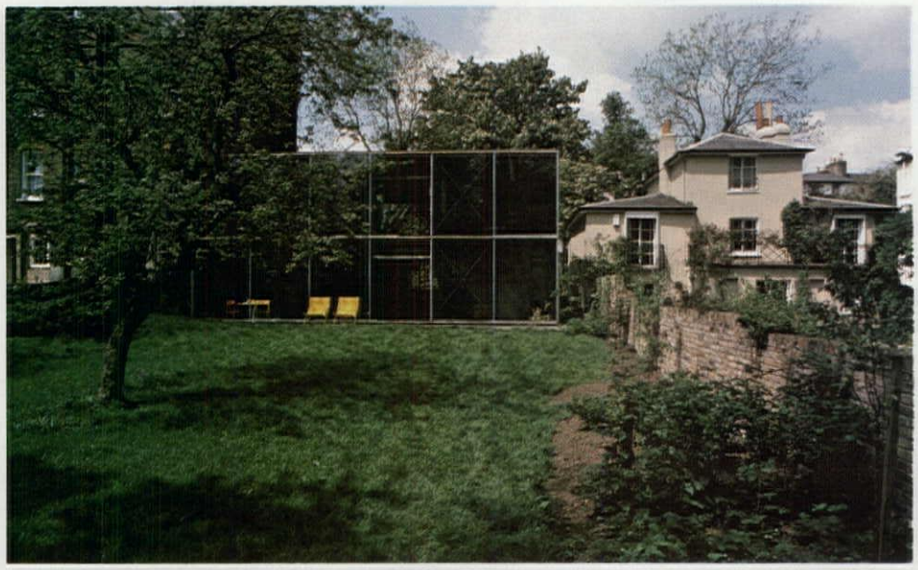
Project: Furniture Manufacturing Facility for Herman Miller Ltd., Bath, England.
Architects: Farrell/Grimshaw Partnership; Nick Grimshaw, Jeff Scherer, job architects.
Program: Herman Miller wished to increase its facilities at Bath from 55,000 sq ft to a production space of 123,000 sq ft without tearing down existing factory. The 63,375-sq-ft building had to be flexible for manufacture of the office furniture system, it had to express the company's design policy, and be completed within a year of commission.
Site: on the banks of the River Avon at Bath, in an industrial area.
Structural system: 1′ x 1′ steel columns, 33 ft and 66 ft on center, supporting 1′9″ x 8″ steel primary beams 66 ft on center, supporting 1′ x 4″ x 7″ steel secondary beams 8′3″ on center. Cladding steel frame has 5″ x 3½″ members placed 4 ft on center horizontally, 10 ft on center vertically.
Major materials: tinted float-glass panels and louvers; fiberglass insulated panels with neoprene gaskets; plastic coated steel decking.
Mechanical system: roof-mounted gas warm air heaters with high level distribution network and recirculation facility.
Consultants: Ronald Hurst Associates, mechanical; Peter Brett Associates, structural; Hanscomb Partnership, quantity surveyors.
Client: Herman Miller Inc., Zeeland, Mi. Max De Pree, managing director.
Costs: app. $1,647,750; $26/sq ft.
Photography: Jo Reid, except top right, p. 47 and p. 48, John Donat.

Hopkins House, London

Optimum box

Barbara Goldstein

English architects Michael and Patricia Hopkins designed a house and studio for themselves with the cool austere elegance typical of British 'high-tech.'



The house's light frame and small scale reduce its impact on the street.

The house is the most traditional form of architecture in any society; and it has been shown by anthropologists to be the last form to respond to changes in social customs. Its basic plan and elements are fairly universal, and many characteristics of the house have significant symbolic value.

Relatively few houses in the 20th Century contradict this notion, since they are still geared to a fixed type of client—the growing and shrinking nuclear family. Therefore, changes in house design have usually been changes in architectural expression relating to materials and construction techniques.

The Hopkins house is one such example. It makes use of industrialized building materials on a domestic scale. In addition, it breaks with other conventions of "normal" house design by doing away with permanent room divisions and traditional definitions of territory, and by incorporating the offices for a very active architectural firm into its program. Surprisingly, the symbolic values important to houses are still there—in the disposition of spaces and definition of territory marked by the simple arrangement of furniture and personal belongings. Although the house presents an extremely cool appearance on the surface, it is very clearly a success as a family residence and office.

The house was designed and constructed as a "built feasibility study"—an exercise in achieving the maximum amount of space within the constraints of a site limited by various building lines. It was completed within one year's time, out of necessity, because the architects, Michael and Patty Hopkins, had sold their previous house and needed to move into the new one quickly.

The house makes very close philosophical and aesthetic connections to ideas developed over the last 30 years within the Modern Movement, and it takes these

The fittings for the bath are minimal (left); the living room gives a view of the garden from second level (right).

ideas to another level of ascetic purity.

One influence on the design of the house was the work of Foster Associates. Michael Hopkins was, for a number of years, the third partner in that practice, together with Norman and Wen Foster. It is clear that this house, his first independent job to be completed, reflects the development of some of the work he did there. He feels it is most related to work he was involved in on the Advance Head Offices for IBM near Portsmouth, England. There, the architects designed large, flexible offices using a steel-framed structure with integrated services and glass cladding. The building was, at the time, comparable in price with thrown-together asbestos sheds; and as a result of its elegant contrast to such run-of-the-mill commercial and industrial buildings, it received a number of awards.

Similarly, Hopkins' own house is "a very small-scale structure where there is no differentiation between cladding modules and structural modules . . . and it uses materials repetitiously."

Michael and Patty Hopkins readily admit that they were "fantastically influenced" by the famous Charles Eames house of 1949, which they consider to be an unsurpassed design. Their house relies on a number of the same structural materials and principles. Because industrialized building components are now commonly accepted in housing design, however, they set themselves the problem of using as *few* materials as possible and of eliminating the number of details involved. The house was designed with great elegance and economy of materials, and was seen as an opportunity to refine and reduce in scale techniques used for larger commercial buildings.

The program for the Hopkins house was more demanding, in certain ways, than the program for the Eames house. The Hopkins house accommodates two working parents, three children aged 8 to 14; and a six- to eight-person architectural office. The house, therefore, receives much more intensive use over the course of 24 hours than would normally be expected. It was

Downstairs a den is located next to the dining area and kitchen.

designed to accommodate the variety of different activities, to be opened or divided, private or communal, domestic or businesslike.

The house is situated on an exclusive, tree-shaded street in Hampstead, one of London's oldest and most picturesque villages. Most of the other houses on the street, built in the 18th and 19th Centuries, share a common building line. In the case of the Hopkins house, rear property lines of adjacent buildings determined the back wall of the structure as well. Because of its sensitive historical location, the house had to present a carefully designed "low profile" exterior to meet with the approval of the local planning authorities. The site is unusually wide—78 ft—and it slopes down steeply 10 ft from street level to the level of the garden. Most of the other houses on the street have one floor below street level and three above.

In driving or walking past the Hopkins house, one hardly notices it. It is so well landscaped, transparent, and cool in appearance, you might think it was someone's conservatory. The house is basically a glass and metal box, divided horizontally into two structural zones, and entered at top floor (street) level. On entering the house, one has a clear view of tantalizing leafy, green gardens at the back, where offices are located.

The space is divided along the structural grid lines by only the lightest of possible partitions—silver-colored venetian blinds. These separate the space as necessary, providing divisions for private meetings or undisturbed workspace over the course of the day. Identical venetian blinds run the

length of both glazed end-walls. A central service core provides a coffee area and toilet facilities on this level.

A blue industrial steel spiral staircase punctuates the top floor, dropping down to the family area below. The parents sleep on the garden side of the house and the children at the front—the two areas separated by a bathroom/laundry core. Another service core on this level provides kitchen and pantry facilities. On this level, the space is again divided by venetian blinds, giving children and parents visual privacy.

The elements that went into constructing the house are extremely simple: steel structural frame, tempered glass, and (insulated) profiled steel decking. The structure spans in two directions on a base module of 6½ ft and on a 6½' x 13' structural grid. The plan area is 39' x 32½' with eight internal columns. The 39-ft building width meant that the house could be pulled 3 ft away from its neighbors on both sides, thereby obviating party walls. By choosing a small structural grid, the architects were able to avoid a secondary structure to support the cladding. Indeed, the perimeter columns serve as direct supports for the glazed end-wall panels and for the profiled steel decking used in sidewalls, roof, and first floor. Structural cross bracing strengthens strategic bays. In addition, the size of the structural grid is convenient for subdivision. The Hopkinses describe the house as an "optimum box," because within its own structural rules it makes the optimum use of the site area available to it.

The blue painted steel frame sets the house off from the other elements. The insulated decking used for walls, roof, and floor is prefinished with plastic coating that leaves it a natural silver color. The architects designed the extruded aluminum glazing frames specially for the house, fixing the glass almost invisibly at three points: top, bottom, and side.

The bathroom and kitchen cores represent additional exercises in design economy. They are assembled from white plastic laminated panels that fit into the structural grid. The tubless bathroom has standard white bathroom fixtures, with the shower head mounted directly onto the wall, and a layer of duckboard raised above normal floor level. The slats of this platform therefore act as a drain for the shower. Very neat. The "adequate although minimal" kitchen and bathroom cores, as Hopkins describes them, won't wear out, since there is nothing to wear.

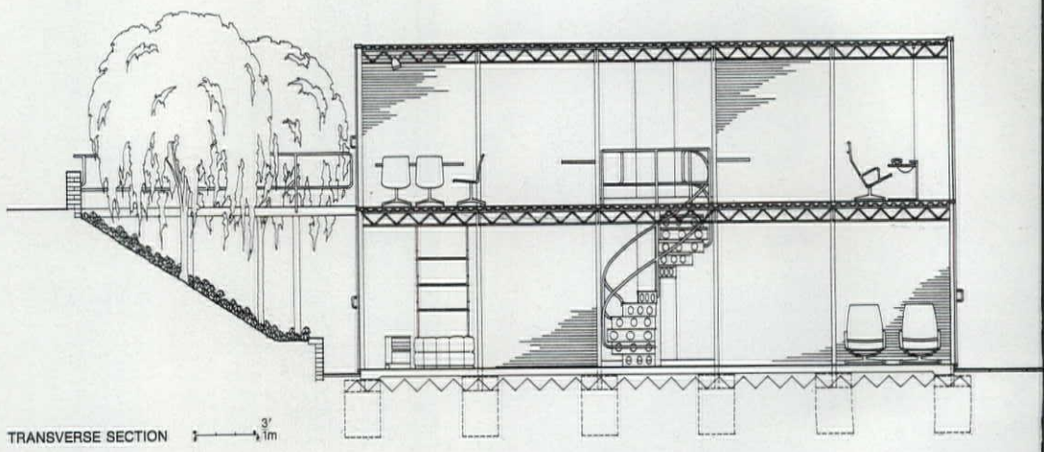
Thin skin

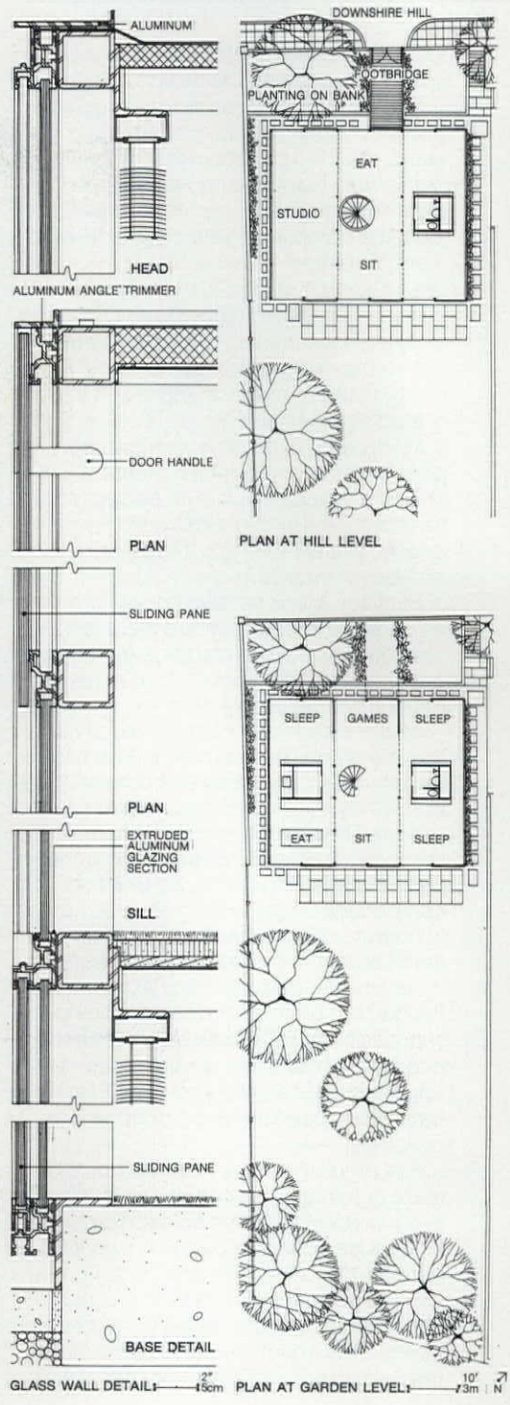
When the house received the 1977 RIBA Architecture Award for the London region, it came in for a certain amount of criticism from fellow architects for being "overglazed" and therefore, presumably, wasteful of energy. The house *does* have a thin skin and a large amount of glass, but its energy consumption has been surprisingly low. The Hopkinses believe that the energy efficiency of the house is due to a number of factors, some calculated, others fortuitous. In winter, the house is draft-free when all its sliding glass panels are closed. It is able to take advantage of direct solar gain in the daytime by keeping the reflective blinds open, and it also receives "scatter radiation" from lightly overcast skies. The glazed garden wall faces southeast, a definite advantage in terms of solar gain. Equipped with an industrial system of ducted forced warm air, the house still is not terrifically well insulated, but it has absolutely no thermal lag. It heats up in about ten minutes with no heat lost into the structure as with conventional masonry walls. The main disadvantage is that it can get very cold on a winter night if the heat is turned down (which energy-conscious English people tend to do).

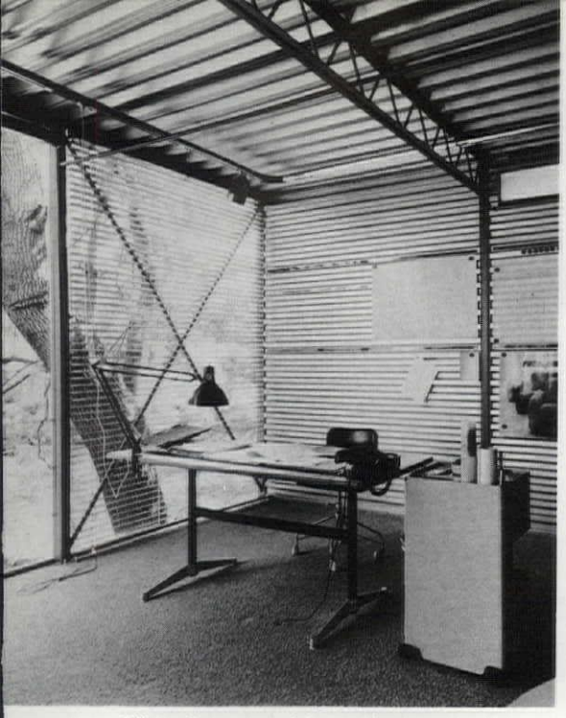
In summer (when temperatures rarely go above 80 degrees), glazed walls may be slid open for cross ventilation and the blinds adjusted to reflect the sun. Being inside the house seems virtually like living in the garden.

Acoustically, there is a surprisingly good separation of noise from floor to floor. Within one floor level, however, the house can be noisy if several conversations are going on at once. Metal walls and venetian blinds do not dampen sound. Domestically, this can create a problem when one person wants to watch television and another is listening to the record player. The problem is remedied simply in the evening and on weekends by moving the television upstairs. At those times, the venetian blinds drop down around drawing boards and the central area of the "office" floor becomes additional living room space.

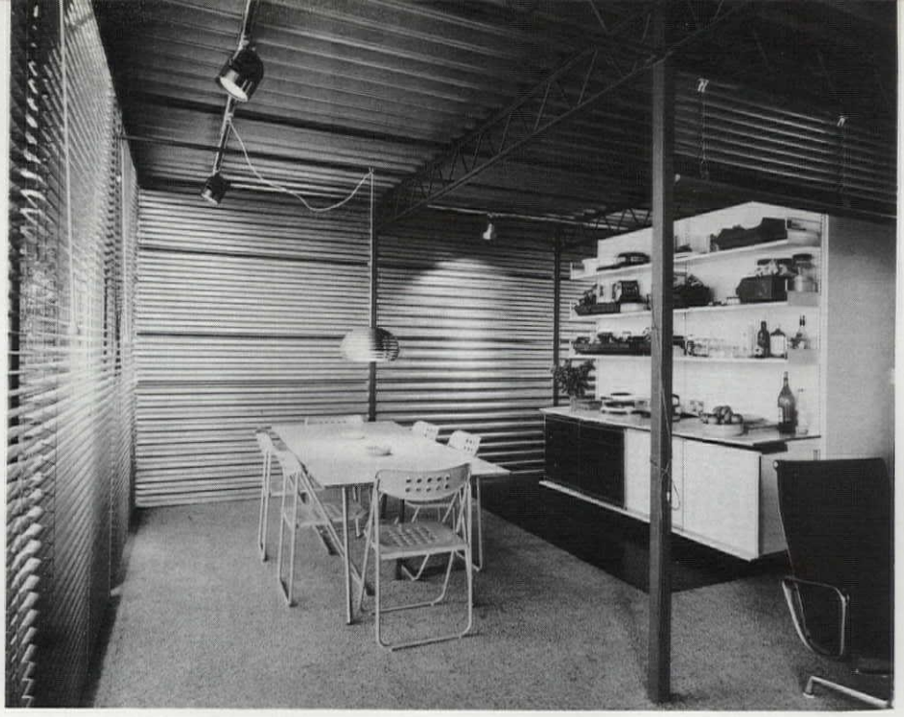
With regard to the need for acoustical privacy in the course of ordinary family events, the Hopkinses explain they have always lived in open-plan arrangements and, until now, this has suited them well. Since their eldest daughter may soon want more privacy, they plan to partition off her space along the structural grid, using a demountable partition system similar to the







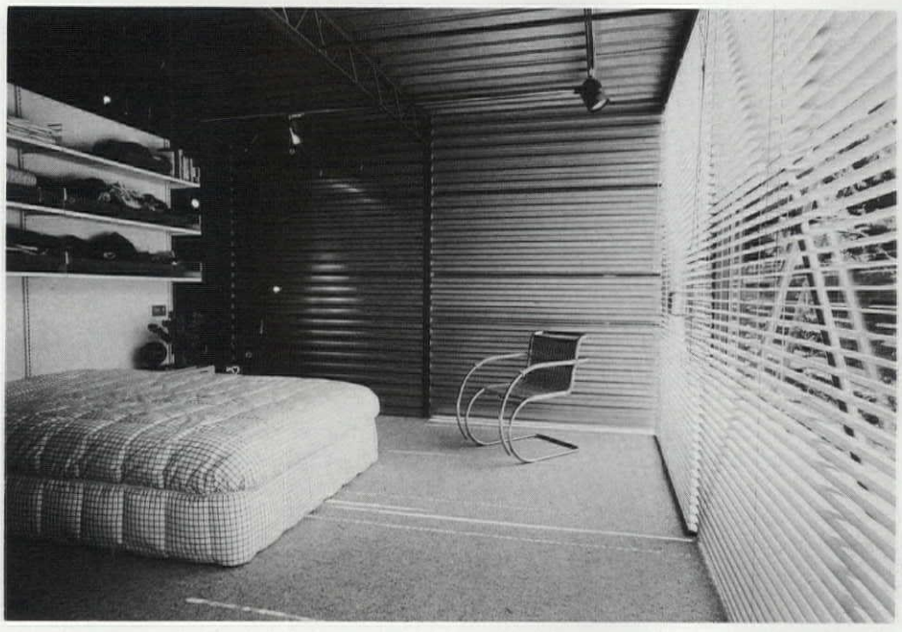
Offices face toward the garden.



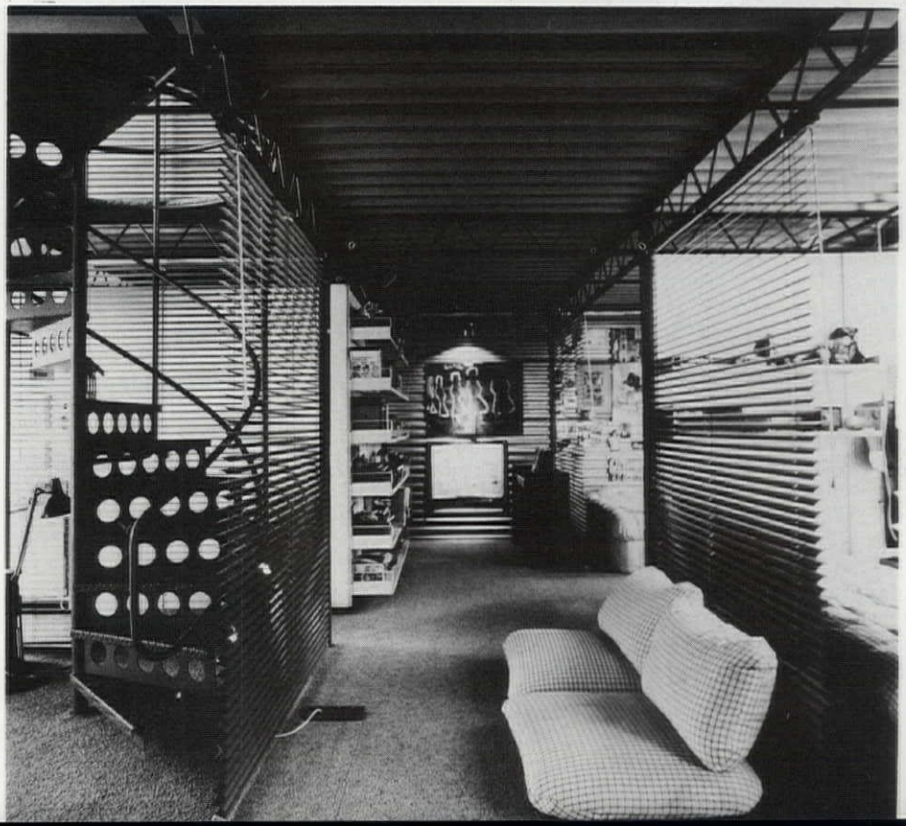
Dining area (above) faces garden; bedroom overlooks depressed bank.

service cores. When they built the house, they felt it would be a pity to divide so much free space unnecessarily, since it is at a premium. They take it for granted that the house will change; it was designed to accommodate such needs easily. They maintain the house is very "low-tech": although it uses industrialized components, its methods of construction and manner of servicing are extremely simple. The actual construction process involved very few trades on site.

It is necessary to emphasize, when discussing the house, that it was designed to a particularly demanding program for the architects, their office, and their own family. It is by no means a universal solution and there are many things one could not do in it as it is now designed. It is not a house for people who want to argue outside of children's earshot. Nor is it a house in which to listen to recorded symphonies—the acoustics simply are not that good. It is not a house for relaxing in the bathtub. Nor, one suspects, is it a house for people who enjoy living with clutter. However, for the present occupants, it is very well designed and will be constantly evolving in use.



Bedrooms on lower level are partitioned by dropped blinds.

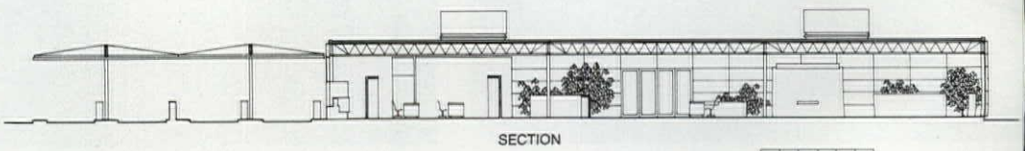


Data

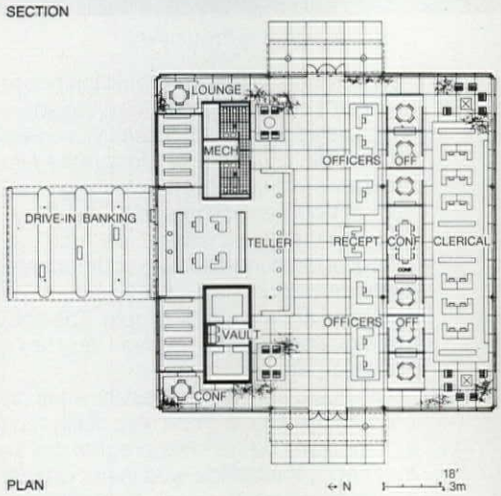
Project: Hopkins House, London, England.
Architects: Michael Hopkins Architects
Program: studio and house, 2535 sq ft, for two architects and their three children; designed to be flexible, economical, and easily constructed.
Site: a low-density London street with a 45-ft frontage and change in grade of 10 ft from front to back.
Structural system: a two-story light steel frame on a 6½′ x 13′ grid stiffened by steel decking on roof and first floor.
Major materials: steel cladding, glass, gray carpet.
Mechanical system: industrial forced-air duct heating; gas-fired furnace.
Clients: Michael and Patricia Hopkins.
Consultants: Anthony Hunt Associates, structural.
Cost: $37,000; $14.88 per sq ft.
Photographs: Tim Street-Porter.

First National Bank of Ripon, Wi

Ripon pavilion



SECTION



PLAN

In a small Wisconsin college town, an industrialized black metal box is both bank and community pavilion.

The new First National Bank in Ripon, Wi, is at the end of the commercial section of the town's main street. There, just beyond the hill where Ripon College and downtown are located, the terrain becomes flat before it stretches out into vast farmlands. Although the hilly nature of the town's core obviously had no influence on the design of the new bank, it was nevertheless the major cause of the building's construction in the first place.

The problem was simply that for a bank in such a small, isolated community as Ripon, a drive-in facility is crucial, but one could not be built at the old bank. That was an attached building that fronted on the main street but had a steep drop-off at the rear. With a move forced upon it, the bank reluctantly left its massive, richly detailed, neo-Egyptian Art-Deco structure and moved to new quarters.

Rarely have two buildings for the same purpose and client been more dissimilar than the old and new banks. The new building follows a particularly Midwestern tradition of siting important public and semipublic structures as freestanding objects in parklike surroundings. While this arrangement is not common for banks, it was important for this one because its president views the building not only in terms of its primary function, but also as a place to be used for community activities. As such, the building houses frequent art exhibitions, with flea markets and other activities on the grounds outside.

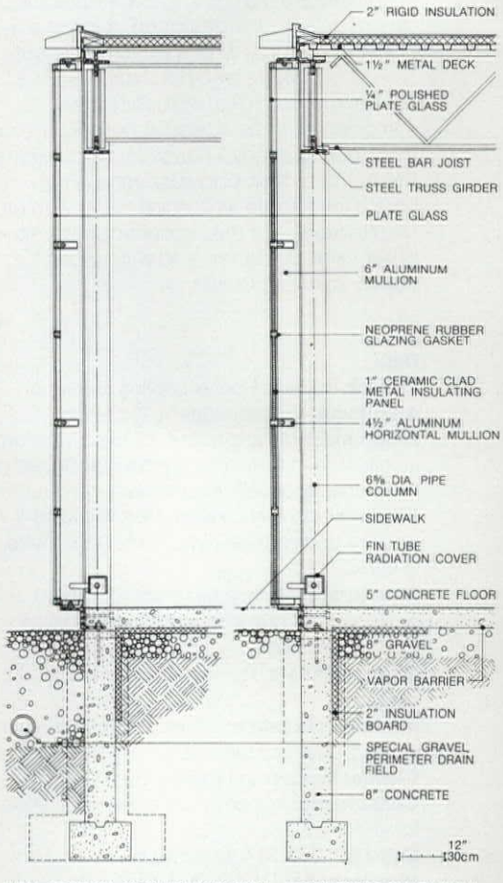
In contrast to the heavy appearance and somewhat surrealistic detailing of the old building, the new one is a lightweight, airy structure of rationalistic simplicity. But it is not, because of this, devoid of richness.

The black, industrialized steel-frame building with porcelain-enameled infill panels and tinted glass is classically proportioned, as a perfect square, which is divided into nine equal size bays of 36' x 36'. As a freestanding pavilion, the building has no distinguishable front or back. Identical steel entrance canopies projecting from the middle bays of those east and west sides are supported by columns and an overhead truss, with tie rods extending from the trusses to retain the ends of the canopies. The sides of the building, however, are read as sides. From the north façade, a steel porte cochere detailed in the same manner as the entrance canopies extends as a shelter over the drive-in stations. The south façade is similar, but without the automobile accommodations. Parking for employees and for customers who need to go inside has been kept near the east and west perimeters of the site. Large, old trees have been retained, but no new shrubbery has been added. The bank meets the ground directly, in the tradition common to European country houses, which do not need to be "dressed up."

Exposed construction throughout clearly reveals the building's 6-ft planning module and also shows how its parts, which have been employed in a standard manner, have been used to enrich the building by the way in which they have been arranged.

On the exterior, tinted glass is alternated with metal infill panels not only for functional reasons, but also to heighten the visual effect and to provide clues to the building's internal organization. The entry façades are divided into three equal parts corresponding to the bays behind them. The middle third of the wall is glazed, and the end portions are solid except for the 2-ft-deep horizontal band of glass that runs around the top of the entire building. The three bays running longitudinally between the glazed entrances form an interior "street" where the public activities of the bank take place. Private activities are in the bays flanking this space. The private zones are marked and separated from the public zones by three freestanding "pavilions" that stand inside the larger one on the ground-concrete floor.

On one side, an exposed, sandblasted concrete vault and a toilet core are visually joined by a long marble tellers' counter that protrudes into the "street" space a few



WALL SECTION AT GLASS EXTERIOR – AT EXTERIOR PANEL WALL

The 11,664-sq-ft black metal and glass building stands free on its site, unencumbered by planting, yet it does not intrude with that around it.

First National Bank of Ripon, Wi

Inside, private banking functions are separated from public "street" by a long office core (below and far right) on one side, and by the vault and tellers' counter (bottom) and wet core (not shown) on the other side. Officers' desks are in public space to encourage casual attitude; electricity and telephone cords drop from ceiling for ease of future furniture arrangement.

feet in front of them. On the other side, a long office core of wood framing and drywall, with floor to ceiling glass, separates the public space from the clerical area. These enclosures are essentially white in color in contrast to the black walls, roof, and structure, and their roofs hold the exposed red ducts of the heating and ventilation systems. The only other color in the bank is the orange-red upholstery fabric.

From the inside, the exposed steel structure is revealed as a system of custom trusses on pipe columns with standard bar joists and metal deck roofing. In each of the nine bays, the orientation of the bar joists is altered so that each bay is next to one with a different pattern above it.

None of these concerns with visual appearance, of course, is essential to the bank. But they are essential to architecture, and that is what this building is about. It is not just a simple, industrialized shed, but an exquisitely proportioned structure of classical symmetry with an elegantly balanced centralized spatial organization.

