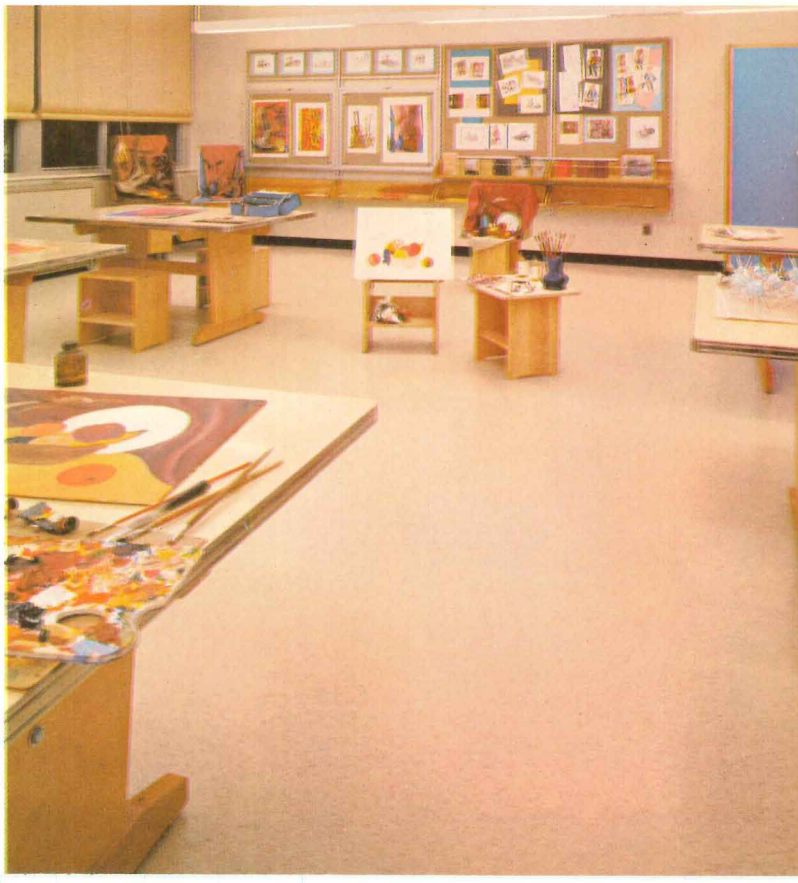
PROGRESSIVE ARCHITECTURE *April 1967*

A Chapman–Reinhold Publication



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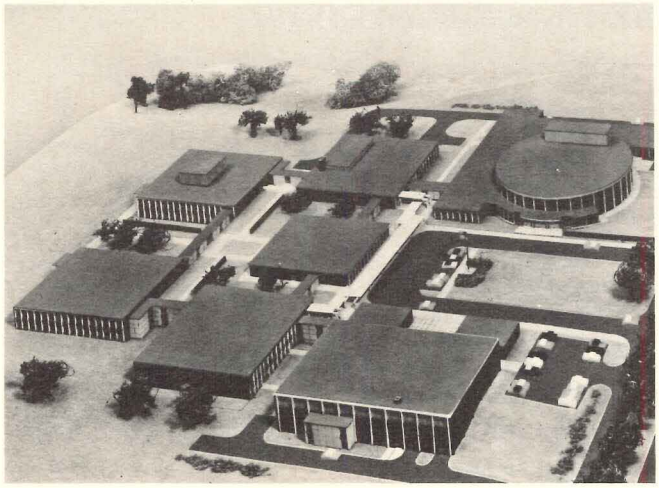

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THIS MONTH IN P/A

Progressive Architecture® *April 1967*

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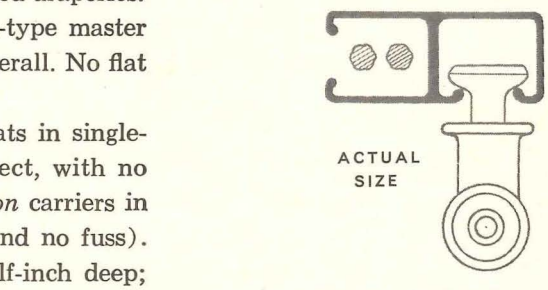

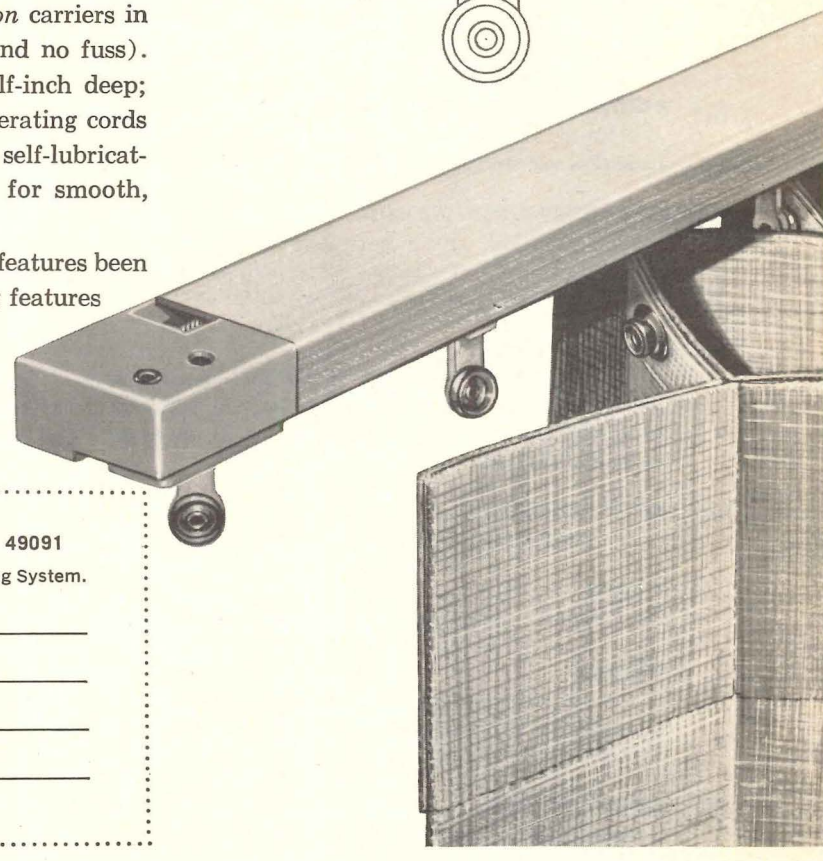

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VIEWS

Editorial Reactions

Dear Editor: I found the Editorial in the DECEMBER 1966 P/A to be one of the finest pieces of thought-provoking reporting that I have ever had the pleasure of reading.

RICHARD K. OLSEN
Batten, Barton, Durstine & Osborn, Inc.
New York, N.Y.

Dear Editor: I read with great interest your Editorial in the FEBRUARY 1967 P/A in which you describe public relations as "a near cousin to advertising."

While there is much in your Editorial with which we agree, permit me to take some exception to your views.

It is our contention that public relations is the umbrella that covers all of the activities an individual or a firm may undertake to sell his product line or services. Under public relations, there are a variety of "tools" available to the individual or firm.

Some of these are: advertising, publicity, display, direct mail and more. Sometimes direct advertising is desirable. In some cases, it may be desirable to exploit the news value of a product or service before doing any advertising. Then there are the other tools available that must be evaluated by professionals to achieve the most effective public relations program.

You were correct to put the word "free" in quotes when you referred to publicity. Actually, nothing is free. If it's free, it's usually worth nothing. It takes professionals to develop a sound public relations program, just as professional architects and engineers are required to design and create in their fields.

Today, public relations and advertising are separate entities — in too many cases with little understanding of the need for integration. We predict that a time will come when public relations will be the umbrella under which advertising, publicity, direct mail, and other means of reaching the public will operate.

We take the liberty of sending this note because we believe that communications with its various publics is vital to the success of the professionals who read P/A. A better understanding of public relations can help your readers.

CHRISTOPHER CROSS
Christopher Cross Associates, Inc.
New York, N.Y.

More on the Design Awards

Dear Editor: After reviewing in detail not only P/A's Design Awards submissions, but also the jury comments (JANUARY 1967 P/A), one can't help but conclude that entries would get more impartial evaluation if they were more anonymous. I refer to the obvious "personal" evaluation and jury comments of Venturi's designs.

MARVIN J. DeWINTER
Grand Rapids, Mich.

Dear Editor: I am very pleased that Robert Venturi's work was placed on the citation table. I have difficulty understanding his architecture, but his writings alone justify citation. P/A did the profession a great service, because we must give encouragement to architects who take a fresh approach. The search for form has to continue, and particularly at this time in history.

WILLIAM W. CAUDILL
New York, N.Y.

Dear Editor: May I congratulate the jurors of the Fourteenth Annual P/A Design Awards for many of their very excellent criticisms and comments on the entries. As a student, I found the critical reactions a very instructive and beneficial part of my education.

However, I must object to certain disappointing tendencies that revealed themselves in the course of the conversations. Some of the critics' statements did not spring from a personal response to a design but from an arbitrary and backward concern for the effect (e.g., "I'm voting for this partly because I want to put the brakes on the zips and zaps" . . . "What bothers me is that . . . every young kid is going to be . . . saying 'Wow, this is it this year!' ") Some of us are trying to comprehend a little more than the formal configurations and personal idiosyncrasies of architecture, and for that we require frankness and integrity from our peers.

If the jurors are intent on pulling our budding noses in one direction, then perhaps they would prefer to publish their "valid" criticisms in a private letter to architects and their "concerned" criticisms in *Playboy* — for the students.

For your information, and with all due respect, I am currently having a terrible time teaching zip, zap, and zoop to my "concerned" architectural brain.

S. ROBERT ANDRON
President, Student AIA, Pratt Institute
Brooklyn, N.Y.

Dear Editor: Congratulations to Peter Millard and students Golding, Ives, Mackall, Michels, and Ryan for returning to functional nonarchitecture. Their project for a Youth Recreation Center (p. 130, JANUARY 1967 P/A) is a demonstration of space and function as content, rather than the contents of clever architectural shapes.

ROBERT MELIK FINKLE
North Hollow Farm
Rochester, Vt.

Dear Editor: The brilliance of my Yale contemporaries in meeting the demands of an architectural program, as evidenced in their solution to New Haven's Youth Recreation Center, is not to be denied. But it's a hideous society when ugliness must be consciously produced to help make people happy.

THOMAS E. EVANS
University of Wyoming
Laramie, Wyo.

Dear Editor: Not bad, these kids from Yale.

J. HAGAN
Atlanta, Ga.

Dear Editor: A few years ago, I was fortunate enough to have been the designer on a project selected for a citation award in your annual Design Awards Program. Therefore, I feel a statement of this type will not be received as the proverbial sour grapes. I have, with a great deal of thoroughness, examined your award winners from the inception of your program, up to, and including, your most recent publications. Certain questions arise that seem diametrically opposed to the basic principles surrounding this contest — namely, the works that have been the recipients of these Citations and Awards. I wonder if you too, as sponsors and creators of this program, have not been more than disappointed in your jury selections in recent years.

In years past, this program has provided the conceptual designers in our field with insight and deeper understanding of the progress, direction, and philosophy of firms and individuals throughout the country. It has provided us with a yardstick, and in many instances served as a point of departure to the further development of a brilliant concept. Many have won a degree of recognition on unbuilt but valid departures from the norm. In recent years, this annually anticipated issue has fallen far short of its intended goal, disappointing not only the firms with rejected submissions, but the ones eagerly awaiting a preview of new directions, new forms, new conceptions, new solutions to tired problems. What, then, is the purpose of this letter?

It is to urge you to review your initial philosophy and the basic premise of your Awards Programs.

It is to urge you to evaluate the recip-

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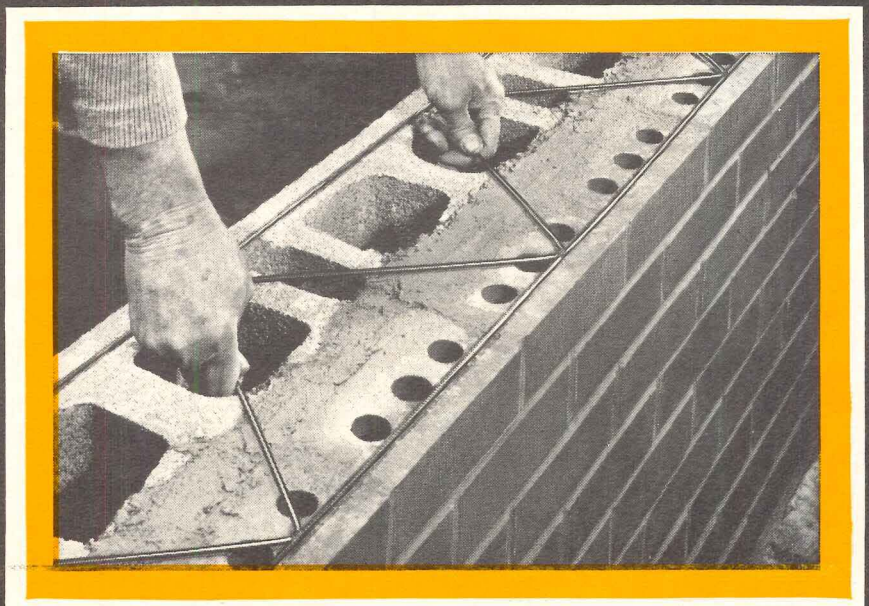

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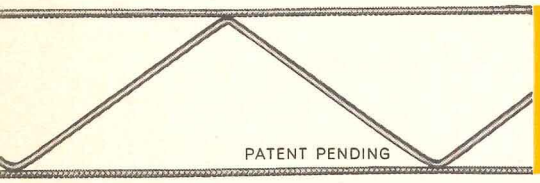

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On Readers' Service Card, Circle No. 344

Continued from page 6

ients of awards in recent years, in respect to their contribution to the direction of architecture as opposed to recipients in years past.

