AIA JOURNAL

MARCH 1971

BREAKTHROUGH?

SEATTLE, WASHINGTON

JERSEY CITY, NEW JERSEY

INDIANAPOLIS, INDIANA

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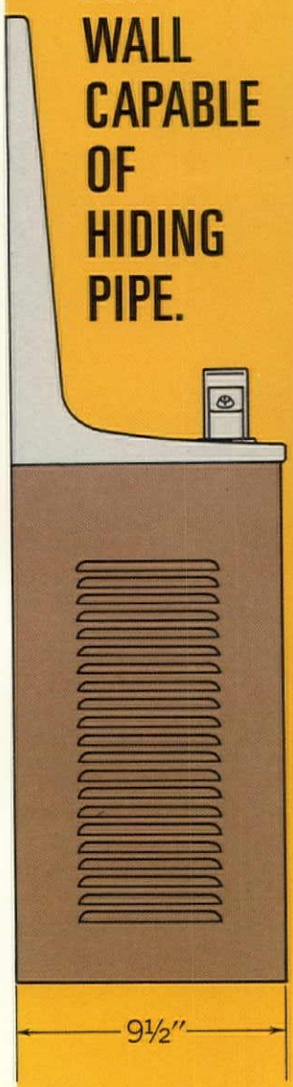

NO RECESS REQUIRED

Extending just 9½ inches from the wall, this simulated-recessed water cooler, Haws Model HSR-6 or 12, needs nothing in the wall but a water source, drain pipe, and an electric outlet.

18 inches wide and 37 inches high overall, it comes beautifully finished in stainless steel top and choice of woodgrain, tan or gray vinyl; or tan or mist gray enamel base. New streamlined combination valve and bubbler. Cooling capacities in 6 and 12 GPH. Get all the facts, write . . .

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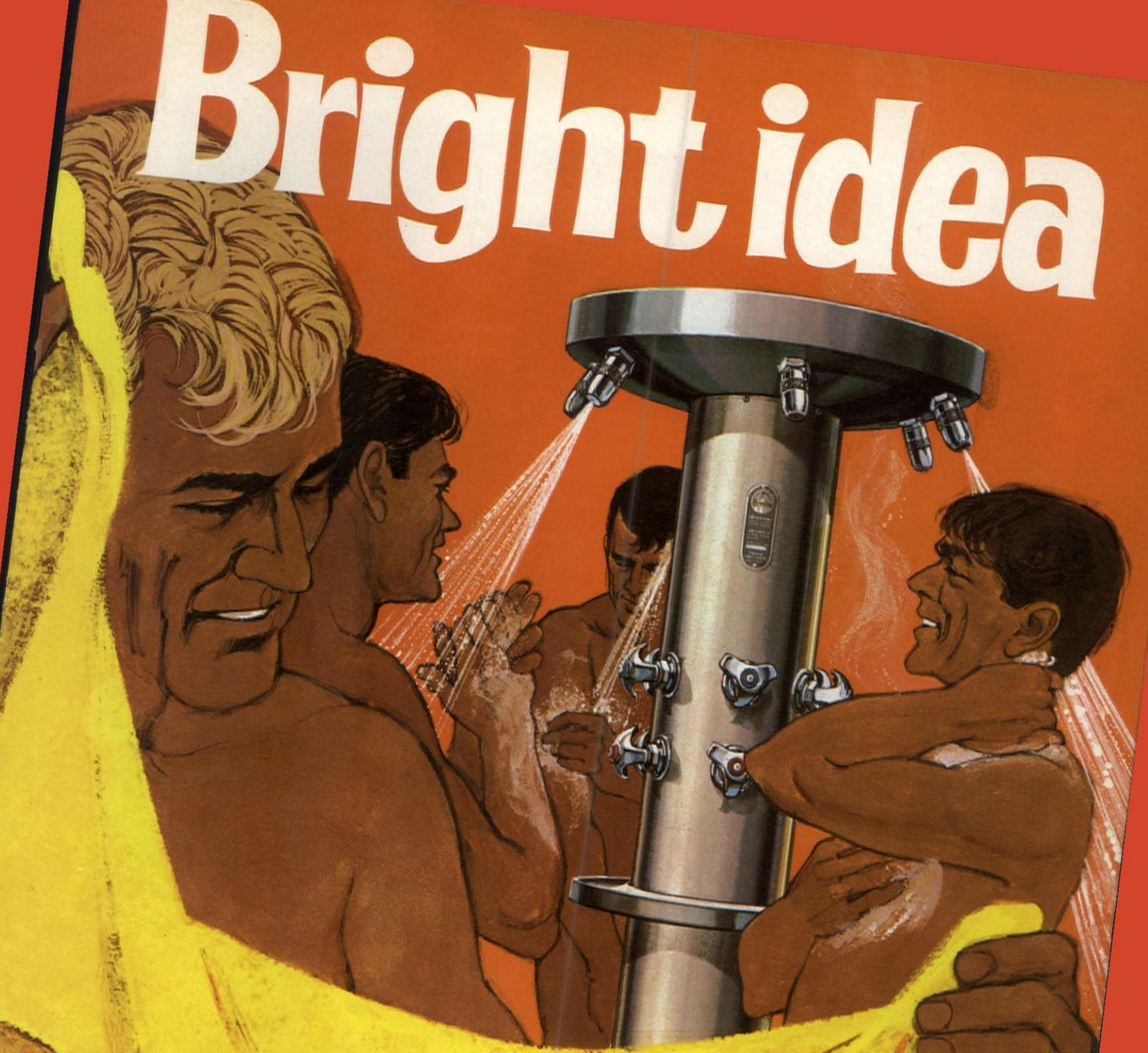
Bright idea



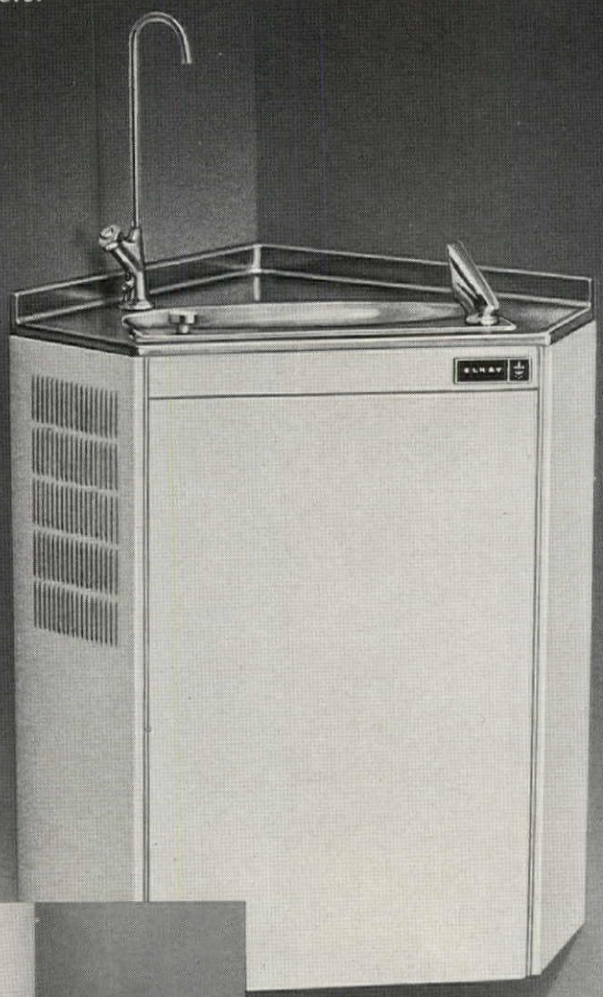
Space-saving showers that never squeeze people!

Bradley Column Showers serve more people in less space than ordinary showers. They squeeze maximum use from every inch of available floor space. But Bradley Columns never squeeze people. Shower patterns leave *plenty* of room between bathers. Bradley Columns offer other important savings. They serve up to 6 people with one set of plumbing connections, cutting installation costs as much as 80%! Bright idea: put the squeeze on building costs. Put Bradley Column Showers into your shower room plans. See your Bradley representative. And write for literature. Bradley Washfountain Co., 9109 Fountain Blvd., Menomonee Falls, Wis. 53051.

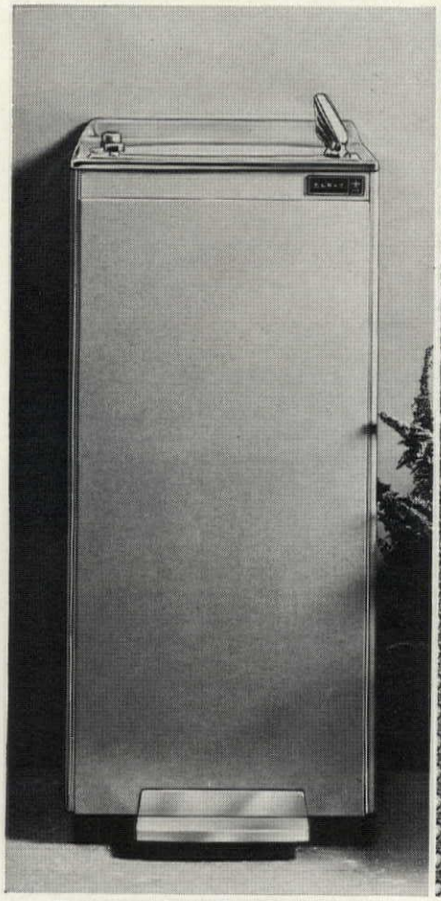
from Bradley!

BRADLEY

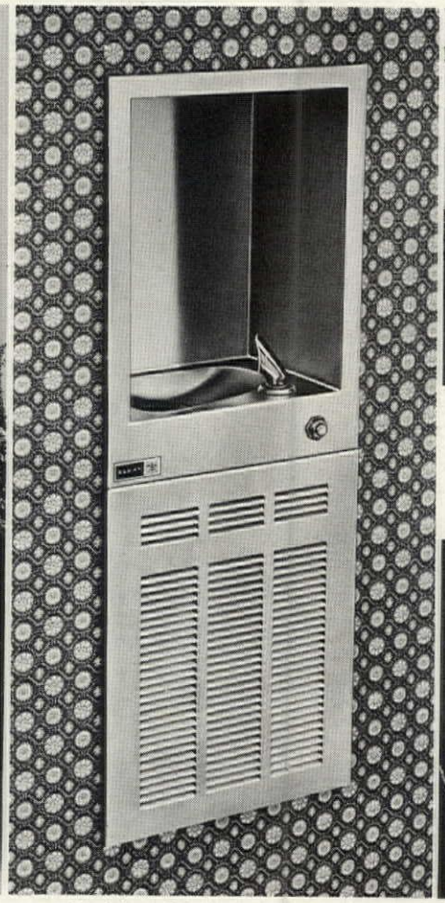
Elkay refrigerated water coolers fit today's creative design ideas for every type of building. Easily replaceable decorative panels of laminated vinyl in nine colors and two in baked enamel are offered at no extra cost and for immediate delivery. A unique cascade design, anti-splash basin with built-in, vandal proof drain teams up with a hooded stream projector and separate control button. The complete water cooler line includes Elkay innovated corner models, floor models and wall models, in regular and compact sizes. Three sizes of fully recessed and two capacities in semi-recessed coolers complete the line. Parts interchangeability and standardization are part of the Elkay concept in improved water coolers.



Ingenious corner model permits full utilization of space—eliminates corridor traffic problems. Meets "Hill-Burton" program requirements.



Floor models in 5 capacities. An attached child's size is available for side-by-side installation. Hot and cold water supply optional except on Model EF 4.



3 styles of fully recessed coolers in 8 and 12 gallon capacities created by Elkay comply with "Hill-Burton" program requirements.

Regular and compact sizes in wall mounted coolers are available. Combination two level cooler. Attached child sizes are also in the complete line of coolers. Hot and cold feature available on all models.

Made in two capacities. Both of the Elkay semi-recessed water coolers take the same rough-in dimensions and incorporate the famous cascade basin.

from the ELKAY® family of firsts

Hooded stream projector—*a mark of Elkay innovation.* When you see this Elkay product you are sure of sanitation and properly designed flow for drinking.

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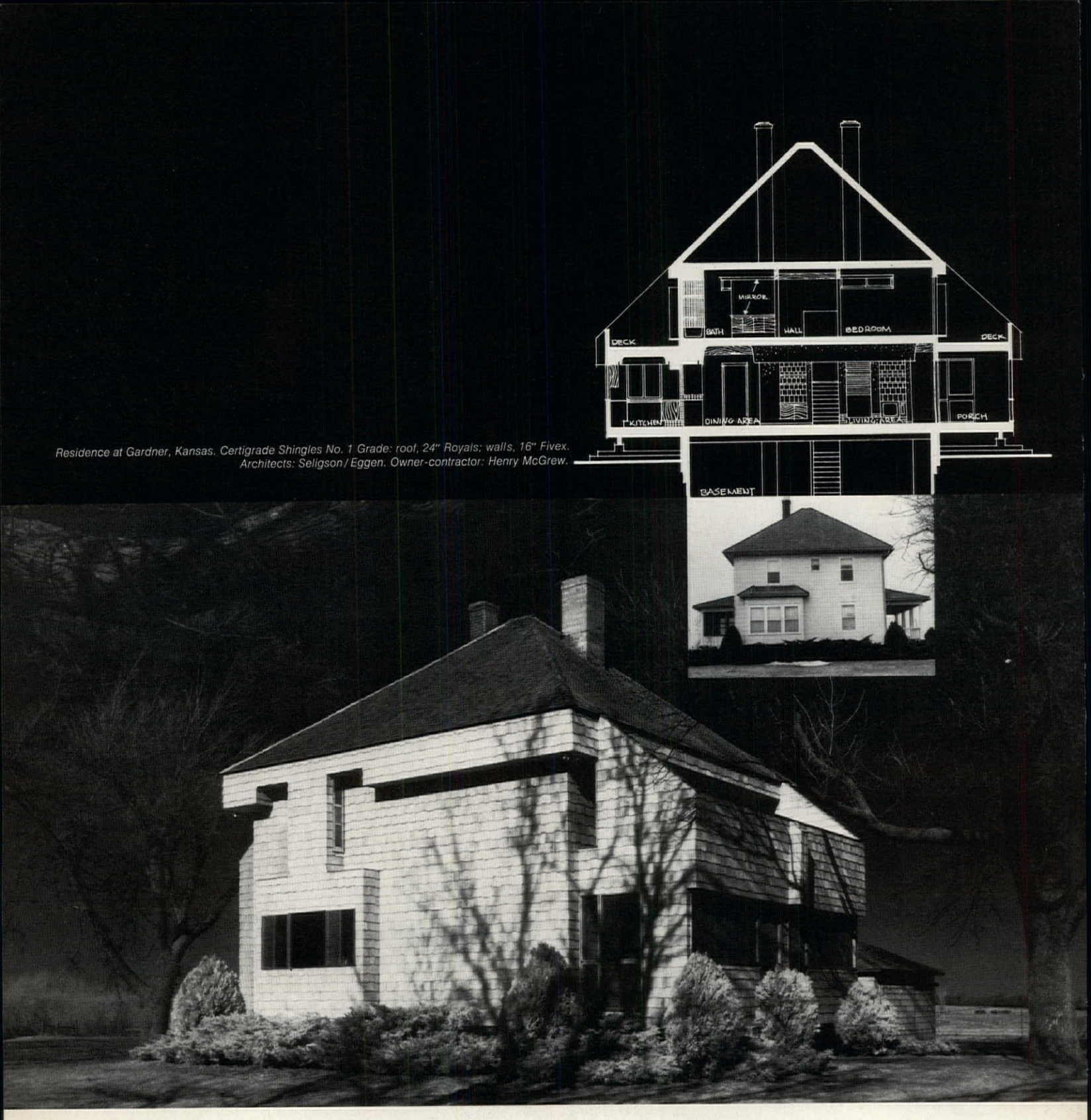

Residence at Gardner, Kansas. Certigrade Shingles No. 1 Grade: roof, 24" Royals; walls, 16" Fivex. Architects: Seligson/Eggen. Owner-contractor: Henry McGrew.

Red cedar shingles restore some great planes to the Great Plains.

Owner Henry McGrew decided some rural renewal was in order after he bought this farmhouse near Kansas City. The building was structurally sound, so minimum cost turned the trick. Red cedar shingles for the expansive plane surfaces of the outside. New wall surfaces and a double-sided fireplace for the inside. New doors and windows for in-between.

Red cedar shingles were selected for several reasons. Their natural beauty looks inviting from a distance — something that Kansas has lots of. Their rich texture complements a rustic environment. And their inherent warmth projects a sense of informality.

Red cedar is also practical. It is naturally insulative against the coldest Great Plains winter, the hottest summer. It withstands even hurricane force winds. And it requires no maintenance for decades.

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One of a series presented by members of the American Wood Council.

AIA JOURNAL

MARCH 1971

DEPARTMENTS

COVER

Soon to be two years old, Operation Breakthrough now has under construction housing on nine sites. For an analysis of this government-sponsored program, *see* page 17.

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VOL. 55, NO. 3

comment and opinion

THE HOMEBUILDING INDUSTRY'S CONSCIENCE: A small but significant group assembled on the Saturday prior to the official opening of the annual convention-exposition of the National Association of Home Builders in Houston in January. The occasion was a day-long conference of the Institute of Environmental Design which, with little fanfare and a modest budget, has been in existence since 1964. In attendance were some of the country's most sensitive builders and land planners; a sprinkling of architects, including representation from The American Institute of Architects via its Housing Committee; and a half dozen or so members of the architectural/environmental press. Headed by Abba I. Polangin, AIA, who also belongs to the American Institute of Planners, the NAHB offspring is, as one participant so aptly put it, "the conscience of the homebuilding industry."

Suggesting the scope of its activities, during the past year the institute:

- Initiated a resolution later adopted by the NAHB directors urging FHA to include environmental design elements in its valuation process.
- Asked for a broad range of NAHB activities, programs, published commitments and policies, with a report to be made analyzing the environmental aspects and ways in which greater coordination of effort may be realized.
- Presented its first awards for contributions to environmental improvement — one to a person from within the residential building industry and one from without — to Miami's Nathan Manilow, developer of the Chicago satellite city of Park Forest, and Laurance S. Rockefeller, chairman of the Citizens' Advisory Committee on Environmental Quality.
- Recommended continuing a program of three-minute radio public service announcements inaugurated last year entitled "Experts in Environment" and reported on increased demand for the film "Your Role in Improving Our Housing Environments," directed to community leaders.
- Updated the slide kit "Your Parade of Homes: Innovations for Expanding Markets" to be part of a package of programs which may be used by builders when presenting their project plans for approval before local governing bodies.
- Announced the sponsoring of a fall seminar planned for implementation of environmental design concepts for small volume builders; and an invitational Interdisciplinary Environmental Design Conference in May 1971 at which authorities in a variety of fields will make specific recommendations for both the industry and the individual builder toward improving their environmental design abilities.

It is in the comprehensive and interdisciplinary approach to list and codify those elements which must be considered in the housing design process that NAHB's institute has probably made its greatest contribution. At a seminar dealing with education arranged in conjunction with the AIA, the AIP and the American Society of Landscape Architects in 1967, Raymond D. Reed, AIA, of Iowa State University explained: "The architect says the homebuilder is too self-conscious about the market and that he is a slave of the market. I think this is right. Architects will associate with those homebuilders willing to influence the market as well as be influenced by it. By the same token, the architects can justifiably be criticized because they don't know what the market can carry. Architects must be concerned with dollars, and the homebuilders must concern themselves more with values."

As I see it, the liaison between architects and builders, as well as a concern for values, has come a long way in those three years, although there is still a lot to be done. In any event, the Institute of Environmental Design can claim its share of the credit for progress to date.

ROBERT E. KOEHLER

ACKNOWLEDGEMENTS

10 — right, Dome City Photographers, Inc.
23 — below left, Photographics Ltd.
23 right, 24 — Art Hupy
26 — left, Wayne Thome
26 — above right, Julius Shulman
26 — below right, G. Wade Swicord
27 — above left, Norman B. Sandler
27 — below left, John Holmes
27 — right, J. Alexander
28, 29 — Doxiadis Associates
30 — below, Louis Checkman

NEXT MONTH

Few will argue with the charge that over the years a good many of our cities have turned their backs on their waterfronts, and there they are—dirty, polluted, neglected. Today, however, these same cities are beginning to realize that the waterfronts—be they on the ocean, a lake or a river—are assets to be eyed as potential sources of new income, as a means of bringing life back into ailing downtowns and as recreational areas. And here is a sphere of activity where architects can generate long-range, overall planning and be in on decision making. Just how this can be done is suggested in a 15-page presentation that is illustrated by a half dozen or so specific developments in cities that range in locale and in size from Spokane, Washington, to Oshkosh, Wisconsin, to St. Petersburg, Florida.

Other features in the April issue:

- In 1967, a young, unknown architect was thrust onto the international architectural scene with his design of Habitat for Montreal's Expo 67. What has happened since and the meaning of it all for today's architect in this time of innovation are discussed by a member of the AIA Housing Committee.
- What can a town of only 160,000 people do to create one of the most interesting bits of urbanism in North America? A professor of architecture at the University of Michigan explains it pictorially, showing how Centennial Square in Victoria, British Columbia, provides small cities in the United States with ideas about saving the old and combining it with new beauties.
- How a Vancouver firm uses the critical path method of scheduling to mobilize for creative group interaction and to enhance the design process is reviewed by a partner in the continuing Practice Aids series.

ASIDES

Speaking of next month, that issue also will include the Architectural Education section, which is appearing on a quarterly basis: January, April, July and October. One of its aims is to report what's happening in the field of continuing education for professionals, for which a new Institute executive staff position is being created and for which applications are now being received at AIA Headquarters.

The director of the Continuing Education Program will be responsible for developing new and expanded services and projects to be implemented throughout the local, regional and national structure of the AIA. He will draw upon the recommendations of a Continuing Education Advisory Council and gather data on other similar successful programs.

In addition, the program director will be charged with accumulating and making available to the national AIA membership continuing education course information from universities and private agencies sponsoring seminars, etc., of particular interest to the profession. He will report to the administrator of the Department of Education and Research, James E. Ellison, to whom résumés, including salary requirements, should be forwarded. □

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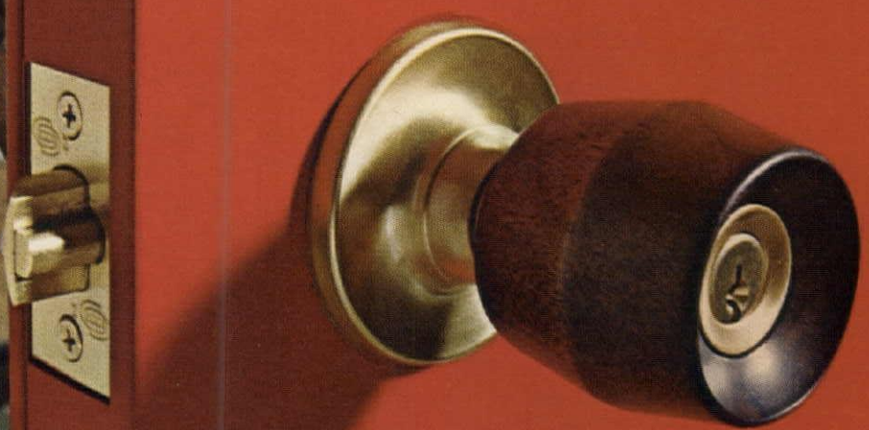

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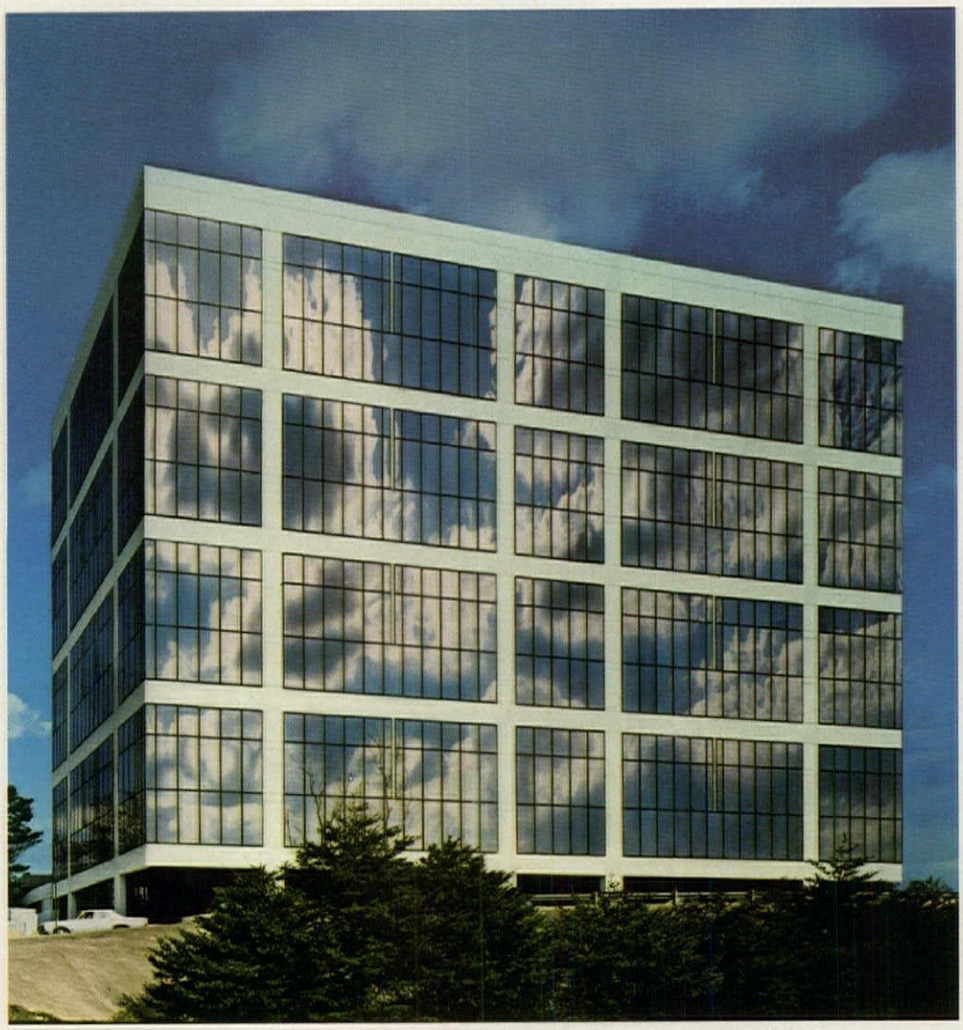

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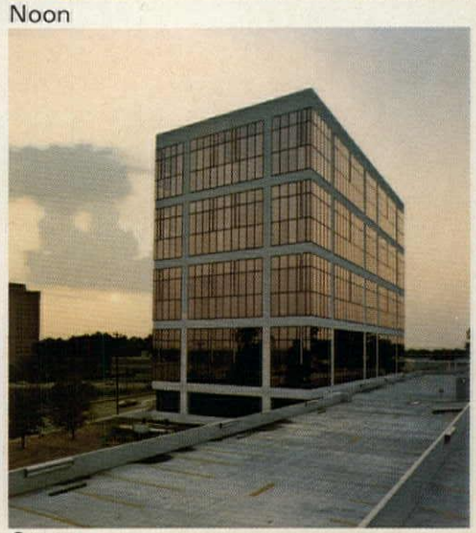

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Architect: Toombs, Amisano & Wells, Atlanta