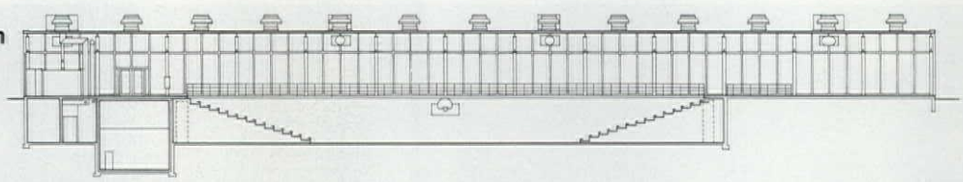
Many of the townspeople were originally somewhat apprehensive about having such a "modern" building standing alone in a prominent site in the small town. They feared that a stark black structure would cause a vicious clash with the white 19th-Century houses around it. Some of them loved, and still miss, the old bank (which fortunately still exists, but with a different use). The truth of the matter is, though, that the new building recedes into its setting and could be passed without notice. It is as calm in the 1970s as the old one was outrageous in the 1920s, and still is. [David Morton]

Data
Project: First National Bank of Ripon, Ripon, Wi.
Architects: Hammond Beeby & Babka, Chicago, Il; Kirsten P. Beeby, Thomas H. Beeby, Harry B. Burroughs, John J. Ekholm, James W. Hammond, Carl R. Hoglund, Ronald E. Krueck, Cora S. O'Fallon, Keith R. Olsen.
Site: park setting at end of commercial portion of main street, surrounded by old houses.
Program: new banking facility of app. 12,000 sq ft, designed as semipublic community pavilion, and with drive-in facility.
Structural system: round metal columns, custom steel trusses, standard bar joists, metal deck.
Mechanical system: roof-top air conditioning, unit heaters, and perimeter convector.
Major materials: steel structure; polished concrete floor; cast-in-place concrete vault and toilet cores exposed and sandblasted; aluminum stick and gasket curtainwall with tinted plate glass and insulated porcelain enameled infill panels; office core of wood frame, drywall, and clear glass panels.
Consultants: Kirsten P. Beeby, landscape and interiors; Environmental Systems Design, mechanical; Gullaksen and Getty, structural.
General contractor: Oscar J. Bolt Construction, Appleton, Wi.
Client: First National Bank of Ripon.
Cost: $539,000; $38.03/sq ft, not including fees or landscaping.
Photography: Bill Engdahl, Hedrich-Blessing.

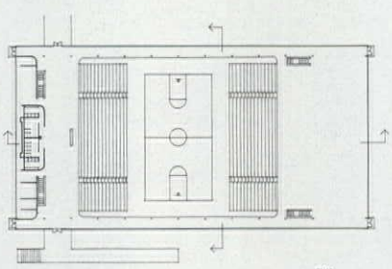
Angela Athletic Facility, St. Mary's College, Notre Dame, In

Great leap forward

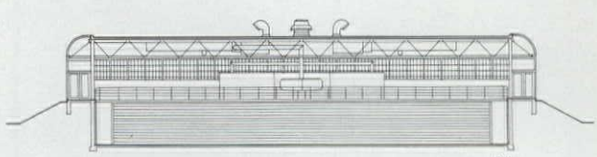
C.F. Murphy Associates' new gymnasium for a small midwestern women's college represents a quantum jump in quality for an architecturally deprived campus.



LONGITUDINAL SECTION



FLOOR PLAN 20' 6m



TRANSVERSE SECTION 20' 6m

The Roman Catholic Church was for a millenium without question the greatest architectural patron in the western world. Even the most casual visitor to Europe cannot help but see the staggering results of a building program unparalleled in the history of our civilization. Yet in the United States, the general quality of design sponsored by the Catholic Church has been considerably, even astonishingly lower—the result, one must guess, of the domination of the Catholic clergy in this country by the austere Irish, rather than the luxury-loving Italians.

Be that as it may, it is hard to imagine a less architecturally distinguished campus than that of St. Mary's College, a Catholic women's affiliate of the University of Notre Dame, located within sight of the famous golden dome of the school that gave the world The Gipper. Clustered in a calm rural setting, the architecture of St. Mary's is attractive in scale, but terrible in design. Built for the most part of garish orange brick, these structures are not unlike the purposefully utilitarian Catholic school architecture that can be seen in most cities in the U.S. That makes the addition of a splendid new gymnasium to this lackluster ensemble seem practically miraculous. Few college campuses are so impoverished as not to have at least one good building (a Latrobe-like Old Main, a Richardsonian library); St. Mary's College was one of the have-nots, and now it can rejoice in its new Angela Athletic Facility.

The right box

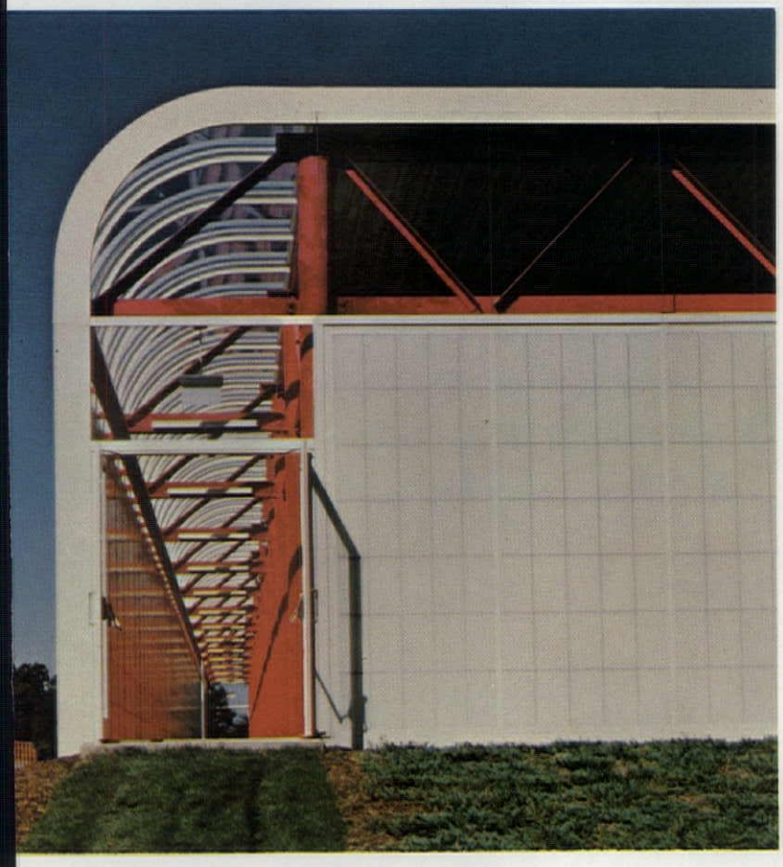
As a building type, the gymnasium does not allow for a great deal of variation, in that it must accommodate playing areas for sports requiring orthogonal configurations. Attempts to break out of rectangular forms for such buildings have not always met with success, and with a building as successful as this one, one wonders why an architect would have wanted to bother with that recurrent architectural obsession—the need to "break out of the box." The architects of this gymnasium, C.F. Murphy Associates, have a design history that makes this building an interesting culmination of their work. Ten years ago, the Chicago-based firm was still in the thrall of Mies, though their architecture escaped the onus of being slavishly imitative. Since then, C.F. Murphy Associates has become more and more interested (under the influence of its design principal, Helmut Jahn) in an aesthetic employing industrial elements and imagery, while never abandoning the interest in the formal organization and meticulous detailing of those elements developed in the firm's more purist Miesian phase.

This firm's now-familiar affinity for industrial materials within a high-tech aesthetic lends itself particularly well to the requirements of a gymnasium, and the visual results seem so appropriate as to appear inevitable. What gyms that any of us have seen did not have exposed structural members, an arresting array of posts and beams, that needed only slightly more thought and rearrangement to make them truly handsome? This is the basic premise on which the St. Mary's gym was based, and the fine results belie the simplicity and reveal the sophistication of the idea. What, then, distinguishes this building from the gymnasiums you and I have known? Materials, imaginatively chosen and skillfully handled, but put together with a fitting modesty that does not make this building look like an expensive Swiss watch, as so many high-tech structures do. And light, which shines and diffuses into this gymnasium to an extent rarely enjoyed in this building type, most other examples of which seem hopelessly dim and warehouselike compared to the Angela Athletic Facility.

It's what's up front that counts

The lightness and simplicity of this structure are at first visible from afar, as one approaches it from the access road that winds its way into the flat, open campus. The site for the gymnasium was selected with an eye toward the closure it would give to an existing group of buildings. But better yet, it commands a highly visible

The simple exterior of the Angela Athletic Facility (opposite top and center right) gives little indication of its fine crafting and interesting interplay of transparency and translucency, as seen in interior (opposite bottom right) and exterior views (opposite bottom left).



setting, deflecting our attention from the dismal dorms behind it. Crisp, white and clearly legible against the orange jumble in the background, St. Mary's gym seems from the outset to be completely understood, but that simple structure contains a number of surprises.

Arriving in front of the Angela Athletic Facility, we find that it is set atop a small berm, appealingly landscaped with low clumps of scrubby bushes that do not attempt to soften the way the building meets the ground, but rather complement it. So neatly is that done that, upon entering the building, one is surprised to be reminded of what the berm predicts; for we are on the upper floor of the gym, the playing floor sunk a story beneath us below grade. Thus, what looks to be a rather small building from the exterior opens up to a rather grand space on the inside. The perception of spaciousness is further accentuated by the absence of freestanding columns (eliminated by the building's trusswork structure), and the presence of vast amounts of natural light that passes through the translucent walls and transparent windows.

In addition to making artificial light unnecessary on all but the darkest days (and, of course, at night), the fiberglass panel walls and curving clerestory windows make the roof appear almost to float overhead, never making the industrial structure seem heavy and overpowering, but rather light, almost lacy, and serene. In the choice of the fiberglass wall panels we see a specification that borders on the providential. Inexpensive, shatterproof, needing little maintenance and increasing energy efficiency, the panels also look quite handsome (C.F. Murphy Associates does not go in for schlock), not at all reminiscent of the material in its 1950s turquoise breezeway incarnation.

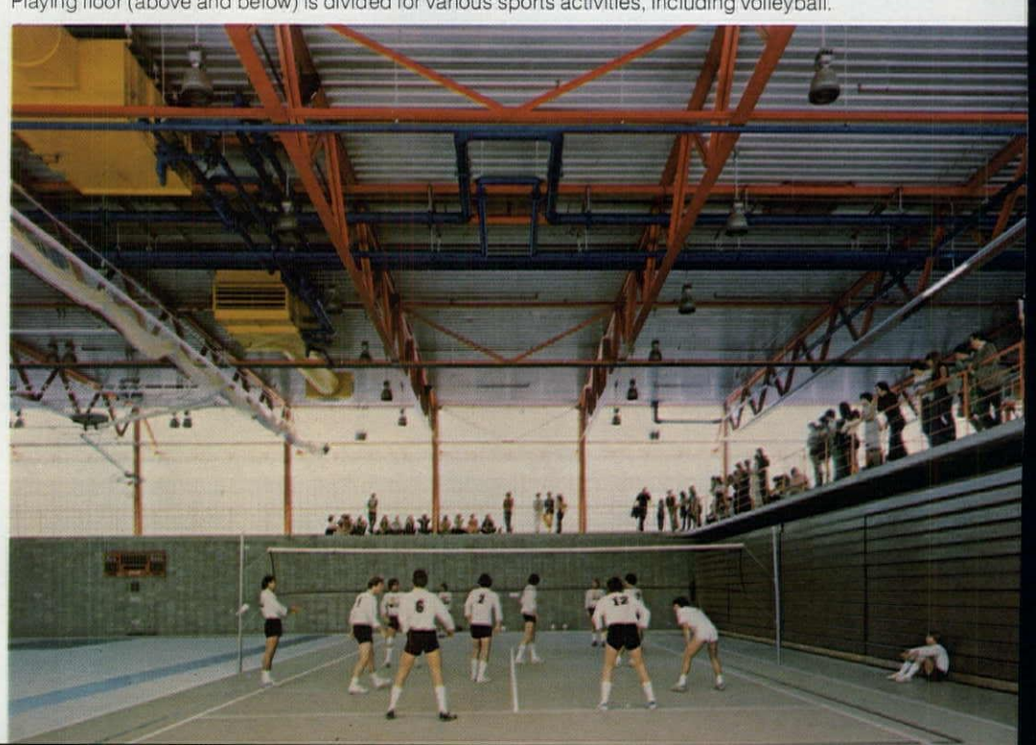
Full of grace

Within those translucent walls, the architects have indulged in a vibrant application of color to the structural members, and the results are considerably more pleasing than the now-inevitable painting, in loud colors, of every exposed pipe, duct, and truss in what seems like every new building now done by every architect under the age of 50. The red trusses, blue pipes, and yellow ducts as St. Mary's gym work particularly well at night, visible as they are through the transparent clerestory strip. There they create a bold frieze running around the building's exterior, forming a riot of primary color above the chaste, glowing translucent paneling. The effect is unexpected, joyous, and buoyant, exactly right for a place wherein those qualities ought to abound.

Color is used effectively elsewhere in the interior as well, acting as a foil against which some blatantly budget-conscious materials such as concrete block do not seem too unremittingly bleak. A freestand-

Boldly painted duct and trusses (above) hover over exercise area, suggesting a huge bird.

Playing floor (above and below) is divided for various sports activities, including volleyball.



At nighttime, the full effect of the gym's transparency and translucency can be experienced, as the building becomes a dominating feature of the campus.

ing trophy case is particularly effective: capsule-shaped, glass-walled, its school-bus yellow color visible across the length of the gym. This trophy case is at one end of what is, in effect, a wide and open ambulatory that encircles the playing floor below. On the long sides of the building's rectangle, the structural wall members are painted fire-engine red, and a walk down the length of the gym under the curving windows overhead (part skylight, part clerestory) is an exhilarating experience. The complex simplicity of the play of solid/void, transparent/translucent, industrial/architectural relationships in this building is most apparent in this progression not of "spatial experiences," but rather the multiple experiences of a single memorable space.

Down below, the large playing floor is almost the size of the building's external dimensions, save two areas at the short ends of the rectangle wherein are stored the retractable bleachers brought out for spectator contests, and, to one side beyond them, locker room and shower facilities. The large floor (covered in polyurethane surfacing rather than the prohibitively expensive wood flooring of sock-hop fame) is in itself subdivided into three smaller oblongs: a central one for basketball, flanked by two tennis courts (also usable for volleyball), the side two occupying the area covered by the bleachers when they are rolled out. The gym floor is uncommonly well lit for one of these facilities, and the problem of glare into players' eyes (a defensible reason for limiting window area in gymnasiums) is effectively reduced by the diffusive properties of the translucent fiberglass wall panels.

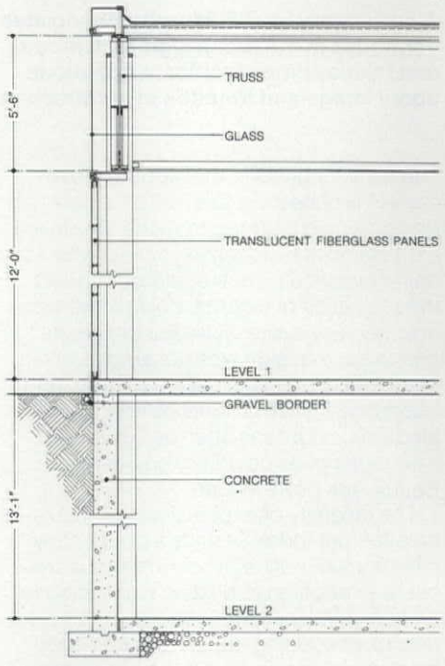
Look sharp, feel sharp, be sharp

In its various elements, the Angela Athletic Facility has the kind of racy stylishness that is seen in a host of products now available to the growing hordes of participants in America's physical fitness boom. Requiring the utmost in functionalism, sporting equipment and clothing have long embodied some of the same principles of logic, lack of the extraneous, and inherent, use-related beauty that have led architects to admire a bicycle, a tennis racket or an oar with as much enthusiasm as an Aalto stool or a Thonet chair. The general public has caught on to this, too, and the degree to which Adidas (and their imitators) have become America's favorite leisure-time shoes is as much indicative of their style as it is of their comfort.

So have C.F. Murphy Associates provided an image for St. Mary's College that embodies the best aspects of functionalism and style. The firm's enthusiasm for industrial materials is right on target here, for there could be little disagreement for their use in a building type which houses human activity at its most functional. The mock Gothic gyms at older institutions seem ludicrous by comparison (however good the dorms and chapels in the same style at those schools might look), and the expressionist efforts of such buildings as Eero Saarinen's Ingalls Rink at Yale no less so. Here we see the way to do it—a building that is bright, tough, and no-nonsense, but with care and attention given to every aspect of the job.

Only in one aspect is the building less than well done, and that flaw was imposed by the client. After an unpleasant incident involving an emotional loser of a game, the athletic director required that the open-plan offices (surrounded at first by partition-height walls only) be fully enclosed to protect the privacy of those who sought (or required) counseling. The resultant spaces have the approximate dimensions and atmosphere of low-budget saunas, and look mean and illogical, especially in comparison to the generous and open space just outside these horrid little cubicles.

But that is a very small detail as seen against an excellent whole. C.F. Murphy Associates has given its client a new sports facility that is economical, functional, handsome, and praiseworthy, and has conferred on an architecturally undistinguished campus its first building of style and distinction—a quantum jump, and also a jump for joy. [Martin Filler]



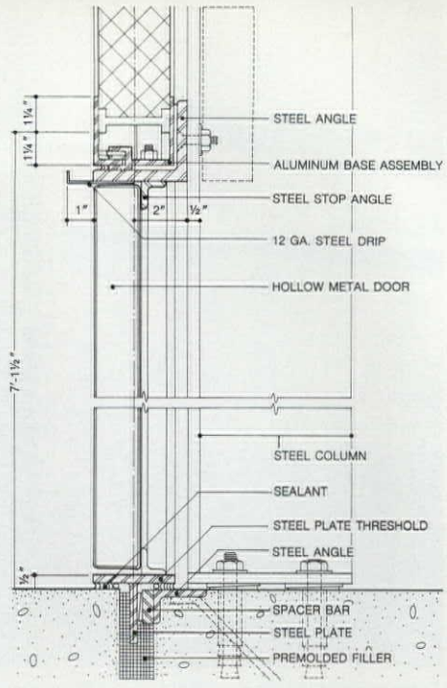
WALL SECTION

Data

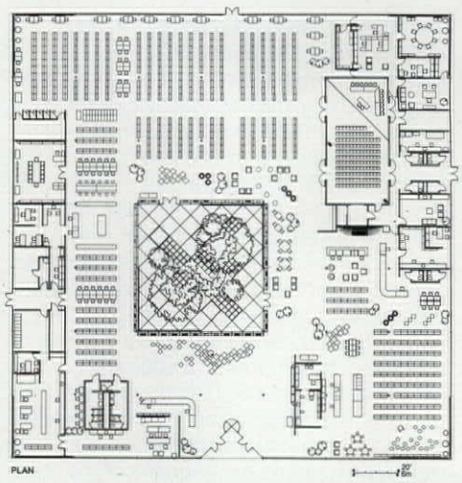
Project: Angela Athletic Facility, St. Mary's College, Notre Dame, In.
Architects: C.F. Murphy Associates. Design principal: Helmut Jahn; project architect: James Goettsch.
Program: athletic facility of 42,000 sq ft for small Catholic women's liberal arts college, with bleacher seating for 1800 people for spectator sports and use as exhibit or assembly facility for graduations, concerts, or social events, with provisions for future expansion.
Site: empty lot completing existing architectural grouping on rural campus.
Structural system: steel frame construction.
Mechanical system: package units, all air.
Major materials: fiberglass walls (interior and exterior); concrete block walls (interior); carpet, concrete, and polyurethane recreational surface floors; exposed construction ceiling. (See Building materials, p. 110).
General contractor: The Hickey Co., Inc.
Client: St. Mary's College.
Costs: $1,750,000; $39/sq ft.
Photography: Keith H. Palmer.

Michigan City Public Library, Michigan City, In

The reading factory



WALL SECTION AT DOOR


PLAN

A new library by C.F. Murphy Associates continues in the firm's high-tech mode, and raises some significant questions about image and function in architecture.

The early theorists of the Modern Movement in architecture foresaw a future when design would be freed from the fraudulent expression of historicizing styles, when architecture would once again be "honest" in its rejection of external design that was not internally expressive. But the desire to create such design was not always within reach of architects' abilities to do so, and accordingly the machinelike imagery of Modern design was often as "dishonest" —though not as obviously so—as a Beaux-Arts powerhouse.

The diversity of expression that marks architecture today permits a great many different aesthetics to operate simultaneously. In addition to pristine white images and shaggy gray ones, we can find a great deal of work being done in the so-called "high-tech" mode. And like its stuccoed or shingled siblings, this architecture is best understood by listening to what it "says" to us, for, like its more frankly historicizing relatives, it shares a tradition and a set of associations that cannot be overlooked in its proper comprehension.

Artists and models

"I don't agree that different building types have to have a different look," says Helmut Jahn, design principal of C.F. Murphy Associates. "Nobody has been able to tell me anything typically associated with the way a library ought to look, or with any other building type, for that matter." Thus he sets himself up in direct opposition to a great deal of architectural thought today, which maintains that various building types have various established forms that must be followed (or at least considered) if a humanly responsive architecture is to be obtained. Strictly speaking, Jahn is right. Though one can think of any number of excellent libraries (Michelangelo's Laurenziana, the cult-object Ste. Geneviève, any one by Richardson), one is hard pressed to define what one should actually *look* like, in quite the way that some ground rules could be established for the way a house or a church should look.

An easier approach might be to look at some of the libraries of the 1960s (SOM's Regenstein at the University of Chicago or Beinecke at Yale, or Philip Johnson's and Richard Foster's Bobst at NYU) to define what a library ought *not* to look like. Taken against those monumental comparisons, the Michigan City Public Library is a welcome reversal of a trend that seemed to see the preservation of wisdom in great stone tablets, not in books and people. Paradoxically, although the Michigan City Public Library's image is that of a factory, it in fact is a considerably more humane setting than that image would seem to indicate. The scale, the sense of amenity, and its apparent care about its users are all easily discerned.

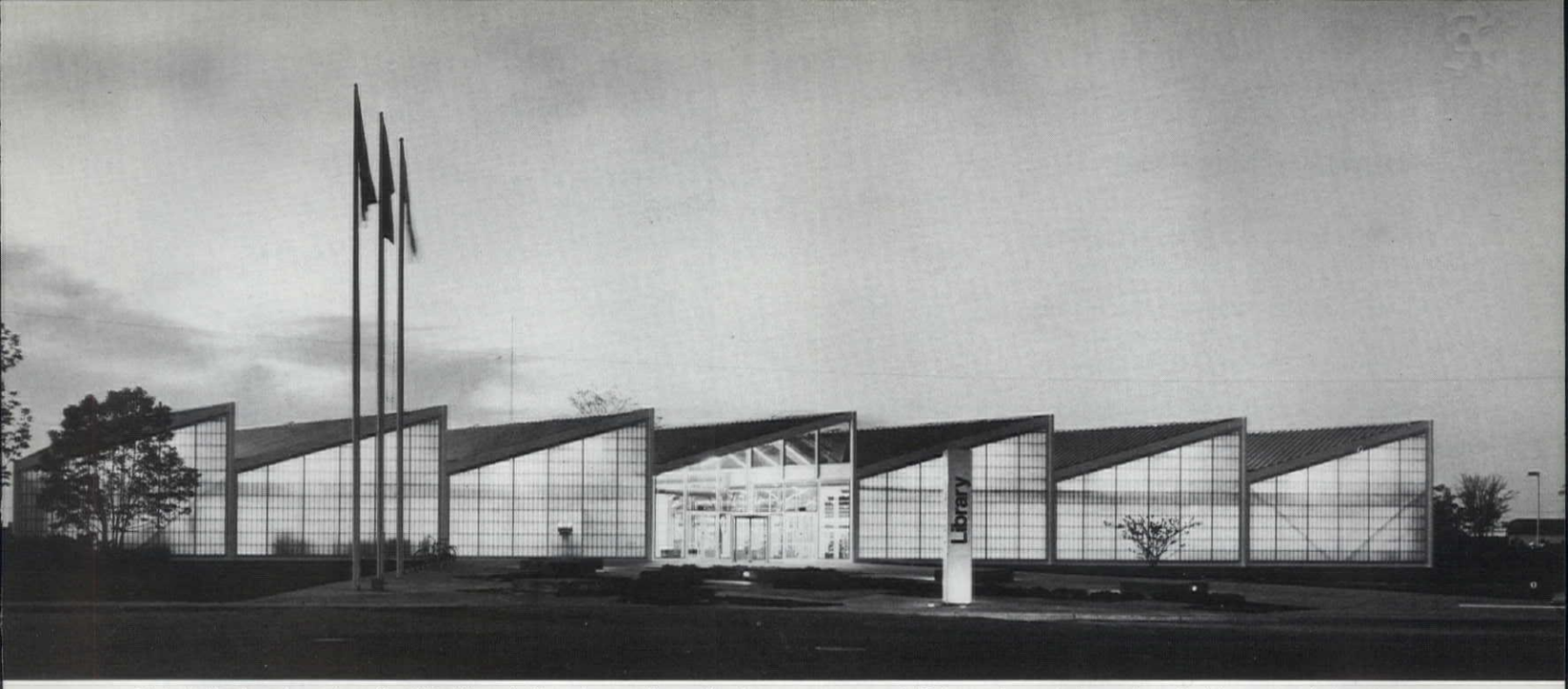
It is, instead, in the physical performance of the building that fault can be found, but those failings are serious in a building type where human comfort must be promoted. If the limitations of factory design cause those failings, then is not that image as intrusive to human activity as any other stylistic imposition, no matter how much this particular image speaks of (and promises) efficiency, productivity, and, above all, functionalism?

Light at the end of the tunnel

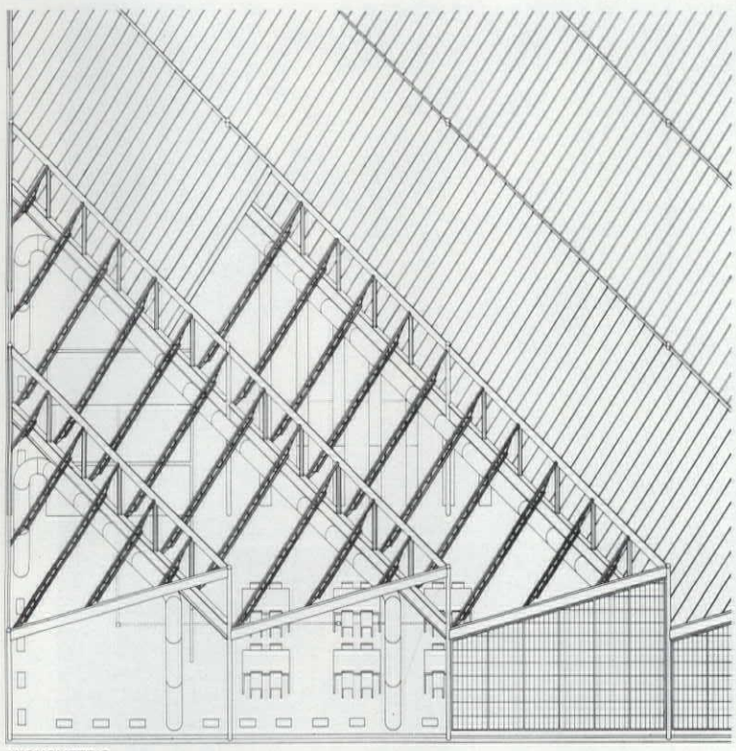
The Michigan City Library stands at the end of the main downtown street of a small Indiana city not far from Chicago. Like many other small Midwestern cities, Michigan City has suffered urban blight. In an attempt to reverse Michigan City's decline, the main commercial street of the city was transformed into Franklin Mall. This revitalized corridor leads at one end to the new library and its landscaped entrance plaza, providing visual closure to the recently created shopping mall. The factory image of the library, especially when viewed in this context, at first seems an incongruous sight, but it is also an intriguing one.

It takes not long at all to appreciate it as far better than the kind of pompous little mansarded monument that would be used to create axial closure in a more pretentious community. For the residents of Michigan City, many of whom work in the factories that are visible along the highway all the way to Chicago, are quite a bit more comfortable about wandering into this library than they might be if the building were all decked out in travertine and bronze. Thus the factory look turns out to be, in this setting at least, as effective in fostering human responsiveness as the red brick/white trim approach of the exponents of the Vernacular Revival.

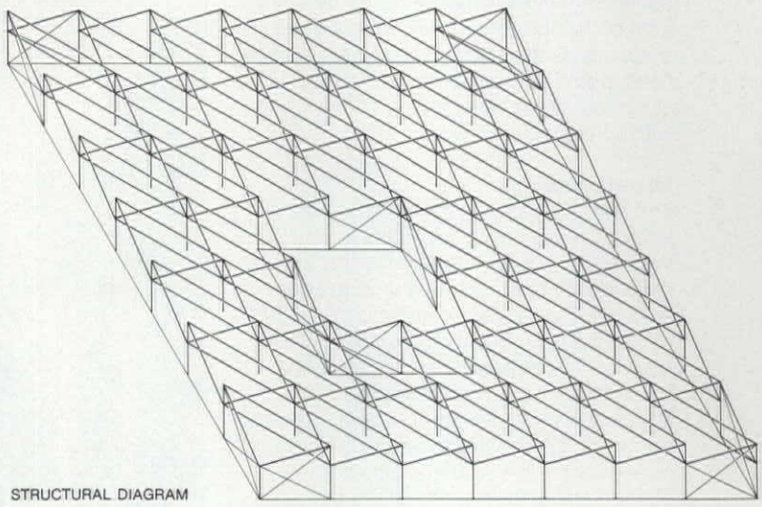
As one approaches the building down Franklin Mall, one eventually can tell that this is not a real factory. Even with its sawtooth roof line and its industrial materials, it is all a bit too neat and much too clean to be a place where real manufacturing goes on. The library's vocabulary of exterior materials is exactly the same as that of C.F. Murphy Associates' new gymnasium at St. Mary's College some 30 miles to the east of this building (see p. 58). Large expanses of translucent fiberglass wall paneling work as well here as they do in the gym, though the programmatic requirements of those two building types could scarcely be more different. But a library needs a good deal of light, and why not let it be natural? And like the college



At dusk, the translucent quality of the library's fiberglass wall paneling becomes apparent. Entrance is made through central, transparent glass bay.



AXONOMETRIC



STRUCTURAL DIAGRAM

The roof structure of the Michigan City Public Library was plotted by computer, done in-house at C.F. Murphy Associates. The structural diagram (above) gives a better idea than any photograph of the sophisticated double-ordering system that allows for the diagonal arrangement of skylights, enabling them to be oriented toward even northern light. The deceptively simple plan of this building (opposite page) gives no indication, as these diagrams do, of the visual richness that the two arrangements combine to create. The cutaway axonometric (above left) gives a more detailed view of the library's system of trusswork.

that commissioned the gym, Michigan City had a limited budget at its disposal, so the savings both in material costs and in energy and maintenance expenses were significant. Thus Helmut Jahn's assertion that one building type need not look different from another is given more credence by his interchangeable use of materials.

In plan, the Michigan City Public Library is essentially a square, with another square (an atrium) set, though not symmetrically, within it. On closer inspection, another ordering system is revealed. The building's sawtooth roof contains transparent skylights above the translucent walls (an arrangement again similar to the clerestory windows at St. Mary's). In order to enjoy exposure to the even northern light, the skylights are placed at a diagonal against the simple square of the exterior walls. The compositional results are exceptionally interesting, and a circuit of the building (inside as well as outside) makes one's perceptions of the forms a constantly changing and constantly revealing experience.