It is to urge you to further instruct your jury in its responsibilities, not only to your program, but to their profession.

I will avoid pointing out specific cases and specific years. However, mediocrity has overwhelmed the avant-garde. New directions have given way to sophomoric solutions.

FRANK PRINCE
Tampa, Fla.

Dear Editor: MacDougal Street has moved to P/A. Tennyboppers in the jury room. Fifty-year-old teenyboppers. Shame.

"Not one zip or zap or zoop" . . . "There are marvelous girl-watching zaps" . . . "A mushroom-cloud type idea" . . . "Mod without being slangy" . . . "Work in an idiom that I, for one, turn on to" . . . "And angularity and zap without ever, you will notice, actually zapping" . . . "I think its great; now we'll have to figure out why" . . . "Turn these kids on" . . . "I like this project. I'm not sure I understand it yet."

Please understand, it's not the language that turns me off. Why, man, all of us young hippy architects and acid-artists talk this way all the time.

What is terrifying are the values implicit in much of the work chosen, the abandonment of criteria that allowed it, and the level of recorded jury discussion. Architecture, or building, or environmental art, or whatever it is we do, is not dress design — not a binary system that turns you off or turns you on.

You have, as one bruised juror stated, "honored here certain qualities that are frightening" and in the process abandoned a critical vocabulary and its ideas in favor of a subjective hodgepodge of contentless post-Pop terms.

When you justify these architectural qualities as "allusions to the Pop Life," you've overindulged and underdigested Susan Sontag and Marshall McLuhan. This architecture alludes only to the life-diminishing facets of Pop Life — Andy Warhol's glory in boredom, Jonas Mekas' technical incompetence, the alienating chaos of the Kluver-Rauschenberg theater-dance pieces, and Lichtenstein's simplistic verbal reduction. Nowhere does this work allude to the solid, lusty, vulgar richness — vox pop. Yours is the precious, boutique approach to Pop Life.

The profession does not demand that P/A be a scholarly journal, and has less need still for a comic book.

MIKE BRILL
New York, N.Y.

Dear Editor: Zip, zap, zoop. Zowie! Whammo! Zok! Splat! Ugh! Nor am I turned on by your "no principles" argument. Do we now rely on juvenile tastes enunciated by such language as the above to evaluate architecture?

FOSTER C. PARRIOT
Boulder, Colo.

Dear Editor: Surely you jest! Either you or the members of the jury for your awards are putting us on. I am referring specifically to their incredible inconsistency of judgment. Without trying to make a Federal case of the P/A Design Awards Program, I feel that one comment from one of the jurors can very simply apply to most of the published entries — "a manifestation of the depths to which the art world has fallen."

I am still trying to find words to describe the unbelievable "thing" entitled Youth Recreation Center. Are you sure these guys are in third year? Is this their third year of school or their third year of a long "trip"? I have seen innumerable cases of typical clients coming in to the office with a freehand-drawn sketch of their dream building (on a coffee-shop paper napkin) with a much better understanding of architecture than these fellows who are supposed to have had some design training. By the way, I thought that the U.C.L.A. stadium was an excellent entry. That's probably the reason why — at least, as far as we know right now — it seems that it will never get built. Doesn't it somehow figure?

NELSON FAY
Van Nuys, Calif.

"Toward the Third Millennium," Revisited

Dear Editor: I would like to convey my sincerest congratulations on the issue "Toward the Third Millennium" (DECEMBER 1966 P/A), which, as a summing-up of our cultural situation, was perhaps one of the sharpest of its kind published within the last year.

MANFREDI G. NICOLETTI
Rome, Italy

Dear Editor: Congratulations on the December issue, which I have finally gotten around to reading. It is endlessly fascinating and a careful consideration of its contents should be a part of every architect's education.

CHARLES W. MOORE
Chairman, School of Art and Architecture
Yale University
New Haven, Conn.

A Matter of Definition

Dear Editor: I have come across something that may be of interest — the concept of architecture as established by *Webster's New Collegiate Dictionary.*

Continued on page 16

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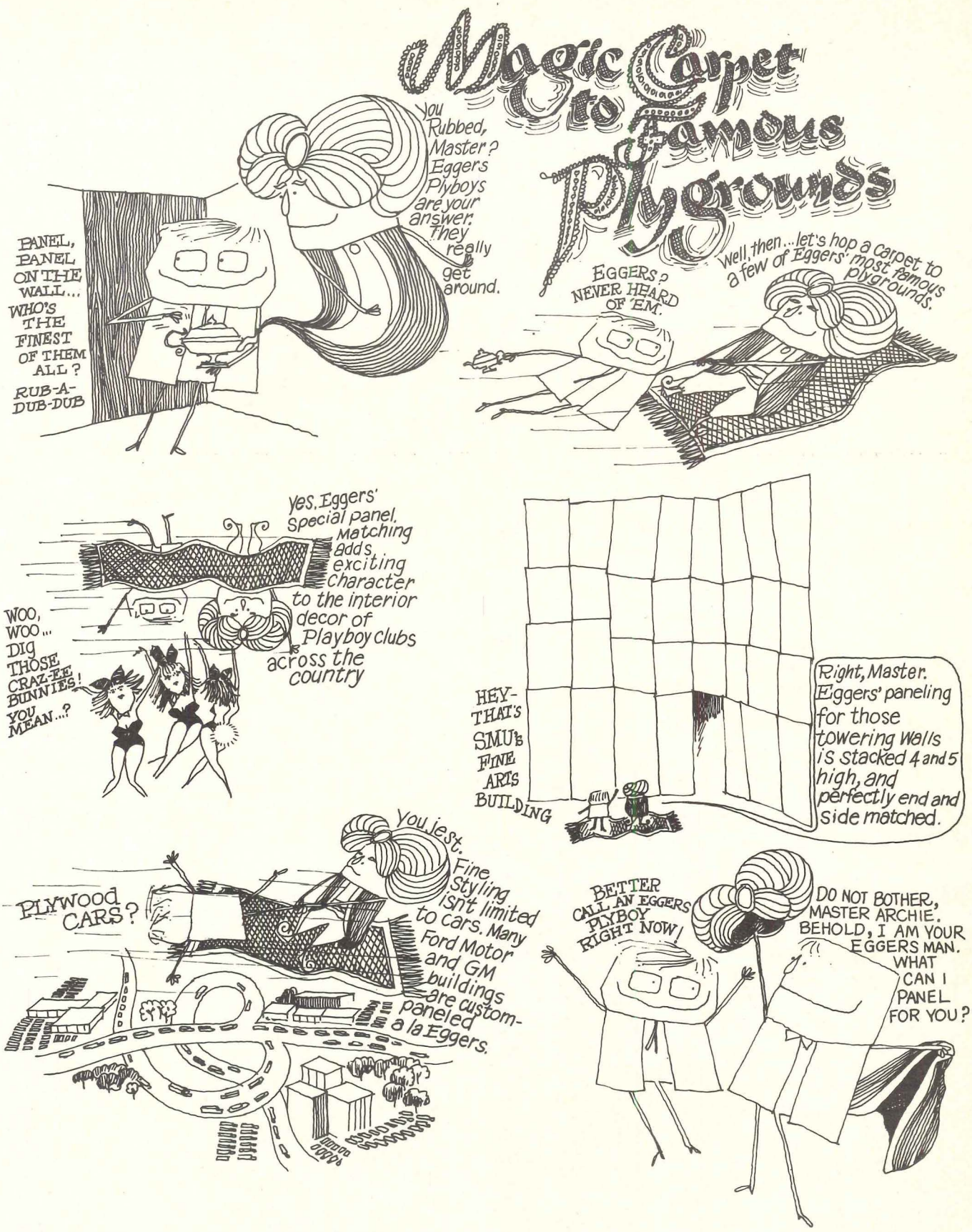

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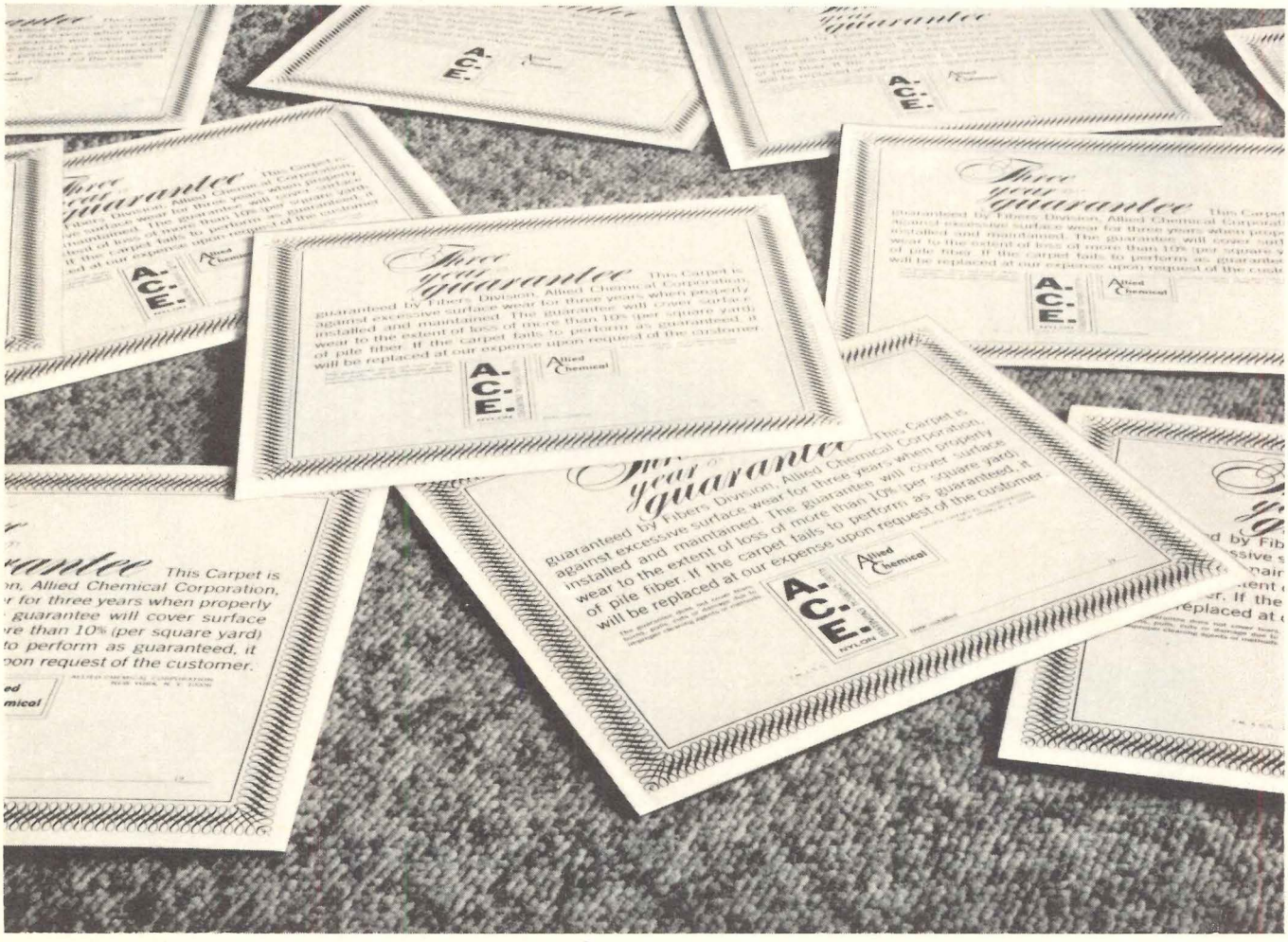

