AIA JOURNAL

FEBRUARY 1972

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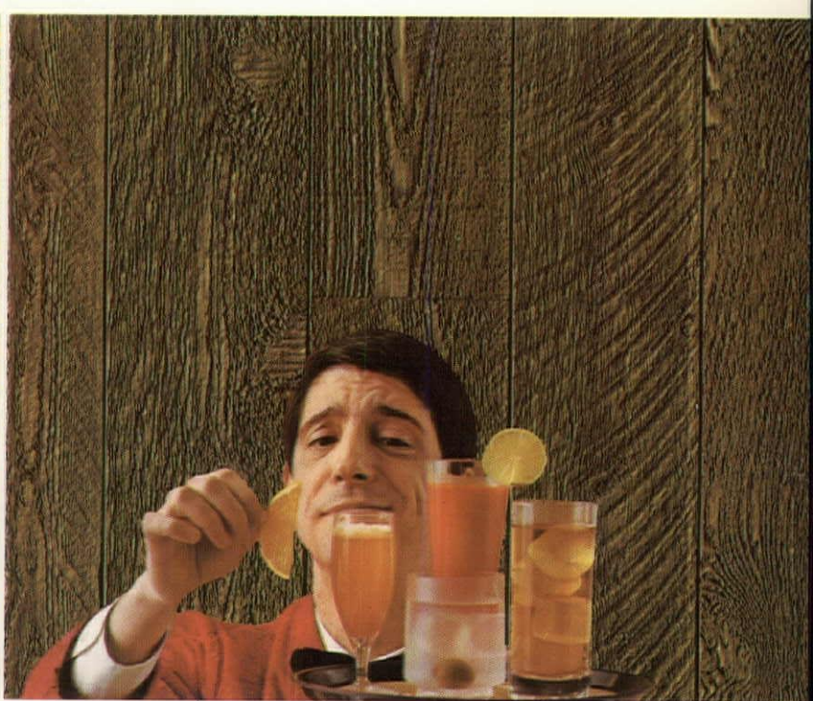
Marlite Sarona adds the elegant beauty of alabaster at a cost far less.

Marlite Rainforest gives an interior the freshness of all outdoors.



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HOPE'S WEATHERSTRIPPED STEEL WINDOWS

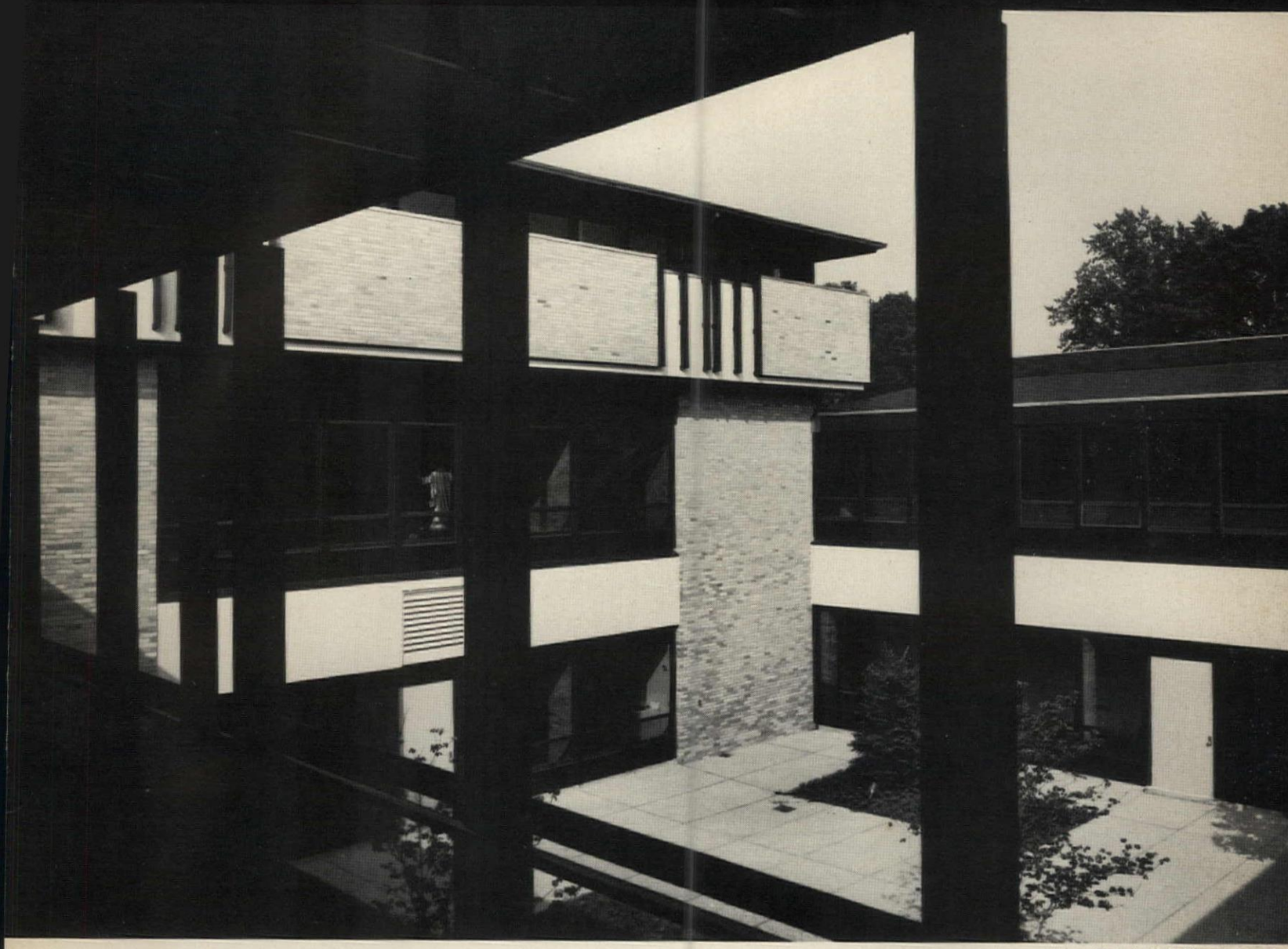


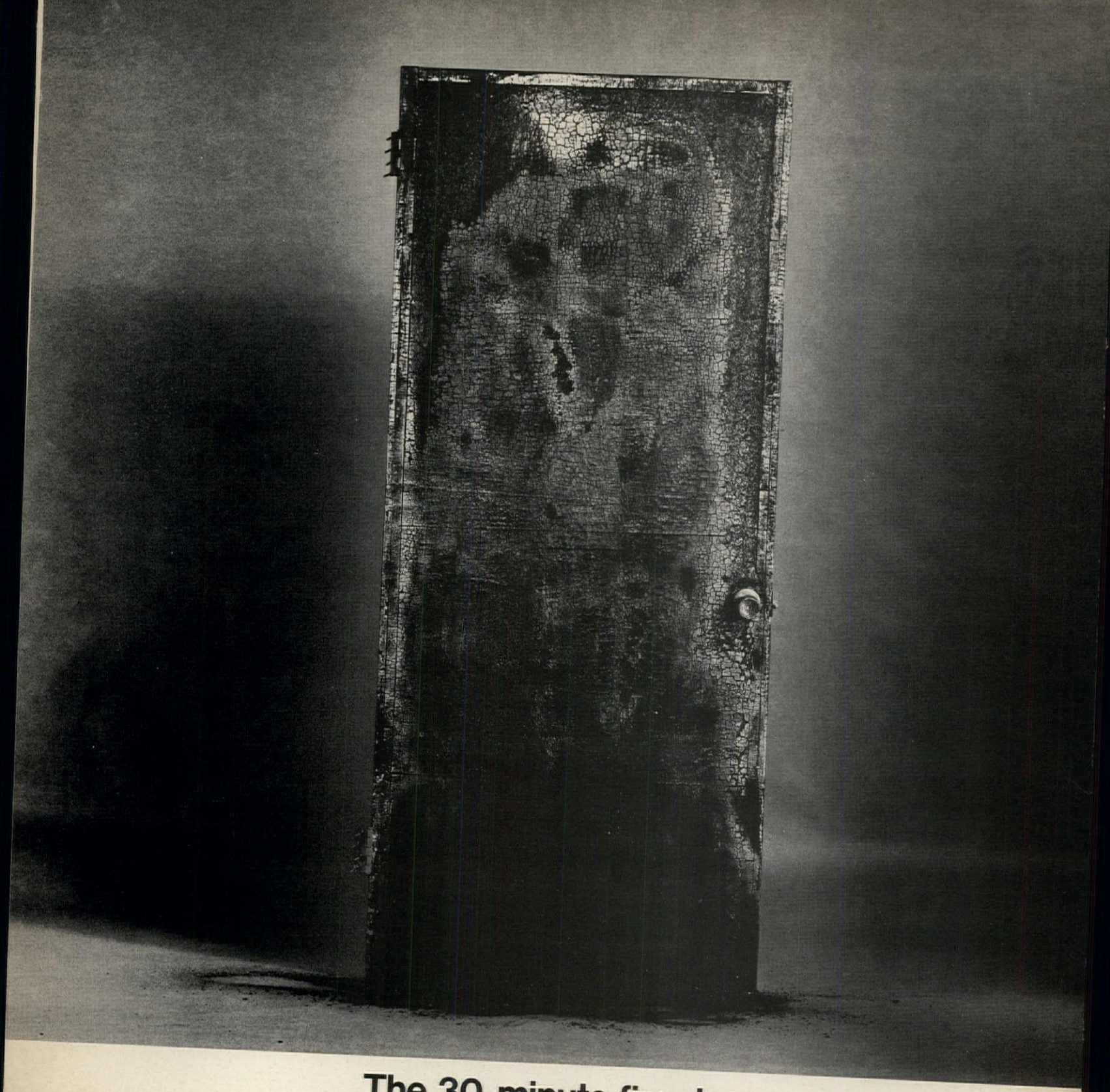
Photo by M. E. Warren

St. Martin's Home for the Aged — conducted by the Little Sisters of the Poor, Baltimore County, Maryland
Architects: Gaudreau Architects, Baltimore, Maryland • *General Contractors:* R. S. Noonan Company, York, Pennsylvania

The concept of "bringing in the outdoors" guided the architect in the design of this handsome and very livable structure. Compatability with the religious and daily living functions of the aged and a type of ventilation and hardware suitable for the occupants determined the architectural design requirements of the windows. Consideration of these factors prompted the architect to specify Hope's Heavy Intermediate Weatherstripped Steel Windows with clear lights above and hopper vents at sill. Through the large upper fixed lights, the outside scenery is pleasantly visible to both the elderly and the staff during the course of each day's routine. To obtain the desired color and the durability of a factory-applied finish, Hope's Ultra-Coat was specified. This process includes cleaning by shot blasting prior to fabrication; zinc phosphate treatment in a continuous five-stage process; a prime coat of oven-baked epoxy alkyd; and a spray finish coat of acrylic enamel applied in an automated electrostatic process and oven baked. Hope's Weatherstripped Steel Windows with continuous Neoprene weatherstripping applied in integrally rolled grooves combine the strength and rigidity found only in steel and have an air infiltration rate comparable with weatherstripped windows of any type. Hope's engineers worked closely with the architect from the initial design stage, and erection by Hope's own crews eliminated the problem of divided responsibility.

HOPE'S WINDOWS

Jamestown, New York 14701



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Weyerhaeuser

AIA JOURNAL

FEBRUARY 1972

COVER: Teamwork is more than ever the key to good school planning and programming. This particular constellation of participants, adapted from a chart by Caudill Rowlett Scott, was used in the City of Baltimore (*see* p. 19).

Publisher: DUDLEY HUNT JR., FAIA; *Editor:* ROBERT E. KOEHLER, HON. AIA; *Associate Editor:* BESS BALCHEN; *Assistant Editor:* MARY E. OSMAN; *Consulting Editor:* JAMES E. ELLISON, AIA Dept. of Education & Research; *Art Director:* SUZY THOMAS; *Sales Manager:* RICHARD J. SATOLA; *Production Manager:* GEORGE L. DANT; *Circulation Manager:* MICHAEL A. BENOIT

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VOL. 57, NO. 2

comment and opinion

FOUND—AN ARCHITECTURAL FUNNY BONE: "You've restored my faith in architects! I had come to the point where I had decided that there was no humor left among the professional group except for a twisted, sadistic type." So began a letter from the executive secretary of the Mechanical Contractors Associations of Texas, Inc., to a practitioner who is known among his colleagues and outsiders as "a new Will Rogers," "Bob Hope's stand-in" and "the Don Rickles of Dallas." In this day when we all take life too seriously, I think it is high time to salute an architect with a real sense of humor.

Before introducing David R. Braden, AIA, I would like to make a general observation. Readers often tell us that the AIA JOURNAL could use a little humor in its pages now and then, to which we heartily agree. But the problem is that it is difficult to be funny in print. We do receive occasional contributions along this line, including cartoons, but they just don't fit the bill. We haven't had a regular humorist among our pages since good old Al Bendiner used to raise his martini glass a couple of times a year. Maybe Dave can be coaxed to send us a piece once in a while.

I first heard about Dave's exploits as a humorist last fall when I attended the annual meeting of the Architectural Aluminum Manufacturers' Association in Dallas. I arrived too late for the luncheon at which he was scheduled to talk on "The Aluminum House and You All," but in checking with those who had heard him, I started to get the message. I got such comments as "He's one of the funniest persons I have ever heard" and "My opinion has changed about those stuffy architects."

When I contacted Dave to find out how an unknown architect from a town in the Southwest had become a professional humorist and platform performer with the greats and not-so-greats of our society, he admitted that it is a story too long to relate here, but added, "Suffice it to say that I believe you must be over 40 to be really funny." Dave is now 47 and getting funnier every day, according to those who have followed his career.

And what a career it is! Through various experiences—he has had no formal training, not even the experience of a Toastmaster's Club—Dave developed as a speaker with a sense of humor. About two years ago he became so "developed," in fact, that he was going out of his mind trying to be a nice guy and answer every request. Finally, he realized he had to learn to say no or give up his architectural practice. Yes, he *does* practice architecture, being a partner in the firm of Braden & Jones whose work includes a variety of building types. He found his answer in "turning professional" and is represented by three talent agencies. "I am literally 'talking' two daughters through college on speaking fees," Dave admits.

His recent engagements range all over the lot from the Safeway stores annual employees party to the Daughters of the American Revolution to the University of Texas Ex-Students Distinguished Alumnus Program (with such celebrities as Lyndon Baines Johnson, John Connally and astronaut Alan Bean) to the Idaho Potato Growers Association. And he has addressed the Texas Society of Architects too.

To say the least, all of this is unusual for one who started out only to be a responsible architect. The comments naturally come something like this: "Do you suppose he is a good architect as well?" Dave simply replies, "Funny architects don't necessarily design funny-looking buildings. Have you ever noticed that all kinds of architects design funny-looking buildings?" Wife Sara Bird once overheard a woman say, "He must be a tremendously creative architect, his humor is so creative." To which Dave Braden seriously responds, "That's what I want to believe and that, of course, is what I hope people will say."

ROBERT E. KOEHLER

ACKNOWLEDGEMENTS

6—above right, Mel Chamowitz
16—Carl Ruff Associates
17—below, George S. Zimbel, courtesy Educational Facilities Laboratories
28—Ben Schnall
29—Crescione Studios
30, 31—Courtesy Joliet Jr. College, Joliet, Illinois
34 through 39—Allen M. Krathen
48—right below, Walter J. Kaufman
54—Joel Strasser

NEXT MONTH

We are entering an era which will stress health, or prevention of illness, rather than cure. In the past, we have organized for sickness. In the future, we must organize for health. How this philosophy will affect the architecture of health facilities is discussed in March. The architect has more to offer than the design of a hospital. What he can do to help a medical facility get founded on a sound economic base and provide his client with the data necessary for him to obtain the funds for his project is explained in detail in another piece. Big business is entering into the world of health care facilities in the form of hospital corporations. What these are and what they mean to architects is the topic of a third article.

Ask any architectural student, and a good many of their elders for that matter, to identify Konrad Wachsmann, and it is likely that the majority know very little about him —if anything at all. Yet the director of the University of Southern California's Building Institute and an architectural professor there received the Gold Medal of the Senate of the Republic of Italy in 1970. A portfolio of his work, accompanied by some observations from one of his former graduate assistants, is indicative of his great contribution to the field of industrialized architecture.

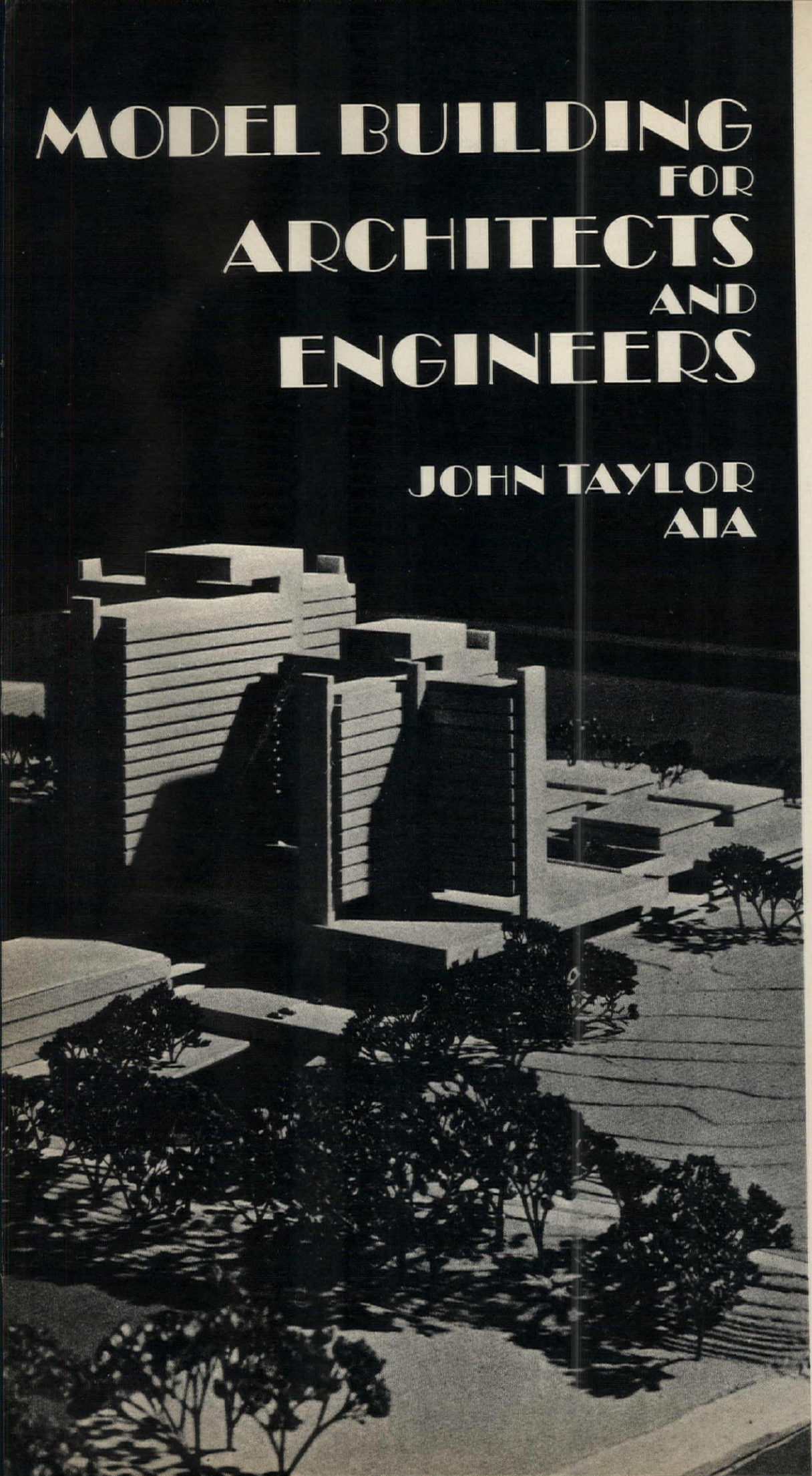
ASIDES

When you hear the word "RAP" used around AIA headquarters these days, it probably doesn't refer to "knock" or what other synonym can be found in Webster's. What it does stand for—in all caps, at least —is "Review of Architectural Publications," referring to a series of hour-long cassettes which is being offered by the Institute's Continuing Education Department.

Under the direction of Stuart Rose, AIA staff members will review and condense from about 30 publications, including the AIA JOURNAL, practice-related information—and that will be the sole criterion in the selection process. The tapes will contain source data for each item and will be indexed by item and tape footage. In addition, information from conferences, etc., that meets the test of direct practice applicability also will be fed into the tapes.

Consisting of one cassette each month, the service is available to members for $54 a year and to nonmembers for $72, payable in advance. Subscriptions and/or inquiries should be directed to RAP, c/o Director of Continuing Education at AIA headquarters, 1785 Massachusetts Ave., N.W., Washington, D.C. 20036.

It is interesting to note that the JOURNAL also is included in another cassette program which is being conducted by the East Ohio Gas Company but on a much smaller scale. It is providing a service for some 250 architects and engineers in its region to keep them abreast of new developments in their fields. From our November issue, for example, the company selected "Putting a City's Future in Focus," "A Firm Whose Practice Belies Its Size" and "Safety Glass Gets a Big Push Across the US." □



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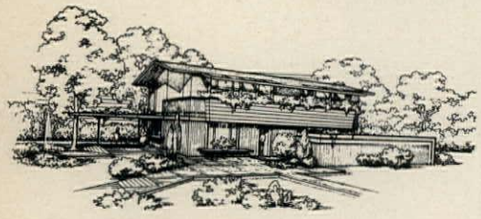
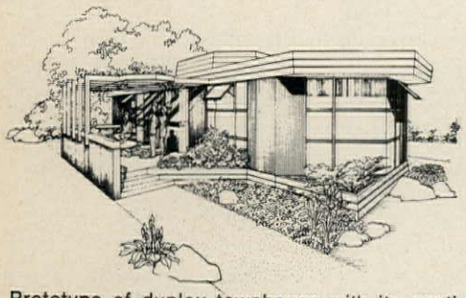
World's Largest Producer of Factory-Built Housing Teams Up with FLLW Foundation

The Frank Lloyd Wright Foundation has been commissioned by National Homes Corporation to design a full spectrum of projects for the company, the world's largest producer of factory-manufactured housing that is later assembled at a homesite.

The program will include plans that range from a $4,000 mobile home to custom houses costing in excess of $200,000. In-between will be designs for modular residences of all sizes—some starting at $16,000, including lot, depending upon the geographic location—garden apartments, townhouses, multifamily cluster developments and a complete system of modular units for National Homes' involvement in Operation Breakthrough.





Prototype of duplex townhouse with its cantilevered balcony, and mobile home with its full-length awning-type windows are previewed by homebuilders at their Houston convention.

The first completed models—a modular duplex townhouse and a mobile home—were being exhibited at the annual convention and exhibition of the National Association of Home Builders in Houston as this issue of the AIA JOURNAL was going to press.

Vernon D. Swaback is project architect for the foundation, which will also design the landscaping for the houses it creates.

Olgivanna Lloyd Wright, the foundation's co-founder and president, at a press conference announcing the new program, said that at the beginning of the century her late husband developed a system for "manufactured housing" and expressed his conviction that industrial processes "put into an artist's hand could be a real benefit to our civilization in an artistic way."

National Homes, which headquarters in Lafayette, Ind., has 18 manufacturing plants in 10 states which have produced more than 400,000 living units. This is more than has been produced to date in western Europe by all companies put together using off-site industrialized housing systems, according to James R. Price, board chairman.

Award-Winning Solution for Bonn Housing Is Work of Londoner on Virginia's Staff

A University of Virginia professor of architecture is part of a team whose lowrise housing scheme has won an invitational competition sponsored by a housing agency in Bonn, Germany, for a high density development.

The design is by H. Cassius Higgins, his London firm of Higgins, Ney & Partners and London architect Kit Allsopp. Higgins, who divides his time between teaching duties at Virginia and practicing in England, also is director of the university's Center of Housing and Social Environment.

Planned for a five-acre tract formerly occupied by ruins of army barracks, the Loe-Kaserne housing development will consist mainly of middle income family housing. The lowrise scheme, rarely exceeding four stories, was designed to keep the complex on a scale with the historic 18th and 19th century residential district bounding the site on one side.

Some 1,000 persons will be housed in units arranged in two tiers rising above a second-floor level deck. The deck creates a raised pedestrian street, from which each apartment is entered. It also forms the roof for a ground-level parking garage.

Higgins cites many advantages to the "low deck" scheme which also formed the basis for a $15 million housing development designed by his firm for the London borough of Hammersmith. Each apartment is entered from the open air; even upper-level apartments are near the street and accessible without elevators, and the raised deck provides a walkway and a play area.

"The Germans love sun," says Higgins. The tier construction allows maximum sunlight into the apartments, each of which is provided 200 to 500 square feet of garden or terrace space.

A variation of the winning solution was shown in the AIA JOURNAL for February 1970 (p. 10), although at that time it was referred to as "high deck" housing, a term which the architects now feel is misleading. The scheme is being studied as a possible solution to providing shelter in the nation's capital by the Architects' Coalition, formed by two District of Columbia firms and the London office, under a $15,000 Ford Foundation grant.

FPAA President Raphael Norma of Mexico City gets an opportunity to discuss the upcoming congress when he visits with Max O. Urbahn, FAIA, president of the Institute; Richard S. Sharpe, FAIA, second vice president of FPAA; and Jorge Azpurua Rios, president of the College of Venezuelan Architects, in Washington, D.C. Urbahn received an honorary membership from Rios at the Venezuelan Embassy.

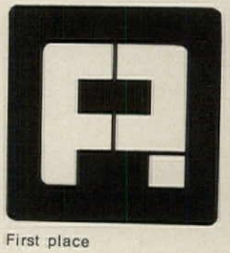
Panamerican Architects Prepare for June Congress as New FPAA Symbol Appears

As plans are being firmed up for the Panamerican Congress of Architects which will meet in Brazil and Paraguay in June, the new symbol of the sponsoring organization, the Panamerican Federation of Architects, is getting good exposure.

Winner of a competition to design a symbol or emblem, which had to include the initials FPAA or its entire title, was Julio Antonio Coll Rojas, first vice president of the College of Venezuelan Architects.

Second place went to an American, Kelly Brandon of The Richardson Associates, Seattle architects, and third to a Chilean architectural student, Konrad Ernest Klötzer Peters.

The designer of the winning symbol, which will be used on official stationery, insignias, publications, posters, etc., receives $1,000 and paid registration and expenses to the 14th congress. It will be held in São Paulo, June 10-14, and move on to Asuncion, June 15-18, with "Urban Deterioration" as the theme.