The sounds of silence

That is especially true in the case of the atrium, which one sees immediately upon entering the library's glass doors (the only transparent break in the translucent wall paneling at ground level). We have come inside, and are immediately outside (so it seems) once again. Centered by a large honey locust tree that was flown into place by a helicopter, the atrium is a successful resolution of a frequently risky design element. Atriums in public buildings are second only to sunken urban plazas in their frequency of high expectations followed by disappointing realizations. But this one really works: both visually, as it opens the interior of the library to light and a pleasing prospect of greenery, and physically, when it is used as the setting for midday chamber music recitals and readings.

The interiors that surround the atrium have been pleasingly designed by Deborah Jahn, an interior designer who is also the architect's wife. The furniture tends towards light and simple designs, some in white-painted metal harmonizing with the exposed interior structure of the library. The color scheme is predominantly worked out in a series of high-keyed yellows, greens and blues, tied together by the almost-gold wall-to-wall carpeting (scored with a brown pencil stripe) that is used throughout the building.

But as nicely worked out as the interior of the Michigan City Public Library is in terms of its design, after one has been in it

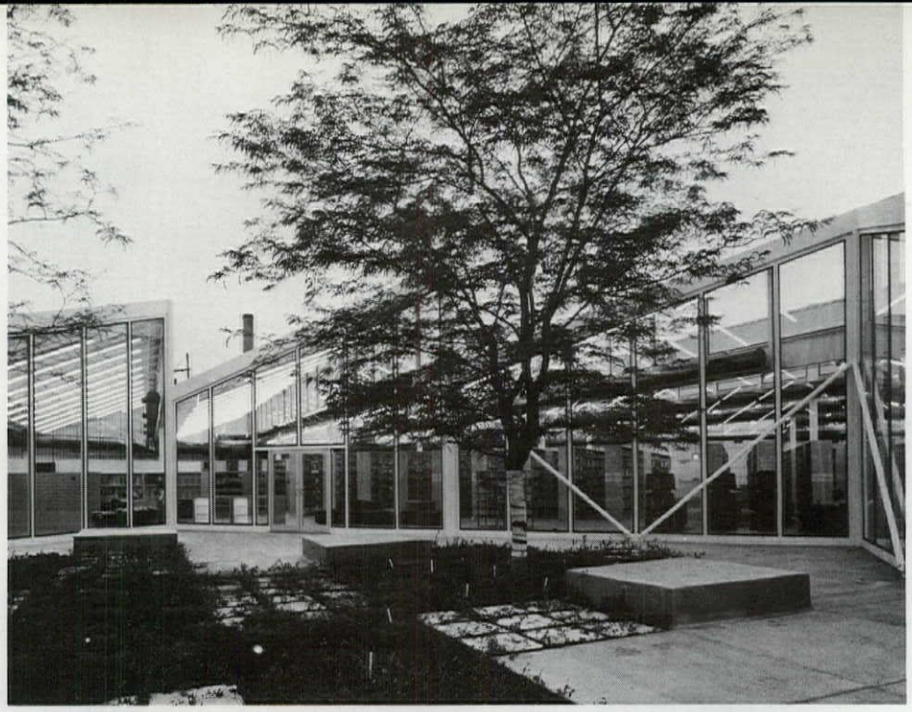
for a few minutes, one slowly begins to sense that something is not quite right. It begins with a faint put persistent tapping sound. The pitter-patter of the rain on the roof? No, it is sunny outside. Are starlings tap-dancing overhead? No, it is the sound of the aluminum roof expanding and contracting in the course of a sunny spring day. Once that little obbligato has been accepted as so much inevitable background noise—nonobjective Muzak, as it were—one then becomes aware of the very strange and rather bad acoustics of the place. The problem has been neatly summarized by one librarian on the staff, who says, "At most libraries, the librarians go around telling people *"Shhh!"* Here, they tell *us* to be quiet." The unusual roof configuration of the building, combined with its lack of enough sound-absorptive surfaces, makes for some rather odd acoustical phenomena. There are such surprises as the staff, in their open-plan offices, being able to hear the children's story hour at the other side of the building with surprising clarity.

Mixed blessings

The annoying and undeniable fact of the library's acoustics is a result of the building's tight budget. Interior acoustic paneling was deleted in a questionable economy move, and was not anticipated either by architects or clients to create such difficulties. The importance of quiet in this building type was not sufficiently respected, a programmatic aspect more important in a library than issues of image or pure design. The staff has also complained about the heating of the building. The unit heaters that are distributed around the open interiors (only a meeting room complex is entirely enclosed) proved inadequate during the severe weather of last winter. Thus the users of this handsome but flawed building found it to be a less than congenial environment during their first year of occupancy—though the librarians rejoice in the expanded space and noteworthy organizational improvements that their new quarters bring. What is to be done? One would think that the acoustical difficulties will not be insurmountable ones.

One solution might be to insert acoustic paneling on the raking inside surfaces of the ceiling (a measure the architects are urging). Another might be the addition of so-called "white noise" machines to screen the various aural annoyances. The building's virtues are many, not least of which is the economical cost of this kind of construction. The appearance of the building is handsome and neat, but there always remains the old question of form and function. Here we have a building that is good looking, though it does not work so well as its looks and materials would seem to suggest. The disparity is more acutely felt because of the industrial materials that are used here, but that is no more than a piquant contradiction. And it is certainly not without precedent in the history of Modern architecture.

The lesson that the Michigan City Public Library gives us is that the issue of a building's successful functioning remains a central one. And though the high-tech style of design has some notable aspects to commend it to our attention, it is not immune from some of the same problems experienced in architectural design of all styles, past and present. The recent work of C.F. Murphy Associates, one of the more skilled firms working in the high-tech mode, provides an interesting breadth of issues to be dealt with in this necessary wider evaluation of this kind of design. This firm's work is thus all the more significant, as much for its failures as for its successes. [Martin Filler]

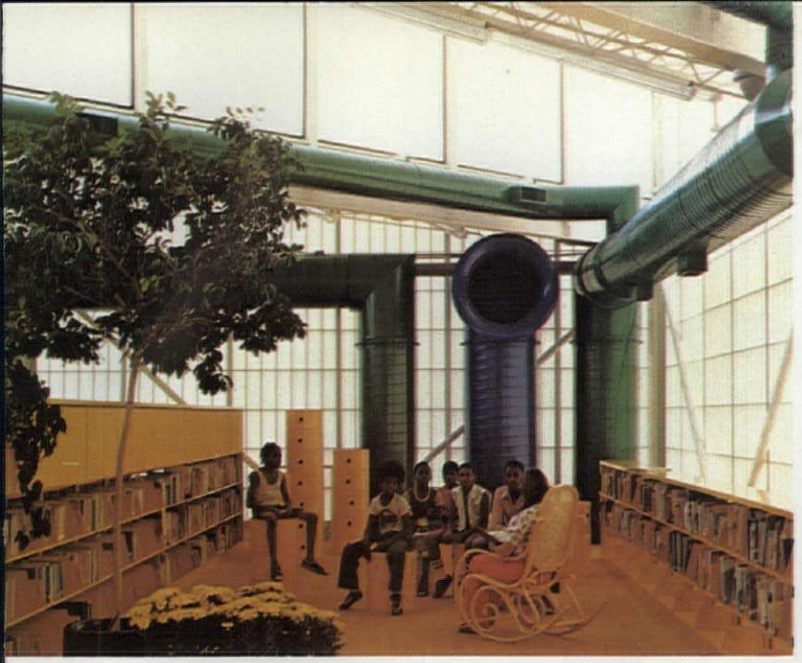


Library's atrium (above) is centered by honey locust trees, and is used for recitals and readings.

Exterior walls of library (above) are fiberglass panel, contrasting with transparent clerestories.

Data

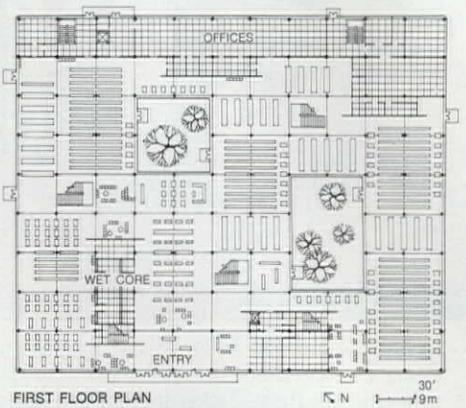
Project: Public Library, Michigan City, In.
Architects: C.F. Murphy Associates. Design principal: Helmut Jahn; adm. principal: Carter H. Manny, Jr.; project architect: Dennis Recek.
Program: main library branch facility of 35,280 sq ft for a small midwestern city, containing areas for adult services, reference information, children, audiovisual, technical services, administration and business offices.
Site: downtown site adjacent to municipal buildings, creating closure to city's main street.
Structural system: steel frame construction.
Mechanical system: air and hydronic.
Major materials: fiberglass walls (interior and exterior); carpeted floors; exposed construction ceiling. (See Building materials, p. 110)
General contractor: Larson-Danielson.
Costs: $1,541,768; $43.50/sq ft.
Photography: Keith H. Palmer.



The interiors of the library are flooded with light; translucent wall panels (above, left) diffuse direct light and reduce glare. Colors throughout were chosen to create a feeling of lightness and warmth; green, blue and yellow predominate. Seating was imaginatively selected for varying needs: Thonet rocker and stacking stools (above, left) for the story corner, womblike sphere chairs (above, right) for privacy in open reading area.

Auraria Learning Resources Center, Denver, Co

Aurora Auraria



FIRST FLOOR PLAN

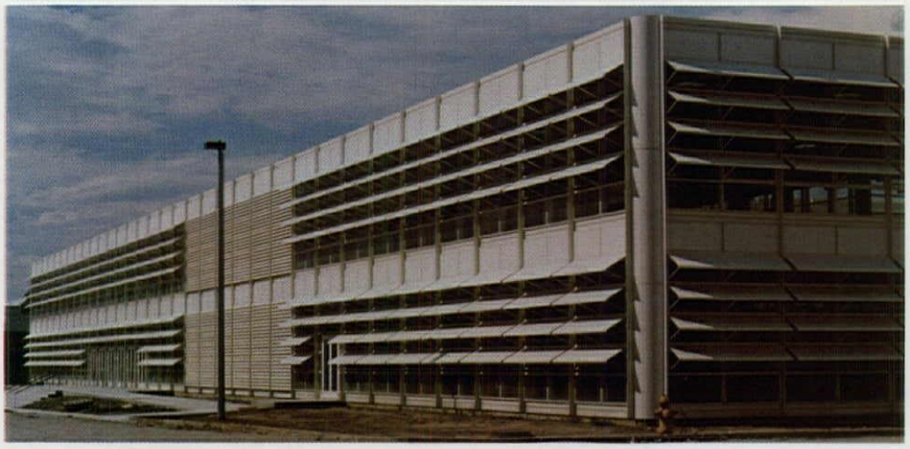
The new learning resources center at Auraria Higher Education Center glows in a place that is otherwise rather dim.

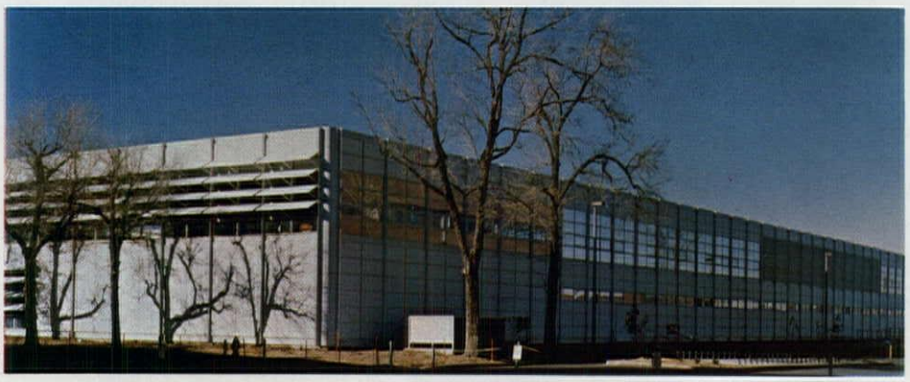
In the best tradition of International Style Modernism, C.F. Murphy's Learning Resources Center at Auraria Higher Education Center in downtown Denver, Co, could as easily be a factory as a library. The shining, white painted aluminum-and-glass-clad reinforced concrete structure was originally designed as a prototype for all the buildings of the new campus, but the school's board of governors opted for subsequent structures to be finished in red brick. As a consequence, the resources center stands today in a sea of mediocrity as the only reminder of a scheme that promised to bring architectural distinction to the entire campus.

The 184,000-sq-ft center is the main focus of a new campus, and, as such, it was purposely designed to impart a sense of openness and transparency to "advertise" itself and the activities that go on in it. The two-story building contains facilities for the library, for media production, and media education, with some of the media activities housed in a partial basement. These facilities are shared by 28,000 students of three publicly supported educational institutions that use the campus: the Community College of Denver, Metropolitan State College, and the University of Colorado.

The two floors of the building are organized as flexible "loft" space that is asymmetrically divided into use areas only by two large open interior courts and three unenclosed stairways. Other than these elements and a wet core, there are no spatial determinants within the 30-ft square column bay system that makes up the structure. The interior has been kept unencumbered, with enclosed rooms limited to one perimeter wall.

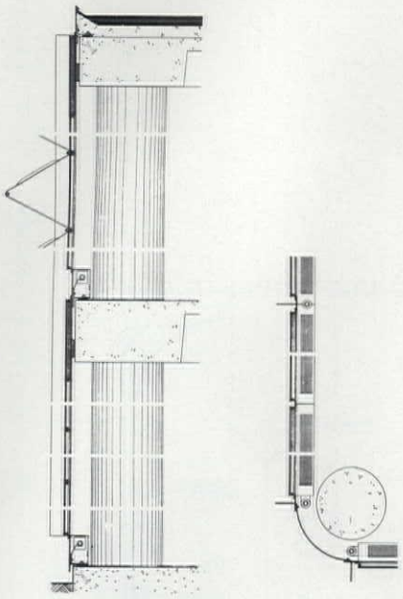
The exterior walls of the center are assembled from a factory-finished modular system of extruded aluminum curtainwall that accepts fixed glass, operating sash, mechanical louvers, or insulated metal


Sunscreens protect west, entry side and south side (above), but not east office side (below).

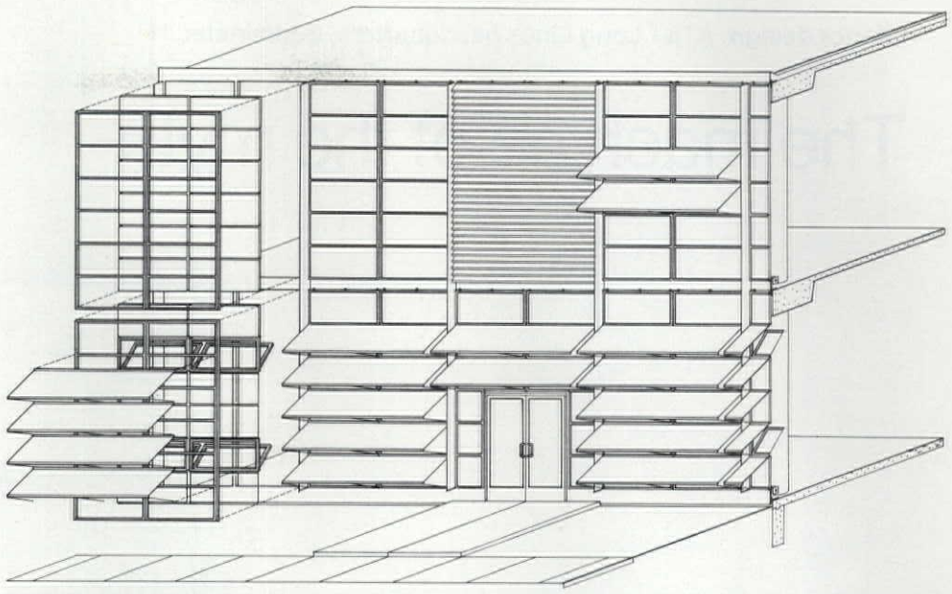

Photos: C. F. Murphy

Inner courtyards (below) are a major spatial determinant in the large open-plan space.


Barbara Elliott Martin



CURTAINWALL SECTIONS



COMPOSITE AXONOMETRIC CURTAINWALL

panels. Fixed sunshades are used on the south and west exposures. Because the curtainwall is attached to the outside of the concrete structure, the problem of fitting an enclosure between bays is avoided.

It is in the innovative use of conventional materials and technical systems, however, that the real importance of the center can be seen. Because budget limitations did not allow expensive environmental devices, significant energy savings were attained in other ways. The architects conceived of the building as a rectangular shell, since that form would minimize the amount of exterior wall in relation to the gross square feet to reduce heat gain and loss. High quality roof insulation and insulated wall panels give additional help, and the building's white painted exterior further reduces heat gain in summer. Fixed sunshades on the south and west exposures are angled to keep sun out in the summer, but to allow it to enter during the winter. In addition, diffused natural light from the sunshades gives adequate reading light to 40 percent of the building during the day. This, coupled with the use of low-wattage halide lighting, has reduced electrical costs by requiring less power for lighting and none for conditioning light-generated heat. But in addition to savings in operating costs, the architects estimate that by using the sunshades $400,000 has been saved in mechanical equipment costs.

Through intelligent and innovative use of existing technologies and materials, the architects have produced a building that takes advantage of the sun as a heat and light source when needed, but keeps it out when not needed. They have made a building of high transparency that is habitable without air conditioning. They have produced an extremely energy-efficient structure on a very low budget, thus countering the often-heard belief that such design is initially costly. Granted, this has been done in a region of the country that is particularly receptive, both climatically and socially, to such ideas, but these ideas are still too rarely seen, even in places such as Denver that average 300 days of sun per year. [David Morton]

Color is limited to large wall areas (above); exposed ceiling aids future use rearrangements.

Data

Project: Auraria Learning Resources Center, Denver, Co.
Architect: C.F. Murphy Assocs., Helmut Jahn, partner in charge; David Hovey, project arch.
Program: 184,000 sq ft of flexible loft space for library, media education and production.
Site: flat, once-deteriorated area downtown.
Structural system: reinforced cast-in-place concrete with post-tensioned beams and joists on round columns forming 30-ft-sq bays.
Major materials: concrete, extruded aluminum skin of fixed glass, operating sash, and insulated metal panels; aluminum sunshades.
(See Building Materials, p. 110)
Mechanical system: 13 single-zone air handling systems with one fan for each exposure, plus four interior zones. Central steam and chilled water.
Consultants: C.F. Murphy Assocs., mechanical; Zeiler and Gray, structural.
General contractor: Eby Construction Co.
Client: State of Colorado.
Cost: $5,254,201; $28.55/sq ft.

Barbara Elliott Martin

Interior design: AT&T Long Lines headquarters, Bedminster, NJ

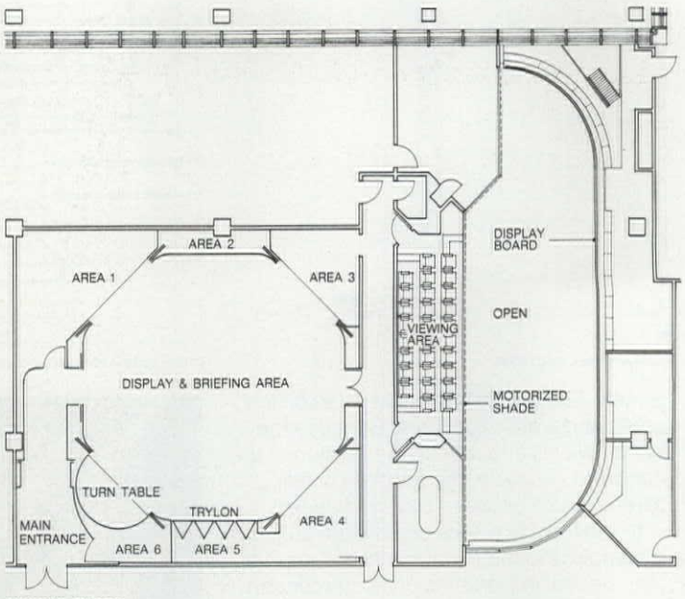
The machine of the myth

Set for *Star Wars II*? New home for Eyewitness News? No, it's Alan Sitzer Associates' designs for AT&T, creating an image in keeping with the client's faith in the future of technology, and reminding us with surprising impact that the future is already here.

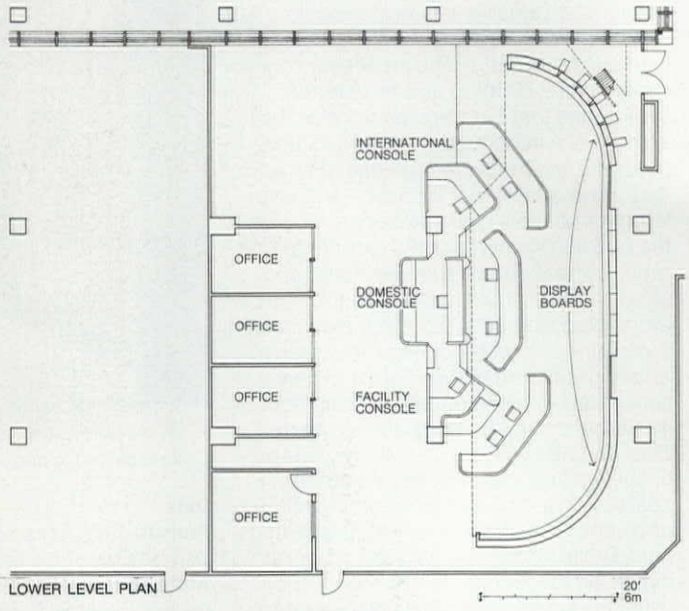
Set amidst the lush, rolling hunt country of Northern New Jersey are three sprawling office building complexes, several miles from each other, which together form the regional nerve center for the American Telephone and Telegraph Co., America's largest corporation. One of those buildings is a big, bland, boring affair, clad in pink granite, designed by John Carl Warnecke & Associates for the long-distance department of the company, AT&T Long Lines. Removed from the variety and vitality of a city, a large corporate headquarters seems even more frightening and impersonal when it is isolated on a remote rural site. Accessible (and escapable) only by private automobile, such a setting precludes such individual delights as lunch at a neighborhood bistro, bargain-hunting in a nearby department store basement, or even milling about aimlessly in one of those urban mobs that often provide more entertainment than a Broadway show. Though the architect of the Long Lines building provided three central atriums (approximate in scale and style to a high-class suburban shopping mall), those spaces do not even approach the socializing potential of those exurban agoras, let alone that of a busy city street.

Fly me to the moon

But within this dehumanizing setting are two interiors of much greater wit and imagination. They are rooms which wholeheartedly embrace the imagery of the machine and the worship of the future, a much more honest stylistic stance for AT&T than the soporific middle-of-the-road modernism that surrounds them in a haze of beige walls and peach carpeting. For the design of their new Display and Briefing Room (known at AT&T as D&B) and new Network Operations Center (NOC), the company turned to a firm which previously had done display, exhibit, and interior design work for them with notable success: Alan Sitzer Associates, whose principal had worked on exhibits for



SECOND FLOOR



LOWER LEVEL PLAN

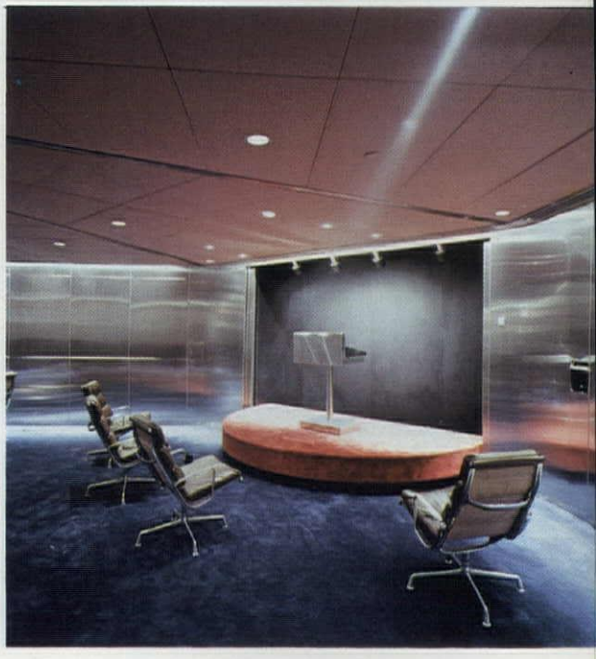
Harrison & Abramovitz's AT&T Pavilion at the 1964 New York World's Fair. In the best tradition of world's fair exhibit design, Sitzer and his associates (including a staff of skilled craftsmen to execute components that are largely custom-made) have created in these two interiors a feeling of excitement, glamour, and (not least) persuasiveness. For above all, these rooms are highly sophisticated sales tools, and in that intended role they perform superbly.

The Display and Briefing Room and the Network Operations Center are used for giving small groups of important AT&T employees, clients, government officials, and the press the Gospel according to Ma Bell. The operations of the company's long-distance network are first described in the D&B Room, and then are observed (at least symbolically, on maps) in the NOC. It is a performance designed

Entry to D&B Room (above) is lit by blue neon.

D&B Room as seen through entrance (above) and interior (below) showing rotating display screen.

Screen (above) and stage (below) are used for presentations.



for selling, using architecture and interior design in a very traditional way, no matter how futuristic the image of the rooms. The first of the two spaces, the D&B Room, is entered through a vestibule off the building's central atrium. Passing through smoked-glass doors, we are in a small vestibule that sports a snazzy portal—rounded corners, stainless steel—that is illuminated from behind by indirect blue neon lighting, which casts a spacey azure glow on the shiny, curving walls. Overhead, thick cylinders of Lucite set into downspots (lit by blue bulbs) further enhance the feeling that we are in quite a different environment from the one we've just left. Turning to the right, another portal opens electronically, revealing the octagonal D&B Room behind it.

Low-ceilinged, columnless, spacious, and hermetic, the Display and Briefing Room immediately makes the visitor feel special, pampered, and adventurous. Like a world's fair exhibit, or a ride at Disneyland, you somehow know this room is going to *do* something. Before the lights dim, one has time to be suitably impressed by the quality of the workmanship: the flawless stainless steel walls, and especially the beige-fabric-covered ceiling, faultlessly detailed as so few ceilings are. Lush, dense, steel blue carpeting underfoot adds to the sense of quiet luxury that is inescapable here, and as one settles into the chrome-and-brown-leather swivel chairs, one finds Ma Bell's lap a very comfortable place indeed. That is, until the real show begins. Four walls of the D&B Room are given over to audio/visual presentation systems, on which inspirational messages from AT&T are played: sermons on better living through better technology, paeans to growth and expansion. To the accompaniment of music in the *Star Wars* heroic mode, we are asked to believe that AT&T's main purpose on earth is to launch more satellites so we can place a Mother's Day call to Grandma Hawkins in 2.5 seconds. Needless to say, the company's less altruistic practices are never mentioned; one remembers the unforgettable *New York Daily News* headline proclaiming yet another phone rate hike: "Ma Bell Wrings, and It's for You."

We have seen the future, and its works

But the content of the presentations aside, this is a very effectively designed interior, and its integration of a vast number of mechanical devices impresses one with the range of problems faced by display and exhibit designers. On a pure design level, Alan Sitzer's choice of seating is particularly intriguing. For the now-classic Eames Soft Pad lounge chairs, designed in 1968, seem far more believably futuristic than this season's last word in far-out seating. Though it's been around for ten years now, this Eames chair gives no hint as to its real age, and as such it possesses true futurity. People have often assumed that the future will bear little or no resemblance to things as we have known them. (One need only look back to the visionary predictions of the first half of this century to see how cloudy has been the crystal ball of design.) The D&B Room correctly reminds us that, in many respects, the future is already here.

After we have been inculcated with the doctrine of Progress with a Profit, we are ushered across a narrow corridor into a glass-walled gallery, with 28 auditorium-style seats, overlooking the Network Operations Center where the Long Lines network is monitored in all its nationwide complexity. The NOC is best described in terms of a Pentagon Situation Room as seen in such apocalyptic epics as *Dr. Strangelove* or *Fail Safe*. Its vast, glittering, wraparound maps do not, however, record the passage of enemy missiles across the DEW Line, but rather report mere breakdowns (and resultant reroutings) of long-distance telephone service across the United States. The NOC is just as meticulously put together as the D&B Room, but like its antechamber, it is a glorious fraud. Behind the two-story swath of maps and lights are all manner of props and struts holding the whole thing up. The sleek entablature of smoked glass onto which gorgeous maps are projected is, in truth, too heavy to be supported by the flats below it, and is therefore suspended from the ceiling.

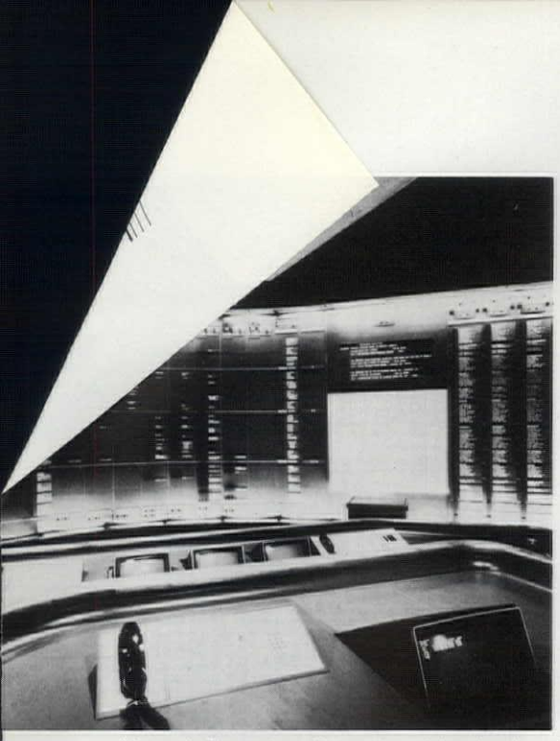
Grand illusion

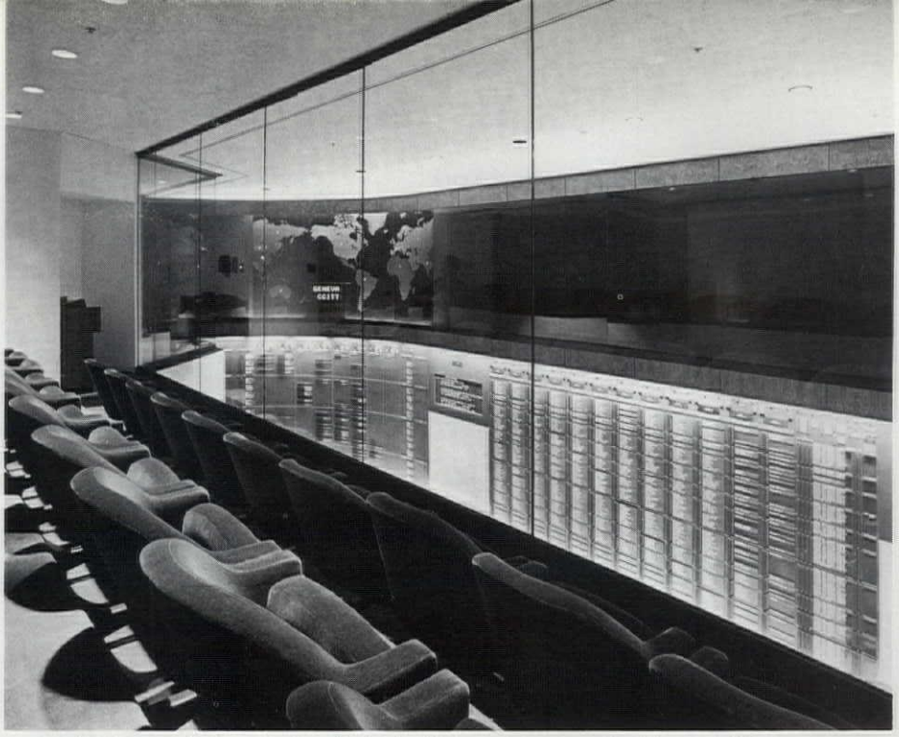
Nothing we see in either room is structural, and, like much of the machine-aesthetic design of the early Modern Movement, what we have here is expensive hand work masquerading as machine-made components. The functions of the NOC were at one time carried out in a small, nondescript office on New York's Sixth Avenue. None of the entrancing visual displays in the new NOC are really essential to its operation, and a look behind those walls is a bit like a peek behind the Wizard of Oz's curtain. But that ought not to ruin our fun in having been taken in by the illusion, for isn't that revelation essential to the necessary deflation of blind belief in the future and the power of its machines?