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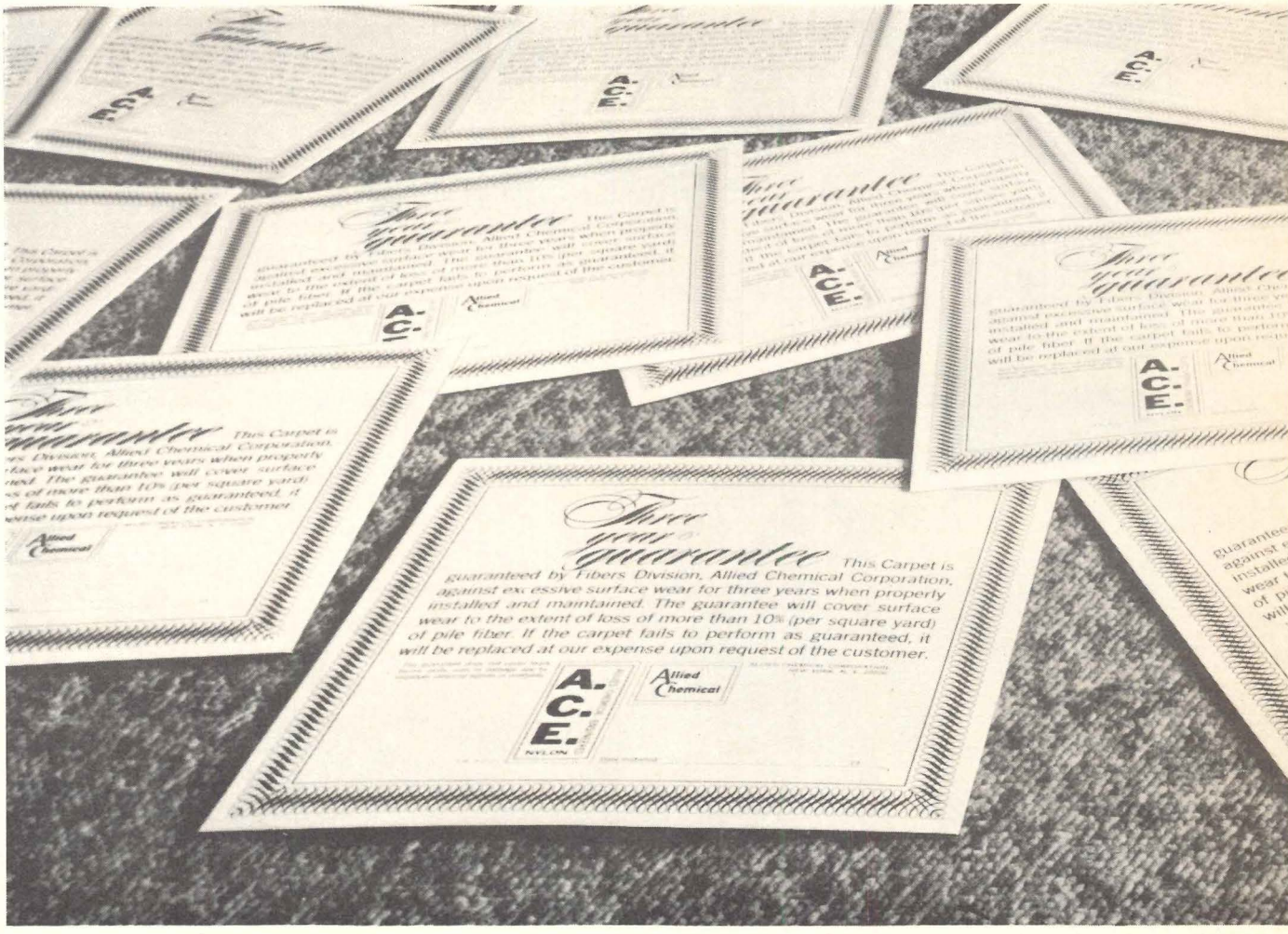

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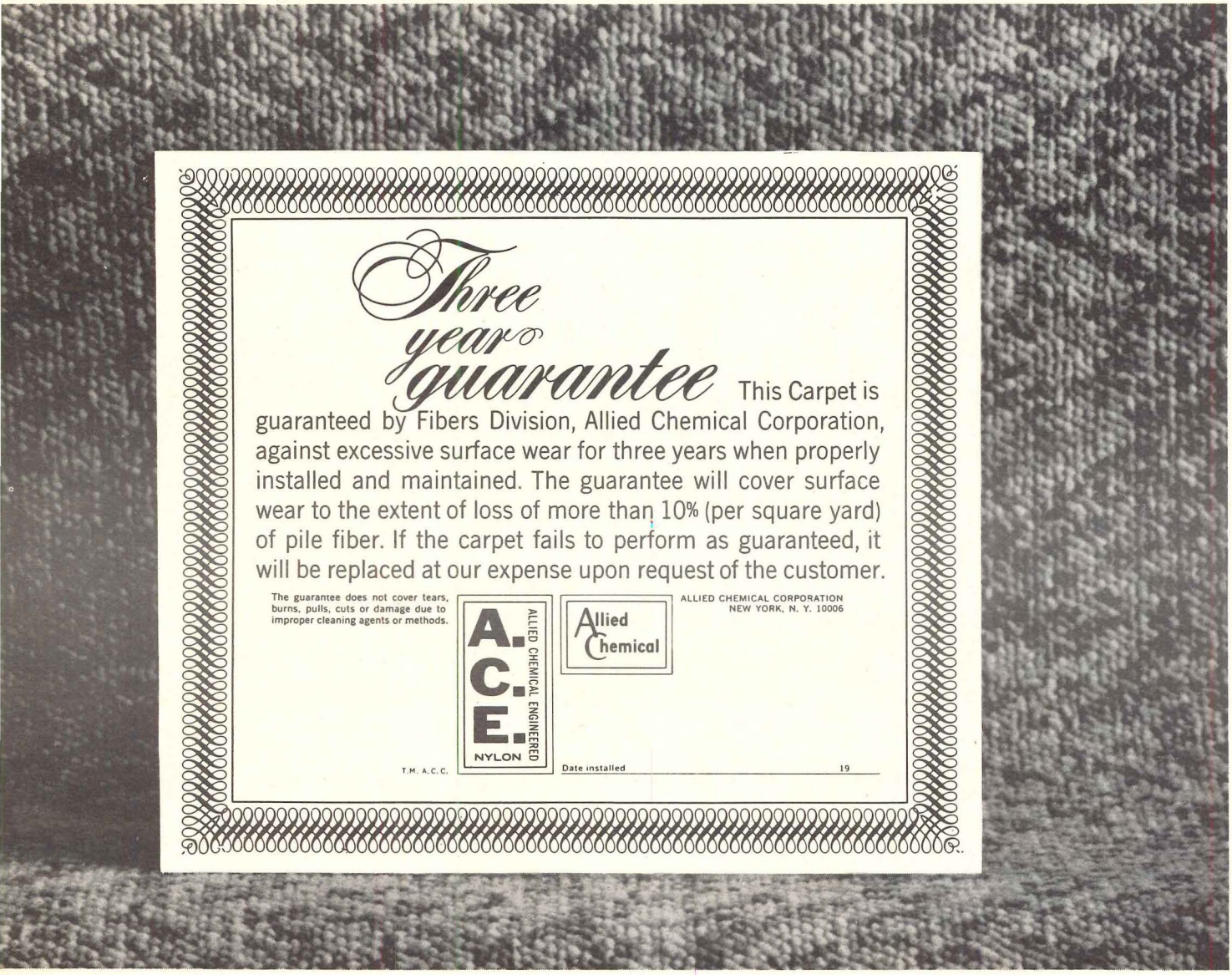

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Continued from page 8

The following are definitions as given by *Webster's New Collegiate Dictionary*: "FINE ARTS: Painting, drawing, architecture, and sculpture; and sometimes, poetry, music, dancing, and dramatic art. FINE ART: Art which is concerned with the creation of objects of imagination and taste for their own sake and without relation to the utility of the object produced. UTILITY: Quality or state of being useful; usefulness."

Being listed as one of the fine arts, Webster's concept of architecture can be determined by substituting the words appropriate to architecture in the definition of fine arts. The following substitutions will be made: Substitute the word architecture for the word art; assuming that buildings are the objects created in architecture, substitute the word buildings for the word objects; being the definition of utility, substitute the word usefulness for the word utility.

Architecture is concerned with the creation of buildings of imagination and taste for their own sake and without relationship to the usefulness of the buildings produced.

No wonder the public has such a wide misconception as to the meaning and purpose of architecture when it becomes evident that the "scholars" do not have a proper conception.

GARY D. RINER
Corpus Christi, Tex.

Concrete: A Most Engrossing Issue

Dear Editor: Having finished a fairly thorough persual of the issue on exposed concrete (OCTOBER 1966 P/A), I must compliment you on one of the most engrossing and enjoyable issues in some time. (I am somewhat surprised at my own interest, in fact, as the detailed commentary on techniques and construction are at the other end of the scale from the broad urban design considerations I'm usually involved with.) The composite-solicited-opinion articles seem a little sketchy but do give extensive coverage; the punlike headings, if not always on the mark, are still fun; and even the skeptical Mr. Farch's comments add to the enjoyment.

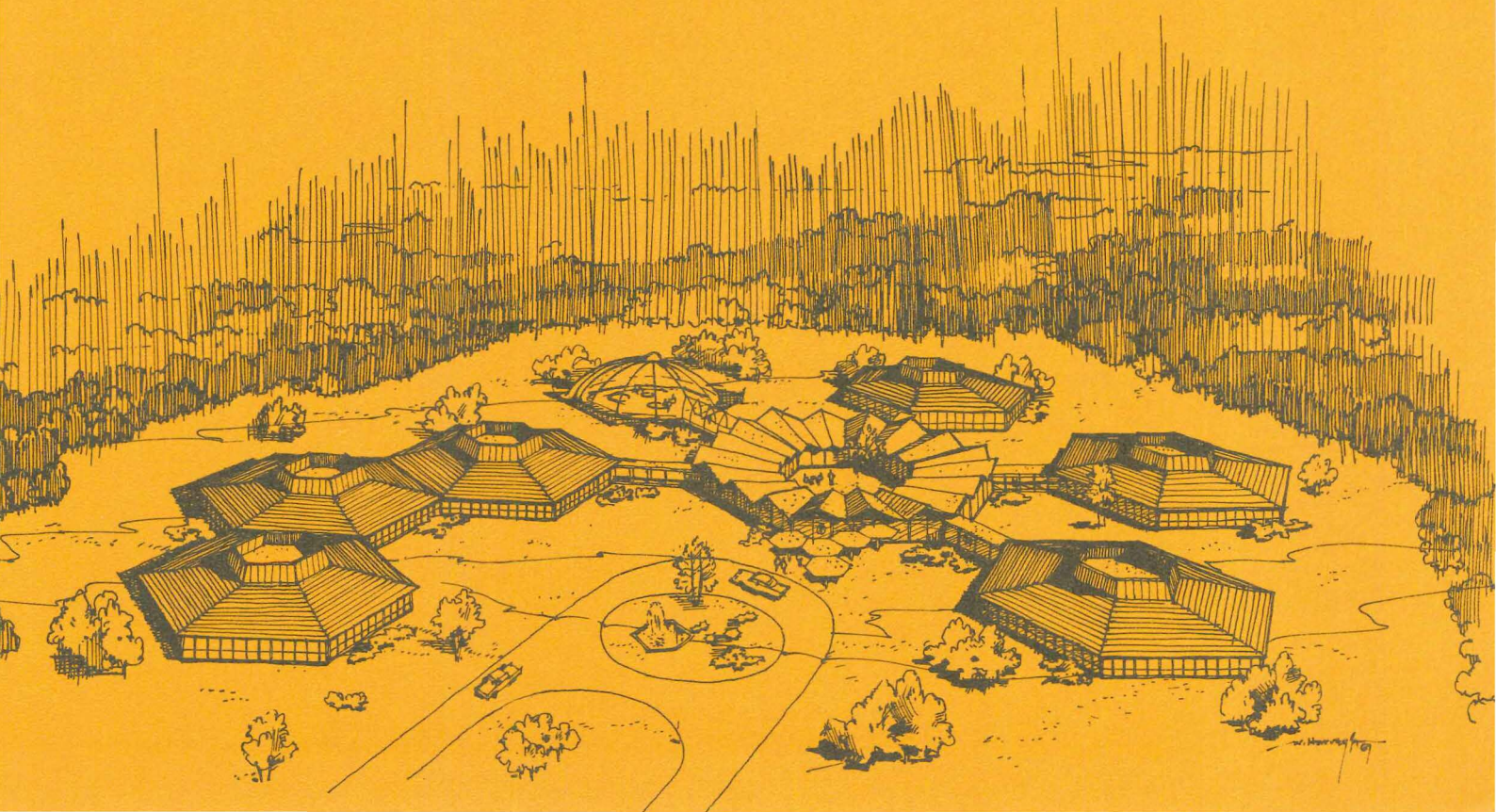
Highlight of the issue, to me, was Aldo Cossutta's article tracing the simultaneous evolution of design and technique through several projects. A great deal more might well be done with this kind of history of design development — in reporting on building and design developments, in linking together the progress of decades in search of better solutions to certain problems, and even in illuminating archi-

Continued on page 24

A CONVALESCENT HOSPITAL FOR THE 1970'S

Arnold Lawrence, A.I.A., combines site, concept and materials to serve the needs of the patient and the expanding role of the nursing home, in this cluster type extended care facility.

A design project commissioned by CERAMIC TILE American Olean



Arnold Lawrence, A.I.A., is a specialist in the design of medical, convalescent and geriatric facilities. He has designed numerous such installations in many parts of the country.