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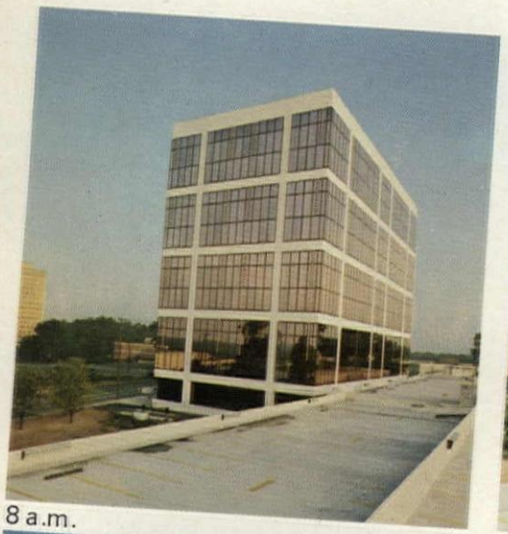
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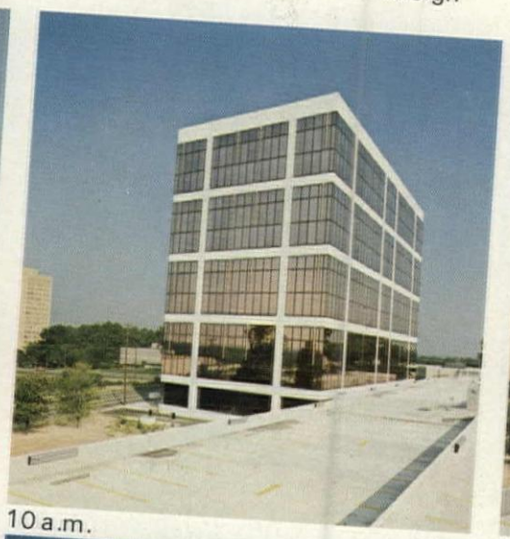
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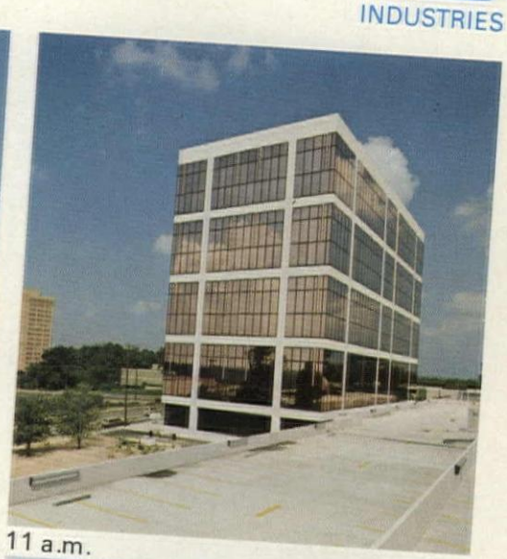
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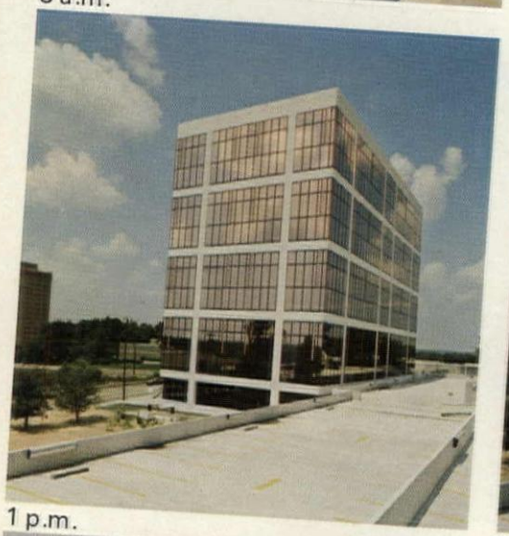
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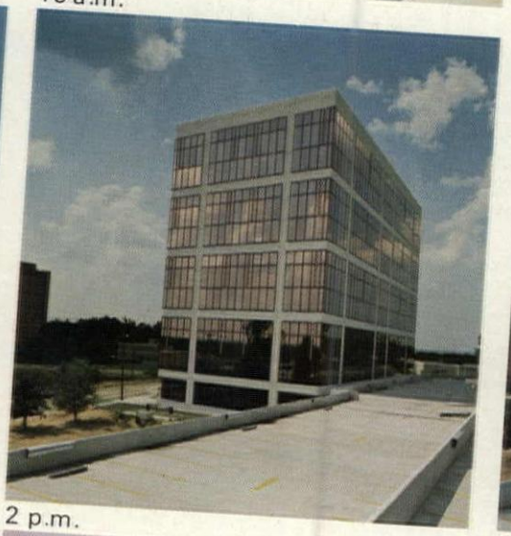
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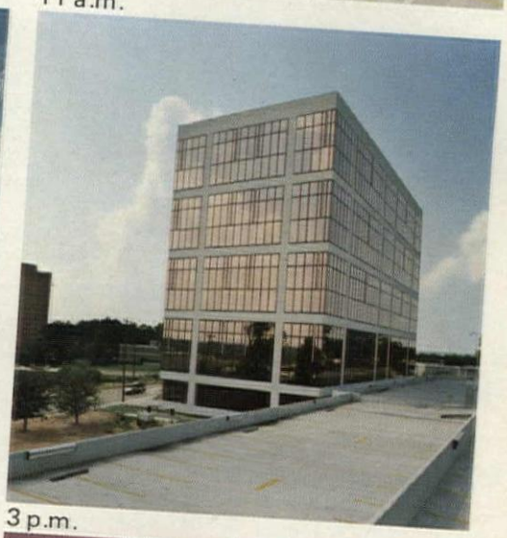
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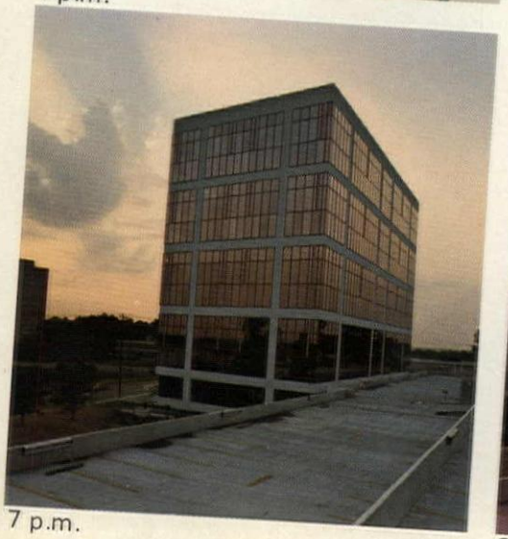
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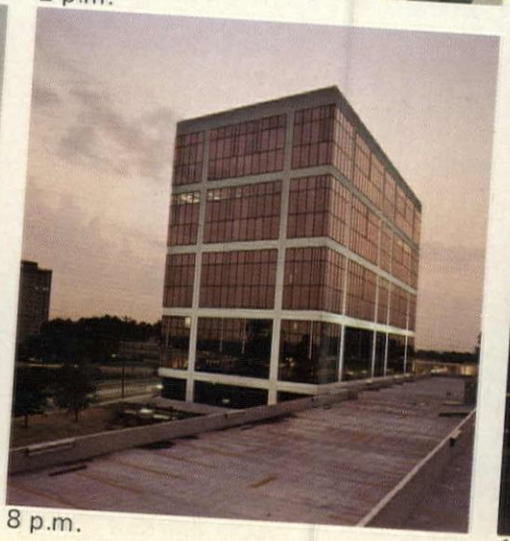
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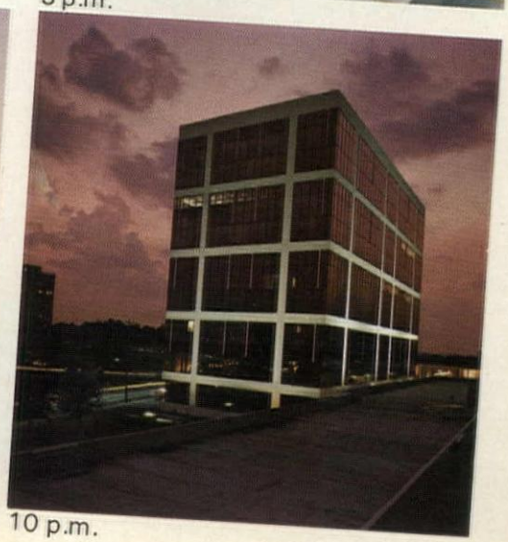
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AIA does its thing for builders in Houston: Jeh Johnson, Orfino, Tsuruoka, Richardson (front row); Carl Johnson, Kessler (back row).

Architects Make Their Presence Known as NAHB Brings Some 50,000 to Houston

When the National Association of Home Builders held its annual convention-exposition in Houston for the second year in mid-January, the more than 50,000 registrants were offered what might be considered a massive refresher course. The curriculum was arranged in seven basic categories, one of which was planning and design.

For the third year in a row, the AIA Housing Committee had its own spot on the program, as indicated by the flyer reproduced here. The demonstration drew a sizable crowd to the two showings, with a combined attendance nearing 1,000.

A total number of about 35 architects and other design professionals appeared on panels, etc., during the five-day sessions—all under the heading "The College of Environmental Knowledge." This phase of the program was developed by NAHB's Institute of Environmental Design (*see* Comment and Opinion).

Decade 70 House of New Concepts, conceived and built by Copper Development Association, draws visitors to Houston suburb of Hunters Creek. M. Arthur Kotch, AIA, is architect.

A spirit of optimism prevailed throughout the speeches and discussions at the Astrohall, which also housed more than 500 exhibits. Indicative of the mood was the prediction by Secretary of Housing and Urban Development George Romney that housing production in 1971, generally forecast at 1.7 million units, could reach 2 million, and next year 2.3 million or more.

"Leadership in keeping costs down and a mobilization of the public demand for action to curb inflation of housing and other costs" are the ingredients that are needed to move to the higher figure this year, he said.

"If we have a strong housing industry, we can keep it from being federalized or socialized through further expansion of subsidization," the HUD Secretary added. He said that action was needed in 1) reforming building codes, 2) strengthening competition to meet housing requirements, 3) examining the impact of federal, state and local tax policies, the problem of excessive land cost resulting from speculation or unearned windfalls and the problem of the uneven cost in separately incorporated metropolitan communities of education, law enforcement and other public services; 4) combining government funds and private voluntary efforts to meet the housing and social needs of the poor and disadvantaged families.

John A. Stastny, a third-generation builder from Chicago, was elected NAHB president.

THE COMMITTEE ON HOUSING
OF THE
AMERICAN INSTITUTE OF ARCHITECTS
PRESENTS

"THE DESIGN OF A
PLANNED COMMUNITY"

The housing industry is facing a new era with the demand for housing greater than ever. To satisfy this demand will require new systems of building and new concepts of land use and planning.

With this in mind, The American Institute of Architects presents this exercise in the design of a prototypical planned community. The planning demonstration will cover site analysis, site evaluation, land planning, environmental concepts, site solutions . . . the design of the non-housing entities such as recreational spaces, community facilities, lighting, landscaping, graphics . . . design of the housing types, unit plans, construction systems, maximum utilization of materials . . . subsidized housing, urban and open lands planning, community services, planning and design.

Created to demonstrate the importance of the team approach, the presentation also emphasizes the role of the architect-planner in the design of successful planned communities.

G. HUGH TSURUOKA AIA
Chicago, Illinois
moderator

JEH V. JOHNSON AIA
Chairman, Committee on Housing
Poughkeepsie, New York

CARL D. JOHNSON
Johnson, Johnson & Roy
Ann Arbor, Michigan

JOHN J. OROFINO AIA
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WILLIAM KESSLER FAIA
William Kessler Associates
Grosse Pointe, Michigan

WALTER J. RICHARDSON AIA
Walter Richardson Associates
Costa Mesa, California

PRESENTED AT THE 1971 CONVENTION
OF THE
NATIONAL ASSOCIATION OF HOME BUILDERS
JANUARY 19 AND 20, 1971
HOUSTON, TEXAS

World-Renowned 'Sculptural' Architect To Receive AIA Gold Medal in June

The highest honor bestowed by the AIA — the Gold Medal — will be presented to Louis I. Kahn, FAIA, of Philadelphia, at the 1971 convention.

Since 1957, Kahn has been a professor at the University of Pennsylvania, while continuing his own practice. His work includes new forms of housing and pioneering effort in public housing; the Salk Institute for Biological Studies, La Jolla, California; the Yale University Art Center (in collaboration with Douglas I. Orr); the Richards Medical Research Building, University of Pennsylvania; the Second Legislative Capital of Pakistan, Dacca, East Pakistan; the Kimbell Museum of Art, Fort Worth; the Theater for Performing Arts, Fort Wayne; a factory for Olivetti Corporation of America, Harrisburg, Pennsylvania; and other college buildings, schools, homes, churches and temples.

Each one, said the *New York Times* last year, "is an acknowledged masterpiece . . . always powerful, provocative and painfully wrought."

In addition to the Gold Medal and the Architectural Critics' Medal announced in January, the following honors will be given:

- **Architectural Firm Award:** Albert Kahn Associates, Detroit
- **Craftsmanship Medal:** Wharton Esherick (posthumous), Paoli, Pennsylvania
- **Industrial Arts Medal:** Edith Heath, Sausalito, California
- **Allied Professions Medal:** Daniel U. Kiley, Charlotte, Vermont
- **Architectural Photography Medal:** Alexandre Georges, Pomona, New York
- **Citation of an Organization:** San Francisco Bay Conservation and Development Commission, San Francisco
- **Architectural Critics' Citation:** *Perspecta,* School of Art and Architecture, Yale University, New Haven Connecticut
- **Edward C. Kemper Award:** Gerald M. McCue, FAIA, San Francisco
- **Special Citation:** Ansel Adams, photographer, Carmel, California. *continued on page 53*

for architects, engineers, consultants . . .

"NUTS & BOLTS" SEMINARS ON BUILDING MOBILE HOME PARKS

Qualify for today's hottest opportunity in housing

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DENVER, COLO.
April 15 - 16

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Detailed coverage: Sanitation (sewerage and water) • Utilities services • Grading and paving • Landscaping • Auxiliary structures.

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ATLANTA
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MOBILE HOMES have come of age. Right now they provide comfortable — *and affordable* — housing for more than FIVE MILLION people, in over 24,000 'parks'.

The homes are being produced faster than sites for them are being made available in soundly conceived, well-designed and properly engineered residential environments.

•

This spells opportunity for architectural/engineering firms, landscape architects, lenders and other specialists. All are needed to help land developers convert raw land into quality housing. Quickly, and at minimum cost.

•

This is big business. Mobile homes account for 67% of new homes selling for under $25,000. Production in 1970 topped 400,000; they were sold at retail for approximately $3 BILLION. Sites are needed for more than *one thousand mobile homes a day!*

Typically, parks cover 30 to more than 200 acres; provide sites for 100 to 700 homes, at costs of from $2500 to $3500 per site. Million-dollar projects are not uncommon.

Specialized preliminary studies and engineering techniques are needed, if costly mistakes and delays are to be avoided. *Is your firm prepared?*

Mobile Homes Research Foundation, with over 20 years extensive involvement, is making the specialized techniques available through a series of seminars for professionals. Nationally recognized authorities share their experience covering every vital step *and answer questions from the floor.* Obviously, attendance can be worth thousands of dollars in time and materials saved on these projects.

Also, enrollees can be listed in a Directory of qualified professionals being compiled by this Foundation for distribution to land developers and others in response to many requests.

•

Enrollment will be limited by the facilities. Prompt action is suggested. Use the coupon below, write on business stationery, or to be absolutely sure, telephone (312) 792-3782.

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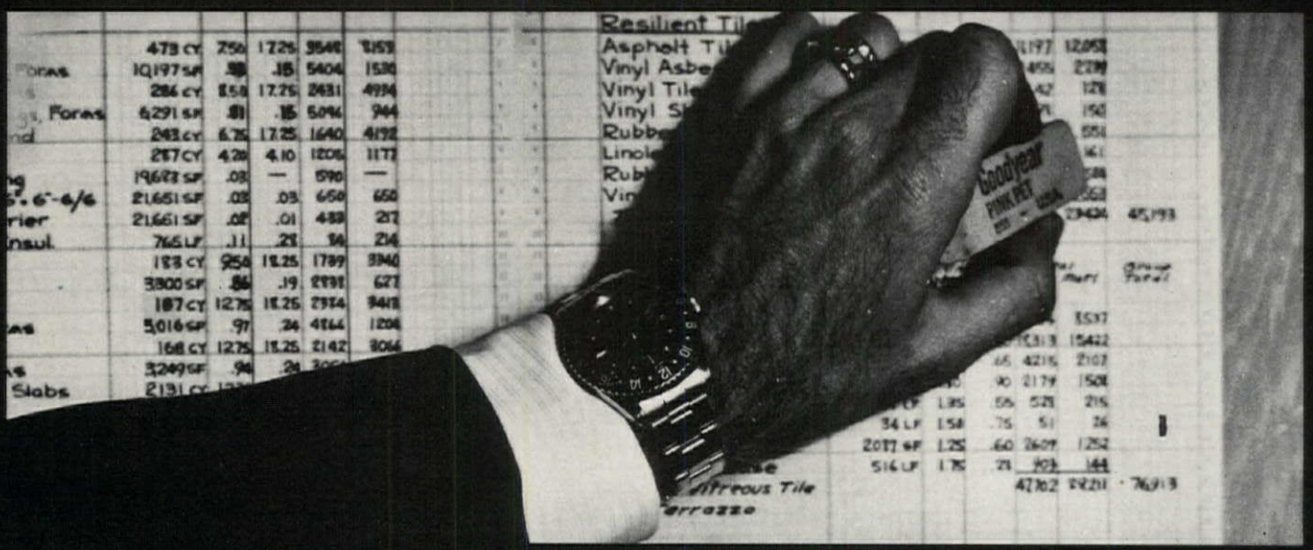
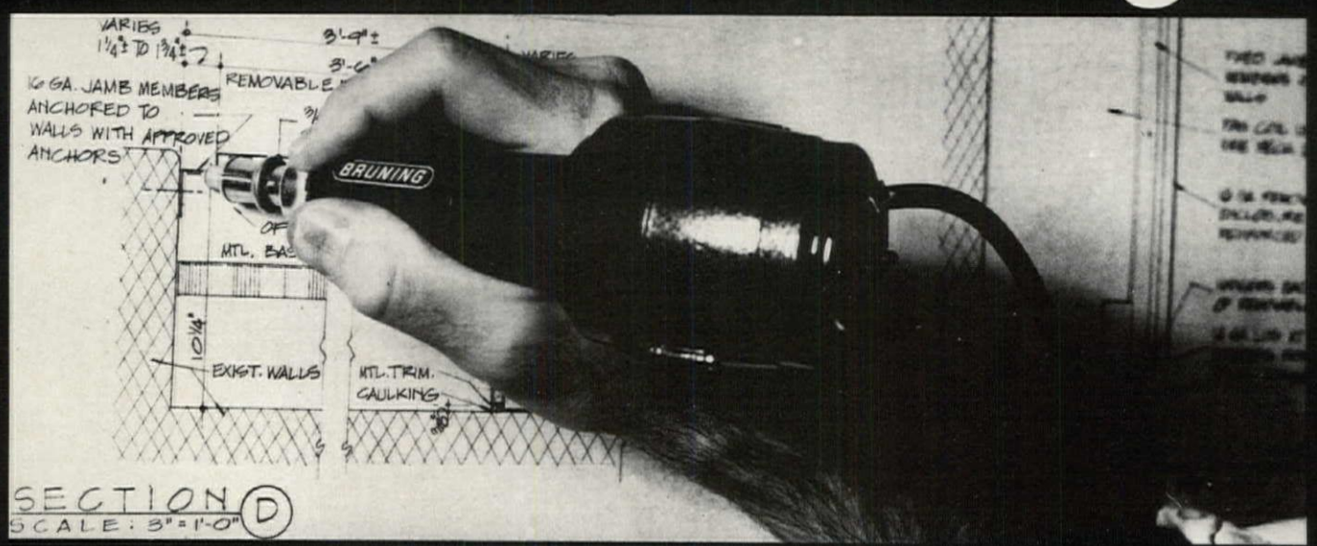


than on final drawings.



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'The Hard Choices'

by HERBERT H. SWINBURNE, FAIA
Chairman, 1971 Convention Program

In January on this page, Bob Hastings asked if we architects were willing to make those hard choices that will enable us as a profession to support the needs of a society re-examining its priorities. Specifically, he said that the AIA has a responsibility to advise wisely on these priorities and is now developing a five-point program to that end. Committees and task forces are establishing criteria for making those hard choices where they impinge on the physical environment and where architects can exert their leverage.

The convention in Detroit this June has been developed around the concept of these "Hard Choices." It will be a forum, rather than a convention, where we will be challenged to participate — to pick up a piece of the action when decisions affecting our society are being made.

Knowledgeable people have been selected to define the issues of three broad themes. Their papers will be in your hands before the convention, and these same people will moderate the discussions. It will be their job to jab constantly and provoke us; to show our relevance to the issues; to pinpoint our architectural responsibilities; to ask if we have been making some hard choices ourselves. Our speakers will be announced from time to time. They are good, and you will be given time to interact with them. These are the three sets of hard choices:

HARD CHOICE NO. 1

Patterns of Human Settlement

Will Americans accept a national program for urban growth?
Cities and towns:
- How can their growth be channeled?
- Should development be handled on a regional level?
- Will new towns replace suburban sprawl?
- Will they prevent the rebuilding of our inner cities?

HARD CHOICE NO. 2

Use of Human Resources

How do we best use our resources to meet basic human needs — now?
Cities and towns:
- How do we shape them to restore the opportunities for personal and community identity?
- How do we shape them so as to eradicate institutional racism?
- Will racial bigotry actually destroy urban planning?
- What are the elements of quality in urban life?
- As well as the "now" problem of human needs, are we running out of the world's natural resources to serve the needs of our children for the next 30 years?

HARD CHOICE NO. 3

What do we give up?

What do we have to give up to create a liveable environment?
Cities and towns:
- How do we shape them to achieve an environment of quality within reasonable ecological limitations?
- Can we preserve the natural environment and still produce a rational man-made environment within the network of our present political boundaries?
- Who pays for all this? Within what time scale? What are the politics of realization?

Conventions are for business, serious thinking and fun, and not necessarily in that order. In the past, these three activities have caused conflict. This year, the forum will have a new format. Sunday through Tuesday have been reserved for AIA business sessions and technological conferences and exhibition (a joint effort with the Producers' Council that you will be hearing about later). Sufficient time has been allowed to give full discussion on all business subjects.

The last two days, Wednesday and Thursday, have been set aside for the forum on "The Hard Choices," with ample time left over for individuals to explore the Detroit area.

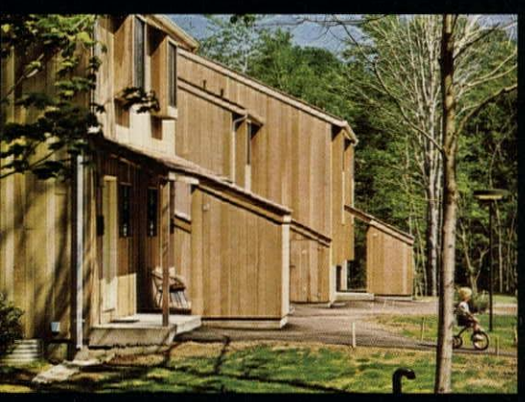
Linn Smith has a powerhouse in his "GO DETROIT" Committee, whose members have great great things in store for you in and around the city. Win Rankin and Dan Meltzer have worked with this committee and the producers to put on a conference and exhibition in Cobo Hall that will have many innovations. The technical sessions will be geared to the theme "Building Teams and Systems the Focal Point." They will cover such topics as construction management, turnkey construction, performance specifications, systems and interface problems, labor and other areas of management affecting the building team.

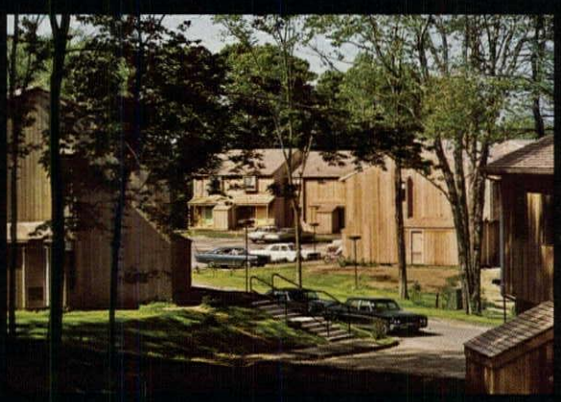
Mark your calendar now: June 20-24.

GO DETROIT 

Wadsworth Grove Cooperative, Middletown, Conn. • McHugh & Associates, Architects.

The environment. The architect. Redwood.





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Low income housing.

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But not anymore.

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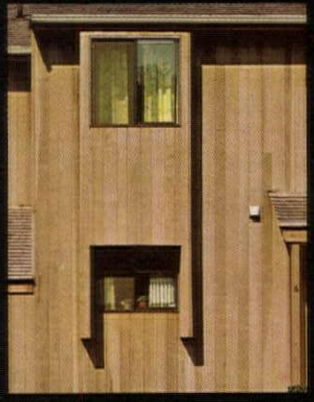
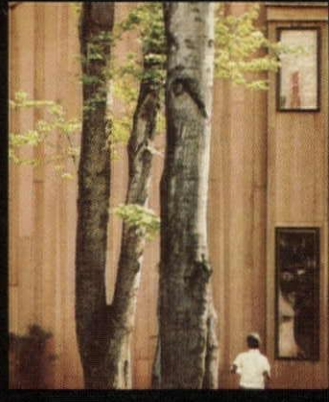
Here redwood made the difference.

Redwood's rich, natural beauty meshed graciously with its surroundings. While its warm grain and texture created its own informal environment. The suburban neighbors could relax.



But redwood was perfect for other reasons.

It gave the development the durability it needed. Wear against kids. Parasites. Weather. (Redwood was *so* ideal, that FHA officials—convinced by the architects that redwood siding would be more economical in the long run due to its low maintenance requirements—allowed its added cost to be included in the mortgage.)
In short, redwood *stays* beautiful.



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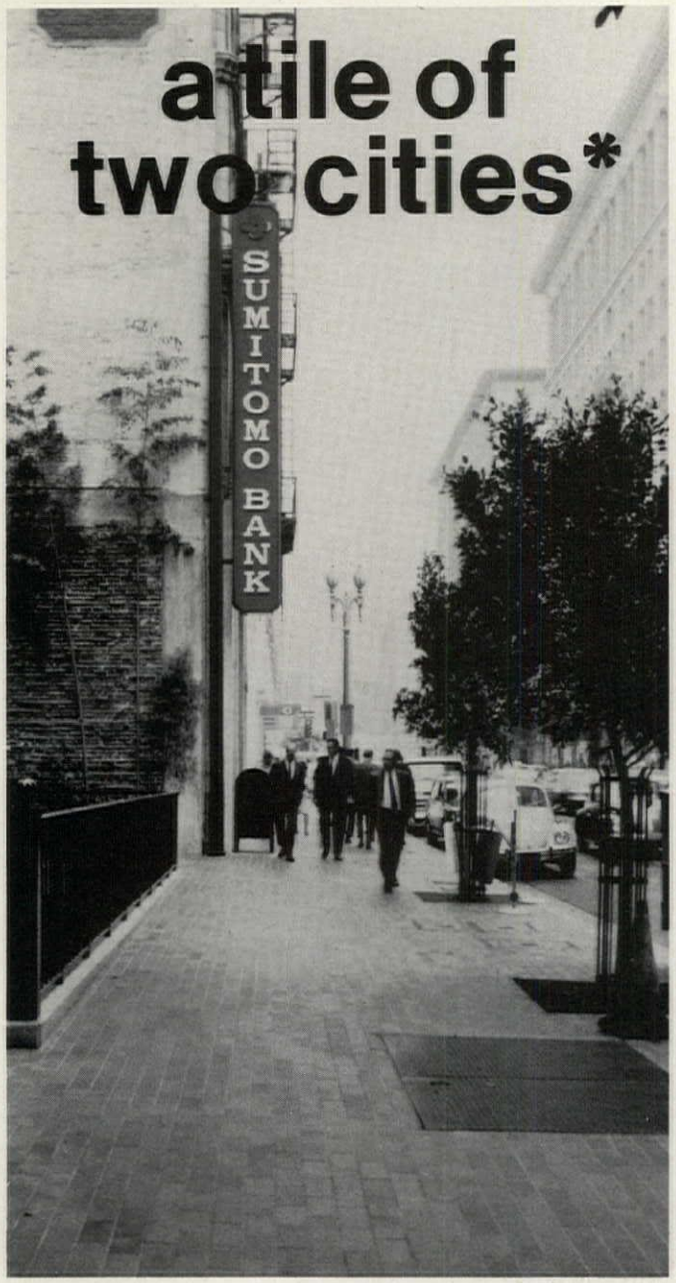

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What has Operation Breakthrough accomplished during its first two years? The American Institute of Architects' national Housing Committee, recognizing the interest of the profession in this program, appointed a special Operation Breakthrough Review Committee* to give an interim report on the program's significance as well as what it can mean to the architect. The following is adapted from that report by the review committee chairman.