Truly we can see the Display and Briefing Room and the Network Operations Center as the accurate manifestation of the client's wishes, hopes, and dreams. This *sanctum sanctorum* is dedicated to the worship of the machine (in both its literal and symbolic incarnations), and as such it does better to look like one, rather than a hunt club dining room or a middle class suburban living room, more usual images for visitors' centers such as this one. If we take this as a fun interior in which one can conjure up all kinds of Space Age telephonic power fantasies (Calling Sydney toll free! Listening in on Henry Kissinger!) then we can recircuit its less lighthearted intentions as effectively as the Long Lines system can recircuit our telephone calls. AT&T has commissioned an imaginative firm of designers to create an environment in which it is quite possible for AT&T to pursue its fantasies while we independently pursue ours. And best of all, it's their dime. [Martin Filler]

Data

Project: Display and Briefing Room, and Network Operations Center, AT&T Long Lines department headquarters, Bedminster, NJ.
Architects: Alan Sitzer Associates, Inc. Creative Director: Alan Sitzer. Design & Coordination Director: Jorge Sosa, AIA. Audio Visual Director: David Peter Egen. Construction Director: Erwin Adler.
Program: audio/visual sales and marketing display and briefing room, and monitoring control room for the long-distance network of a large communications corporation.
Major materials: stainless steel walls, carpeted floors, fabric-covered and acoustical tile ceilings.
Cost: withheld at request of client.
Photography: Bill Rothschild.

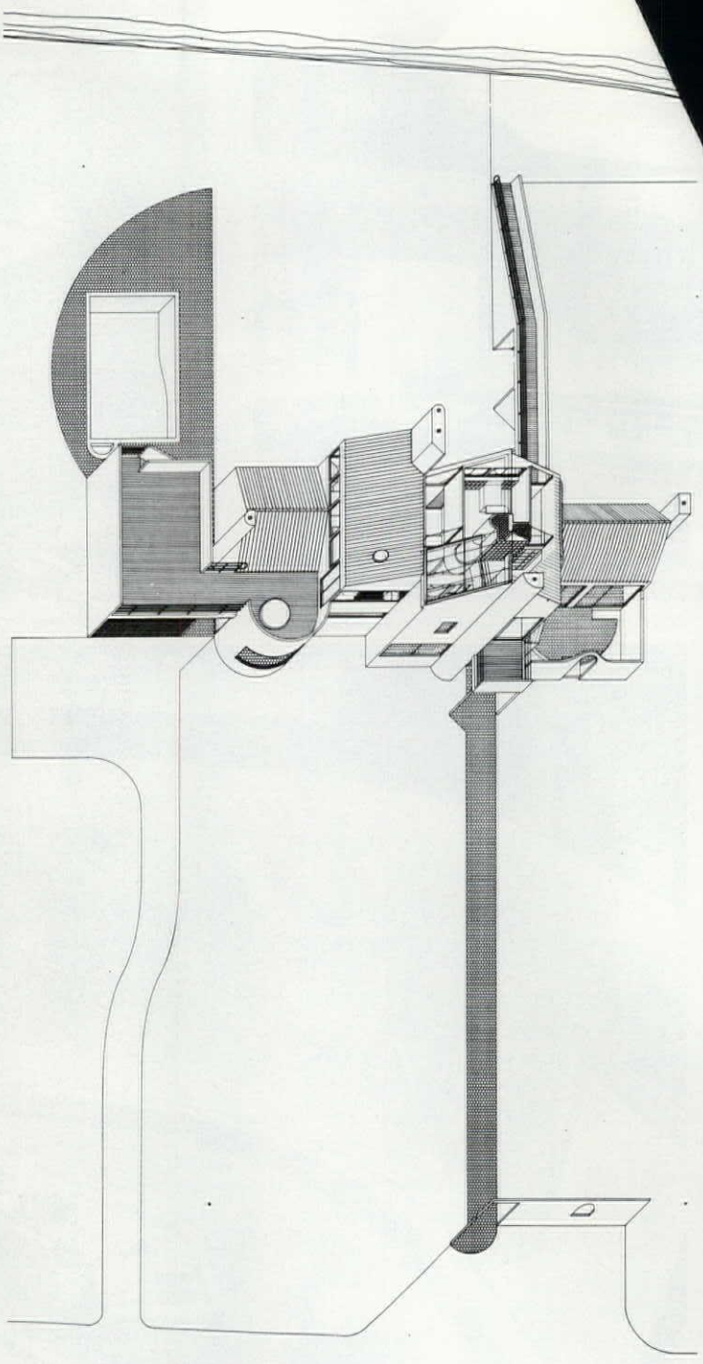




Network Operations Center has visitors' gallery (above, right) which overlooks main floor (below), with its various consoles (above, left).

Kislevitz House, Long Island, New York

Casa moderna



AXONOMETRIC SHOWING THIRD FLOOR

Adhering to their commitment to Modernist notions of space, circulation, and plane, Gwathmey Siegel redesigned this Spanish Colonial beach house, staying within the volume dictated by the original.

This house is not for the sentimental—not for those nostalgic souls (as this observer surely is on occasion) who shrink from touching a single tendril of ivy creeping over crumbling stucco walls. This beach home on Long Island, designed in the 1920s in the Spanish Colonial style, *did* have ivy dripping off its tan stucco walls. But today only the roof and foundations remain. The rest of the house has been gutted and given a new *parti* with all that it implies, including new exterior walls to reflect the plan within. It is a new house in an old volume, not a renovation.

Working within the Modernist code, architects Charles Gwathmey and Robert Siegel have done a superior job. Nevertheless, as a work of architecture that embodies certain attitudes about responding to the past, the house leaves some issues unaddressed (or *over* addressed).

The architects are not engaging in the same Modernist/Classicist interaction seen in their Whig Hall scheme at Princeton (P/A, June 1973, p. 122). Dialogue between past and present occurs here, but only in whispered asides. As an exploration and demonstration of how elements of the past, both pre-Modern and Modern, can be manipulated and refined to generate architectural form, however, this design solution is instructive.

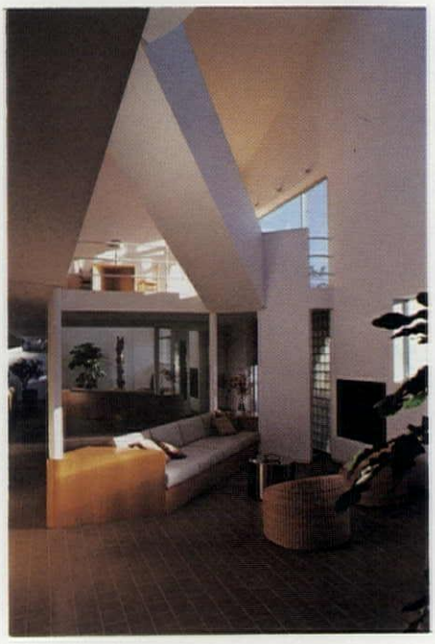
The client, Harry Kislevitz, an interested and knowledgeable architecture enthusiast, had at first contemplated renovating the house only slightly, making a few functional modifications. Yet he wanted something really *architectural*. He called upon Gwathmey Siegel, whose published work had attracted him. When Gwathmey said, "It is a s—t house; tear it down," Kislevitz was nervous. But Gwathmey's renovated barn in Greenwich, Ct, contained that element of surprise he was looking for: entering something old and seeing a new space dramatically unfold.

Given Kislevitz' desire to keep the exterior shell of the house intact, Gwathmey Siegel still came up with a scheme that meant rebuilding all walls and floors except two cross walls, portions of the front stair, and most of the main floor. Kislevitz agreed with the tearing down of the exterior walls to open up the interiors to light and view. Once involved in the process of change, he explains, his imagination was seized: he had to go with each step.

Staying within the volume established by the red tile roof, Gwathmey Siegel developed a scheme almost choreographic in its motifs, its composition, and its spatial experience. They responded to the potential of the given volume, with its 26-ft-high ridge line, by organizing the *parti* so that the focus of the house is a three-story-high hall, topped with a 17′ x 17′ skylight.

This house manifests extremely well this firm's Modernist forte in making circulation architectural. Interestingly, however, the circulation does not take over the space: corridors, mezzanine, stairs, and ramps are narrow (3′-3″ generally). There is as much logic in the connections of this spatial armature as there is formal play—orthogonally, diagonally, vertically, and horizontally.

As one approaches the house, a fragment of the entrance elevation comes into view through the opening in the screen wall (above). Moving past the wall and down the entry path of the expansive lawn, the full elevation looms large. At the entry one moves through a compressed space, where architectural motifs to be seen within are presented as clues. Inside, the hall then expands dramatically (photos, below).



Kislevitz House, Long Island, NY

Push and pull

There is also an element of surprise, both in spatial sequence and inclusion of minor devices for optical effect. Spatially, the whole entrance sequence and its pacing creates a series of crescendos as you are pulled into the house: from the point of seeing only a fragment from the outer gate, to the house as a whole moving down the extended front path; to the entry that presents many of the architectural motifs to be seen inside, to the diagonal screen wall inside the foyer, and finally to the skylit hall. The second-floor ramp extending out to the water from the rear of the house sets up an effective counter motion.

The main hall has a compactness and density that can be felt. The muscularity of its control is balanced by the lateral push of spaces away from it, spaces that are much cooler, more straightforward and understated. The Modernist geometric vocabulary, exercised with consistency and rigor, ties all areas together and creates variously scaled spaces that are *usable* (with the exception of the second-floor landing, which functions as a game room, but is too important to the circulation to read as such).

Elsewhere the semicircular motifs seen in the plan of the court paving are repeated in the section of the barrel-vaulted living room, and in elevation in the breakfast room and several balconies. The pitch of the skylight repeats over bathroom ceilings; the diagonal of the stair bridging second-floor landing to third-floor guest room balcony is repeated below in the design of the built-in sofa and cabinet. Built-in furniture constantly underscores the motifs, and fin walls at the entrance are reestablished as leitmotifs under the ramp at the rear. It never stops.

In some cases it simply goes too far for psychological or visual comfort. For example the extensive use of the built-in oak cabinetry and seating, on the diagonal or orthogonal, with semicircular contours, and the same palette of materials and colors, gets to be thick after a while. Another problem is the fin walls under the ramp. They may give the living room space a sense of privacy, but they do obstruct the view of the water.

Minor motifs

Subtle design devices that the firm has been employing in some of its interior work add a visual complexity. The use of mirror to dissolve walls and give a sense of spaces beyond is sophisticated, although its use triggers associations with chi-chi decorators expanding the spaces of small model apartments. In the breakfast room the device is most successful, the mirrored wall reflecting the garden outside and optically rounding out the circle established by the curved window. The sandblasted glass circle on this mirror signifies the conceit, while transmitting light to the bathroom on the other side.

The translucency of glass-block walls in the interior baths or in the stippled-glass sliding doors of the bedrooms off the balcony comes as a surprise, too. Similarly, the clerestory windows on interior walls that read initially as *reflections* of other windows effectively exploit perceptual impressions.

The manner in which the house opens to light and view succeeds in making the visitor aware of the logical layering of space. From the screen wall at the parking area to the fully transparent wall facing the water, this idea is pursued systematically. Notwithstanding large expanses of windows toward the street, views are controlled: to the idyllic landscape off the breakfast room; to the courtyard off the living room. Framed glimpses of trees and sky can be had from the floor of the hall, patches of grass or tile roof from the upper levels.

Nevertheless the new elevations appear almost raw under the old red tile roof. The flush fenestration turns the elevations into taut membranes. The roof carries such a weight and texture that the exterior walls could use the massiveness, texture, and detail seen in the Spanish Colonial style architecture. Oud's 1922 Garden Village at Oud-Mathenesse in Rotterdam dealt with this issue of planar walls, large expanses of windows, and gabled tile roofs. But there the window mullions and muntins, the projections above the planar wall, and the break-up in massing served to link the vernacular code with the Modernist one through weight and articulation.

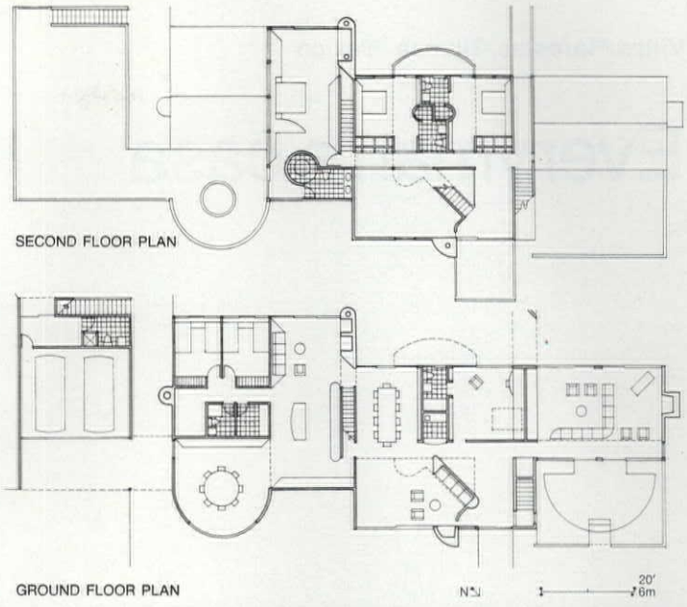
It would have been nice to keep the original tan stucco wall dripping with ivy as a screen wall so that when you passed through the house, you passed through it in a layering of time as well as space—a theoretical speculation, to be sure, that has little to do with practicality or money. Retaining the old façade, Gwathmey responds "would have been a little too cute for me. That's not my game—leave it to the historians." He is straightforward.

The clients like the house. Kislevitz feels enough of the old house has been retained by working within its volumetric framework. The result gives the house a quality and subtlety he doesn't usually sense in renovations.

Despite the additive nature of the solution, there is a *coherence* that carries with it intimations for future work by the firm, and for work of other architects. Adhering to Modernist values of manipulation of space, volume, light, and plane plus a Modernist geometric code, Gwathmey Siegel has demonstrated that the baby of Modern Movement architecture need not be tossed out with the bathwater. In their role as "straight shooters," this firm, paradoxically aided by the pre-Modern physical parameters of the old house's volume, reaffirms the notion that architecture is still about an internal three-dimensional dynamic. This dynamic has a center of gravity and is governed by a body of principles worth attending to. [Suzanne Stephens]

House at beginning of "remodeling."

Data
Project: Kislevitz Residence, Long Island, New York.
Architects: Gwathmey Siegel Architects.
Site: 3.25 acres near beach.
Program: remodel extensively six-bedroom house designed in the 1920s; new features in the 6000-sq-ft house include a gym instead of garage, swimming pool, decks and balconies, an expanded kitchen, and guest suite.
Structural system: existing concrete and masonry block foundations, new wood framing with stucco surfacing.
Major materials: stucco, quarry tile (ground floor and terraces), white oak strip floors, laminated gypsum board. Existing terra cotta roof tiles.
Mechanical system: oil-fired forced hot air heating.
Contractor: Laszlo Girhiny.
Client: Mr. and Mrs. Harry Kislevitz.
Cost: withheld at request of client.
Photography: Norman McGrath.

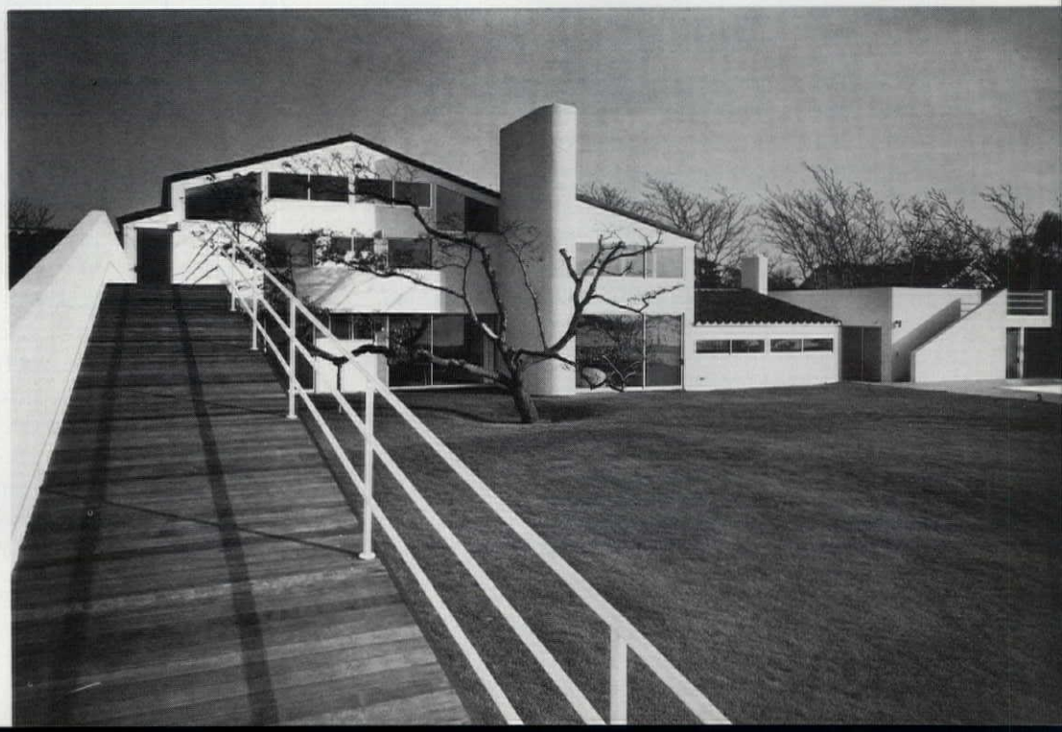


Design for kitchen is shiplike and elegant.

Barrel-vault of living room shifts eye to view.

The chimney for fireplaces in bedroom (above) and kitchen beneath is expressed as a curved semi-detached element in rear of house (right).

The back wall of the breakfast room is mirrored to complete the arc of the curved window.



Villas Florestas, Tijuana, Mexico

Everyman's casa

High-density, open-market housing for a border town meets routine needs with designs that are at once simple and sophisticated, traditional and modern.

Twenty miles below San Diego, on a 52-acre site in Tijuana, Mexico, are the first 40 houses of a 200-unit project. The architect is Morphosis, headed by 33-year-old Thom Mayne and Michael Rotondi, 28, both instructors at Southern California Institute of Architecture (SCI-ARC).

Morphosis is a bound-form/free-form firm which expands, in this case to include Livio Santini, former SCI-ARC student and a Mexican national. In bound form or free, Morphosis has won two P/A citations (Jan. 1974; Jan. 1977).

You can call the population of Tijuana half a million; even Mexican officials give or take a hundred thousand when they set it, because of the uncounted tens of thousands from the interior waiting there to get into the U.S. Add to this the steady stream of Americans entering every day to shop, to dine, to go to bull fights, laetrile clinics, or on their way to one of the many resorts down the Baja peninsula.

Tijuana is a cultural and dimensional hybrid. Its symbols of the good house come from across the border in the form of gabled roofs, shingle or wood siding—an impossible dream because wood is imported and—for big jobs—even the carpenters to do the rough framing. The official system is metric but Tijuana observes the 4-ft/8-ft module from across the border. The common dimensional reference is the concrete block. Roof beams are precast, prestressed concrete planks poured in forms with adjustable length and width.

Learning to work in Mexico was not clear sailing. The architects revised the developer's site plan to take advantage of the natural contours and give separation to the houses, but the bulldozers moved in and executed the original plan. This required several 10- to 15-ft retaining walls between flat building sites. The architects had hoped to recoup by following a typical Mexican practice of the continuous wall along the street—deleted, alas. However, the variation of the design theme produced a progression of forms along the streets.

The architects designed four models, each with three bedrooms and one-and-a-half baths, the area ranging from 810 to 1100 sq ft. One is two-story; one is one-level-and-a-half; and two are composed of two separate volumes with a narrow linkage. The most ingenious are the last two; sleeping and living are on the same level but detached.

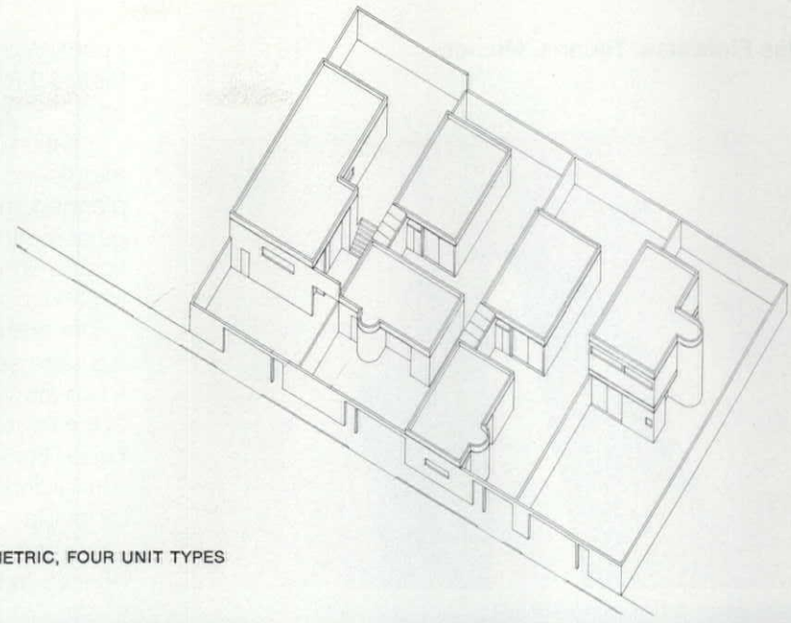
A decided advantage in planning for sites only 33′ x 80′ was the Mexican leniency regarding side setbacks. The houses are pushed to the lot line on one side and all the open space is thrown to the other. This creates three separate courts, entry/auto, living, and service. The linkage in the two-volume model forms a third wall of a three-wall court, a typical Spanish Colonial scheme.

The interior space is also pushed around so that it adds up to more than its sum. In the one-and-a-half-level house, the illusion of spaciousness comes from a clear sweep of ceiling above kitchen cabinets, the cylinder enclosing the half bath, and the glimpse into the balcony bedroom.

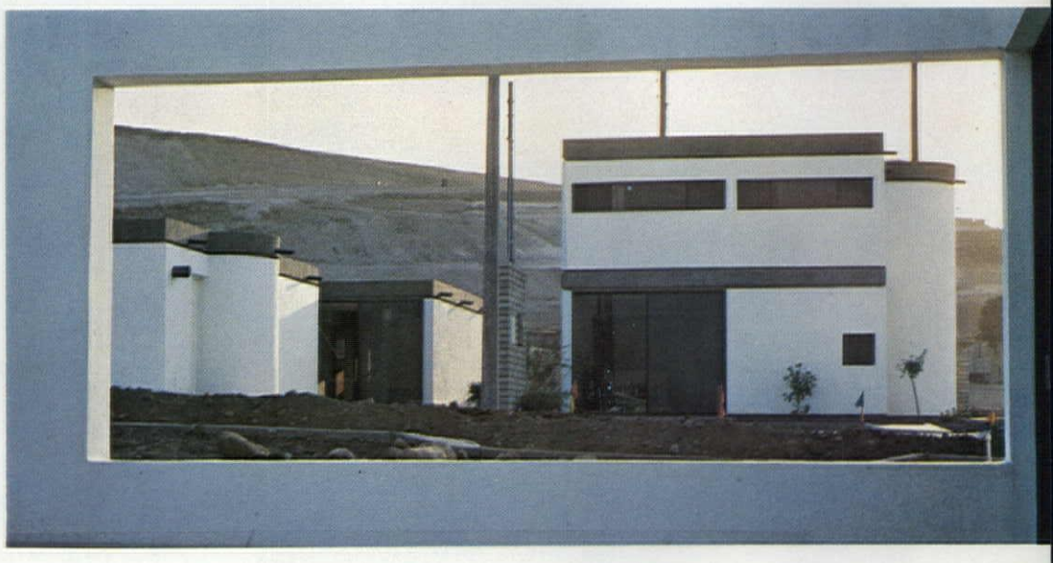
The cylinder—"We just liked it"—interrupts the interior space of one model and the exterior form of the others. In the latter cases, the cylinder is a recess for the second bath or for the stair. The light favors the cylinder, too—light from strip windows out of the 1920s, glass block out of the 1930s, and the decadeless sliding glass opening onto protected courts.

Corbu's homage to ocean liners is acknowledged in the cylinders and vents; more expected is the ode to the boiler room in the exposed ducts. What is touching in such small houses, however, is the scaled-down Luis Barragan vistas—minus Barragan's references to the coarse materials of village convents. What ties the whole design together is the band of dark, coarse concrete running like a syncopated cornice from house to house, somehow making up for the continuous street wall that isn't there. There is always vitality, sometimes more refinement than one could expect in a low-cost house.

At least they were planned as low-cost. The typical housing by INFONAVIT (Mexico's HUD) in Tijuana was $8 per sq ft for the decorated box; the first estimate Morphosis got was $9. Then the peso was devalued. The cost of the lots rose from $3000 to $5000, the houses to $13.50 per sq ft. For the second series of houses, cost was reduced by substituting for the concrete block a new wall



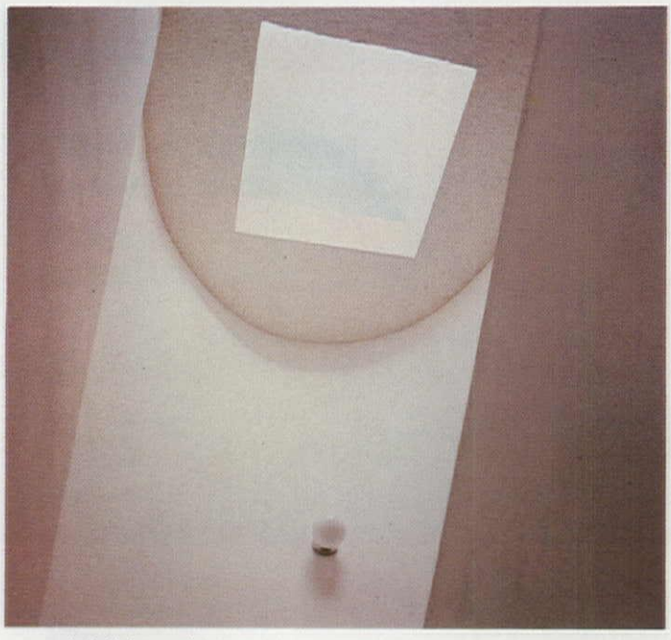
AXONOMETRIC, FOUR UNIT TYPES



Entrance to split-level unit (above; left in view below) shows typical white stucco walls, dark cast-in-place parapets, bright painted doors. Deletion of street walls (shown in drawing) detracts from typical units (right).

Villas Florestas, Tijuana, Mexico

Stairs of two-story unit, with tile treads . . .



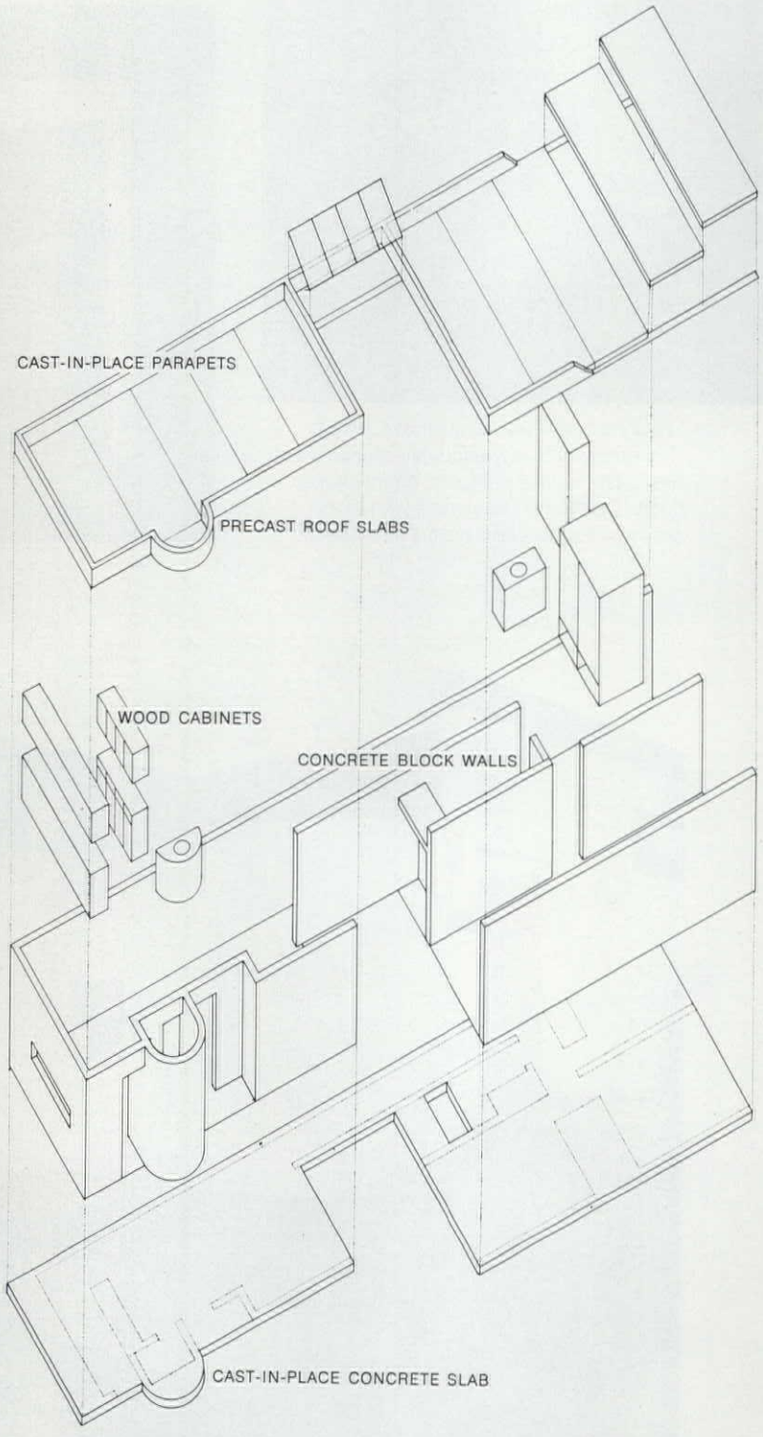
. . . and skylight, project next to entrance.

panel (W-2) developed in Chino, Ca, for low-tech countries, a 3-in. wire space frame with a 2-in. polyurethane core.