Ceramic tile works with other materials to create a "recovery environment," keep maintenance costs low.

Aquarium. An undersea pattern of green and blue ceramic mosaic tile sets off the aquarium in this restful patient lounge. Semi-circular seating arrangement encourages social contact among patients. Floor of Fawn Gray Murray quarry tile contributes to the relaxed mood.

Arnold Lawrence's design reflects the convalescent hospital's growing role as a supplement to the full-service hospital. It offers an environment for recovery and rehabilitation for convalescent patients of *all* ages.

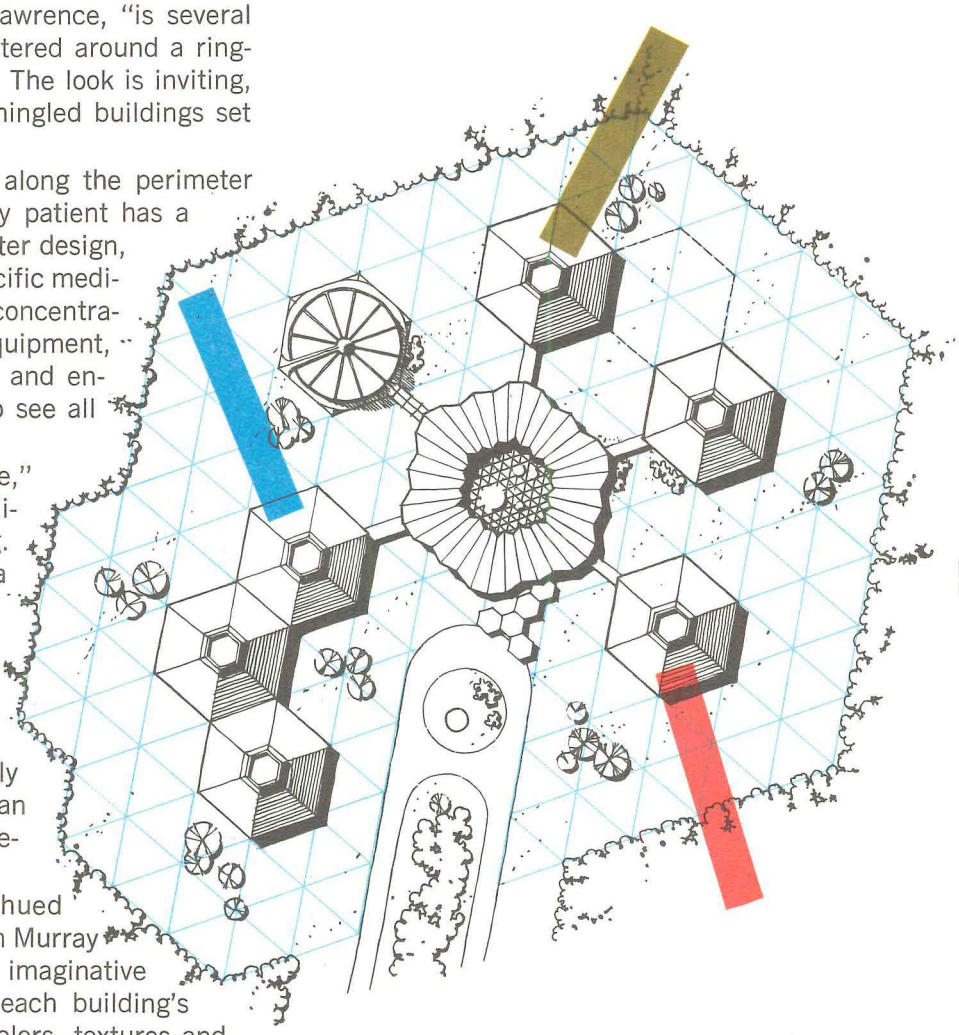
"The basic concept," says Lawrence, "is several modular satellite buildings clustered around a ring-shaped administration building. The look is inviting, *un*clinical—tent-roofed, wood-shingled buildings set on a rolling, wooded site."

Patients' rooms are located along the perimeter of each satellite building. Every patient has a pleasant outdoor view. The cluster design, with each wing devoted to a specific medical specialty, also allows for the concentration of specialized medical equipment, permits intensive patient care, and enables nonresident specialists to see all their patients in one stop.

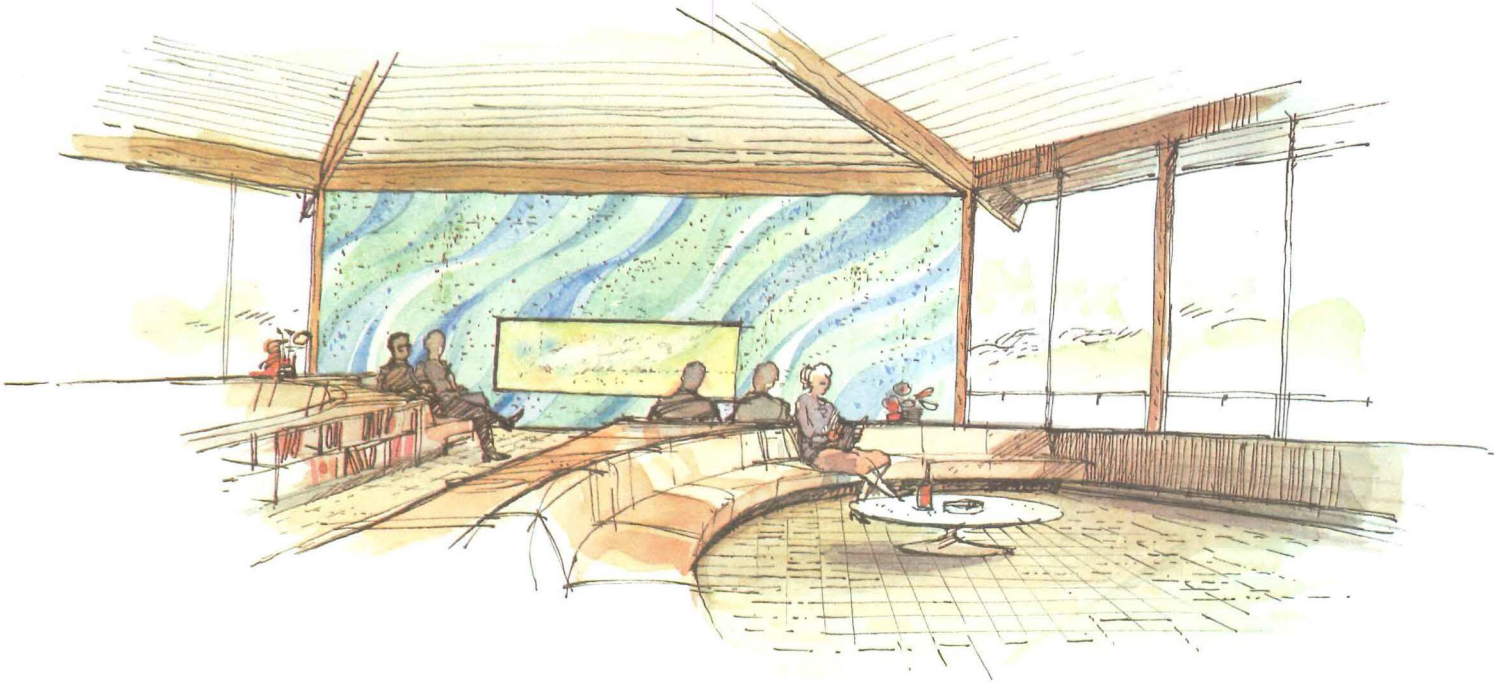
"The modular hexagon shape," says Lawrence, "permits the addition of future units to any wing. Expansion can take place in a number of directions.

"Color," he points out, "plays an important psychological role in patient recovery. Since ceramic tile offers a broad color palette and is highly functional as well, it makes an ideal surfacing material for a recovery environment."

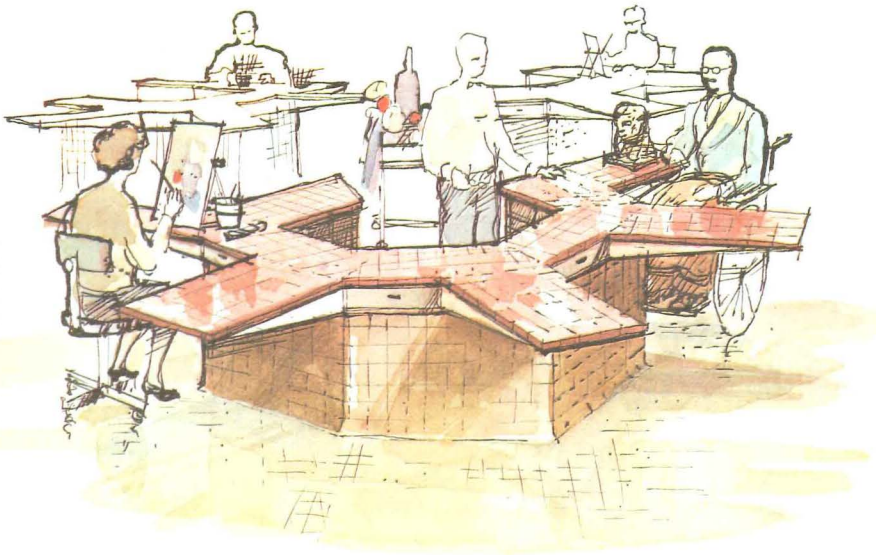
Colorful glazed tile, subtly-hued ceramic mosaics and rich, warm Murray quarry tile are used to achieve imaginative design effects appropriate to each building's function. The mixture of tile colors, textures and sizes creates a lively feeling of variety throughout the interior. And, because it is so durable and easy to clean, ceramic tile helps keep maintenance costs low.



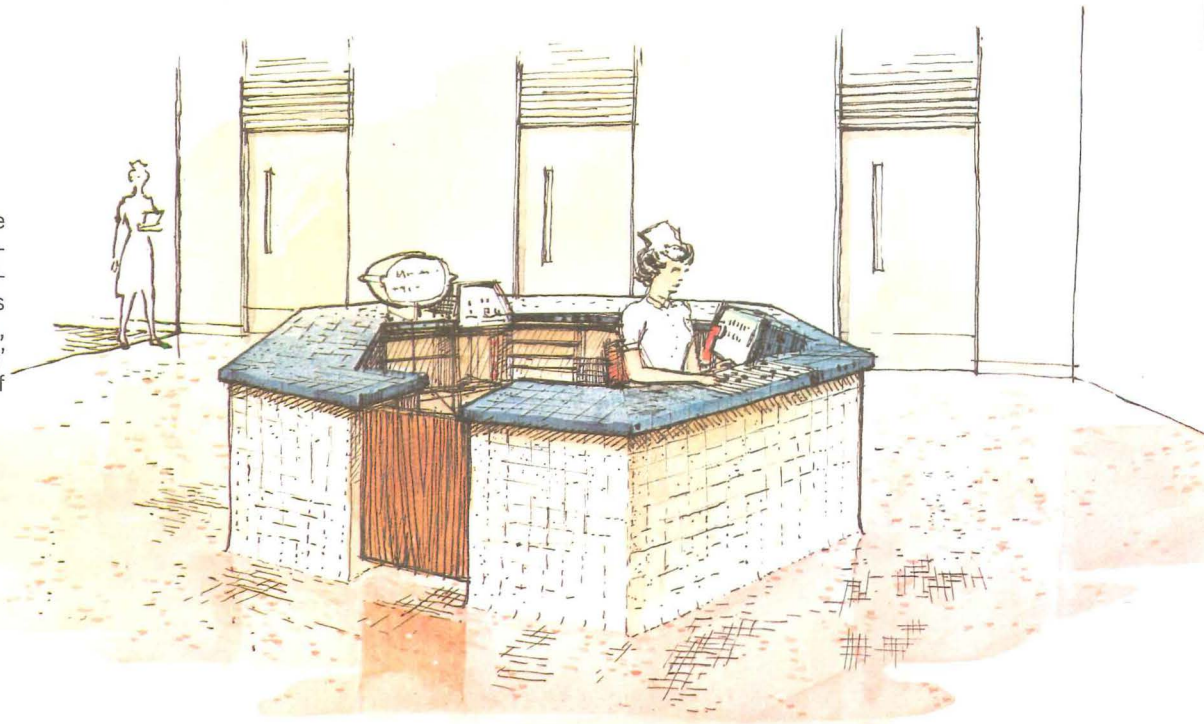
CERAMIC TILE
American Olean



Arts and crafts—integral parts of the rehabilitation process—take place at clusters of specially designed tables. Configuration allows several patient groups to work from one model set-up. Table tops of matte finish glazed tile permanently resist stains and scratches. Table bases are tiled in varying pastel shades.



Nurse's station has a base of smooth glazed tile, counter top of textured Crystalline glazed tile. It places nurse in central position, equidistant from patients' rooms. Floor is a pattern of ceramic mosaics.



A sunken garden domed for year-round use

A retractable plastic dome makes this sunken garden a year-round haven for patients. It provides them with a pleasant setting for conversation or recreation, and prevents them from roaming unattended. A floor of Murray quarry tile in Canyon Red establishes the warm, relaxed mood. A relief mural of ceramic mosaic tile adds to the visual interest.