First place

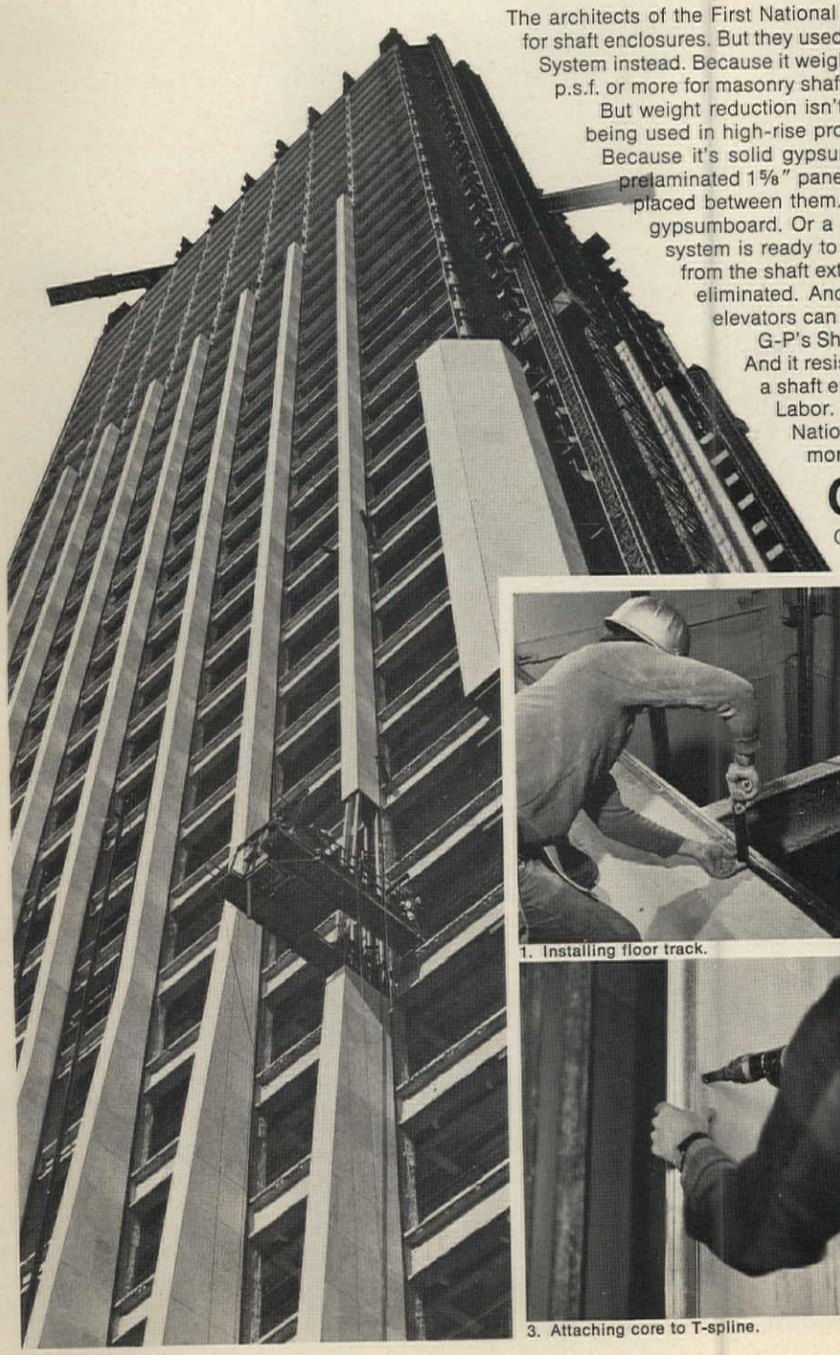
Second place

Belluschi Named to Receive AIA's Highest Honor; Three Other Medalists Are Chosen

Pietro Belluschi's 46 years of practice—26 of them in Portland, Ore., where he developed what is considered a truly regional style—has been climaxed by his selection for the Institute's 1972 Gold Medal.

The former dean of the School of Architecture and Planning at the Massachusetts Institute of Technology has designed over 1,000 projects for which he has earned numerous awards. But it has been in the area of ecclesiastical architecture that he has made his major contribution. *continued on page 48*

G-P's Shaft Liner System saved the First National Bank of Oregon Tower 23.5 lbs. p.s.f.



The architects of the First National Bank Tower could have specified masonry for shaft enclosures. But they used Georgia-Pacific's new Shaft Liner System instead. Because it weighs only 10.5 lbs. p.s.f. compared to 34 lbs. p.s.f. or more for masonry shaft walls.

But weight reduction isn't the only reason G-P's Shaft Liner is now being used in high-rise projects like the First National Bank Tower. Because it's solid gypsumboard, installation is simple. Just attach prelaminated 1⅝" panels in top and bottom runners with a T-spline placed between them. Then attach two layers of regular ½" G-P gypsumboard. Or a plaster system may be used. And the finished system is ready to be decorated. This system also installs from the shaft exterior. Temporary shaft enclosures are eliminated. And since there is no scaffolding in the shaft, elevators can be installed much sooner.

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Georgia-Pacific

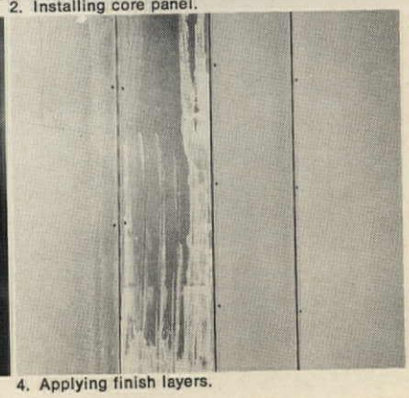
GYPSUM DIVISION, Portland, Ore. 97204

Architects: Charles Luckman & Associates
General Contractor: Hoffman Construction Co., Portland, Oregon

1. Installing floor track.

2. Installing core panel.

3. Attaching core to T-spline.



4. Applying finish layers.

The Weyerhaeuser Building, Tacoma, Washington
Owner: Weyerhaeuser Company
Architects: Skidmore-Owings & Merrill, San Francisco
Glazing Contractor: Cobbledick-Kibbe Glass Company, San Francisco
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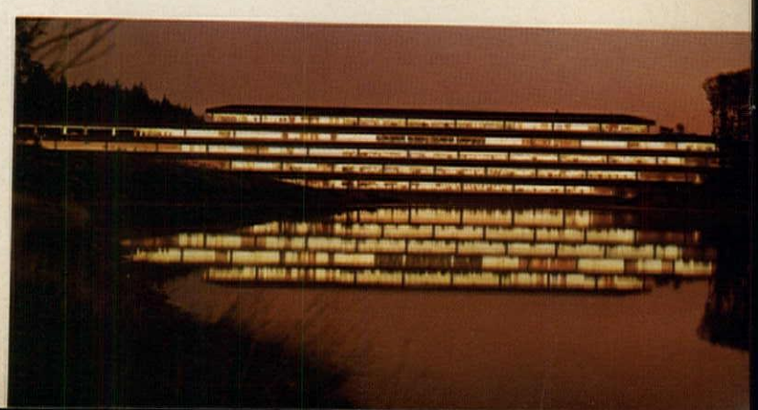

Weyerhaeuser Building a non-stop view.

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With glass that thick, the architects were able to butt the vertical edges, seal them with ¼″ of silicone and eliminate mullions.

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Talking the Same Language

by STEVEN H. ROSENFELD
Director
Professional Practice Programs

How many times have you wished that your clients were more knowledgeable in the construction process? It often becomes a major project to educate a client to the reasons, processes and realities of the construction industry.

Every once in a while some organization accepts the challenge and presents a program designed to bring the latest available information to the client. How successful the result is depends upon the organizers of the conference and what they have to sell. Sometimes the consequence for the client is wasted time and money down the drain; sometimes for the industry it means a client filled with some strange and often erroneous information.

The American Management Association is an example of a vehicle through which a client may pay large sums of money to learn how to better understand the construction industry and to protect himself in the process. I recently attended the last sessions of "Executive Management of New Building Projects" produced by the AMA. The program included "Understanding Construction Contracts and Documents for Building Projects." The conference, to be presented again shortly, has added "Insurance and Bonding Requirements for Owners of New Building Projects" to the program. These are exciting titles, but the real question is how knowledgeable are the speakers and what information will actually be presented.

My contention is that the conference offered a considerable amount of misleading, dated and erroneous information. Inconclusive debates on the merits of construction management, copies of papers dated 1961 and a discussion of the 1967 edition of document A201 don't make for an educational experience for anyone seeking background on the construction industry.

The program devoted to contracts and documents would produce screams of anguish if presented to an audience of architects and contractors. The architect was seen as seeking to protect himself from all liability at the owner's expense, as requiring a time limit on his design services if the client wants him to produce and as having foisted on the industry through the AIA a series of documents whose sole purpose is to protect the architect.

Even so, architects fared better than contractors. The audience was encouraged to make the contractor responsible for all subsurface conditions and was told that soil borings are an unnecessary expense. It was suggested also that the standard general conditions should be changed to require the contractor to indemnify the owner for all errors, including those solely of the owner.

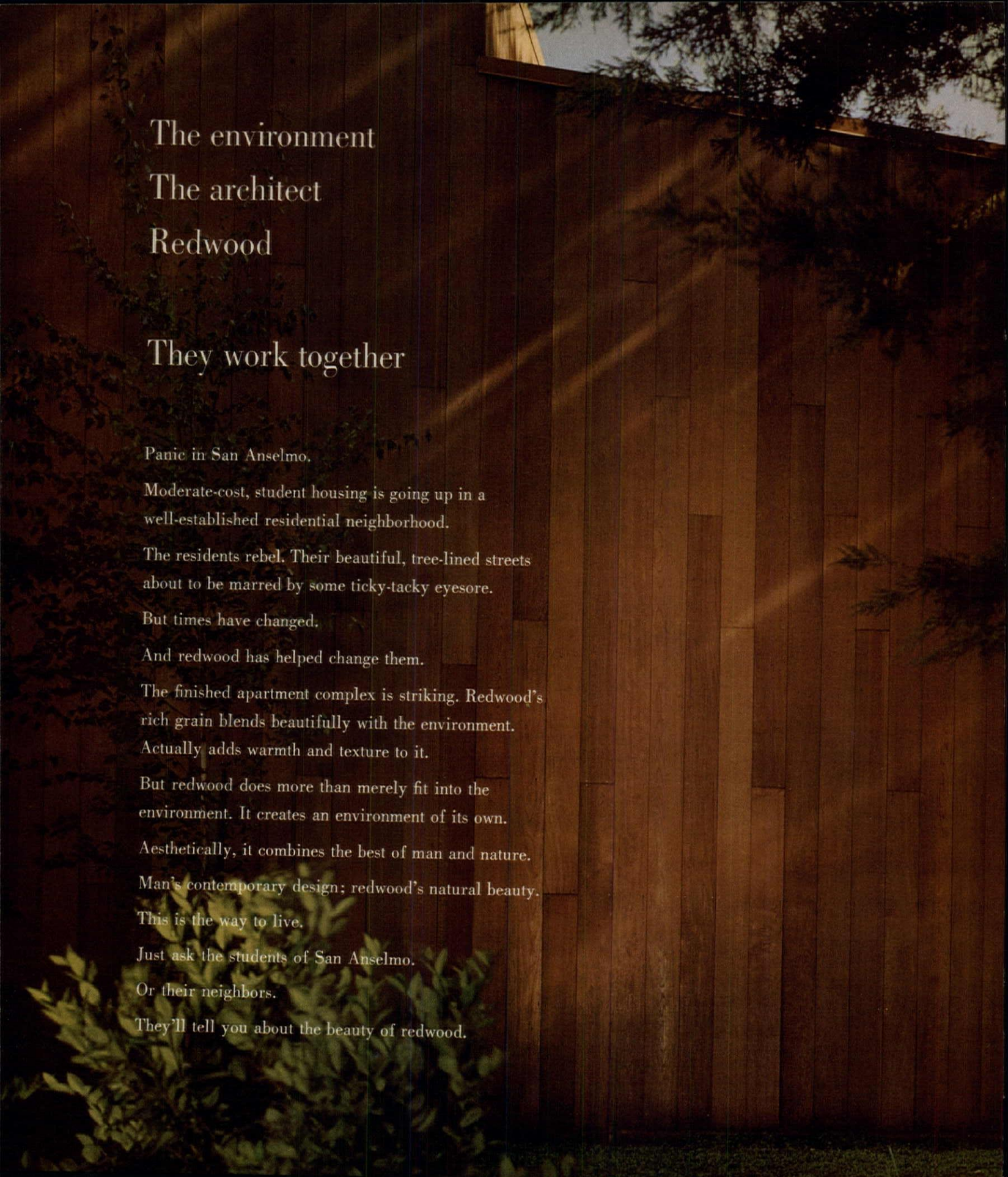
What came through clearly was where would the owner be without his legal counsel to think up new ways to make life miserable for everyone else. Owners naive enough to swallow the presentation will soon be amazed at how high construction costs can climb if those requirements are imposed.

The AMA could be an excellent vehicle to reach people responsible for a major part of the construction in this country. Granted, the architects who participated made excellent statements on the merits of good design which was visually supported by the presentation of an IBM representative. But the total atmosphere of the conference was divisive rather than constructive.

The climate is ripe for the development and presentation of fair and equitable programs designed to educate those people who are responsible for a major part of the decision-making process. The challenge to the individual practitioner is that he be sufficiently fluent in the areas of practice that most interest the owner. He must readily understand his and the client's obligations under the owner/architect agreement forms and the duties and responsibilities of owner, contractor and architect under the contract for construction.

The *Architect's Handbook for Professional Practice* is a continuing source of reference material; unfortunately, it cannot respond directly to questions. A series of conferences such as Advanced Management Research's "Management Strategies for Architects and Engineers" provides a forum for the architect to ask specific questions and to receive direct response from knowledgeable people. This is the type of program that must be developed for the owner and his representatives.

To improve the architect's position with his clients, we must continue to foster both understanding of the processes and communication between the parties. Both can be achieved only when the architect and his client are talking the same language. Increased understanding of the construction process by the owner and his representatives will improve the architect's ability to provide quality design without the constant strife that has been the standard in the industry. □



The environment
The architect
Redwood

They work together

Panic in San Anselmo.

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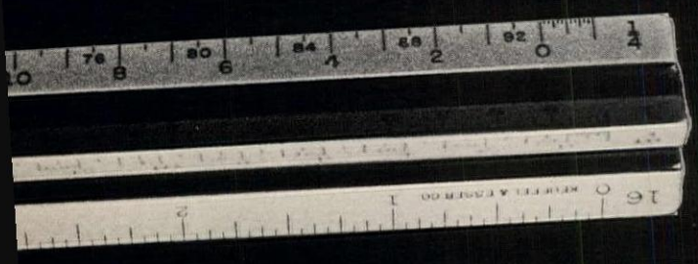
Married student housing, Theological Seminary, San Anselmo, Californ
Architects: Frants Albert, AIA and Wm. M. Abend, AIA, San Francisc

Your profession is Architecture.



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PLANNING FOR EDUCATION

It's a negative take-off for sure but this is how it is, as most architects so well know: Funds for school construction are at ebb tide in the majority of American communities. This, of course, doesn't mean that the building of educational facilities is coming to a halt. What it does mean is a greater demand for ingenuity on the part of architects and school administrators. It means, in many cases, redesigning available space, or "found" space, as it's now usually referred to. It means erection of so-called temporary facilities (for what these really are, *see* page 27). It means making sure that a new plant or education-connected facility is the best possible for the money invested by a community and that it fulfills all user requirements. It means providing an inspired, inspiring educational environment in order to support faculty in its efforts to make the learning process as rewarding and painless as possible. It means finding quick ways to get the job done. It means easy-to-care for facilities and furnishings to keep maintenance cost down. It means research. It means long-range, coordinated planning. It means that in order to achieve the best, an architect must draw on a complete team. It means that if he doesn't, or cannot due to an unenlightened school administration, well, it might be something like trying it down the up staircase at intermission, working against an upsurge of people who must be heard.

But even in the rare community with a fairly decent school construction budget, planning a school isn't what it used to be: a matter between client and designer. Today it's very much the matter of the entire community and of the students as well.

All of this doesn't mean that we will be seeing all open space, all systems building, complete flexibility in every structure, bubbles and domes and the end of dormitories. It means that we'll see what each specific community needs or wants, as described in a few examples in the following articles.

BESS BALCHEN

THE INSPIRED LEARNING

A school in an old supermarket? In a warehouse? You bet. And the transformation offers architects both challenges and rewards.

If there's a startled look on the faces of many architects attending school facility planning conferences these days, there may be good reason. The programs are dominated by discussions of how to create environments for learning in existing buildings and, surprisingly enough, many of the most exciting are not even in school buildings.

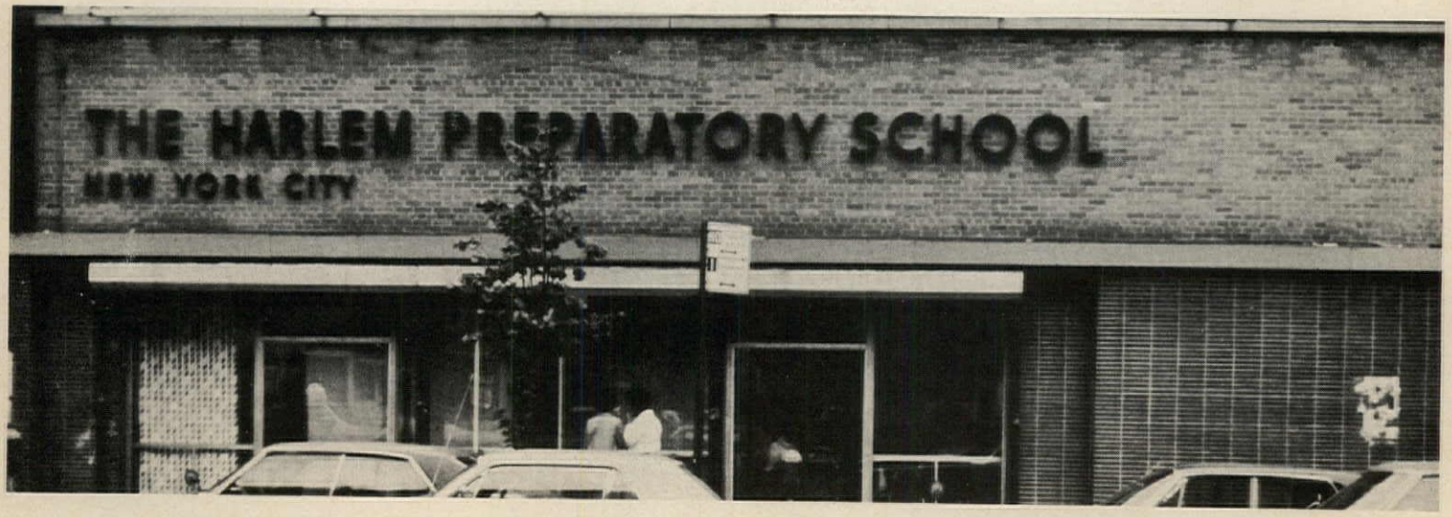
Take New York City's Harlem Prep, for instance. A former supermarket is now the high school (a bad term, for it's a far cry from the high school most of the students dropped out of) for a dedicated group of young people. They're committed to continue their educations and in turn use their knowledge to help others. As might be expected, funds for such a venture are always short of the need. This made it even more surprising when the student body turned down the offer of experimental furniture from a well-known manufacturer unless the designers could prove that it would not ruin the free, open environment that had been created with the make-do they had lovingly assembled. In turn, the manufacturer's offer was accepted when the students found the furniture satisfactory.

The whole question of furniture and equipment is so closely related to the creation of a complete design that it's rather remarkable that more architects and educators haven't come up with and even produced their own.

One educator who did just this is Dr. Edward Pino, superintendent of schools in Cherry Creek, Colorado, who opened up some of the district's schools by the simple expedient of knocking down a few walls—only to discover that the traditional furniture got in the way of the educational program. When he had difficulty in finding someone who would listen to what he thought furniture for an open plan elementary school should be, he designed his own. In place of rigid tables and chairs, which seemed to like to be lined up in rows and clutter the space, he started experimenting with movable chalkboards with snap-up shelves, large hollow blocks, tote trays with hard-surface writing tops, inflated inner tubes for sitting in or, with the addition of brightly painted plywood tops, for sitting at. Stadium seats—the kind taken to football games—and pillows are used for floor sitting.

At about the same time, the neighboring district of Jefferson County had started planning some open schools. Furniture was a stumbling block here too. What was needed, it seemed, was a basic collection of things to sit on, stand on and show slides on. It would have to be skiddable on the carpeted floor and lightweight enough for elementary school children to move about as needed. The difficulty arose when the performance specifications were released to manufacturers for the development of proto-

New York City's Harlem Prep is in a former supermarket. Though short on funds, students turned down an offer for experimental furniture until they saw that it would not ruin the open environment. The gift, from Herman Miller, Inc., includes wall units, free-standing partitions.



SPACE by Ben E. Graves

Colorado's Jefferson County School System is using Boxes and Things furniture designed by the architectural firm of Rogers-Nagel-Langhart Inc. under a grant from Educational Facilities Laboratories (top). Pittsburgh's Shady Lane Elementary school is in a Victorian frame house; the interior is "an environment built by" Paul Curtis and Roger Smith.

types. Even the manufacturers who showed the slightest interest kept asking what the client wanted the "things" to look like and be made of. But the client and the coordinating architects, Rogers/Nagel/Langhart, stood firm and after two disappointing years the furniture is marketed under the name "Boxes and Things." The first day the units arrived, the youngsters at the school kept finding new uses—even to hiding in one "sitting" box and pulling another over for complete privacy.

On a more elaborate scale, Toronto's Study of Educational Facilities (SEF) program has resulted in a casework system for the 2 million square feet in the first SEF building system. The solution is a series of molded polyurethane foam containers and panels that can be combined in a number of ways. All of which adds more truth to Dr. Pino's remark: "Ten years ago we challenged the concept of building bigger boxes. Now we must challenge the conventional ideas of what we put inside the bigger box."

But the Harlem Prep mentioned earlier is just one challenge of even what that bigger box should be. In Cleveland, one of the most exciting schools and a supplementary education center are both in former warehouses. Chicago has several schools in warehouses and no-longer-used factory buildings. A community college in New Jersey has found a home in two former wooden barns. A college in Manhattan is in a defunct department store. Another department store, this one in Dallas, houses a junior college. The architects for this project, The Oglesby Group, Inc., have walked off with several awards for their imaginative design efforts. The importance of this type of facility has even grown so that it has its own name: found space.

Coupled with this is the discovery by school districts (and finally by architects) that the modernization of existing educational facilities is just as respectable as building new structures. Sometimes the challenges are greater.

Modernization has grown from a single project to district-wide planning. An example of such a program is in Portland, Oregon. Here the systems approach to plannning as well as to construction is being brought into play. Edward C. Wundram, AIA, on leave of absence from the architectural firm of Heery & Heery, is directing a program which solves the problem of building expertise in-house in a short period of time. Working with architects assigned to individual projects, Wundram, with the help of outside architects, engineers and other specialists, concentrated on four major areas of concern:

1. Central policy-making on construction criteria, standards and techniques.

2. Monitoring and evaluation of design and construction activity, with related data collection and analysis.

3. Coordination of the work of local architects to assure consistency with long-term objectives, to maximize opportunities for massing of markets, etc.

4. Responsibility for procurement of services and contracting for construction-related activity including the possibility of multi-projects by contractors. It should be emphasized, however, that the local architects continue to participate in the programming and planning of individual projects as they have in the past.

Unfortunately, the Portland voters turned down the bond issue which would have seen the program brought under the ultimate test. But similar organizational programs are being considered in several cities, including San Francisco and Kansas City. The organizational concepts as developed in Portland (plus computer inventory of existing facilities) take modernization from the "reinventing the wheel for each project" category and begins to bring some order and sense to decision making.

Recycling is popular today—from bottles and newspapers to buildings of all types and in the case of the latter it is in no way limited by current economic necessity at the elementary and

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Mr. Graves is a project director with Educational Facilities Laboratories. He is not an architect, but serves on the AIA Committee on Architecture for Education. He is not an educator, but belongs to most of the "alphabet soup" of organizations. Many of the facilities described in this report were encouraged by EFL.

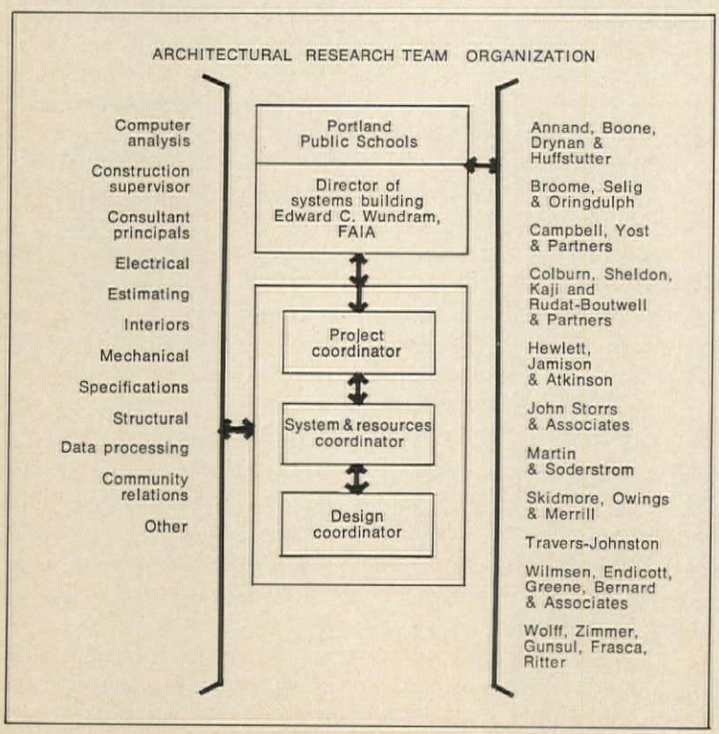
secondary school levels. One of the problems facing the colleges and universities is that the students are refusing to live in dormitories. Various consultants were asked to visit a campus in the East to see if they could determine why the students were systematically destroying the new award-winning residential halls. It didn't take long to find the main problem: Everything was too perfect and the rules so strict that no place was left for the student to leave his mark or show his individuality other than through destruction.

We see reports in the press of the student approach to a campus for Antioch at Columbia, Maryland. The student solution: an air-supported structure to cover an acre of land; beneath it a changing (one of the prime program objectives) collection of paper huts, portable laboratories, domes and other readily available products of our advanced technology. The students' rationale: Perhaps some day the land will be too valuable for a campus, or the site will no longer be the proper place for a campus. If that be the case, "We will just deflate our bubble and move on."

One had only to see the model of this campus on display at the architectural exhibit at American Association of School Administrators a year ago to realize how much of a threat architects and school planners find this approach. These experts would take their pens or any other readily available sharp objects and try to deflate the bubble to prove that such a nontraditional approach couldn't possibly work. And each evening the Antioch students would patiently take their sticky tape and repair the day's damage, check the hair dryer motor used to hold up the bubble and prepare for the next day's onslaught.

It is, perhaps, this pneumatic-nomadic philosophy that is behind the student revolt against residence halls. In their publication *Dorms at Berkeley* authors Sim Van der Ryn, AIA, and Murray Silverstein outline the problem and offer some approaches to future design. The report, which appeared in 1967, has since been reissued with two new supplements. In one of these, Van der Ryn rejects the traditional rulers of the modern university as possible agents for change. States he: "It will be students who build the new university environment."

And this can be seen happening, albeit slowly, with the



Antioch bubble and other experimental projects. The living/learning campus has helped to create an atmosphere where the student is given a bit more freedom of expression. Many of these, including Justin Morrill College at Michigan State University, are housed in old residence halls. The main thing to recommend these large lounges with double-loaded corridor wings of two-man rooms is location, which is often in the center of campus.