Inflation is swallowing the saving. Instead of the lower-middle-income families for whom the architects had planned, most of the houses were sold to young engineers, doctors, and merchants—of a generation sophisticated enough to be comfortable with imagery indigenous to Mexico.

The weeks the architects spent in Tijuana on the housing were good training for their second large project there, a five-story building for doctors' suites. Delayed by the fall of the peso, it is now ready to start. The client is the Maria Luisa Riedel Hospital, which adjoins the site for the offices.

In giving this glass-block, curtain-wall building a P/A citation (Jan. 1977, p. 58), juror Craig Hodgetts called it a "considerate" building. Considerate is a good word for the houses, too. [Esther McCoy]



EXPLODED AXONOMETRIC

Unit interiors have boldly painted cabinets, ducts, and vents set off against white plaster walls and quarry tile floors. Sliding glass doors open living areas to sheltered patios (bottom photo) enclosed by walls of adjoining houses. Construction of units along one lot line allows maximum private outdoor area, but private front courts were sacrificed with elimination of planned walls along street.

Data
Project: Villas Florestas, Tijuana, Baja California, Mexico.
Architects: Morphosis, Los Angeles, Ca (Thom Mayne, Michael Rotondi, Livio Santini).
Client: Immuebles y Fraccionamientos, Tijuana.
Site: 200 existing, subdivided lots, 33′ x 80′; rolling terrain.
Program: four single-family house types, 3 bedrooms and 1½ baths each; separation of living and sleeping areas; 40 of 200 completed.
Structural system: concrete block walls; precast, prestressed roofs.
Major materials: stucco on exterior of walls, plaster on interior; wood cabinets as interior partitions; ceramic tile floors; built-up roof.
Consultants: Susan Clark, interiors; Asistec Ingenieros, structural and mechanical; Logo, precast concrete (engineering and contracting).
General contractor: Asistec Ingenieros.
Cost: $12.50 per sq ft.
Photography: Daniel Zimbaldi.

Consulting engineers' specifications

Alvin D. Skolnik

Unless there are guidelines established in advance, specifications contributed by various engineering consultants may differ on important points. The author suggests ways to overcome these inconsistencies.

Architectural firms that engage the services of engineering consultants must be careful to properly coordinate the specifications, not only for technical content and completeness, but also for style, format, syntax, consistency in the use of terminology, and other equally vital characteristics of the documents. While the sections related to the architectural trades are prepared by the architect, along with the General Conditions and Division 1—General Requirements, the engineering sections are frequently prepared by one or more consultants. It is not uncommon for engineering firms to have the engineers (rather than specifications specialists) prepare the specifications for their respective trades (civil, structural, HVAC, plumbing, and electrical). As a result, the total specification is a product of the work of several individuals, often from a number of different firms, each with his own style, and varying degrees of expertise or interest in the skills required for writing specifications.

The primary purpose of the *technical* specifications within a set of contract documents is to complement the drawings for a project by establishing quality standards for products and systems, performance standards, acceptable tolerances, and requirements for test programs. The technical sections may also augment the "up-front" documents by elaborating on requirements for such things as specific samples, certifications, and *extended* guarantees. It is important to recognize the concept of the specifications being part of *the contract documents*.

Considering all of the above, it is advisable for an architect to meet with all of those who will contribute to the specification and establish the matrix in which they will work, the format, the terminology, the style, and any other ground rules or items of coordination. Engineering consultants who serve more than one architectural firm are plagued by the differences in what their clients expect of them in these matters.

The General Conditions and Division 1 should be reviewed by the engineering consultants *before* preparation of their trade sections. Consulting engineers often have their own "boiler plate" in a section entitled "General Requirements for Mechanical (or Electrical) Work" which invariably covers subject matter already included in the General Conditions, and in entirely different language—a cardinal sin! The usual explanation is that they (the engineers) have not seen the General Conditions and want to be certain these items are covered. In my own experience, there is rarely anything in the engineer's "boiler plate" section which is not more properly covered "up front."

There are certain sound basic rules to follow related to the language, style, and format.

Format: A great deal has already been written about the benefits of using the CSI format. Its acceptance continues to grow, even on an international level. The Specifications Clinic article "Using The CSI Manual of Practice," written by William T. Lohmann in the April 1977 P/A, is a useful reference.

The Language of Specifications: As to the language of specifications, it is a good rule to rely on the dictionary for commonly accepted usage of terms. Definitions are contained in the AIA General Conditions for the following: 1) The Contract Documents, 2) The Contract, 3) The Work, 4) The Project, 5) The Architect, 6) The Owner, 7) The Contractor, 8) The Subcontractor, and 9) definitions related to time, such as a) The Contract Time, b) Date of Commencement of Work, c) Date of Substantial Completion, and d) Day. Other definitions frequently added to the Supplementary Conditions are for the terms "provide," "furnish," and "install." *It is essential that terminology be consistent.* If "provide" is defined as meaning furnish and install, do *not* use phrases such as "provide and install."

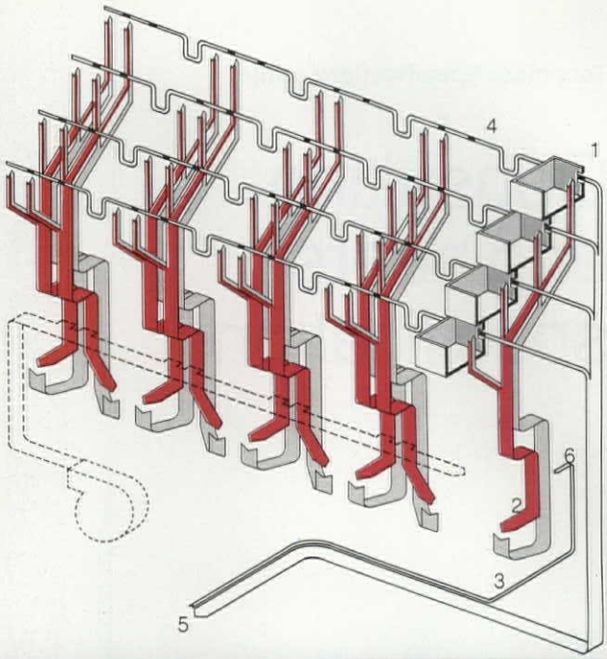
Do not repeat anything that is covered elsewhere. Write specifications in the imperative mood. Use proper grammar and sentence structure. Avoid ambiguities. Capitalize words and phrases used as proper nouns, such as "Contract Documents," "The Work," "The Owner," and so forth. Avoid phrases such as "This Contractor shall . . ." or "The Plumbing Contractor shall. . . ." Everything in the contract documents should be directed (in the imperative mood) to the contractor by merely saying "Provide. . . ."

Relationship to Owner/Architect Agreement: It is essential that all segments of the contract documents prepared by architects or engineers be properly interfaced for consistency with the agreement between the Owner and the design professional. Clauses included in the contract documents which define a responsibility of the design professional to perform a function *not* in his Agreement with the Owner are gratuitous and may very well get the architect or engineer into trouble. The Schinnerer "Guidelines for Improved Practice" urges that such clauses be avoided.

Unless the specification is written with the same care and skill brought to the matters discussed above as is brought to the design and engineering, the end product will surely jeopardize the success of the project and create problems for those involved.

Author: Alvin D. Skolnik, FCSI, is Director of Research and Specifications for Skidmore, Owings & Merrill, New York.

Internal distribution systems



Courtesy The Ehrenkrantz Group

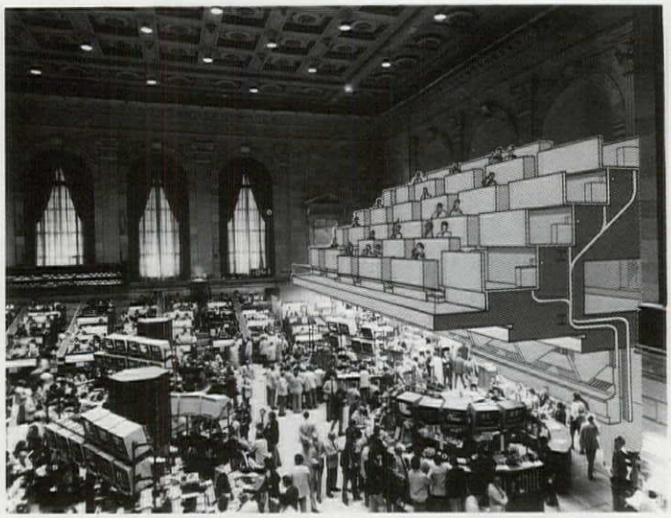
New materials handling applications come in all sizes. Although much pioneering takes place in hospitals such automation has its modest place in offices, too. Effective use of these can mean economy and quality.

A family of automated pack animals is bringing factory technology to more task-oriented buildings. It is no surprise that we are infatuated with them. They smack of little red wagons and electric trains and stimulate our repressed fantasies of robots, the toys and imagery of youth. Let us not demean the nature of the task. If a box the size of a refrigerator lifts itself to the ceiling of your kitchen and snakes out of the front door all by itself, it gains your due respect. Indeed, these sophisticated space-age machines yield a circulation system which rapidly becomes the building's lifeblood.

As complex as the machinery is itself, the architectural problems it generates are simpler than the circulation problems created by moving people. A machine is born when a task becomes so patterned and regular that it can be flawlessly described and executed by logic alone. These robots cannot feel, although our perception of them sometimes gives them human traits. We can control their movement with great accuracy and prescribe the shortest path through spaces people do not go, except for repairs.

Architectural treatment ranges from a sophisticated type of materials plumbing to exciting visual displays of moving capsules. The effect on the building depends upon the scale of the materials handling system. The scale of the system can be described simply in terms of the human function it is replacing.

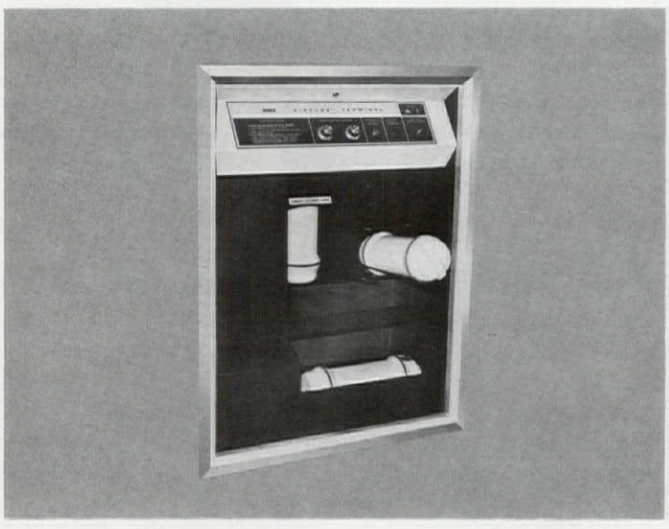
The smallest scale systems relate to materials which would otherwise be transported by the human hand. This scale is followed by a picnic-basket-size container which might be held in two hands or slung over one arm. The next scale needs a strong back, a dumbwaiter, or a dolly for manual transport. Finally we reach a scale which demands a good size wagon or cart, sometimes a special corridor, and usually a mechanical lift to transport vertically. We would expect automated systems to improve on the quality, speed, and reliability of these systems otherwise maintained manually.



Courtesy The Ehrenkrantz Group

A pneumatic tube system at the American Stock Exchange will update the existing paper handling system. The clerk on the new balcony will place a message in the pneumatic console in his booth (1). The carrier will emerge at the broker station on the trading floor (2). The floor broker retrieves the message and returns the captive carrier to the booth (3). A second tube line (4) links the booth clerk to a remote transfer station which then connects to any trading post (5). Messages can be returned to the original booth at the back of the broker station (6).

A more conventional pneumatic tube station and carrier is shown below. A 4-in. pneumatic tube speed is about 2500 fpm.



Courtesy Diebold Inc., Lamson Division

What are some of the systems?
Pneumatic tubes: Quite early in the history of modern building, the pneumatic vacuum tube was used to replace the fleet-footed messenger. The conventional single-line pressure vacuum originated in this country in the late 1880s. It consists of a single tube connecting point A to point B, and a return tube from B to A. A compressor is cross-linked into the lines to create the suction necessary to propel the hollow, usually cylindrical carrier. In the mid-1930s, a switching mechanism was invented which allowed each carrier to reach a manned central station and then be electrically transferred to one of up to 12 other lines. This "semi-automatic" version permitted several stations to be serviced from the same compressor, but consumed time. The 1950s finally brought a "fully automated" condition which permitted a carrier to be sent quickly from one point to any other of the system without going through a central station. The system originated in Germany and helped eliminate the lengthy switching time. The early 1970s saw the development of a computer-operated pneumatic tube. The computer-operated system handles large and complex demands quickly and flawlessly and monitors the carriers during travel. Recently the expensive computer systems have received competition from somewhat simpler printed-circuit control mechanisms which promise to offer economic advantages with no loss of speed.

The carriers themselves come in a variety of sizes and shapes with diverse methods of access. Their common trait is their general size. They are meant to be hand-held. Only the tubing has remained virtually unchanged throughout the system's dynamic history.

Large-scale pneumatic tubes are used in hospitals to transport bags of trash and linen. One system uses a sensing device that allows the same tube for both trash and linen. The device separates the bags and neatly drops each into its appropriate bin.

Selective vertical lifts: The oldest working selective vertical lift in the country seems to be the Ætna-Life building in Hartford, Ct, built in the 1930s. Very few changes have been made to system machinery itself since the first example. As shown here, a chain loop passes over the uppermost circular sprocket, which is motor-driven and constantly moving. The chain then passes down and through a guided return before it completes its cycle. Metal seats are spaced along the length of the chain and remain horizontal as they complete the turns. At the station, a container about the size of a picnic basket can be seated while the chain is in motion. Two station-point access windows are necessary at each floor, one for up and one for down travel. Most manufacturers produce three different trays which vary in volume. Linkage mechanisms at the station points change with the manufacturer. Some produce a mechanical device which charges and discharges its tray automatically, while other manufacturers use an electric


Richard Rush
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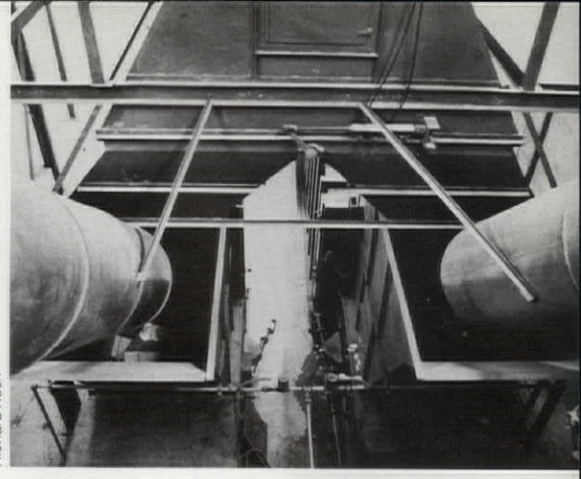
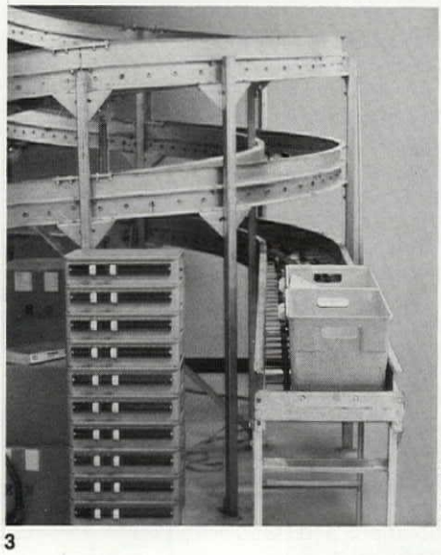

Richard Rush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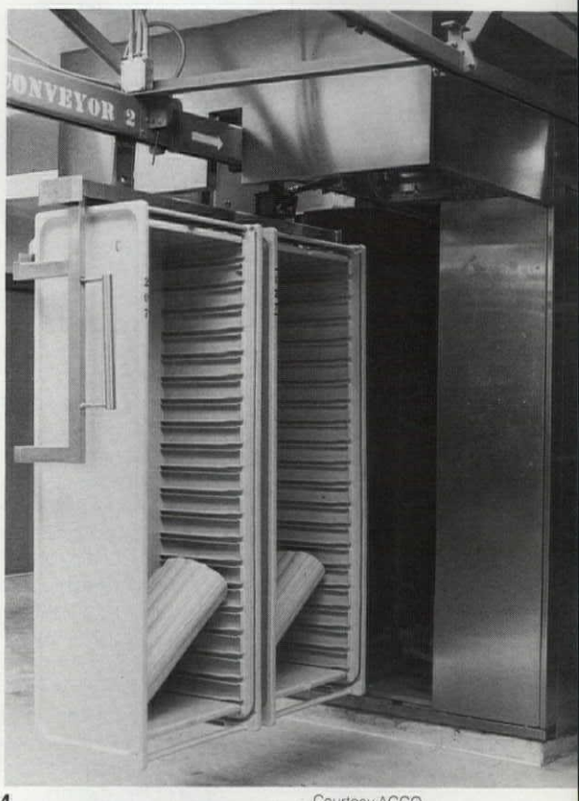

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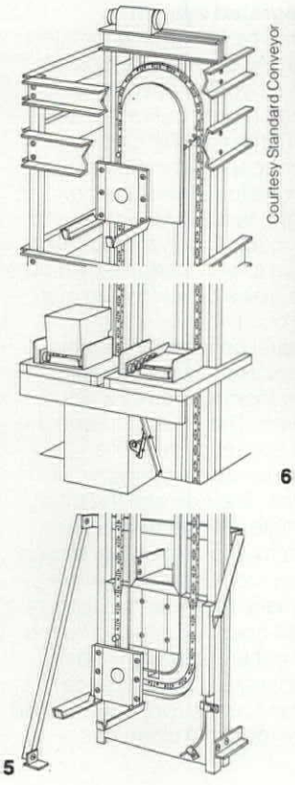
Courtesy ACCO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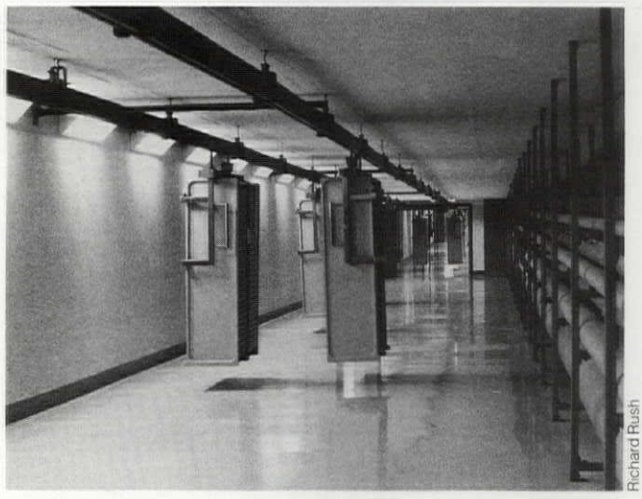
Richard Rush
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Large-scale pneumatic tubes can be used to transport 35-lb bags of linen (**1**) and/or trash (**2**) at speeds up to 2000 fpm. The two machines are shown at the new Walter Reed Hospital in Washington, DC. A spiral track uses gravity to conserve mailroom space and bring a selective vertical lift tray to a remote access point at the Hennepin County Government Center (**3**). A selective vertical lift, as shown diagrammatically (**5**) can transport from 465 cu ft/hr (small trays) to 935 cu ft/hr (large trays). Monorail cars at the Hennepin County Medical Center use a unique all-purpose design (**4**). The cars are shown ready to enter a decontamination chamber. Monorail car speeds range from 180 to 225 fpm supporting up to 500 lbs. (**6**).

motor-driven device. The return chain guide at the chain base also varies. Some guides are metal and some are wooden. Once the tray has reached the correct floor, it can link with a horizontal belt conveyor or gravity track which will guide it to its final destination.

Automatic cart inject/eject lift: Heavy vertical loads have traditionally been borne by ordinary elevators. The elevator gets the job done, but a whole elevator must be designated for that purpose and an attendant must waste valuable time waiting, then nursing the bulky cart on and off the elevator. Automatic cart inject/eject lifts now exist that permit a single attendant to take charge of a fleet of supply carts. The attendant lines up the carts directly in front of the opening of a miniature stainless steel elevator. When the elevator arrives, it spreads its jaws and a little metal tongue slithers beneath and gobbles a cart (like sliding a drawer into your file cabinet). At the proper floor, the jaws release their prey unharmed and ready for service.

Tracked electric car: Twenty years ago in Germany, Mr. Eric Weisner attached a small electric motor to the bottom of a lidded box. The assembly had rollers which guided it through a plastic track. The track could be oriented vertically or horizontally, and could negotiate vertical or horizontal turns. When the system was brought to this country ten years ago, some modifications had to be made. The relatively shallow floor-to-floor heights in the U.S. meant the proportions of the car had to be adjusted to fit within a standard dropped-ceiling space. The track was produced in aluminum instead of plastic because of code restrictions. Some of the switch mechanisms were modified. Eight million dollars later, an automated materials handling system was ready which could travel vertically, horizontally, sideways along a wall, or even upside down.

Electronically guided vehicle: Lunker tote carts and wagons loaded with food trays or supplies have been wrestled down corridors for years. The last decade has seen the development of a driverless generation of electric cars to end the corridor battle. The heftier versions of these vehicles can lug a half-ton payload dead straight down a hall and corner with the dignity of a Rolls Royce. The manual controls are feather-light and the "fail safe" steering makes them unisex to use. The power system is usually replaceable or rechargeable car style batteries (either six-volt or twelve). Bumpers either stop the car cold, just short of collision, or retract after a light tap. A wire guide path in one system is embedded in a saw kerf in the floor, and floor finish materials render it invisible. The electric pulse in the wire helps the car to "think" and avoid other cars as it follows its route. The car has a flat bed that lowers to pick up a supply cart and then lifts it gently off the floor, freeing the wheels from possible contamination. The cars used in hospitals are designed to be able to withstand complete cleansing in 180-F water. The manufacturer guarantees travel up a 6 percent grade. Another manufacturer has developed a mailcar that follows a path which has been sprayed on the carpet and remains invisible to the naked eye. A new track can be generated in seconds.

Monorails: If your refrigerator has not returned yet, chances are it's part of a monorail system. Health-care consultant Gordon Friesen adapted the monorail to hospitals in the 1960s to solve the problems of bulk materials handling. Although manufactured monorail systems vary significantly, they effectively accomplish the same task. They have the facility to reach down and lift a cart loaded with deliveries for a nursing unit and glide it, fully loaded, through a corridor or designated space. Automatically, the cart can board a lift where the destination address is transferred from the monorail to the lift controls. At the proper floor, the lift unloads the cart. In the case of a soiled cart, an attendant at the user floor can call the lift, address the cart to the processing level, and watch the lift automatically take the soiled cart aboard. It travels to the processing level, exits, and goes by monorail to the decontamination area. All soiled material is removed and the cart travels again by monorail through a cart washer which washes and dries the cart automatically. After sanitizing, it exits the washer and travels to the clean work station where it is ready for reuse.

Although the systems are universally chain-driven, they are practically soundless. Their trim obedience bespeaks the scrutiny of the head nurse who must ultimately ride herd on them. If pack animals we must have, then they will be prompt, obedient, and fastidiously clean!

A complete integrated system

Gordon Friesen: The father of automated materials handling in hospitals is Gordon Friesen. Friesen's involvement originates not in a love of equipment but rather a total conception of what a modern hospital must do. It is a concept that extends from regional planning to location of the bedpan over the night light. In the end it is his kind of architectural, mechanical, and sociological interplay, as a total conception, which will preserve the place of automated materials handling in buildings.

Friesen's hospital conception centers around the patient. Rather than shuttling the patients from room to room, services must come to them. The idea is to keep the patient off of the conveyor belt. The Friesen hospital prefers single rooms as opposed to wards. The rich and the poor alike deserve single, private rooms.

Friesen decentralizes the nurses' station to give the patient more individual attention. The nurse makes the rounds without being called, and does not depend on the judgment of the patient and his call bell, except for emergencies. The entrance area of each room has a supply cabinet for the nurse. It is divided into clean and soiled sections; the soiled section is connected to an exhaust tube to avoid odor. This cabinet Friesen calls the "nurserver." Each nurserver station is equipped with a pneumatic tube which carries medical records, charts, and specimens as well as emergency supply requests. (Certain specimens are adversely affected by tube transport.)

A nurserver acts as either destination or source of two completely separate paths of materials circulation. It is the destination of a supply path that begins in a remote central supply storage area which Friesen calls the "supermarket." The daily shopping list for each patient is routinely filled by an attendant with a shopping cart. These supplies are loaded on the monorail cart destined for the patient's floor. The cart is then addressed and monorailed to the clean holding area of that floor where the supply technician for the patient retrieves the correct supplies and carts them to the nurserver.

The other path of materials has its source at the patient's room. A second technician retrieves only the waste items from the nurserver and carts them to a post serviced by decontamination personnel. The waste material is disposed of and the cart is addressed to the hospital's central decontamination area.

If these two systems are functioning correctly, the nurserver is properly charged and discharged as a matter of course. Should the system temporarily become inactive, a complement of supplies is maintained both in the nurserver itself and in the clean holding area for each floor. Emergency calls can be made and filled in minutes by the supply technician.

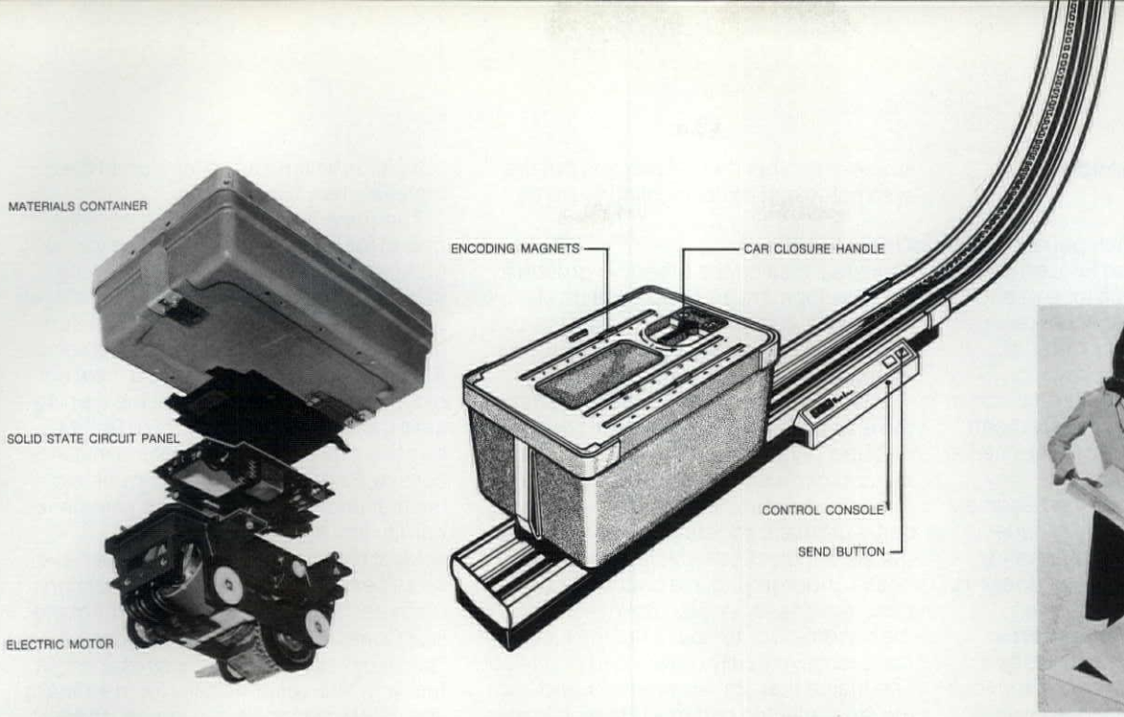
Through use of the monorail, the kitchen can also exist in a remote centralized location. Meals are prepared and programmed for the proper floor where they can be held, refrigerated, and individually heated when the patient is ready to eat.

The operating rooms also function efficiently. Each operation is serviced by the central supply area to suit the particular needs of each patient and the surgeon who will operate. Used carts are cleansed in the decontamination center.

The result of this process is centralization, organization, and simplification. The Friesen idea, brewing since the early 1960s, originated in 30 years of experience as a hospital administrator. It is being perfected in a craftsmanlike fashion to yield what Friesen feels strongly is the 20th-Century answer to health care. He is not alone. Although his total organizational theories are rarely completely fulfilled, most modern hospitals make use of at least parts of his theories.