BREAKTHROUGH?

by ROBERTSON WARD JR., FAIA

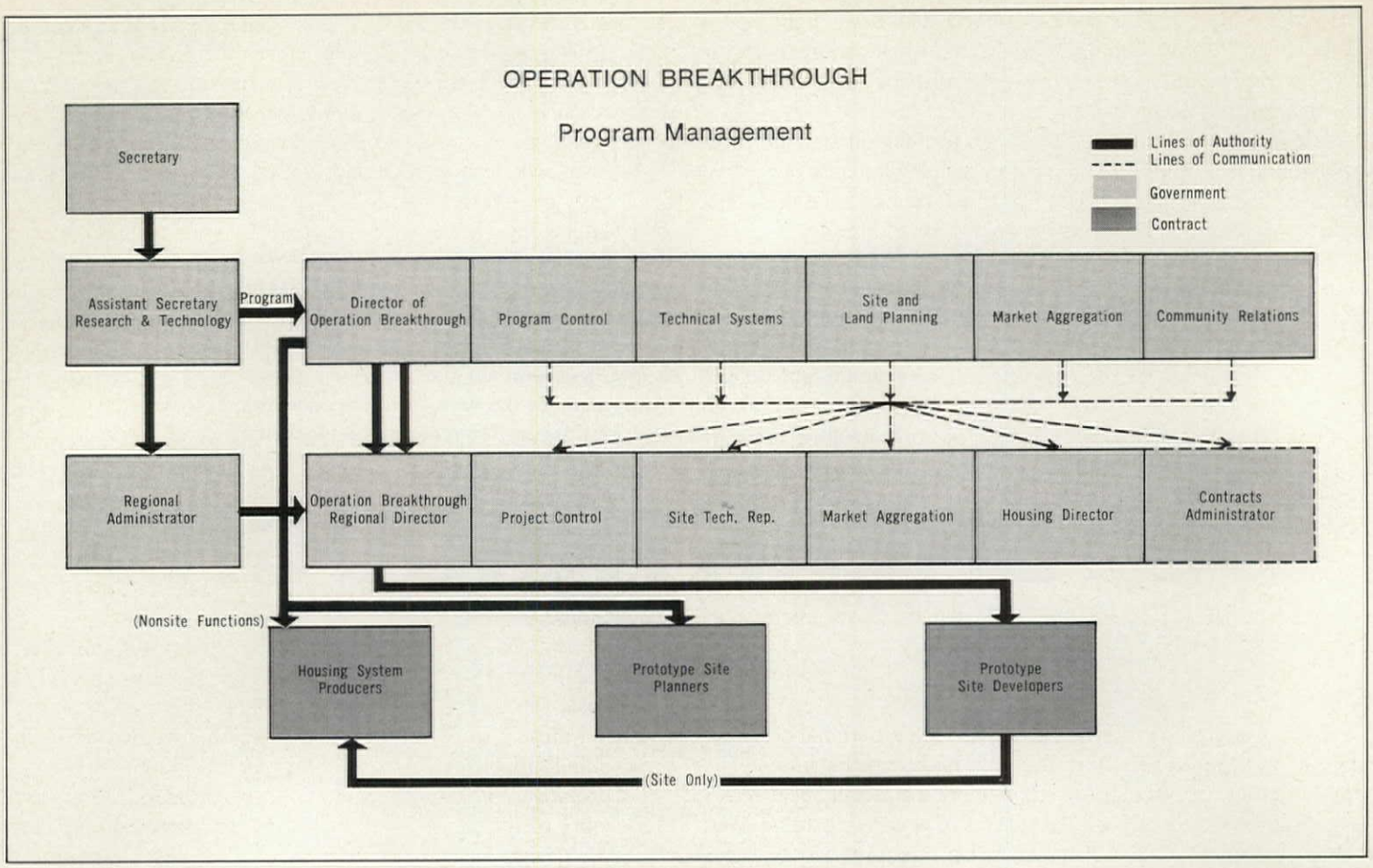
With appropriate fanfare Operation Breakthrough, a program proposed to help improve the process to double nationwide housing unit production in the 1970s, was announced in early May 1969. George Romney, Secretary of the Department of Housing and Urban Development, made the announcement in conference with governors, mayors, leaders of industry, labor and the design professions.

To achieve a breakthrough, the program's planners emphasized a comprehensive effort in the many areas that constrain our housing supply, calling for innovative land use, modern management, financing, market aggregation, good design and removal of constraints to the introduction of these innovations. Doubling housing construction would mean that an average of 1.1 million additional units per year be built in the next 10 years. With even a modest achievement of its goal, such a program could encourage vast changes in those sectors dependent on the housing industry.

Proposals were solicited from state and local governments and the private sector for prototype sites, housing system producers, site planners and site developers in order to procure a comprehensive development of various model communities. These demonstrations of advanced systems of residential housing techniques would require concurrent efforts toward future market aggregation to assure volume production of these systems. Over 600 proposals were submitted. Of these, 236 were Type A (for complete housing systems), the remainder Type B (for advanced research and development contracts). Eighty-two firms submitted proposals for prototype site planning. Local governments submitted 218 prototype site proposals.

Through a series of evaluation procedures, 9 sites were chosen and matched with 10 site planners, later with 8 site developers. Thirty-seven housing systems producers were selected and later narrowed down to 22. Although site developer contracts were not let until the summer of 1970, most other contracts were

* Robertson Ward Jr., FAIA, chairman; Henry N. Cobb; Robert Elkington, FAIA; James Fagelson, student; John N. Highland Jr., FAIA; Jeh V. Johnson; Stephen G. Oppenheim. Jackson T. Wright Sr., director of Housing Programs. The full interim report will be available soon to members of the AIA upon request from the director of Housing Programs. A future report is anticipated to review in detail the completed prototype sites and housing systems.



signed in the winter and late spring of that year. By December, ground-breaking had begun on all sites with completion of most prototype sites scheduled before the end of 1971.

The magnitude of these responses indicated the increased interest by local governments, industry and the design profession in the implications of more innovative approaches to housing and the application of new techniques to housing production.

This report concerns itself with four issues: 1) national goals, prior recommendations and present policy; 2) strategy of Operation Breakthrough, alternative strategies and objectives; 3) detailed issues within the program; and 4) issues of significance in the program as they relate to the architectural profession.

National Goals

The issues and concerns which generated Breakthrough reflect the recently published findings of three national committees: the National Commission on Urban Problems, or the Douglas Commission; the Committee on Urban Housing, or Kaiser Committee (*see* AIA JOURNAL, Jan. '69, pp. 61 and 50); and the Departments of Commerce and Housing and Urban Development Panel on Housing Technology. Within the past three years, these have all issued substantial documentation in support of greater governmental involvement in the entire field of housing.

Reports from the three committees urge major government action and allocations in all areas of housing programs, support, financing, codes and standards, and constraints, particularly in housing research and technology for which a minimum of $100 million per year was recommended. Section 108 of the Housing and Urban Development Act of 1968 (the Proxmire Amendment) calling for 1,000 units a year of five housing systems for five years was particularly signaled for action. The act of 1968 *directed,* not merely authorized, the Secretary of HUD to carry out this demonstration program of 25,000 units. (Section 108 was cited as the enabling act for Breakthrough, though modified in that program to an initial direct HUD participation of only 3,000 demonstration units. However, over 13,000 subsidy units are already allocated for the program's systems in fiscal year 1971.)

Great emphasis was placed on the creation of long-term research and development as well as evaluation and information systems to be carried on under guidelines established by a new National Institute of Building Sciences and a new National Institute of Environmental Sciences under the wing of the National Academy of Sciences/the National Academy of Engineering. (Legislation to create the NIBS — the Javits Bill, S2368 — was killed in the Senate, as the new HUD administration unveiled Operation Breakthrough in July 1969.) What is important in these prior recommendations, as a background for evaluating Operation Breakthrough, is their consensus of the magnitude of effort required and the importance of establishing a long-range comprehensive research base for the building industry. Certain basic premises lie at the core of these prior recommendations:

Goals: To fulfill the housing needs of the nation, over 26 million units (6 million for low income families with government subsidies) must be built in the next decade.

Massive commitment: This, and a *realignment* of national priorities, must take place if we are to attain these goals.

Government policy: This must recognize the need for and assist in the generation of this massive commitment. A major and immediate increase in legislative support and appropriations must be promoted in all critical areas affecting the quantity and quality of the housing supply. Government must be the principal initiator of many of the changes necessary to solve our housing crisis; only government can redistribute the national energies in the form of subsidies and support to assure "a decent home" for all.

Volume production: Annual production of housing must be doubled, and this cannot be accomplished without major changes.

Our predictable labor resources demand that new, higher productivity techniques be utilized in volume production to reach these housing targets, with concurrent redistribution at all levels of a broadened housing industry.

Program continuity: Such volume production has, in prior experience, required long-term commitment of housing programs and an active government policy of assistance, coordination and funding to achieve this assurance of program continuity.

Operational catalyst: Essential in affecting this quantum jump is the mobilization of all our technical, social, financial and managerial resources and skills in all sectors, public and private, of the building industry. It may be the logical role of government to be the coordinator, organizer and catalyst in affecting these operational aspects of industry transformation.

Breakthrough has initiated a first step toward these housing goals, acting as the operational catalyst with the major thrust of the program toward volume production through use of new techniques, with admirable objectives of an operational and organizational nature and of social and environmental quality.

What is certainly missing from the desirable full equation is the massive national commitment initiated by Government, and the assurance of sufficient program continuity.

Strategy, Alternate Strategies

Accordingly, to those who feel that such a national commitment is an absolute necessity, Breakthrough appears silhouetted against the partial vacuum of other, more emasculated, priority programs. It is accused by its detractors of occupying an unjustified amount of HUD and Administration attention, sidetracking the main efforts from immediate action, diverting funds from already inadequately financed programs and providing a sophisticated excuse for eluding other problems.

We feel that these criticisms should be directed at the priorities policy at a higher level rather than at Operation Breakthrough, which should not necessarily bear the load of these larger policy inadequacies.

However, in the strategy chosen by HUD for Operation Breakthrough, great reliance is placed on market aggregation to be stimulated by assisting means rather than by an assured program continuity. This strategy makes no pretense that its initial Phase 2 of prototype construction (3,000 units) is more than a single demonstration project (though comprehensive) which, together with the hopeful generation of a much larger aggregated market, will assure volume production (Phase 3 of the program) in a desirable magnitude of 250,000 units. Legitimate questions on the strategy level would be: "Is there another operational strategy which can accomplish the same objectives more effectively?" "Are energies being unnecessarily expended in an effort that is relatively nonproductive?" And the corollary: "Does the strategy rely too much on a less than predictable element which may not take place or in insufficient magnitude?"

Proponents of alternate strategies closer to that of Section 108 claim that the technology and the systems concepts of many systems need not undergo this lengthy demonstration phase, that they can be implemented immediately within the aggregation of existing programs with realistic application of the emerging and available new technologies. "Why cannot HUD make some systems decisions and choices and implement them by its leverage on existing HUD programs?" Examples of this alternate strategy of direct utilization of on-going programs are already underway, notably in New York State. The relative validity of Breakthrough's strategy, with large, purely demonstration Phase II expenditures, will be closely watched for what added benefits will be actually produced in developments of advanced technologies.

Many people have been led by the high profile publicity on the isolated effort of Breakthrough to expect substantial, dramatic and highly innovative results. They may well be disappointed. Without success at the market aggregation level, Breakthrough will certainly not generate a significant quantity of housing. It will probably not demonstrate more than a few genuine technological innovations, nor will it create significant new concepts of habitation. As this balance sheet of Breakthrough will be somewhat lacking at the end of Phase 2 in terms of the physical products, the validity of this basic strategy choice will rest heavily on success in other areas of the program's objectives.

Within this given strategy, the objectives of Breakthrough, as stated by HUD, are commendably broad, bringing together a marriage of software ideas with currently feasible hardware techniques; thus:

Primary objective: Establish self-sustaining mechanisms for rapid, volume production of marketable housing at progressively lower costs for people of all income levels, with particular emphasis on those groups and individuals which have had difficulty in obtaining satisfactory housing in the past.

Secondary objectives: Stimulate the modernization and broadening of the housing industry through increased emphasis on better design and greater utilization of improved techniques within the current housing industry and through increased participation by other organizations that possess the necessary talents, interest and capability for such a commitment.

- Increase participation and leadership by state and local governments in providing on-going planning and market and site aggregation for housing, its environment and the community.
- Waive or remove constraints to the introduction and use of tested and proven innovations in design, construction, land acquisition and use, financing, labor utilization, materials, components and systems, sponsorship, consumer participation, management and maintenance.
- Introduce new organizational concepts and management techniques for market and site aggregation and for design, production and marketing of living units.
- Coordinate the application of all available government resources appropriate to a given site or sites for housing, environment, community service and facilities.
- Encourage identification and development of performance standards for evaluation of innovations.
- Develop an on-going testing and evaluation mechanism and technique for judging the effectiveness of innovations.
- Encourage greater social, economic and environmental mix and enforce standards of equal opportunity throughout.

The specific time framework within which Breakthrough was conceived places many limitations on the attainable levels of each objective. The highly compressed time cycle of phasing for the program very definitely restricts it to an implementation program with respect to new techniques; there is precious little time for lengthy new development cycles. However, if no new physical system innovations appear in the finished products (there may hopefully be one or two), several significant contributions still have the possibility of being made.

In the program, the government is acting in a form of stewardship that hopes to guide industralized techniques into the

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Mr. Ward, who heads his own design and research firm in Chicago, was previously head of research for Skidmore, Owings & Merrill in the same city. He was designer of the major component systems for the California SCSD project and is presently chairman of the AIA's Housing Technology Subcommittee of the Operation Breakthrough Review Committee.

development of housing prototypes which will be the initial models for the '70s in land use development, management reforms, cost controls, economic and social mixture and community involvement in the development process. What could be the greatest single contribution is the development of "process" and the creation of mechanisms to make this process operational.

Breakthrough, as a process prototype, may have greater consequences for the housing industry than any specific "product" prototype resulting from the program. This attitude toward process extends through the program's organizational structure. The mechanisms developed for communicating, criteria, control, cost, comparison and evaluation will hopefully educate the industry and professional participants. The new skills, new people, new money entering the housing field may benefit by this more rational start and in turn may force the more established industry members to upgrade their own operational structures.

Detailed Issues

HUD Assistant Secretary Harold B. Finger and his Breakthrough staff are to be commended for the ingenuity and managerial skill with which they organized and developed the program and for the attitudes and enthusiasm with which they have pursued it. The staff has structured an enormously comprehensive program in balance with the stated objectives and has implemented it to date with remarkable vigor, if only with partial success, considering the relatively small nucleus of key personnel, the extremely tight (and possibly unrealistic) time framework and the ridiculously small budget.

Flexible and purposeful program control is being maintained at the operation's core. Imaginative efforts in structuring the program's information systems has resulted in significant contributions in such areas as site documentation, analysis of local code authority approval sequences and identification of redundancies in HUD's own maze of paper work.

Breakthrough's contributions in the cost information and retrieval areas will no doubt benefit the entire housing industry, as will the cost data feedback required from program participants. (One would hope that the AIA would consider similar retrieval networks.)

Documentation* shows a well-structured beginning evaluation methodology at work during the proposal stages. However, the quality of the final evaluation and the correlation between the evaluation and the actual selection decisions may not have been at quite the same level.

When it comes to performance standards and criteria, HUD developed, with the National Bureau of Standards' Building Research Division, a four-volume *Guide Criteria for the Evaluation of Operation Breakthrough Housing Systems* (published in the spring of 1970). It is primarily concentrated on the more easily identifiable and quantifiable criteria; it hardly touches on the critical areas of user needs, qualitative design and habitability criteria. It is inadequate in other ways also. Still, it is a start on a potentially major contribution to the building industry.

This is an area in which the architectural profession can play a key role in helping to identify basic design criteria through studies of the relationships of physical planning to social goals. The AIA should endorse and lend professional assistance to this Operation Breakthrough effort.

It is hoped that the important role of continuing research and development that the Type B proposals are intended to play in Breakthrough can be brought to bear on this problem.

* "Evaluation of Proposals for 'Operation Breakthrough'" by Ralph Warburton, *Industrialization Forum*, Vol. 1, No. 4, July 1970, pp. 9-18.

Concurrent with the development of performance criteria for Breakthrough has been a related testing and evaluation program leading to final certification of each of the program's building system. As these were selected prior to the development of the initial performance criteria, the adherence of every system to every requirement may be difficult to achieve. The magnitude of the required test program may also preclude an ideal compliance. Accordingly, certification even of the quantifiables may not initially be as consistent as would be desired.

As the necessary qualitiative design criteria do not now exist and will take major efforts to develop, so much more difficult will be their certification. The task of certification probably increases exponentially as one progresses from the simple quantifiables of a material through components of the permutations of total building systems and to the unquantifiable complexity of dwelling unit and community design. The desired goal is to certify the flexibility of a system; the easy route and danger is to certify a few standard plans. Breakthrough has initiated a valuable procedural mechanism of certification; however, much will depend on HUD's ability to develop these qualitiative criteria, to generate a more flexible attitude of criteria-equivalency in the local authorities and to achieve a greater communality of criteria at the Federal Housing Administration and Model Code group level.

Breakthrough's staff points with some pride to its "instruments of cooperation," a device which serves as an opening wedge at waiving code and zoning constraints. The staff points to the large numbers of agencies, organizations and individuals drawn together to work on the housing problems to the cooperative role of the National Academies of Sciences and Engineering; to the tritrades agreement which allows interchange of tasks between plumbers, electricians and carpenters; to the ending of certain jurisdictional disputes between industrial and trade unions in the construction field; to some relaxation of the plumbers' ban on factory-assembled products, and to the many documents, criteria and information networks Breakthrough has originated.

Breakthrough sites, though exhibiting a wide range of conditions, seem to avoid the major metropolitan urban problem areas. In a demonstration program such as this, a valuable opportunity may have been side-stepped. Another opportunity of relevance also seems to be missing: the demonstration of intermediate densities in the range of 20-25 dwelling units per acre, which would permit a range of dwelling unit/land criteria to operate and still permit proximities of an urban/community scale. Breakthrough site densities fall either in the suburban sprawl category of 8-12 or in the central urban densities of 30 or higher.

Though objectives of demonstrating advanced schemes of planning and community relationships at all levels are commendably expressed, the actual planning schemes are generally disappointing when measured against some of the opportunities which might have been developed. Competent schemes are evident but there are few exemplary ones to match the professed objectives. The program should be commended for the selection of the professionals involved as project site planners and their involvement at an early priority stage. However, constraints of time, sequence and demonstration mix have contributed to the limited attainment of the goals.

The review committee was unanimous in its feeling that too many different systems have been imposed on each site. The opportunity to demonstrate what one system could do with permutations of simple elements in developing varying scales of spaces and community relationships at a sufficiently large scale is not explored on any site. Some schemes try to develop this sense of system demonstration with only limited numbers. But the general

"supermarket" mix of five, six, seven or eight different systems threatens to perpetuate many of the aspects of existing suburban developments.

It might be noted that at a number of sites, major changes in unit type and number have occurred. The site developers, with the task of eventually marketing the communities, are presently involved with balancing the economic package of market price, HUD's allowable overcoats and the unit mix. The results in some cases may not be consistent with the original planning assumptions.

Undoubtedly, the most important single element in Breakthrough's strategy, and possibly the most vulnerable, is the effort toward market aggregation. Unfortunately, the means proposed for the task carry no certainty of success. The program's officials have stated that subsidy allocations are being made available to help stimulate market aggregation. Still, assurance of funding continuity may yet be insufficient to attract industry to make the investments required for volume production.

Much will depend on the growing movement of developing statewide industralized housing laws, state authorities and coordinating agencies. HUD now has a Breakthrough Type B research and development project operating in Illinois, specifically as a prototype coordinating effort toward market aggregation. This involves the study of all elements including the identification of the agencies, sponsors, producers and participants, their capabilities, the market models and approaches, in matching the housing needs to the available land acquisition-financing-and system production resources. (One of the joint contractors is the AIA-sponsored Urban Design and Development Corporation.) This effort may be an indication how well the market aggregation assumptions of Breakthrough will fare.

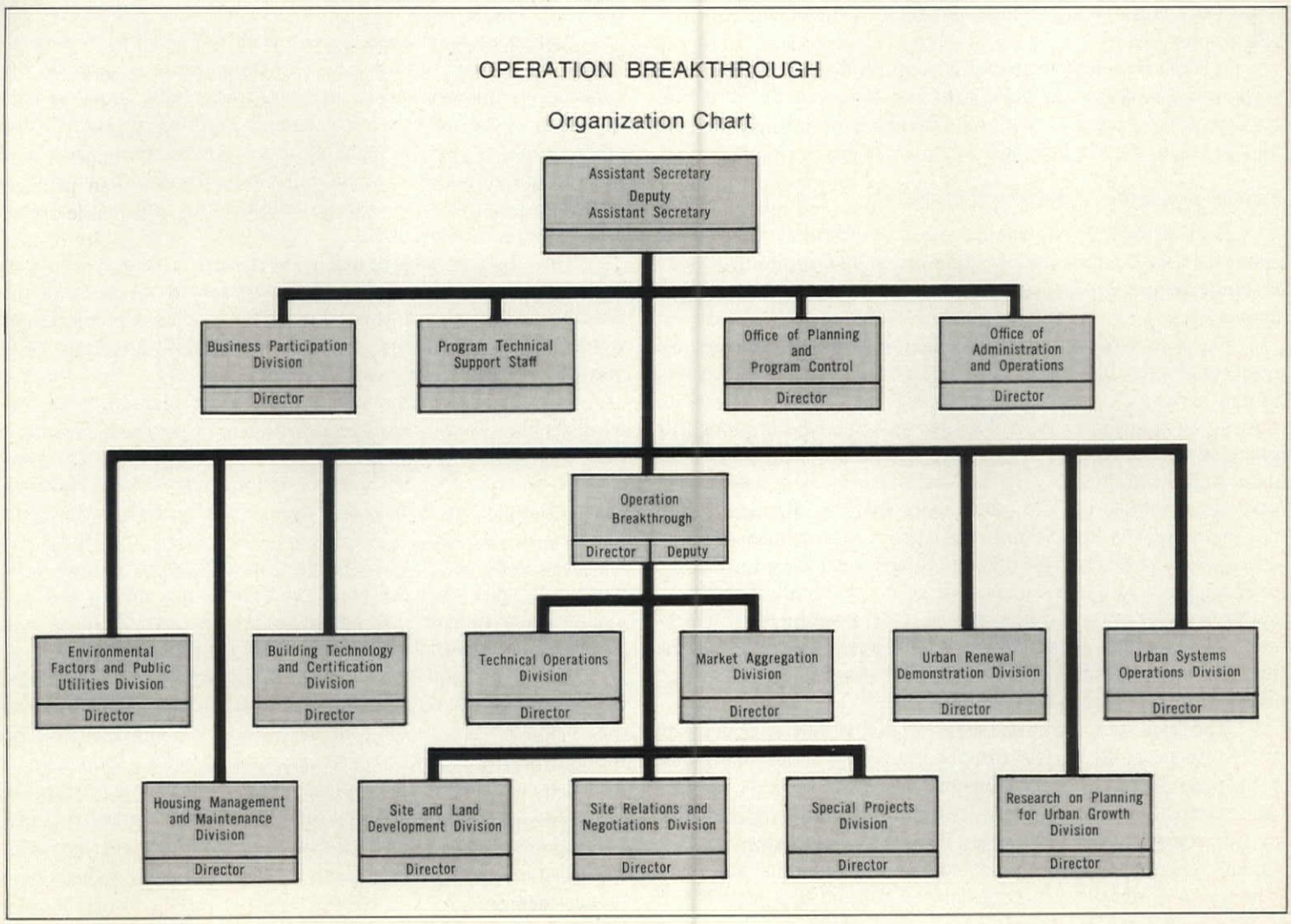
Operation Breakthrough's hardware, or building systems, were deferred for review by the committee until prototype construction is further toward completion.

One apparent gap in Breakthrough is that of all the well-intended efforts to attain its objectives, few have been initiated toward a long-range program of research and development. Certainly, many are needed in areas other than the physical systems, but some very specific efforts are needed in the fields of identifying, documenting and disseminating the characteristics, the disciplines, the particular methodologies and issues inherent in building systems design and development.* The budget restrictions have curtailed nearly all development in Type B proposals where presumably long-range research and development projects would have emerged.

Thus the development of hardware in Breakthrough emphasizes immediate physical demonstrations but miniscule support of long-range systems methodology which may be of much greater importance. Out of HUD's $45 million research and development budget for fiscal year 1971, Breakthrough takes the major portion. (HUD's original request for $55 million was cut back. In comparison, the Department of Agriculture has $300 million.)

A second area of comment concerns the systems and system procedures selected in relation to the predictability of innovations and the quality of final systems. Many of the systems had already

* These specific issues are well exemplified in such publications as *Industrialization Forum* and in such articles as "Prerequisites of Industrialized Housing" by Klaus Blach in *Build International*, Oct. 1970.



been developed or were on an existing noninnovative technological base where final results could be predicted. In quality, many range from the mediocre to the dismal. In these cases the producers' combined competency in management, marketing, distribution and/or production seems to have been the basis for selecting this deliverable mediocrity.

On the other hand, selection of particular systems at earlier stages of development depended to a greater extent on the evaluation of the system's conceptual validity and the competency of the development team. Here again, R&D is needed to increase this evaluation base and avoid proving by lengthy physical demonstration what can be concluded by a firmer initial analysis.

The review committee suspects that in some cases in Breakthrough there is the assumption that competency in organizing large production, managerial and technological systems can be equated with competency to develop the *seemingly* simpler physical systems for the built environment.

In this equation, competency to handle great "complications" (sending a man to the moon, for instance) should not be confused with competency to handle the infinitely lesser "complications" but inherently greater "complexity" of matching ridiculously simpler quantifiable systems with continuing social/physical value systems and changing human needs (the environmental design process). The competency to handle complications is badly needed in all surrounding areas but does not necessarily attack the core problem of complexity.

Accordingly, an assumption that increasing the numbers, the diversity and horsepower of the participants may increase the team's competency may be exactly the reverse. It may be more a question of maintaining control of the complex synthesis process; a few extra nonworking linkages may make contact and effectiveness impossible.

It is felt that the few innovative contributions in the physical systems of Breakthrough will come from development teams who have preserved control of the synthesizing process, more predictably from the smaller than the larger teams.

Significance to the Architectural Profession

Breakthrough is one manifestation of the impact of the great changes in the building industry referred to by Gropius. But there is ambivalence in the architectural profession toward these changes.

On the one hand, there is an underlying fear of change in the traditional roles, a threat of dominance or complete displacement of the architect's function by an image of a computerized industry, an aerospace technology or vast managerial consortia plugging robotized criteria into their design machines, extruding their sterile products across the landscape under the banner of cost/effectiveness. On the other hand, there is impatience with the status quo, with the redundancies of efforts, the waste of energies and resources, the inability to apply combined talents on a scale appropriate to the magnitude of the problems. There is an enthusiasm for what can be done, an understanding of new techniques and methodologies as design tools and a recognition of the freedom and possibilities offered by new vocabularies of simple, industrially developed components.

The fears stem from the confusion discussed earlier between the competency to handle complications (the multiquantifiable problems) and complexity (the core problems of synthesis). Industry and the profession itself need to increase their ability to master complications. However, this does not threaten the essential function of someone or some team with the key competency to synthesize. This role must exist and it is essential to industry; the question may be whether it will be exercised by the architect or a "system synthesizer" or "environmental integrator." The title may change; the role is far from obsolete.

Breakthrough, therefore, represents an opportunity, not a threat, to the profession. Different roles can be identified in the process that the program exemplifies: the role in programming and criteria development, of systems design, of utilization of and planning with the systems, and of evaluation of the process itself and its products. All these roles are being played in varying degrees in Breakthrough.

> *"But, to be honest with ourselves, we must admit that only relatively few of us architects have directly taken part in influencing and performing this great change, or in designing those component parts which we all use in building. It is the engineer and the scientist who have been instrumental in this development. That is why we have to speed up to regain lost ground by training our young generation of architects for their twofold task: 1) to join the building industry and to take active part in developing and forming all those component parts for building; and 2) to learn how to compose beautiful buildings from these industralized parts. This presupposes, in my opinion, much more direct participation and experience in the workshop and in the field in contact with industry and builders that our usual training provides.*
>
> *"The coming generation of architects must bridge that fatal gap between design and building."* WALTER GROPIUS
>
> *Scope of Total Architecture,* 1952

As already mentioned, a great need for impact from the profession exists in the development of design criteria, both in the areas of systems performance and site/community. Breakthrough staff realizes the major work that must be done to establish the relationships of physical planning to the human needs and social goals. Some important operational mechanisms with which this work can be done have been established but little of the work itself has been accomplished.

The role of systems designer, the essential role of synthesizer, is being played with various degrees of success in many of the Breakthrough projects. Most of the final systems demonstrations will amply demonstrate the lack of this key work, hopefully a few may demonstrate its proper execution.

The role of systems utilization and site planning with systems has been given priority recognition in the program. However, there has been insufficient information and coordination between systems developers and the project site planners, and the effectiveness of this role has been greatly diminished by too many systems imposed on each site.