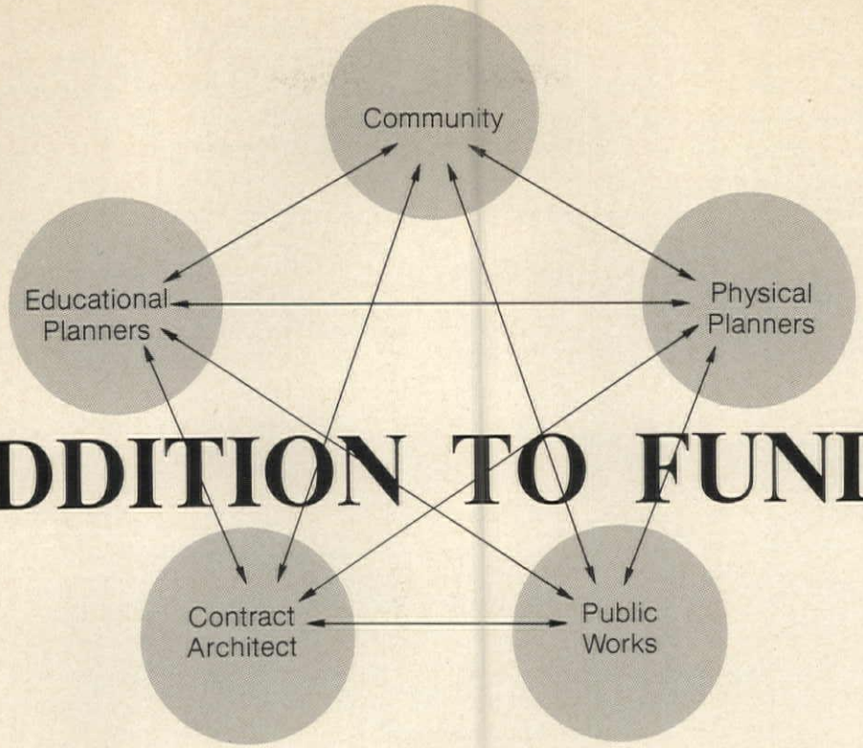
Under the guidance of Robert T. Jaeger, AIA (currently acting head of the Department of Architecture, University of Illinois Chicago Circle), a group of students undertook an environmental study of Justin Morrill College. To get the answers to some of their questions it was necessary as the study progressed to establish dialogue with such diverse groups as the student housing officers and the cooks in the dining hall. Result: Now both sides can talk to each other and the students, first by building scale models and next by building actual demonstration projects, have taken the first steps in changing their living/learning environment.

But what is happening here and at other colleges and universities is just a start. As the economic pressures become more acute, activity in reclaiming empty resident hall space will accelerate. The architect may well find that he will be left out if he refuses to recognize that the student has become his client.

We have discussed elementary and secondary schools and colleges and universities. To bring our circle back to start, it is time to take a look at facilities for early childhood. It is probably only natural that this type of facility would search out existing buildings as a home. Two exciting day care centers are described as "environments built by" Paul Curtis and Roger Smith of Holt Associates, a multidisciplinary design firm in Boston. (John Holt's ideas of what a school should be was given wide circulation in his two books, *How Children Fail* and *How Children Learn.*) One child care center, in Washington, D.C., is for a telephone company and is housed in a former supermarket. The other is a nursery/kindergarten/elementary school housed in an old estate in Pittsburgh. Both are a joy to be in with their imaginative use of color, in-out, up-and-down, over-and-under "furniture." The word furniture is in quotes because there is no such thing in the traditional sense. No longer do we have scaled-down versions of adult tables and chairs. We have sitting places and working places and playing places that often are one. Most schools must be seen; these environments must be experienced.

The 1971 Educational Facilities Laboratories annual report states: "Observers old enough to remember the Depression of the 1930s recognize a pattern, diminished in intensity to be sure, but seeming to be repeating today: Education's private economic curve tends to bottom out about two years after the national economy has turned upward. If, hopefully, the national economy did in fact turn up in November 1970, happy days may not be here again for education until 1972 at the earliest. In the meantime, many schools and colleges require more good space. Frequently this space will not have been designed originally for education but can nevertheless become first rate if its furniture and equipment are chosen with an eye toward its human function rather than defensive maintenance. Accordingly, EFL is helping to develop a 'kit of parts,' selected eclectically from such neighboring fields as home furnishings and office equipment to be inserted into found space. Strangely, the resulting environment for learning can be better despite declining funds."

The architect who overcomes his startled reaction to what is going on will be the one who not only becomes part of helping to design this "new architecture for today's schools" but who also will have a heck of a good time while doing so. □



IN ADDITION TO FUNDING

by STERLING S. KEYES and ROBERT A. BROOKS

Money isn't the only obstacle in the path toward a better school system. Aware of this, the City of Baltimore, as one step in the right direction to overcome the hurdles, employed an architectural firm, strictly in an advisory capacity, to provide guidelines for its overall school construction program. Here are some results.

Baltimore—a 175-year old city with 192,000 children in its public schools—has displayed an impressive degree of voter support for school bond referendums totaling $97 million in two years. Yet, the city was unable to get its school building plan moving until it decided to attack long-standing procedural problems that were blocking the way to a comprehensive program of new construction.

Gearing up to plan and build $30 to $40 million worth of new schools a year cannot happen overnight in a city which has been used to spending about $8 or $9 million annually for the purpose. The situation in Baltimore was complicated by the fact that its school system is a city department whose capital improvement program requires the involvement of as many as 13 other city agencies. The city's dedication to community participation in school planning multiplied the number of concerned agencies, making a spirit of mutual respect and cooperation the first priority for effective planning.

The 1970 census surveyed Baltimore's population as 900,000, about 45 percent black and 55 percent white. Perhaps more important than these statistical characteristics are Baltimore's many small and cohesive neighborhoods, each possessing its own sense of identity. These communities are highly organized and participate in local government to a degree unknown in many other cities. Public education with its most visible symbol, the hundreds of school buildings throughout the city, ranks perhaps No. 1 among the issues being addressed by many of these communities and civic groups. But this community interest has not always been so much in evidence. In 1968, when Thomas J. D'Alesandro III was promising the rebuilding of the schools if elected mayor, 28,000 children were still attending schools constructed prior to 1900; countless others were receiving only half a day's instruction due to severe overcrowding. School building had clearly not kept pace with educational and demographic developments.

With an impressive mandate from an aware citizenry, Baltimore faced the challenge of mounting a school construction program that would prepare the way for a brighter future.

Although Baltimore has unique characteristics, it shares most of the typical problems of today's big cities. Some of the major obstacles which were found to impede the progress of its school construction program must be felt by many other communities throughout the country:

1. The responsibilities of the architect and the client were not well defined.

2. Educators were not properly involved in the planning of the educational environment.

3. Methods by which the community could be involved in the planning of new schools were nonexistent.

4. Architects were asked to solve problems that were not clearly analyzed and stated.

5. There was inadequate cooperation between some of the city agencies involved in school planning and construction. This resulted in significant voids as well as duplication of effort and staff.

6. There was a failure to realize the breadth and complexity of the school planning process; a complete array of staff skills and tools were generally underdeveloped; basic analytical checks and

reviews existed only in the most subjective form; a great deal of time was committed to detailed "plan checking" while items with significant directive and preventive implications received only cursory attention at best; and control of major factors such as cost, scheduling and program compliance did not exist.

The definition of these problems was part of a concerted thrust to improve the quality of Baltimore's public education that really began when Mayor D'Alesandro, Superintendent Dr. Thomas D. Sheldon and other local leaders proposed to the voters a package of new schools budgeted at about $133 million. In that same year, the city asked and received voter approval for $80 million in capital funds to initiate this unprecedented, accelerated program. This was supplemented in 1970 by support of an additional $17 million bond issue.

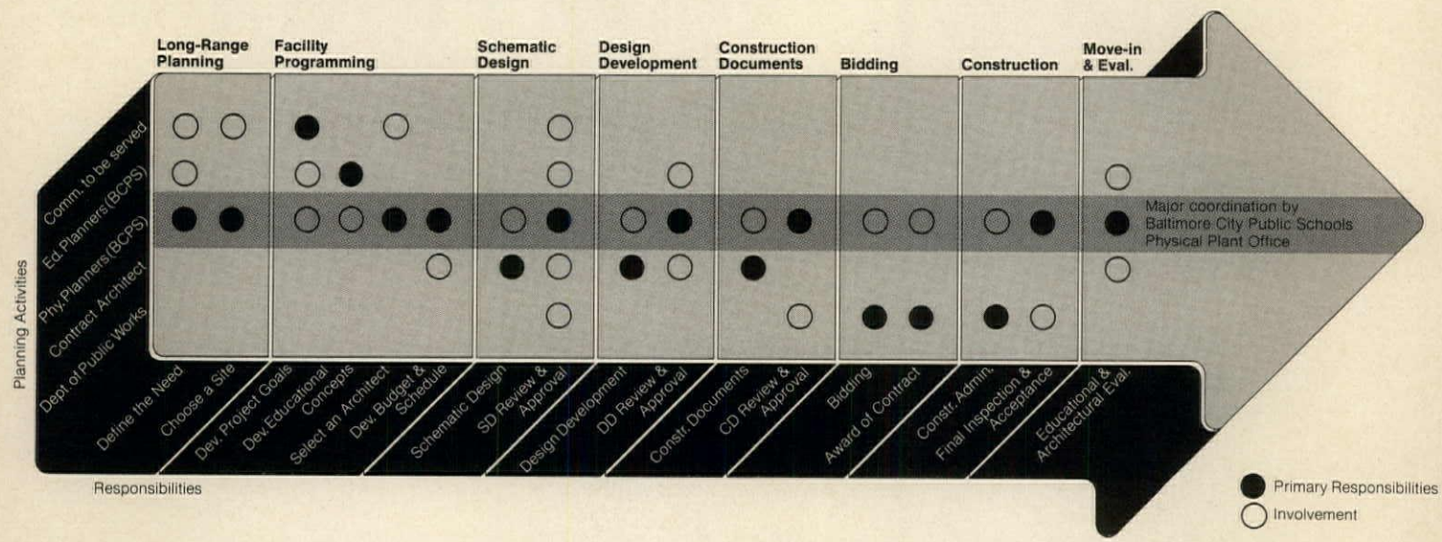
While a bond referendum is a "yes" or "no" issue, it was becoming clear to the local community that something more than funding was required if Baltimore was to gain the schools its children needed. Local organizations such as the League of Women Voters and the Baltimore Chapter of The American Institute of Architects supported the referendum but at the same time they presented a clear challenge to the leadership of Baltimore City Public Schools and to the city itself: "We don't believe," they said, "that the staff and the general procedural competence exist in Baltimore to ensure the efficient investment of public funds in a viable school building program." They demanded a vastly improved delivery mechanism and cited the need for more efficient coordination and control of the program by the various agencies of the city.

In the latter part of 1968, BCPS hired Grinnell W. Locke, FAIA, as architectural consultant. He took leave of absence from his responsibilities as partner in a Baltimore firm in order to assist BCPS with immediate steps such as a program of prefabricated classroom buildings totaling $9 million. Even of greater consequence was his recognition of the need for additional outside assistance to ensure effective management of the total school construction program. Once this need was generally understood and accepted by the city, BCPS solicited proposals from numerous consulting firms and in March 1969 hired Caudill Rowlett Scott to serve as management planning consultants for a period of 15 months, which was later extended another 12 months. Architectural services were explicitly excluded from CRS's responsibilities, thus creating the proper opportunity for consultant studies and recommendations concerning the framework within which other architects would function in the design of new schools.

A CRS team consisting of specialists in various types of facilities planning and design, project managers, programmers, engineers and technicians worked with BCPS and a number of involved agencies and individuals to find out what was standing in the way of progress in the Baltimore school building program and to clear the path to the future.

Of course, it is not always easy to put the team approach into effective operation. People sometimes resent the idea of a group of "out of town experts" who fly in, set up shop and begin pointing out the inadequacies of existing ways of doing things. But this kind of frank analysis of procedures—including staff capabilities, communications, organizational techniques, approval hierarchy—is an essential part of any meaningful consultation such as this. In Baltimore, as people began to realize how much the students would gain from operational improvements, they began to listen, to accept the idea of change and to think positively about the recommended directions. Of course, some people listened faster than others; some are still finding it hard to think of new ways of doing things. A genuine team approach came into being. Following are some of the issues and results of recommendations.

SUMMARY OF SCHOOL PLANNING AND CONSTRUCTION RESPONSIBILITIES



1. BCPS needed to develop a more comprehensive organization to manage the planning of its new schools. An Office of Physical Plant was established, bringing maintenance and operations into the organization and adding crucial new skills directed toward the accurate determination of long-range citywide facility needs.

There was a danger that contract architects might get bogged down in the programming phase as a result of having to deal with such a large educational staff as well as many community groups. Professional skills in facility programming were, therefore, added to provide each architect with a comprehensive fa-

Mr. Keyes is associate superintendent for administration, finance and planning, Baltimore City Public Schools. **Mr. Brooks,** an urban schools specialist, is an associate of the firm of Caudill Rowlett Scott, Houston.

cility program, unique to his particular project. This would allow him to move immediately into schematic design.

Staff members long active in the coordination of school planning gained redirection from more precise definition of their authority and responsibilities. The leadership position for Office of Physical Plant was established at the assistant superintendent level and recruitment for a top-level individual was begun. In late April 1971 Curtis E. Lantz was appointed by the Board of School Commissioners to lead this new organization and put the recommended program into practice.

Systems building and fast-track scheduling techniques not previously used on Baltimore schools can now be explored in an appropriate manner by this comprehensive organization.

2. It was clear that a smoothly oiled machine within BCPS would only solve part of the problem. Common understanding of the sequence of events and the allied agency and individual responsibilities in the development of a new school needed to be forged. This is not an easy task in a city as large as Baltimore. Departmental jealousies had developed through the years, and in some cases it was a step forward just to get individuals speaking to one another again about their common problems.

The documentation of agreed-upon activities and responsibilities began to develop as the core of what soon became a Management Information System for Physical Plant Planning. This system determines the sequence and scope of all events which should occur in the planning and construction of a new school and delineates the specific responsibilities of representatives of all involved city and state agencies. This information, as well as considerable reference material, planning and specification guidelines, cost and area analysis techniques and cost control procedures have been documented within this comprehensive Management Information System, which has been reproduced for initial distribution to approximately 90 involved parties.

With so many people taking part in getting a new school up, not everyone can operate effectively "off the top of his head." So the Management Information System is becoming "The Book" by which school planning is to be managed in Baltimore, providing each participant an appropriate level of procedural information and resource data in the form of a manual tailored to his unique role.

3. Nowhere does there seem to be more fertile ground for true participatory democracy than in the planning of new public schools. Superintendent Sheldon was strongly committed to community involvement but needed to develop some techniques for making this involvement a reality in physical planning. Much was learned from a major *charrette* (or intensive work session) held in east Baltimore in February 1969 which brought in the local community to help plan a new high school. The charrette convinced BCPS of the true value of community involvement in producing a better school, but it also showed BCPS that it would not be economically or logistically feasible to employ the charrette technique in planning each new facility.

Baltimore has now developed an approach to community involvement which works better and which is employed on each new project: The community takes the lead in establishing its educational goals and pointing out special problems which it feels the new school could help solve. Once these basic goals have been established, the BCPS staff goes to work to devise ways of implementing them. This evolves into a comprehensive educational "prescription" for the particular community as well as a complete facility program which will guide the architect in the design of the new school. This method may not work in every city but it has been successful in Baltimore, where it draws upon the best of both laymen and professional educators. It puts the public back into public education.

4. More public information on the school building program was needed to make parents and voters aware of progress on a city-wide basis. The public needed a general understanding of the new processes being used to develop their schools. Local newspapers did not seem to be an appropriate medium initially, so BCPS developed an illustrated newsletter explaining these processes to the communities that would participate in the planning.

5. A Facility Planning Group was formed within BCPS to insure that truly comprehensive decisions would be the basis for the BCPS capital improvement program. This group brings together education, administration, planning, programming, maintenance and operational skills so that recommendations made to the superintendent will reflect all these considerations. With so many pre-1900 buildings still in use, constant demographic changes, the planning of a major expressway system and massive efforts to revitalize residential neighborhoods in the center city, it is vital that the school planning program be relevant to all these issues and not carried on in isolation from the development of the city as a whole.

6. To be sure of getting the best architect for each new school, BCPS needed to establish a more structured, objective screening process to consider architectural qualifications in relation to specific projects. This process, carried out by a newly formed architect screening committee, evaluates the qualifications of all architects interested and matches the skills of the firm with the demands and nature of the particular project. There is even a step in the process for the community to voice its feelings about the kind of architect it would like to see design a school.

7. The contract under which an architect works can be a most critical document. The AIA has done much in recent years to establish a contractual framework that is widely used and with much success. The prevailing contract in use by the City of Baltimore was not of the AIA variety and was seriously outdated. Its most glaring shortcoming was that the architect was not held responsible for fulfilling the program within the specified project budget but was even paid extra to revise the plans if the low bid exceeded the established budget. This made effective cost control almost impossible.

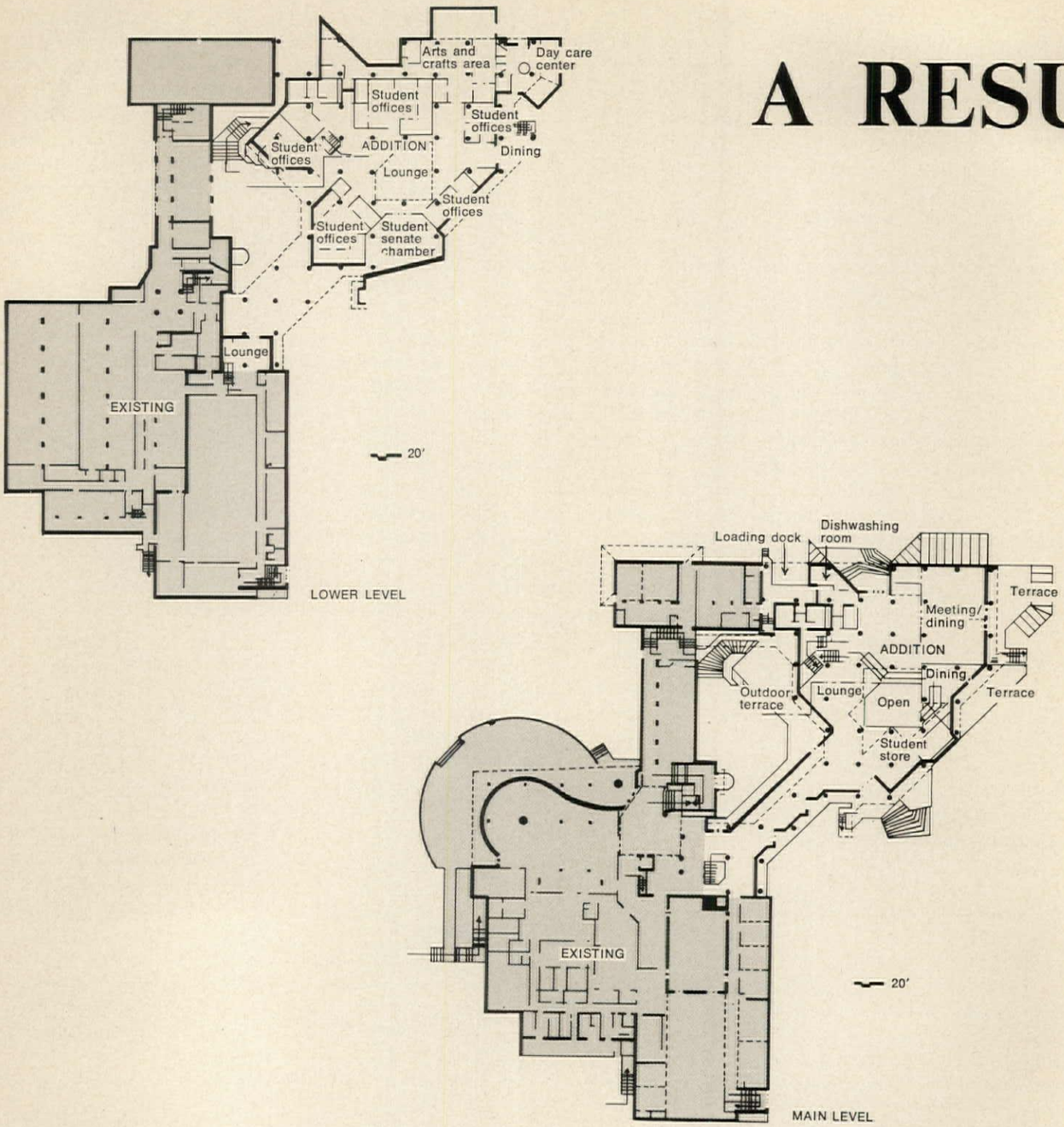
A more comprehensive architectural contract was developed through the efforts of the local chapter of the AIA, the Department of Public Works and BCPS. When formally instituted by the city's Department of Law, this should be a most significant document in paving the way for architectural excellence.

Reshaping the way in which new schools are developed is a long-range investment. Since some of the effects may not be clearly demonstrated for three or four years, it is important to establish some short-range objectives as well that can pace the staff and the expectant voters along.

Shortly after completion of CRS's consultant service, the State of Maryland began a program of 100 percent state funding for all public school construction. This has added numerous steps to the school delivery process yet the Baltimore system will remain as their basic procedural framework. It is interesting to note that numerous Maryland architects are now urging the state to adopt the Baltimore process for use throughout Maryland.

Those of us deeply involved in the complexities of school planning in a big city are convinced that this kind of concerted attention to the school building process, based on a sound educational program, will assure a better learning experience for our students. Only in a well-designed, stimulating school environment can we properly meet our commitment to each child. □

A RESULT



Are you designing a student union building? If you think you know all its functions and how the use pattern should be planned, your ideas may change radically if you listen to the future users.

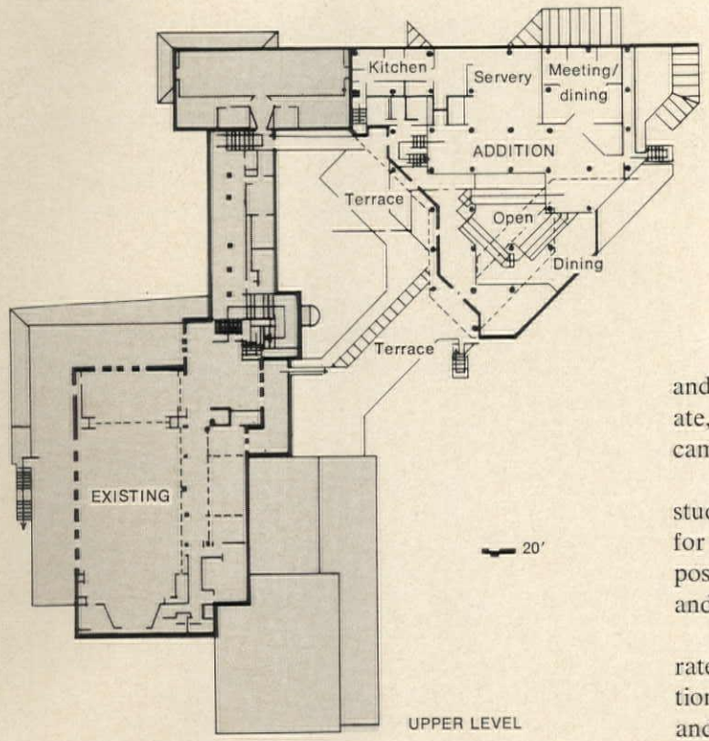
Students played a vital part in the development of the addition to Erb Memorial Union at the University of Oregon in Eugene. They determined the design concept, the location and space allotments and reviewed the entire design process through completion of contract documents.

It was through the university campus planning committee that students first assumed an advocacy role. This committee has 16 members: 9 voting faculty, 2 nonvoting faculty and 5 voting students appointed by the Student Senate. The committee reviews and makes recommendations to the president of the university on physical planning for the Eugene campus.

Initially, alternative sites for the proposed addition had been presented to the campus planning committee by the Office of Planning and Institutional Research, the planning arm of the university administration. Some committee members and the university administration supported a satellite addition on a site remote from the existing union. The five student members, however, were unanimous in their support of a central location adjacent to the existing union, reasoning that a satellite addition would divide the student body into groups, each identifying with a separate union. This would further break down communications and the sense of community among students. They argued

OF STUDENT ADVOCACY

by GEORGE C. SHELDON, AIA



The location, space allocation and circulation pattern of the addition to the Erb Memorial Union at the University of Oregon is conceived by the students in close cooperation with the architects, Colburn, Sheldon, Kaji, and associated architects, Lutes & Amundson.

that the fundamental factor which should influence the planning of the union was the compelling need for maintaining personal contact and interaction among all members of the university community. The five convinced enough of the faculty members, and a central location was recommended to and approved by the president.

The established program had been written around the assumption of a satellite union. The campus planning committee now organized a subcommittee to develop a new program to reflect the central location. This committee met three times a week and was composed of four students appointed by the student senate, the director of the union and the architect, who moved onto campus for two months to be able to attend every meeting.

Instead of beginning with allocation of square footage, the students were more interested in developing a conceptual model for the addition. Once this was accomplished, they considered the possible sites, then examined the activities of the existing union and finally assigned square footage.

The first discussions were aimed at gathering a more accurate reflection of student opinion regarding the proposed addition. Cooperation by the architectural school produced a survey and the manpower to gather a sample of student, staff and faculty opinion. Early discussions centered around data from this survey and the ideas contained in a planning study for a student union at California State College, Los Angeles, entitled "Actions, Objectives and Concerns, Human Parameters for Architectural Design," by Deasy & Bolling under a grant from Educational Facilities Laboratories, Inc.

The Eugene campus' existing student union had been designed for a student enrollment of 8,500. Its highest use facilities are nearest the entrance lobby, the lower use facilities in remote locations. As the population of the university has almost doubled, approaching the limit of 17,500 students, a serious problem has resulted. The circulation system is totally inadequate and causes extreme congestion at the high-use facilities, blocking lobbies and entrances and further isolating the low-use facilities.

The committee decided that the new addition should provide an alternative to this organization. It ought to be a "shopping center of student services." The high-use facilities should be located away from the entries to increase exposure to otherwise unnoticed services. The stress would be on retention of the patron, not on efficiency and high turnover. The key to the success of this concept is circulation. The proposed addition should therefore relate well to existing campus pedestrian circulation and might be organized as a vertical shopping center. Students would be drawn between a main level pedestrian mall—which

Mr. Sheldon is a partner in the architectural firm of Colburn, Sheldon, Kaji in Portland, Oregon.

would relate strongly to the existing path from the dorm to the center of the campus—and the food service on the highest level, ensuring their exposure to the activities in-between.

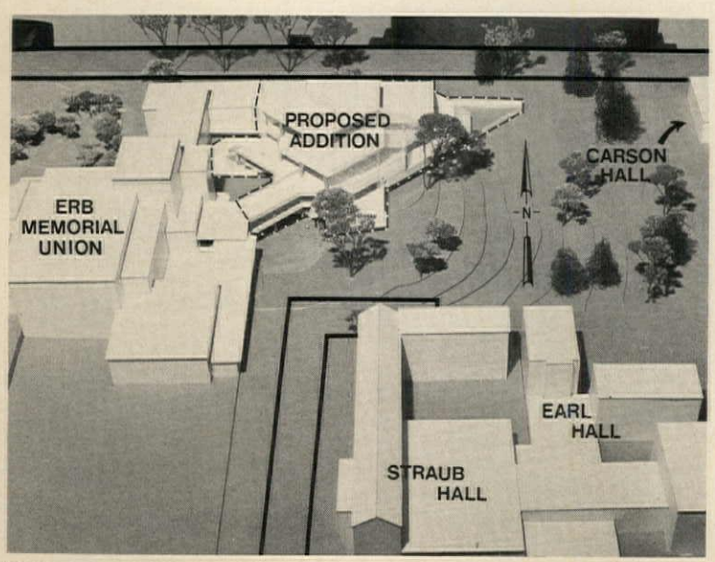
Once the conceptual model was formed, the committee looked at the various site possibilities and coordinated these with the model to discover the optimal selection. An eastern scheme provided the most open space; in addition, it straddled the existing circulation path, thus providing alternative choices to students in moving through or around the facilities. The lower level could be opened up as an on-grade passage and second major entry. This would alleviate a great deal of congestion in the present union since students would not actually go through the building for the shortest route between dorms and the rest of the campus. Direct access would be provided from a new lower level entrance, further easing the bottleneck in the main lobby. The eastern scheme was approved unanimously.