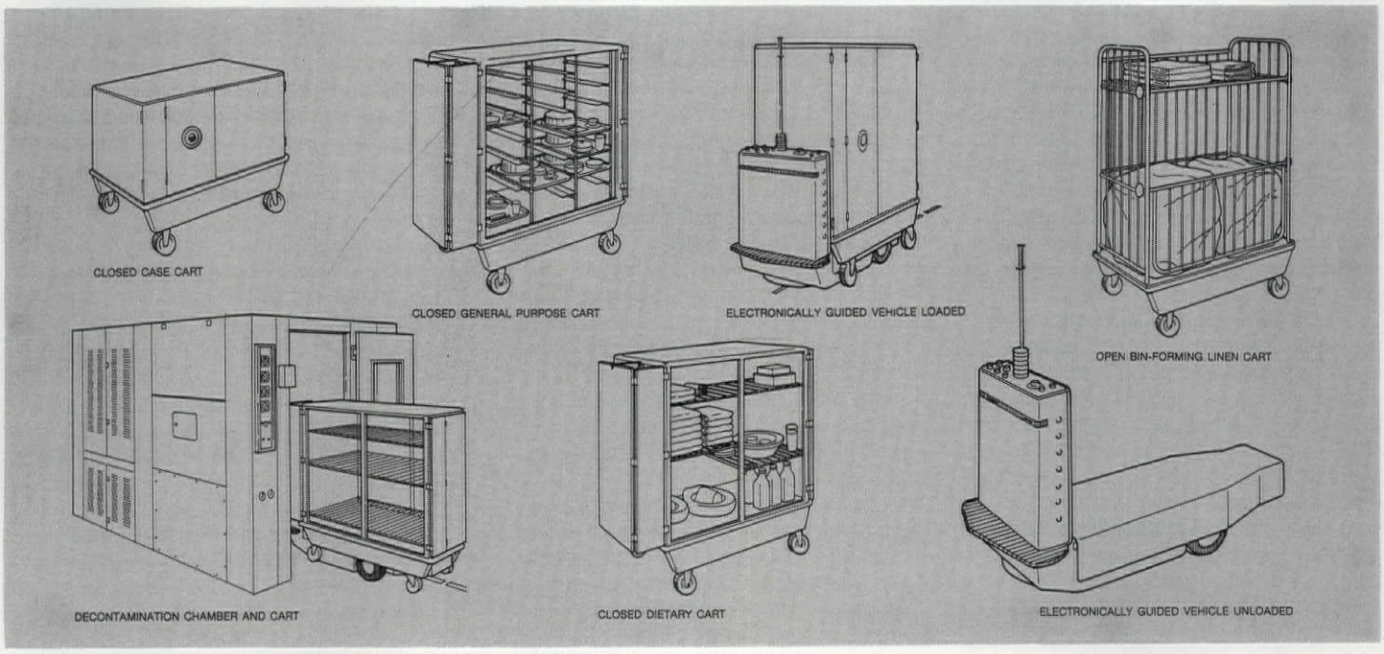
Hospital examples

Walter Reed: A new Army hospital in Washington, DC, will soon open. It is fairly bristling with automation almost as if to match the polish to which the Army is accustomed. It follows the Friesen plan to a great degree but has made some modifications. The rooms are not singles but



Courtesy Mosler Telelift

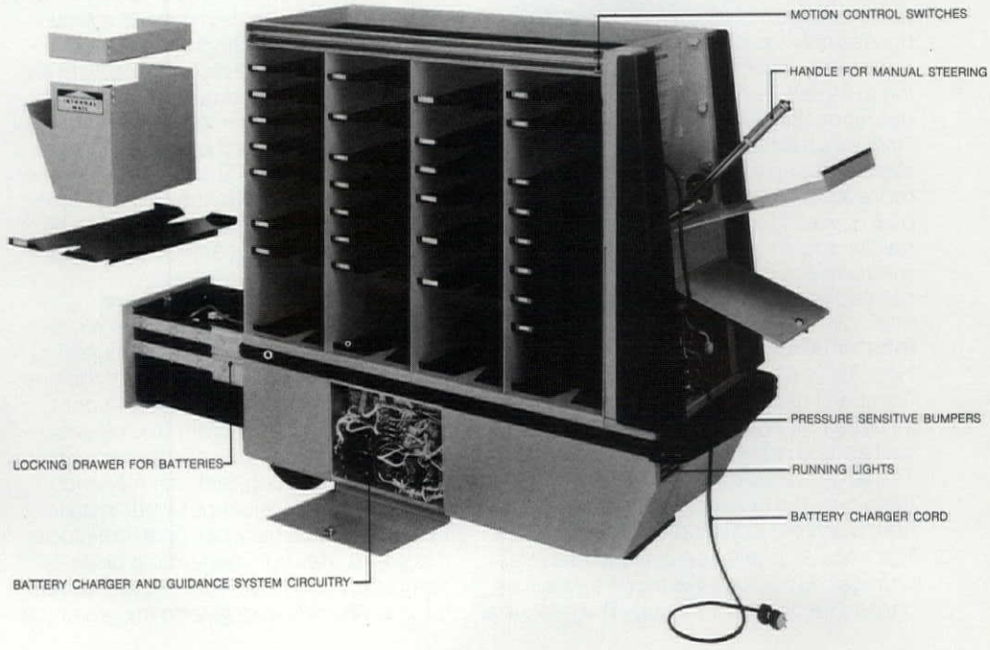
The versatile tracked electric vehicle shown above can carry up to 20 lb at speeds of 100 fpm either vertically or horizontally.



Drawings courtesy Amsco Systems

The electronically guided vehicle easily transports the typical hospital carts above. It can move up to 800 pounds horizontally at a speed of 88 fpm.

Courtesy Lear Siegler Inc.



The electric mail car is shown exploded and in action. It automatically stops (10-20 seconds) and then proceeds at about 1 mile per hour.

rather four-bed rooms. Each patient has a nurserver which follows the Friesen design. There is no pneumatic tube at each nurserver station but rather a tracked electric vehicle that feeds each cluster of wards. There is a room for receiving supplies that contains the tracked electric car station as well as the automated-cart inject/eject lift stop. It is the largest installation of the tracked electrical system in America. A monorail runs on the basement level and feeds the vertical bulk loader with food and supplies. A "supermarket" storage follows Freisen's plan as does the centralized decontamination center.

Hennepin County Medical Center: In Minneapolis, a 485-bed hospital uses a monorail system but incorporates a unique cart design. Instead of having to change carts from one use to another, the same cart shell is used for all of the monorail functions. Shelf spacing can be modified to suit food trays, medical supplies, linen, or paper. All of the carts can be sterilized in a common space and reused. When they are not being used, they are hung on the wall. The lockers ride a special elevator automatically to the proper floor where they are mounted on manual carts.

Monorails to the rescue: New York architects Rogers, Butler, Burgun & Shahine were given a near-impossible task in Brooklyn: turn a half-million square feet of abandoned warehouse into a hospital. The impossible part was the six stories of 700-ft-long corridor. As project architect architect Bill Atkinson put it: "The biggest mistake you can make is not to make a decision." Sixty-five million dollars worth of decisions later, the neighborhood has a working Lutheran Medical Center. The key is a 390-car monorail system that runs lengthwise of the building, both on the roof and in the basement. The rooftop treatment of the monorail takes particular advantage of the automated materials handling system. An enclosure was built directly over part of the existing roof. It houses only the monorail and therefore needs only minimal lighting and 50-F heating in winter. During the first six months of operation the system was debugged. Now, two maintenance men service the system during the day shift. The hospital represents the recycling of a building and quite possibly a neighborhood. The original warehouse was replete with broken windows and graffiti. The new hospital is painted off-white, and there has not been a mark on it in the first year of operation.

Interstitial statement: The new Children's Hospital in Washington by the Leo A. Daly Company uses its interstitial space to run its large electronically guided vehicles as well as its smaller electric tracked cars. The larger vehicle hums untouched among the pipes and chases like the 5:03 express from Stamford to Grand Central Station. The tracked smaller electric car has interchanges which look like mini-freeways as cars scoot obediently along. The interstitial space is another natural place to put the automated materials handling systems.

Office buildings

Hospitals may be the breeding ground for the development and coordination of complex automated systems, but the use of automation in office buildings also has increased markedly in the last decade.

New York's new Citicorp building has the ultimate in modern-day mail service dubbed "supermail." The building has its own zip code and receives its mail at a building remote from the new building itself. Automatic sorters prepare the mail for the electric tracked vehicles which then snake underground in a specially built concrete chase (in total darkness). From the basement of the building, the electric car scoots vertically upwards to each floor. The mail is then transported by hand from the small electric cart to a trim mobile electric mail cart which circulates to fixed station points and waits while personnel come to fetch their mail.

The Sears Tower in Chicago uses three selective vertical lifts stacked on top of one another to negotiate its 110-story height. At each floor a conveyor belt moves the mail horizontally.

The Fort Worth National Bank uses the tracked electric vehicle oriented on its side to handle securities and cash as well as mail. This use proved to be so effective that the system paid for itself in less than a year. Expressed architecturally, the track is exposed in the bank interior and runs vertically in full view.

The American Stock Exchange is at once an exciting, dynamic precursor of tomorrow's destiny and a bastion of traditions. Computers wield the split-second decisions in the marketplace while men signal each other with hand signals which date back to the days when the market was held in open streets. When the market decided to expand, The Ehrankrantz Group, architects and planners, were presented with the touchy contrast. Seating was to be increased, necessitating a steep sloping balcony on each side of the current space. The existing belt conveyor could not handle the steep slope. The answer was a tiny pneumatic-tube system which would allow balcony clerks to pass their orders to the exchange floor with speed and security. The architects worked with a local pneumatic-tube manufacturer and were able to redesign the tube carriers as well as invent a new tube station.

Equipment installation and care

People who sell automated materials handling equipment have no difficulty selling the machinery itself. Coming from the hospital and factory environment as it does, the machinery is well crafted. One-year maintenance contracts can accompany an installation and long-term maintenance contracts are possible on larger installations. The machinery can take three to six months to "debug," depending on its complexity. Elevators and people movers have a mandatory long-term maintenance obligation which has so far eluded the materials handling industry.

The systems often require a training period for their effective use. The various companies commonly provide training seminars and help in the "start-up" stages. Some institutions which have a high turnover of employees have found problems. After the initial transition period, new employees sometimes don't get the training care that they need and "botch up" expensive equipment. Some of the installations need highly skilled, well-qualified maintenance crews which are sometimes hard to find in rural areas.

Most of the equipment which we have been describing is installed by the manufacturer himself as subcontractor of the job. Construction managers prefer the "turn-key" approach that leaves a single firm with total responsibility for the installation. Should anything run amuck, there is only one person to blame. Usually a specially trained employee from the manufacturer will be sent to the job as contractor, and union employees from the local area are chosen for the work. The automatic inject/eject lift is an exception. It can be installed, and usually is, by a local elevator sub who is familiar with the work and can do follow-up maintenance.

Cost dialogue

Bill Lewis of Jaros, Baum & Bolles refers to cost analysis techniques as "How to kid yourself into buying what you wanted to buy in the first place." Typically, mechanical distribution systems get designed into the building when everything else has already been designed. It is just as foolhardy to try to do an inexpensive and efficient materials "plumbing" system as to try to design the location of bathrooms as an afterthought. The economy does not usually originate with the system but with the use of the system.

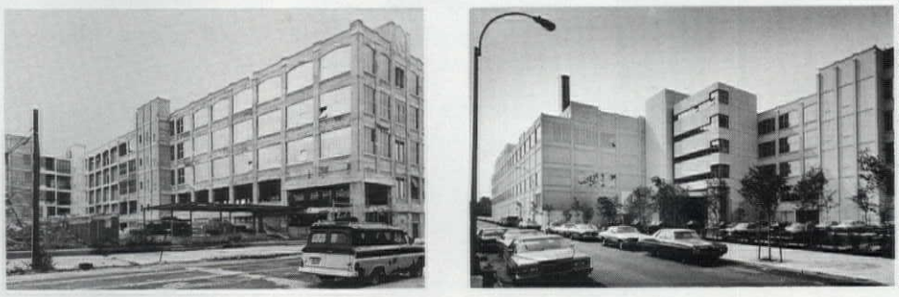
Gordon Friesen follows the credo: "If the logic is there, let's make it work." Before Friesen, for example, hospitals typically differentiated between "ordinary dirt," "dirty dirt," and "very dirty dirt." Three different fragmented areas for cleaning were required. Friesen centralized with a single decontamination center. Of course decontamination is just a small part of Friesen's total idea. Much of the innovation centered around the nurse.

The nurserver concept means that each nurse effectively has a "hod carrier" and can concentrate on the nursing for which she has been trained. Friesen feels his total hospital concept has "increased the use of the nurse by 100 percent and reduced her walking time by 50 percent."

A total integrated concept of the building's programmatic and mechanical functions produces the greatest economy. Bill Lewis feels: "You can't design elevators without designing the materials handling equipment." Most mechanical means of materials distribution reorient the labor force or eliminate the use of elevators for vertical materials handling entirely. If we design elevators by peak traffic loads, how

Richard Rush

The monorail is used to shrink 700-ft-long corridors.



Photos: Rogers, Butler, Burgun & Shahine

The Lutheran Medical Center in Brooklyn is shown above, before and after renovation.

can we make decisions for people-moving and materials-moving independent of one another?

Traffic profiles are made at the outset of most projects to indicate roughly how much and what kind of materials need to be moved. The weight, volume, distance, and time required to manually transport the materials are calculated. Some intangibles are taken into consideration. Workers are considered to have only a 62 percent efficiency. They work an estimated average of only 37 minutes per hour. A worker off the floor to which he has been assigned, and is supervised, is considered unproductive. Programmatic restrictions peculiar to a particular building or labor force are also taken into account.

It is clear that a direct trade-off from people to machinery is not possible. People, for example, offer the advantage that they can think and react to emergency situations. Machines offer the advantage that they do not need clean, well-lit, air-conditioned space in which to move.

If the functioning aspects of the building have been designed with people as the labor force, the plan will differ from one with an electro-mechanical equivalent. It is also true that various combinations of automation will functionally affect the building organization in different ways. Horizontal plans like the Lutheran Medical Center make excellent use of the monorail. Vertically organized buildings make excellent use of selective vertical lifts and automatic cart inject/eject lifts. Pneumatic tubes and tracked electric vehicles do not demand any particular geometry.

Eventually a direct trade-off has to be made to evaluate the cost of a system. The cost of the manual labor force per year is compared with the initial cost of the mechanical equipment, the maintenance costs, operating costs, and depreciation of the systems, as spread out over a period of time.

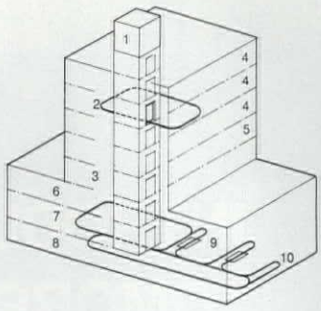
Some companies prefer to compare the life-cycle cost for a twenty-year period, the intended life of the machinery. Others refer to the "pay-back" period. A pneumatic system, for example, can pay for itself in about one year while a monorail can take optimally three to five years. Bill Lewis takes the annual decline in value and cost of money into account, a technique called discounted cash flow.

One thought is clear—systems which are introduced at the last minute into a building design cost more. Buildings which have used automation from the inception of an idea will find them economical.

Conclusions

Architects should take the lead in the understanding and correct use of automated materials handling systems and coordinating the people and materials moving systems. We can expose these systems to add excitement to a space, or run them efficiently between or around the exterior of the buildings. We can color them, texture them, light them, in short we can build architecture with them.

[Richard Rush]



Legend
1 Patient elevator tower
2 Typical cart path
3 Clean linen
4 Medical/surgical bed
5 ICU/CCU
6 Surgery/O.B.
7 Emergency/O.P.D.
8 Dietary, C.P.D., laundry
9 Cart washers
10 Trash

Typical life cycle costing analysis for health care material distribution, prepared for P/A by Daniel R. Dundon, Amsco Systems Company.

Assumptions: Labor cost is established at $11,000 per year. The hypothetical hospital size, 250 beds. Movement of bulk material is included (no small unit or paper movement). The 20-year-life-cycle program assumes that all equipment has a zero salvage value at 20 years. Inflation rates are assumed of 8 percent per year for wage increases, 6 percent per year for capital investments, and a discount rate of 10 percent is used to quantify the loss of value of tomorrow's dollar.

The hypothetical hospital consists of a base building with the dietary department, central processing department, and laundry located in the lowest level, an emergency and outpatient department located above these at the ground level, and surgery and delivery at the first level. A centrally located patient tower is above the base building. All nursing and medical units will be served disposable supplies by a delivery cart system. The surgical/OB departments are being served by a central instrument room in the surgical suite. There is minimal reprocessing in the CPD. Linen is being delivered by exchange carts, and returned to the laundry via a gravity chute. Dietary employs a "convenience" food system. Trash will be loaded into the empty nursing-unit delivery carts and travel directly to the loading dock. Total cart movement, both clean and soiled, for the 250-bed hospital is 125 carts per day.

Cost estimates

The following defines the costs of the various bed count/material distribution alternatives:

Alternative 1, Manual: $3,857.700.
Initial investment, $125,000.

Alternative 2, Inject-eject: $2,654,800.
Initial investment, $375,000.

Alternative 3, Monorail: $1,392,600.
Initial investment, $900,000.

Alternative 4, Electronic vehicle: $832,000.
Initial investment, $570,000.

Alternative 5, Inject-eject with electronic vehicle shuttle: $903,700.
Initial investment, $475,000.

Acknowledgements

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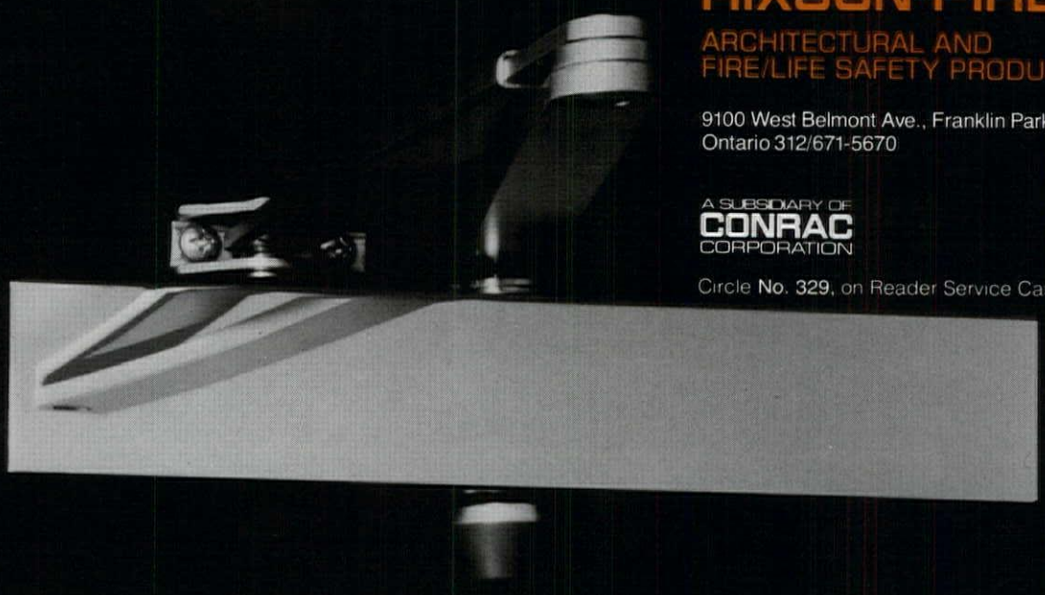

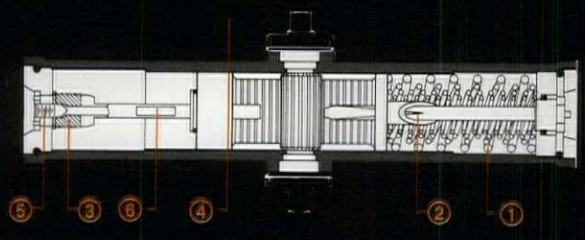

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Bernard Tomson: 1909–1978

Norman Coplan

As the result of the untimely death of Bernard Tomson, the originator and coauthor of this column, the architectural profession has lost a significant voice, and the writer has lost a valued colleague and a good friend.

Judge Tomson's interest in architecture was first aroused as the result of his association with Edward Durell Stone, whom he met shortly after the end of World War II. Stone, after returning from the service, had set up temporary quarters in Tomson's home town, and the two men became close friends. As Stone has pointed out, Tomson's developing interest in the architectural profession transcended the law or legal technicalities, but reflected a broad social interest in achieving a beautiful environment. It was Tomson's hope that, by treating with the law as it applied to the practice of architecture, he could make at least an indirect contribution toward the enrichment of our environment.

Bernard Tomson was also concerned with the seeming naiveté of many architects in business matters. He was of the opinion that great architects were great artists, but that artistry alone was insufficient for a successful professional practice. He sought to provide insight into the business and legal problems with which every architect has to deal. Many of the concerns and problems which he wrote about in 1950, the date of his first publication in *Progressive Architecture,* are still with us today, and many of the cautions he suggested then are currently applicable.

If there was a central theme that is reflected in Judge Tomson's writings, lectures, and teaching, it was that an architect is entitled to adequate and timely payment for services rendered. I believe it was in his first article for *Progressive Architecture* that Judge Tomson challenged the concept that architects generally were expected to finance, at least in part, a client's project by agreeing to accept payment for services after the services have been rendered. He urged that, whenever possible, the architect's contract should call for a retainer (which would be the minimum fee payable) to be applied to the last payments under that contract and for monthly payments during the furnishing of services so that the architect was "ahead" of the client rather than financing him. This approach is still a desirable and valid one.

During the 1950s and 1960s, Tomson was often critical of the AIA form documents, believing that they did not provide sufficient protection to the practicing architect. This criticism may well have contributed to the several revisions of and improvements to these documents. Although Judge Tomson believed that these form documents are a significant and important tool in the practice of architecture, he also believed strongly that they should not be used blindly but, where necessary, modified and oriented to meet the particular requirements of characteristics of the project. Again, this advice is as sound today as it was when first given.

Another major concern of Bernard Tomson was that the public did not really understand the function of an architect nor did it appreciate the leadership status that the architect must have for a successful building project. This lack of understanding or appreciation was reflected, he thought, in many different ways. One example to which he often referred was the apparent lack of influence by the profession in resisting legislation not in the best interest of sound architecture; or its inability to promote legislation which would architecturally serve the public interest or which might rectify inequities from which the architectural profession was suffering. Tomson continually urged that the profession, both in its own interest and in the interest of promoting aesthetic objectives and sound planning, do a better public relations job; and he personally, at every opportunity, sought to educate the general public as to the importance of the architect and the need to build his status. The necessity for educating the public in this respect still continues.

Another favorite theme of Judge Tomson was that the law is not static, but is a growing and changing discipline. Certainly, legal principles applicable to architectural practice did not remain constant during the long period he wrote for *Progressive Architecture*. Judge Tomson deemed it an important function of this column to report on these changes so that its readers would gain an insight into areas of involvement in which they might have a legal problem. He viewed with concern as judicial decisions increased the potential liability of architects arising out of claims for malpractice; and he viewed with satisfaction decisions of the United States Supreme Court and other courts progressively recognizing and accepting aesthetic criteria in dealing with zoning and other legislation whose constitutionality was challenged. His philosophy welcomed development and change in the law as a healthy reflection of a legal system that could respond to the needs of society, and during his years as a jurist, he had the opportunity to make a direct contribution to such development.

Although Bernard Tomson was a fine lawyer and an outstanding jurist, he will probably be remembered best for his contributions to the architectural profession. The profession will miss him. I know I will. □

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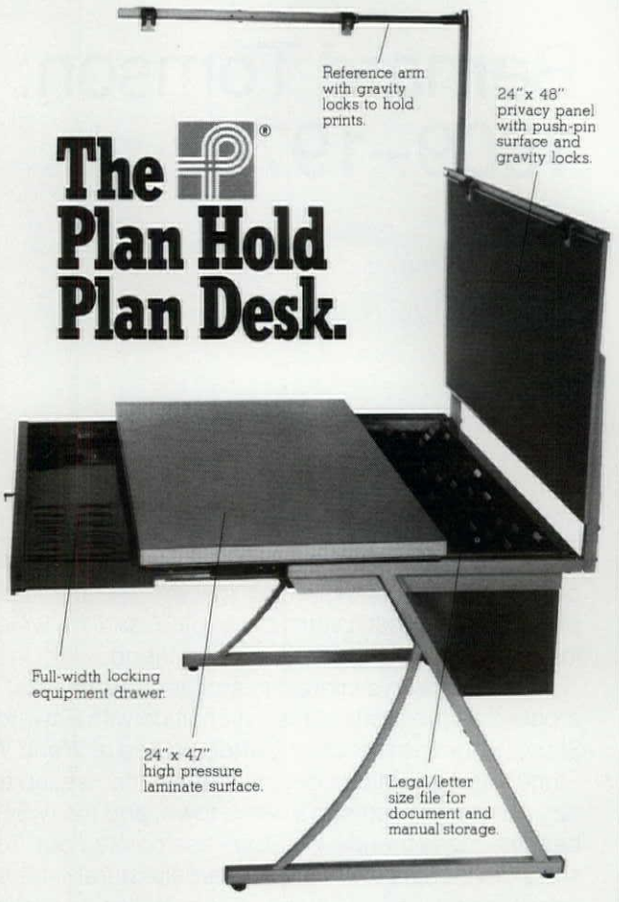

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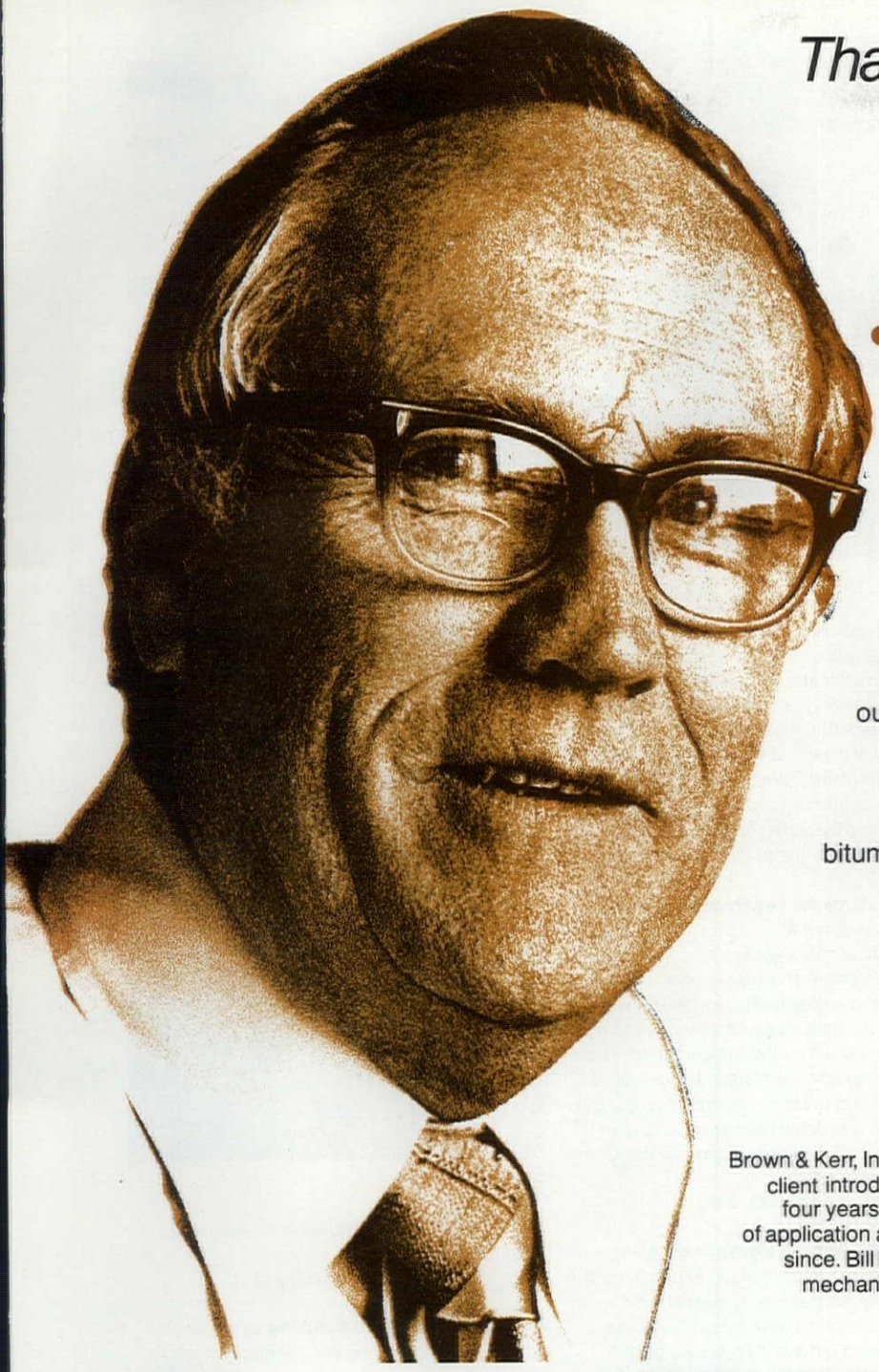

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- "Many of our roofing contracts are in the north central states...Illinois, Indiana, Ohio, Michigan, Kentucky, etc.... *'Tornado Alley'*. Most of our roofs are engineered to meet FM I-60 or FM I-90 requirements.

"The Perma-fastner System meets these requirements...is the best way we know to fasten roof insulation to metal decks. All types of insulation, too: perlite, perlite/urethane, urethane, glass fiber and fiberboard.

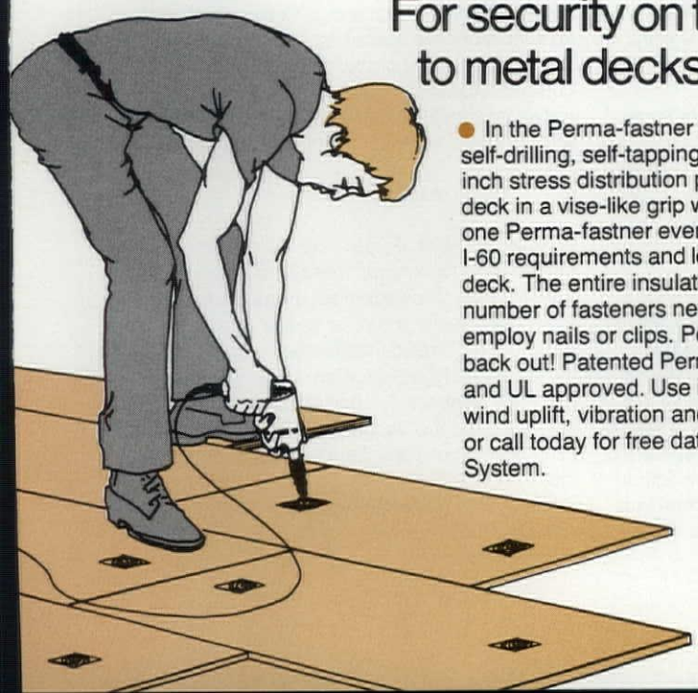
"There are fewer penetrations with Perma-fastners, and the screws fill the holes they make and never back out. They're self-drilling and self-tapping...are hardnosed to penetrate the metal and double-threaded to stay put.

"We know that FM-approved Perma-fastners hold insulation better to metal decks than ribbon-applied bitumen. Installation is faster, too—a big saving in labor. The Perma-fastner System works for us. We use it. We recommend it."

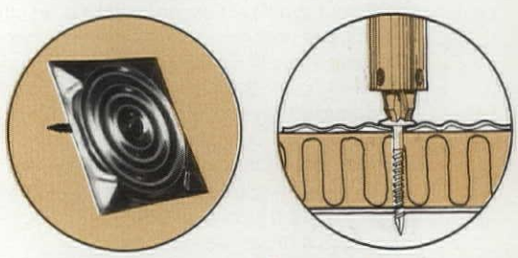
W. E. "BILL" Hendricksen,
President, Brown & Kerr, Inc., Wheeling, Illinois,
and Louisville, Kentucky

Brown & Kerr, Inc., is one of the larger roofing contractors in the United States. A good client introduced them to the Perma-fastner Roof Insulation Attachment System four years ago. Brown & Kerr were so satisfied with its holding power, its speed of application and its positive protection against wind uplift, that they've used it ever since. Bill Hendricksen says, "We feel a lot more comfortable if the insulation is mechanically fastened with Perma-fastners. We can forget about blow-offs!"

For security on the roof, specify that the insulation be attached to metal decks with the Perma-fastner® System!



- In the Perma-fastner System, specially designed, self-drilling, self-tapping screws and strong nine square inch stress distribution plates hold the insulation to the deck in a vise-like grip without any adhesive. As few as one Perma-fastner every four square feet meets FM I-60 requirements and locks any board tightly to the deck. The entire insulated area is secure with half the number of fasteners needed by other techniques which employ nails or clips. Perma-fastners fit snug, never back out! Patented Perma-fastner System is both FM and UL approved. Use it for positive protection against wind uplift, vibration and construction movement. Write or call today for free data sheet on the Perma-fastner System.



perma-fastner®
Roof Insulation attachment system

GREFCO, Inc./Building Products Division
General Office: 3450 Wilshire Boulevard
Los Angeles, CA 90010
National Sales Office: 2905 Butterfield Road
Oak Brook, IL 60521—(312) 654-4500

A subsidiary of General Refractories Company

Circle No. 349, on Reader Service Card

Products and literature

Conserv-a-trieve

Internal distribution systems

The following literature items are related to the Technics article on internal distribution systems which appears beginning on p. 86.