The last role, that of evaluator, has and will continue to be part of Breakthrough. A great need exists for more consistent evaluation throughout the profession's own work. Industry and Breakthrough particularly would benefit from this.

Many "mystiques" are current regarding the new directions of industralized building systems and the future roles of the industry and the profession. The profession has a vital contribution to make in dispelling these mystiques by rigorously analyzing its own problem-solving role, by actively participating in evaluation of all these new efforts and by establishing as constructive a discourse as possible with industry, with government programs such as Operation Breakthrough and, most particularly, with its own membership. □

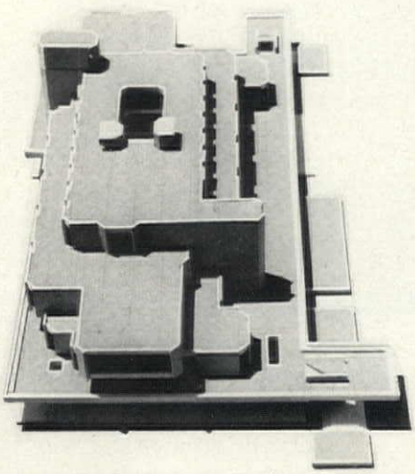
Introducing a New Series About Architectural Services

The AIA Standard Forms of Agreement Between Owner and Architect divide the latter's "Basic Services" into five phases: Schematic Design, Design Development, Construction Documents, Bidding or Negotiations and Administration of the Contract. These basic services form the nucleus of architectural practice and, in many instances, the total service.

A listing of "Additional Services" follows in the agreement forms. The 1961 edition included nine types of additional services; 1966, 16 types; and 1970, 20 types, with a 21st item — for the first time making provisions for "any other services not otherwise included." This expanding, and now open-ended, list of additional services reflects the practice of more and more architects in providing clients a comprehensive approach to their building programs.

In 1965, The American Institute of Architects published the book *Comprehensive Architectural Services — General Principles,* edited by Wm. Dudley Hunt Jr., FAIA. It was a compilation of articles that had appeared in the AIA JOURNAL and gave a first, broad look at the whole spectrum of services that are now being indicated in the AIA agreement forms.

In the following, the JOURNAL, working with the AIA Committee on Commerce and Industry, begins a series of ministudies of projects that we hope will demonstrate the provision of these additional services by architects to their clients. The services will vary in complexity from the fairly simple to the more sophisticated; the building types will vary, too, as suggested by the examples shown here; and the firms involved will range from small to very large offices. THE EDITORS



University Classroom Building, New Mexico

Systems Manufacturing Facilities, Colorado

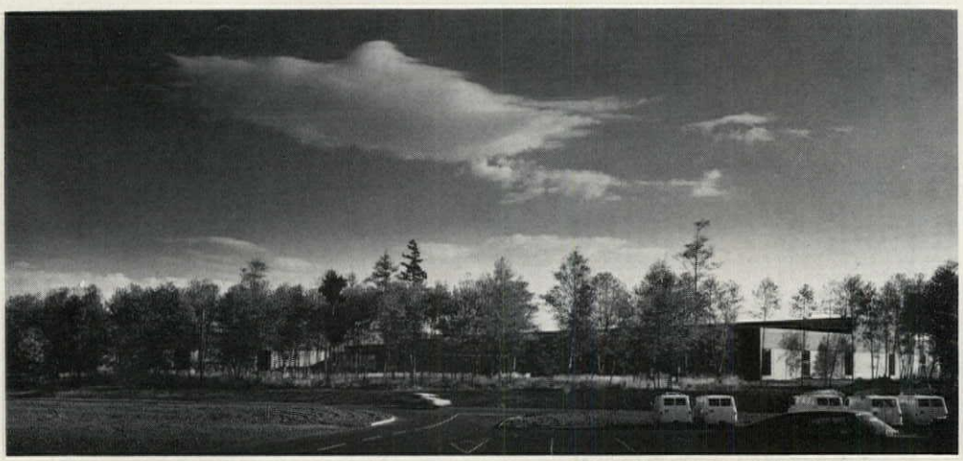
Public Housing, Illinois

Electronic Manufacturing Facilities, Oregon

MECHANICAL PRODUCTS BUILDING
TEKTRONIX, INC.

Beaverton, Oregon

Ministudy of a Project



Architects: Wolff Zimmer Gunsul Frasca Ritter, a 40-man firm (20 registered architects) affiliated with Nortec, Inc., a multidisciplinary engineering group of about the same size. Based in Portland with an office in San Francisco, WZGFR is the outgrowth of a practice organized in 1942 by George Wolff and Truman Phillips; today it has an annual volume in completed projects averaging $22 million in direct construction costs.
Type of Architectural Contract: Percentage of construction cost.
Additional Services: Development of a method of producing early bidding documents termed "scope drawings"* which provided the owner with a guaranteed price very early in the program; teaming up with the contractor in value engineering, trades availability and market research to determine optimum material and technique utilization; designing and engineering the project within pre-established component unit cost.
Consultants: Structural, mechanical and electrical design — Nortec, Inc.; field surveying — Pettijohn Engineering Co. Inc.; soils engineering — Shannon & Wilson.
Type of Construction Contract: Negotiated general contract (Reimers & Jolivette) with bids from a selected list of subcontractors.
Project Costs: Manufacturing complex — $13.31 per square foot (structural/architectural — $6.89; mechanical/electrical — $6.42); cafeteria — $26.60 per square foot.
Program Requirements and Solutions: Specifically, the architects were asked to:

• Design a building to house the manufacture of electronic components for cathoderay oscilloscopes and related devices; assume that unheard of and completely new processes would eventually be installed; produce an interior environment to accept variables from quiet laboratory and office space to punch presses and die-casting machines without major revisions to structure or mechanical/electrical systems.

In very simple terms, an inner overall environment was devised, providing gross mechanical/electrical and volumetric requirements. As activities develop, they take their needs from within the space. If, at some point in time, individual needs exceed the gross system, then the latter is expanded, not the former.

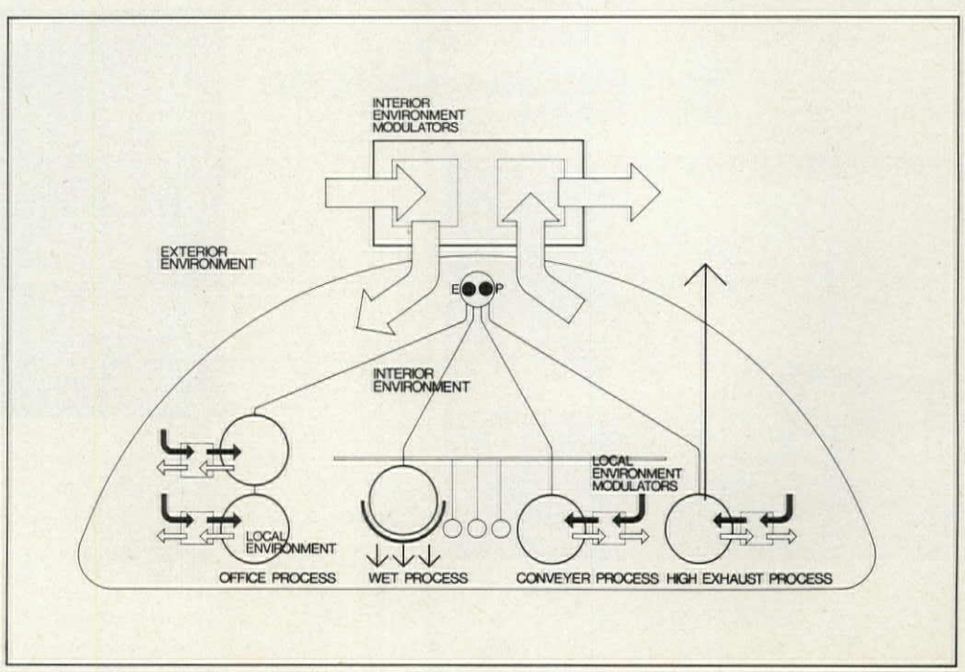
Where enclosures are required (offices, engineering, etc.), a subsystem takes its air requirements not from a direct connection but from air produced by the gross system.

To meet the needs of future overhead systems such as conveyors, or undersystems such as gravity drains, the clear height floor to structure merely has been increased; where gravity drains are required, platforms hold wet process and drains connect to spaced inlets to underfloor waste systems.

• Devise a concept compatible with the present development, a 200-acre single-owner site consisting of masonry buildings, large green areas and pleasant wooded sections; integrate the 200,000-square-foot interior with the outside, taking advantage of the campuslike setting.

An L-shaped structure was evolved to break down scale and preserve existing trees. The cafeteria and other common facilities are at the center of the L. Massive grass units placed at 50-foot intervals allow views from all areas of the complex. Brick and painted metal exterior match existing materials.

• Scale the budget to industrial construction costs.



* Consist of overall architectural plans, sections and elevations accompanied by typical structural, mechanical, electrical and architectural details and specifications.

A conventional lightweight steel frame is beefed up with a continuous center bay monitor to house capital fan equipment with indoor access. Exterior walls are of stock metal panels and cavity brick/block. Glass is gasketed to steel structural members.

Airconditioning is provided by 18 single-zone air supply units located on platforms in the monitor. Each serves an area of about 10,000 square feet by furnishing 20,000 cfm of conditioned air to the space. The units individually are capable of providing 100-percent outside air as required to offset future process exhaust system requirements.

Heating and cooling is supplied from a central plant with 350-degree hot water and 42-degree chilled water. The monitor serves as a raceway for compressed air and process cooling water mains and also provides space for future process exhaust fans and specialized process equipment.

Electrical power (480/277 volts) is distributed throughout the building by means of a 1,600-amp bus duct located in the monitor split into four independent systems.

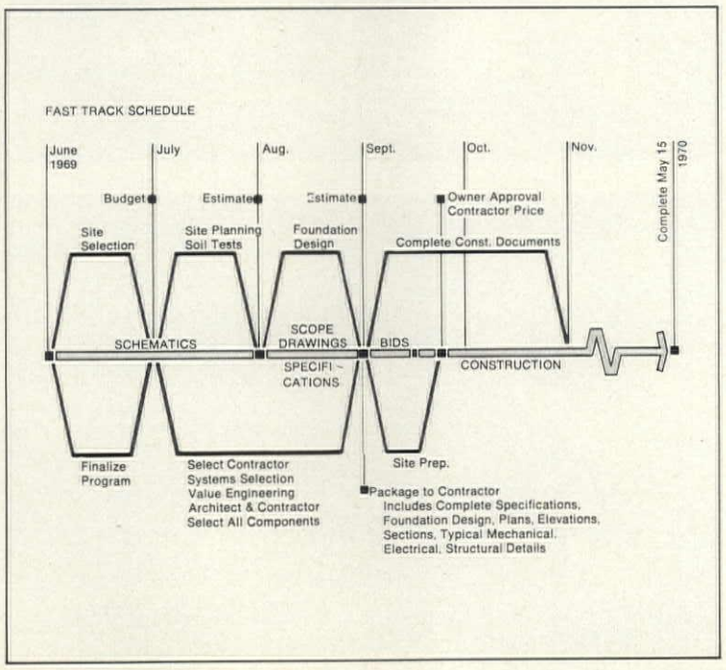
Lighting is furnished by mercury vapor fixtures mounted 18 feet above the floor, spaced to offer a minimum light level of 150 footcandles with minimal shadowing.

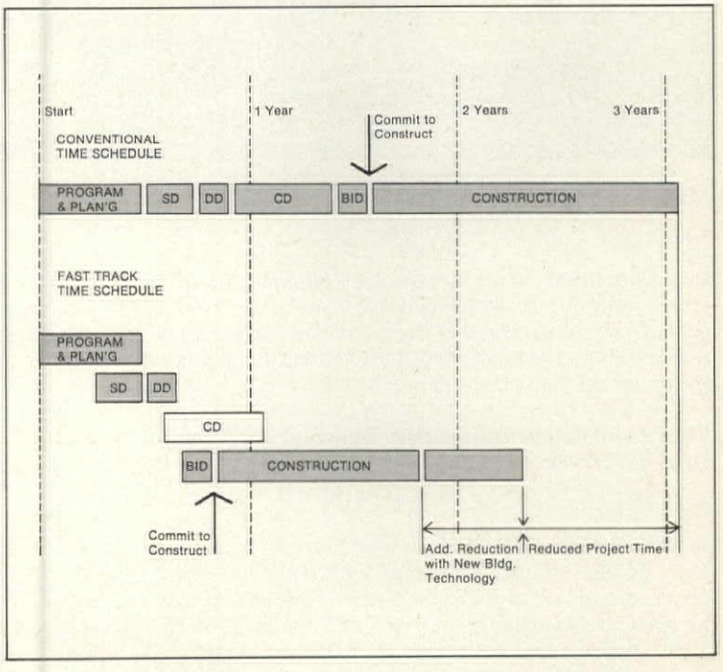
• Complete the structure within 12 months from start of design. (If this were not possible, costly moves would have to be made. However, the owner would not commit to beginning the project without knowing ultimate costs which had to fall within normal prices for industrial facilities — that is to say, an open-ended time/materials construction program was not acceptable.)

Preliminary conferences were held with area contractors, subcontractors and suppliers to explore the feasibility of such a program. It was determined that it would be feasible if 1) the architects could produce bidding documents three months after start of design, 2) the owner would commit to site preparation early and 3) components, stock or special design, would be limited by availability and delivery time (*see* Fast Track Schedule for month-to-month accomplishments and Comparative Time Schedules.)

Special Benefits to the Owner: The start-of-design to move-in time was reduced by six months; the owner had in hand a fixed price and fixed time schedule in less than four months after the start of site selection; the project cost as finally established was 10.5 percent below the accepted budget; the structural/mechanical design solution yielded optimum flexibility without committing to initial high capital costs and without waiting for process design.

Architects' Comments: The type of response to this project is a logical one to today's commercial/industrial client, although it does imply more responsibility for the architects and a very close rapport among them, engineers and contractors. Serious practitioners must gear up to the job or it will be done by others. Most important of all, traditional knowledge and abilities in design must be turned to the new demands so that each completed work not only meets schedule and budget but also employs the best architectural and environmental qualities that can be achieved within those limitations. □

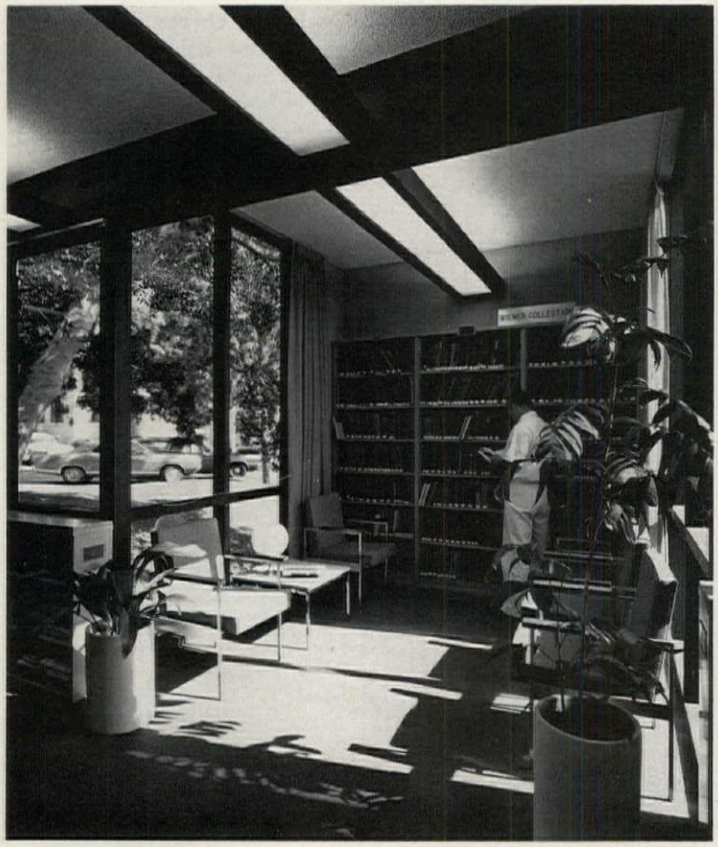




1970 Naval Facilities Awards Program

Six winners have been selected from 48 entries in the second biennial Awards Program for Distinguished Architectural Achievement sponsored by the Naval Facilities Engineering Command of the Department of the Navy in cooperation with The American Institute of Architects.

Jury Report: The jury was impressed with the many good buildings which were submitted appropriate to their tastes, conscientiously detailed and executed sometimes within exacting limitations. It especially commends several which added qualities of life and humanity well past the demands of their programs. It is encouraging to see so many conscientious and capable efforts to design buildings to be executed within the Navy's regulations and to see signs that those regulations are being looked at in a new way to make those efforts fruitful. Charles W. Moore, FAIA, Chairman of the Jury; Edward G. Grafton, AIA; William Marshall Jr., AIA; Dan Childress, Student Observer.



Medical Library, US Navy Hospital, San Diego, California.

Architects: Delawie, Macy & Henderson.

Jury Comment: The jury especially admired the siting of this handsome, little library which holds its own against the large buildings behind and even enhances the power of the grouping. The detailing is admirably consistent, and the relation of indoors to out creates a warm and human atmosphere.

Chapel and Religious Education Building, US Naval Training Center, Orlando, Florida.

Architect: James A. McDonald, AIA

Jury Comment: This clear and bold chapel, which simply achieves a sense of high drama, is detailed with sensitivity and restraint and is understated in all of the right places. The building sits successfully in its open environment and even makes the most of an adjacent water tower, which could have been an inhibiting factor.

HONOR AWARDS

Enlisted Men's Barracks, Naval Air Station, North Island, San Diego, California.

Architects: Delawie, Macy & Henderson

Jury Comment: This scheme of great clarity and simplicity manages to avoid the institutional monotony characteristic of most barracks and infuses personality, warmth and even excitement while remaining well within the Navy's budget and constraints. It is a concerned and human solution.

Naval Reserve Training Center, Scranton/Wilkes Barre Airport, Avoca, Pennsylvania.

Architects: von Storch & Burkavage

Jury Comment: This crisp and lighthearted structure seems especially appropriate to its task of training "weekend warriors" and to its site. It is free, fresh and handsome.

AWARDS OF MERIT

FY-68 Family Housing, Bremerton Annex, US Naval Shipyard, Bremerton, Washington.

Architect: R. James Dersham, AIA

Jury Comment: These family housing units are sited to take full advantage of the contours and the beautiful existing trees. Great attention is paid to privacy and visual amenity, though the price paid to avoid monotony is sometimes a slight fussiness.

Michelson-Chauvenet Hall, US Naval Academy, Annapolis, Maryland.

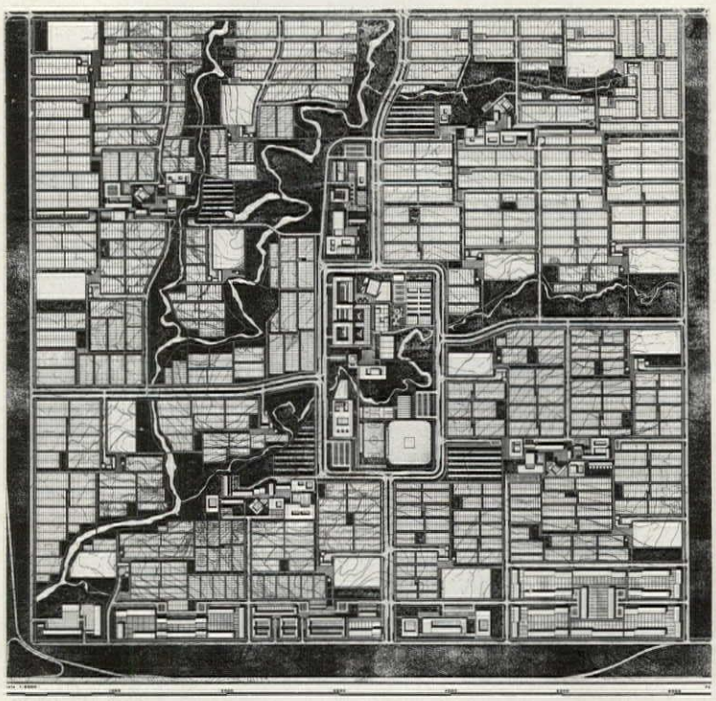
Architects: John Carl Warnecke & Associates

Jury Comment: This academic building is a good neighbor to the adjacent French Renaissance buildings. Partially because of skill of the massing, it achieves grandeur with restraint and without bombastic or oppressive formality. The interiors are straightforward; the recall of neighboring forms is especially successful.

TOWARD A BETTER ENVIRONMENT

by JULIAN A. KULSKI, AIA

The emphasis of the next few decades will be upon the attempt to resolve environmental problems. There is a pressing need to provide society with a new source of funds and innovative ways of implementing the economic growth and the reconstruction of urban and rural underdeveloped areas. Toward this end, the idea is proposed here of a United States Environmental Development Corporation. It is not clear what specific role The American Institute of Architects should play in helping meet the socio-economic difficulties of our time, but to make the Institute more relevant to societal demands, it is also proposed that an AIA Environmental Academy be formed which would function as a center of research on the man-made environment and on professional development. It is recommended that the study of these two related projects be given to a specially formed task force and that its findings be presented by the Institute to the US Congress.



The high caliber of architecture and planning of a new environment, as portrayed in the capital city of Islamabad, Pakistan, provides a parallel to the suggestion made in this article for the establishment of a United States Environmental Development Corporation. The planning and building of the city were made possible by aid of various national and international organizations who provided both money and technical assistance. Such cooperative effort and intelligent use of resources are needed for the provision of funds and an organization which would be capable of the comprehensive development of new towns and cities in our own country.

"From the city flows the inspiration which pulsates life into the nation. It is a symbol of our hopes. It is a mirror of our desires. It is the heart and soul of the nation." Thus did the Federal Capital Commission, appointed in 1959 by the Pakistani Government, express its sentiments about the new capital, to be located below the foothills of the Himalayas. In 1960, the commission was replaced by the Capital Development Authority, and the small group of experts increased to include many directorates and several consultants.

The master plan of Islamabad (above) is by Doxiadis Associates, who worked for 10 years to develop it. As parts of the plan begin to function and are completed, life flows into the city, and it has become in truth a symbol and an inspiration for the future.

The limitations to the creation of urban spaces which are conducive to the economic and cultural development of deprived and disadvantaged people are multitudinous. National planning continues to fail to recognize that the economic growth of urban ghettos and the building of new communities are top priorities. Political boundaries and administrative systems are generally obsolete and do not coincide with the realities of the problem areas. Industry, government and the professions are attacking the design of space in a compartmentalized and highly individualistic fashion, preferring short-term, stop-gap remedies to long-term socio-economic reforms.

The token interest recently evidenced in urban underdeveloped areas is only a reaction to the riots of the 1960s. As such, these half-hearted efforts cannot be expected to produce anything more than a continuation of sporadic and highly experimental short-range urban renewal programs which, to date, have been largely responsible for attempts to destroy the indigenous quality of urban neighborhoods, for black removal and for the accentuation of already enormous and economic problems of the inner city.

The doleful socio-economic conditions of the black inner city neighborhoods are but a demonstration of the pockets of poverty throughout the nation. Lacking decent housing, educational opportunities and the amenities of life that are so plentiful in surrounding areas, the space of the ghetto is in every sense cut off from the space of the universe.

If these places are to be re-established as significant urban spaces, conducive to further development, they must first be assisted to redevelop, renew and reform from the inside. No amount of token assistance from government or private outside sources can be expected to accomplish this task. The inner city is fully capable of achieving its own renaissance if given the power to govern itself and adequate financial and technical assistance.

The inner city neighborhood, as an established urban entity, must have its own representative government which would be responsible for charting and planning its development with accompanying powers to borrow long-term, low interest or interest free loans. Such largely self-governing units would be capable of redevelopment to the point where spatial and human integration become a reality. Partnership between unequals is economically and spatially impossible.

In order to meet the critical requirements of society, capital is needed to finance the reconstruction of cities destroyed by decades of neglect and to increase the education, productivity and living standards. The task is so great and involves financial risks of such magnitude that private capital alone is obviously unable to undertake them. The undertaking must of necessity exceed presently employed methods and available federal, state, municipal and private resources. New approaches to planning and development are required.

Two decades of urban renewal efforts stand witness to the gross inadequacies of the Department of Housing and Urban Development and of its predecessor, the Housing and Home Finance Agency, in coping with the mammoth problems of developing urban America and solving its socio-physical problems. The history of private, municipal or county sponsored programs is even more insignificant and less magnanimous than the national effort. Since the end of World War II, we have attempted to meet the demands of housing for our burgeoning urban population by simply producing more of the same. Hardly utilizing the space age mass production know-how and misusing urban land, we have created suburban wastelands and enormous problems in the center city. Since 1945, the US has built almost 40 million housing units, but only several hundred thousand of these have been within the low cost range for low income people who account for about one quarter of our urban population. Public apathy has not encouraged innovative government housing programs and increased congressional appropriations required to meet these demands.

United States Environmental Development Corporation

It is proposed that an environmental development corporation be established. Embodied in the concept is the idea for the creation of a national investment institution capable of authorizing, granting or guaranteeing loans and credits for productive reconstruction of blighted areas and for economic development projects through mobilization of private capital resources, and provided with a structure under which the risk of investment in the inner city and rural areas of poverty would be shared by federal, state and local governments. The Urban Development Corporation in New York State is a first, though minute and grossly inadequate, step in this proposed general direction. No single political entity nor statewide organization alone is capable of providing the required financial assistance.

The proposed corporation, an interstate governmental institution, with all of its capital stock owned by the US member states and territories, could begin operation with as little as one-tenth of the subscribed authorized capital. Thus, with let's say a $30 billion operating capital, the corporation would have $300 billion of authorized capital which could be called in, if the money were needed to meet obligations as a result of borrowing or guaranteeing loans.

Such a basic capital structure would enable the institution to borrow much more sizable financial resources by selling its obli-

gations to private investors. Through the sale of bonds and notes to investors, the corporation would draw upon the tremendous resources of the private sector. It must be emphasized that no single resource, however large, is capable of meeting the environmental crisis. Therefore, the corporation's paid-in capital would simply be a feasible means by which the private capital of the US would be enhanced to move into the underdeveloped, high risk areas where need is greatest.

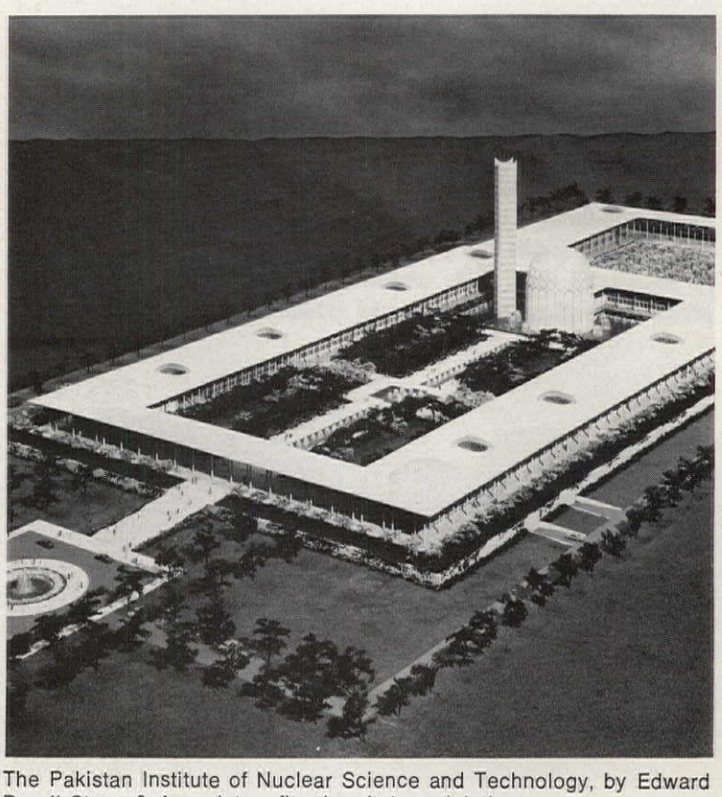
Although the corporation is envisioned as an intergovernmental, interstate institution, it would rely mainly upon private investors for its financial base. The degree of guaranteed risk would be limited only by the requirement that the total amount of outstanding loans and credits made or guaranteed by the corporation would not exceed the total of subscribed capital plus reserves and surplus.

To avoid defaults, it would be incumbent upon the corporation to insure that loans are not made without careful attention to the borrower's ability to pay. The borrower might be a state government or a political subdivision, such as a county or municipality, or even a private business enterprise located in the territory of a member state. Should the borrower be a private enterprise or a community group duly incorporated in the member state's territory, however, the state government would have to act as the guarantor. Furthermore, the corporation would have to insure that the proceeds of each loan are used exclusively for the purposes for which the loan was initially made and would have to insist that the borrower pay utmost attention to economy.