This extended care facility is one of three designs executed by Arnold Lawrence under commission from American Olean. The others are a high-rise convalescent hospital and a retirement home. A "Designer Sketchbook," illustrating and describing all three, is available free from American Olean. Write for your copy today. American Olean Tile Company, 1069 Cannon Avenue, Lansdale, Pa. 19446.

CERAMIC TILE
American Olean

A Division of National Gypsum Company
Executive Offices: Lansdale, Pa.
West Coast: Pomona Tile Mfg. Co.

DOW CORNING

New product

When is Terraseal 100 joint sealant a bargain at $20 per gallon?

When leaks on terraces can cause expensive damage to underlying building areas.

When freeze-thaw of standing water on decks may result in heaving, cracking and structural damage.

When foot traffic on walks or patios poses dangers of mishap and injury.

Whenever replacement of sealant is a costly, never-ending maintenance expense.

In these instances, there's no margin for failure, no allowance for the alternate softening and hardening of asphalts, the cracking and failure shown below. No allowance, either, for punctures, abrasion damage and loss of adhesion which often befall polysulfides in these applications.

A new Dow Corning product, Terraseal® 100 joint sealant, has mastered these problems and many others which afflict deck, terrace and traffic joints. It costs as much as ten times more than the lowliest asphalt caulk — and it's worth every penny.

Terraseal 100 sealant is a flexible, one-part polyurethane caulking compound specially formulated to give long, trouble-free service in joints on

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patios
swimming pool decks
parking garages
walkways
sidewalks
roof gardens
drives
stadiums
entranceways

Terraseal 100 sealant is exceptionally *tough* (tear strength, 110 lbs/inch), and will withstand heavy abuse of foot and vehicular traffic. It resists puncturing by rocks, stones or spiked heels. It has iron-like *adhesion* to most joint surfaces, even *green concrete*. Flexibility and recovery are excellent even at low temperatures. Terraseal 100 sealant can be stretched or compressed up to 50% in service without affecting joint soundness, and it will rebound to 90% of its original dimensions after long periods of expansion and compression.

This polyurethane sealant is exceptionally resistant to direct sunlight and the deteriorating effects of *water* and *weather*. Standing water will not affect the sealant or its adhesion in the joint.

In a word, Terraseal 100 joint sealant is the "greatest" . . . stronger, longer lasting, and more durable than asphalt, polysulfide or any other polyurethane sealant.

Why not make your own *value test* — send for demonstration sample, product data and source of supply. Circle the reader service number provided by this publication or write direct to Chemical Products Division, Dept. 8116, Dow Corning Corporation, Midland, Michigan 48640. Demonstration sample offered only in U.S.A.

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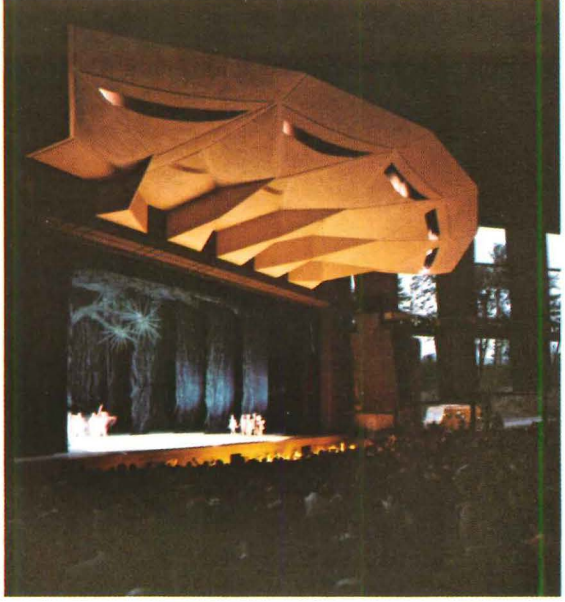
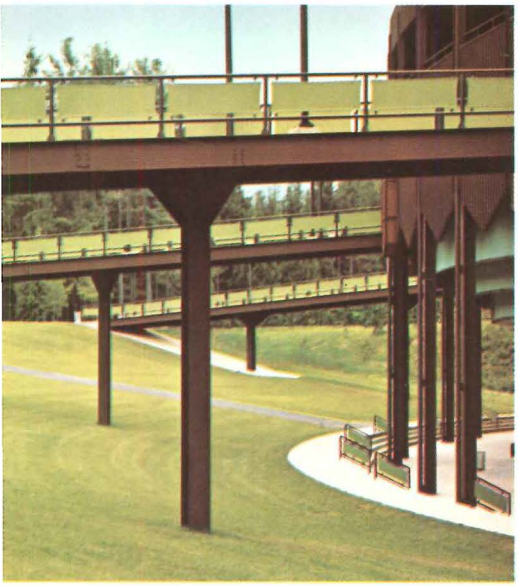


Saratoga Performing Arts Center



Steel bridges reach over the lawn to the balcony so ticket-holders don't have to pick their way through orchestra and lawn crowds.

This summertime center for ballet and music made its debut last year as the home of the New York City Ballet (George Balanchine, Director) in July, and The Philadelphia Orchestra (Eugene Ormandy, Music Director) in August.

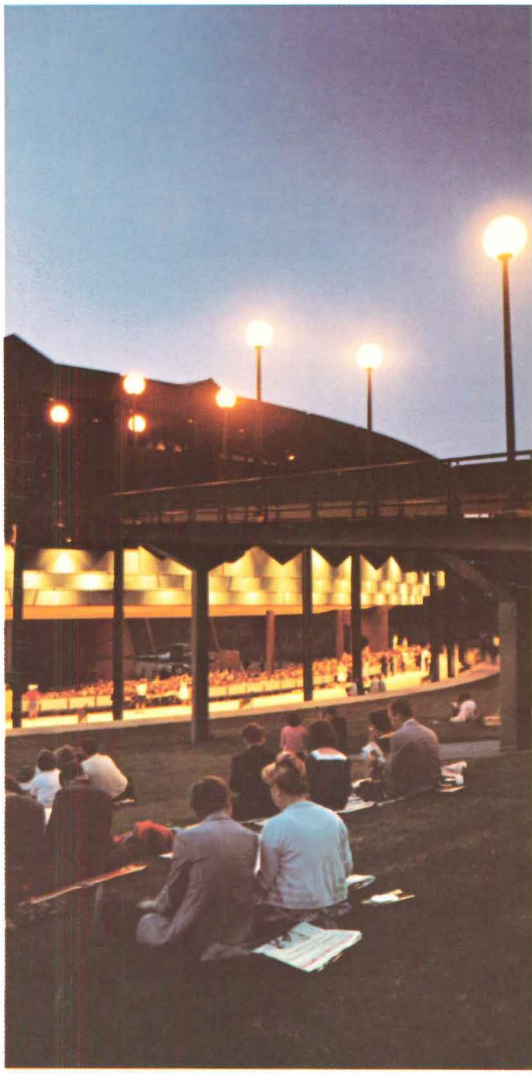
Situated on a 150,000 sq ft wooded plot at Saratoga Springs, N.Y., the Center has two main structural elements. First is the steel-framed, fan-shaped amphitheater which seats 5,100 people under roof. The steel frame was designed so that there is an unobstructed view of the stage from every seat. Six steel trusses, each 126 ft long, span out from the steel proscenium girder (82 ft x 10 ft) to form a pleated roof, specially designed to blend acoustical properties with the visual requirements.

The second structural element is the towering stagehouse, 100 ft high, 102 ft wide, and big enough to accommodate 104 separate sets of scenery. The stagehouse is heavily framed and braced with steel to satisfy all load requirements.

The Saratoga Performing Arts Center was designed by the architectural and engineering firm of Vollmer Associates. Structural steel was fabricated and erected by James McKinney & Son. General contractor: L. A. Swyer, Co., Inc. Bethlehem supplied the structural steel.

BETHLEHEM STEEL CORPORATION, BETHLEHEM, PA.

BETHLEHEM STEEL



The sloping lawn provides room for about 7,000 people who can both hear and see the performances.

The pleated roof is supported by 126-ft-long trusses, ranging from 16 to 25 ft in depth. Major acoustical element is a steel-framed canopy 100 ft wide and about 50 ft long, cantilevered 50 ft over the audience.

Steel

Continued from page 16

tectural history as such. This approach could interrelate whole periods viewed as a search through various techniques for ways to realize objectives that are simultaneously architectural, social, and practical.

Certainly the plea for an integral profession (or a closer rapprochement of professionals about common tasks in our time) was well and convincingly stated by several of the authors. Safdie's comment about Habitat being an overlap of a technical building system and an urban pattern is, perhaps, saying the same thing in tangible terms. Missing, however, in his concept are two other overlaps of fundamental importance: the *community* pattern, and the *economic* system that any building system must also satisfy (along with the technics and the urban design) if it is to be a viable new answer for our housing problems. I would be interested to know how Safdie can really consider Habitat an alternative to suburban housing (even if costs were brought into line) considering what the suburbs have going for them in terms of the economic and community patterns. On the other hand, Habitat may be a good experiment in urban housing, offering something non-suburban for those needing better housing in the inner cities. No doubt we'll see and hear much more of Habitat.

Again, my thanks for an issue on *architecture* that has both breadth and detail.

STEPHEN W. OSBORN
Detroit, Mich.

Extending Credit

Dear Editor: This letter may have a familiar ring. We appreciate the credit to consultants in the feature on the Colgate Creative Arts Center, but we didn't *quite* get in (p. 114, FEBRUARY 1967 P/A). Acoustics were credited to "Cambridge Acoustical *Consultants*," rather than to Cambridge Acoustical *Associates*, Inc.

In addition, although we are credited only with "theater acoustics," we designed the acoustics of all rooms in the Center. However, our commission did not include a review of the mechanical equipment noise sources and paths. This omission may be the reason that the organ can be heard in the auditorium via the ventilation duct.

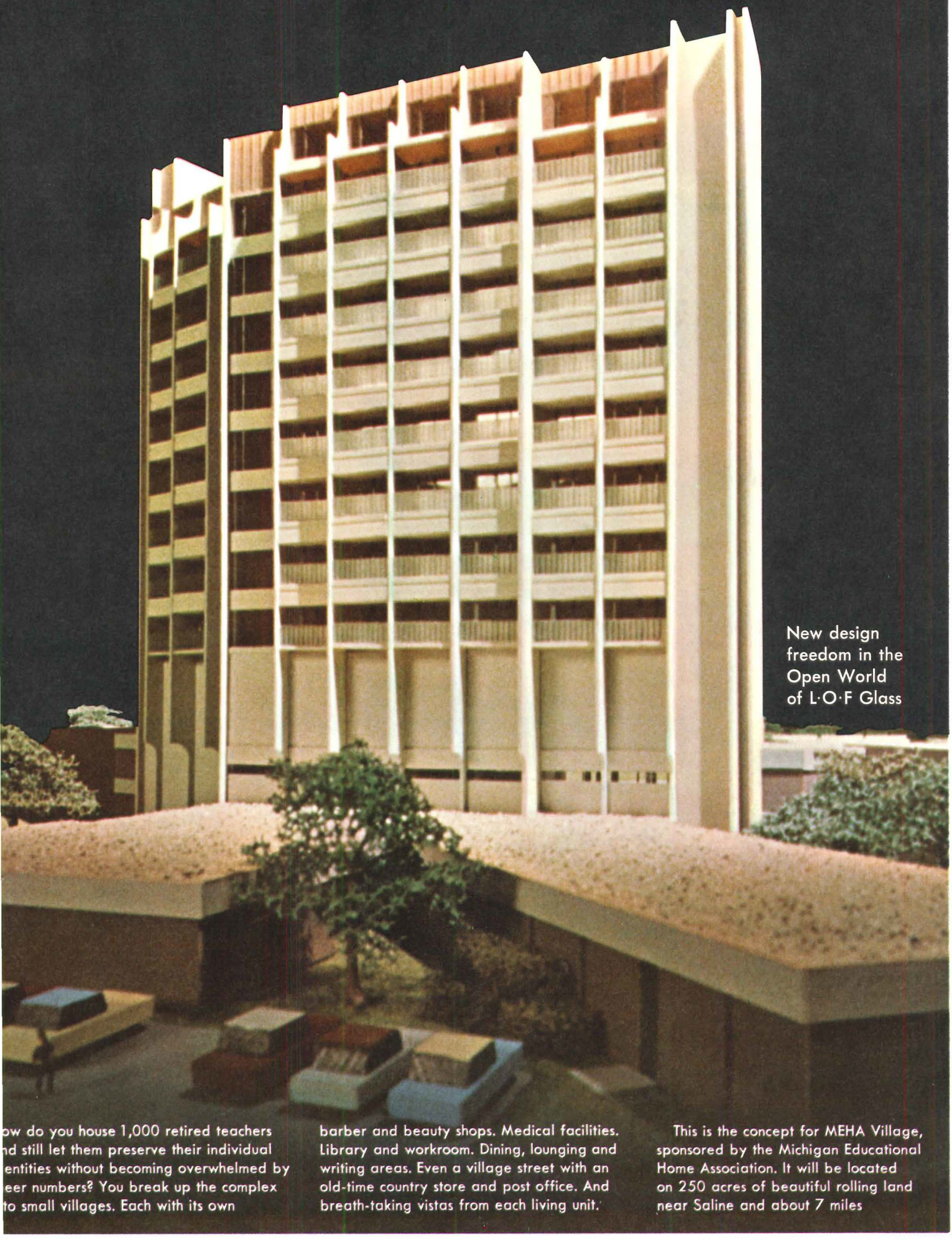
KLAUS KLEINSCHMIDT
Cambridge Acoustical Associates, Inc.
Cambridge, Mass