The survey of students, staff and faculty was intended to determine what the campus community thought of the existing union and what was desired in the addition. The questionnaire was also concerned with educational goals and the role of the student union in the educational experience. Its emphasis was on the functional concept of the union, i.e., not as a showplace of bronze and marble but as a down-to-earth usable building.

The survey showed that the food and lounge/study services are the most frequented areas of the present union and are severely limited, overcrowded and noisy. The existing lounge cannot accommodate even a fraction of those who would like to use it. The survey also showed that the university community would like to have an arts and crafts center.

Observation of actual use patterns bore out the recommendations of the questionnaire. When time came for allocation of space, the student committee concurred with these preferences and assigned high priority to lounge and dining facilities. Also high on the list were new spaces for the student government offices and a day-care center.

The new addition is organized vertically around an open circulation spatial core and horizontally as a progression of functions from general public activities at the core to specific private activities at the periphery. Student offices and active lounge space are in the center; moving outward are conference rooms, quiet lounge space, an arts and crafts center and a day-care facility. Again, the student is encouraged to pass activities and services he might otherwise ignore. For example, the student offices cloistered on the third floor of the existing union will be on the main circulation path from the entrance to the food area.



First suggested as a satellite remote from the present facility, the proposed addition to the student union is instead—at the recommendation of the students—centrally located adjacent to the existing building.

The dining area is on three levels between the main and upper floors. The largest of the three is slightly below the upper level serving area with smaller areas located near the main floor. Ramps connect all levels and provide quick orientation for the patron looking for an open table or for friends. Patrons exit by continuing down the ramp to the main level. Outdoor terraces at all levels fulfill one of the students' most pressing needs: sunlight and access to the outdoors. When not used for dining, the terraces can be used for lounging, concerts and the like.

The other major student demand was for increased lounge space. Lounges will be provided at all levels of the addition and are typically adjacent to and part of the circulation system. Lounge/study spaces play a highly functional role in responding to the philosophical goals of a student union: to provide the "living room" of the university, space for nonstructured interpersonal contact between students, faculty and staff. One large and six small meeting rooms will be provided near the dining areas and can double as overflow dining space and as television lounges, in contrast to the meeting rooms in the existing union, which are in such demand for scheduled events that they are kept locked against casual use.

When the time came to allocate square footage, students were as influential as they had been in the conceptual phase. By comparing the original program for the satellite addition and the revised program organized by the committee, one can see how effective the students were:

FUNCTION	Proposed Square feet	Final Square feet	Difference Square feet
Lounge	7,100	8,285	+1,185
Offices	8,350	5,984	−2,366
Restaurant	2,850	—	−2,850
Food Service (incl. dining area)	6,830	10,237	+3,407
Meeting rooms	7,600	4,850	−2,750
Ballroom expansion	5,000	—	−5,000
Crafts	4,050	4,176	+ 126
Assembly	—	1,600	+1,600
Day care	—	1,416	+1,416
Store	—	1,354	+1,354
Lobbies, etc.	26,220	23,000	−3,220
Gross	68,000	60,902	−7,098

Allocation of square feet, ERB Memorial Union, University of Oregon.

Usually when the Oregon Legislature is to decide upon allocations of building funds for the universities in the state, a representative of the State System of Higher Education presents all proposals, which are then considered by a subcommittee of the ways and means committee. Students are normally divorced from the procedure until the final yes or no decision is made public several weeks later.

This year, however, when the students heard that the ways and means subcommittee had decided against approving funds for the union addition, the students were determined to do everything in their power to reverse the decision. Some of the students who had been involved in the planning and the director of the union went to the capitol in Salem and spent several days talking with state senators and representatives, arguing in favor of the addition. Student legislative lobbying is rare in Oregon, but because the students communicated their interests to the legislators, the ways and means subcommittee approved the union addition for construction in the next biennium. □

THE STUDENT QUARTERS THAT TEAMWORK CREATED

by EWING H. MILLER, AIA

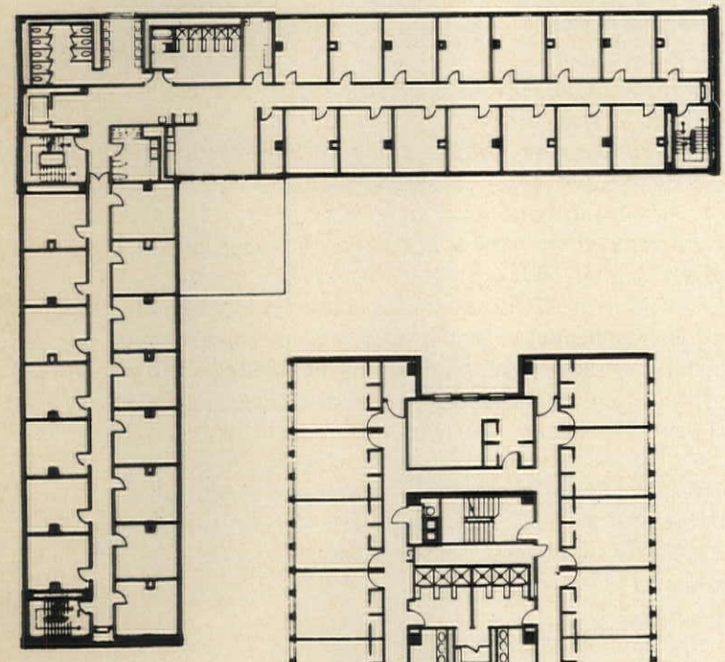


Figure 1

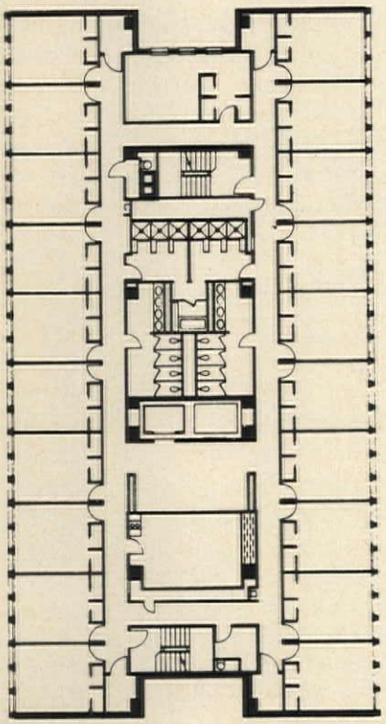


Figure 2

An architect's intuition cannot solve today's complex design problems. And the client who hires the architect for a large project cannot give the total input to design. It takes input from the users, and this requires research among user groups. Years of behavioral study by an A/E firm with a psychologist and three sociologists among others on its team is behind the evolution of dormitory design at Indiana State University.

We started in the 1950s with our first commission for a residence hall and developed it in the orthodox plan (Figure 1) that had been established following World War II. It has a double-loaded corridor, L-shaped, with a grouping of service facilities such as bathrooms and elevators at the centroid of two wings. It was economical, and since we knew that more residence halls were in the offing, we asked our psychologist to run the first of a series of behavioral studies.

We found that many aspects of the building did not please all its inhabitants. The social rooms on the ground floor were large and easily supervised, as requested by the dean of women, but their goldfish-bowl characteristics made them undesirable for entertaining anyone, even parents. The double-loaded corridors were noisy and used by the students as a communications link by shouting from room to room.

Inadvertently, the first plan did contribute one excellent feature which we have continued throughout our entire residence hall design: Economics dictated that very little furniture be built-in. Consequently only the closet is fixed. Desks and beds and

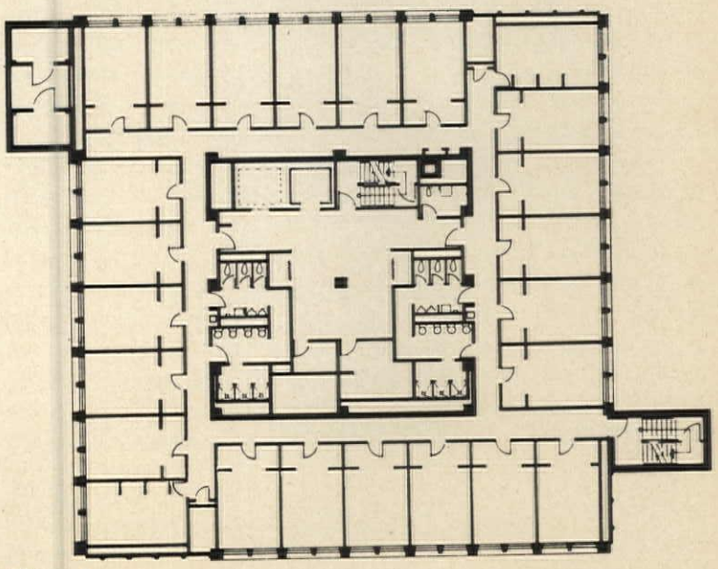


Figure 3

The evolution of dormitory design: first, the traditional double-loaded corridors; next, as a result of behavioral research, single-loaded corridors with stairs, bathrooms, etc., placed to cut noise between student rooms; finally, a square, making it easy to make acquaintances and with doors between elevator lobbies and hall, further cutting noise. The work won top design awards from the Indiana Society of Architects for the Ewing Miller Partnership (now Archonics Corporation).

chairs were to be purchased through other funds. This has been preferred by the students. There are areas where the professional designer should stay out! The student room is decidedly one of these. The student wants to bring his own color and allow his personal items to dominate so that his space is his personal space.

The materials we used, though desirable from a maintenance

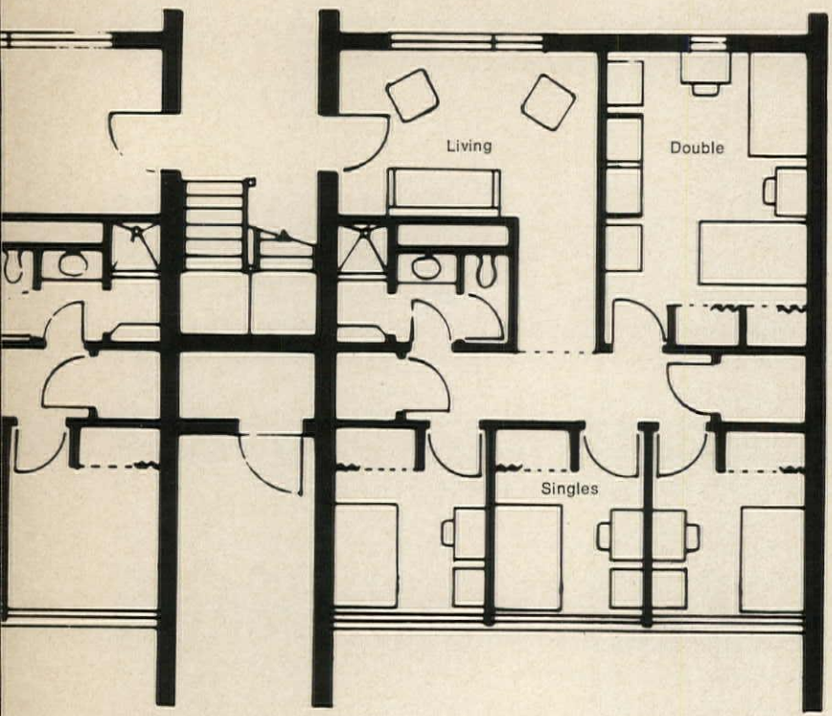


Figure 4

Another form of student living environment: apartments for five in three- and four-story buildings, providing a less regulated lifestyle.

point of view, were brittle and harsh and contributed to echoing instead of sound reduction. The centralized toilet facilities were very communal and therefore the building was difficult to use for graduate students returning for work in the summertime. We took these facts and many more to the director of housing, then to the vice president of student affairs and finally to the board of trustees. Because they were well documented and the methodology was considered accurate, we were allowed to experiment with the second plan (Figure 2).

Its rectilinear shape answered many of the problems. The student room is on a single-loaded corridor which cuts down noise. Each side of the building has access to toilet facilities and although they are shared by all, they seem more personal and can be divided into men and women's areas. Graduate couples or singles of either sex can occupy one floor in the summertime.

We switched to more appropriate flooring material and other sound-dampening materials. On the ground floor we separated the noisy recreation areas from the conversation lounge. We purposely brought major elements of the building, such as stairways, down into the center of this lounge so that it provides a series of furnishing groups which are more visually protected and give the user a feeling of privacy and containment of his own group. All of these things have worked very successfully. Howsoever, we did build in a problem for the "organization" of the floor unit. Since the community was split into a left side and a right side, seemingly friendships were not made across the zone that contained all the multiple-use facilities.

The last plan (Figure 3) for the highrise residence halls is the square which removes the objections of the floor being split by the services and lounges. Acquaintances are now easily made around the floor and noise-generating space is even more isolated by adding doors between the elevator lobby and the halls. The square reduces the perimeter of the building which of course reduces costs. We had reached the optimum plan for housing two students to a room on the minimum of land at an acceptably sized floor for what the administrators considered a functional unit.

We then surveyed the people who had used these buildings, comparing the three plans, and found that a large minority felt that all of these arrangements were not sufficiently independent but resulted in too much governmental structure. This was true particularly of students in the last two years of university, after their friendships had been well established. These comprised such a sizable minority that we foresaw the demands for off-campus apartments and a greater degree of independence. As in many university communities, the neighborhood could not possibly provide decent quarters for a large number of students in existing facilities, and the young people were asked to pay excessive rates for the spaces they found. They also accepted the responsibility for providing their own food and their own maintenance without realizing how time-consuming this can be.

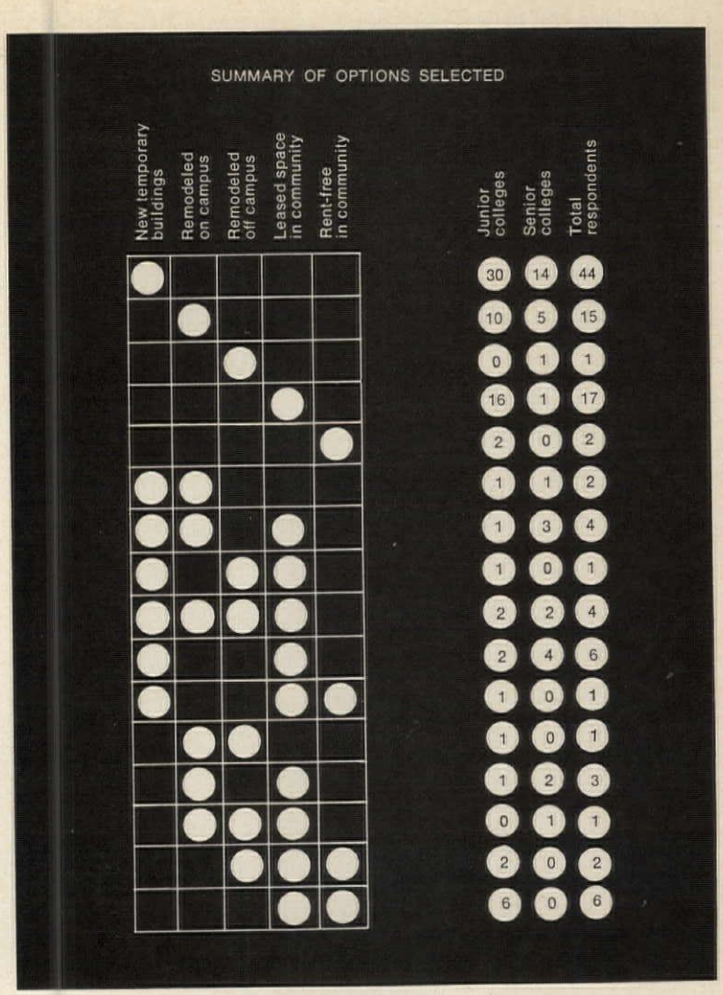
Again we asked the housing administration and the deans of students and the board of trustees to give consideration to another form of living environment. Fortunately, less expensive land became available because of a change in the university boundaries, and we were able to compare the rise in construction cost and the lowering of land cost, which showed that it was economically feasible to build three- and four-story walk-up accommodations. These are apartments for five with living room, bath, three single rooms and one double room (Figure 4). We felt it a must to bring in single rooms as these provide another desirable lifestyle.

Years of behavioral study shows that one generality can be made: Students need to be able to change lifestyle concepts as their maturing personality evolves, and they need to be able to experiment with different forms of living enclosures. Our suggested apartments will undoubtedly be the ones built on the campus in the future. They are background architecture, not focal point architecture, which is oftentimes hard for boards of trustees to accept. On the other hand, they are a visual prediction of a lifestyle that is less regulated, that is subdued and certainly adult.

We were able to furnish the apartments with the types of furniture and use-finishes that were vandalized in the larger and more anonymous residence halls, because the plan establishes responsibility. The student accepts his apartment, and anything that occurs to it is his to repair. There are no anonymous areas to speak of with the exception of the commons building and the central post office facilities. The stairwells are open to the weather; there are no corridors. We have increased the actual student space by 100 square feet and we have lowered the actual student cost substantially over the traditional highrise residence halls.

Our work at the university is a practical application of behavioral research. It applies to everyday immediate problems. Without such research, the architect must remain intuitive. This was sufficiently difficult in an age where he was an inherent part of the culture. But today, with increasing stratification of society by economics, age groups, education levels and even disciplines, the architect's intuition no longer is sufficiently broad. □

Mr. Miller is president of Archonics Corporation with headquarters in Terre Haute, Indiana. He is a member of the AIA Committee on Architecture for Education.



THE 'TEMPORARY' FACILITY COMES INTO ITS OWN

by DAVID S. HAVILAND

Think of a college campus. What comes to mind? A stable, durable bastion of higher education with ivy walls? A brand new, carefully laid-out collection of buildings and greens, conveying newness, vitality and growth? Perhaps something in between? No matter the image, it would probably come as little surprise to find that most campuses, old and new, include facilities which can be considered temporary. It may surprise some, however, that these are coming into their own as key resources on our campuses.

Temporary space—whether it be unrenovated "found" space in the community or specially procured new structures—has long been a fact of life in our institutions of higher learning. Much of it has been begged, borrowed or (even) stolen. This phenomenon has been increasingly evident in the past few years which have seen such unprecedented growth and change in both junior and senior colleges.

We have always thought of temporary space as something which is disposed of (torn down, moved, sold, abandoned) when the need has past. A casual inspection of our campuses, though, suggests quite the opposite: We procure temporary space—and keep it. Temporary facilities are beginning to assume a life and a viability of their own.

Perceiving the growing importance of all types of such facilities and expressing some concern about the dollars being placed in them, The American Institute of Architects' Committee on Architecture for Education, the American Association of Junior Colleges and the Association of University Architects sponsored a survey on "Temporary Facilities for Higher Education" in 1970. A questionnaire seeking information about the nature, uses, costs, construction and planned disposal of "temporary" facilities was developed by Robert E. Entzeroth, AIA, in cooperation with

The South Campus Surge Buildings, State University of New York at Stony Brook by Smith, Hinchman & Grylls Associates, Inc. prove that permanent quality facilities for temporary use need not convey an air of temporariness. The State University Construction Fund developed the complex.

these groups and mailed to junior and senior colleges around the country. The analysis work was sponsored by the AIA, AAJC, Council of Educational Facilities Planners, Society of College and University Planners and Educational Facilities Laboratories, Inc.

An analysis of the returns from this poll provides the basis for the statements just made on the growing significance of temporary facilities. Over one-half of the institutions returning the questionnaire indicated some dependence on such facilities in 1970; several noted that they had at one time depended on them.

What Is Temporary?

Perhaps we should begin with this question, which seems simple. The questionnaire provided the respondent with five choices:

- new temporary buildings
- remodeled existing facilities on campus
- remodeled existing facilities bought throughout the community
- leased space in the community
- rent-free facilities throughout the community.

and the cost of the facilities at levels appropriate to these targets.

An examination of the returned questionnaires in the new temporary buildings category begins to refute this definition. Respondents rated the projected life of their facilities from 5 to 60 years, with a very high proportion (nearly three-quarters) targeted from 10 to 20 years. Many will probably last longer.

A visual survey adds to this by indicating that many of these facilities are truly of permanent level quality: They are well built and provide a standard of environmental performance which is, in many cases, equivalent to that for new construction for similar use.

The cost information provided by the respondents further confirms that we are not talking about inexpensive, makeshift space. While cost data are always difficult to place in their proper perspectives, a large number of the new temporary buildings reported were in the $14 to $15 per square foot range, with another clustering in the $9 to $10 range. While the figures may not consistently come up to those for more permanent construction, an analysis of the use of these facilities indicates that most

Temporary facilities at Bergen Community College, Paramus, New Jersey, started with one 25,000 square foot structure in 1968. The college placed a 28,700 square foot addition in 1969. The building layout was prepared by the owner/architect, The Grad Partnership (then Frank Grad & Sons); bids were advertised and lowest bidder selected. The successful bidder engineered the structural, mechanical and electrical (with the architect's approval). The lump sum bid was a complete turnkey job, including financing. The college had a year-by-year option of purchasing the buildings and in both cases did so the first year. Had they not been sold after 10 years, they would have been removed and the site restored.

The chart presents the options selected by the 110 junior and senior colleges which provided positive, useful information on their uses of temporary facilities. As can be seen, the "new temporary building" category received the most attention. It will serve as the focus of this article. The remaining responses are scattered, with many colleges leasing space and with many indicating that they are using more than one of the options given to provide themselves with temporary facilities.

Beyond the five options offered, there was no effort by the sponsors of the questionnaire to define what they meant by temporary facility. This was left up to the colleges. It's probably just as well, too, for it seems that everyone has his own definition of the term.

For architects, the first impulse is to consider the *construction* as temporary: disposable structures which provide a level of environmental performance geared only to meet the immediate need. From this, we would assume that the projected life of the facilities would be low, the amortization period equally low, are destined for rather simple educational uses and have large open areas without many special services.

The Key to Temporariness

If projected life and cost are not the keys to temporary facilities, what is? The answer, in a word, is *use*. It is the projected use of the facility which is temporary, not necessarily the physical structure itself.

From looking at the answers to the questionnaire, it appears as though these facilities are being used in three or four different ways:

Initial space, when starting a college (or a major program in an existing college) from scratch, while waiting to build or to renovate more permanent facilities.

Interim space, for new or growing programs, while waiting for more permanently assigned facilities.

Buffer space, allowing a college to house programs which are momentarily growing, contracting, shifting emphasis or in experi-

mental phases. The thought here is to pursue more permanent facilities only when that commitment appears to be justified.

Crisis space, when enrollments suddenly exceed estimates, or when other facilities are suddenly taken from service.

Many responding institutions, particularly junior colleges, indicated that they are just employing temporary facilities as an initial solution, waiting for the large, new campus on the outskirts of town. Given the history of campus planning and building in this country to date, this is not an unexpected response. The goal of each college is its own campus, carefully planned and designed, a community of its own.

Given two strong forces now afoot, though, one cannot help but wonder if many of these "initial" facilities are not destined to become permanent quarters for these colleges:

- The growing concern about the cost of education and the kind of commitment implied in the capital investment which goes into large campuses.
- The growing concern about the relevance of education to societal and community objectives. Many are asking if the tightly integrated campus on the edge of town is truly an appropriate physical setting for higher education today. Perhaps the complement of leased space, new temporary structures and other found space in the community which so many colleges think of as initial space *should* serve as their more permanent quarters.

Even where colleges and universities are established on their own campuses, the growing importance of the two middle categories of use cannot be denied. As institutions grow, contract, change, innovate and respond to the many pressures placed on them, there is no perfect complement of physical facilities to house them. What works one moment doesn't the next.

These colleges, given the means, are constantly adjusting their complements of space. One large southern university which is generally considered to have a mature complement of physical facilities indicates that, at any one time, about 15 percent of its square foot area in use is somehow temporary in nature. It needs this space to accommodate internal change and adjustment.

Interestingly enough, one of the state college systems responding to the questionnaire notes that it uses relocatable temporary buildings to serve as buffer space on a systemwide basis. As the pattern of activities and unmet facility needs change from campus to campus, it has a "pool" of these buildings which can be deployed to take up the slack.

The specific uses reported for these temporary facilities are what might be called bread-and-butter college uses: classrooms, seminar spaces, faculty offices, library uses, student services, etc. Few were designated for specialized uses, although one temporary building housed a computer laboratory and a few others indicated laboratory uses of one kind or another.

Several respondents indicated that they would probably be changing uses before long. A number suggested that the ultimate use of a temporary building would be shops, maintenance and campus support activities. (One cannot help but wonder if there isn't some wishful thinking in that prognostication!)

One wrinkle presented by two or three senior colleges was the use of these types of facilities for student residential units. Stanford University, for example, placed 117 four-student units in mobile homes, all in 63 days from firm order to delivery, and at an in-place cost of just over $12,000 per unit (including site development, community facilities, fees and furnishings). It plans to use the units for five years and then sell them. To this end it set a rent schedule which provides the necessary financial return.

One pitfall for a university when it needs fast, incremental space is that it forgets to give due consideration to overall campus planning. This can lend an air of temporariness which may not in fact exist, since many universities expect the structures to last 20 years or more.

Some additional findings from the "new temporary buildings" category in the questionnaire reinforce the notion that it is *use,* not *construction,* which is temporary:

These are not always small buildings. Generally one thinks of space for temporary uses as coming in small chunks—perhaps 600 to 1,800 square feet (the size of many commercially available portable classrooms). About one-third of the new temporary buildings procured by junior colleges responding to the survey did fit this mold. More significantly, though: Nearly one-half of the buildings were in the 5,000 to 6,000 square foot range. This appears to be a useful size when an institution seeks to add a space increment to its existing stock.

Mr. Haviland is associate professor and director of the Center for Architectural Research, Rensselaer Polytechnic Institute, Troy, New York.

Often several buildings are procured at once. Many of the colleges responding built several (most frequently two to eight) of these structures at once. The reason is probably twofold: the "infilling" nature of these facilities requires that they be placed in close proximity to existing facilities, requiring smaller buildings; and many commercially available building systems and packages are most amenable to these sizes.

Nearly all these projects were planned and built in a hurry. Looking at the junior college facilities again, the listed planning time for over 80 percent of the buildings for which this piece of information was given was two months. The construction time-range for 80 percent of the projects was two to five months. While this kind of information can be misleading, the sense of it is clear: Many colleges were pressed for time. They had to get something up in a hurry and the plan/design/construct game plan for conventional permanent facilities was just out of the ballpark.

A very high proportion are airconditioned. While undue significance should not be given to this seemingly important issue, it is a fact that nearly all of the structures reported, in spite of their geographic location, are listed as being airconditioned. In many cases, this probably results from the procurement of an industrialized product where airconditioning simply comes with it. It does, however, reveal that these are not necessarily low-, marginal- or temporary-quality structures.

As far as the nature of the structures is concerned, it is evident that the majority of the new temporary buildings are industrialized products which are prefabricated to some extent, with erection on a site-placed foundation. Only a few were listed by their respondents as trailers. The direct issue of portability and relocatability was not addressed in the questionnaire but a reasonable inference from other questions asked is that about one-half of the new temporary buildings reported are relocatable.

Is There a Market for Fast, Incremental Space?