Pneumatic Tube Systems. Describes and illustrates vacuum conveyor systems for delivering messages, small parts, orders, and similar applications. Diagrams show systems available, carrier sizes and shapes, inlets and receiving terminals. Standard Conveyor Co.
Circle 200 on reader service card

Conserv-a-trieve® conveys records from files to individual working stations in seconds. Custom built to any length and height required, the system consists of two facing banks of individual metal file cradles. At a signal from the console located at any work station, the electronically controlled conveyor travels to the desired file. The file is slid onto the conveyor automatically, and is transported to the work station. By pushing a "Restore" button on the console when the file no longer is needed, the operator can return the unit to its storage position. Supreme Equipment & Systems Corporation.
Circle 201 on reader service card

Recordlift, an automated, continuous chain, vertical conveyor carries mail, files, records, books, and supplies. For use in office buildings, libraries, and hospitals, the conveyor can move up to seven tons of material per hour, depending on the model. Stations at each floor accept preaddressed trays for delivery to other floors, or receive them. Eight-page brochure gives general description and illustrates the system which is custom-engineered to suit building and owner. Standard Conveyor Co.
Circle 202 on reader service card

Hospital transportation systems. Three systems for handling materials in hospitals include: Cargomaster which automatically picks up loaded carts, and lifts them to the appropriate floor in seconds; Amscar automated distribution system, a fleet of electronically guided, battery-powered units that make deliveries to any point on any floor without human assistance; and Amscomatic module transport system, a self-balancing overhead distribution system used to transport materials both horizontally and vertically. It is available both automated and semi-automated. Ten-page brochure describes these systems and smaller, pneumatic systems. Amsco Systems, American Sterilizer.
Circle 203 on reader service card

Handling systems for health care institutions. Provides information about the following: Selective vertical conveyor systems that move trays of material from one area to another preselected area at a speed of up to 12 containers per minute; automatic carts for moving food and reusables, as well as for the disposition of soiled dishes and other commodities, that are routed through sterilizing process between cycles. The company also makes an overhead conveyor system for use in hospital laundries. Chain Conveyor System of Acco.
Circle 204 on reader service card

Document conveyor system moves office paper automatically from person to person and floor to floor. Personnel may remain at their desks, thus increasing work output. The multilane system and other conveyors for paperwork are described and illustrated in both diagrams and photos. Brochure provides specifications and dimensions. The Novak Co., Inc.
Circle 205 on reader service card

Laundry conveying system. Diagrams show typical pneumatic systems for laundry collection combination set-up and for conveying laundry for continuous flow washers. Describes the two systems and illustrates installations. ECI Air-Flyte Corp.
Circle 206 on reader service card

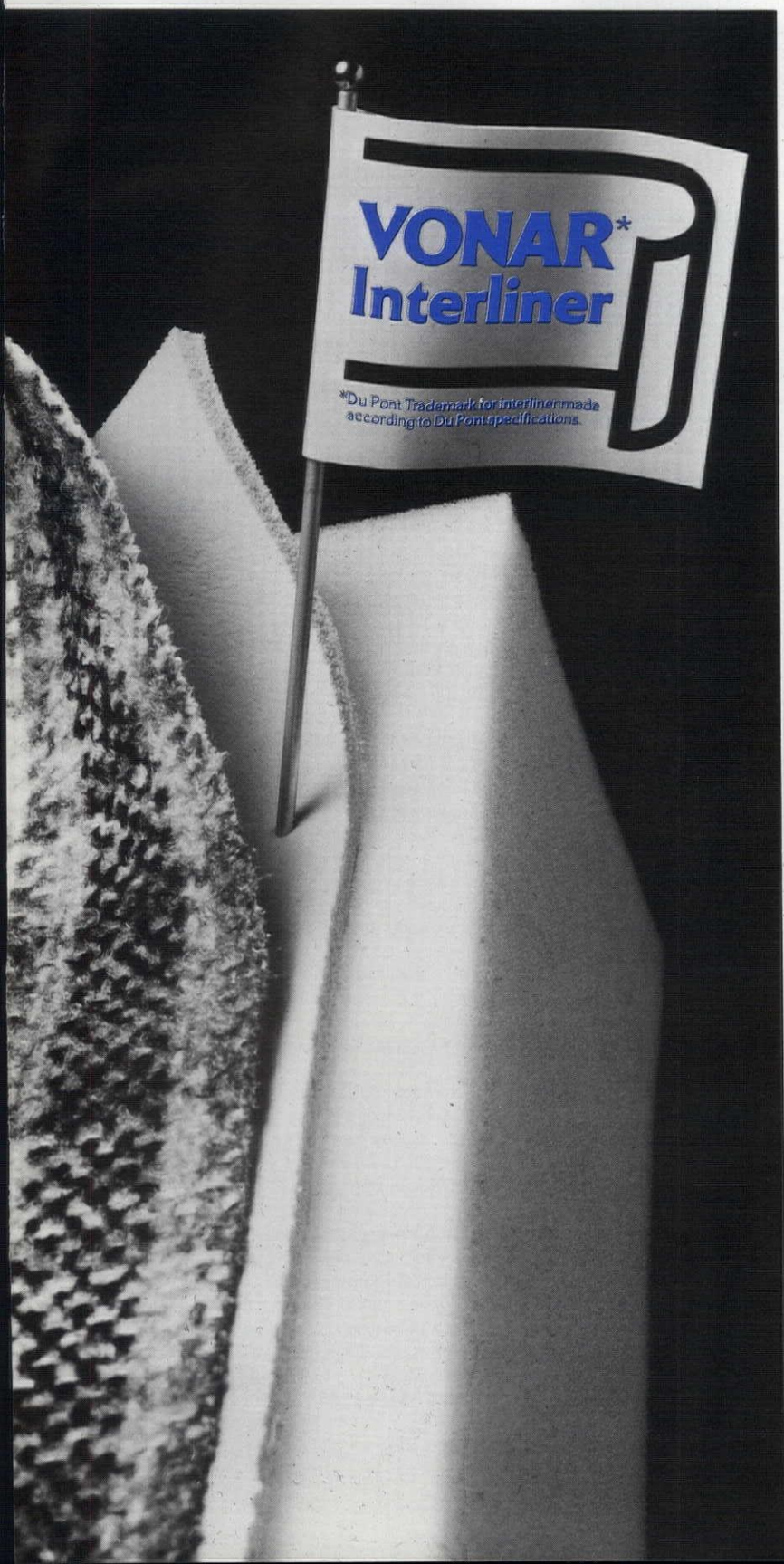
Mailmobile. Full-color brochure shows a self-propelled mail delivery vehicle that covers a fixed route. Compartments are provided for various departments and for outgoing mail so that deliveries can be presorted. The unit is powered by rechargeable batteries having 8-hr operating capacity, and runs along an invisible track that can be removed and rerouted. "Exploded" illustration points out vehicle's components and safety features. Lear Siegler, Inc., Automatic Systems Div.
Circle 207 on reader service card

Mailmobile

Automated materials handling systems. Information about a pneumatic system for handling both waste and linen covers single-tube and double-tube installations. Components and specifications are described and illustrated with both diagrams and photos. According to the company, the system offers lower labor costs, improved sanitation, reduced traffic, fire safety, and freedom from maintenance. ECI Air-Flyte Corp.
Circle 208 on reader service card

Airtube systems. A pneumatic tube system can be used to transport messages, telegrams, punch cards, office supplies, drugs, bottles, small parts, tools, and other similar items. Brochure provides carrier dimensions and illustrates twin-line systems. Also shown are various terminals available. Technical data section covers tubing, bends, vacuum, air volume, and exhauster dimensions. Lamson Div., Diebold, Inc.
Circle 209 on reader service card
[continued on page 98]

For improved flammability performance, without sacrificing design, specify furniture with VONAR interliner.



In response to increasing demands for improved flammability performance in upholstered furniture, Du Pont developed the VONAR* family of interliners. In limited ignition situations, properly used VONAR interliners can reduce the likelihood of ignition of furniture as a unit. Should ignition occur, VONAR can reduce the furniture burning rate.

VONAR can be used with a variety of fabrics and furniture constructions with little or no effect on comfort, aesthetics or hand. Best of all, VONAR can be added to many furniture styles at a modest increase in cost.

Why insist on VONAR?

Authentic VONAR interliner is made only by licensed interliner manufacturers according to Du Pont's rigid specifications for VONAR formulation and physical properties.

Du Pont is committed to protecting you and your customer against imitation interliners by regularly testing samples from licensees for proper formulation, specified thickness, physical properties, and restricting use of the VONAR trademark to those who meet Du Pont specifications.

Ask for VONAR. Make certain you use—and your client gets—authentic VONAR interliner. For more information, use the coupon below, or write: Du Pont Company, Room 35581K, Wilmington, DE 19898.

*Du Pont trademark for interliner made by licensed manufacturers according to Du Pont specifications. Du Pont supplies the basic elastomer to such manufacturers, but Du Pont does not make the interliners.

Circle **No. 313**, on Reader Service Card

DU PONT
REG. U.S. PAT. & TM. OFF

Mail to: Du Pont Company, Room 35581K, Wilmington, DE 19898

Please send me: ☐ further technical data and test results
☐ a list of furniture manufacturers using VONAR
☐ a list of licensed manufacturers of VONAR

Name _____ Phone _____

Title _____

Company _____

Address _____

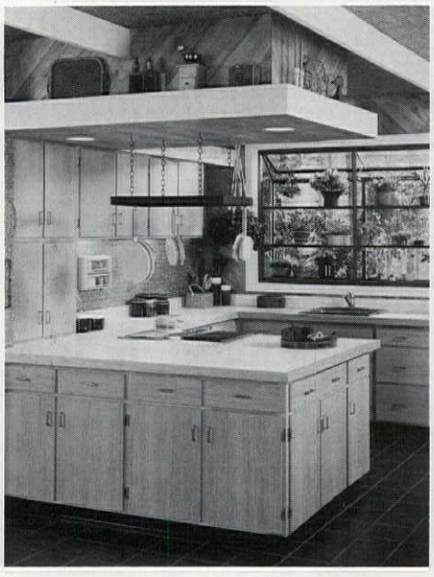
City _____ State _____ Zip _____

Products continued from page 96

Products

Energy Protection Sheathing, made of expanded polystyrene, produces more R-value per square foot cost than other sheathing materials, according to the manufacturer. The sheet, with an R-value of 4.7, is 1 in. thick and has 1½-lb density. The company recommends its use for covering the opaque wall and the entire foundation wall down to the frost line to cut conduction losses and heat lost through the foundation. It is said to be stable under severe freeze/frost cycles and in the presence of water and common soil chemicals. Poly-Foam, Inc.
Circle 100 on reader service card

Dualoy® T & D Fiberglass Epoxy Conduit, fittings and adapters for electrical and communication cables are available in 2-in. through 16-in. diameters. The manufacturer says the conduit has superior strength and corrosion resistance, and is nonconductive. It is one-tenth the weight of steel conduit, making it easier to handle. The conduit is joined by Pronto-Lock®, a mechanical system combining a heavy-duty threaded coupling and a positive O-ring seal, permitting joint make-up in minutes. Ciba-Geigy Corp.
Circle 101 on reader service card



Cabinets for kitchen, bath, or other areas

Cabinets for kitchen, bath, or other areas, in new or remodeled designs, make up the Nordic Oak group. Doors and drawer fronts of wood-grained Formica match the color of the all-wood framing. The group has mortise-and-tenon construction, monorail drawer glides, self-closing hinges, and brass hardware. Width of base units is from 9 in. to 48 in.; wall cabinets are 12 in. to 30 in. high, up to 48 in. wide. Del Mar.
Circle 102 on reader service card

An emergency electric generating set, rated at 30kW when operated on gasoline or propane fuel, 25kW on natural gas, is designed to provide emergency electric power wherever an interruption in commercial power cannot be tolerated. According to the manufacturer, the set is lighter, stronger, and more versatile than comparable models currently on the market. The unhoused version can be converted to a weatherproof, housed unit by attaching optional side panels and a one-piece, drip-proof roof panel. Onan Div., Onan Corp.
Circle 103 on reader service card

Precast stone drinking fountains. Pedestal models of precast stone fountains, either round or square, come in light and exposed aggregate finishes in two natural colors. Wall-mounted and wheel chair-height models are polished terrazo with light and exposed aggregate finishes, in eight earthtone colors. According to the company, they can be used outdoors or indoors. All units have stainless steel receptors, lever handle valves, and vandal-proof bubblers. Cordley.
Circle 104 on reader service card

Precast stone drinking fountains

Luminaire for wide spacing

Luminaire for wide spacing. A new reflector system for the company's dust-tight "IL" series luminaires provides an S/MH ratio of 1.8. According to the manufacturer, it is the only enclosed, dust-tight, 1000-watt industrial luminaire that allows wide mounting while maintaining uniform light distribution. "IL" luminaires, available with either glass or Teflon lenses, incorporate reflectors that minimize multiple reflections and light lost by reflection back to the arc source. Wide-Lite Corp.
Circle 105 on reader service card

Polyethylene pontoon encasements. Available on the company's floating structures, both recreational and industrial, are durable, high-density polyethylene pontoon encasements. The manufacturer says the pontoons are unaffected by water quality and resist stress- and impact-cracking. They are foamed with expanded-in-place polystyrene and are said to be unsinkable. United Flotation Systems.
Circle 106 on reader service card

Vapor barrier. Two sheets of high-strength kraft, laminated with bidirectional glass fibers, and extrusion-coated top and bottom with black polyethylene, form Moistop 395. This underslab vapor barrier, which inhibits moisture migration into a building structure, is applied after the base for concrete is leveled and tamped. Test results indicate it has a 0.15 vapor permanence (per ASTMF 96, Procedure A), 76+ water resistance, and 63 puncture resistance. The material comes in 8-ft-wide rolls containing 1000 sq ft, and weighs 4.2 lb/100 sq ft. It is currently available east of the Rocky Mountains only. St. Regis Paper Co.
Circle 107 on reader service card

Intermediate level sprinkler. Suited for rack storage fire protection, the intermediate level sprinkler can be installed either upright or suspended. A shield plate protects its fusible element from water released by sprinklers operating above it. Model I-LD is both UL listed and FM approved. It has fusing temperatures of 165 F, 212 F, and 280 F, and has orifice sizes of ½ in. and 17/32 in. Finish is standard bronze. Grunau Sprinkler Manufacturing Div.
Circle 108 on reader service card

Washer/extractor. A 125-lb capacity, open-pocket washer/extractor, Model 4226 QWE, provides fast, easy handling of laundry. According to the manufacturer, the 42-in. cylinder has a gross volume of 20.8 cu ft with a capacity for washing, for example, 82 double-bed sheets or 220 bath towels. The Miltrol automatic programmer controls all washing and extracting functions, including injection of appropriate supplies, eliminating the need for attention during operation. Pellerin Milnor Corp.
Circle 109 on reader service card

Electronic distance meter, for use by surveyors, is a medium range distance meter said to be capable of measuring ten kilometers with an accuracy of ± 5 mm + 1 mm/km making it possible to set up in one place and make measurements automatically. Each measurement can be made in approximately eight seconds and displayed in either meters or feet. According to the manufacturer, if atmospheric conditions prevent accurate measurements, a flashing signal alerts the operator. When conditions improve, the measurement sequence continues automatically. Hewlett-Packard Co.
Circle 110 on reader service card

Steel channel/anchor insert system. Inserts available in 10-ft and 20-ft lengths are embedded in narrow, prestressed concrete tees when the beams are poured. The inserts are held in place by spring wire attached to anchors welded in the Unistrut P-3300 12-gauge channel. The continuous channel slot, 1⅝" wide x ⅞" deep, is used to suspend or support electrical or mechanical equipment without drilling. Spring-loaded nuts slipped into the slot are then secured with bolts to appropriate fittings. Metal Framing Division, Unistrut Corp.
Circle 111 on reader service card
[continued on page 100]

Sun Oil's headquarters in a rural setting.

ELEVATORS BY DOVER

On the green meadows of Radnor Corporate Center in suburban Philadelphia, Sun Oil Company located their world-wide headquarters. Two other buildings of this $25 million, 450,000 sq. ft. office campus house the national corporate headquarters of six additional companies. The 72-acre setting, distinguished for its natural landscaping that includes a wildlife preserve, blends graciously with the gently rolling Pennsylvania countryside. Ten Dover Oildraulic® Elevators serve the three buildings, carrying employees and visitors to their destinations smoothly and efficiently. For more information on Dover's low-rise Oildraulic Elevators and high-rise Traction Elevators (both geared and gearless) write Dover Corporation, Elevator Division, Dept. B, P.O. Box 2177, Memphis, Tennessee 38101.

Circle No. 311

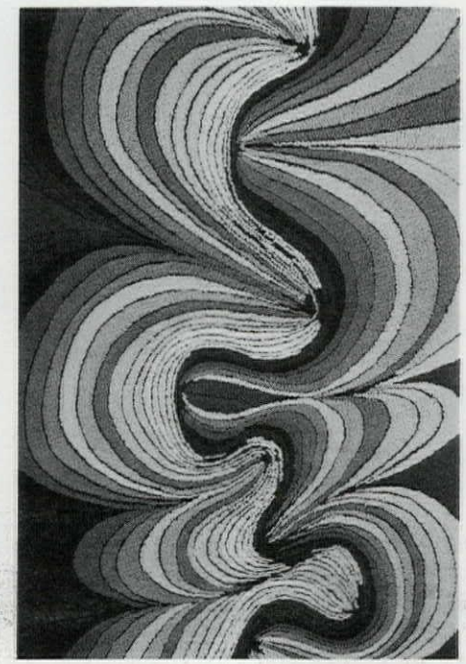
DOVER®

The elevator innovators.

Sun Oil Company Headquarters
One Radnor Corporate Center, Radnor, Pennsylvania
Owner: Radnor Corporation
Architect: John Carl Warnecke, FAIA, Architects, New York
Contractor: Turner Construction Company, Philadelphia
Dover Elevators sold and installed by
Security Elevator Company, Philadelphia

Products continued from page 98

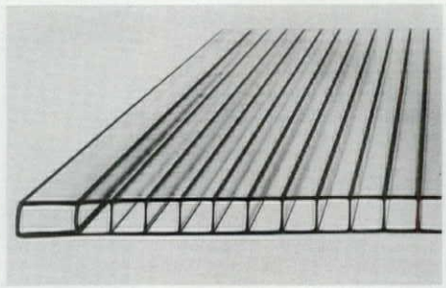
Area rugs in the "Lyricals" collection, designed by Giorgio Sant' Angelo, come in a variety of sizes and shapes: rounds, squares and oblongs, as well as a 12-ft runner. Four themes are "Basic," "Ethnic," "Geometric," and "Floral." Designs are available in a choice of colors. Shown is Mogul which comes in sand, multicolor, or gold. All rugs in the group are made of Allied Chemical's 100% Anso nylon on a latex and scrim backing. Regal Rugs, Inc.
Circle 112 on reader service card



Area rugs

Direct reading calendar clock

Direct reading calendar clock. Clock, approximately 10½" x 12½" x 5" deep, operates entirely automatically, including addition of Feb. 29 in leap year. It is available synchronous or slave-connected to a master clock, and has eight hours of spring reserve. Solari America.
Circle 113 on reader service card



Passive solar energy glazing

Passive solar energy glazing of extruded, double-skinned acrylic sheet has internal ribs that trap air to provide insulating value comparable to that of glass, at a lower cost. Acrylite SDP 100% acrylic has thermal efficiency and light transmittance equal to a ⅝-in. insulating glass unit, according to the company. The double-skinned sheet is also available in polycarbonate, and comes in clear, translucent white, and solar bronze tints. There are two aluminum joining systems to meet a variety of application needs. CY/RO Industries.
Circle 114 on reader service card

Plan Caddy. A free-standing file for plan storage accommodates: up to 20 friction binders with a capacity of 2000 sheets (as shown); 5 to 10 square tube files; up to 40 envelopes for artwork, charts and presentations; or a combination of the three filing modes. Optional features are a walnut-finish top, and gang locks to join multiple units. Plan Hold.
Circle 115 on reader service card

Floor-plan layouts. Grid plansheets with title block, and plastic scale drawings of equipment and furniture for layouts, permit components to be moved about for the most efficient use of floor space. Pieces are held in place electrostatically, rather than with adhesives. Completed plans may be reproduced on the office copier or blueline machine. Pads of 676 precut symbols are scaled to ¼" = 1'. Each plansheet, five per pad, is scaled to represent 1660 sq ft in area. Fickled.
Circle 116 on reader service card

Ridge Runner ridge vent, made of .024-gauge stucco aluminum in natural finish, black, and brown, is available in 10-ft lengths with 5¾-in. hood width. End covers and double cap connectors are made of durable flexible plastic. Leigh Products, Inc.
Circle 117 on reader service card

Aquagraphics, a process by which artists' work is transferred directly to fabric, permits designers to specify original art work at reasonable cost. The unique designs may be customized as to color, mood, and style of nonobjective art, as well as size (up to 60" x 140"). Each is signed by the artist. The paintings can be developed for any material including canvas, silk, leather, and tapestry, and for decorative accessories. Lamlee Studio.
Circle 118 on reader service card

Vertical conveyor. The Whizlift®, available in heights in excess of 50 ft, continuously transports any mixture of items including cartons and irregular shapes. The conveyor consists of an upright carousel containing an elastic retaining cover. It is said to convey individual weights as heavy as 200 lbs per item and will handle a broad range of sizes with variations in height and width up to a maximum girth of 120 in. It can be installed in existing retail stores to connect multiple levels, whether between floors or to mezzanines. W&H Conveyor Systems, Inc.
Circle 119 on reader service card

Touch-button metering valve control. Located on the front rim of the fixture bowl, a control button activates the Handi-Tap valve with only a few ounces of pressure. A deck-mounted gooseneck spout delivers a timed flow of water of pre-set temperature. Timing and water temperature can be adjusted easily to meet local requirements. The one-piece, pre-assembled, stainless steel units are said to conserve water and heat, and meet all existing codes for accessibility by disabled persons in wheelchairs. Bradley Corporation.
Circle 120 on reader service card

Literature

Aluminum curtain walls and windows. Color brochure describes appearance, performance, construction, and glazing features of aluminum curtain walls and windows. Basic detail drawings of each are included. Color photographs illustrate product installations. Kawneer Architectural Products.
Circle 210 on reader service card

Luxalon® architectural system for ceilings, soffits, and façades is made up of a range of carriers to which a standard aluminum panel is clipped. The system is quickly installed, with no screws, bolts, or rivets required. As described in the booklet, the system is corrosion-resistant, lightweight, noncombustible, and has good acoustical properties when it is installed with acoustic pads. The panels, which offer design flexibility, come in a selection of colors. Hunter Douglas, Inc.
Circle 211 on reader service card

How to plan parking areas. Guide offers illustrated step-by-step instructions on how to lay out a parking lot of any size. Scaled templates are provided for drawing 90-, 60-, 45-, and 30-degree stall angles. Layout drawings show entry and exit control systems and dimensions for ramp and driveway design. Copies of the guide are available for $3.00 from Federal Signal Corp., 291 Frontage Rd., Hinsdale Industrial Park, Hinsdale, Il 60521.

Wastewater controls. Catalog highlights carbon steel and stainless steel butt-weld wastewater controls for nuclear and fossil-fueled power generating stations. Included are roof and floor drains, cleanouts, backwater valves, and leak-detector drains. Photos, engineering drawings, dimensions, and engineering specifications are provided. Also in the catalog are engineering tables for chemical requirements and tensile requirements of the commonly specified stainless steel grades. There is also a condensed manual of the company's standard cast plumbing line for uses other than welded steel drainage pipe systems. Zurn Industries, Inc.
Circle 212 on reader service card

[continued on page 102]

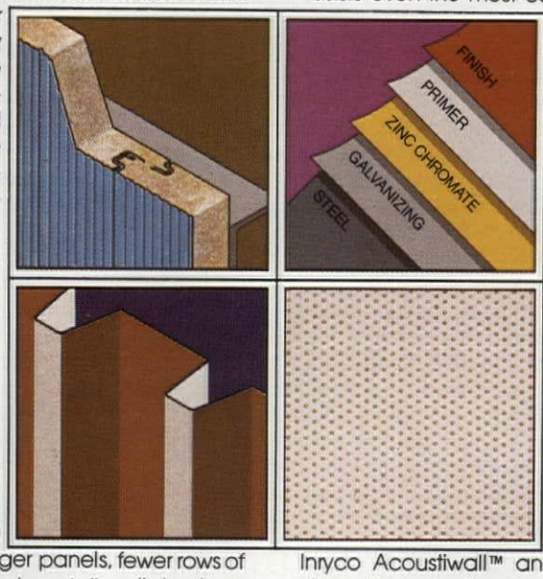
Hard Working

Inryco® Wall Panels can help you solve four tough building problems

Inryco wall panels are more than good looking. They also work hard for a living, helping you gain economies in construction, maintenance, and heating and cooling costs as well as reducing noise.

Conserve Energy

New factory-insulated Inryco/wall™ has a U-value of .064—six times as efficient thermally as an 8" block wall—and yet it's only 2" thick, with prefinished steel faces on both sides. Inryco/wall's low heat loss factor helps reduce a building's energy consumption, making possible savings in heating and air conditioning—both in equipment and fuel costs. Important savings are also possible with Inryco field-assembled panels that have U-values in the range of .10.



Resist Pollution

New Duofinish 700™ is one of the toughest wall panel finishes you can get—bar none. Its armorlike urethane surface resists even the most corrosive, abrasive industrial atmospheres (test data on request). And like all Inryco Duofinishes, it is a two-coat, oven-cured, factory finish applied over ASTM G-90 galvanized steel. Duofinish 700 is a wall panel finish that doesn't just put up with pollution—it fights back. For less hostile environments, Duofinish 500, Inryco's two-coat, oven-cured, Kynar finish delivers reliable, long-life performance.

Save Through Design

New deep-profile Inryco panels have been specifically designed to make long span walls economical. Ribs up to 4½" deep provide strength that makes possible longer panels, fewer rows of panels and fewer horizontal supports on tall-wall structures. That means fewer laps, too, and erection savings, both in time and in auxiliary structural steel.

Reduce Noise

One of the best ways to reduce noise levels in a building is to provide sound absorbing surfaces. Inryco Acoustiwall™ and Acoustideck® help to provide dramatic reductions in overall decibel readings—important to human comfort and efficiency in any kind of building.

Inryco
an Inland Steel company

INRYCO, Inc. Building Panels Division
Dept. G-4069, P.O. Box 393
Milwaukee, WI 53201

We'd like to tell you more about all our good looking, hardworking panels. Please fill out and return the coupon to the address shown here.

Name _____

Title _____

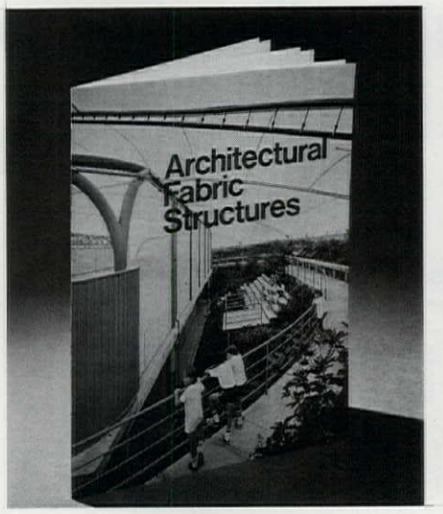
Firm _____

Address _____

City _____ State _____ Zip _____

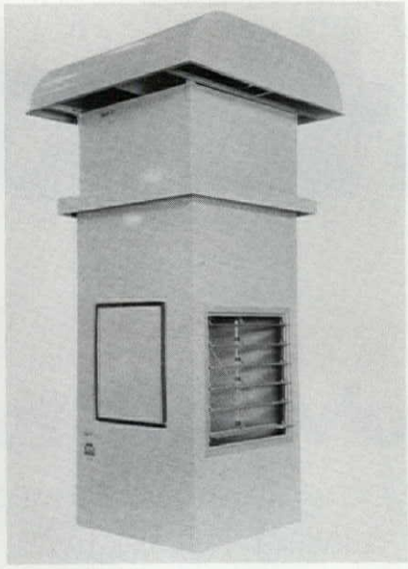
A8-22-2

Literature continued from page 100



Architectural Fabric Structures

Petrarch building panels


Three-way heat saver/ventilator

Architectural Fabric Structures. Full-color, 16-page brochure provides information on permanent structures of coated fabric used because of design flexibility and best use of available space at lowest cost. Fabric used is woven of glass fibers coated with Teflon fluorocarbon resin. Installations are illustrated and specific cost and performance data are given. The permanent structures include sports stadiums, zoos, student multi-activity centers and schools, from Saudi Arabia to Alaska. Du Pont Company.
Circle 213 on reader service card

Aluminum Store Front and Entrance Design Guide. A revised and updated version of a manual published in 1966, this edition is divided into four sections: Terminology, Design Information, Hardware, and a new section on Engineering Design Rules. Included are latest hardware developments such as hinges, latches, locks, doorstops and holders, revolving doors, and similar items. The new section on engineering design covers load distribution and magnitude, section properties, deflection, lateral buckling, etc. The manual is available at $9 per copy from: Architectural Aluminum Manufacturers Association, 35 E. Wacker Dr., Chicago, Il 60601.

Prefabricated engineered chimneys and stacks. Custom-engineered, free-standing chimneys and stacks, in sizes from 10 in. to 11 ft i.d., are prefabricated for boilers, furnaces, incinerators, and processing equipment. Brochure covers construction, installation, and specifications. Photographs and diagrams supplement text. Van Packer Co.
Circle 214 on reader service card

EnerVent reverse-cycle air conditioning for schools is explained in a 16-page bulletin. Information is provided on cost analysis, quality features, and use in new buildings and renovations. Includes capacity data, dimensional and application drawings. American Air Filter Co., Inc.
Circle 215 on reader service card

Petrarch® building panels, with the appearance of stone or slate, are a composite of glass-fiber reinforcement, resin binders, and a high natural mineral content. The material, for interior or exterior use, is easily cut and drilled. Brochure provides information about installation and performance properties, as well as photographs of buildings on which the panels have been used. Textures and colors also are illustrated. Redland Claddings.
Circle 216 on reader service card

Decorative ceramic tiles. Glazed and unglazed tiles for walls and floors are shown individually and in typical installations. Dimensions for each are given and colors available are shown. There are florals, geometrics, illustrated tiles, solids, and textures in squares and other shapes. Villeroy & Boch (U.S.A.), Inc.
Circle 217 on reader service card

Information retrieval systems. Catalog provides information about Visual Search Microfilm Files consisting of more than 100 current and comprehensive data bases. They include vendor, industry, and government documents needed in design, construction, purchasing, quality control, value analysis, and many other areas. For use by architects and engineers are building product services and product selectors providing catalog data and manufacturers' data sheets in all 16 divisions of the CSI Uniform Construction Index. Information Handling Services.
Circle 218 on reader service card

Barrier-free bathroom facilities study. A study of design alternatives to eliminate barriers confronting the disabled suggests modifications to public and residential bathroom facilities to remove some of the problems. The research project was conducted at the University of Michigan School of Art. Copies are available from the sponsoring company for $2.00. Send requests and checks (payable to the company) to Owens-Corning Fiberglas, Toledo, Oh 43659, attention of S.R. Meeks.