Breuer's FDR Memorial

Dear Editor: In reading the P/A NEWS REPORT (p. 35, JANUARY 1967 P/A), you mention that a comparison is inevitable between the original, competition-winning design by Pedersen, Tilney, Hoberman,

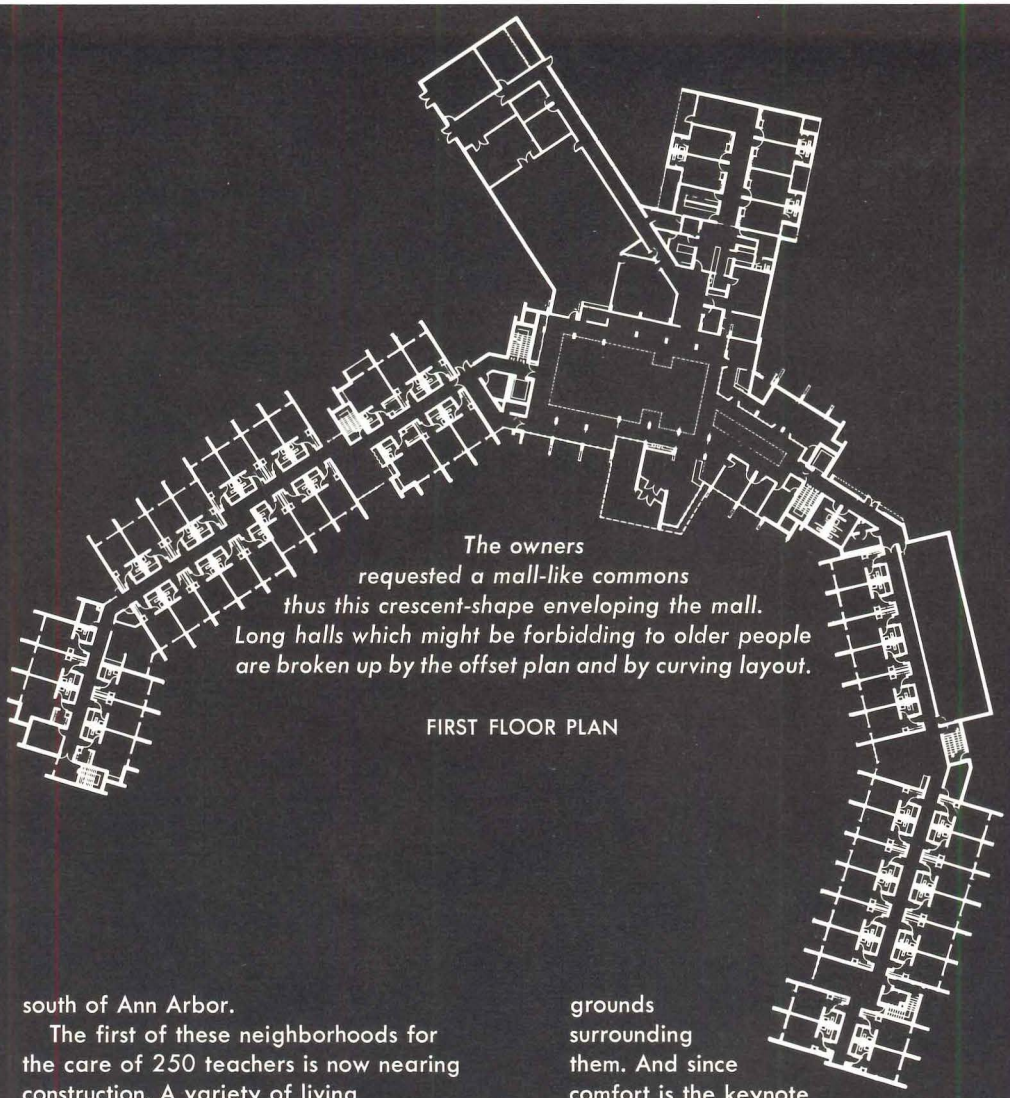
Continued on page 30

Samborn, Steketee, Otis and Evans design a retirement village on a neighborhood concept



ow do you house 1,000 retired teachers nd still let them preserve their individual entities without becoming overwhelmed by eer numbers? You break up the complex to small villages. Each with its own barber and beauty shops. Medical facilities. Library and workroom. Dining, lounging and writing areas. Even a village street with an old-time country store and post office. And breath-taking vistas from each living unit.

This is the concept for MEHA Village, sponsored by the Michigan Educational Home Association. It will be located on 250 acres of beautiful rolling land near Saline and about 7 miles



The owners
requested a mall-like commons
thus this crescent-shape enveloping the mall.
Long halls which might be forbidding to older people
are broken up by the offset plan and by curving layout.

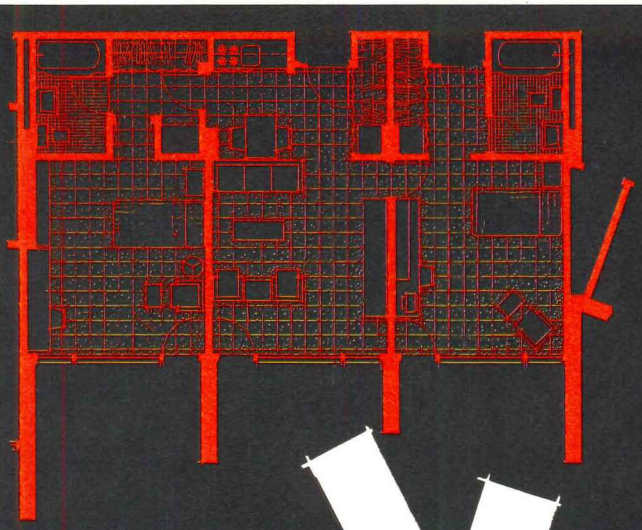
FIRST FLOOR PLAN

south of Ann Arbor.

The first of these neighborhoods for the care of 250 teachers is now nearing construction. A variety of living accommodations, with flexibility among each, has been provided. The resident has a choice of a two-story terrace unit with a patio outside each room on the lower floor, or an apartment with a balcony on the second floor. Or the retiree may prefer living in a hi-rise tower in which each room also has a balcony.

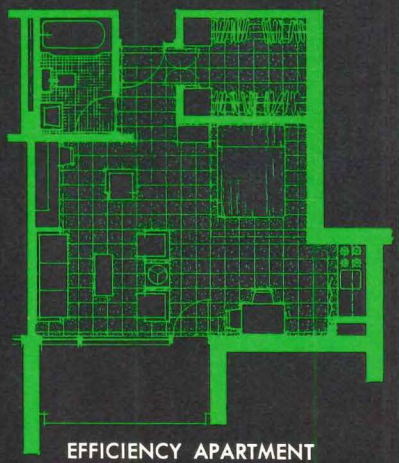
In all cases, window walls are provided so residents may enjoy the wooded grounds surrounding them. And since comfort is the keynote for the buildings, Thermopane® insulating glass with glare-subduing Parallel-O-Bronze® plate glass as the outer pane is specified. With Thermopane, one is comfortable in winter, even next to windows, making it possible to use all interior space. By insulating windows against heat loss in winter and heat admission in summer, Thermopane cuts temperature controlling costs.


MODELS BY MITCHELL

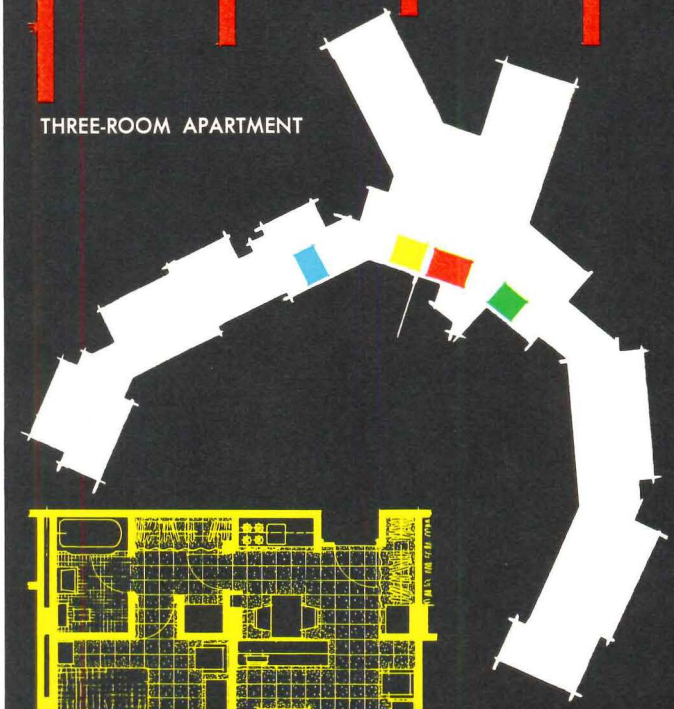


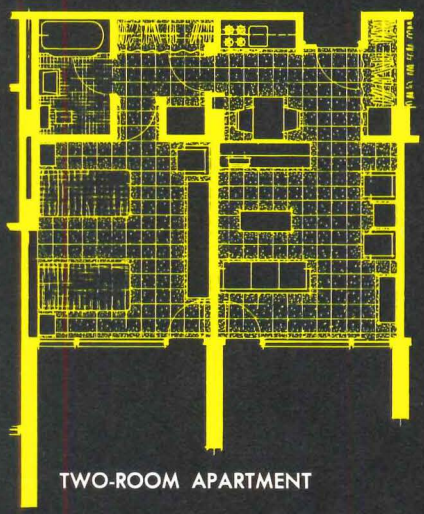
THREE-ROOM APARTMENT

Additional three-room apartments can be provided by removing a knock-out panel between the two-room and adjoining single. Likewise, additional two-room apartments can be created by removing the knock-out panel between efficiency and single room adjoining it.

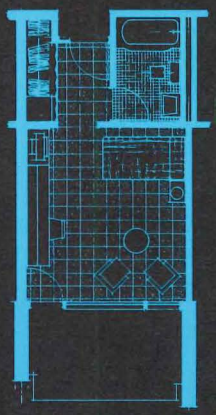


EFFICIENCY APARTMENT





TWO-ROOM APARTMENT



SINGLE-ROOM APARTMENT

Samborn, Steketee, Otis and Evans, engineers and architects of Toledo, Ohio, stacked the balconies to provide sun shades for the window walls and as an aid to window cleaning.

L·O·F makes a particular kind of glass for every purpose in Open World design. Refer to Sweet's Architectural File or call your L·O·F Glass Distributor or Dealer listed under "Glass" in the Yellow Pages. Or write to Libbey·Owens·Ford Glass Company, 811 Madison Avenue, Toledo, Ohio 43624.