These conclusions can be drawn from the survey:

1. Many colleges are turning to prefabricated structures, or to building systems, to play a number of roles on their campuses. Notable are uses for initial, interim, buffer and crisis spaces.

2. Very often increments of 5,000 to 6,000 square feet are being sought. Secondarily, increments of 600 to 1,800 may be in order.

3. The space sought is of permanent quality, i.e., it is to perform at levels equivalent to those in more permanent construction.

4. The space is for bread-and-butter sorts of activities and is rarely provided with sophisticated mechanical and electrical devices. Long structural spans are likewise rarely called for.

5. Colleges want the space quickly. Both planning and construction time are likely to be severely compromised by the very nature of the need for the space. Industrialized products—and a process which can deliver them quickly—are clearly called for.

6. Most of the institutions are looking for space which fundamentally meets the requirements just listed and most realize that the cost of this kind of space may not significantly vary from more permanent construction.

In summary, it would appear that many colleges surveyed are looking for small increments of permanent quality space, for general, perhaps temporary uses, and they want them fast.

The survey seems to reveal the existence of a real market for this type of space, of reasonable cost and quality. For some crucial reasons, it would appear that this market will continue to grow in strength and visibility.

While the exterior of a temporary facility may speak of a transitory function, the interior may give a feeling of a much longer projected life and have an overall performance geared more to conventional construction. Across page and above, Joliet Jr. College, Joliet, Illinois.

First, the very economic forces which are causing higher education everywhere to re-examine its goals, its programs and its resources will cause it to re-examine its physical resources as well. It has already begun, and more than one major university or university system has called a halt to further capital investment while it sorts things out.

The re-examination will undoubtedly shift the focus from *building* new physical resources to *managing* (getting the most out of) what we now have. This is not to say that construction will stop, but it is suggested that its nature will shift from emphasis on the large building (or building complex, or entire campus) to smaller structures, to additions, to some infill space here, to some found space there, to renovation and improvement. Result: a growing market for incremental space.

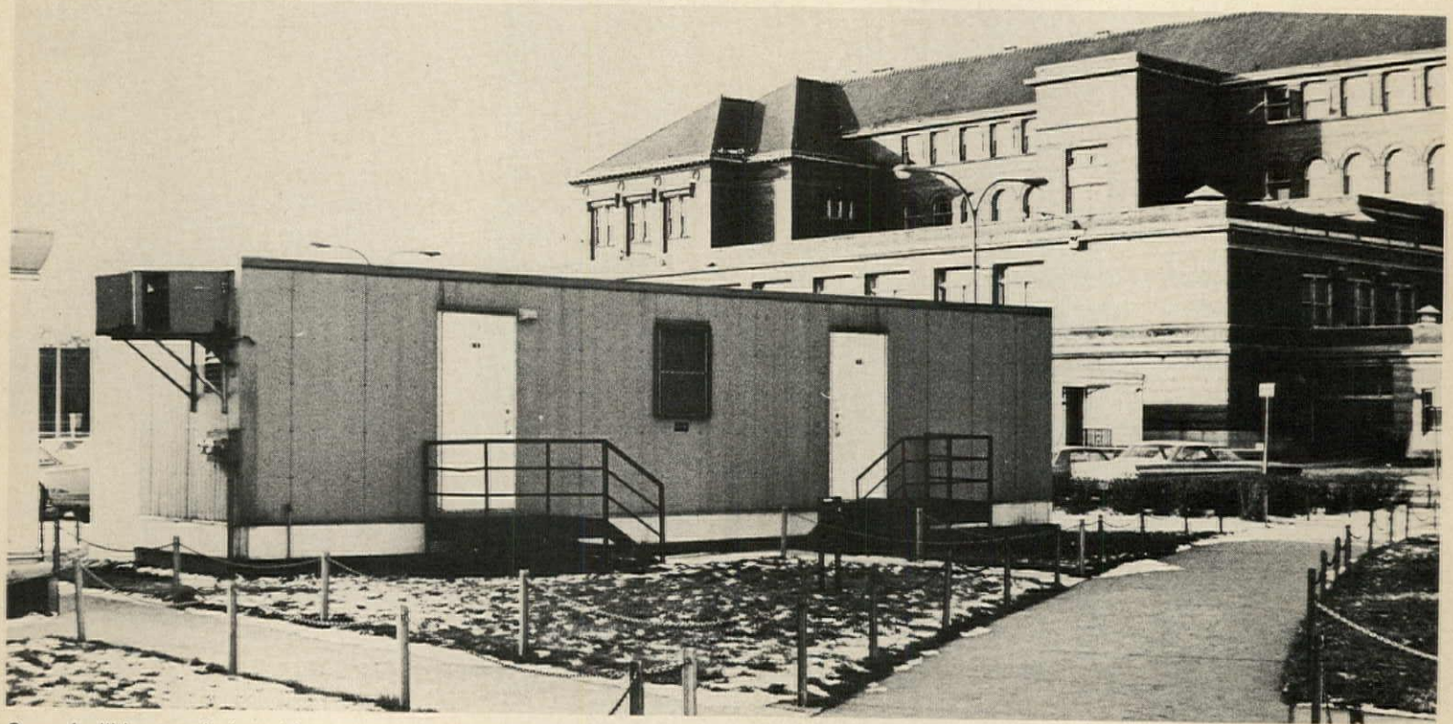
Second, the fast incremental space market is not limited to colleges and universities. In a study of recent construction of

public elementary and secondary school facilities in the state of New York, staff members of the Center for Architectural Research at Rensselaer Polytechnic Institute uncovered a clear tendency to these kinds of projects at these levels of education as well: smaller additions and ancillary structures, fast planning and construction time, relatively simple structural and mechanical requirements, etc. Clearly the market exists.

Better Use of Existing Space

Inherent in much of what has already been said is the need for better use and management of existing space. One-quarter of the respondents to the AIA-AAJC-AUA questionnaire noted use of remodeled space on and off campus for temporary uses, and over one-half indicated that they were leasing some space for their programs.

If one adds the large number of colleges and universities who are remodeling space for permanent uses (and soon thereafter find that they need to remodel it again as needs change), it is clear that the management of the existing resource, as well as temporary addition to that resource by leasing, are becoming significant parts of the space management strategy.



Some facilities are designed for temporary use and have a projected life to match, such as this structure at Chicago State College, Chicago.

Some Directions and Concerns

All of this is not to say that fast, incremental, permanent quality space, or even remodeling and leasing, are the central issues in building for higher education today. Many of the questionnaire respondents pointed out, directly and indirectly, the problems and frustrations often involved in successfully procuring this kind of space.

Perhaps the first problem is also the hardest to grasp. It has something to do with people's attitudes about building. Buildings have to be 1) large, 2) easily recognizable as buildings, 3) permanent looking and, preferably, 4) nonindustrialized.

The reasons for this view of buildings are many and complex. Nevertheless, they are all-pervasive. College planners and administrators see buildings as measures of progress. The community as well as alumni and other outsiders may take the same view: It is terribly difficult to convey growth (and therefore the need for more money to keep the pot boiling) without some visible signs; and quite frankly, additions, renovations and incremental space just don't do it. Probably the financial squeeze, along with solutions in some of the other problem areas which will be addressed shortly, will begin to chip away at this attitudinal barrier, but it will be difficult.

A second problem area relates to temporariness itself. It appears that many college administrators and planners do not ask themselves just what they mean by temporary facilities. The evidence is that they often procure new permanent quality space, probably lasting 20 years, under the illusion that they will use it only for a year or two or three. Results:

Lack of appropriate concern for siting. The buildings are often poorly sited on the theory that they will be moved or torn down soon, anyway. Likewise many campus plans make no provision for possible increments of space (it's always new buildings). The resulting hodge-podge is a continual daily reminder of a temporariness which may not in fact exist at all.

Lack of appropriate concern for all aspects of performance. The visual and environmental character of many temporary facilities, even when not reinforced by poor siting, is often below standards for more permanent quality structures. Yet there is no reason why this must be. It is suggested that in more than one case, these critical issues are dismissed with the "oh well, it's only going to be temporary" attitude.

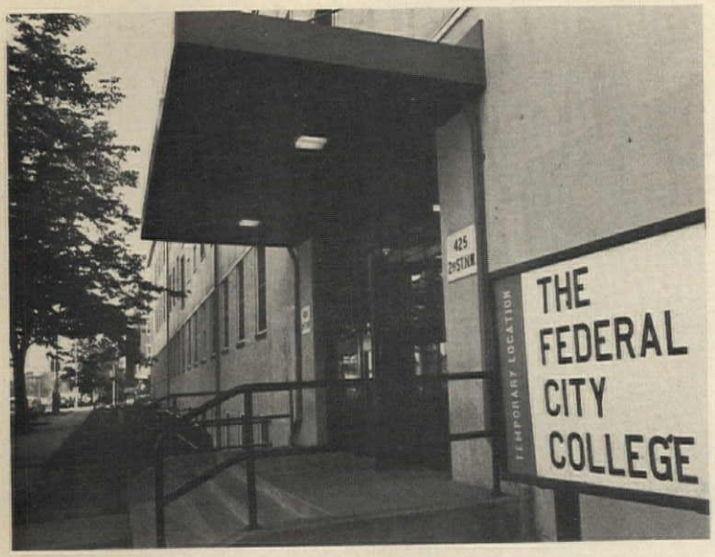
This problem area can be at least ameliorated with the simple asking of the question "What are we *really* looking for?" at the outset. If the facility, no matter what its size or use, is to be of permanent quality, it should receive as careful consideration in these areas as more permanently constructed facilities. And there is no reason why this consideration need unduly compromise the requirement that the facility be delivered quickly.

Perhaps, too, the architectural profession (and the building industry in general) can be faulted for perpetuating the "new building" attitude—with the result that it does not pressure its clients carefully to consider more temporary-use solutions. The

fear of being left out of a package design/build arrangement for a fast, incremental building, or the complexities attending a renovation project, may additionally contribute to the "new building" syndrome.

The problem of fast, incremental, permanent quality space does not, however, lie strictly with the colleges and universities and their architects.

A comprehensive industry capable of providing this kind of space within the time, quality and cost parameters being sought



Many colleges "make do" with existing spaces in the community. Federal City College in Washington, D.C., has bought and remodeled some space and is leasing more in government office and warehouse structures.

is now just emerging. Beginning with some of the established pre-engineered and modular producers, a variety of industries are now turning their interest to this market. Some of these producers have not traditionally been identified with educational facilities, in fact, not even with the building industry.

While this industry is emerging, it can be said that the burden of proving that there is indeed a coherent market for fast, incremental space lies with the educational enterprise itself. If it doesn't come to grips with the fact that it is this type of space it is really looking for, and if some of the consumer acceptance problems are not attacked, a comprehensive, viable industry will never come into being.

In addition to these problems, many institutions are finding it difficult to procure this kind of space within conventional plan/design/construct processes:

- The nature of the need forces a rapid, often knee-jerk, response to increasing enrollments or other pressures; this does not allow adequate consideration of site, or the development of comprehensive performance requirements.
- The nature of the funding process for higher education facilities may restrict the use of this type of space. Many public bodies have yet to come to grips with various forms of temporary space, forcing conformance to permanent-space formulas for aid, for planning approvals, etc. In the case of privately controlled institutions, the donor of capital for facilities usually thinks in terms of freestanding buildings and not incremental additions or changes in the overall physical environment.
- Site standards are often archaic, making it easier to perpetuate the adding of freestanding buildings than the selective adjustment of the existing physical plant.
- There may be significant constraints on bidding this type of project. In multiple-contract states, for example, it may be necessary to break the overall package into prime contracts, thus countermanding the benefits of a fully integrated building system and causing problems of at-the-site coordination.
- Finally, the design/construct roles in procuring this kind of space often result in departures from conventional owner/architect/contractor/manufacturer relationships. The time constraint, and the very nature of the space itself, often suggests a design/build package in response to a performance specification developed by the institution. Many architects object to this approach and specific roles and responsibilities may be greatly confused by a tangle of statutes and industry practices and pressures.

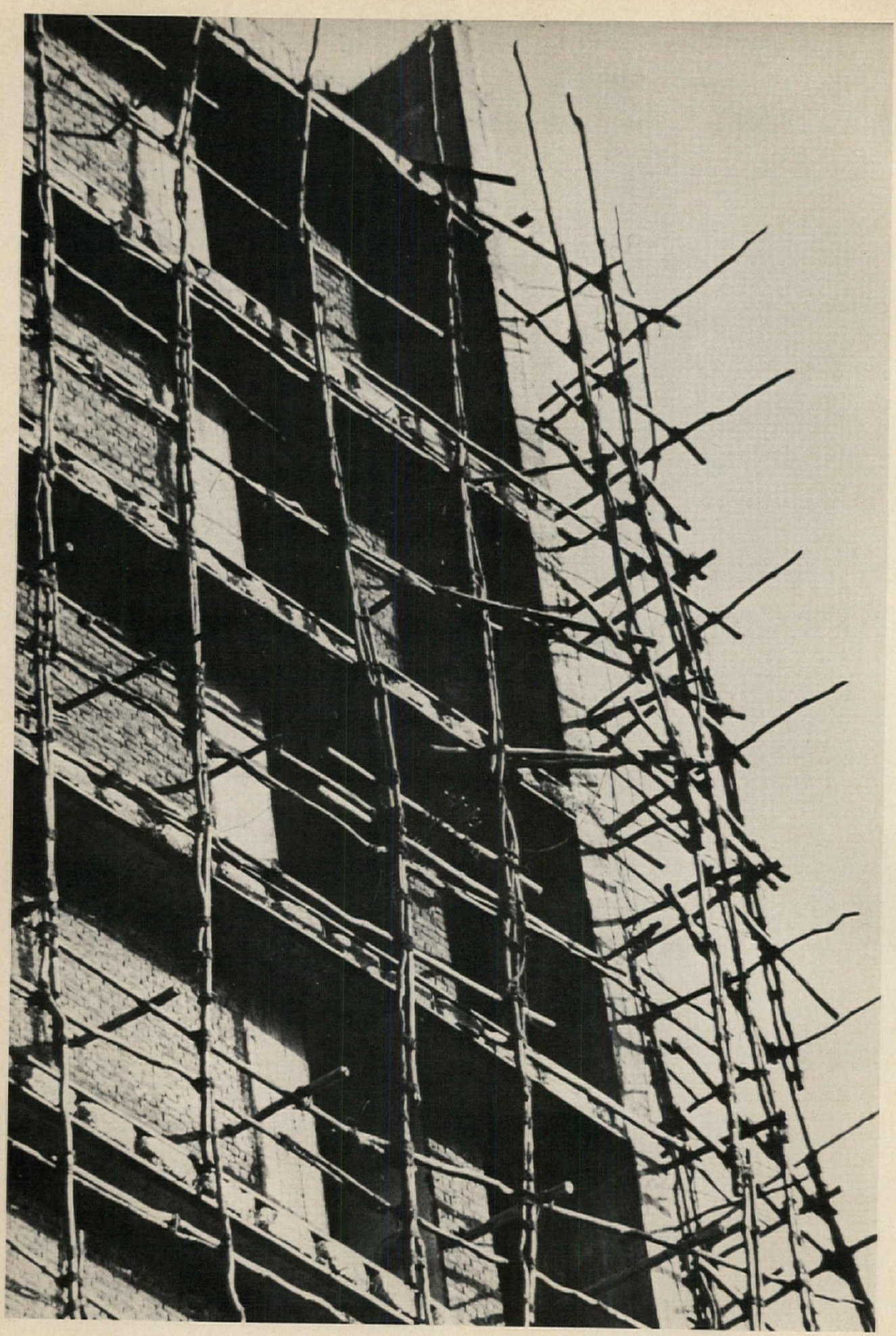
In spite of some of these frustrations, colleges and universities are increasingly finding that fast, permanent quality space for temporary, or changing, uses is a good investment in time, dollars and energy. It not only fills the gaps noted but also takes the onus off of long drawn-out facility programming. New York's State University Construction Fund, for example, has had a good deal of success with "surge" space on its Stony Brook campus: large chunks of open space providing permanent quality performance for a range of temporary uses. The fund found that it could deliver the space quickly, and let the occupants program its subdivisions later.

Several of the concerns noted above lie in the province of the architectural profession.

Effective planning for incremental space, assistance to institutions in definition of just what types of space and performance they are really looking for, client and consumer acceptance of industrialized products, assistance in defining market for this type of space, development of environmental performance documents, and proper placement of the architect's roles and responsibilities in new approaches to design/build are all in the profession's purview.

If anything at all, the survey commissioned by the AIA, AAJC and AUA reveals that temporary facilities are indeed coming into their own as key resources on our college and university campuses. Some of the forces set in motion in higher education since the initiation of the survey reinforce their significance.

It's time for colleges and architects alike to recognize the legitimacy of the kind of fast, incremental permanent quality space portrayed in the survey—and to work to best provide it. □



THE PROBLEMS and PROSPECTS OF INDIAN ARCHITECTURE

by ALLEN M. KRATHEN

India's fame for inspirational achievements in historical architecture is long-standing. In recent years, however, a bold commitment to imaginative contemporary design has become apparent. Given the rigors of an Indian setting, this is no mean accomplishment. Concurrently, a corps of professional architects is emerging whose efforts, in spite of constraints, demonstrate a coming of age for Indian architecture in this century.

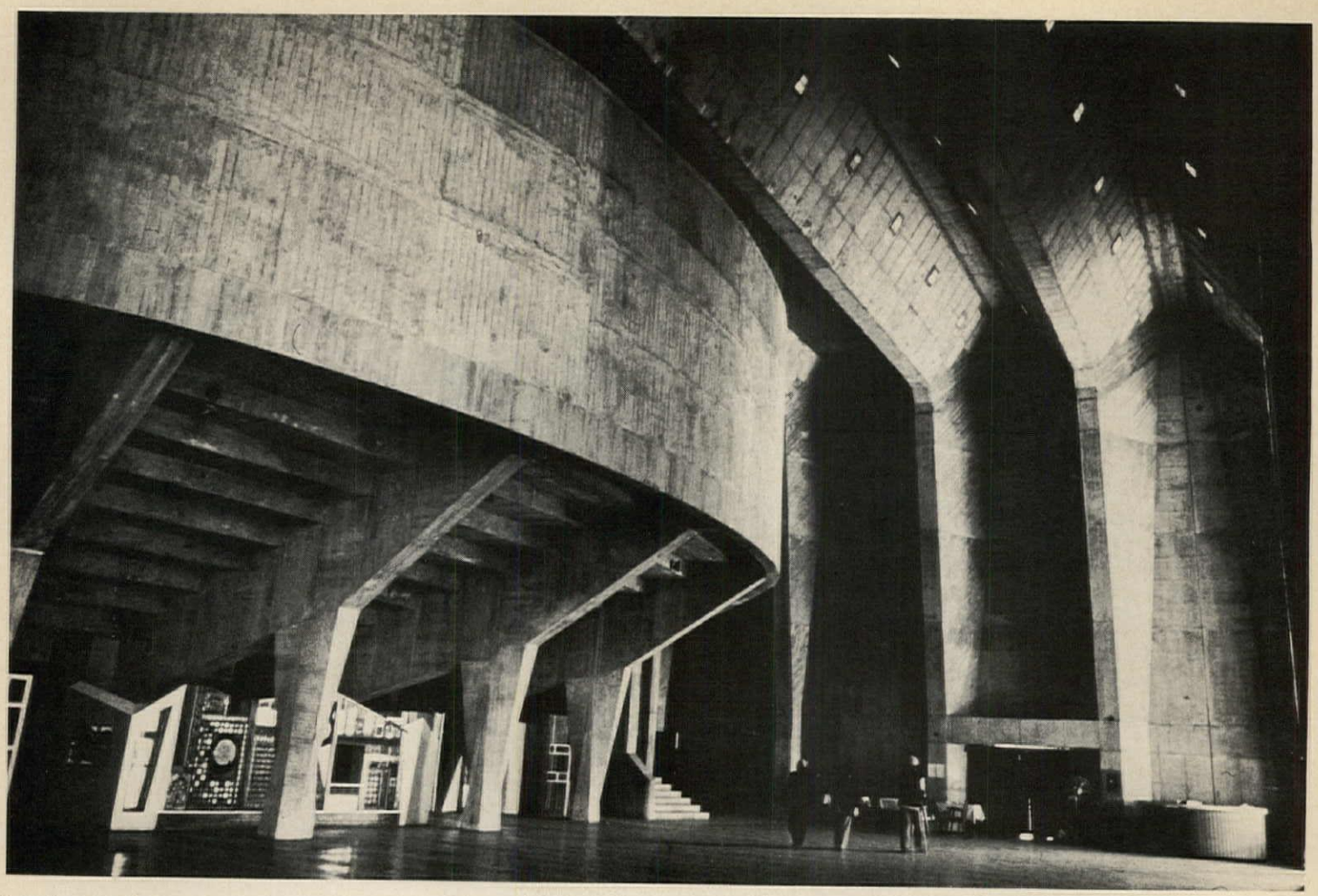
The term "Indian" architecture to most Westerners tends to evoke a somewhat restricted though deservedly reputable range of associations, with Shah Jahan's 16th century Taj Mahal by far the most popularized example. And, at least for architects and planners, Le Corbusier's decidedly 20th century Chandigarh remains an indelible favorite.

As is more than apparent to any wide-eyed Westerner who has mustered enough nerve to become immersed for a time in that truly exotic culture, however, Indian architecture brings to mind a good deal more than such shortsighted first impressions suggest. It is in India today that we find a new self-conscious commitment to contemporary architectural design. The efforts of an emergent corps of architects to establish a professional validity for themselves and for the benefit of Indian society in general deserve commendation, particularly during this critical period of cultural transition from colonial to sovereign status. Most of this recent generation of practitioners have been struggling to come to grips with a rich esthetic heritage, while recognizing the necessity for securing a foothold in the precarious mire of Indian social and technological constraints—a situation to which they must adapt themselves in every sense if they are to survive as a profession.

The development of Chandigarh as a planned new town and capital of the Punjab naturally had an impact on Indian architecture which was, and probably still is, immeasurable. Before its building, architecture as a professional activity in India had been merely embryonic in size and achievement. Chandigarh finally stimulated its full-fledged emergence, and today much of the building demonstrates that contemporary architecture has begun to come of age there. Chandigarh not only fostered symbolic pride in a great political achievement for Indian society as a whole, but also for her architects in particular, the emotional impact of its architectural boldness titillated visions of new and dramatic concepts of form, ideals which soon proved of fundamental relevance to the self-awareness of the new profession. In addition, the sheer attainment of such a great entrepreneurial undertaking appeared to convince aspiring Indian architects that a promising future for the profession could be in the offing.

In a society not yet certain of its own architectural directions, Chandigarh had inescapable drawbacks, however. In the wrong hands it inspired a stubborn imitativeness which soon blemished the northern half of the subcontinent. Smothered in its own greatness, Chandigarh still beckons admiration, but per-

Scaffold network of saplings and rope in New Delhi (across page). Hotel, also in New Delhi (top), Shivnath Prasad. Office towers in Bombay (bottom): at left, Indian Express Building, J.A. Stein; at right, Air India Administration Building, Holabird & Root and P. Kudianavala.



haps it should do so from afar. Today the real vitality of that city emanates ironically not so much from the formal ideals of the visionary architect who created it, nor from its own relentlessly seductive esthetic power, but from the incredible juxtaposition of India's persistently ancient lifestyle pitted against the incongruous backdrop of Le Corbusier's radically surrealistic future: a sad and futile interminable battle.

The Professional Image

A look at the distinctive context in which architects must function in India today is essential to an understanding of the position of the profession and its future. That immense web of bureaucratic inefficiency pervading all aspects of architectural practice in India (as it does in almost everything else) is familiar enough. Indeed it is a common affliction of developing countries in general. Perhaps the most frustrating and incapacitating of constraints plaguing practice in India, however, is the absence of a clearly defined image of the profession within the public consciousness. Though this problem besets architects elsewhere, in India it exists as a severe and predominant restraint upon practice. On one level this becomes manifest in a low volume of available work simply because there is so little awareness as to what constitutes the proper domain of the professional architect. Among the consequences are low professional fees and little attendant social standing.

Such widespread cultural neglect for architecture as a professional activity has its roots in history. British imperial rule, especially during its last agonizing decades, afforded civil engineers a virtual monopoly of construction projects, from bridges to buildings. Only during the last decades of British India could architects finally make their presence felt by an increasing share of building construction, though even then in meager measure. Their projects tended to be restricted to those important buildings symbolic of imperial rule, including the gothicized university buildings at Bombay and Madras, as well as Lutyens' masterful work on the new capitol at Delhi. Thus it is civil engineering as a profession and not architecture which today enjoys a degree of public recognition more defined, prestigious and financially rewarding than its sorely neglected sister profession.

Indian architects, however, have begun to retaliate. Their most effective method so far in combating the public apathy which lay at the root of their malaise has been through professional consolidation: The Indian Institute of Architects was born shortly after independence in 1947. This organization is helping to endow architectural practice in India with a degree of social and political strength as well as a concomitant level of pride and self-confidence.

In order to help create a better professional image, the IIA has proposed a measure in Parliament at Delhi calling for nationwide registration of all architects—an unprecedented and radical move designed to bolster the position of Indian architecture as a profession by legally defining its range of tasks and responsibilities, thereby protecting the title "architect" from the all too liberal interpretations given it by Indian engineers. Predictably, a bitter controversy between architects and engineers has ensued.

Engineers are responding defensively, for the most part, fearing that mandatory registration as defined by the IIA means jeopardizing their own professional survival, at least in its tradi-

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Mr. Krathen, presently a Ph.D. candidate in architecture at Princeton University, recently participated in a program of architectural internship in India sponsored by the University of California at Berkeley.

tional role. Most Western architects may find it a bit difficult to sympathize with such concerns, perhaps because the notion of interprofessional cooperation has become so cherished an ideal. In architecture as in politics, however, India develops in manners and changes at rates which are necessarily dissimilar from ours.

Foremost among the tasks preoccupying Indian architects is the critical need for adequate housing, primarily for those destitute masses who emigrated to the urban centers in the political wake of independence. The influx, though rooted in economic causes, continues today with little sign of amelioration. The pervasive and stabilizing social patterns of the typical Indian village immediately disintegrate in the urban milieu, which further aggravates the already disconcerting physical estrangement of city life that greets the rural refugee.

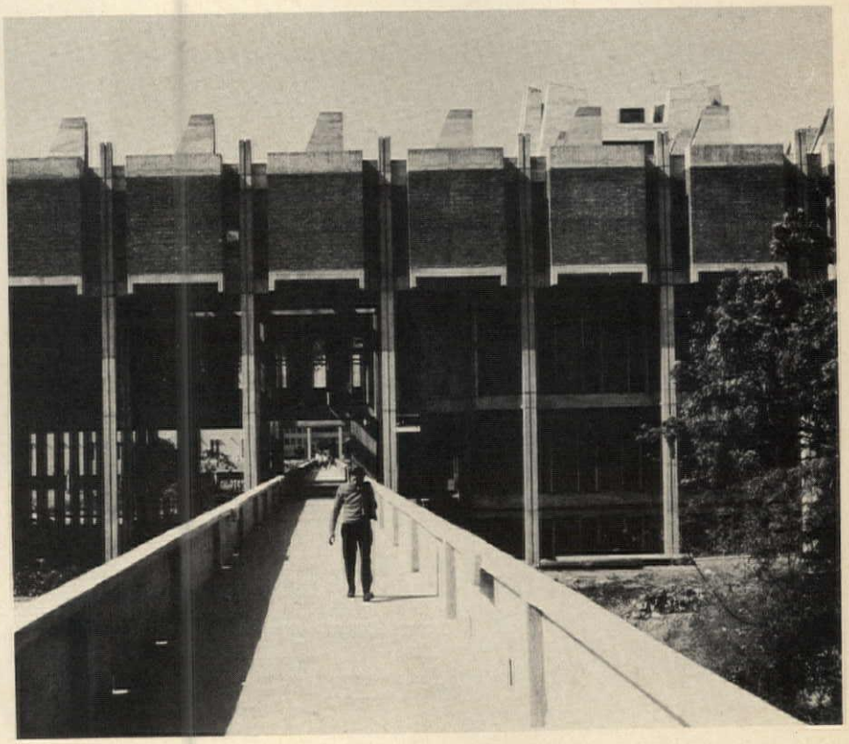
Materially, at least, middle income families are better off. Sprawling residential neighborhoods grew atop the semiurban landscapes, especially in the New Delhi region. They appear as little more than complicated networks of low density, middle class communities called "colonies." Such environments lack physical coherence and ominously resemble the sprawling subdivisions of recent decades in the West. Disorienting to inhabitant and visitor alike, such communities are generally too far removed and inaccessible from commercial centers to be practical. They appear, especially in Delhi, on the verge of becoming swallowed by the very degeneracies of the older city which they were designed to avoid.