In order to obtain maximum success in its primary role as an economic development institution, the corporation would also have to make sure that it does not grant loans in cases where the borrower could obtain funds from other reasonable sources. Only economic considerations would be relevant to the corporation's decision to make a loan or grant a credit, if the basic objectives of the proposed corporation are to be implemented.

In order to optimize the economic and technical assistance objectives of the corporation and to minimize adverse political pressures, the legal statutes, membership and organization of the institution would have to be carefully structured. Membership would be open to all states, with subscription to the capital stock based upon each state's comparative economic standing, with voting power relative to shareholdings. The powers of the corporation would be vested in a board consisting of the state governors, who would delegate the authority to executive directors. The latter would in actuality be responsible for the general operations of the corporation — loans, financing, budgets, policies and technical assistance operations.

The technical assistance operations of the proposed corporation would be handled by departments which would be responsible for conducting continuing economic studies of all regional and metropolitan areas of the US. They also would conduct studies of sectors such as housing, transportation, education and industry, as well as pollution control, in an interdisciplinary and intersectorial manner. They would be responsible for identifying projects, financing and supervision. Basically, the objective of the institution would be to provide a unified data bank for economic development of urban and rural areas, provision of funds and tech-



The Pakistan Institute of Nuclear Science and Technology, by Edward Durell Stone & Associates, fits the site's undulations.

Dr. Kulski, a pioneer mover of the AIA's Professional Development Program and contributor of articles on the subject, is director of the Department of City and Regional Planning, Howard University, and an international development consultant. This article is adapted from his soon to be released book *Architecture in the Revolutionary Era,* with the permission of the Aurora Publishing Company.

nical assistance and formulation of policies and procedures for the administration of such assistance.

The corporation would cooperate with all agencies of the federal government, especially HUD, in order to provide the important link for a truly effective approach to economic development, to coordinate the private and public effort and to provide funds in quantities and in a manner not presently available. The present efforts are disjointed, inadequate and, to a large extent, wasteful. Instead of supporting economic development projects which would provide maximum economic returns, urban development projects to date have been, in large measure, based upon political and hand-to-mouth decisions. The proposed corporation would assist in the establishment of economic priorities and provide much needed low interest loans and no-interest credits for the development of urban and rural areas in dire need. It would further provide the country with a new power structure whose basic and immediate task would be to assist in the attainment of a significant environment for the millions who so far have been denied this basic human right.

AIA Environmental Academy

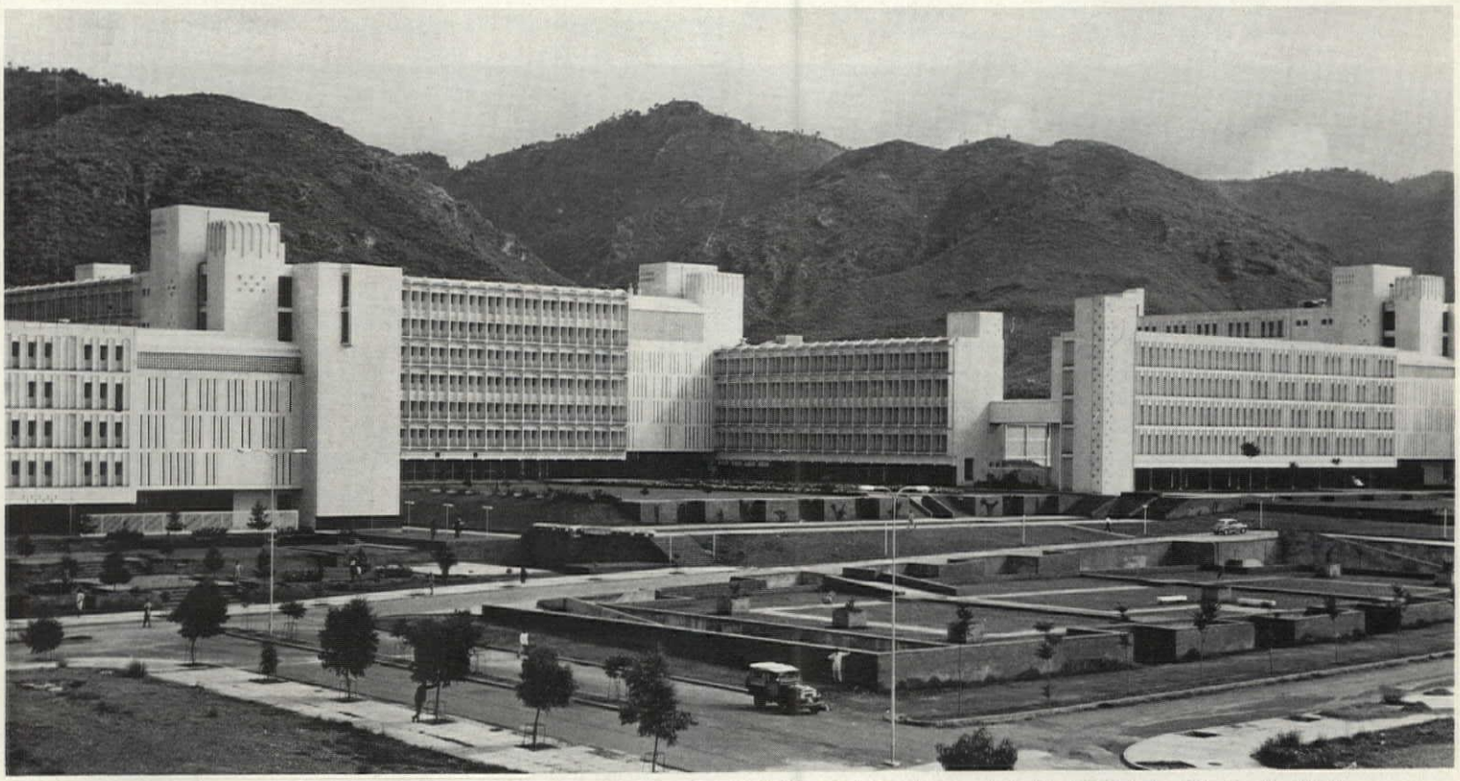
The established professional and educational institutions of the American architectural profession can at best only partially meet the environmental, interdisciplinary challenges and the demands for new social responsibilities of our epoch. The Task Force on Professional Responsibility to Society and the Professional Development Program of the AIA have been engaged in individual and joint efforts to meet this challenge. It would be unfortunate and futile for the American architect to abandon his basic social responsibility for shaping man's environment through systems architecture and to replace it with disjointed, nonprofessional and short-range social action programs.

To optimize the chances of being able to meet most of the new social responsibilities which face the architectural and other environmental design professions would be to improve the competence and to broaden the social responsibility of the professions and to assist in the education of the greatest number of well-qualified students from predominantly black and disadvantaged sectors of our society — all through a systematic and highly concentrated injection of excellence into the top but missing level of the educational system itself.

The problem which faces the profession — the dichotomy which still exists between education and practice and the needs of society — is but a reflection of the divisions existing in the world today where social progress has been far outstripped by technological genius. To bridge the gap, there is a need for more than mere random attempts to initiate new schools of architecture and of environmental studies, of more than mere reorganization of the philosophies and curricula of existing schools and of more than the Professional Development Program's valiant, and to a large degree successful, effort to provide coordinated and systematic mid-career educational opportunities. There is little hope, however, of being able to achieve the much needed coordinated improvements and to set the desired levels of excellence in architectural education and practice through these individual efforts alone. Further, the interested practitioner and professor of architecture in mid-career must be assured an opportunity for high level interdisciplinary study and for research in the environmental sciences and in systems architecture.

The distinguished military officer has the staff college for his professional development; the medical and legal professions have highly advanced and centralized professional development programs. The socially and environmentally motivated architect or architectural educator has no such facility and little opportunity for professional and educational support for his continuing development. It is therefore not surprising that the existing dichotomy, instead of disappearing, seems to be widening, with disastrous effects on the society and the environmental professions as well.

If the AIA is really serious about its responsibility to meet the social challenges of the '70s and '80s; if it is vitally interested



Islamabad is planned as an administrative center. The Central Secretariat Buildings (phase 1), completed in 1966, is by Gio Ponti of Italy.

in assisting communities in solving social, racial and economic problems; and if it is actually committed to the idea of faculty and practitioner improvement in an effort to resolve its goals of excellence in architectural practice and education, then well worth consideration is the establishment of a top-level national academy for the systematic, intensive, interdisciplinary and synoptic professional development of the American architect and environmentalist.

Such an academy would enable the profession to offer its members intersectorial research opportunity and scholar- and practitioner-in-residence facilities for interdisciplinary study. The inherent goals of the science of architecture and environics and, at the same time, the well-being of society would be advanced by means of greater environmental knowledge and the application of research. The academy would assist in improving professional competence, broadening the social responsibilities, strengthening the role of the environmental design schools and directing the entire spectrum of professional development programs and activities into areas of increased usefulness.

Instead of wasting the limited professional resources on random and uneconomic schemes and projects, the Institute's major effort in the early 1970s might be jointly to charge appropriate divisions of the AIA with the responsibility for the development of an academy with a possible target date of 1976.

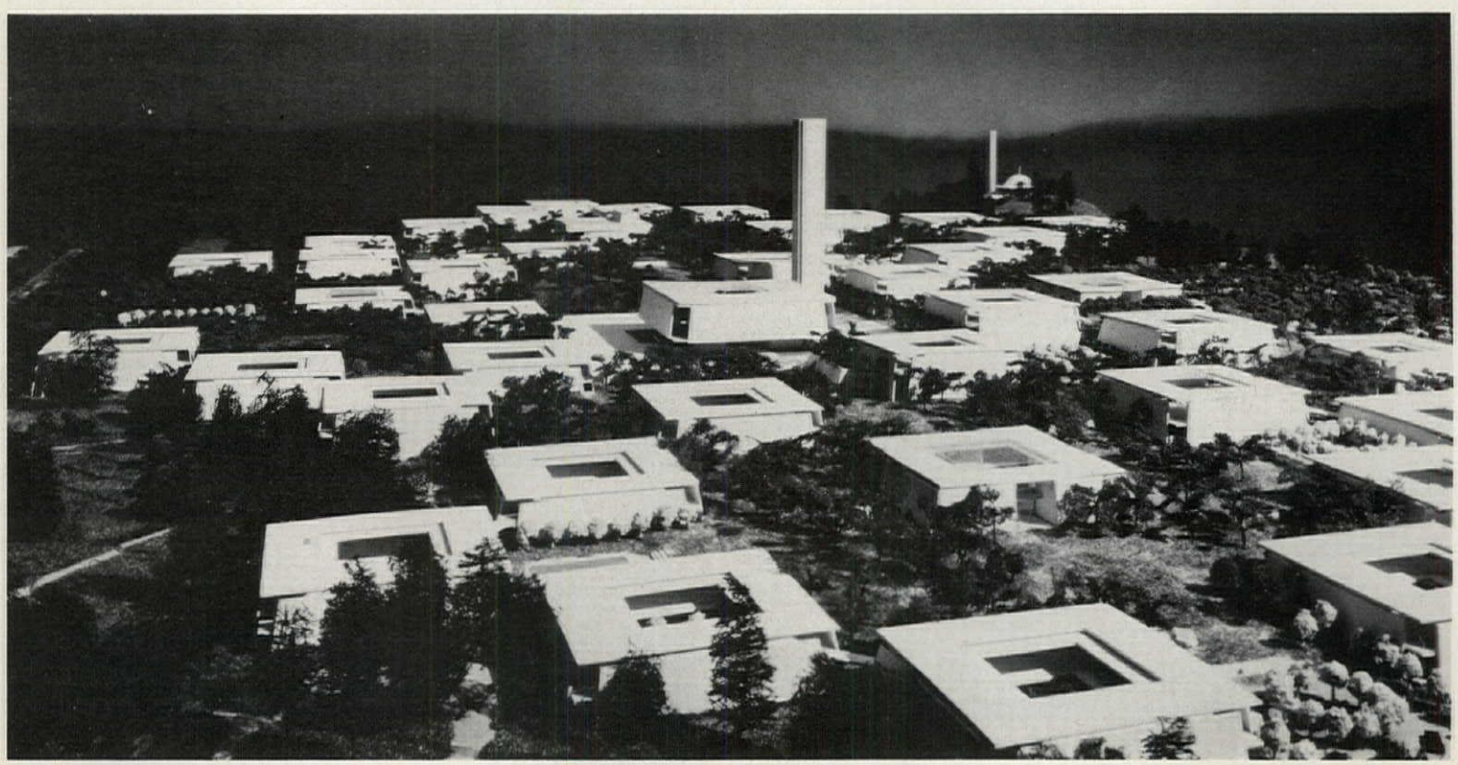
Preliminary study for the President's Residence (top) and model of the University of Islamabad: Edward Durell Stone & Associates.

Research that could be conducted at the academy would include economic development methods and political strategies through which environmental architecture could assume a leading role in meeting the new social demands of the profession. The far greater degree of man's freedom of movement, necessary to accommodate the population of the 20th century, is today being planned on the basis of 1970 projections, envisioning the population of the future as leading a 1970 pattern of living — traveling in today's vehicles, living in today's homes and participating in today's leisure activities. The study of alternative futures, particularly in the field of movement systems theory, must be further developed to enable the environmental planner to make realistic long-range plans. Without such projections, architecture will continue to meet past needs rather than to provide an environment which reflects current requirements and philosophies and assists in shaping the future.

Without a more economic use of resources, the gulf which today exists between technical ingenuity and social wisdom will doubtless continue to grow. The architectural profession, by focusing greater attention on its responsibilities for the social environment, would assist in eradicating the dichotomy between capability and responsibility.

The architect in the '70s faces the challenge and opportunity of meeting the new social demands: more significant leisure-time activity; more economic use of resources; better redistribution of income and amenities; increased citizen participation in environmental development; maximization of the freedom of movement and choice of educational and job opportunities; and improved use of industrial techniques to meet housing needs, eliminate all forms of discrimination and accelerate economic progress.

The proposed academy could be a great deal more than a "staff college" or a national design resource center. By coordinating its programs and objectives with those of the proposed Environmental Development Corporation, the action and research components of architecture could be combined with the result that the profession would put into practice the contemporary philosophy that the architect's actual client is the public and his primary responsibility is both social and environmental. □



As Our British Cousins Do It

by WILLIAM A. ALLEN

How the British professional society of architects changed policies to bring about greater efficiency, wider influence, increased contracts and public recognition is described in this informal account, prepared at the suggestion of several AIA members.

A quiet revolution in the Royal Institute of British Architects began in 1955. A number of its council members foresaw a need for changes and a strengthening of the profession's position. Over the 10 succeeding years, the council made a series of policy decisions which have had beneficial results.

In-house Research on Vital Statistics

The first important job seemed to be to set up an in-house research division so that we would have an instrument to obtain and process professional vital statistics and information. Typical purposes were to find out how much of the total building program the profession was engaged in; what parts we were *not* doing and why; income levels, pay rates, profits, the relation of workloads, trends, etc., all just as though we were a company performing a management and market analysis.

Probably this was the wisest thing we ever did, and all sorts of values have accrued. The research has given us a strength in negotiation, evidence for public inquiries and information for getting new areas of work. By quarterly sampling of jobs coming into the profession, we keep government, profession and industry informed about the status of the industry's workload trends. We have accuracy in sampling because we now have more than three-quarters of all new work.

Official Architects

Since the 19th century, we have had a tradition of architects as chief officers in central government, in counties (i.e., states) and in major cities. We decided to campaign and to negotiate in order to persuade every city of over 60,000 people to have its own chief architect with responsibility for his authority's building programs. This has been generally successful. It now seems that the chief architect is being commonly accepted as the primary professional officer of his ministry or authority, largely because he generally has the widest view and biggest budget.

We insisted on the chief architects having program responsibility and proper status so that their work could attract good designers and executives. Occasionally, but not always, they also have planning responsibility. There is a slow but steady migration of people back and forth between private and public practice. We expect public offices to do no more than two-thirds to three-fourths of the total program of the employing authority.

A spin-off value of good people in this position is that they are able to have an excellent influence on the political personnel's attitudes and the values and outlook of other officers. Their strongest supporters in the end are often the finance officers and committee chiefs.

On the whole, collaboration and working agreements with the private sector are good, and the combination of the two sides gives the profession as a whole an authoritative voice all the way up to cabinet level of government and in the industry. Roughly half the profession is classed in these and other nonprivate categories. We would not be without this arm of the service.

A Study of Our Services

We made an intensive sample survey of offices eight or nine years ago to support the research branch. We checked up on composition of the profession, types of office organization, kinds of activity, quality of service rendered (good and bad), profitability, motivations, ways of working, etc. It was a profile which we published — warts and all. Some said that we were fools to tell people about our faults; we like to think that it took some courage. It paid off tremendously, because it was realized that all the building professions have faults and that we were the only one with strength enough to admit them and go out to get them corrected.

The Profession as a Service

We took a stand on the concept that if architecture was good for some, it could be good for all and all should at least have access to it. The tough nut to crack was low income public housing. We negotiated vigorously to get a fee schedule to make this work attractive to good private offices, and we succeeded. We made environment a big feature. Even speculative work does not often ignore good design now.

The Planning Angle

We decided that town planning was too dominated by land use planners and engineers who had inadequate concepts about the quality of cities and city life and how to make it both good and efficient. The commanding height to hold for those concerned with a well-built environment is 3-D planning. When there is a 3-D planning concept, architects implement it, whether it is just an urban complex or a new city. We set out to roll back Philistines, and in less than five years we had largely done so by means of our own careful thought and planning.

Public Relations

We set up a vigorous public relations section to see that architecture was properly reported and well covered in press, radio and television. We reached into schools to attract high grade candidates for the profession. For five years, no branch of learning came anywhere near us in growth rate of applications for university admittance.

We made a policy decision that our top annual conference would always have discussions of matters of *public* interest. If you set out to gain influence, the public is entitled to know your views about the issues in your field. We usually get good coverage — anything from 35 to 75 square feet of national and local press space.

Making Friends and Influencing People

We built an elegant dining room in the Institute headquarters building and put a good chef in charge of it and the cafeteria. We constantly entertain influential people — the Prime Minister and other ministers, top public officials, trades union and commercial leaders, builders, et al., letting them meet architects. This is all private so that everyone can talk freely. Sometimes these leaders request such discussions. We have found all this a most valuable activity and investment.

Making an Image

By 1965, we were responsible for more of the country's fixed capital formation than any other group, and overall we used our public relations to promote an image of a profession essential to civilized life, concerned about society and its built environment and a national resource over which citizens should have control.

We worked hard to give the image all the reality needed for credibility by strengthening internal discipline and policing, by getting weak schools of architecture improved or closed and by other similar methods. We required better service from builders and the building materials industry and a stronger positioned influence with our consultants, engineers, estimators, et al., and we undertook some unusual steps to accomplish these goals.

Mr. Allen, formerly a member of the RIBA Council, is a partner in the London-based architectural firm of Bickerdike, Allen, Rich & Partners.

The Image on Paper

We decided to persuade journals, builders and the lot to go over to the international 'A' series of paper sizes. This is now used for journals, correspondence and all technical trade literature; it is the folded size for all drawings. Thus filing is greatly facilitated. Nearly all paper in the industry — even in government departments — followed our lead. The A series starts with A-0, which is a square meter in area with its sides in the ratio of 1 to the root of 2. Then A-1 is half that; A-2, half that; etc. A-4 is used for all correspondence and journals. We also promoted good typography.

We borrowed from The American Institute of Architects a 1920 idea of annual competitions for trade literature. This was successful.

We adopted and adapted a filing system so that everything filable is precoded in the upper right-hand corner. This procedure systematized the flow of useful trade information and made people see that we valued clear and methodical trade communication and that it was our job to give a lead.

We set up a liaison committee for industry to tell it where we had complaints, and for it to tell us. We used the committee also to promote good product design.

We developed a paint color range, using the Munsell classification, and caused the whole paint industry to adopt it. This is a good range and fairly well cuts out the uneconomic need and demand for special colors. Any of the 850 firms may make any color desired, but ours is a British standard and all firms are able to supply it. The idea has been extended to other surface materials — ceramics, enamels, plastics, floorings, etc., all "Munsellized" so that one can rely on the choice of color without having to ask for samples everywhere in order to work out decent schemes. A briefcaseful of bits of carpet, plastics, floor tiles and all the rest is no longer necessary for color design.

We got a fine design for a big enameled standard office name plate, with the RIBA monogram, to go on the large advertising boards which are set up on all sites. It carries all contractors' and subcontractors' names. This flies the flag both for the firms and RIBA. Now all the other professions do the same with separate colors. The plates are all the same size. A great success.

Our latest move is to set up a publishing company for all our own literature, standard forms, reports, etc. This is profitable, and the idea is being extended.

There are many other things I could mention but this brief survey should portray the policy ideas. Primarily they are:

- To make people understand what architects do and that architecture is the design of the environment.
- To make the architectural cake big by indispensability through service as the country's biggest spending profession.
- To be the national conscience for the built environment and to promote this concept by every means available.

There are many deficiencies yet, and we need a "rethink" from the coming generation. But in the 1950s we were doing only about 60 percent of the new building; now we are accomplishing over 80 percent. This at least is some measure of the effectiveness of the policies we have established. □

CHURCH OF SAN STEFANO

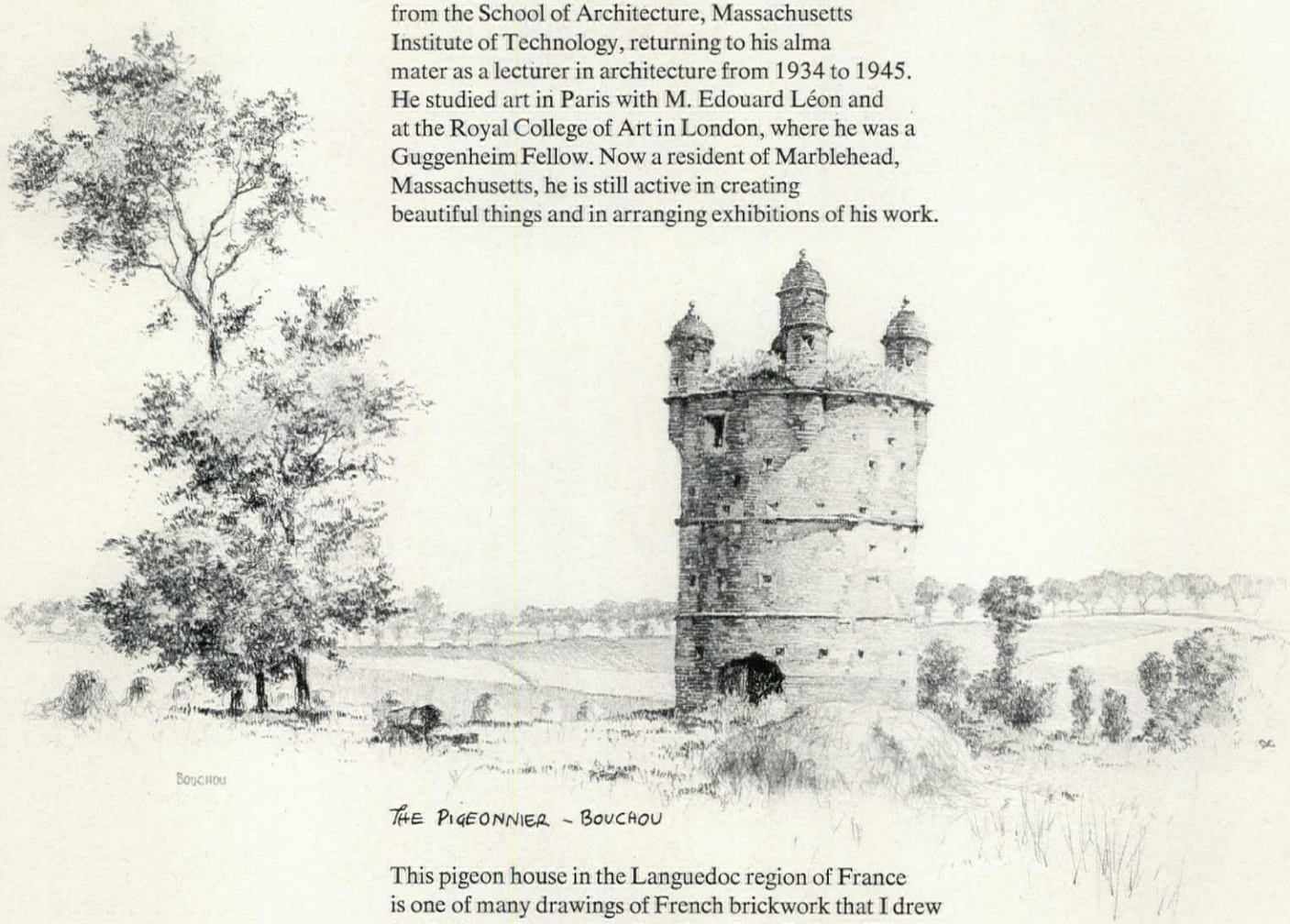
Samuel Chamberlain

In the 1950s, I spent three summers in Italy writing
a book called *Italian Bouquet* about restaurants, hotels, food,
wine and recipes, with a bit of tourism thrown in.
I had time for architectural sketches, of which this is one.

Elected to honorary membership in The American Institute of Architects in 1970, Samuel Chamberlain is the author of numerous books on architecture, travel and gastronomy which he has illustrated with photographs, etchings, pencil and pen-and-ink drawings. A selection of his pencil drawings follows with his own comments about them. "I think this is the medium that interests architects most," he says.

Chamberlain's work has brought him many coveted awards and memberships ranging from the Kate W. Arms Prize of the Society of American Etchers Exhibition in 1933 to fellowship in the American Academy of Arts and Sciences since 1946. His services in World Wars I and II earned him the French Legion of Honor, the Croix de Guerre and the US Army Air Corps' Bronze Star.

Born in Cresco, Iowa, in 1895, Chamberlain was graduated from the School of Architecture, Massachusetts Institute of Technology, returning to his alma mater as a lecturer in architecture from 1934 to 1945. He studied art in Paris with M. Edouard Léon and at the Royal College of Art in London, where he was a Guggenheim Fellow. Now a resident of Marblehead, Massachusetts, he is still active in creating beautiful things and in arranging exhibitions of his work.



THE PIGEONNIER - BOUCHOU

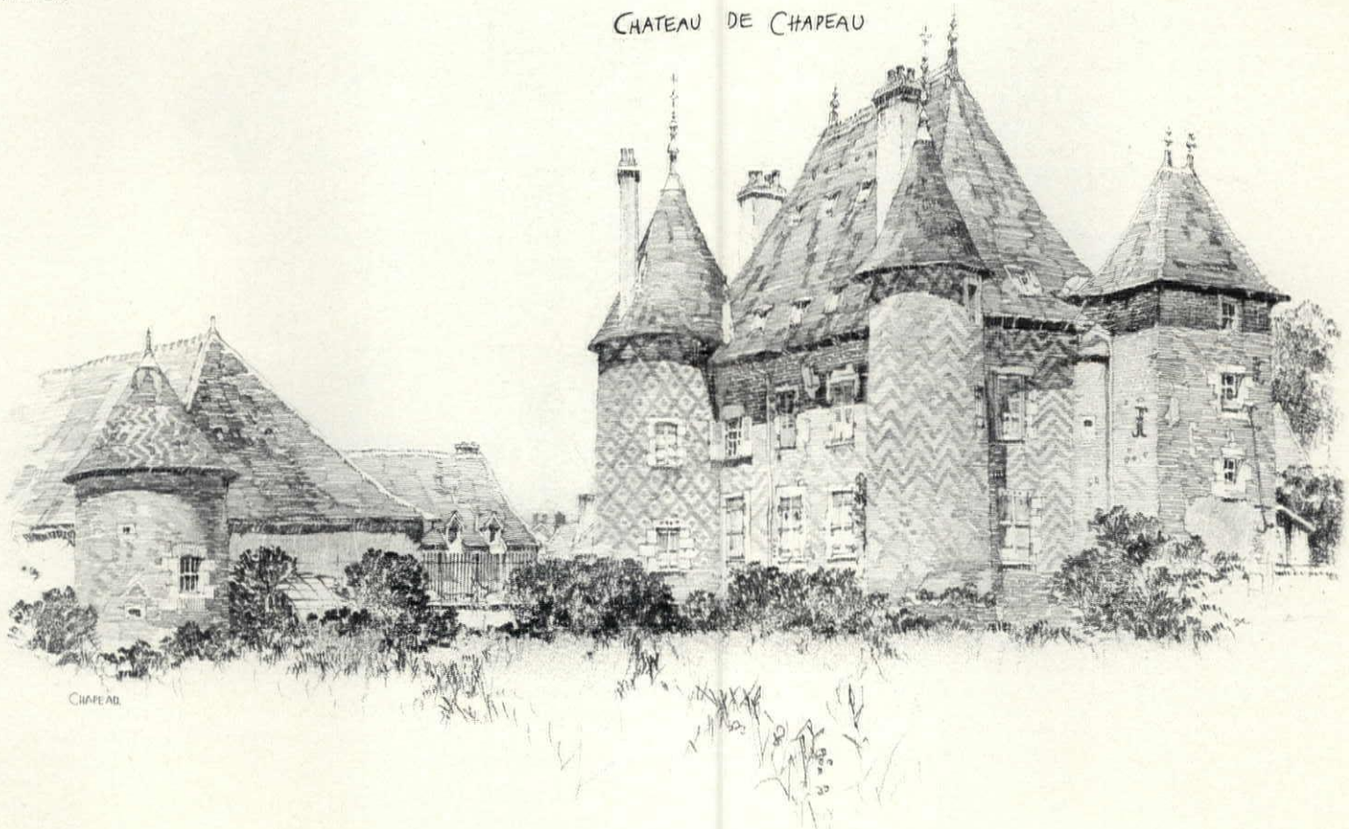
This pigeon house in the Languedoc region of France is one of many drawings of French brickwork that I drew for William Emerson, under whom I studied at MIT and whose participation in the AIA was many-faceted.