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WINDOW GLASS
PATTERNED & WIRED GLASS

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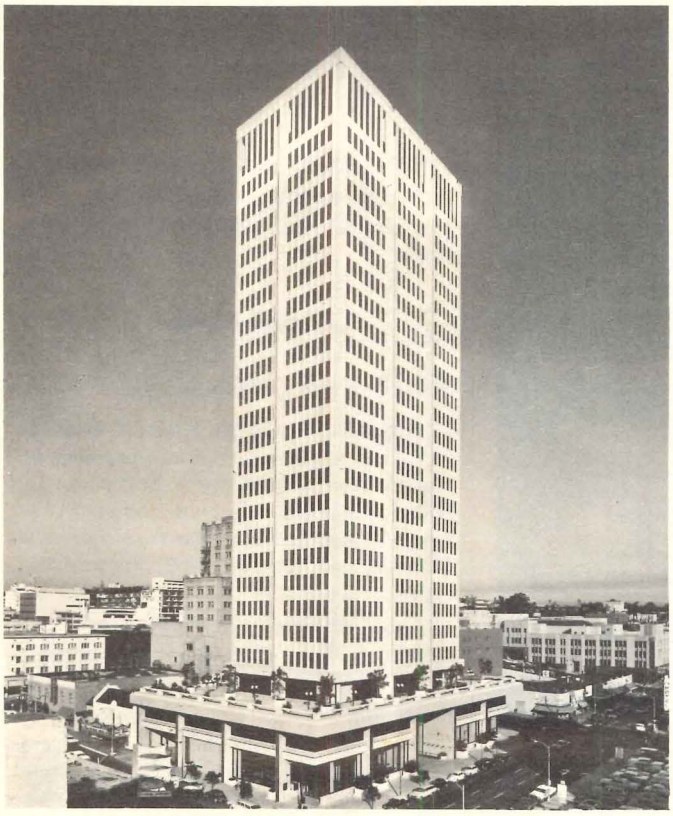
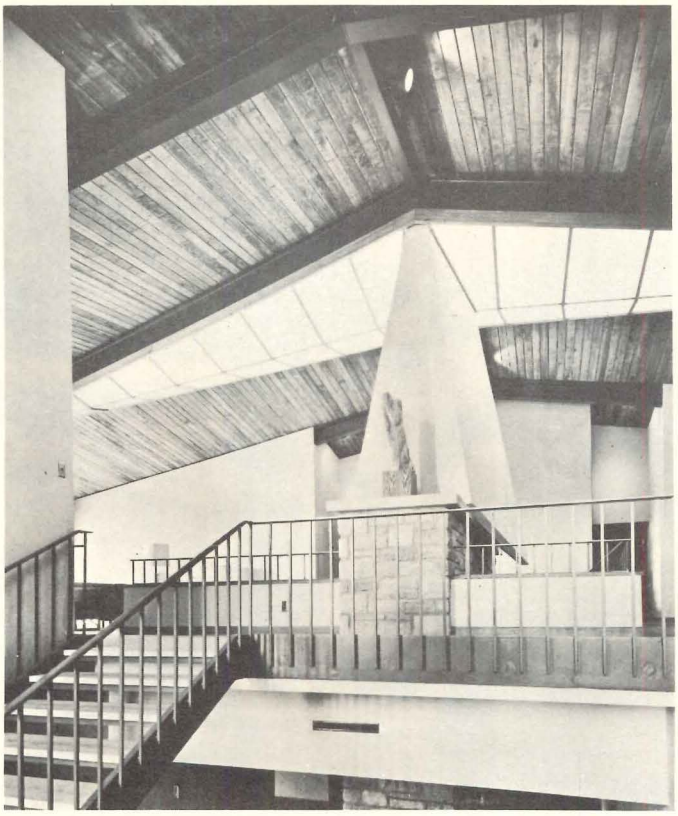
Libbey · Owens · Ford Glass Co.

Toledo, Ohio

The bank and the monastery don't have much in common. Except one thing.



First National Bank of San Diego, California
Architects: Tucker, Sadler and Bennett, San Diego

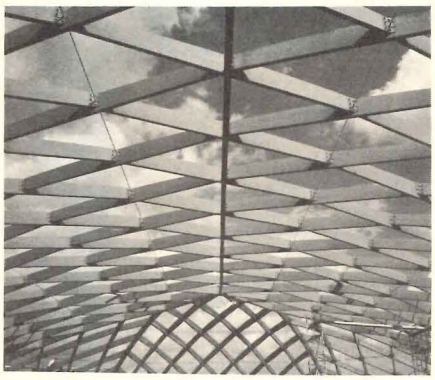


Benedictine Monastery, Pevely, Missouri
Architects: Drake-O'Meara Associates

Fire Protection... with Pyresote® fire-retardant lumber & plywood

And because of that fire protection, the Monastery received a non-combustible insurance rate by using Pyresoted® wood roof decking. And the bank? Due to the low flame spread of Pyresoted plywood cores, aesthetically rich wood paneling was permitted in the handsome office interiors.

The acceptance of Pyresote® fire-retardant lumber and plywood by nearly all regional, state, county and city building codes throughout the United States, opens an unlimited vista for the use of wood. No wonder architects like Drake-O'Meara Associates as well as Tucker, Sadler and Bennett see to it that even monasteries and banks have something in common. For full information on money-saving Pyresote® (available from licensees and dealers throughout the U.S.) write, wire or phone.



The high fire-retardance of this Pyresote® treated Lamella roof in the Mt. Vernon High School gymnasium, Mt. Vernon, Indiana, afforded substantial savings on fire insurance. Architects: Lester W. Routt & Associates; Vincennes, Indiana.

J.H. Baxter

120 Montgomery St., San Francisco 94104
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Continued from page 24

Wasserman & Beer of the Franklin Delano Roosevelt Memorial and the new one designed by Marcel Breuer. It is unfortunate that a national monument of such significance should be taken out of an architectural and aesthetically oriented commission and left to the determination of the family.

In my view, the Breuer design is hardly an improvement over the original, which had dignity, elegance, unusually fine design, and scale. The decision is somewhat an aesthetic compromise determined by sentiment in lieu of experience.

LEON GORDON MILLER
Cleveland, Ohio

CORRECTION: The photographer for the Offices for Brown Company (pp. 122–131, FEBRUARY 1967 P/A) was Louis Reens.

NOTICES

New Partners, Associates

LATHROP DOUGLASS, Architect, New York, N.Y., has announced the advancement of ROBERT ADAMS MCKELVEY, FREDERICK D. RINK, and WARREN CALWIL, to Senior Associates, and EUGENE BARYLA, SANFORD MALTER, and AARON CHELOUCHE to Associates.

MORTON Z. LEVINE & ASSOCIATES, INC., Architects, Engineers and Planners, Skokie, Ill., have named JOHN K. HARASCIUK senior planner.

MCMILLAN, GRIFFIS, MILETO, Architects and Planners, New York, N.Y., announce the addition of HERBERT D. RADER to their partnership.

MEDICAL PLANNING ASSOCIATES, Architects, Malibu, Calif., announce that MICHAEL L. BOBROW and JAMES C. NOACK have joined the firm as planning associates.

JOHN MORSE & ASSOCIATES, Architects, Seattle, Wash., have named as associate JAMES F. HAMILTON.

ALFRED EASTON POOR & ASSOCIATES, New York, N.Y., have named as associates IGNACIO ROMERO, FRANK C. MARCELLINO, and RICHARD S. HAYDEN.

VOSBECK-VOSBECK & ASSOCIATES, Architects, Alexandria, Va., announce that DAVID R. GALLAGHER and PHILIP L. VANDER MYDE are now associate partners.

Elections, Appointments

MISSISSIPPI GLASS CO., St. Louis, Mo., has named ROBERT E. RIES as General Sales Manager.

Name Changes

HAMILL/SHAW ASSOCIATES, Architects, Boise, Idaho, upon the formation of a partnership; formerly, BRADFORD SHAW & ASSOCIATES.

Character, spaciousness, economy— achieved with Pozzolith concrete

Total dedication to concrete has created a striking new federal complex in Austin, Texas. Concrete in many forms — cast-in-place, pre-cast, pre-stressed, exposed aggregate, bush-hammered, inlaid—makes possible the practical vastness of the post office and the sparkling grandeur of the office building.

POZZOLITH was specified for all the concrete because it combines total performance with total economy. In this project, as in every project where it is used, POZZOLITH provided workable, durable concrete of uniform strength and enduring beauty.

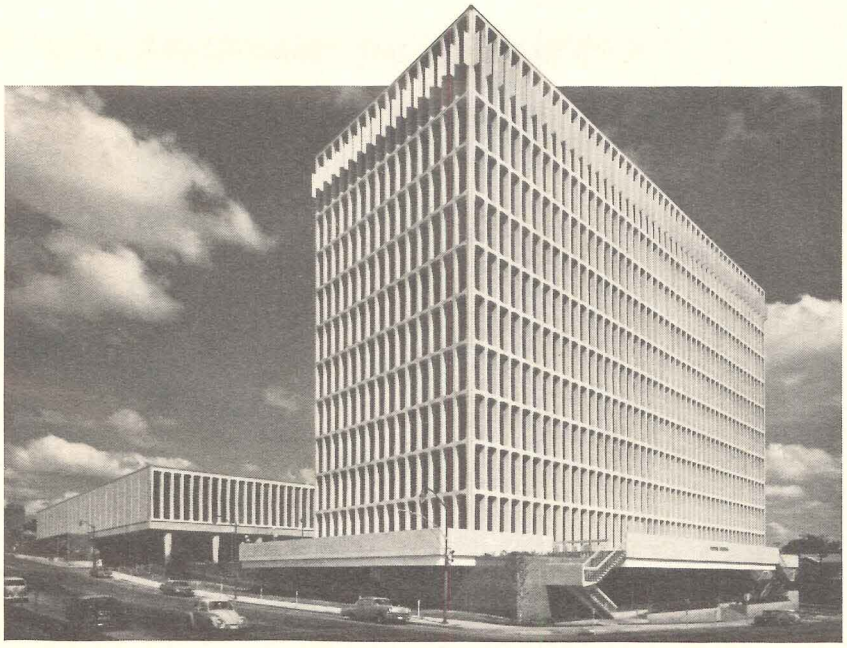
POZZOLITH can assist in the execution of your next concrete design. It is the preferred admixture where predictable performance counts. For information on POZZOLITH for your current or future projects, call your Master Builders fieldman, or write Masters Builders, Cleveland, Ohio 44118 and Toronto 15, Ontario.

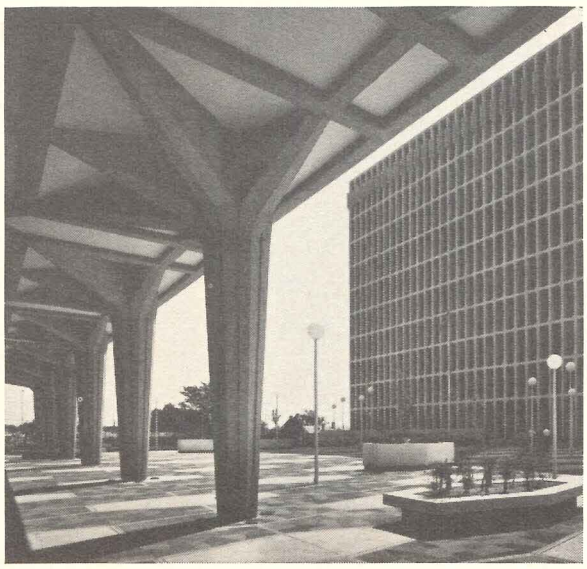
(center) U. S. Post Office and Federal Office Buildings, Austin, Texas, combine a low, broad building to accommodate postal work areas,. a high-rise office structure, and a connecting plaza that gives unity and spaciousness to the complex.

Architect and Engineer: Page, Southerland, Page and Brooks & Barr. General Contractor: Warrior Construction Co. Pre-cast Components: Texas Quarries, Inc. POZZOLITH Ready-mix Concrete: Traverse Materials Co.

(left) The plaza connecting the two structures is surfaced with pre-cast slate-covered panels. Pre-cast wall panels for both buildings feature exposed quartz aggregate.

(right) Bush-hammered concrete "trees" support one end of the rectangular post office "box" — the other rests on a base of polished native granite.





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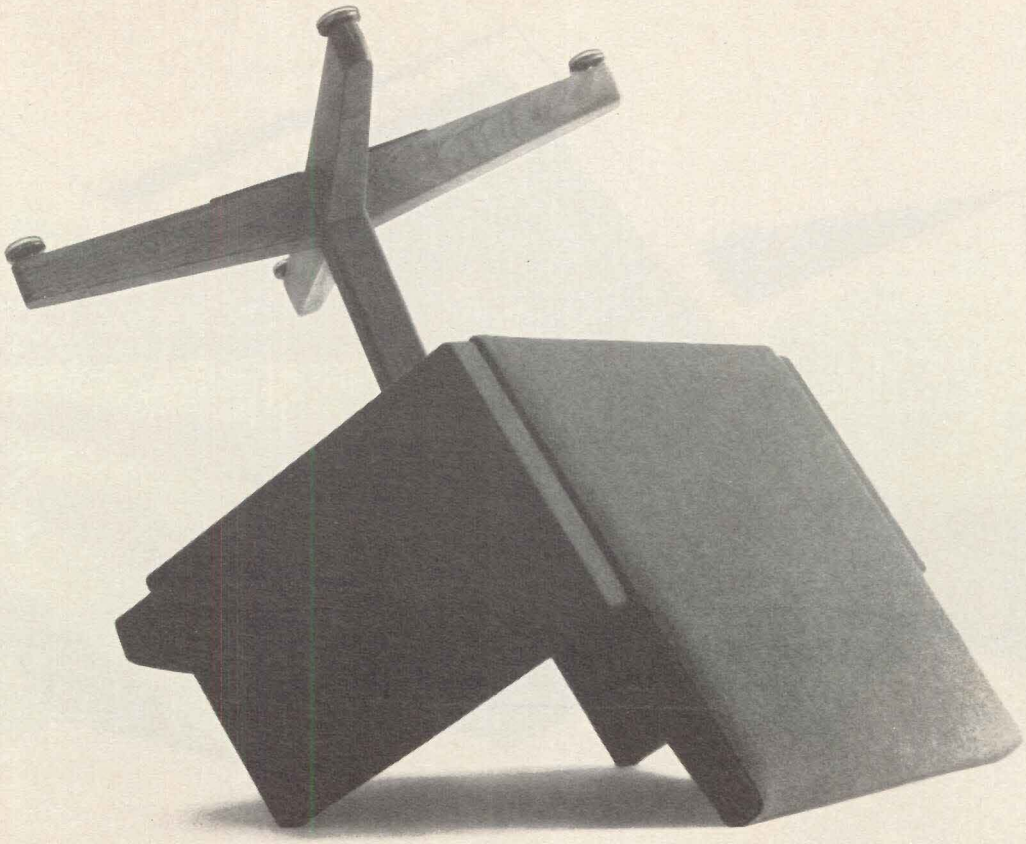
*POZZOLITH is a registered trademark for Master Builders water-reducing, set-controlling admixture for concrete.