Architects claim that a series of related factors deserve attention if any ambitious housing program is to be implemented effectively. Among these is the need for the coordinated teamwork of architects, contractors and municipal authorities who together would function as development groups and thereby prove more effective in overcoming the vagaries and corruption stemming from the lack of rational uniform building codes. Architects are also convinced of the necessity for municipal authorities to conceive of housing on long- rather than short-term bases. A final factor is the need for integrating design and production. In India, as in other developing countries, architects feel that a sensible design approach is one that effectively utilizes the limited technological resources at home while shunning the importation of costly and inappropriate models and techniques.

An awareness of the complexities inherent in contemporary architectural practice, especially in a land seeking rapidly to industrialize itself, has led the architects to a greater recognition of the need for research, and primarily that which may be relevant to practical implementation. Necessarily high on the list is research in climatology, an area of critical importance in any tropical land. Architects also sense the need for a nationwide information pool and urge that it be established as a professional agency which could function as a repository and distribution center for the mutual benefit of practicing architects throughout the country. Finally, one particularly utopian ideal is reflected in the periodic lip service that the architects all too readily give to the chronic need for expanding architectural practice into rural India. There are few volunteers at the present, however, if only for the reason that most architects find themselves irretrievably wedded culturally and economically to major urban centers.

Practice and Construction

The most significant factor affecting design efficiency among Indian architects is the frequent lack of a clearly stated and rationally formulated architectural *program*, largely a consequence of the amorphous public image of the profession. Clients tend to



Foyer in the Tagore amphitheater, Ahmedabad (across page), B. V. Doshi. Meditative space (above), Gandhi Bhawan, Charles Correa. Library and elevated walkway (right), Indian Institute of Technology, Kanpur, A. P. Kanvinde and S. Rai.

remain disinterested in functional demands and space requirements, thus voiding the possibility of a facilitative link between program and design. Often, therefore, Indian architects must operate in creative vacuums. Having little choice but to proceed with preliminary designs based upon hypothetical questions, their designs are consequently subject to drastic and often fatal revision at late stages in the design process.

Among the most patently obvious of difficulties confronting construction practices in India is a widespread neglect for carefully drawn detailing on the part of designers, often worsened by a slovenly disregard on the part of workmen. Such an anomaly is particularly startling in light of the exquisite workmanship and ornamentation of India's elegant palatial and religious architecture. Much of the blame for the kind of work done today must rest with both inadequately trained draftsmen and indolent site supervisors, as well as makeshift construction procedures. Workmen often find it impossible to decipher office drawings and therefore improvise solutions. Irresponsible supervisors will often short-cut specifications, sometimes imprudently altering or ignoring major structural members.

Some mention of the nature of the labor force itself is worthwhile here, if only because this aspect of construction in India remains such a distinctly visible facet of architectural practice. Undertaken by vast groups of unskilled migratory villagers construction sites everywhere abound with entire families swarming across the apron of ground encircling the structure itself. Almost always, they are nomads who have fled famine-ravaged villages in determined effort to seek out the relative economic sanctuaries of the burgeoning cities. Commonplace sights are ill-fed but brightly clad laborers precariously straddling the heights of flimsy looking scaffolds and young women burdened with a dozen bricks atop their heads—sights which in a sense reflect a somewhat dubious architectural resource.

A restricted range of materials and a far less industrialized construction technology than is known in the West are further constraints. Materials commonly used, and also fairly traditional, are brick, quarried stone and plaster. Of the newer materials, concrete is by far the most ubiquitous, enormously popularized at Chandigarh but used much earlier in British India. In the humid south, concrete is frequently coated with a pigmented stucco, often in candy-toned pastels. In the north, where it is sunnier and drier, concrete is generally left exposed or combined with brick to become, in Louis Kahn's sense, a "composite" order. In either case, its chief drawbacks include poor resistance to harsh climatic extremes, particularly on the northern plains. As a result of substandard mixes, concrete work often rapidly deteriorates. Unsightly flaking and cracking exist everywhere, even at Chandigarh. The advantages of concrete, however, far outweigh such relatively minor annoyances.

Though the use of steel in concrete reinforcing systems is widespread, steel frame construction in itself is virtually unknown. Its increasing availability as an architectural material, however, is an obvious credit to the steady industrialization programs of the government's various development plans. Most middle income housing and nearly all office towers under construction rely upon concrete framing systems. The clumsiness in so much of this work shows that steel is still a luxury.

The importance of appropriate architectural responses to climate in a land such as India can hardly be overstated, especially insofar as it dominates design considerations in the glaring, wind-blown world of north India. Architects bemoan the impossibility of designing optimally for all climatic extremes. Mechanical control systems are generally unreliable and prohibitively expensive. The only recourse is to effect an architectural compromise relying upon ingenuity and creative imagination.

Overhangs, breezeways and screening devices predominate. Sometimes the results make for fresh and expressive architectural solutions, but often there are tasteless contrivances and hackneyed gimmickry. In urban areas, an indiscriminate proliferation of facile cantilevers or insipid perforated block walls too often sets the standard for a typical housescape. In north India, however, a more welcome byproduct of climatic determinancy stems from the summer heat lag of concrete houses. Domestic designs invariably include rooftop sleeping terraces, a traditionally Indian fetish but one which nevertheless invests the urban scene with a physical unity in the best vernacular tradition.

A National Approach

Some recent achievements in design would support an optimistic appraisal of India's architectural prospects. Different approaches to contemporary design often arise in those areas of the world culturally and geographically disparate from one another —lands which have long known richly unique cultural traditions.

In this respect, it is not unreasonable to assume that distinctive national personalities might foster different architectural identities beyond what we might attribute to mere "style." India, after all, remains a single political entity of over half a billion people, largely united in religion, culture and geography.

Apart from climatic considerations, highly significant characteristics of much recent Indian architecture consist in an exaggerated articulation of major circulation patterns and elements, often an unabashed use of color and an explosive comingling of interior and exterior space, something dramatically evident in rhythmic sequences of deep, cavernous enclosures. This last aspect, an unusually characteristic element in the imagery of recent architecture, originates not simply with Le Corbusier but extends well beyond to those enduring ideals perpetuated in the ceremonial character of the traditional Hindu temple as well as in the medieval Moghul palace or fortress.

Much recent architecture in India demonstrates a tendency to endow functional requirements with a high degree of spatial import, sometimes manifested in a purposefully ambiguous mixture of primary and secondary activity requirements, wherein highly defined networks of subspaces are governed by loosely controlled spatial envelopes. Mere function thus becomes a statement of high drama.

Stairwell and elevator shaft, Ministry of Irrigation, New Delhi (across page), Shivnath Prasad. Administration Building, Indian Institute of Technology, Bombay (below). Central Public Works Department.

The malleable and structural potential of concrete is commonly exploited as an eloquent container for such expressive concerns, often managing to transcend the mere physical envelope so as to become kinetic statements of vibrant plasticity. A deliberate, almost exhibitionistic, sense of monumentality in form—at its best in concrete—characterizes this work: a dual system of solid form reacting contentiously with those dark, gaping voids it desperately strives to contain.

Those architects who knowingly, or otherwise, embroider their work with such characteristics hold forth great promise for a genuinely Indian approach to contemporary architectural design. Rather than negating the meaningful legacies of Le Corbusier and Internationalism on the whole, they manage instead to graciously exploit the basic premises of these traditions in a manner which becomes their own and contributes to a collective identity. To a degree, the work of such architects is localized at Bombay, Delhi and especially at Ahmedabad.

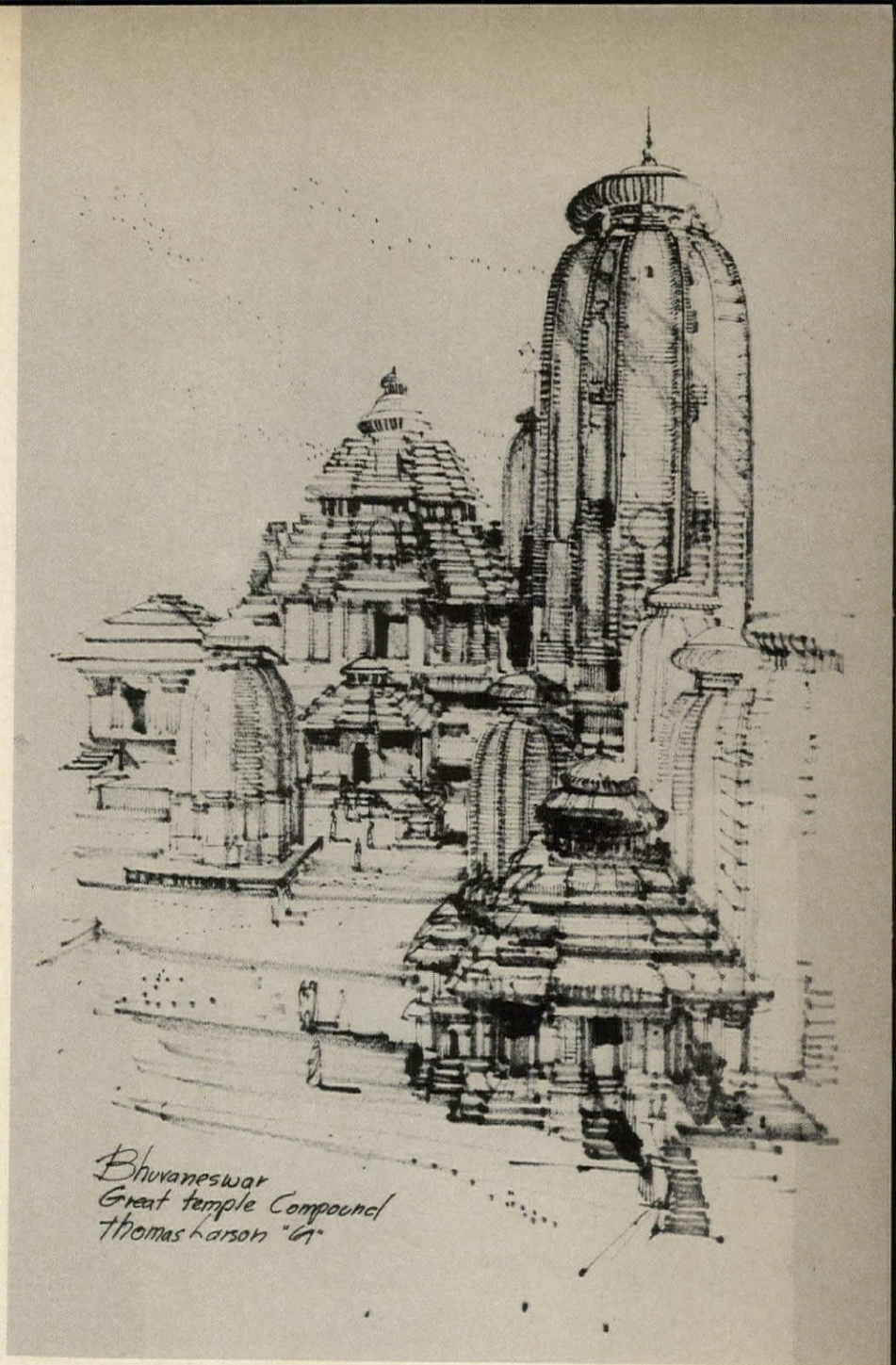
Indian Architecture and Culture

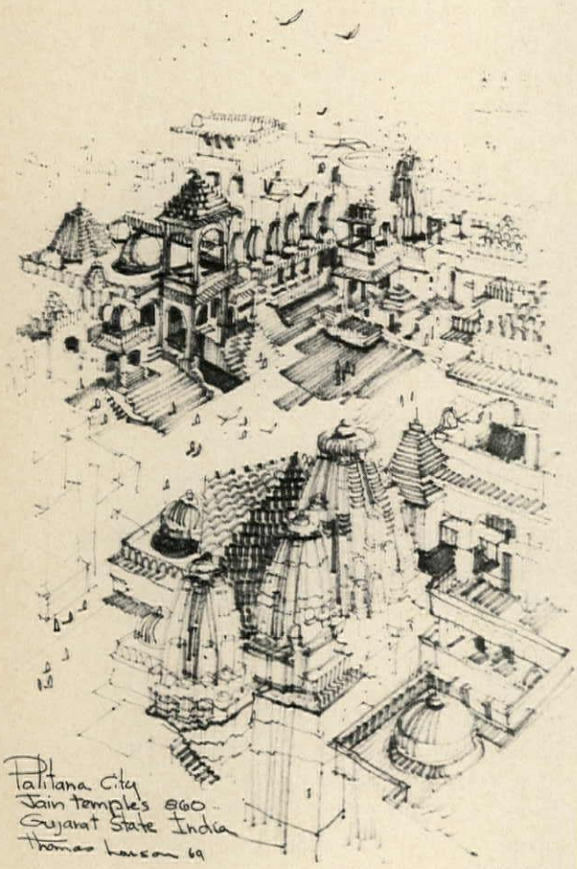
What ultimately matters to many architects is the meaning that their work can hold for the culture it necessarily reflects: an architectural *esprit* which in India at least evokes a poetic resonance with the very fiber of her civilization, its deeply rooted past and its changing present. Derivative origins and influences aside, what is crucial to any national approach in architecture is a set of ideals consistently and extensively practiced by that country's architects—ideals which when seen in their proper context claim an inherent validity and logic all their own. As thoughtful responses to social demands alone, much of the recent work is already, in a programmatic sense, "Indian" in character, if only because any worthwhile architecture must share in the lifestyle of the land. Indeed the vast physical and programmatic scale of so much building in India and the elaborate collective commitment so important in producing it cannot but inspire architects in lands more technologically and economically fortunate.

E.M. Forster in his classic tale of British India, *A Passage to India,* abstracts from the richness of that truly exotic, and at times bizarre, culture, a generalized but distinctive personality. He delineates this impression in his book as largely consisting of a tenuous equilibrium between brutal sensualism on one level and a penetrating spiritualism on the other. It is easy enough to share in his assessment: associations perhaps typified by a mysteriously silent temple interior reeking of incense, a sacred place, yet engulfed in the secular chaos just outside. "How can the mind take hold of such a country?" laments Forster. "She is not a promise, only an appeal . . . a civilization which the West can disturb but will never acquire."

Though so many centuries apart, Shah Jahan and Le Corbusier together seem to exemplify such antagonistic yet complementary traditions and appear to mirror Forster's view of India: the contemplative spirit of the Taj for one; the emotional power of the Secretariat for another—each its own testament to parallel currents in a civilization unalterably distinct from our own.

Today, we find a number of imaginative architects synthesizing such contradictory ideals into superbly artful expressions of an often contradictory culture. Taken collectively, these works represent a hybridized achievement of great significance—tectonic creations saturated with both an earthy drama and a transcendental melancholy, qualities which only together begin to capture the enigmatic essence of what is India. □


Bhuvaneswar
Great temple Compound
thomas larson "69


Palitana City
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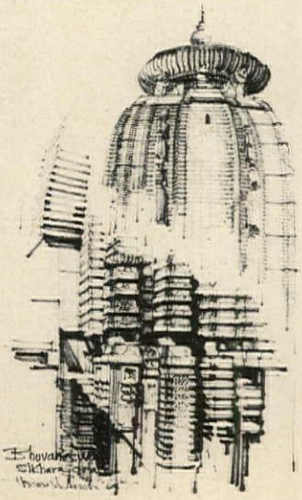
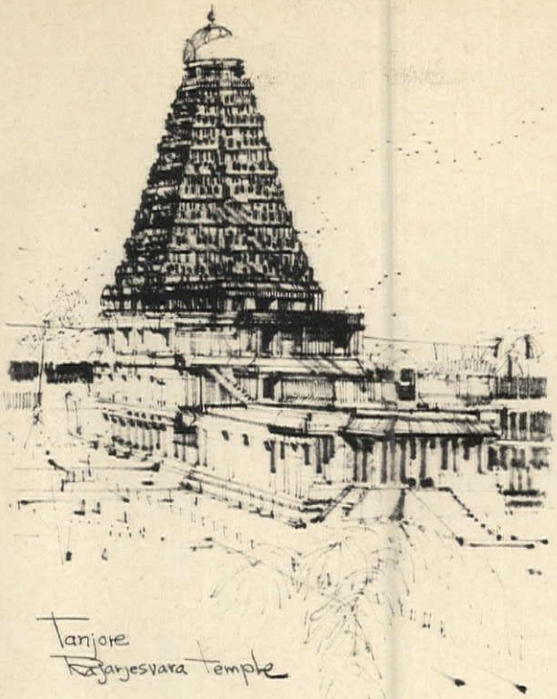
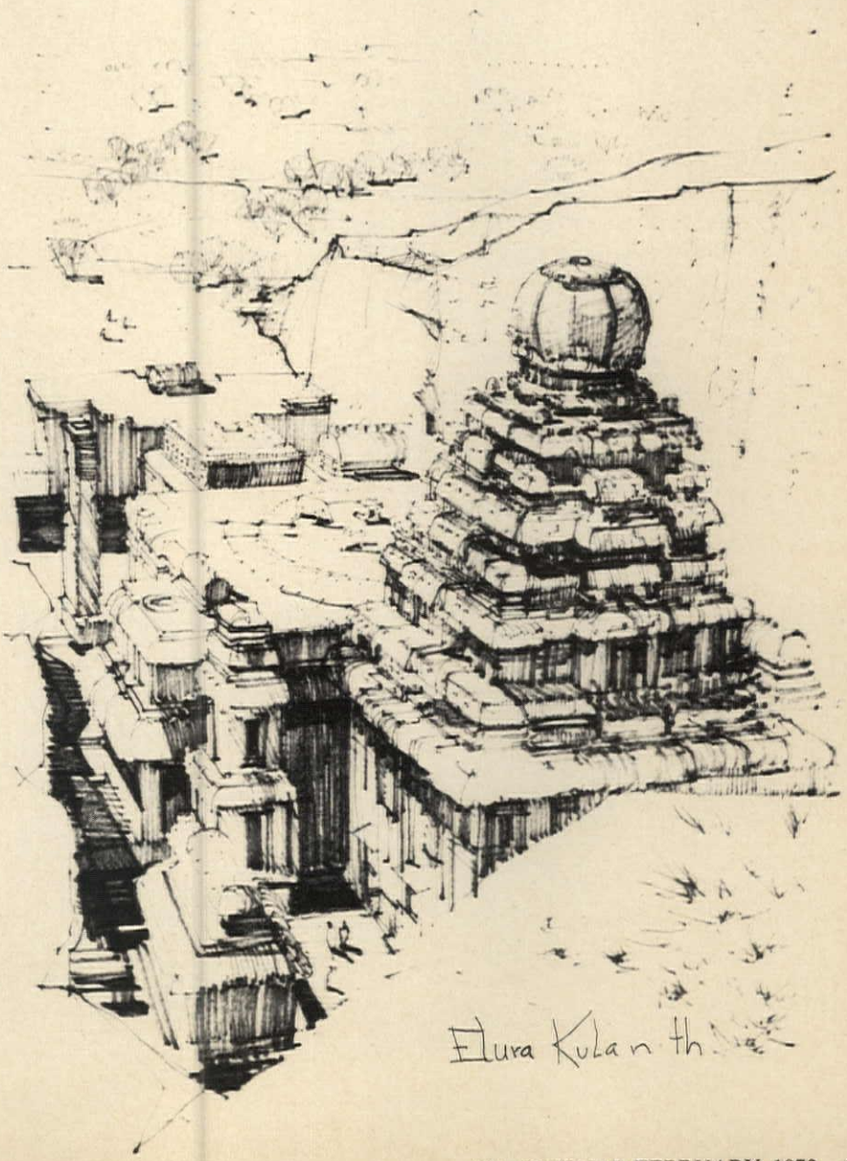




A Glimpse of Old India

A recipient of the Rome Prize Fellowship for two years and winner of The American Institute of Architects and Rotch traveling scholarships, Thomas N. Larson visited India, that land of beauty and mystery, drawing as he went. He was among the first tourists into Jundagarth when this Mecca for Jainists opened to nonbelievers in 1964. He is now associated with The Architects Collaborative in Boston. Examples of his work are shown here which offer insights into India's architectural heritage.



Structural systems have come on the scene recently which are the results of higher strength steels and the 1969 steel specification. Some of them, including the staggered truss system, and the effect of modifications in the specification, are explored here.

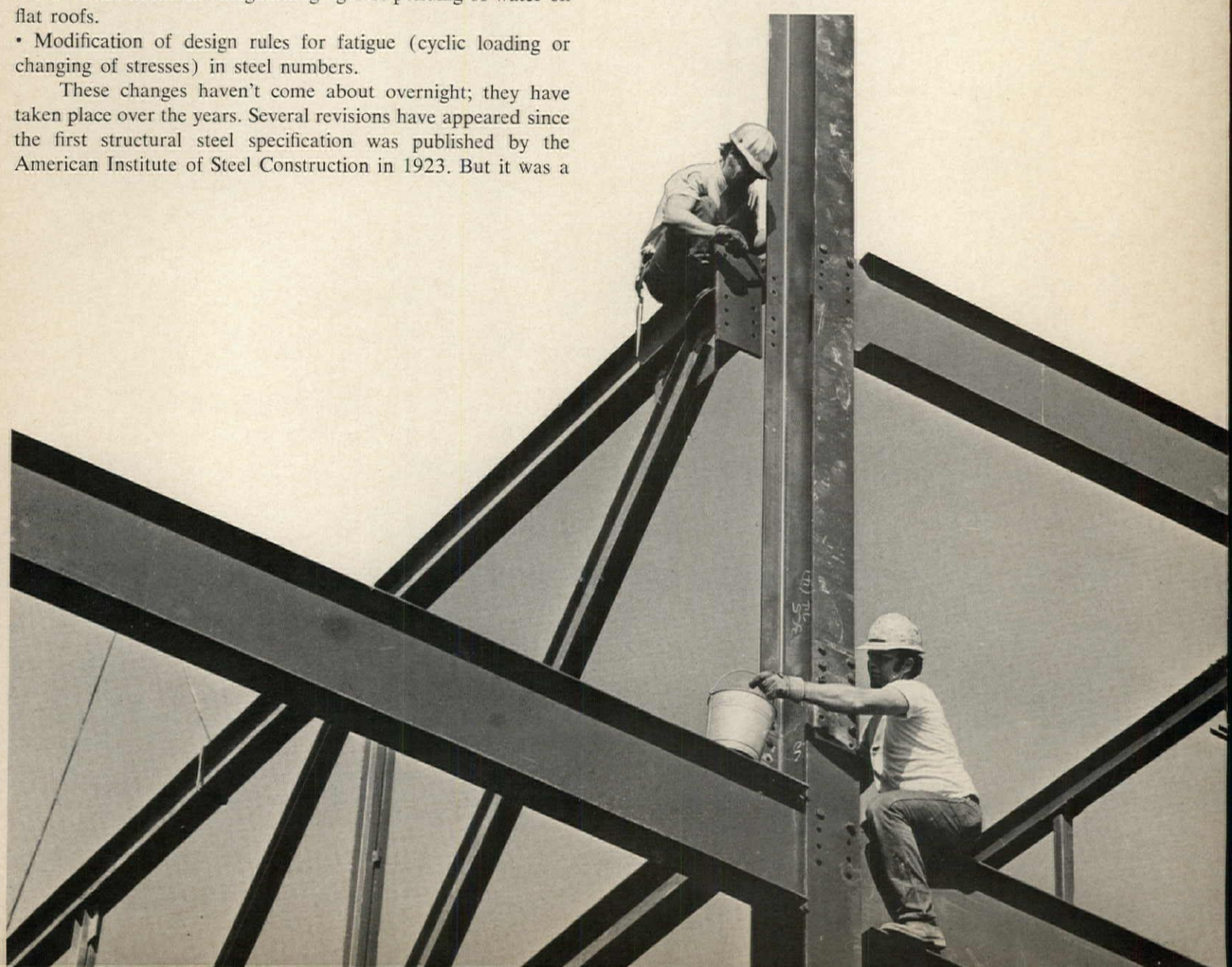
NEW HORIZONS IN STRUCTURAL STEEL

by GORDON D. FRIEDLANDER

Salient changes appear in the 1969 *Specification for the Design Fabrication and Erection of Structural Steel for Buildings* which add up to greater freedom of architectural expression but which only now are beginning to show a real impact. The seven most important of these changes or additions are:

- Increase in allowable stresses fo fillet welds.
- Updating of plastic design provisions to make them applicable to steels to 65 ksi yield strength, and the extension of plastic design rules to include braced multistory structures, reducing the amount of steel necessary.
- Provisions for the design of hybrid beams and girders, i.e., a single web beam or girder whose flanges are made of considerably stronger steel than that used in the web, important in solving such problems as spanning over large spaces for auditoriums, theaters, sports arenas, etc.
- Inclusion of rules for the use of composite design in negative moment areas. This will result in shallower floor construction depth for buildings which require long spans and heavy loads such as warehouses, office buildings and parking decks.
- Increase in the permissible distance between points of lateral support for box girders, which may now be designed for considerably longer spans.
- New rules to afford safeguarding against ponding of water on flat roofs.
- Modification of design rules for fatigue (cyclic loading or changing of stresses) in steel numbers.

These changes haven't come about overnight; they have taken place over the years. Several revisions have appeared since the first structural steel specification was published by the American Institute of Steel Construction in 1923. But it was a



fundamental revision in 1961 that paved the way for subsequent breakthroughs in '63 and '69. The '61 changes permitted the use of higher grades of steel, with yield strengths ranging from 32,000 to 50,000 psi. It also covered improvements in welding electrodes and in the materials used in various connectors. A high-strength grade of rivet steel was added along with two grades of high-strength bolts.

The changes in 1969, comprising the latest revision to the specification, were motivated primarily by the introduction of several new grades of structural steel by the American Society for Testing and Materials. These have yield strengths ranging from 36 to 100 ksi. The new edition is the work of a 35-man committee of structural engineers, architects, researchers, educators, metallurgists and experts on welding, riveting and high-strength bolting.

The higher-strength steel has given the architect the design latitude and prerogative of reducing the number and size of required interior columns, which makes it easier to meet the increasingly prevalent requirement of clear floor space in office or institutional construction.

The new lighter weight structural steel, with its high strength-to-weight ratio, means a minimum dead load for a building's foundation. This can be a major consideration, especially when soil bearing conditions are poor. Also, light steel-framed buildings have the advantage that earthquake forces transmitted from the foundations are smaller than those in heavier types of construction. This is because the magnitude of seismic forces acting on a structure is proportional to the weight and stiffness of the structure itself.