DOORWAY OF THE CONVENT OF SANTA MARIA
SALAMANCA

I made this drawing in 1924 while on a sightseeing expedition to Spain at the request of Charles Harris Whitaker, then editor of the AIA JOURNAL. It was published in a portfolio called *Sketches of Northern Spanish Architecture*. The doorway is interesting, presenting a symmetrical appearance although the balancing details are studiously unlike.

This is another of the drawings of French brickwork commissioned by William Emerson. He was intrigued by the tapestried brick patterns that flourish in Burgundy and the Berri, where this château, now a farmhouse, is located.

CHATEAU DE CHAPEAU



THE GAMBREL-ROOFED COTTAGE - ANNISQUAM

All the other drawings were made with graphite pencils, but this interpretation of an ancient cottage in Annisquam, Massachusetts, is done with four square Conté crayons of different degrees of blackness. This medium produces vigorous contrasts, good for publication.

THE RALEIGH TAVERN - WILLIAMSBURG

This is a working pencil drawing for a drypoint etching of Colonial Williamsburg, published in a limited edition in 1938. The commission came about due to the great encouragement of William G. Perry, FAIA, who recommended me.

'We Have Met the Enemy and He Is Us'

by FRED SMITH

A good environment comes at a high cost, and every single one of us has to pay for it in one way or another because we are all involved. More is required than money, however. The most important element is the willingness to find a way out of our dilemma.

Our present environmental upheaval has been a long time on the way and, in fact, is long overdue. But there is a reason to wonder how, at this late date, it came down upon us like an avalanche. We are not necessarily ruining our environment in more dire ways now than in 1968 or 1960. As a matter of record, we are doing more to restore and protect it than in each of those years.

Our first impulse, typically, is not to seek practical, considered solutions, or even to sort out the problem, but to take to the streets, like Carrie Nation, and start smashing up the furniture. If we are in trouble, somebody did it and he ought to have his head broken. There are several popular villains so far: overpopulation, politics, too meager federal funds — but most notorious of all is industry.

Many of the most vocal prime movers in the environmental revolution are people who are particularly hostile to business and industry and blame this sector of society for too much progress, too much materialism, too many gadgets — in short, too much civilization. They seem to feel that the natural acquisitiveness of individuals would go away if there were no one to cater to it. Stop generating so much electricity, and people will give up appliances; stop building highways, and people will give up automobiles.

This is elegant logic but, unfortunately, we may paint ourselves into a corner before too long if this point of view persists. There is a great welling-up of sentiment that to save our environment our economy must be reduced to "zero growth." While this sounds simple, the fact is that a certain factor of growth has long been built into the economic system. If we shortcircuit it, there could be disaster — quicker and at least as inescapable as the earth's presumed upcoming uninhabitability.

Moreover, there is an interdependence among things that have to be done. The economic growth necessary to do them cannot be ignored and cannot be eliminated by rhetoric or dramatic admonitions.

For example, we need $30 billion worth of sewage disposal facilities in the next five years if we are to get the upper hand over water pollution. Sewage plants are massive users of power, and nowhere near enough power is currently available to handle the load of hundreds, perhaps thousands, of new plants. But building new power facilities, siting new plants and setting aside new rights-of-way for transmission are being stopped everywhere across the country by protest and by court action. If we are to insist upon "zero growth" in power production, how will we get power to operate the facilities to eliminate pollution from our sewage-ridden streams?

Who determines the relative values of cleaning up our streams, on the one hand, as against preventing, on the other, the alleged scenic blight and potential pollution dangers of new power generating plants and transmission lines? We can't have it both ways. Or take electric automobiles, which seem so desirable to reduce air pollution. If 20 percent of the cars in the United States were powered by electricity, the national electrical load would skyrocket by 15 percent.

Before long, we will find ourselves boxed in all along the line. And nobody is attempting to calculate the ultimate costs and consequences of unilateral, dramatic, headline capturing demands to stop action at point "A" while demanding action at point "B," when the two are irrevocably interdependent.

This is not to say that irate citizens have no business interfering with what appears to be unnecessary pollution or with unessential industrial development and expansion. They have a right to protest, and it is just as well. They ought to stay on the alert, providing the protests are reasonably peaceful, and if the press and the courts are not exploited solely to promote the welfare and publicity purposes of professional reformers or of politicians or of the minority of radicals whose true and admitted objectives are to overthrow society by destroying its underpinnings.

Without such protests, industry won't be pushed, and it should be. Industry can do more than it wants to do. It can afford more than it feels that it can. The public will pay for more environmental protection in increased prices than industry thinks it will. Who complained when emission control systems added to the cost of a new car? The assignment of the day is to compel industry really to scratch.

We also need to protest the laxity of our cities in meeting their responsibilities in pollution abatement, for in some quarters they are the worst offenders of all. And the federal government, in spite of all the speeches emanating from the hallowed halls of Congress, has a long and stubborn record as a polluter.

A good environment comes at a high price. It is worth it, but everybody has to pay for it and everybody has to face the music. "We have met the enemy," says Pogo, the comic strip philosopher, "and he is us." Unhappily, the record indicates that when an individual is presented with the prospect of paying directly for an improved environment (not indirectly, as in the case of his new car) with an increase in taxes or with some form of personal discomfort, he too often loses his enthusiasm.

There seems to be widespread feeling that somehow the federal government can and should solve all our environmental problems by creating laws that affect someone else and by appropri-

ating funds. But nobody ever asks, "What makes you think Uncle Sam's supply of money is endless or, for that matter, why do you think money alone will do the job?"

A great day will dawn in this country when Congress and the Administration are required to have an approved nonpolitical system ready to get a job done before laws are passed to create an authorization of funds. The amount of the authorization and the method of distribution might then reflect with some accuracy the costs involved in carrying out the approved system to reach a predetermined result. The authorization would no longer reveal the public measure of the politician's passionate concern for a popular cause but would be based upon a practical budget.

This might result occasionally in the politicians having to come clean with the public on the magnitude of the contemplated objectives and the impossibility of complete success. They could no longer boast: "We are going to eliminate poverty; we will provide ample education for all; we will eliminate air and water pollution." Instead of ringing rhetoric, which has so delighted editorial writers in the past and has bred frustration in so many victims, the sadder and wiser politician will have to admit occasionally that there are unavoidable limitations beyond which available funds, applicable technologies and possible organizational structures cannot go.

In the final analysis, the job is to bring together various elements of the population who are involved in polluting the environment so that a course of constructive, cooperative action can be hammered out. It is fatal to invent ulterior motives and to polarize emotions and opinions when the task at hand is to coordinate efforts. I have seen instances where businessmen have made an honest effort to resolve problems with the assistance of professional environmentalists, only to have themselves plastered as nefarious maneuverers in the press.

In spite of these hazards, we blazed an important trail, in a microcosmic way, with the Electricity Utility Industry Task Force on Environment. At the time the task force was established, the electric utility industry was the most dreadful of all villains in the rising flood of environmental discussion, and public criticism and political reflexes had resulted in nearly 100 bills in Congress aimed at domesticating this apparently untamed animal. The courts had handed down some landmark decisions which will forever influence all new development and industrial expansion. Today, things are quiet on the Congressional front, and an opinion study among leading businessmen reports that "only the electric utility industry scored a clearly positive response. In all other cases, there was general recognition that individual industries have done less than a satisfactory job."

This is not quite as reassuring as it sounds. The utility industry's score was low, and we can assume that it was more a measure of honest effort than achievement; but most other industries came out with inexcusably poor records on both counts.

The task force proved it could steer an industry and its technologies in the right direction and prod its leadership into making substantial progress in areas where even the industry's most conscientious managers originally thought little could be done. We found out what an industry *can* do, and we determined fairly clearly what was technologically or economically out of reach at that time.

We haven't closed the books on the electric utility industry or its suppliers. The leadership working with us caught the spirit and, for the most part, went back home and did some remarkable things. The industry as a whole, however, followed this leadership with varying enthusiasm. In too many places, individual utilities, sometimes in concert with their state public service regulatory boards, have clung rigidly to the four decades old rule that a straight line is the smallest expenditure between two points — and don't spare the trees or any other natural impedimenta. Too many still adhere to the traditional conviction that the prime and only objective of the utility is to deliver the most possible power at the smallest cost to the consumers.

There are still power companies who view the undergrounding of distribution lines as undiluted heresy and a waste of money, and there are public service commissions who agree. This perhaps is one reason why the industry was expected to invest $47 million more on undergrounding in 1969 than in 1968, but wound up spending a few hundred thousand less than the year before. At the same time, overhead line expenditures, expected to increase by 1 percent, increased by 13 percent.

Will the industry really face the music in transmission lines, in the siting of atomic plants and the problems associated with hydraulic storage facilities? And will all of them do it, even though some do not yet have to contend with vocal and ingenious environmental enthusiasts? And will they build environmental considerations firmly into their engineering and financial and legal departments, as well as in their operating ones? Will they require that *nobody* do *anything* without asking: What will this do to the environment, and how can we avoid damage, and how much extra will it cost, and how can we manage it? That last is the most important: the willingness to find a way. Until this happens, the industry will not be out of the woods. And the woods are filled with wild and hungry animals with ravenous appetites for utility white meat.

Too much of industry across the board has still to wake up to the facts of life. There remains a residue of individuals, mainly in the trade associations, who still believe that they can talk their way out of this situation by endlessly reciting industry's virtues. But so long as smoke comes out of chimneys and pollution goes into streams, words will sound hollow. They won't convince; they will only irritate and add fuel to the fire.

The policy makers in industry, however, seem pretty well convinced of what they are up against. When a *Fortune* survey asked the cream of US business leaders whether protection of the environment should be taken into consideration if it meant inhibiting the introduction of new products, 88 percent said yes; if it meant foregoing an increase in production, 84 percent said yes; if it meant reducing profits, 85 percent said yes. That's a fairly clear consensus.

The environmental job that looms before us is a massive one, but it has to be done. It will take the ablest planning we have seen in this country since the space effort was organized. It will require very large chunks of money. It will show on the bottom line of a thousand annual reports. It will make a serious dent in our gross national product, at least temporarily, although curing some of the expensive side effects of some of our problems, of which environmental pollution is one, may in the end improve the GNP.

The cleanup job has to be done — make no mistake about that. The economic system in all its ramifications must be harnessed and put unequivocally in the service of the people and their priority needs, rather than vice versa. Make no mistake about that either. But in our enthusiasm to unmake past errors and to avoid future ones, we can't afford to throw out the baby with the bath water. □

Mr. Smith, an associate of Laurance S. Rockefeller, is chairman of the New York State Park Commission for the City of New York and director of several major firms including American Motors. Adapted here is an address delivered before the Missouri Valley Electric Association.

Highrise Office Design: It Can Be Systematic

by G. Neil Harper

The profession has a practical design tool in the computer when it comes to integrating the many aspects of highrise design. What's more, a simple to understand language is now provided, making proceedings easy to follow both for architect and client.

The architectural profession to date has not made significant imaginative use of computer technology in the design process. There are, of course, numerous instances of computer use in office management, elementary tabulation and estimating and a few interesting developments in architectural computer graphics. By and large, however, the fact remains that there has been little use of this tool in the actual creative aspects of practical design. This is in marked contrast to the use of the computer in several of the engineering disciplines, especially civil, structural and aeronautical engineering.

There are a number of reasons for this state of affairs, three of which seem especially important. First, the scope of the architectural problem is typically far more extensive than that of other disciplines. Second, architecture has traditionally lacked a well-defined analysis/design procedure that is easily mechanized. And third, members of the architectural profession are only now beginning to learn the computer skills necessary to use the machine in their practice.

The scope of the operational model described here has been limited to the highrise office building, although the essential concepts are equally valid for apartment, school and hospital design. Even at this restricted scope, however, there is a significant range of variables, including client building program, site limitations, building and zoning codes, engineering constraints, cost estimating, financing, etc. Thus the limitation of the scope of the prototype to highrise office buildings by no means renders the problem trivial.

This prototype development arbitrarily imposes on the problem a well-defined analysis/design procedure which is easy to mechanize and gives promise of producing reasonable design alternatives. The designer governs the solution procedure by specifying various design parameters such as admissible floor sizes, building heights, etc. The space envelope so marked off by the designer is then investigated systematically by the computer for possible solutions. The computational algorithms for determining the details of each solution have been provided by an interdisciplinary team of architectural designer, structural engineer, mechanical engineer, estimator, contractor and real estate analyst.

The Building Optimization Program (BOP) is probably best described by reference to the problem-oriented language that has been developed for use by the designer without prior computer experience. This language has been developed with the use of a Problem Language Analyzer (PLAN) on an IBM 8K single-disk 1130 computer and is similar to the language a designer might use in talking with his client and colleagues about the proposed building. The language falls naturally into several main classes. The examples given below are not exhaustive but serve to illustrate the basic nature and capabilities of BOP.

In the geometrical input class are those commands which have to do with client building programs, site limitations, dimensional restrictions, etc. The designer can assign a job name and date and call for the BOP program with the commands

```
JOB NAME, 'CLIENT X' Date 2 1 71 BOP.
```

If the client building program calls for 300,000 square feet, this is entered as

```
TARGET GROSS AREA, 300000.
```

It may be that the client also requires 14,000 to 16,000 square feet per floor:

```
FLOOR AREA LIMITS, MINIMUM 14000, MAXIMUM 16000.
```

Site limitations may also impose a maximum width of 125 feet and length of 150 feet:

```
BUILDING WIDTH LIMIT, MAXIMUM 125,
BUILDING LENGTH LIMIT, MAXIMUM 150.
```

The reader should bear in mind that the commands shown here are examples of the BOP language and can be punched directly into cards and then be read and interpreted by the BOP system. The ease of communication using such a language is a significant new achievement in architectural design.

There are, of course, a number of other commands available for specifying geometrical information. Some of these are:

```
LENGTH WIDTH RATIO, MINIMUM ——, MAXIMUM ——,
INCREMENT ——.
CORE WIDTH LIMITS, MINIMUM ——, MAXIMUM ——.
STORY HEIGHTS, FIRST ——, SECOND ——, TYPICAL ——,
MECHANICAL ——.
```

It is important at this point to emphasize that it is not necessary to give any of these commands to the computer, nor are the ones given required to be in any particular order. A complete set of consistent internal data is established by the computer initially on the basis of a given office's past experience and design standards. Any subsequent commands given by the designer serve to particularize the data for the job at hand.

Obviously, much of the data given by the geometrical commands are used by the structural and mechanical subsystems in computing column spacings, beam depths, clearances, heat loads, etc. In addition to the geometry, however, it is possible and necessary to be able to specify such information as limits on the structural span:

```
STRUCTURAL SPAN, MINIMUM —— MAXIMUM ——,
```

Mechanical floors typically require about 4 to 6 percent of the overall building area, with duct shaft openings of 1 or 2 percent on each floor:

```
MECHANICAL SPACE REQUIREMENTS, OVERALL 5 PCT,
PER FLOOR 2 PCT.
```

Heat gain in the building will obviously depend on the window wall characteristics and the environmental data:

Dr. Harper is president of CLM/Systems, Cambridge, Massachusetts. The original work described here was done in the Chicago office of Skidmore, Owings & Merrill, where he was previously an associate partner. A number of SOM personnel contributed to the study. Parts of the article are from Dr. Harper's "BOP — An Approach to Building Optimization" in *Proceedings — 1968 ACM National Conference*, and are reprinted by permission of the publisher, Brandon Systems Press, Princeton, New Jersey.

Figure 1.
Overall Summary of Computer-Generated Solutions

JOB TITLE CLIENT X
ALL SOLUTIONS AT 1 FLOOR INCREMENTS

DESIGN LIMITS	MINIMUM	MAXIMUM	TARGET
GROSS FLOOR AREA	270000.	330000.	300000.
GROSS AREA PER FLOOR	14000.	16000.	
BUILDING WIDTH	50.000	125.000	
BUILDING LENGTH	50.000	150.000	
CORE WIDTH	25.000	250.000	
CORE LENGTH	25.000	250.000	
CORE TO EXTERIOR SPAN	35.000	45.000	
NUMBER OF STORIES	1	100	
LENGTH WIDTH RATIO	1.000	2.000	
SHAPE INCREMENT	0.200		
NUMBER OF SOLUTIONS		25	
GLASS LINE OFFSET			0.000
BLDG LINE OFFSET			0.000

MODULE CHOICES 5- 0

ID NO	FL NO	MODL FT IN	LEASE SPAN FT IN	-FLOOR DIMENSIONS- L FT IN	W FT IN	LENGTH FT IN	WIDTH FT IN	-CORE DIMENSIONS-- L FT IN	W FT IN	LENGTH FT IN	WIDTH FT IN	GROSS PER FL SQ FT	TOTAL GROSS SQ FT	TOTAL RENT SQ FT	TOTAL PCT RENT	BLDG COST $1000	UNIT COST $/SF	RETURN ON INVEST
1	18	5- 0	35- 0	25	25	125- 0	125- 0	8	11	40- 0	55- 0	15625.	281250.	240862.	85.6	7385.	26.25	9.85
2	18	5- 0	35- 0	29	21	145- 0	105- 0	13	7	65- 0	35- 0	15225.	274050.	234194.	85.4	7273.	26.54	9.39
3	19	5- 0	35- 0	25	25	125- 0	125- 0	8	11	40- 0	55- 0	15625.	296875.	255649.	86.1	7730.	26.04	10.34
4	19	5- 0	35- 0	26	22	130- 0	110- 0	11	8	55- 0	40- 0	14300.	271700.	232236.	85.4	7250.	26.68	9.21
5	19	5- 0	35- 0	29	21	145- 0	105- 0	13	7	65- 0	35- 0	15225.	289275.	248581.	85.9	7612.	26.31	9.89
6	20	5- 0	35- 0	25	25	125- 0	125- 0	8	11	40- 0	55- 0	15625.	312500.	269488.	86.2	8068.	25.81	10.70
7	20	5- 0	35- 0	24	24	120- 0	120- 0	9	10	45- 0	50- 0	14400.	288000.	246617.	85.6	7605.	26.40	9.64
8	20	5- 0	35- 0	26	22	130- 0	110- 0	11	8	55- 0	40- 0	14300.	286000.	244750.	85.5	7563.	26.44	9.57
9	20	5- 0	35- 0	29	21	145- 0	105- 0	13	7	65- 0	35- 0	15225.	304500.	262020.	86.0	7944.	26.08	10.24
10	21	5- 0	35- 0	24	24	120- 0	120- 0	9	10	45- 0	50- 0	14400.	302400.	258933.	85.6	8012.	26.49	9.52
11	21	5- 0	35- 0	26	22	130- 0	110- 0	12	8	60- 0	40- 0	14300.	300300.	256966.	85.5	7981.	26.57	9.39
12	21	5- 0	35- 0	29	21	145- 0	105- 0	13	7	65- 0	35- 0	15225.	319725.	275161.	86.0	8368.	26.17	10.14
13	22	5- 0	35- 0	24	24	120- 0	120- 0	9	10	45- 0	50- 0	14400.	316800.	272390.	85.9	8354.	26.37	9.84
14	22	5- 0	35- 0	26	22	130- 0	110- 0	12	8	60- 0	40- 0	14300.	314600.	270323	85.9	8320.	26.44	9.71

OPTIMUM SOLUTIONS

LEAST COST	SOLUTION 4
LEAST $/SF	SOLUTION 6
MAXIMUM RETURN ON INVESTMENT	SOLUTION 6

Figure 2.
Architectural Summary

CLIENT X
SOLUTION 3

PLAN DIMENSIONS

MODULE	5 FT 0 IN	LEASE SPAN	35 FT 0 IN
FLOOR LENGTH	125 FT 0 IN	CORE LENGTH	40 FT 0 IN
FLOOR WIDTH	125 FT 0 IN	CORE WIDTH	55 FT 0 IN
TRAVEL DISTANCE	77. FT		

ELEVATION DIMENSIONS

FIRST FLOOR	AT 20.00 FT = 20.00	TYPICAL STRUCTURAL DEPTH	21.0 IN	MECH. ROOM LOCATIONS	
SECOND FLOOR	AT 12.50 FT = 12.50	TYPICAL MECHANICAL CLEARANCE	18.0 IN	FIRST	AT 19 FL
16 TYPICAL FLOORS	AT 12.50 FT = 200.00	TYPICAL LIGHTING CLEARANCE	6.0 IN	SECOND	AT *** FL
1 MECHANICAL FLOORS	AT 20.00 FT = 20.00	TYPICAL FLOOR TO CEILING	8 FT 9 IN	THIRD	AT *** FL
TOTALS	19 STORIES 252.50 FEET	TYPICAL FLOOR TO FLOOR	12 FT 6 IN	PARTIAL	AT *** FL

TYPICAL FLOOR AREAS (SQ. FT.)

GROSS PER FLOOR	15625.	MECHANICAL	315.	FIRE TOWER	0.
TOTAL BLDG GROSS	296875.	STAIRS	280.	TELEPHONE	43.
TOTAL BLDG RENTABLE	255649.	JANITORS CL	15.	TOILET	357.
OVERALL EFFICIENCY	86.1	ELECTRIC CL	80.	PART MECH	0.

NO. TOILET FIXTURES 5
STAIR WIDTH REQD. 88. IN.

ELEVATOR ZONING AND PERFORMANCE

ZONE	LOW FLOOR	HIGH FLOOR	ZONE POP	ZONE DENSITY	LOCAL CABS	TOTAL CABS	CAB SIZE	CAB SPEED	INTERVAL SECONDS	CAPACITY PCT	CAPACITY PEOPLE	SHAFT AREA	LOBBY AREA	TOTAL CORE	FLOOR EFF
1	2	10	909.	125.	4.	9.	3000.	500.	29.9	17.6	160.	720.	450.	2261.	91.5
2	11	18	808.	125.	5.	5.	3000.	700.	25.6	23.1	187.	400.	250.	1741.	93.6

0. FREIGHT ELEVATORS

WINDOW WALL CHARACTERISTICS, PCT GLASS ——
BLINDS FACTOR ——
UGLASS —— UWALL ——.
ENVIRONMENTAL DATA, TEMPERATURE OUTSIDE ——
INSIDE ——.
AIR INTAKE BTU ——
SOLAR GAIN ——.

Additional loads on the airconditioning system will depend on the level of illumination and convenience outlets, expressed in watts per square foot:

ELECTRICAL DATA, ILLUMINATION ——
CONVENIENCE OUTLETS ——.

It is also possible to specify items such as perimeter zone depth, cost and clearance factors as a function of system type:

MECHANICAL PERIMETER ZONE, MINIMUM ——
FT, MAXIMUM —— FT.
MECHANICAL SYSTEM TYPE, COST FACTOR ——
CLEARANCE ——.

One of the major influences in highrise office design is the elevator system. Typically, elevatoring is zoned, such as zone 1, 2 and 3 for low, medium and highrise zones, with appropriate zone densities or population in each zone:

ELEVATOR ZONE DATA, ZONE —— ZDENS —— ZPOP ——.

Elevator criteria and performance are usually specified, by zone, on the basis of the average interval between arrival of cabs at the ground floor and on the basis of carrying capacity at peak time:

ELEVATOR CRITERIA, ZONE —— INTERVAL ——
CAPACITY ——.

Elevator performance obviously depends on certain characteristics of the cab, such as size, speed, door time and width:

CAB DATA, ZONE —— SIZE —— SPEED ——
DTIME —— DWIDTH ——.

It is possible to perform independent elevator analyses by issuing the command

SELECT ELEVATORS, ZONE ——.

It is also possible to specify explicitly the number of freight elevators in a building:

NUMBER OF FREIGHT ELEVATORS ——.

Normally, however, the number of elevators and their sizes and speeds are selected automatically during the course of a single BOP run.

The reader should note that the elevator system, like the structural and mechanical systems, depends on a single common geometrical data base. It should also be noted, for example, that there is some interaction between the building population as

Figure 3.
Engineering Summary

```
                                    CLIENT X
                                    ------------
                                    SOLUTION  3
STRUCTURAL
----------
FLOOR SPAN      35.0 FT  BASE COST                3.50  SPAN PREMIUM    0.30     FOR SPANS   20. TO 40. FEET
UNDERFLOOR DUCT          UNDERFLOOR DUCT PREMIUM  0.50  HEIGHT PREMIUM  1.00     FOR HEIGHTS 20. TO 60. STORIES
PERIMETER AIR            PERIMETER AIR PREMIUM    0.15
EXPOSED STRUCTURE        EXPOSURE PREMIUM         0.30

                                    STRUCTURAL COST 1150390.  =  3.87 / SQFT

HVAC
----
                         WINDOW WALL CHARACTERISTICS     ENVIRONMENTAL DATA      ILLUMINATION          3.50 WATTS
COST MULTIPLIER    1.00    PCT GLASS          60.00        TEMP. INSIDE  75.00   CONVENIENCE OUTLETS   0.50 WATTS
COST PER TON    1200.00    BLINDS FACTOR       0.56        TEMP. OUTSIDE 95.00   BLDG POPULATION    2250.00 PEOPLE
PERIM ZONE DEPTH  15.00    UGLASS              1.13        SOLAR GAIN   126.00   GROSS SPACE REQ       0.050*GROSS
                           UWALL               0.25        OUTSIDE AIR    0.20
                                                           BTU/CFM       47.00

PERIMETER ZONE  118800.  SQFT     BTU      8107355.          COST        810735.
INTERIOR ZONE   133078.  SQFT     BTU      3546281.          COST        354628.
       TOTALS   251878.  SQFT     BTU     11653636.       TOTAL COST  1165363.  =  3.92 / SQFT
```

Figure 4.
Cost and Financial Summary

```
ENR COST INDEX  700.                                                              CLIENT X
                                                                                  ------------
BUILDING                          $    TOTAL     O/O    $/SF                      SOLUTION  3
    SITE WORK                     $        0.    0.00   $  0.00
    FOUNDATION                    $   285151.    4.93   $  0.96
    SUPERSTRUCTURE                $  1150390.   19.89   $  3.87
    EXTERIOR WALL                 $   977691.   16.90   $  3.29
    ARCHITECTURAL FINISHES        $   611833.   10.58   $  2.06
    ELEVATORS                     $   531160.    9.18   $  1.78
    PLUMBING                      $   296874.    5.13   $  0.99
    HVAC                          $  1165363.   20.15   $  3.92
    ELECTRICAL                    $   231279.    4.00   $  0.77
    GENERAL CONDITIONS            $   387704.    6.70   $  1.30
    G. C. FEE                     $   144549.    2.49   $  0.48
                                  ------------   -----  -------
BASE BUILDING COST--------        $  5781995.  100.00   $ 19.47
    CONTINGENCY                   $   576199.    9.99   $  1.94
    TENANT                        $  1283961.   22.20   $  4.32
    EQUIPMENT, FURNITURE          $    86729.    1.49   $  0.29
    OTHER                         $        0.    0.00   $  0.00
                                  ============   =====  =======
OVERALL BUILDING COST-----        $  7730885.  133.70   $ 26.04
                                  ============   =====  =======
OVERALL DIMENSIONS      19 STORIES          LENGTH  125.00   WIDTH  125.0   HEIGHT  252.5   LSPAN  35.0   MODULE 5.00
TOTAL BUILDING AREA       GROSS  296875.    RENTAL  255649.
AREA PER RENTABLE FLOOR   GROSS   15625.    RENTAL   14202.

RENTAL RATE       ($/SQFT)   6.00          LAND COST              773088.
OPERATING EXPENSES  (PCT)   40.00          TOTAL PROJECT COST    9416216.
VACANCY RATE        (PCT)    5.00          MORTGAGE AMOUNT       7062161.
MORTGAGE AVAILABLE  (PCT)   75.00          EQUITY                2354054.
DEBT SERVICE        (PCT)    8.50          GROSS INCOME          1533897.
LEGAL, FINANCING + PROM      5.00          NET INCOME             243359.
A-E FEE             (PCT)    6.00          RETURN ON INVESTMENT     10.34
```

specified for elevatoring purposes and the ultimate heat gain, due to these people, on the mechanical system. Thus the degree of integration of the various subsystems in BOP begins to become apparent.