Three-way heat saver/ventilator. An air-moving device with hooded inlet recycles heat in the winter and exhausts hot air or introduces fresh air in the summer. Recirculating heat trapped near the ceiling in the winter is said to reduce heating system load. During warm months, hot air can be exhausted to the outside or, by reversing fans, fresh air can be brought in. Six sizes available are described in 4-page bulletin. Aerovent, Inc.
Circle 219 on reader service card

Portable panels that can be set up singly, on removable feet, or linked together, provide semiprivate areas within larger rooms. Heights up to 7 ft provide acoustical baffling without interfering with lighting or air circulation. Panels are covered in burlap, vinyl, nylon plush, or fabrics. Pins, tacks, or picture hooks can be used for temporary or permanent displays. The Brewster Corp.
Circle 220 on reader service card

Metal wall and roof system catalog offers technical information on U-values, fire tests, air infiltration, water penetration, coating comparisons, and other data. Chart shows colors available. The various systems within the Foamwall group are illustrated, with typical installations shown in color. Elwin G. Smith Div., Cyclops.
Circle 221 on reader service card

Bar grilles and linear diffusers, in over 28 frame combinations, are outlined in company literature. Shown are special features such as sliding latch, vinyl gasketing, corner construction, and snap-on damper. Diagrams illustrate various configurations and option details. Charts and text provide performance data. Millaire Division, Miller Industries.
Circle 222 on reader service card

Red Cedar Shingles and Shakes. Four-page color brochure illustrates usage and recommended application techniques, contains product data. Red Cedar Shingle & Handsplit Shake Bureau.
Circle 223 on reader service card

Security glass. Products consist of a combination of various types and thicknesses of glass, with layers of polyvinyl-butyral plastic in different thicknesses. Brochure contains descriptive data on glass types and sizes and test data. ASG Industries, Inc.
Circle 224 on reader service card
[continued on page 104]

Decathlon Athletic Club, Bloomington, Minnesota.

Pella Wood Folding Doors. The attractive solution to space-control problems.

Pella Designer Doors combine the look of richly paneled walls with the design freedom and flexibility you need to bring space into efficient, full-time use. Large areas can be spanned by joining several Pella Doors together. The space can be further divided in an almost unlimited number of ways by using Pella switches and curved track. Pella Folding Doors operate quietly with minimum effort and come in a selection of high quality, genuine wood veneers, or vinyl finishes, over a stabilized wood core.

Circle **No. 331**, on Reader Service Card

For more detailed information, send for your free copy of our full color catalog on Pella Wood Folding Doors. See us in Sweet's General Building File, call Sweet's BUYLINE number, or look in the Yellow Pages under "doors", for the phone number of your Pella Distributor.

Name

Firm

Address

City State Zip

Telephone

Mail to: Pella Windows & Doors, Dept. T35G8, 100 Main St., Pella, Iowa 50219. Also available throughout Canada. Coupon answered within 24 hours.

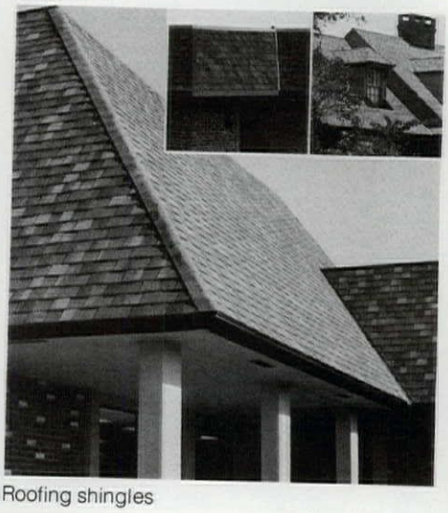
Literature continued from page 102

Washroom accessories. 1978 catalog pictures and describes safety grab bars, corridor railings and other products for use by the handicapped as well as the able-bodied. Dimensions, and other data are given. Bradley Corp.
Circle 225 on reader service card

Particleboard products. Newest addition to line is KorTron/EB which is given a hard, smooth finish that looks and performs like a laminate through a process called electron beam curing. It is suitable for vertical applications, nonwear horizontal surfaces. Product comes in wide choice of standard colors or can be custom matched to your specifications in your choice of low or medium gloss, on one or both sides. KorPine Division, Willamette Industries, Inc.
Circle 226 on reader service card

'Sportsplay Lighting Guide.' A fully illustrated guide to sports lighting containing techniques, descriptions, specifications, photographs, and diagrams is available to architects, engineers, and contractors. The 144-page guide contains over 100 detailed lighting layouts for sports, recommended illumination levels, competitive floodlight comparison chart, and typical photometric data. Keene Lighting.
Circle 227 on reader service card

Exit devices for narrow stile doors. Mortise latch is all steel case with white-bronze bolt and deadlatching mechanism. Bolt throw is ⅝ in. Push bars are of extruded aluminum with black nylon end caps. Normal no load actuation requires only 8 lbs. pressure anywhere along bar Literature has cutaway sections illustrating preparation for installation. Adams Rite Manufacturing Co.
Circle 228 on reader service card



Roofing shingles

Roofing shingles. A 12-page catalog and specification guide describes six fiberglass and organic-felt asphalt shingles, with code compliances, dimensions, weights, UL ratings, and other pertinent product information. Many available colors and blends are shown, and cutaway diagrams illustrate various shingle benefits. Discussed are differences between conventional asphalt shingles and fiberglass shingles. Johns-Manville.
Circle 229 on reader service card

Rolling doors. 1978 brochure illustrates company's line of doors and grilles including fire doors and counter doors, side coiling closures, and power operators. Installation diagrams and specifications are included. The Cookson Co.
Circle 230 on reader service card

Building products catalog. Full-color, 88-page 1978 booklet is a guide to prefinished wall panelings, exterior plywood, lumber, hardboard sidings, and gypsum products. Fully illustrated in color with product details and actual applications, the catalog also compiles information on materials, sizes, thicknesses, finishes, patterns, code, assembly, and installation. Georgia-Pacific Corp.
Circle 231 on reader service card

Building panels. Permatone "S" panels combine an inorganic base sheet with a baked color finish available in 21 bright and earth tone hues. Brochure covers applications, installation recommendations, panel properties, sizes and thicknesses, moldings, and suggested specifications. True color samples are shown. Johns-Manville.
Circle 232 on reader service card

Metal doors and frames. Eight-page brochure illustrates and describes full line of doors and frames, UL/FM fire-rated doors, door/glass/louver sizes, and door and frame specifications. Amweld Building Products.
Circle 233 on reader service card

Incredible.

An operable flatwall system with a one-hour fire rating.

These photographs were taken during the Underwriters Laboratories, Inc. fire test of Acousti-Seal® 904 FR (the first operable flatwall system ever to be fire-tested successfully for one hour at U.L.).

The test is brutal. A full hour of flames with temperatures reaching 1700°F. Followed by a punishing 2-minute blast of cold water at 30 psi from a 2½" fire hose.

Acousti-Seal 904 FR stood firm. And is now the only one-hour fire-rated operable flatwall system in the world.

Acousti-Seal 904 FR. Engineered to make space more productive... fire-rated to save lives. For more information, see your Modernfold distributor. Or write Modernfold, Box 310, New Castle, Indiana 47362.

Modernfold®

An American-Standard Company

This Minneapolis Housing Authority building was built in 1967. The STYROFOAM brand insulation is as energy efficient today as it was 11 years ago.

Energy efficient then. Energy efficient now.

Make sure the buildings you build today offer the same energy efficiency years from today.

The energy crisis isn't going to go away.

So the buildings you're building today had better be energy efficient for plenty of years to come.

Cuts energy costs

STYROFOAM* brand insulation can help cut both heating and air conditioning costs. Today . . . as well as years from today.

No other plastic foam insulation resists moisture as well. This means not only a longer life for our insulation, but also a more efficient insulation for the life of the building.

More reasons to specify it

There are other reasons to make sure the specs read "STYROFOAM brand insulation" period.

It's sturdier than most other plastic foam boards. So it handles easier without breaking.

It's accepted by most major building codes.

It installs easily in almost any type of commercial structure.

And because it's virtually impervious to moisture, it can be placed outside the foundation of the building to cut heat loss through the foundation walls.

New savings for older buildings

There are also systems for retrofitting using STYROFOAM brand insulation both inside and outside existing structures. So even older buildings can be made more energy efficient.

For more information on how STYROFOAM brand insulation can help you, contact your local salesman or write:
The Dow Chemical Company
STYROFOAM Brand Insulation,
Midland, MI 48640.

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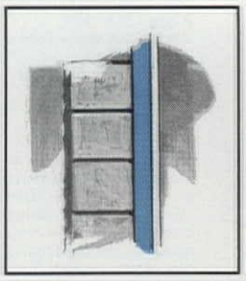
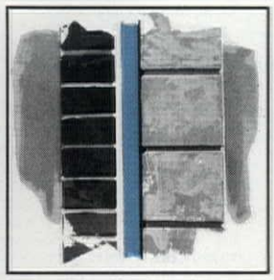
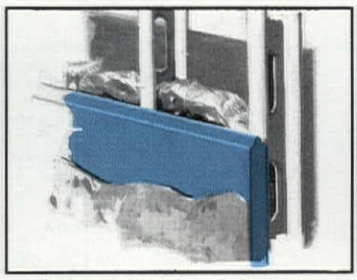


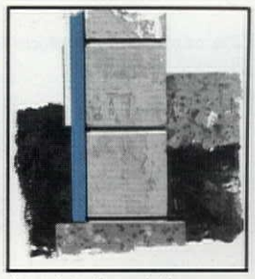
Apply to the inside of masonry walls with STYROFOAM brand insulation mastic No. 11.



Insert between interior and exterior walls in cavity type construction.



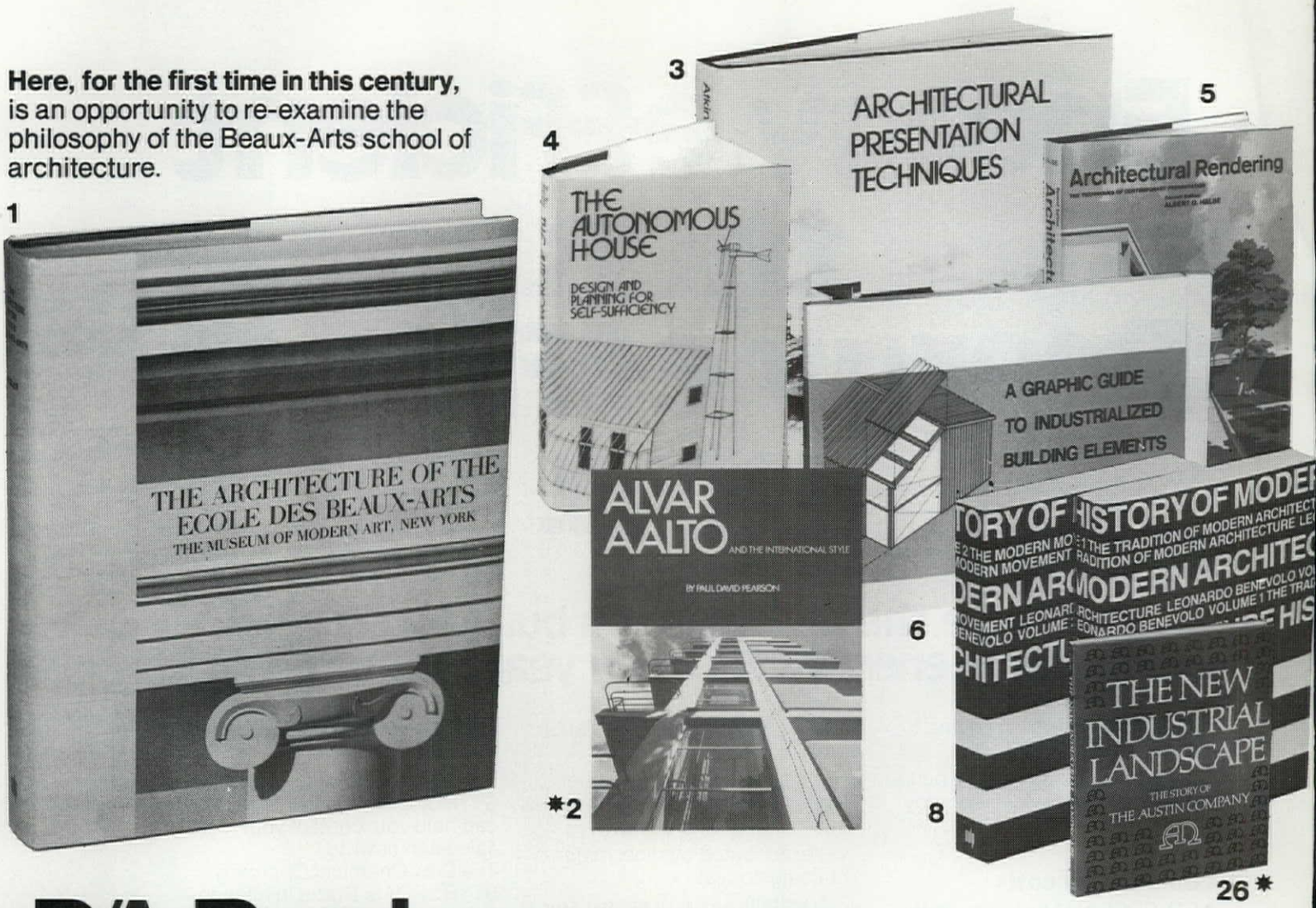
Apply to outside of studs just as you would apply other nonstructural sheathing.



Attach to foundation with STYROFOAM brand insulation mastic No. 11 or merchanical fasteners.

WARNING: STYROFOAM brand insulation is combustible and should be properly installed. For commercial construction a minimum of ½" gypsum board or equivalent thermal barrier interior finish should be used. See Dow literature available from your supplier or from Dow.

Here, for the first time in this century, is an opportunity to re-examine the philosophy of the Beaux-Arts school of architecture.



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February . . . . . Hotels/Exterior wall panels
December . . . . . Neighborhood buildings/Solar energy
November . . . . . Restoration and remodeling
October . . . . . Venturi & Rauch/California houses/ Exterior lighting

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1 The Architecture of the Ecole des Beaux-Arts

Edited by Arthur Drexler with essays by Richard Chafee, David Van Zanten, Neil Levine and Arthur Drexler
423 pp., illus. . . . $45.00

The most comprehensive analysis and documentation of Beaux-Arts architecture ever published. Includes large-scale drawings of elevations and plans and photographs of major French and American Beaux-Arts buildings (including Pennsylvania Station and Grand Central Terminal).
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2 Alvar Aalto and the International Style

By Paul David Pearson,
240 pp., illus. . . . $27.50

Although Aalto's heritage is being carried on by those he worked with and personally influenced, he left no written legacy of his design philosophy. This timely critical study fills that void by analyzing his personal form of expression as the last great leader of 20th century architecture.
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3 Architectural Presentation Techniques

By William W. Atkin,
196 pp., illus., . . . $15.95

This book includes presentations ranging from simple sketches in pencil and pen-and-ink to elaborate drawings, photographs, slide presentations and various combinations of media achieved with overlays, camera techniques and modern reproduction methods.
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By Brenda and Robert Vale,
224 pp., illus., . . . $10.00

Two architects offer practical solutions to the design of a house that operates independently within its environment. This "Autonomous House" is not linked to utility lines for gas, electricity, water, or drainage; but instead uses the energy of sun, wind and rain to service itself and process its waste.
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5 Architectural Rendering: The Techniques of Contemporary Presentation

By Albert O. Halse, 326 pp., illus., 2nd edition, 1972 . . . $29.00

This completely up-dated revision of the most widely used guide to architectural rendering covers all working phases from pencil strokes to finished product — and shows how to obtain the desired mood, perspective, light and color effects, select proper equipment and work in different media.
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6 A Graphic Guide to Industrialized Building Elements

By Raymond Sluzas & Anne Ryan
176 pp., illus. . . . $17.95

This ideal source book and general reference tool describes and analyzes the characteristics and practical applications of those parts of a building which are preassembled as a unit in the factory. In a clear, encyclopedic style, it provides a substantive overview of the options and resources available.
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7 Tourism and Recreation Development: A Handbook of Physical Planning

By Fred Lawson & Manuel Baud-Bovy,
220 pp., illus. . . . $39.95

This comprehensive book sets out step-by-step planning techniques for tourist resorts and recreational parks, from the national down to the local level. Practical measures are included for conservation and for monitoring developments.
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8 History of Modern Architecture Volume 1: The Tradition of Modern Architecture Volume 2: The Modern Movement

By Leonardo Benevolo
912 pp., illus. . . . $20.00 the set

This 2-volume paperback boxed set, lavishly illustrated, is the first English translation of a notable history of modern architecture by one of Italy's foremost teacher-architects. Volume 1 covers the period 1760-1914, Volume 2 from 1914-1966.
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9 Graphic Standards of Solar Energy

By Spruille Braden,
224 pp., illus., $19.95

A timely design reference guide for those involved in the structuring of our environment. The author melds energy-conscious design with mechanical systems for commercial, institutional and residential buildings, providing quick and efficient extrapolation of data from design concept to working drawings.
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10 Architecture and You How to Experience and Enjoy Buildings

By W. W. Caudill, W. M. Pena and Paul Kennon,
176 pp., illus. . . . $16.50

Written by practicing architects whose buildings are used by millions of people throughout the world, here is a book that explains how to experience and appreciate the spaces and forms of architecture just as you experience a painting or a symphony.
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NEW*

11 Guide to Frank Lloyd Wright and Prairie School Architecture on Oak Park

By Paul E. Sprague,
96 pp., illus. . . . $3.50

This paper-back edition illustrates the many homes, buildings and churches in Oak Park that were designed by the great Frank Lloyd Wright and many of his contemporaries among the architects of the Prairie School. Includes road maps that indicate the specific location of each structure.
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NEW*

12 A History of World Furniture

By Luis Feduchi,
656 pp., Illus. . . . $50.00

This exquisite slip-cased volume offers a vast panorama of the different styles of furniture throughout history, starting with ancient Egyptian civilization, Greece and Rome, through the Paleo-Christian and Byzantine periods, the Renaissance, Baroque, the Empire period, and finally the Spanish Isabelline style. Includes a brief introduction to contemporary furniture.
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13 Corrosion of Building Materials

By Dietbert Knofel
Translated by R. M. E. Diamant
107 pp., illus. . . . $15.95

Because of increasing pollution, the problem of corrosion of building materials is becoming more acute every day. This timely and informative book describes corrosion processes of various construction materials, along with preventive techniques.
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NEW*

14 Interiors 2nd Book of Hotels

By Henry End,
224 pp., illus. . . . $26.50

A thoroughly illustrated reference for all members of the hotel design team — architects, engineers, graphics and lighting consultants, landscape architects, as well as interior designers — this book is equally useful to owners and managers concerned with providing luxurious yet functional hotel facilities.
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NEW*

15 Current Construction Costs 1978 — 15th Annual Edition

This 1978 annual edition presents an accurate portrayal of more than 8,000 construction costs for preparation of conceptual, schematic, preliminary and final estimates for architects, engineers, estimators in all trades as well as general building and engineering contractor estimators.
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16 Site Planning for Cluster Housing

By Richard Untermann &
Robert Small
306 pp., illus. . . . $22.50

An invaluable guide to planning low-rise, medium-density cluster housing environments. Also covers jurisdictional and technical considerations of site planning, and includes more than 600 drawings and photos that illustrate design principles and techniques.
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17 Drawing File for Architects, Illustrators and Designers

By Marc Szabo
251 pp., illus., . . . $13.95

This book provides over 200 pages of figures — in the most common and natural positions, activities, and types of wearing apparel, as well as dozens of drawings of boats and cars, all of which can be copied freely — by direct tracing, photostats, or photocopying machine. The pages tear out easily to form an easily accessible fingertip scrap file.
Circle B617 under Books.

NEW*

18 Doors — Excellence in International Design

By Gretl Hoffmann,
144 pp., illus. . . . $24.50

An international compendium of contemporary door design, this richly illustrated book offers a remarkable array of doors, both interior and exterior, which provide entry to all kinds of buildings, including office and municipal buildings, churches, schools and private homes.
Circle B618 under Books.

19 Building Construction Illustrated

By Frank Ching,
320 pp., illus., . . . $17.95

Charmingly hand-lettered by the author, this book presents step-by-step techniques in residential and light construction. Containing over 1,000 drawings, it covers materials, finishes, fastenings, posts, trusses, slabs, wood joists, light steel/aluminum, structural calculations, planning and site work, cost estimating, and construction sequencing.
Circle B619 under Books.

20 Working Drawing Handbook A Guide for Architects & Builders

By Robert C. McHugh,
166 pp., . . . $12.95

This guide is a step-by-step presentation on how to produce working drawings as an integral aspect of communication between designer and builder. Includes convenient check-lists, budgeting information, and data on dimensioning that helps minimize chances of errors.
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21 Rendering With Pen and Ink

By Robert W. Gill,
368 pp., illus., . . . $7.50

This paper-back edition is a copiously illustrated guide to the techniques and methods of rendering, including sections on perspective, projection, shadow, reflections, and how to draw cars, ships, aircraft, trees, and human figures. The author also describes the very wide range of instruments and equipment currently in use.
Circle B621 under Books.

22 The Kitchen 100 Solutions to Design Problems

208 pp., illus. . . . $25.00

Whether its style is contemporary, colonial or country, today's kitchen must be designed to function as a convenient, congenial living center. This collection of 100 successful ways to design kitchen spaces explains the particular design problem for each kitchen area and illustrates the solution with superb photographs.
Circle B622 under Books.

23 Learning from Las Vegas The Forgotton Symbolism of Architectural Form Revised Edition

by Robert Venturi, Denise Scott Brown and Steven Izenour
244 pp., illus. . . . $17.50

Includes the full texts of Part I of the original, on the Las Vegas Strip, and Part II, "Ugly and Ordinary Architecture, or the Decorated Shed". This book created a storm of controversy in its original edition, calling on architects of be more receptive to the tastes of common people.
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NEW*

24 Hotel and Restaurant Design

By Douglas Smith,
240 pp., illus. . . . $15.95

A comprehensive guide for owners and operators of small to medium-sized hotels and restaurants that will stimulate ideas on schemes of all sizes, from extending and improving old buildings to planning new developments in town and in the countryside.
Circle B624 under Books.

NEW*

25 100 Years of Architecture in Chicago, 3rd Edition Continuity of Structure & Form

By O. W. Grube, P. C. Pran &
F. Schulze,
191 pp., illus. . . . $14.95

This lavishly illustrated book explores virtually all the structures that have established Chicago as the single most important metropolis in the history of modern architecture, with particular emphasis on the direction taken over the past 100 years.
Circle B625 under Books.

NEW*

26 The New Industrial Landscape The Story of the Austin Co.

By Martin Greif,
192 pp., illus. . . . $27.50

A fascinating story of The Austin Company, an innovative company whose influence has helped to shape the modern world. Traces the company's history from its begging in the carpentry shop of a poor English emigrant to its spectacular growth as a major corporation responsible for "revolutionizing the international industrial landscape".
Circle B626 under Books.

Building materials

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

First National Bank of Ripon, Wi (p. 54). Architects: Hammond Beeby & Babka, Chicago, Il. Pipe columns, trusses, bar joists: Vulcan. Curtainwall: Tubelite. Roof surfacing: Johns-Manville. Partitions, windows, entrance doors: Tubelite. Doors: Steelcraft. Hardware: Russwin, Stanley, LCN, Brookline. Black graphite paint: Detroit Graphite. Paint: Pratt & Lambert. Kitchen appliances and cabinets: General Electric. Drive-in banking equipment and alarms: LeFebure. Vault door and night deposit: Mosler. Lighting: McPhilbin, Lightron, Spear Lighting, Devine Lighting. Plumbing and sanitary: Kohler, Sloan Valve. Perimeter convector: Vulva. Boiler: Rite. Unit heaters: Dunham-Bush. Rooftop air conditioning units: Nesbitt.

St. Mary's College Athletic Facility, Notre Dame, In (p. 58). Architects: C.F. Murphy Associates, Chicago. Insulated fiberglass wall panels: Kalwall Corp. Floor surfacing: Resin Guard Inc. Four-ply membrane roofing with coal pitch and gravel topping: Koppers. Rubber membrane waterproofing and dampproofing: W.R. Meadows Inc. Roof drains: Josan Drains. Groundface concrete block partitions: Illinois Brick. Wood interior doors: Michiana Millwork. Locksets: Russwin. Door closers: Rixson-Firemark. Rolling doors: J.G. Wilson. Paint: Tnemec. Public address system: Electronic Service Co. Pipe insulation: Johns-Manville. Water closets: Kohler Co. Flush valves: Sloan. Sprinklers: Kropp Fire Protection. Water coolers: Watrous Inc. All-air air conditioning and heating package units: Trane. Controls: Johnson Controls. Kitchen package equipment: Dwyer Products Corp.

Michigan City Public Library, Michigan City, In (p. 62). Architects: C.F. Murphy Associates, Chicago. Steel frame structure: Evans Metal Products. Fiberglass wall panels: Kalwall Corp. Aluminum roof panels: Kaiser. Interior fiberglass walls: Kalwall Corp. Carpet: Mohawk. Rubber membrane waterproofing: Carlisle. Hardware: Rixon, Sargent. Exterior paint: Vinoline. Kitchen equipment: Dwyer. Computerized circulation system: CLSI. Modular seating: Castelli. Lavatories: American Standard. Air heating system: Mammoth Package Unites. Air conditioning: Mammoth package units and Carrier chiller units.

Auraria Learning Resources Center, Denver, Co. (p. 66). Architect: C.F. Murphy Assocs., Chicago, Il. Concrete beams and joists: Colorado Premix. Aluminum curtainwall: PPG. Floor surfacing, ceiling surfacing: Armstrong. Roof surfacing: Koppers. Partitions: U.S. Gypsum. Doors: Ray W. Crabb. Hardware: Sargent. Paint: Pratt & Lambert, PPG. Elevators: Montgomery. Lighting: Lightolier. Plumbing and sanitary: Crane, American Standard, Vulcan. Air conditioning: Trane.

Kislevitz Residence, Long Island, New York, (p. 72). Architect: Gwathmey Siegel Architects, New York City. Quarry tile floor surfacing: American Olean. Wall insulation: Johns-Manville. Aluminum window frames: Arcadia. Glass block: Pittsburgh Corning. Paint: Benjamin Moore. Kitchen equipment: Thermador. Laundry equipment: General Electric. Recessed exterior and interior lighting: Lightolier. Surface mounted interior lighting: McPhilben. Plumbing fixtures: American Standard.

Villas Florestas, Tijuana, Mexico (p. 76). Architects: Morphosis, Los Angeles, Ca. Cast-in-place concrete floor slab. Concrete block walls. Precast, prestressed roof and second-floor slabs: Logo, SA. Wall surface, stucco (exterior), plaster (interior). Quarry tile floors. Built-up roof. Anodized aluminum windows. Locksets: Premiapri (Milan). Exterior floodlights: Stonco (U.S.). Interior incandescent reflectors: Benjamin Lighting Co. (Los Angeles). Plumbing fixtures: American-Standard (U.S.)

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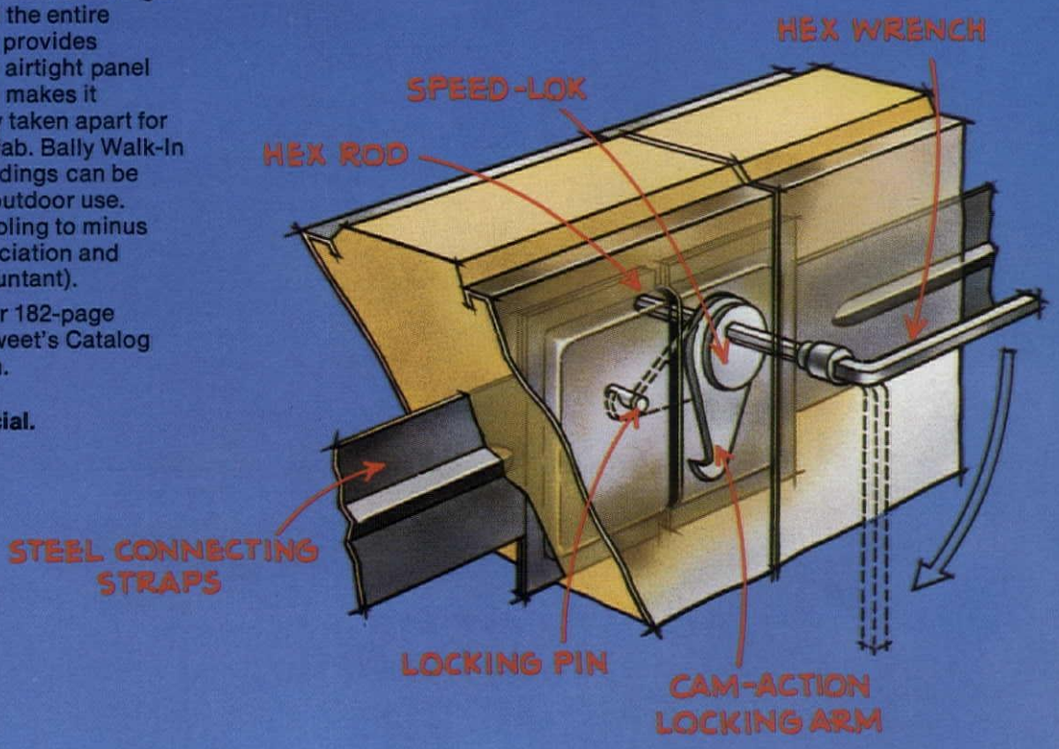

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Architectural Draftsman or Licensed Architect: Position in architectural office dealing in design with a varied practice for an experienced person capable of assuming personal responsibility and handling total projects. Send resume. Richard M. Shanahan, Architect, 104 North Church, Bozeman, Mt 59715 (406) 587-2521.

Architectural Technology Instructor: Faculty position starting Sept., 1978. B.S. minimum, M.S. preferred. Professional work experience required, professional license and teaching experience a definite consideration. Deadline: July 31, 1978. Contact: Forrest Cope, Chairperson, Engineering Division, Sinclair Community College, 444 W. 3rd St., Dayton, Oh 45402. An equal opportunity employer.

Assistant Professorship Interior Design/Interior Architecture: Beginning 1978 or 1979, 3 year renewable contract. Send resume and 3 letters of recommendation to: University of Washington School of Art, DM-10, Seattle, Wa 98195. Attn: Richard Arnold, Director, School of Art. Application Deadline: August 1, 1978 The University of Washington is an affirmative action/equal opportunity employer.

Construction Technology Instructor: Faculty position starting Sept., 1978. B.S. minimum, M.S. preferred. Professional work experience required. Engineer's license in Civil Engineering and Surveying highly desired. Teaching experience also definite consideration. Deadline: July 31, 1978. Contact: Forrest Cope, Chairperson, Engineering Division, Sinclair Community College, 444 W. 3rd St., Dayton, Oh 45402. An equal opportunity employer.

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[continued on page 114]

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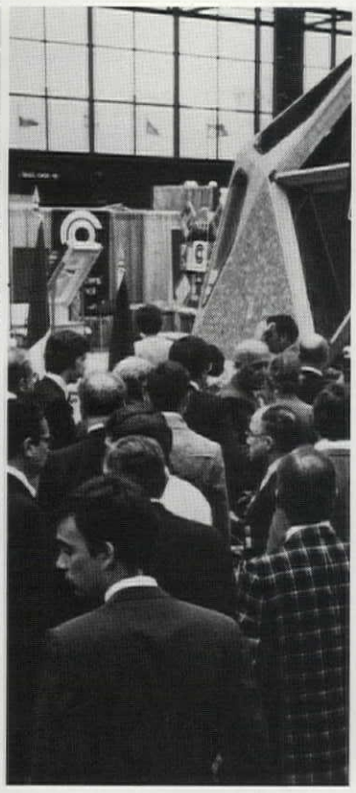

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