Although recognized in bridge design for many years, the composite construction system made its debut for structural framing applications in buildings with the 1961 revision. Its benefits include:

- Reduction in girder depth.
- Increased section intertia of composite framing into the column reduces the effective length of the column to permit the use of a lighter column. The increased stiffness also reduces the total building drift due to lateral (wind) loads.

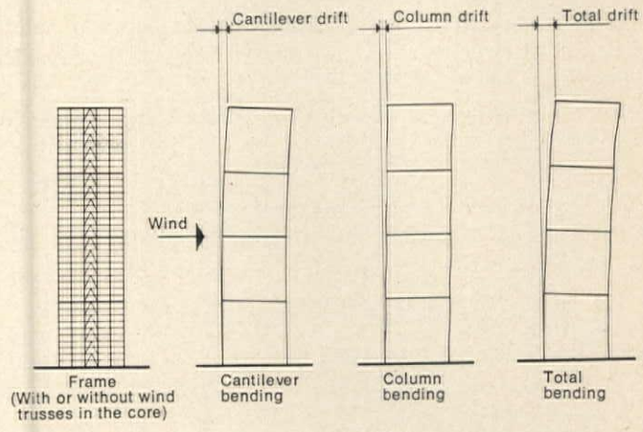
In the 45-story office building shown in Figure 1, approximately 30 feet of total building height was saved by use of composite construction. Thus the typical story height is only 11 feet 6 inches, as compared with 12 feet 2 inches required in conventional framing. This led to a substantial cost savings for all vertical components, exterior walls and risers. The lower building height resulted in a reduction of the total wind load on the structure. Also, the higher moment of inertia of the composite girders and consequent reduction in total drift afforded additional savings in the cost of steel.

Another recent design innovation is the tube concept, shown in Figures 2 and 3. This was first applied in Chicago's John Hancock Center (Skidmore, Owings & Merrill), New York City's World Trade Center (Minoru Yamasaki & Associates; associated architects, Emery Roth & Sons) and in some smaller buildings. Actually the concept itself is not new. The applicable general theory and analysis were well known to many structural engineers. Existing shop fabrication and field erection techniques have been and are available for this type of construction.

The conventional highrise building comprises layers of floors vertically cantilevered from the foundation, as shown in

Thirty feet of total building height is saved by using composite steel/concrete in this office building. Emery Roth & Sons.

Figure 1



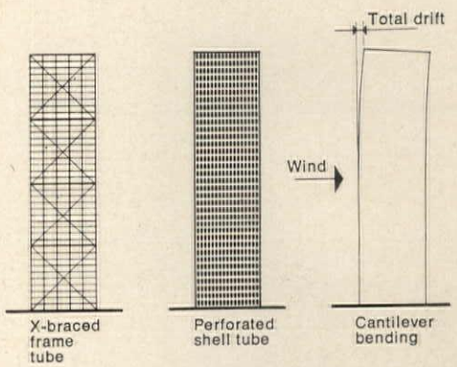
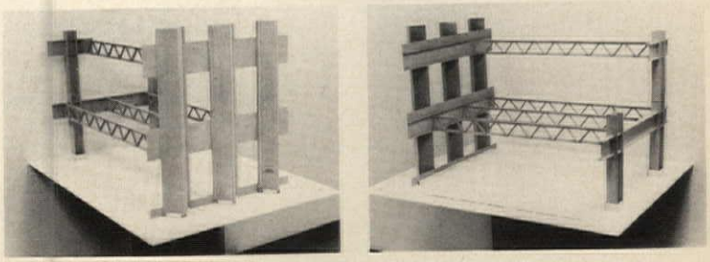


Figure 2

The effect of cantilever and column drift is shown in conventional structures (top) and in the new tube concept (bottom).

Figure 3



Use of steel shell walls eliminates exterior bracing members. Edward Durell Stone & Associates and Perkins & Will Partnership.

Mr. Friedlander, a structural engineer, is senior staff writer for *IEEE Spectrum*, core publication of the Institute of Electrical and Electronics Engineers, and has contributed to many other periodicals.

Figure 2. The superstructure is subject to lateral wind loads which must be transmitted to the foundation. In the case of seismic forces, it is just the opposite, with lateral forces applied to the foundation and transmitted to the superstructure. In addition to the lateral loads, the vertical live and dead loads are also carried down to the foundations. Thus the conventional structures are designed as frames consisting of columns arranged in a grid system plus beams and girders spanning between columns to support a membrane that forms each floor level. The frames resist the lateral forces by combinations of girder-to-column moment connections, vertical trusses within the structure's core or various types of X-, K- or knee (portal) bracing.

The left-hand elevation diagram of the tube concept shown in Figure 2 is an X-braced tube similar to that employed in Chicago's 100-story Hancock tower. Here the X-bracing in the four sides of the perimeter frame causes the entire tower to react under lateral load in a manner that is analogous to a vertically cantilevered hollow tube. The diagonal bracing carries a portion of the vertical loads; the horizontal component of the gravity loads in the sloping exterior columns (not shown in the diagram) greatly reduces the size of members needed for bracing against lateral loads. The average weight of the structural steel was about 29 psf in this 100-story frame, which is about the same average weight of steel in 30- to 50-story conventionally framed buildings.

A notable departure from the X-bracing system is shown in Figure 2 in the perforated shell tube concept and in the Figure 3 study model for the 89-story Standard Oil Company of Indiana office building now being erected in the Chicago area. This modification involves the development of a "real tube" by eliminating the exterior bracing members and using a steel shell wall instead. The shells are relatively thin and are fabricated from rolled steel plates. Instead of using heavy columns, wall spandrels and bracing members, the V-section steel shells are distributed continuously around the building's perimeter. The shells are mass fabricated in floor-to-floor subassemblies in the struc-

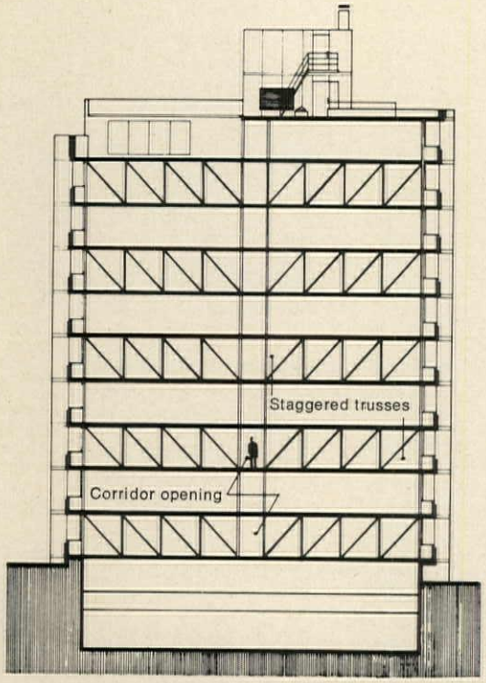
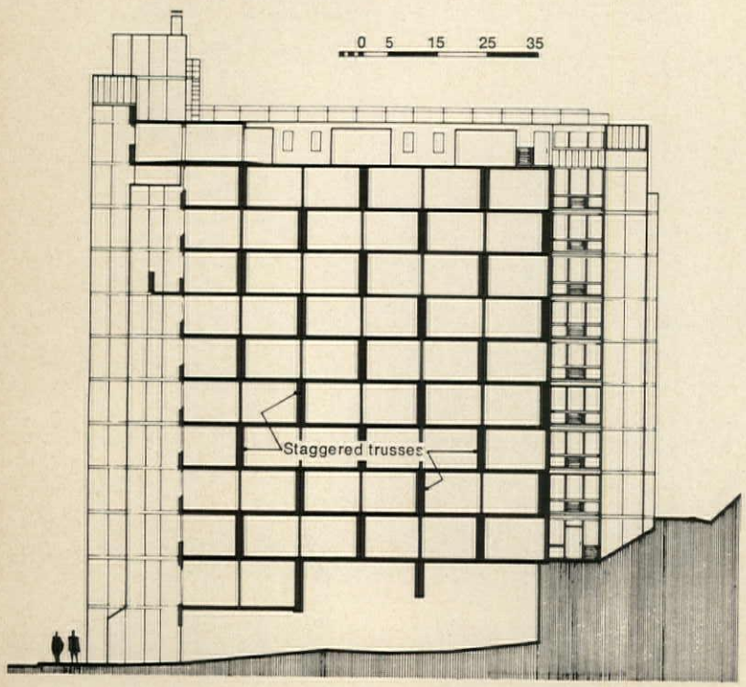


Figure 4 TRANSVERSE SECTION



LONGITUDINAL SECTION

An apartment building for senior citizens, 1880 Pine Street in San Francisco, is said to be the first structure to make use of the staggered truss system on the West Coast in an area requiring seismic design. Chan/Rader & Associates. Story-high trusses on 25-foot centers extend across the width of the building and are staggered in plan to provide a 12-foot 6-inch module on each floor between the top chord of one truss and the bottom chord of the adjacent truss on the floor above. The trusses are supported by concrete encased steel column sections. The column bases are set on the top of the foundation walls at the third-floor elevation. The trusses are designed to carry the gravity dead and live loads on each floor. The wind and seismic lateral loads in both directions are transmitted through the composite steel and concrete floors to reinforced concrete shear walls in the stair and elevator tower sections in the front and rear of the building. Typical floor framing plan is shown below.

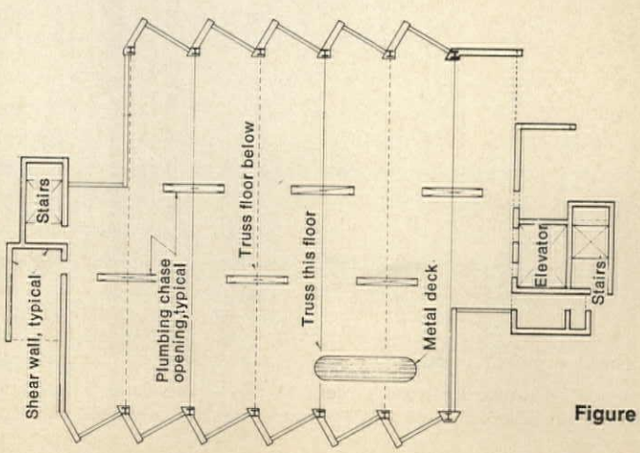


Figure 5

tural shops by means of automatic cutting and welding techniques and are joined on site by automatic welding equipment.

The loads from the floor systems will be transferred to the tubular shells and thence carried vertically and directly down to the foundations instead of by the conventional load transfer from floor to girders or spandrels and then to columns. Since the application of fireproofing, insulation and exterior finish require no auxiliary framing for support, speed of erection can be combined with greater economy by this concept.

Although architects have found structural steel to be adaptable to many shapes and forms in such diverse applications as churches, auditoriums, shopping centers, light industrial buildings, etc., many practitioners may at this point tend to snort and give way to the sentiment: "Hell, I haven't been asked to design any 89-story tubular towers lately!" How about something more modest, then, yet equally innovative, structurally sound and esthetic such as a multistory apartment building featuring the staggered truss system?

This consists of story-high trusses spanning transversely between columns at the exterior of the building and arranged in a staggered pattern, as shown in Figure 4. The floor system acts as a diaphragm, transferring lateral loads in the short direction to the trusses. Lateral loads are thereby resisted by truss diagonals and are transferred into direct loads in the columns. Therefore, the columns receive no bending moments in the transverse direction. Columns can thus be oriented so that the strong axis is available to help resist bending due to longitudinal wind forces and pressures.

The interior of the building is column free, the clear spaces defined and limited only by intersecting floor and truss planes. The trusses are typically penetrated by one rectangular opening to provide a corridor space. However, other openings can be provided in the truss to allow for door openings if required by the architectural room arrangement.

With the staggered truss system, the structural steel required for a 20-story building 240 feet long and 60 feet wide is

Figure 6

Use of the staggered truss system at 1880 Pine Street allows for a column-free 70x60-foot garage at ground level for off-street parking.

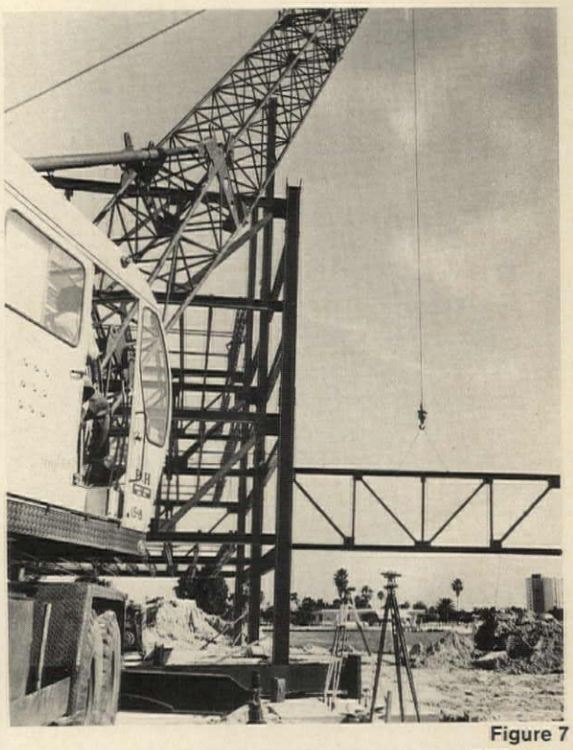
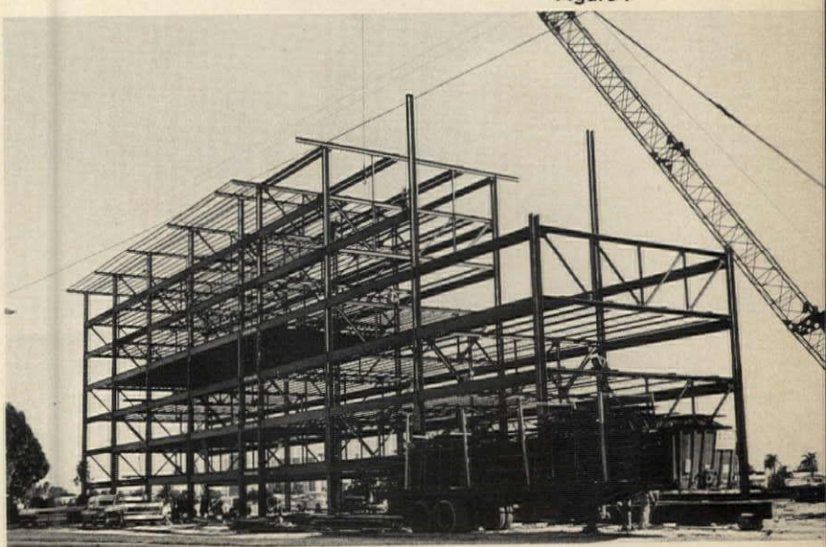


Figure 7



Trusses for the staggered truss frame of St. James Apartments in Florida are lifted into place. Edward W. Hanson. (Page 42 shows them being bolted into place.) Erection time for the eight-story frame is 12 days.

calculated to be 5.7 psf. Although it was developed specifically for apartment type units, it can be used as effectively for other highrise structures. The system was initially conceived and developed by a research team from the Departments of Architecture and Civil Engineering at the Massachusetts Institute of Technology. It was sponsored by the United States Steel Corporation.

Among buildings constructed with the staggered truss system are the St. James Apartments, Treasure Island, Florida, shown under construction in Figure 7; and the 1880 Pine Street apartments in San Francisco, a low-rent housing project for the elderly, shown in Figures 4, 5 and 6.

In the latter building, the weight per square foot including the structural steel, fireproofing, intermediate stud walls and ceilings come to about 22 pounds. For a typical bay, the total weight is about 70 psf, i.e., the steel and concrete floor system is about 48 psf.

In addition to reducing steel requirements around 20 percent, the trusses perform two important functions: They minimize wind-bracing requirements by efficiently transferring horizontal wind loads to vertical column loads, and their design can incorporate openings for corridors as well as for utilities.

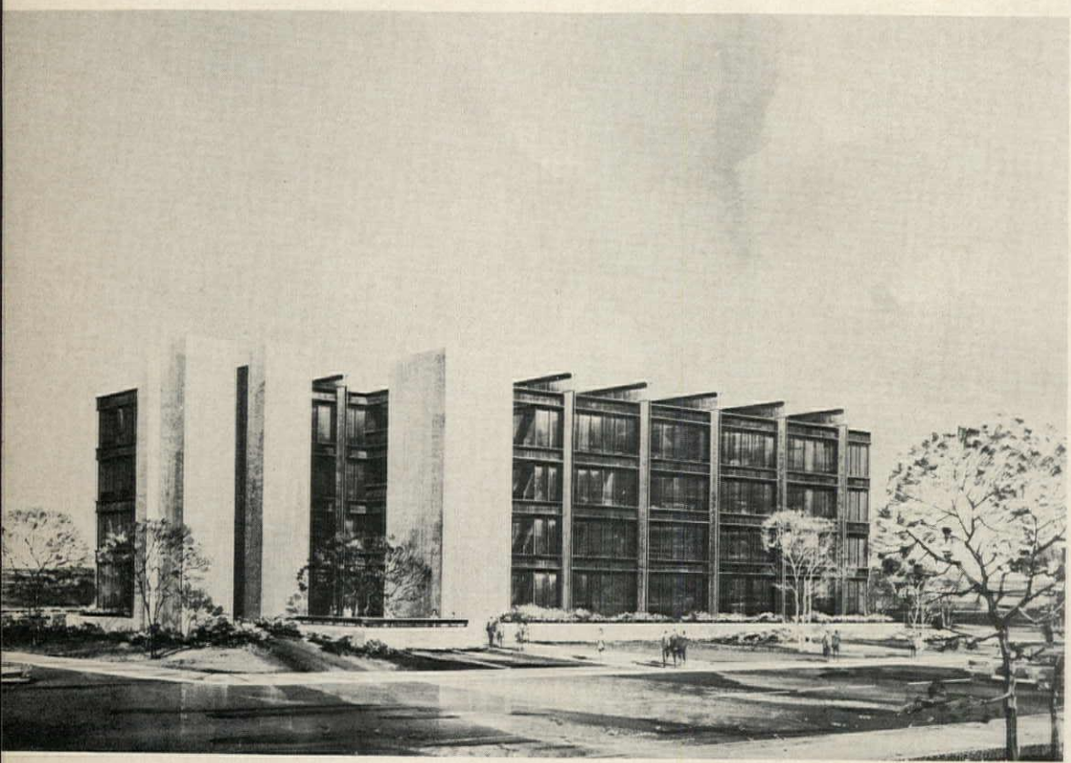
Thus the entire building frame acts analogously to a big low-pressure boiler in the event of a blaze.

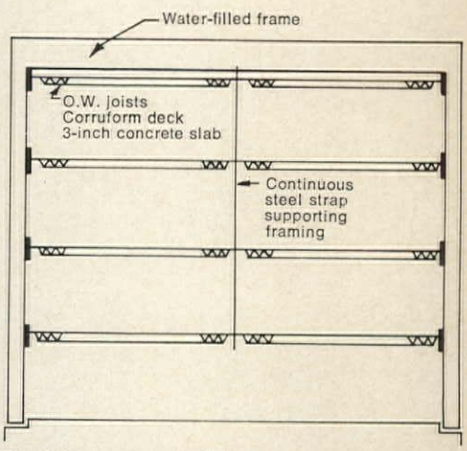
The objective of this fire protection concept is, of course, to keep the surface temperature of the exposed structural steel low enough to maintain its full strength integrity. The heat absorbed by the steel will be transferred to the water, and the heated water will be circulated by convection to cooler parts of the structural frame. The pressure relief valves ensure that the safe boiling temperature, well below 300 degrees F at 3 psi, is not exceeded.

As a new method of fireproofing, the water-filled frames and box columns is another system which is increasing in popularity. New and improved materials and methods of spray-on fire protection, free of materials considered to be hazardous to health, are now being used as an economic means of fire protecting steel framed buildings.

Both the 1963 and '69 specification refer to ponding as the retention of water caused by the deflection of flat-roofed framing. Flat-roof failures have occurred during extremely heavy rainfalls, even when the weight of the accumulated water was thought to be less than that included in the design live load.

Figure 8





The Michelson Building, a commercial structure in California, has exposed rigid-frame bents and spandrels of weathering steel. Riley, Bissell & Associates. The bents are formed of water-filled box columns and girders to provide a four-hour fire resistance rating. A typical section is shown above.

Another structural design innovation concerns water-filled frames (*see* AIA JOURNAL, Dec. '67, p. 55). Figure 8 shows a rendering and a typical cross section of the four-story Michelson Building, a commercial structure in California. The structure comprises exposed rigid-frame bents and spandrels of weathering steel, one of the notable provisions in the 1969 specification. The bents are formed of water-filled box columns and girders to provide a four-hour fire resistance rating and are filled with water to a level of 6 inches below the top of the roof girders. The box sections in each frame are interconnected to permit water flow between the girder and columns. Further, the bents are cross-connected with pipes at grade and roof levels to allow hydraulic flow between them. A pressure relief valve set to blow at 3 psi on each girder permits evaporation in the event of fire.

The amount of accumulated water depends, of course, on the flexibility of the framing. If the framing lacks sufficient stiffness, the weight of the ponded water may collapse the roof. The commentary on the 1969 specification contains special aides which make it relatively easy to design primary and secondary roof members for the necessary elastic bending stiffness to resist ponding.

Successive revisions of the AISC specification will show further progress in the versatility of steel. For instance, heat treated carbon grade steel with a 160,000 psi yield is just around the corner. Young architects are fortunate indeed to be entering the profession at one of the most exciting periods in its history, an era which offers the widest range of materials and systems for enduring design and construction of buildings of all types. □

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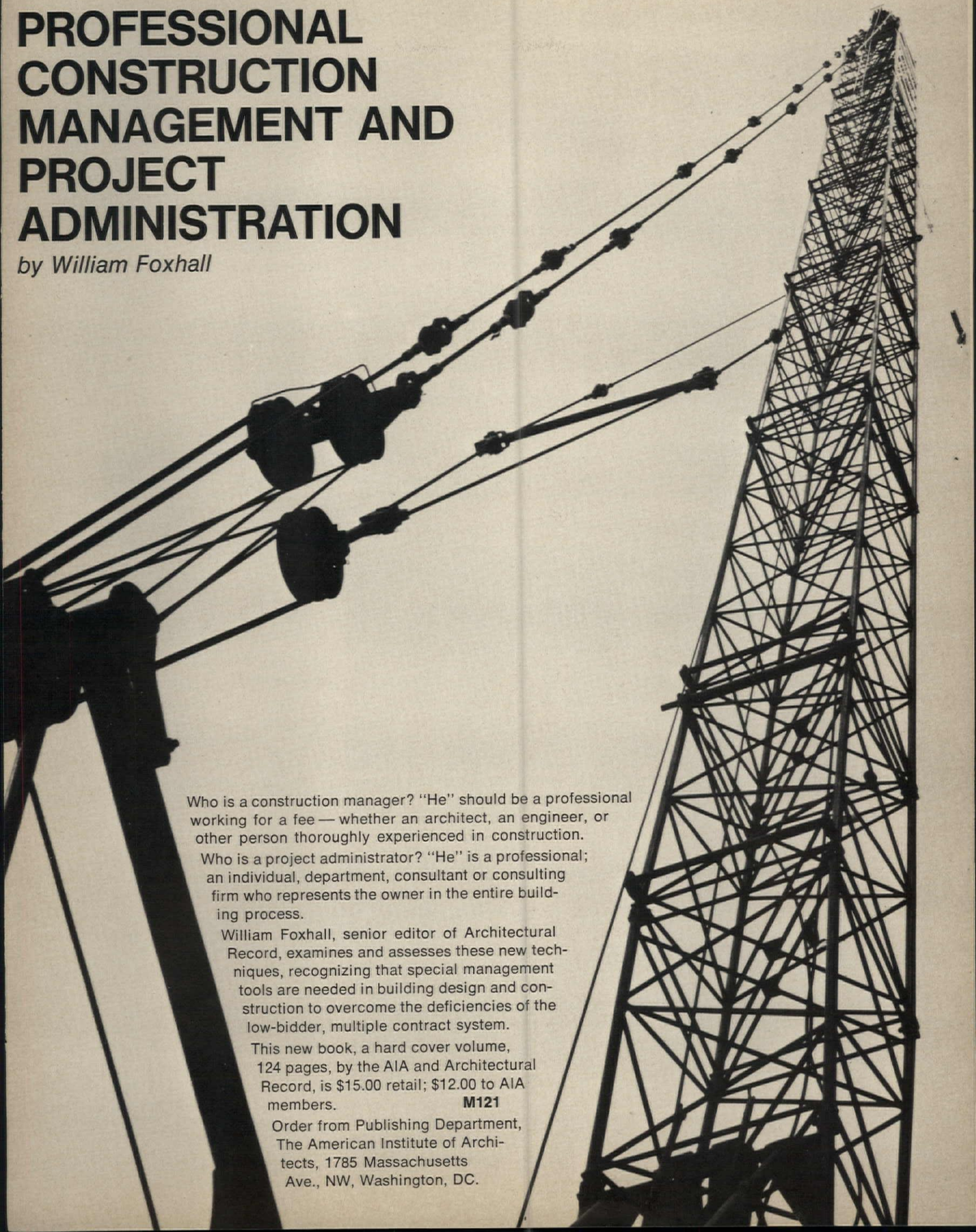
PROFESSIONAL CONSTRUCTION MANAGEMENT AND PROJECT ADMINISTRATION

by William Foxhall



Who is a construction manager? "He" should be a professional working for a fee — whether an architect, an engineer, or other person thoroughly experienced in construction.

Who is a project administrator? "He" is a professional; an individual, department, consultant or consulting firm who represents the owner in the entire building process.

William Foxhall, senior editor of Architectural Record, examines and assesses these new techniques, recognizing that special management tools are needed in building design and construction to overcome the deficiencies of the low-bidder, multiple contract system.

This new book, a hard cover volume, 124 pages, by the AIA and Architectural Record, is $15.00 retail; $12.00 to AIA members. **M121**

Order from Publishing Department, The American Institute of Architects, 1785 Massachusetts Ave., NW, Washington, DC.

outlook *from page 6*

A colleague has remarked that Belluschi's sensitive appreciation of vernacular building and the scenery of the Northwest, combined with his talent in the use of wood, have given his early architecture an unrivaled sense of fitness to purpose and locale. He is also the designer of the first curtain wall skyscraper of glass and aluminum to be built in this country: the Equitable Building in Portland, constructed in 1948, predating the Lever House in New York City by a few years.

A Fellow of the Institute, the Gold Medalist was born in Italy in 1899 and was graduated in 1922 with a doctorate in architectural engineering from the University of Rome. After coming to the United States on a scholarship, he received a degree in civil engineering from Cornell University. Shortly later he went to Portland where he maintained a practice until becoming dean at MIT in 1950.

Retiring from MIT in 1965, Belluschi became consulting professor of architecture at the University of Oregon and in 1966 the Thomas Jefferson Professor of Architecture at the University of Virginia. He also maintains offices in Boston and New York City.