A somewhat fuller description of the mechanism for cost computation is presented later. The purpose at this point is simply to indicate that the designer/estimator can input any one of approximately 50 detailed cost items by a command such as

ENTER COST DATA, ITEM —— { DOLLARS —— / PCT —— / SQ FT —— / UNIT PRICE —— }

The brackets indicate that costs may, in general, be input in one of four ways: as an absolute fixed dollar amount; as a percentage of the base building cost; as a dollar per square foot price; or on some unit price basis.

Cost also increases with increasing height. The user can so specify by a

COST VS HEIGHT CURVE, — — — — .

Investment data typically involve rental income, operating and tax expenses, vacancy rates, mortgage percentage and debt service, land costs, architect/engineer fee and promotional costs.

INVESTMENT DATA, RENT —— OPERATING EXPENSES ——
VACANCY —— MORTGAGE ——
DEBT SERVICE ——
LAND COST ——
AE FEE ——— PROMOTION ——.

At this point, one can also perform individual financial analyses:

COMPUTE RETURN ON INVESTMENT.

although this is typically part of the normal BOP output.

Once again, the foregoing serve only to indicate the general extent of the BOP language and capabilities. It is not necessary to give any or all of these commands; they are available but not required. Once the designer has entered a sufficient amount of detail (which is frequently only four or five data items at the inception of a project), the solution process can be entered by the command:

BLOCK OUT GEOMETRY, EVERY —— FLOORS.

"EVERY 5 FLOORS," for example, will cause solutions to be sought only for buildings with 5, 10, 15, floors, etc. (The precise starting point in this sequence is a function of the current geometrical data base.) Typical results of a BOP analysis are shown in Figures 1 through 4.

The one optimal solution which maximizes return on invest-

ment is automatically printed out in detail. It is possible to obtain similar information on other solutions by requesting

PRINT { GEOMETRY / ARCHITECTURAL / ENGINEERING / COST } SUMMARY, SOLUTIONS { — / — TO — / ALL }

The brackets indicate that a choice is to be made from the alternatives listed within them:

As discussed later, one can also get a rather detailed cost breakdown, by trade, by issuing the command:

PRINT COST BUDGET, SOLUTIONS { — / — TO — / ALL }

An important capability in developing a design is to be able to work on it over a period of time, alternately picking it up and laying it aside. This capability is provided by the BOP commands

{ SAVE / RESTORE } { DATA / BOP JOB } FILE.....

If the user has saved his job in file 121 on the disk, he can return to the computer the next day or next week, restore his job and proceed from where he left off. If he is so unfortunate as to have forgotten his file number, the beneficient machine will joggle his memory with a job name/file number equivalence list if so requested:

PRINT BOP JOB LIST.

Although the building costs are by no means the only useful result from BOP, they are sufficiently important to warrant a somewhat fuller explanation of the assumption behind the cost summaries and budgets mentioned in the text. A single command is available to give a complete listing of unit costs and assumed quantities:

PRINT COST ASSUMPTIONS.

Upon recognition of this command, the BOP routines produce output of the nature shown in Figure 5. A few words of explanation should be sufficient to enable the reader to grasp the essence of the cost approach implied. In general, the cost of each of 50 component items is given in one of four ways:

1. As an absolute dollar amount, column 1.
2. As a percentage of the base building cost, column 2.
3. As a dollar per square foot of gross building, column 3.
4. As a unit price times a quantity which is a function of the building geometry.

The actual basis on which the calculation for a particular item is made is implied by the location of asterisks; i.e., the one column of the four that has no asterisks is the current basis for cost computation for that item. For example, demolition is normally assumed at zero dollars, since that item cost is most often part of a separate contract. Structural foundation members are assumed at 4 percent of the cost of the base building in this example. Excavation, on the other hand, is computed on the basis of $3.50 per cubic yard times the volume of excavation (=15 feet x area of typical floor if not given by the user.)

The user can easily switch the basis and numerical values for computation of any cost item by the command:

ENTER COST DATA, ITEM —— { DOLLARS —— / PCT —— / SQ FT —— / UNIT PRICE —— }

By giving the commands:

ENTER COST DATA, ITEM 2 SQ FT 1.20.

ENTER COST DATA, ITEM 3 UNIT PRICE 4.00, 20, 18000.

the user could change the basis of the structural foundation members from 4 percent of the base building cost to $1.20 per gross square foot of building and change the values in the excavation computation to $4 per cubic yard times a 20-foot basement over an 18,000 square foot area.

Two additional commands are available to control the cost computation. One is of a direct multiplier nature and is given as the *Engineering News-Record* index:

ENR COST INDEX, ————.

The internal costs have been assumed on the basis of an ENR=700. An externally supplied value of ENR=X will cause multiplication of all unit price type costs by a factor of X/700. A second command,

COST VS HEIGHT CURVE, ————

allows the user to specify the ordinates (costs) of a normalized cost versus height curve at the abscissae (number of stories) of 1, 20, 40, 80. The curve is generally concave upward, with a valley of 1.0 around 20 stories. Multiplicative effects of this curve are included along with the ENR COST INDEX. □

Figure 5.
Typical Cost Assumptions.

ITEM NO	ITEM NAME	DOLLARS	PCT	$/SQ FT	ITEM COMPONENTS		ACTION IF ASSUMED VALUE = 0
1	DEMOLITION	0.	******	*******		********	
2	STRUCT FOUND MEMBS	********	4.00	*******		********	
3	EXCAVATION	********	******	*******	EXCAVATION $/CY	3.50	
					EXCAVATION DEPTH	15.00	
					EXCAVATION AREA	0.00	= AREA OF TYPICAL FLOOR
4	SHEETING	********	******	*******	SHEETING $/SF	3.00	
					SHEETING DEPTH	15.00	
					SHEETING PERIMETER	0.00	= PERIMETER OF BLDG
5	MEMBRANE WATERPROOF	********	******	*******	$/SF WALL	0.50	
					WALL AREA	0.00	= 0.
					$/SF SLAB	0.20	
					SLAB AREA	0.00	= 0.
6	MASONRY AND CAULKING	********	******	*******	MASONRY AND CAULK $/SF	1.25	
					LINEAR FT CORE WAL/FL	0.00	= PERIM OF CORE + 4 CROSS WALLS
7	FIRST FLOOR CORE WALL	********	******	*******	1ST FL CORE WALLS $/SF	8.00	
					LINEAR FT CORE WALLS	0.00	= PERIM OF CORE + 2 CROSS WALLS
8	FIRST FLOOR FINISH	********	******	*******	1ST FL FINISH $/SF	4.00	
					AREA SO FINISHED	0.00	= AREA OF FIRST FLOOR
9	ROOF+SHEET MET.NO INS	********	******	*******	$/SF OF ROOF	0.50	
10	MISC IRON	********	******	0.20		********	
11	WINDOW WALL. 1ST FL	********	******	*******	$/SF	8.00	
					NO. OF LINEAR FEET	0.00	= PERIM 1/2 WAY BET CORE & FAC
12	STOREFRONT. 1ST FL	********	******	*******	STORE FRONT 1ST FL $/SF	8.00	
					NO. OF LINEAR FEET	0.00	= PERIM AT CORE + 2 MODULE OUT

Highrise Office Cost Optimization: A New Approach

by KAYA TUNCER

How to analyze an office building's financial feasibility and/or profitability? How to relate its geometry to the land value? Here is an idea that, with the help of computers, might lead to a course away from the common trial-and-error approach.

The problems of designing office buildings — presently regarded as the best long-term investment in the construction field — are common across the country. The typical situation is one of high leverage allowing for speculative profit. However, this exposes the operation to loss if any of the following contingencies should occur: 1) an increase in vacancy rates; 2) a change in mortgage terms; 3) an increase in tax assessments; 4) underestimation of construction costs, even by as little as $1 per rentable square foot (an average of 5 percent underestimation).

At the initial stages of the development of an office building, factors such as vacancy and capture rates are determined exogenously since these depend on the economic conditions of the specific locale. Similarly, mortgage terms and tax assessments have basically an exogenous nature, depending on the money market conditions for the former and on socio-political atmosphere for the latter.

The cost of a building depends, of course, on costs of the land, the structure, the utilities, the architectural skin, etc. Since these factors can be mixed in different proportions, the total cost of an office building can be varied in such a way as to result in an optimal mix. This optimality should be one of minimum total cost, provided that the building has the amenities to command the rental prices commensurate with the market demand.

The study presented here has been made in an effort to develop an optimization model, tying together the geometrical constraints of a highrise building and the associated cost elements. The basic premise behind the problem is that costs are a function of height in terms of the number of stories and of land occupied or required at the base.

The study essentially comprises two major parts: a cost optimization study of a general nature without constraints and one for speculative office buildings with constraints. It should be pointed out that "speculative" here is used in a dichotomous way. It represents the high leverage financial operation as well as the geometrical constraints put upon an office building because of amenities required for an all-tenant — or for mostly tenant — occupancy.

It seems that there is very little information available in this area; in fact, it can be said to be nonexistent. This means that office building projects are evaluated on an individual trial and error basis at the development phase, which throws a heavy burden on the architect. On numerous occasions, the courts have ruled that architects have a legal responsibility regarding construction costs. Many contracts stipulate that drawings must be redone at the architect's own expense if bids do not come in within budgets.

A further purpose of this study, therefore, is to come up with some general and/or particular models that can be of help to architects in the initial phases of an office building design. This would be in terms of overall geometry of a building as well as the study of the effects of changing factor costs.

The models developed allow extensive trade-off analyses and give indications of premiums paid for not using an optimal solution due to client demands. It is obvious that quantifying these demands at the onset of a project would prevent later embarrassment and financial loss in terms of uncompensated re-work.

To arrive at a cost optimization model which gives the various factor costs of a building, the relationship of these and the geometry of the building must be identified. Some costs are direct functions of the height of the structure whereas others are indirectly related to height through the space-enclosing geometry for a given required square footage of rentable space. Furthermore, it must be pointed out that as the number of stories increases, the efficiency factor, in terms of usable or rentable space, decreases since more floor space is taken up by elevators, mechanical systems, etc.

In general, in this study there are three categories of factor costs: 1) costs that are a function of geometry; 2) constant costs that, at the onset, don't bear any relationship to geometry; 3) cost of the land.

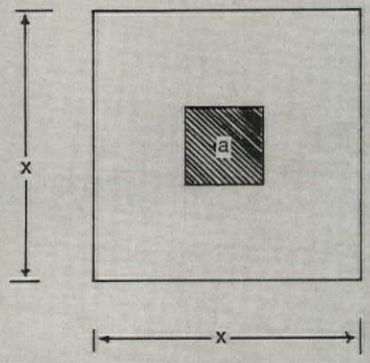
Again, the geometry referred to here is a spatial one, incorporating the base configuration and the height. Eventually, the last two cost categories also become a function of the geometry.

The total cost of an office building is divided into 10 different elements under the above three categories. In each case a cost equation is developed, giving the factor cost as a function of the geometry, be it in terms of a building dimension or the number of stories. The total cost is the sum of these costs. It is on this equation that the operations are made for the optimality analysis.

In order to arrive at the individual element for use in the cost equations, cost data from various office buildings already built and dispersed throughout the continental United States have been gathered and analyzed. Cost figures published by *Engi-*

Figure 1

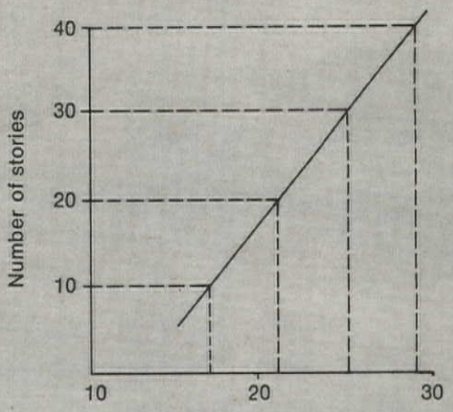
IDEALIZED PLAN OF BUILDING



$a=(13)\ (.004s)x^2$
for $s=10$, $a=.17\ x^2$
for $s=20$, $a=.21\ x^2$
for $s=30$, $a=.25\ x^2$
for $s=40$, $a=.29\ x^2$

x=building dimension
a=area of core
s=number of stories

GRAPH OF REDUCTION FACTOR



To develop the cost minimizing and the preliminary cost optimization models, an area reduction factor is applied to the gross building area. This is due to the fact that a higher proportion of space on each floor is taken up by vertical transportation, larger columns, etc., as the stories increase. The above indicated criteria are believed typical and are used to develop the final equations.

neering News-Record have been depended on heavily. Seemingly unreasonable figures have been replaced with estimates thought to be more in line with general construction costs. This was mainly the case with data relating to projects not typical of the type of building handled in this study.

Naturally, the construction costs vary in different areas. However, in view of the other factors that come into play, regional cost differentials may not be important enough to affect the results of such a study.

If regional information is used, more accurate optimizations applicable to individual regions can be developed. But perhaps the need for such further refinement is not justified since the additional accuracy gained may well be lost in the midst of other assumptions that must be made to have a functional model.

Since neither actual nor carefully estimated unit costs (parameter costs) are needed for the individual equations, a great flexibility comes into the nature of the models. For instance, if more accurate costs can be had for a certain site or for the demands of a client/owner, the model can be updated and/or custom fitted for more precise results. Herein lies a great advantage for initial studies. For example, if the unit price of the architectural skin is modified to provide a more attractive building, the optimal geometry may still be obtained. It is hoped that a computer program will be so designed that this can be done by changing a single data card.

For the sake of simplicity of computations, a square building configuration with a central core is adopted. This is a realistic assumption since most highrise office buildings built today have such a configuration, with minor modifications. The land plot is also assumed to be square, its dimensions a function of the building plan and the land use requirements. A constant floor to floor height of 12 feet is used. A reduction factor to account for the loss of gross usable and/or rentable area as the number of stories increases is introduced, using the criteria illustrated in Figure 1.

An initial survey of the collected data indicated that linear relationships between cost and number of stories could be assumed without loss of accuracy for buildings 10 or more stories high. Forty-story height is taken as the upper limit, mainly because of lack of cost data for taller buildings.

Ten individual factor cost equations are developed: excavation and foundations; structural (steel) framing; elevators; architectural skin; heating and airconditioning; core (elevator skin and stairs); roofing; landscaping; all other constant costs; land.

It should be noted that only structural steel frame costs are developed since data for concrete structures is lacking. Perhaps such a cost equation can be developed later and used as an alternate system. It must be remembered, however, that the foundation costs would also need modification since the concrete buildings are heavier. An integral evaluation system may be incorporated into the model whereupon the computer operations could automatically compare the two structural systems and give the optimal. For example, a 20-story building may have a concrete frame as optimal and a 30-story one a steel frame.

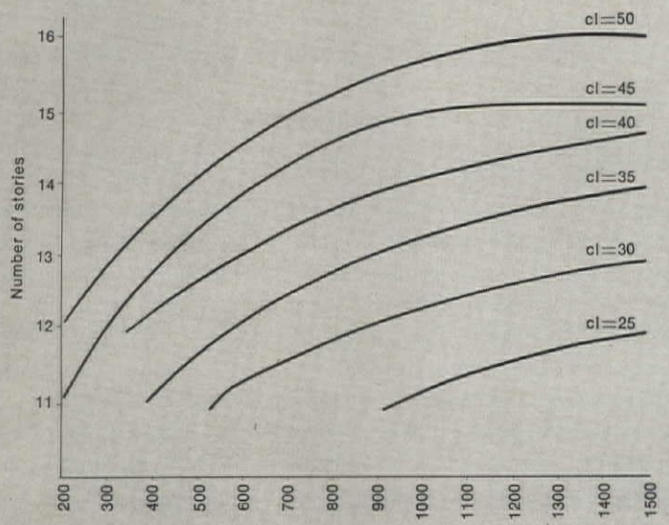
A last point: The cost lines were fit to the data simply by the visual method for two reasons: first, that the workability of such

---

Mr. Tuncer, an engineering economist, is in charge of special projects and research for the firm of Gruen Associates, Inc., Los Angeles.

Figure 2

COST OPTIMIZATION CURVES FOR 80% LAND USE

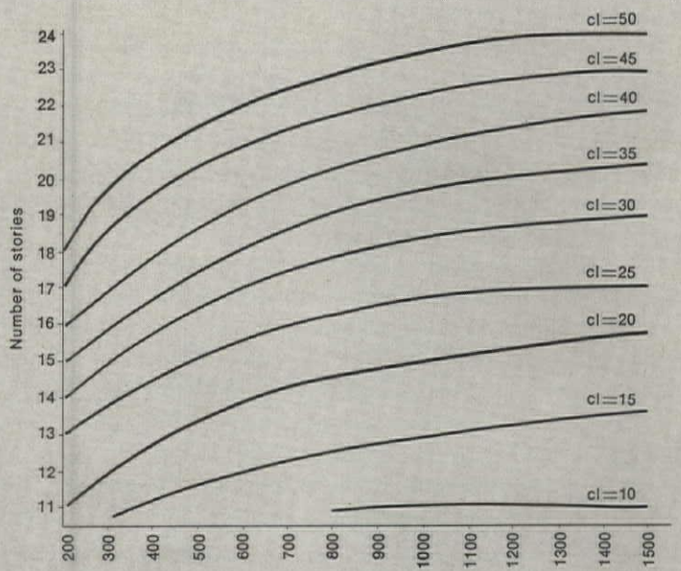


Gross usable and/or rentable area (in thousands square feet)

cl=cost of land in $ per square foot

Figure 3

COST OPTIMIZATION CURVES FOR 30% LAND USE



Gross usable and/or rentable area (thousands square feet)

cl=cost of land in $ per square foot

an approach to office building cost optimization needed to be verified with the minimum effort; second, the scattered and mainly limited nature of the data.

Since it is clear that the approach to the problem is fruitful and the results rather realistic, more theoretical methods such as regression-correlation analysis can be applied, hopefully using additional data. The optimal solutions can then be looked upon with more confidence.

The curves shown in Figures 2 and 3 give the number of stories that should be built for a certain required floor area for different values of land cost. Thirty and 80 percent land usage is assumed. The basic premise is that such mixes give a minimum total initial expenditure for a building.

Since a minimum is the goal and since a cost equation is developed where only either the building dimension, or the number of stories, is the only variable, and the cost of land and the total usable and/or rentable area are parameters, a basic property of calculus can be applied. The total cost is expressed in terms of the above and is differentiated. The differential equation thus obtained is set equal to zero. The number of stories which satisfies the minimizing condition for different pairs of values of total gross usable and/or rentable area and land cost is computed and tabulated. By observation it is verified that these values are the minimizing ones.

Per square foot land cost values starting at $10 up to $50 with increments of $5 are thought to be representative of the conditions most frequently encountered. The optimal value of the number of stories is computed for total gross usable and/or rentable area values of 200,000 square feet up to 1,500,000 square feet with increments of 100,000 square feet. A simple computer program for these computations has been developed and used.

From the computer output, two sets of curves are developed. Figure 2 displays the total cost minimizing curves with 30 percent land use for land costs of $10 to $50. These are smoothed curves obtained from the plotting of the computer output. In Figure 3 are shown similar curves for an 80 percent land use. It will be noticed that in this latter, land values shown start at $25 and go up to $50 per square foot. This is so because for lesser land costs the influence of land becomes rather unimportant. Again, for lower land costs the effect is small for smaller values of gross usable and/or rentable area.

An implied benefit of this model may be an indication of the premiums paid for buildings that are built arbitrarily with a certain number of stories. Such may be the case for a corporate headquarters building that is built 24 stories high to ascertain an image. The model may indicate as optimum a 14-story building. A dollar value to such a premium cannot be had here. However, the next model gives quantifiable solutions, although perhaps of a limited nature.

This model deals with a more limited problem. However, this limitation allows the realization of an output that has monetary values that can help decision making in perhaps a more meaningful way. Whereas the previous model has a macro nature, this one is a micro one. Specifically, it has application in the speculative office building area where the building geometry, in terms of floor space per story, has some constraints imposed on it. This is mainly due to the fact that tenants desire exterior exposure and short distances from the vertical transportation system.

In this model a final optimization is not given, thus the qualification of the model as "preliminary." A tabulation of the points of interest is made, allowing a visual examination of the possible combinations of building geometry and the associated cost factors. From this, a *pro forma* financial analysis can be carried on, incorporating the various factors such as interim financing, the amount of equity investment, or front money, the rate of interest on the mortgage, the length of mortgage, etc.

It is hoped that the "final" cost optimization model will include these factors and indicate the most profitable amount of equity investment in terms of returns on it. Until then, the usefulness of the model will stop at giving the developer and/or architect a good guidance as to what the above mentioned relationships are, as well as the cost per square foot on gross total area and the costs per square foot on gross rentable area.

The solution in this case involves the numerical evaluation of the total cost equation within two sets of constraints for a given cost of land. Within the constraints a set of values of interest are computed and tabulated. This is done for both a 30 percent and an 80 percent land use factor. The total cost equation is made up of the 10 cost factors explained before, and based on a $20 per square foot land cost.

The first constraint is that for the building to be efficient, or rentable, each floor should contain a total of 15,000 to 20,000 square feet.

The second constraint is that the total or gross usable/rentable area should be between 350,000 to 450,000 square feet. This latter is derived from the fact that most speculative office buildings have an average of about 400,000 square feet of floor space. It can easily be seen that any other constraint boundaries can be used. This is also true for the first constraint.

A simple computer program for the evaluation of the total cost equation is developed and the computations are made for number of stories 18 to 40 with 1-story increments, building dimension of 120 to 170 feet with 5-foot increments. The tabulated results are given in the table. Only the values of 80 percent land use are included here since this is the more prevalent case for speculative office building locations.

Again, it would be desirable to refine the cost data used and the processes through which individual cost equations are obtained. The closeness of the values in the table requires such further work. The inclusion of associated statistical and mathematical concepts such as confidence intervals and sensitivity analysis would make the output a more dependable tool for developers, financiers and architects. If, as pointed out at the onset, a $1 underestimation of cost can make a project unprofitable for a speculative developer, more dependable outputs may well be called for. However, until this is done, the model gives strong indications of what might be expected for various geometries and the associated building areas. □

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3. COST: ARCHITECTURAL SKIN COST = $7.50 PER SQ FT
   LAND COST = $20 PER SQ FT

SIDE DIMENSION X (FT)	TOTAL AREA PER FLOOR X (SQ FT)	NO. OF STORIES	TOTAL COST TC ($)	GROSS TOTAL AREA GTA (SQ FT)	COST PER SQ FT ON GTA CGTA ($)	GROSS RENTABLE AREA GRA (SQ FT)	COST PER SQ FT ON GRA CGR ($)
140.00	19600.00	23.00	10029873.00	450800.00	22.25	350722.40	28.60
140.00	19600.00	24.00	10507069.50	470400.01	22.34	364089.61	28.86
135.00	18225.00	25.00	10318901.50	455625.01	22.65	350831.26	29.41
140.00	19600.00	25.00	10989554.10	490000.00	22.43	377300.00	29.13
135.00	18225.00	26.00	10776599.00	473850.00	22.74	362969.10	29.69
140.00	19600.00	26.00	11477324.40	509600.00	22.52	390353.61	29.40
135.00	18225.00	27.00	11239216.90	492075.00	22.84	374961.15	29.97
140.00	19600.00	27.00	11970378.00	529200.00	22.62	403250.40	29.68
130.00	16900.00	28.00	10970668.50	473200.01	23.18	358685.61	30.59
135.00	18225.00	28.00	11706753.40	510300.00	22.94	386807.40	30.27
140.00	19600.00	28.00	12468713.10	548800.00	22.72	415990.40	29.97
130.00	16900.00	29.00	11413027.00	490100.00	23.29	369535.40	30.88
135.00	18225.00	29.00	12179206.00	528525.00	23.04	398507.86	30.56
140.00	19600.00	29.00	12972327.50	568400.00	22.82	428573.60	30.27
125.00	15625.00	30.00	11091351.50	468750.01	23.66	351562.51	31.55
130.00	16900.00	30.00	11859950.90	507000.00	23.39	380250.01	31.19
135.00	18225.00	30.00	12656573.70	546750.00	23.15	410062.51	30.86
140.00	19600.00	30.00	13481219.70	588000.00	22.93	441000.01	30.57
125.00	15625.00	31.00	11513138.60	484375.01	23.77	361343.75	31.86
130.00	16900.00	31.00	12311437.40	523900.00	23.50	390829.41	31.50
135.00	18225.00	31.00	13138853.90	564975.00	23.26	421471.35	31.17
125.00	15625.00	32.00	11939150.70	500000.00	23.88	371000.00	32.18
130.00	16900.00	32.00	12767488.50	540800.01	23.61	401273.60	31.82
135.00	18225.00	32.00	13626045.40	583200.00	23.36	432734.40	31.49
125.00	15625.00	33.00	12369385.80	515625.00	23.99	380531.25	32.51
130.00	16900.00	33.00	13228093.50	557700.00	23.72	411582.60	32.14
135.00	18225.00	33.00	14118146.60	601425.01	23.47	443851.66	31.81
125.00	15625.00	34.00	12803843.00	531250.00	24.10	389937.51	32.84
130.00	16900.00	34.00	13693260.00	574600.00	23.83	421756.41	32.47
125.00	15625.00	35.00	13243520.40	546875.00	24.21	399218.75	33.17
130.00	16900.00	35.00	14162983.30	591500.01	23.94	431795.01	32.80
125.00	15625.00	36.00	13685416.90	562500.00	24.33	408375.00	33.51
130.00	16900.00	36.00	14637262.40	608400.00	24.06	441698.40	33.14
125.00	15625.00	37.00	14132530.50	578125.00	24.45	417406.25	33.86
125.00	15625.00	38.00	14583861.20	593750.00	24.56	426312.51	34.21
125.00	15625.00	39.00	15039407.00	609375.00	24.68	435093.75	34.57
125.00	15625.00	40.00	15499166.50	625000.00	24.80	443750.00	34.93

This table can easily be adapted to specific situations where the cost of land is other than the $20 per square foot used. The constraints can also be varied. For example, if a corporate office building is being considered and larger areas per floor can be tolerated or are required for operation purposes, these can be incorporated by changing data cards for the program.

outlook *from page 10*

Get to Your Drawing Board and Win This Competition for the USA

Both architects and architectural students are invited to participate in a competition for the design of a symbol or emblem for the Panamerican Federation of Architectural Associations. In all cases, the design must include either the initials F.P.A.A. or the complete wording Federación Panamericana de Asociaciones de Arquitectos. The winning symbol will be used on official stationery, insignias, publications, posters, etc., of the association.

Deadline for submissions is April 30, with the US winner going to an international jury on May 30 and the grand prize winner announced on August 15. First prize is $1,000 and paid registration and hotel expenses at the 14th congress.

Entrants will represent all the countries belonging to the association, with winners from the individual countries judged by five international architects, including Richard S. Sharpe, FAIA, of Norwich, Connecticut, in his capacity as second vice president of the association.

For information, contact: International Relations office, AIA Headquarters, 1785 Massachusetts Ave. N.W., Washington, D.C. 20036.

'Wonderful, Wonderful Copenhagen' Is Site of 1971 Reconvened Convention

Two special AIA charter flights to Copenhagen are scheduled to depart from Detroit and New York on June 25.

Charter flight "A" will leave from Detroit and return from London to New York City on July 5 (11 days, 10 nights). The cost is $216 per person, with children under 12 years of age going at a bargain rate of $186.

Charter flight "B" will go from New York City, returning from London to New York on July 11 (17 days, 16 nights). The price for this adventure is $199 per person; children under 12, $169.

Professional treks in Copenhagen are planned, as well as two urban design seminars — one in Stockholm, July 5-9, the other in London on the same dates.

For reservations and travel details, contact: US Travel Agency, Inc., 807 15th St. N.W., Washington, D.C. 20005. A deposit of $75 per person must accompany requests for reservations.