Among other awards to be presented during the AIA national convention in Houston, May 7-10, will be:

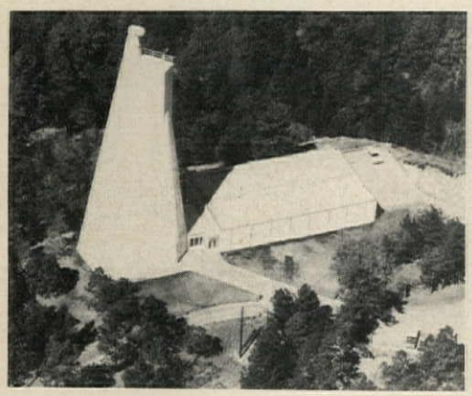
- **Allied Professions Medal** to Ian L. McHarg of Philadelphia, landscape architect, regional planner and author of *Design with Nature.*
- **Fine Arts Medal** to George Rickey, a native of South Bend, Ind., now residing in Germany, sculptor whose stainless steel works are included in the collections of the Museum of Modern Art and the Whitney Museum in New York and the Tate Gallery in London among others.
- **Industrial Arts Medal** to Charles Eames of Venice, California, designer and producer of documentary films but perhaps best known for his molded plywood chairs.

Corps of Engineers Cites Three Projects for Merit Awards in Its Architectural Program

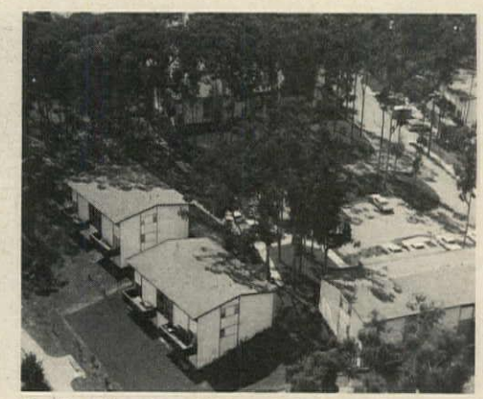
The three structures shown below, with the names of their designers and the comments of the jury, have been given Awards of Merit in the Chief of Engineers Architectural Design Awards program, now in its seventh year of operation.

Nominations for the awards—17 in 1971—are made by the districts and divisions that comprise the corps.

The jurors, all AIA Fellows, consisted of Robert F. Hastings, Detroit, immediate past president of the Institute; Peter Blake, editor of *Architectural Forum;* and William W. Caudill, Houston.

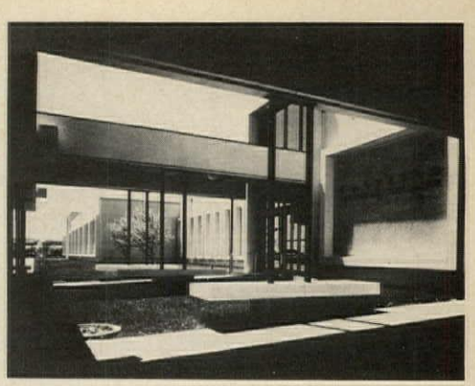


Sacramento Peak Observatory, Vacuum Telescope Sunspot, New Mexico: Charles W. Jones Engineering. "The jury commended the dramatic and sculptural shape of the tower which is used to house such a highly specialized piece of equipment having rigid functional requirements. . . . The project's relationship to the site was adjudged to be excellent."



Family Housing (102 units), San Francisco; George Matsumoto & Associates. "The jury felt the complex was well sited and took maximum advantage of the spectacular view of San Francisco and the Bay. The design was especially praised for the use of a few, simple materials and the lack of superfluous embellishments. The floor plans . . . were livable."

Officers' Open Mess, McGuire Air Force Base, Wrightstown, N.J.: The Nolen & Swinburne Partnership. "The design was commended for its good overall balance in reconciling the form of the building with its functional plan. A dominating roof form was used to pull the whole together and provide visual unity rather than artificial symmetry in developing the mass of the structure."



Costello Terminal Building in Sioux Falls.

Six Buildings Which Feature White Cement Are Recognized for Design Excellence

Selected on a regional basis by a jury of architects and engineers, six projects have been cited for "distinguished architectural design in white cement concrete completed during the year 1970."

Entries in the program, now in its third year under the auspices of the Portland Cement Association, must be located in and be designed by architects having offices in the United States. They may be either single buildings or part of a complex.

The current winners and their architects are Allstate Insurance Company, Farmington, Conn.: Frid, Ferguson, Mahaffey & Perry; Plough, Inc. Administration and Research Center, Memphis: Gassner/Nathan/Browne; Doctors Office Building, Louisville: Jasper D. Ward; Costello Terminal, Sioux Falls (S.D.) Municipal Airport: Fritzel, Kroeger, Griffin & Berg; Kinghorn, Driver & Company, Houston: Denney & Ray; Georgia-Pacific Building, Portland, Ore.: Skidmore, Owings & Merrill.

Educational Workshops Across Country Will Get Underway Early in March

"Finding Facilities Where Money Is Tight" will be the theme of a series of 10 one-day regional workshops with representatives of architecture, finance, education and industry on the program.

The dates and sites are: March 6, Washington, D.C.; March 17, San Diego; March 18, Houston; March 21, Atlanta; April 5, St. Louis; April 11, Columbus; April 20, Milwaukee; April 27, West Hartford, Conn.; April 28, Denver; May 5, Portland, Ore.

Joining the AIA in sponsoring the workshops are the American Association of School Administrators; Council of Educational Facility Planners; Educational Facilities Laboratories, Inc.; and the Office of Education, Department of Health, Education and Welfare. Inquiries should be sent to CEFP at 29 W. Woodruff Ave., Columbus, Ohio 43210.

New Format Will Highlight Public Affairs Conference in Nation's Capital in March

Attendees at this year's Public Affairs Conference, co-sponsored by the AIA and the Consulting Engineers Council, will have the chance to attend several of six seminars, which will be led by congressmen and their

aides who are forming the government's policies in the areas involved.

Six important legislative issues—transportation, labor relations, land use policy, housing and community development, federal contracting, and redirection of research and technology policies—will form the core of the sessions to be held March 13-14 in the Statler Hilton Hotel in Washington, D.C.

On Monday evening the annual Congressional Reception will take place at the Museum of History and Technology of the Smithsonian Institution.

GRA Prepares for Atlanta Conference

The annual Conference on Religious Architecture will consider "New Spaces for the Gathering Community" when it meets in the Regency Hyatt House in Atlanta, April 26-28.

Sponsored by the Guild for Religious Architecture, an AIA affiliate, in cooperation with other national and local religious and architectural organizations, the conference also will feature a juried exhibit of religious architecture and art. The winning entries will become part of a traveling show.

continued on page 51

Deaths

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Hartford
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Newslines

■ **The Organization of Architectural Employees,** by a vote of 5 to 3, has won an election in the San Francisco office of Gwathmey, Sellier, Crosby. The boxscore of the group, headquartered in the Bay area, now stands at three wins and six losses, all conducted under the National Labor Relations Board.

■ **Ada Louise Huxtable,** architectural critic of the *New York Times,* was one of five distinguished women in the world awarded honorary degrees by Mount Holyoke College during Founder's Day ceremonies culminating the Art Building dedication and conference. Designers of the new structure are Hugh Stubbins & Associates.

■ **Historic preservation** will be aided by Department of Housing and Urban Development grants. At the annual meeting of the National Trust for Historic Preservation, it was announced that grants of at least $3 million will be available out of the $100 million open space appropriation which has been renamed the Legacy of Parks.

■ **Concern over ecology** is the core of a film being offered by the American Arbitration Association, 140 W. 51st St., New York, N.Y. 10020. Called "A Contractor Goes to Arbitration," it tells what happens when two parties to a dispute decide to arbitrate a claim instead of suing each other. It has been shown to trade organizations around the country.

■ **The National Institute for Architectural Education** has elected Arnold A. Arbeit, AIA, of Scarsdale, N.Y., as its new chairman. With offices in New York City, NIAE is a nonprofit national organization whose main objective is to encourage and promote architectural education among students and draftsmen under 30 years of age, and to provide a means of communication between students and professionals.

■ **Francis D. Lethbridge, FAIA,** of Washington, D.C., has been named to represent the AIA on the Heritage '76 Committee of the American Revolution Bicentennial Commission. The alternate is Maurice Payne, AIA, director of the Institute's International Relations and Building Design Programs.

■ **General Electric's modular housing** has been erected in a display park in downtown Tokyo for public inspection. The two sample homes were fabricated by GE's Re-Entry and Environmental Systems Division of Philadelphia in Apple Valley, Calif., in a facility which is currently producing military family housing for Norton Air Force Base, Calif., and which recently completed similar housing for George Air Force Base, also in the same state (*see* AIA JOURNAL, Dec. '70, p. 33).

■ **The United States Capitol Historical Society** will begin the publication of an interdisciplinary journal this spring. To be issued twice yearly, *Capitol Studies* will be concerned with all aspects of the Capitol building as well as the two houses of Congress it serves. For additional data write to the society, 200 Maryland Ave. N.E., Washington, D.C. 20515.

■ **An all-weather construction campaign** has been launched by the Washington-based International Masonry Institute, the promotion trust fund established by the Bricklayers, Masons & Plasterers International Union and the Mason Contractors Association of America. Two booklets, "Recommended Practices for Cold Weather Masonry Construction" and "Guide Specifications," are available at 50 cents for both through the International Masonry Industry All-Weather Council, 208 S. LaSalle St., Suite 480, Chicago, Ill. 60604.

■ **Joseph H. Newman,** vice president of Tishman Realty & Construction Company, Inc., and its subsidiary, Tishman Research Corporation, both of New York City, has been elected chairman of Building Research Advisory Board of the National Research Council. He heads the 36-member interdisciplinary board whose members, appointed as individuals, are selected from government agencies, various professions and trades, industrial organizations and academic disciplines. □

books

Open Space Schools. Washington, D.C.: American Association of School Administrators, 1971. 112 pp. $5.

The apparent purpose of *Open Space Schools* is to sell the open space concept. It does just that, maybe a bit too hard.

This very handsomely designed publication, produced by a team of distinguished educators and architects, answers such questions as, "Why open space?" "What is it?" "How does it work?" "Who plans it?" "What's in it?" "How is it built?" and "What does it look like?" Most of the questions are answered quite satisfactorily; others not quite as convincingly as they might be. Nevertheless, it is a worthwhile, timely publication.

The reader might quibble over many statements such as "open space schools often require fewer square feet of space." It is the experience of many architects who have been trying to bust the classroom box for the past 15 years that in most cases more square feet of space are required. To argue for the open space concept on the basis of economy is very questionable. That's too much "hard sell."

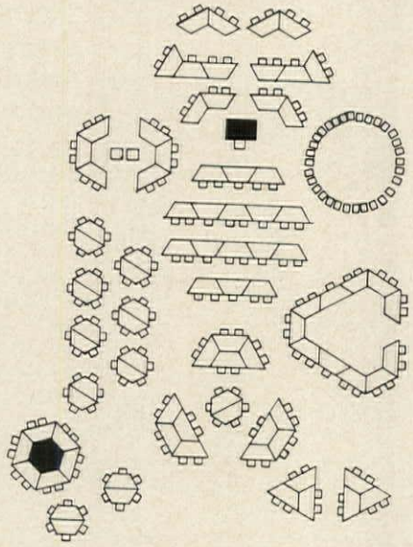
The authors are on solid ground when they sell the open space concept as a better educational process. Such a clear, precise statement as "the open space concept goes hand in hand with individualized instruction and with continuous progress, differentiated staffing and team teaching" tells the reader what he has to buy when he wants open space schools. It's not a product but an educational process that he buys. Unfortunately, the title itself implies a product—a kind of label for a different model schoolhouse. Nothing could be more confusing to teachers and their students than being given a pure open space school building where they must conduct a traditional class-oriented program. They would be happier with the eggcrate model.

A good schoolhouse is an architectural response to an educational process. This point should have been given more emphasis. A clear line needs to be drawn between the education idea and the architectural response. A better title might have been simply *Open Space* or *Open Space in Schools*. The authors point out that all schools should have open or flex ("uncommitted") space as well as fixed ("committed") space. True. And it should be perfectly clear to the reader who must decide, "Am I being sold a new education idea or a new type of schoolhouse?" It's not the latter.

Hopefully, the book will make a meaningful contribution to clearing the air on open planning. Hopefully, too, it will help deter the open space fad that's proliferating without much thought to why it might be a valid physical response to an educational concept.

Open Space Schools is a well-organized book, profusely illustrated. There are some beautiful little diagrams, not unlike chalkboard illustrations with their clarity and simplicity. The reader should particularly enjoy studying the carefully selected photographs which are delightfully full of the users: teachers and children involved in a process, not just posed in a product.

The book would have been stronger without the graphic history of "the open space school concept." It starts circa 1950 and ends circa 1975. New York City in 1896 had a loft plan school with every partition movable; therefore, the 1950 model is a bit misleading. And the 1975 model looks like something in the late '50s. What a flat ending for such an interesting book. It should have ended with the "What does it look like" section, a review of some beautiful, functional schools which respond to varying degrees of the open space concept.



The authors introduce this pictorial section with this clear statement: "A review of some of the most interesting examples is presented. Many of them were exhibited at the annual exhibition of school architecture at Atlantic City, sponsored by the American Association of School Administrators in cooperation with The American Institute of Architects. No attempt has been made to evaluate them, either as architecture or as educational programs. It is suggested, however, that this growing concept is an important available tool for creating a learning environment that is more adaptable, more spacious, less restrictive and less rigid to help encourage new kinds of learning programs." If the book can encourage new kinds of learning programs—free the educator from eggcrate thinking—then it will be a great contribution.

The advocates of the open space concept unquestionably are helping to improve education for the children of America. They free the thinking of educational planners. But the open space school is no panacea for educational ills. In fact, if open plan schools are built without a thorough understanding of the educational ideas undergirding them, such as "individualized instruction with continuous progress, differentiated staffing and team teaching," there will be more confusion of direction-less programs. We want no open space school fad.

Despite the few blemishes, *Open Space Schools* should be "must" reading for school planners. But the reader should always keep in mind that the open space concept concerns the educational process, not a product. The users must want open space. If not, it won't work. To oversell it is a mistake. If the users want open space, even the noise must be quiet. We hope this book will help to quiet the noise.

WILLIAM W. CAUDILL, FAIA
ROBERT A. BROOKS

The reviewers are members of the CRS team.

New Orleans Architecture. Vol. 1: The Lower Garden District. Text by Samuel Wilson Jr. and Bernard Lemann; compiled and edited by Mary Louise Christovich, Roulhac Toledano and Betsy Swanson; photographs by Betsy Swanson. Gretna, La.: Friends of the Cabildo and the Pelican Publishing Co., 1971. 159 pp. $12.50.

Appropriately, this book is dedicated to the memory of John W. Lawrence, FAIA, late dean of the Tulane University School of Architecture, who devoted so much of himself to the preservation of New Orleans' historic architectural treasures.

The book, the first in a planned series of five volumes on New Orleans architecture, was developed under the aegis of the Friends of the Cabildo, an outstanding preservation group. The completed volumes will provide a survey of the many fine structures in the city and, hopefully, will alert others to help protect what remains.

This volume is concerned with the Lower Garden District, one of the most comprehensive Greek Revival communities in the nation. As the book indicates, the Vieux Carré and the Garden District are better known; the beauties of the Lower Garden District are less appreciated by either tourists or residents. Perhaps this book will serve to correct the situation. Handsomely illustrated with an informative text, this commendable effort will be admired by those who want to preserve a priceless heritage.

Orthogonal Town Planning in Antiquity. Ferdinando Castagnoli. Cambridge: MIT Press, 1971. 138 pp. $12.50.

An examination of Greek, Etruscan, Italic, Hellenistic and Roman cities that were based on orthogonal or grid plans. Well documented and scholarly, the book contains many aerial photographs and detailed plans.

New Towns: Laboratories for Democracy. Task Force on Governance of New Towns, Twentieth Century Fund. New York: Twentieth Century Fund, 1971. 73 pp. $1.

Warning that the emergence of new towns across the nation "will not resolve the many dilemmas of growth and decay of metropolitan areas," this report by a group of seven authorities in town planning and public af-

fairs contends that from the first stages of settlement, the new town must have a diverse population with a broad range of economic and social activities.

The task force states that the creation of political institutions in new towns cannot be left to developers but must be a shared effort of citizens, developers and government officials. It asks that new towns become laboratories for testing new forms and processes of local self-government and for experimentation with novel means for broadening and strengthening participation by the people in all stages of planning and governing their urban environment.

A Sculptor's Manual. Bainbridge Copnall. New York: Pergamon Press, 1971. 266 pp. $12.

An illustrated account of the author's experiences in a number of different media during his 45 years as a sculptor.

Master Index of Government Guide Specifications for Construction. Washington, D.C.: Technical Committee of the D.C. Metropolitan Chapter, Construction Specifications Institute, 1970. 73 pp. $2.

Arranged by departments, this compilation offers a handy reference for those who want to locate quickly government guide specifications for construction.

CPM in Construction Management: Project Management with CPM. 2nd edition. James J. O'Brien. New York: McGraw-Hill, 1971. 321 pp. $14.50.

This second edition of a work first published in 1965 is updated to incorporate developments in this tool for fast, accurate construction scheduling.

The Medieval Castle: Life in a Fortress in Peace and War. Philip Warner. New York: Taplinger, 1971. 262 pp. $7.95.

Have you ever wondered just what daily life was like in a medieval castle? If so, ponder no more, for here in vivid detail is an account of how men fought and trained for combat, what they wore, what the people ate and drank and some of the things they did for pleasure. There is information as well on how the castles were sited, designed, managed and decorated.

Modern Prestressed Concrete: Design Principles and Construction Methods. James R. Libby. New York: Van Nostrand Reinhold, 1971. 516 pp. $18.95.

Included in this reference work are field-tested techniques to facilitate the work of the engineer in designing and fabricating prestressed concrete structures of all types.

Noise and Vibration Control. Edited by Leo L. Beranek. New York: McGraw-Hill, 1971. 650 pp. $29.50.

A book for the person who may not be trained specifically in acoustics but who wants to know how to control noise and vibration in buildings and equipment. It is an extensive revision of the standard reference work *Noise Reduction* and reflects new findings and developments. Each phase of the subject is treated by an expert.

Anthropology and Art: Readings in Cross-Cultural Aesthetics. Edited by Charlotte M. Otten. Garden City, N.Y.: Natural History Press, 1971. 440 pp. $8.95.

An anthology of articles by anthropologists and art historians with focus on the functional relationships between art and culture.

Surveying Practice. 2nd Ed. Philip Kissam. New York: McGraw-Hill, 1971. 482 pp. $9.95.

Complete coverage of the surveying operations most often encountered on the job. Among the new topics in this second edition are electronic distance measurement, property surveys, photogrammetry and volume computation.

Module and Metric: The Theory and Practice of Dimensional Coordination in Metric. Alan E. Crocker. New York: Praeger, 1971. 135 pp. $12.50.

Modular coordination is viewed by the author as a design tool that will bring about better, faster and cheaper building. Its use in international metric terms should be understood by all who are involved in the construction process.

This book has three purposes: to explain metrication and modular coordination in simple terms; to explain how and why they should be combined; and to examine ways of using them so that the designer's intentions are translated simply and efficiently into a finished product. □

letters

Seeing the Light

Hip! Hip! Hooray! If my accolades are a bit late please forgive a busy practitioner who can't read all the literature as it comes in. I just got around to the September issue, and Comment and Opinion should be framed and hung on every architect's wall. At long last someone in our national organization has got around to seeing the light.

I have been pressing this very point of view for a long time, but most architects seem mesmerized by the new philosophy, and the colleges are ruining the curricula. As president of the Long Island Society Chapter AIA, I have had the opportunity to express similar thoughts in print. LEON ROSENTHAL, AIA
Babylon, N.Y.

Behind the Scenes with UDAT

Neil Maurer's article in the November issue on the visit of the Urban Design Assistance Team to Falls Church, Virginia, represents an excellent job of reporting. As a member of that group, I sincerely hope that this design team has made some valuable and meaningful contribution to the community. Time, courage and leadership will tell. We also hope we properly represented the AIA objectives and assisted in raising the stature of the Institute as an influential voice in reshaping urban America.

The one area which was not reported was the rapport that developed between the design team and the local citizen leadership. It was a very important feature that led to the success of the three days. Beer parties and other types of group discussions to rap over the *real* issues that lie below the surface are essential to identify the problems from which significant solutions can be developed.
WILLIAM A. GOULD, AIA
Cleveland

'Illuminating'

I am grateful for the illuminating article on l'Ecole des Beaux-Arts, "The Rise of a New Architectural Education in France," by Donald D. Egbert which appeared in the October issue.

It's hard to find out just where things stand with the schools in Paris. Many people simply don't know, I guess.
CHARLES E. PETERSON, FAIA
Philadelphia

Frogs and Dragons

We are always up to something in this office. Although one of our projects is about as far away from architecture as one can get, I pass it along for what it's worth.

The River Rise Group in this city conducted a Big Sioux Inner Tube Regatta for floats over a predetermined course. Although our entry came in near the tail (our frog wasn't particularly streamlined), we did win first prize for design. Fritzel, Kroeger, Griffin & Berg, another local A/E firm, were runners-up with a fire-breathing dragon.
HAROLD T. SPITZNAGEL, FAIA
Sioux Falls, S.D.

More on the Pyramids

"Not by Crack of Whip" in the August issue takes a sober and professional view of pyramid building. I think the conventional con-

cept usually encountered leaves much to be desired, but as an old hand at pyramid technology research, I believe that such spontaneous ideas—for all their ingenuity—do not measurably contribute to the solution of the overall problem.

To my knowledge, the counterweighted platforms have been proposed during the past. A Dane named Soderberg was the first, followed by a Frenchman, M. Samivel, in his book *Glory of Egypt*, translated into English in 1955. A similar theory was proposed by Dr. Constantine P. Lent of New York City the same year.

The difficulty with the counterweighted platform method is that it is too slow by actual count so that too many ropes and too many skidways would be needed. There would be at least 100 placing gangs for the core masonry alone, and the ropes would interfere with their work. Another factor is that the sloping facing blocks had to be placed first, course for course. They controlled all corners, the straight line and the angle of slope, all of which were so exact that we could not match the tolerances without precision instruments. Consequently, the facing could not have been placed last. How would Stenhouse place the three- to five-ton facing blocks after the core masonry had been finished?

Off and on for 40 years, I have been studying the pyramids, during which time I have seen many proposals and recorded many discoveries. There are also many other researchers. Some have specialized in the pyramid design geometries; some in its geographical and astronomical orientation; some in its political, religious and economic affinities; some in the aspects of quarry operations, in transportation of the building stones and in the building of boats and barges.

The paradox is that few experts have concerned themselves seriously with the problem of how the pyramid was built. Most proposals have come from enthusiasts and have been reflective of a generous supply of imagination but little basic knowledge. When some of the proposals are incorporated into a conservative engineering perspective, their efficiency falls short of the requirement: There were simply too many blocks to be handled and placed in too short a time. Also there were the incomparably tight specifications to consider. Responsible engineers have kept aloof, being of the opinion that whatever one proposes, there is no way of proving its veracity.

With what we know, however, we can eliminate all impossible and inadequate procedures, which will leave a mighty narrow sector of adequate possibilities. We can say with assurance that the pyramid was raised by a combination of those possibilities.

As a starter toward the definition of that sector, I wrote an article on how the regular blocks of stone could be raised to the halfway level of the pyramid at the rate of 300 per day, 30 per hour—which is fast enough for a 15-year building schedule, since it could be much faster at the lower levels. The regular blocks weigh, on the average, between two and three tons, with only some of the corner facing blocks going to five tons.

Those weights can be handled by the means I have shown when a few more men are used for the heavier blocks. A two-part tackle is used, doubling the pulling power of the men. Otherwise, it was a system of employing complementary devices, all of which were possible during the Bronze Age. The weight arm was mentioned by Herodotus (a machine made of timbers) and by early Byzantine historians who claimed that models had been found. Translations of those historians are so far only in French. My article to which I have made reference above was published in the November 1970 issue of *Natural History*.

My next effort will be to assemble all the possibilities: brick ramps for the lower courses and for the great blocks and slabs for the Grand Gallery and the Chambers, with weight arms rigged for lateral pull for moving the heavy loads. The combination of greased skids and the weight arm for lifting will be used for the bulk of the regular and the facing blocks. And the 14-ton top piece will be hauled up on a counterweighted platform, essentially as the one proposed by Stenhouse and others. Afterward, platforms will be strung across the skidways and hung from bridles to allow for gangs of men to fine-polish the sides.

This is boiling down the possibilities to a rational engineering perspective—one that capable engineers would draw up if they had to build a similar pyramid under Bronze Age conditions. Regardless of how one looks at it, the ancient builders could hardly have deviated much from those procedures. At this time, I am uncertain as to where this article will be published, due to its length. I am confident, however, that it will find its proper medium because in our time with our analytical skill it is untenable that we should not be able to determine how any structure must have been built.

OLAF TELLEFSEN
Everett, Wash.

Buildings—or Photographs?

In a letter to the editor in the November issue, William Lyman Jr., AIA, writes that "perhaps what is needed is a 10-year nationwide moratorium on design award programs." Maybe what is really needed is a *permanent* nationwide moratorium on such programs.

Many of us have probably visited award-winning buildings and found that they were hardly like the photographs and presentation boards which were judged. This approach to awards, plus the fact that the architect seeking the award makes his own submission, leads to a serious misorientation in architects' minds toward status and image.

The present awards system is really nothing more than a photographic competition. When the day comes—if it ever does—when the actual projects are visited by the persons making the awards, then I might consider entering some of our work.

WILLIAM MILBURN, AIA
Boulder, Colo.

ED. NOTE: In the case of the national AIA Honor Awards, every premiated project must have been seen by at least one juror. In some other programs, and this happens most often on the chapter level, all submissions —or at least those in the "running"—are visited by the entire jury.

events

AIA State and Region

Feb. 25-26: South Carolina Chapter Winter Meeting, Mills Hyatt House, Charleston

Mar. 15-17: Michigan Society of Architects Convention, Detroit Hilton Hotel, Detroit

National

Mar. 13-14: AIA/CEC Public Affairs Conference, Statler Hilton Hotel, Washington, D.C.

Mar. 14-16: College and University Conference and Exposition, Conrad Hilton Hotel, Chicago

Mar. 20-21: Inter-Society Color Council Annual Meeting, Statler Hilton Hotel, New York City

Mar. 27-29: Housing and Mental Health Symposium, School of Architecture, University of Maryland, College Park

Apr. 15-20: American Society of Planning Officials Conference, Cobo Hall, Detroit

Apr. 27-28: Annual Conference on Religious Architecture, Regency Hyatt House, Atlanta

May 7-10: AIA Convention and Exposition, Albert Thomas Convention Center, Houston (Mexican portion, May 12-13, Mexico City)

May 10-12: National Conference for the Building Team, Albert Thomas Convention Center, Houston

June 21-23: National Exposition of Contract Interior Furnishings, Merchandise Mart, Chicago

International

Apr. 16-19: North American Conference on Campus Planning and College Building Design, University of Illinois, Urbana

Apr. 24-26: International Symposium on Lower Cost Housing Problems, Stouffer's Riverfront Inn, St. Louis

June 17-22: International Design Conference, Aspen, Colo.

Competitions

Mar. 20: Registrations due, main activity center, Bay of Tangier holiday resort. Contact: S.N.A. Baie de Tanger, 24 Rue La-Fayette, Tangier, Morocco

Awards Program

Mar. 30: Entry information due, Architectural Exhibit on Religious Architecture. Contact: Henry H. Smith, AIA, Suite 621, Peachtree St. N.E., Atlanta

Mar. 31: Entries due, Biennial HUD Awards for Design Excellence. Contact: Fifth Biennial HUD Design Awards Program, Department of Housing and Urban Development, Washington, D.C. 20410.

Tours

June 16: Study Tour of International Design, departing from six airports across US and Canada. Contact: Richard D. Roselle, Seattle-First National Bank Building, Seattle, Wash. 98104. □

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