They Continue to Do Them Bigger in Texas, Houston Center Will Be No Exception

What is believed to be the largest single urban development project ever to be financed by private enterprise is expected to get underway in downtown Houston before the end of this year.

Houston Center, which when completed will occupy 74 acres in the very heart of the city — more than three times the size of Rockefeller Center in New York — is being implemented by Texas Eastern Transmission Corporation, an energy-supply company with worldwide operations.

The huge complex has been planned "as a prototype of what the city of tomorrow should be, not a projection into the future of the city of today," in the words of B. D. Goodrich, Texas Eastern president. It will include office towers, hotels, retail stores, apartments and recreational facilities — some 20 million square feet of floor space, thus virtually doubling the size of Houston's present downtown business district.

Extending over 33 contiguous city blocks immediately east of the present downtown, Houston Center will completely separate pedestrian and vehicular traffic as conceived by William L. Pereira Associates, Los Angeles architects/planners. The Houston-based engineering/construction firm of Brown & Root, Inc., will act as project managers.

The construction timetable calls for three stages with a goal of completion for the first increment, proceeding in a west-to-east direction, of five to six years.

Phase 1 will employ a multilevel parking substructure as the base for elements assembled around airconditioned pedestrian plaza.

Architects' Office Shorter Work Week Could Be Trend for Entire Profession

One of New York's largest and oldest architectural firms, Haines Lundberg & Waehler, has devised a new four-day, 34-hour week for its 400 employees. Salaries will not be affected by the change. Vacations for those entitled to two weeks will now resolve into eight days; three weeks will get you 12 days. The new work schedule offers 34 three-day weekends, five four-day ones corresponding to national holidays and a mere six of the old-fashioned two-day variety.

There are no more occasional days off for such things as having a tooth filled or getting a car license or meeting Aunt Minnie. These things will have to be done on the employee's own time, except in "hardship cases."

The firm experimented with the short week two years ago and found that the short intense work span increased productivity, cut absenteeism, gave the firm's clients better service and made the staff member's time off more meaningful.

Newslines

- **Factory-produced housing** will increase 20 percent in 1971 over last year's production, predicts the National Association of Building Manufacturers. By 1975, it is estimated that more than half of all housing will be produced in a factory, including family houses and apartments in all price ranges.

- **Five thousand women** now belong to the National Association of Women in Construction, which recently established its first executives offices at 1000 Vermont Ave. N.W., Washington, D.C.

- **Philip Johnson,** FAIA, of New York City has been elected to membership in the American Academy of Arts and Letters.

- **A "Dirty Pictures Contest,"** under the sponsorship of *Psychology Today,* was the nation's first art competition on environmental blight; the AIA was a runner-up citation winner for its photograph "Our Gross National Product," which protests ugly signs and billboards.

- **Neal English,** formerly public relations director for the AIA, has been appointed executive director of the newly created International Masonry Institute in the nation's capital.

Deaths

HARVEY T. BABBITT
New Haven
JOSEPH M. BERLINGER
New York City
JOHN A. BURTON IV
Sanford, Fla.
H. C. CHAMBERS, FAIA
Los Angeles
A. C. CRAMER
Scottsdale, Ariz.
ABRAHAM FARBER
Brooklyn, N.Y.
J. G. GAUNTT
Chattanooga
EDWIN A. KOCH
Hillsboro, Fla.
IRVIN B. LESLIE
Newberry, S.C.
ALEX B. MAHOOD SR.
Bluefield, W. Va.
JOHN RAYMOND MONAGHAN
Palm Beach Gardens, Fla.
L. A. PALME
Santa Barbara, Calif.
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WWPA's 1970 Grading Rules, approved by the Board of Review of the American Lumber Standards Committee, incorporate provisions of the new American Lumber Standard PS 20-70, which establishes new lumber sizes, grades and identification requirements. They are now available from WWPA at $1 per copy.

One of a series presented by the Members of the American Wood Council

The Revolutionary New Corridor-Free Systems in Architecture. Emil Navinsek. Ljubljana, Yugoslavia: Privately printed, 1969. 494 pp. No price given.

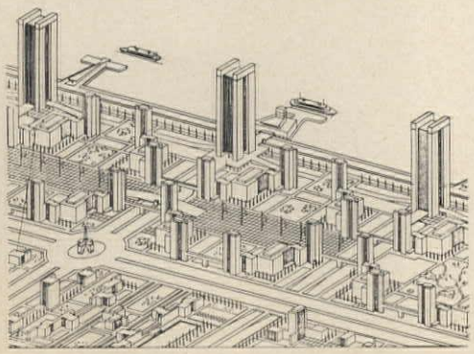
Navinsek is an architect who lives and works in Yugoslavia. He published this book himself, and did so in English. I think it is to his disadvantage that an American or English publisher/editor was not involved since the slim prose sections of this large tome (pp. 75-489 — all drawings) are replete with errors in spelling, grammar and punctuation which necessarily get in the way of the reader.

Despite the concession made for linguistic and cultural differences, it is only fair to approach the book by the same rules applied to American writers because it is offered for review in this country.

Navinsek's contention is that buildings should not have corridors because corridors, as we know them, yield no efficacy as communication space, are unhygienic, uneconomical and preclude the "development of systems." There is no way to determine the meaning of this latter fault. Corridors are today as they always were, he says, due to a "lack of knowledge of spatial sciences in architecture" and because architects "plan by free consideration" and not "on the basis of scientific experience according to spatial laws."

Instead of corridors, Navinsek would have us install a central hall with the "cells" (offices) opening to it, affording each cell occupant "good health conditions" in the form of "spaciousness, instead of narrowness and restrictions in dark and long corridors; natural illumination, instead of artificial lights; airiness; and, finally, harmony between the internal and external world."

The corridor-free system supposedly can also save up to 25 percent in building costs — which must be the result of using natural illumination. Navinsek seems overly concerned with health in buildings, citing the sun as "a source of health." He has disdain for lighting fixtures, saying, "I am convinced that artificial illumination in any building, of any dimensions, is not the solution to problems in modern architecture." He goes on to say that "every problem can be solved" in his corridor-free system, including the common cold!



Basically, corridor-free architecture is an illusion because the halls that replace the corridor's circulation spaces are simply enlarged corridors. These "halls," because they are of greater size than corridors, necessarily add construction space to the building and therefore increase rather than reduce costs. This proposal is hardly acceptable to an investor-client since the corridor, or circulation space, is precisely the area which he is reluctantly forced to produce at no rent.

Moreover, it is hard to see how these internal halls benefit from natural light. By definition, they are central and interior to the building and cannot avail themselves of external exposure. The flexibility of shaping the building for these enlarged corridor-halls exists rarely in a truly urban situation where the typical project is hard up against lot lines. In short, this is an enormous book based upon a thin premise which itself is open to question.

The tome feel of the book, its size and number of drawings are impressive; however, it too quickly reveals itself as being less than meets the eye. ARTHUR COTTON MOORE, AIA

Modular Housing in the Real. J. A. Reidelbach Jr. Annandale, Va.: Modco Inc., 1970. 224 pp. $22.50.

This profusely illustrated work covers the products and methods of the factory-built housing industry of today, with emphasis on the wood framed sectional unit.

The author, a housing industry consultant and former chief executive of a prefabber's national association, conducted a special nationwide survey to add to his personal expertise in producing this fact-filled volume. The section on definitions of the various systems employed in industrialized housing covers the basic differences in construction and financing between code-conforming modular houses and typical mobile homes. In addition to a directory of manufacturers, other sections are devoted to the subjects of construction details and layouts, market analysis, production costs, sale prices, origins and trends, transportation and erection, codes and unions and other pertinent information.

Many readers may find that the Conestoga wagon is the most esthetically pleasing of the factory-produced shelter forms illustrated. If this motivates some great design talent to enter the modular field, changing "pre-engineered" to "pre-architected," then the book is a rousing success. ROBERT ALLAN CLASS, AIA

Modern Architecture in Color. Werner Hofmann and Udo Kultermann. New York: Viking Press, 1971. 528 pp. $30.

There are 112 color plates in this quite handsome book which depict some of the most important work of such architects as

Frank Lloyd Wright, Le Corbusier, Tange, Mies van der Rohe and Nervi. Each plate is accompanied by a commentary written by Kultermann, which indicates the varied architectural solutions to industrial age problems.

The plates are prefaced by a detailed introduction by Hofmann in which he examines a number of themes, including "the apparent conflict between the beautiful and the useful in architectural ideas through the ages" and the "connections between modern architecture and other art forms." He traces the development of modern architecture from three stylistic prototypes: a cast-iron factory (1848) by James Bogardus; the Crystal Palace (1851) by Joseph Paxton; and the Red House (1859) by Philip Webb.

Brunelleschi: Studies of His Technology and Inventions. Frank D. Praeger and Gustina Scaglia. Cambridge: MIT Press, 1970. 152 pp. $10.

These two authors bring an interesting combination of talents together in this study of Filippo Brunelleschi, the great Tuscan Renaissance architect, engineer and inventor. Praeger is a patent attorney whose work has engaged him in the examination of patents for construction techniques and construction, hauling and transportation machinery. Miss Scaglia has expertise in art history, and her study of manuscript illustrations reveals which mechanical illustrations were redrawn and transferred from architect to architect.

Brunelleschi, called by some the architect's architect, has devoted admirers from his time to now who think that he "single-handedly, transformed both building art and building technique by fundamental inventions." For example, his design of the Cupola of Santa Maria del Fiore in Florence, the authors find, synthesizes elements from both the Gothic and Classic styles, solved the static problems he inherited and foreshadowed modern principles of construction.

The authors of this book have examined Brunelleschi's position in technology, art, economics and history through a study of authentic records and documents. They have scrutinized, so far as actual records allow, the instructions he received from Gothic and Classic masters and have explored materials relating to his mechanical inventions and his own comments on problems of inventors and builders.

"At the onset of these studies we were not sure whether Brunelleschi's achievement was as great as his friends asserted," say the authors. "We are now inclined to think that he may have been more creative as a builder than most of his admirers imagined."

This book is a scholarly contribution, and one of compelling interest as well.

The Architecture of Minard Lafever. Jacob Landy. New York: Columbia University Press, 1970. 313 pp. $17.50.

Landy ranks American architect Lafever with his immediate contemporaries, Thompson, Pollard, Town and Davis and Rogers, as well as with his better known "fellow Gothicists," Upjohn and Renwick. Only five of his structures remain standing in New York, and here are reproduced his destroyed buildings

continued on page 60

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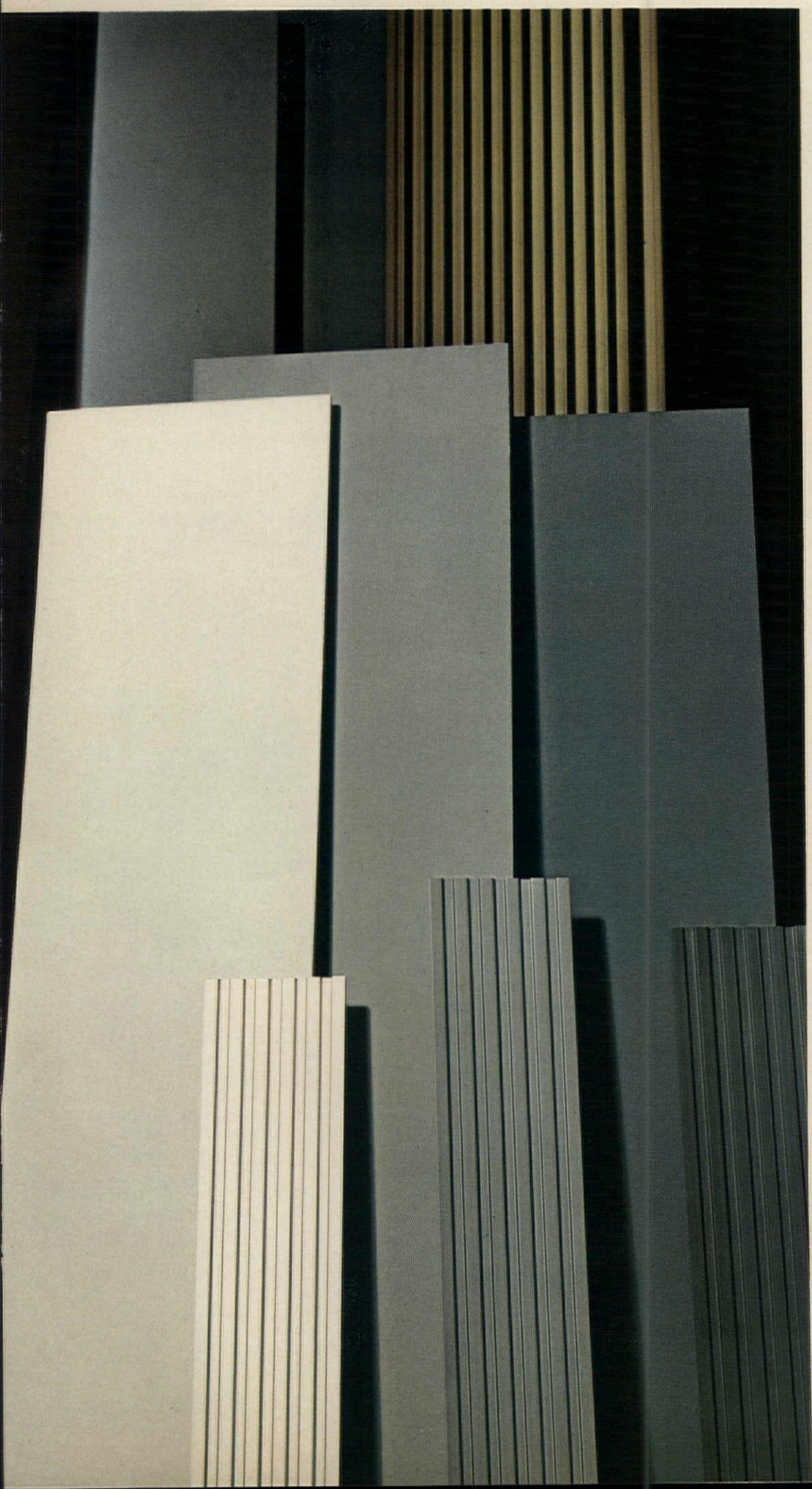

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taken from his own publications and other sources. Over 30 photographs show details of his remaining buildings. Each of his New York buildings is analyzed with emphasis upon style. Landy also provides an entertaining study of Lafever's life and his place in American architectural history.

Robert Adam. Doreen Yarwood. New York: Scribner, 1970. 221 pp. $7.95.

An authority on English architectural history writes here about one of the most honored architects of the western world. As she says, "Today the name Adam is a household word." But few people know very much about his life or what he really accomplished. The kind of man he was and a critique of his work are set forth here in most enjoyable prose.

The Study of Architectural History. Bruce Allsopp. New York: Praeger, 1970. 128 pp. $3.95.

This is a "consideration of the way architecture has been studied historically" and is not a history of architecture. The first part of the book concerns the relationship between architectural history and practice; the second is about the nature of architectural history.

The Royal Palaces. Philip Howard. Boston: Gambit Inc., 1970. 276 pp. $10.

This book affords a journey through English social history by means of visits to the palaces of English rulers. The author calls the palaces "frozen history" in many ways more intelligible than the chronicles. The royal residences reveal much about their inhabitants and the societies which they dominated.

Versailles. Ian Dunlop. New York: Taplinger, 1970. 228 pp. $12.

The colorful history of Versailles, that power base of Louis XIV, is documented here. The book was first published in 1956.

Palaces & Progresses of Elizabeth I. Ian Dunlop. New York: Taplinger, 1970. 222 pp. $10.

As Americans we know that the places where George Washington slept have become places of pilgrimage today. Queen Elizabeth was also a traveler, making yearly rounds to the homes of her wealthier subjects. Here is a fascinating account of the vanished glories of the great houses of the Elizabethan era and an insight into a remarkable period of architecture.

Land and Taxation: A Guide for Conservation and Other Nonprofit Organizations. Berlin, Roisman & Kessler. Washington, D.C.: Conservation Foundation, 1970. 47 pp. $1.

Prepared by a Washington law firm, this booklet is designed to help public interest organizations understand the implications of the Tax Reform Act of 1969 for their funding and programs. It will help conservation groups, usually low on funds, to assess their situations in terms of organizing principles and tax status.

The Specification Problem: Sealants, A Case in Point. Park Ridge, Ill.: Adhesive and Sealant Council, 1969. 31 pp. No price given.

Papers presented at the 1969 fall technical seminar of the Adhesive and Sealant Council. One of the papers by Harold J. Rosen, chief of the specifications department of Skidmore, Owings & Merrill, is on the architect's dilemma in sealant specifications. Other papers are from the point of view of the contractor, the manufacturer and the raw material supplier.

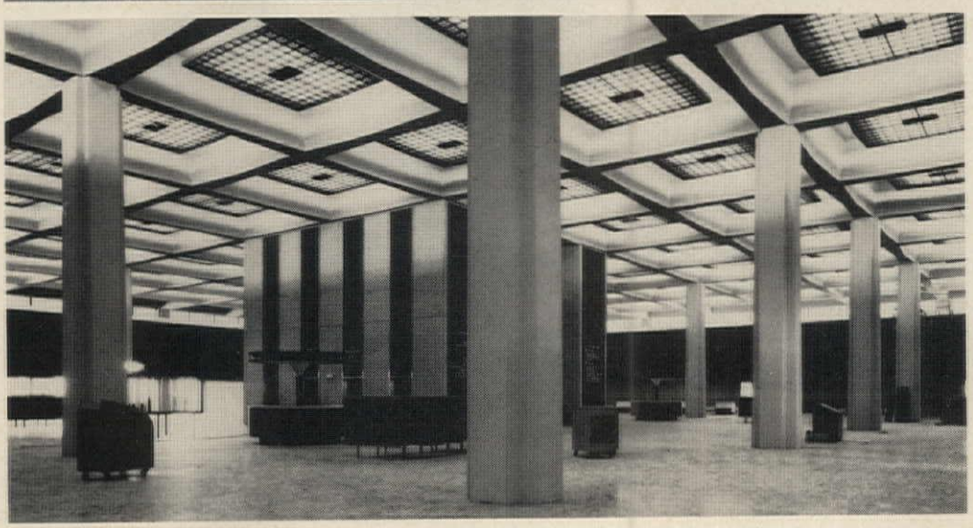
Marble Design Manual. Washington, D.C.: Marble Institute of America, 1970. Variously paged. No price given.

Two years in preparation, this is a comprehensive and authoritative reference source on marble, its properties, maintenance and use. The manual is in a loose-leaf binding so that updated materials may be added from time to time.

Maintenance of Vinyl Asbestos and Asphalt Tile Floors Featuring the No-Wax Method. New York: Asphalt and Vinyl Asbestos Tile Institute, 1970. 7 pp. Free.

Of general information for architects and specification writers, this pamphlet gives details about no-wax floor care for commercial and institutional buildings. The no-wax method, in regular use for over 10 years, cuts the cost of standard floor maintenance up to 50 percent; when properly applied, it enhances appearance, lengthens life and improves sanitation of floors. □

It had to be 100% waterproof, *and it is.*



ARCHITECTS: The Offices of Golemon & Rolfe and Pierce & Pierce
ENGINEERS: Engineers of the Southwest
AUTO-GARD APPLICATOR: Gulf Waterproofing Co., Inc., Houston, Texas

Take the case of the 300,000 square foot, third floor parking area at the new Houston Intercontinental Airport, for example.

It has to be 100% waterproof because it covers all the passenger terminal area and air line ticketing facilities.

After extensive research, airport architects and engineers chose our Auto-Gard waterproofing system to do the job.

We're proud to say Auto-Gard is performing perfectly in the huge terminal.

It not only protects the passenger area from moisture, but from dripping car grease, oil and other contaminants, too.

Auto-Gard works because it's a Neogard fluid applied elastomeric system with Neoprene waterproof membranes that bond to the floor in seamless continuity.

Maybe you could use a system like Auto-Gard yourself.

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Why coat stainless steel?

. . . because proper soldering of stainless steel requires an extra step of pretinning or use of corrosive fluxes. These fluxes must be removed after soldering to prevent attack on the stainless.

TCS solders perfectly using a non-corrosive rosin flux. Pretinning is unnecessary.

. . . because architectural metals are subject to corrosive attack in severe chemical, industrial or marine environments.

TCS enhances the proven ability of stainless steel to resist corrosive attack under these conditions.

. . . because the reflective surface of stainless steel may sometimes be undesirable in architectural applications.

TCS weathers naturally to a predictable, uniform and attractive dark gray. If color is desired, it can also be painted.

TCS, Terne-Coated Stainless Steel, is 304 nickel-chrome stainless steel covered on both sides with terne alloy (80% lead, 20% tin). It is a product of Follansbee Steel Corporation, Follansbee, West Virginia.

FOLLANSBEE

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Terrazzo shows its true colors when it's made with ATLAS White.

This terrazzo in the illustration is composed of 80 per cent Georgia White and 20 per cent Cardiff Green marble aggregate with ATLAS White cement in the matrix. It is showing its true colors in the concourse areas of Ohio's newest and largest enclosed shopping center, the Dayton Mall. In a monolithic installation, 155,000 square feet of terrazzo was placed in 30-foot squares. Developed, built, owned and now managed by The Edward J. DeBartolo Corporation, Youngstown, Ohio, Dayton Mall's 107 stores cater to over 100,000 shoppers per week. Edward J. DeBartolo & Associates was the Engineer. The Terrazzo Contractor was C. Quinlan & Son, Dayton, Ohio. ATLAS White is only one of the many cements produced by Universal Atlas Cement Division of United States Steel.

ATLAS is a registered trademark.

Atlas
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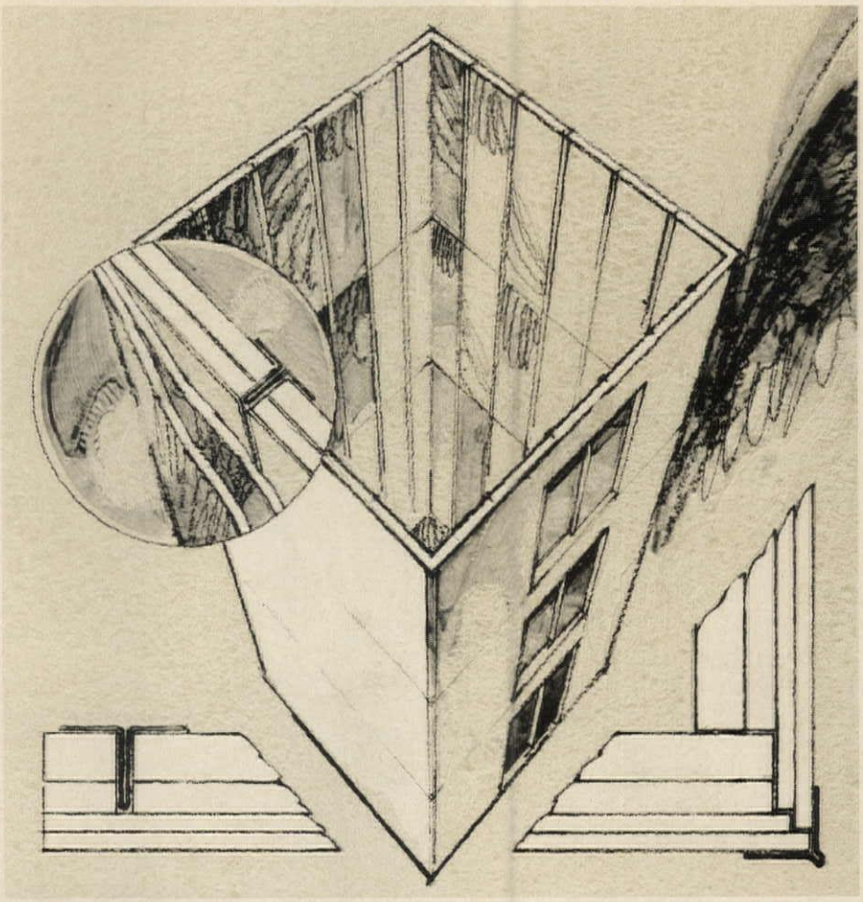

G-P introduces a Shaft Liner System that weighs only 10.5 lbs. p.s.f.

Stop specifying masonry for shaft enclosures. And start using Georgia-Pacific's new Shaft Liner System. It weighs only 10.5 lbs. p.s.f. compared to 34 lbs. p.s.f. or more for masonry shaft walls.

Georgia-Pacific's new system is a solid gypsumboard system. Prelaminated panels are easily installed in top and bottom runners with a T spline placed between panels. What's more, it installs from one side speeding up construction. Temporary shaft enclosures are eliminated.

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letters

A Plea for Those on Foot

My favorite commuter reading is the AIA JOURNAL, but I can't recall when I have enjoyed an issue more than the December one.

I liked the idea of an underlying theme uniting the articles. Beginning with Naomi Miller's piece on streets and the growing necessity to plan for the pedestrian and Charles E. Thomsen's timely survey of developments in the functions and esthetics of urban open space, I found the remaining articles enlarging and refining the central concept as though from a single hand. The message is clear and welcome: We must rescue our cities from the automobile and return them—with their streets, open spaces and street furniture—to the people, especially those on foot.

SIMON BREINES, FAIA
New York City

Fresno Mall a Joint Venture

Charles E. Thomsen's article on open spaces in the December issue is interesting and timely.

I should like to point out, however, that the Fulton Mall in Fresno was a joint project of Gruen Associates, Inc., and Eckbo Dean Austin & Williams. It was based on a central business district plan by Gruen Associates, which included a preliminary design for the mall. The final design, quite different, was done by my firm—in fact by me, working with the Gruen firm. They did the working drawings, with participation and supervision by us. They did the structural supervision; we did the landscape supervision.

GARRETT ECKBO
Landscape Architect
San Francisco

ED. NOTE: Apparently, omission of proper credit for Eckbo Dean Austin & Williams' part in this project is an error that has been compounded over the years, but we are pleased to set the record straight.

Friend of Architects

Your publication of my invocation in the January issue was exquisitely done. What a happy thought to use Rick Gardner's photograph of the soaring gull!

This whole experience—the widespread publication of my prayer and the "fan mail"—I have found very humbling. If the sentiments in the prayer have been so resonant in the hearts of so many architects and designers, then I believe I know why: I "caught" the sentiments from them. Their spirit of wonder and childlike joy in creation, in spite of all the practical problems of the profession, I find so refreshing. Indeed, I count myself fortunate to have had so many artists and architects as friends over the years.

THE REV. MAYNARD TETREAULT, O.F.M.
Cincinnati

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events

AIA State and Region

April 8-10: Gulf States Regional Conference, Arlington Hotel, Hot Springs, Ark.
May 4-7: Wisconsin Chapter State Convention, Milwaukee Exposition Hall Red Carpet, Milwaukee
May 5-7: Middle Atlantic Regional Conference, Jewish Community Center, Wilmington, Del.
May 7-9: Missouri Council of Architects Annual Convention, Holiday Inn of Table Rock Lake, Kimberling City

National

April 18-22: National Conference of States on Building Codes and Standards, Olde Colony Motor Lodge, Alexandria, Va.
April 19-22: National Conference on Religious Architecture, Los Angeles Hilton Hotel, Los Angeles
April 21-22: Construction Industry Advertising and Products Literature Conference, Marriott Motel, Chicago
June 18-19: ACSA Annual Meeting, Detroit Hilton Hotel, Detroit
June 20-24: AIA Annual Convention, Cobo Hall, Detroit (recessed convention, Copenhagen and London)
June 23-25: National Exposition of Contract Interior Furnishings, Merchandise Mart, Chicago
July 14-17: NCARB Annual Meeting, Fairmont Hotel, San Francisco

International

April 18-21: North American Conference on Campus Planning and College Building Design, University of Illinois, Urbana

Competitions

Mar. 31: Applications due, single-stage competition for a memorial to residents of Troy, Michigan, who served in US Armed Forces, limited to applicants from Michigan, Wisconsin, Illinois, Indiana and Ohio. Contact: Harold F. Van Dine, AIA, Professional Adviser, 117 W. Big Beaver Road, Troy, Mich. 48084.
April 30: Submissions due, symbol for the Panamerican Federation of Architectural Associations, open to architects and students. Contact: International Relations Office, AIA Headquarters.

Awards Programs

May 14: Applications due, Western Home Awards program, limited to houses or projects built in last four years in the 13 western states. Contact: AIA-*Sunset* Western Home Awards Committee, Box 2345, Menlo Park, Calif. 94025.

Fellowships

April 1: Applications due, Cintas Fellowship, limited to young professionals of Cuban citizenship or lineage who reside outside Cuba. Contact: Institute of International Education, 809 United Nations Plaza, New York, N.Y. 10017. □

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