Title: Ensign Fire Extinguisher
Artist: The Ansul Company, Marinette, Wisconsin
Medium: Fiberglass



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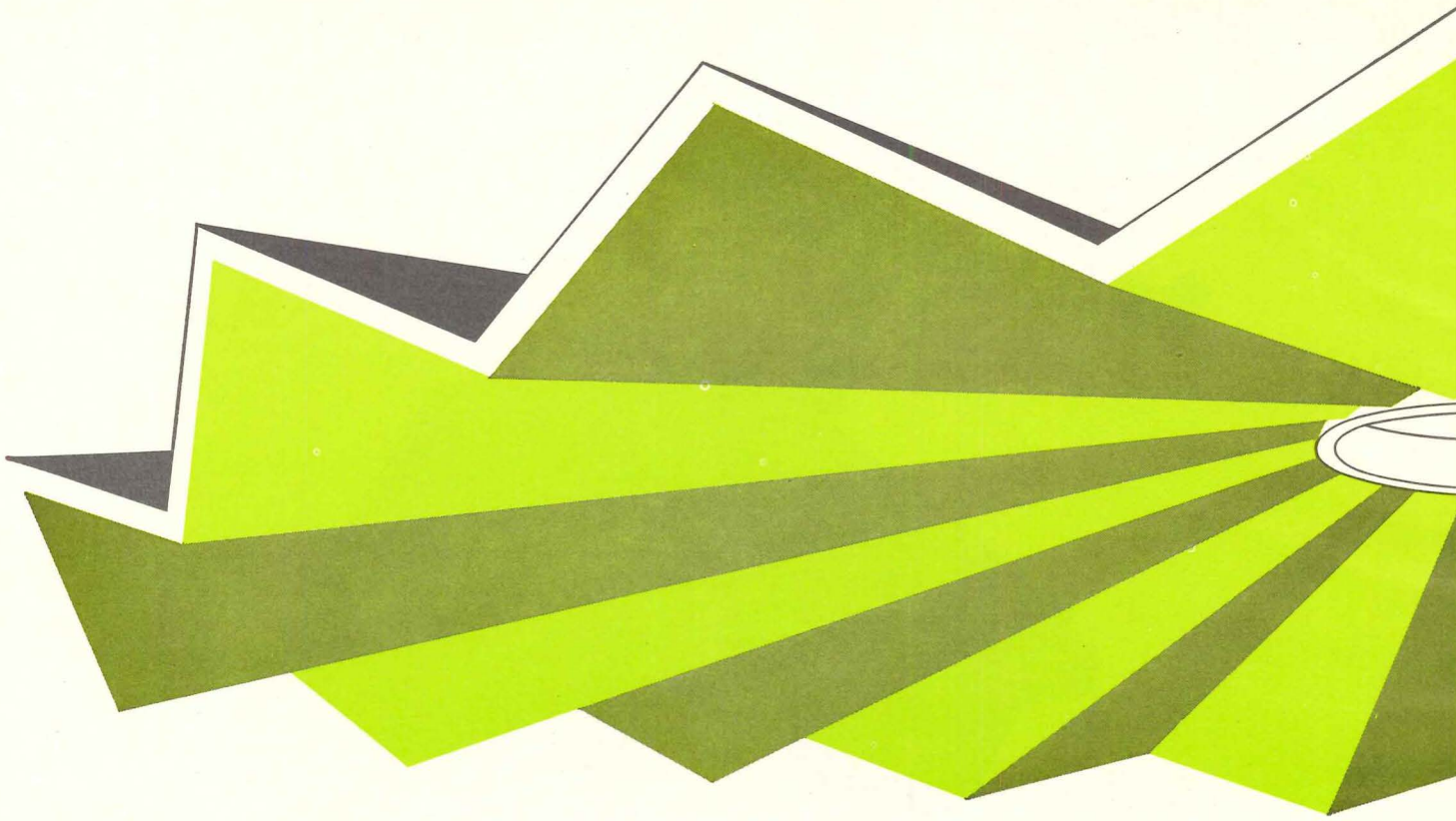
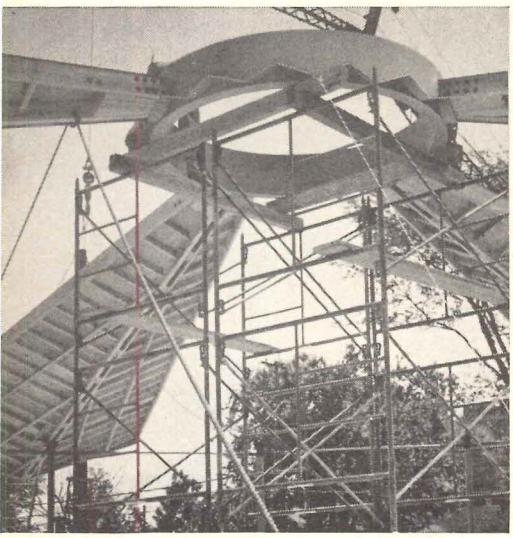
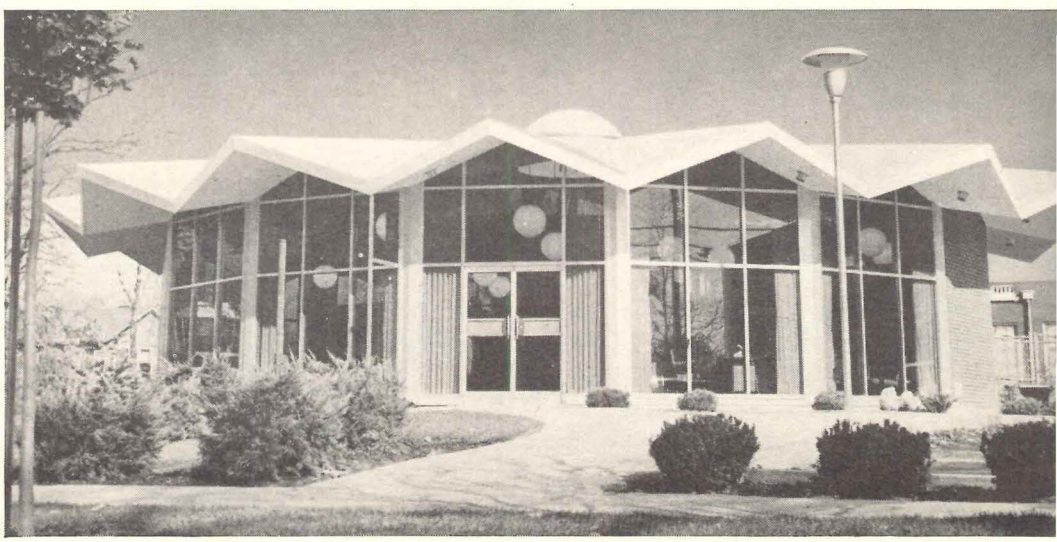
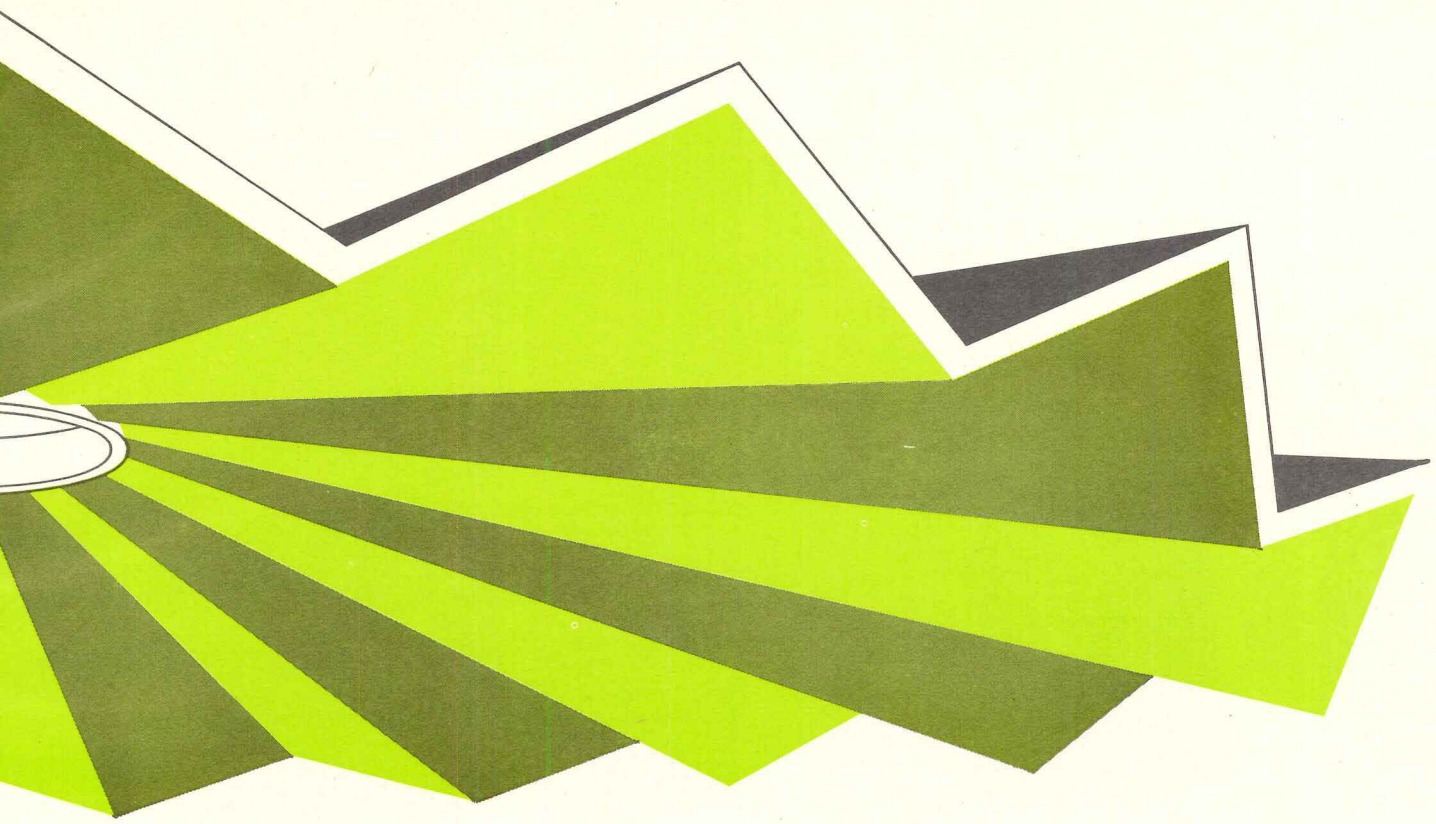
CONFERENCE / DINING TABLE #3340



the most exciting ideas take shape in plywood







Whirlpool Employees Credit Union Building, St. Joseph, Mich./Edward R. Duffield, Architect/Holland Construction Co., Contractor/Plywood Components Corp., Fabricator

The jaunty cap on this glass-walled office building is a plywood radial folded plate. Its use here proves the versatility of the design idea, more often seen in the august context of churches and public buildings. This plywood roof cost less than any alternative and went up faster. Besides saving money, radial folded plates give large clear-span interiors because no center supports are needed. For more about this and other time-saving, high-strength plywood building systems, send for the new, free booklet "Plywood Construction Systems." We're at Tacoma, Wash. 98401 (USA only).

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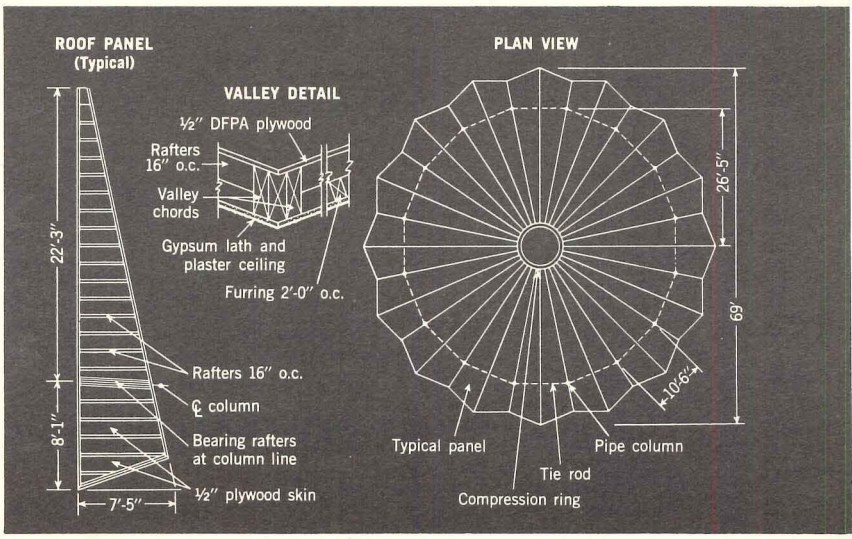

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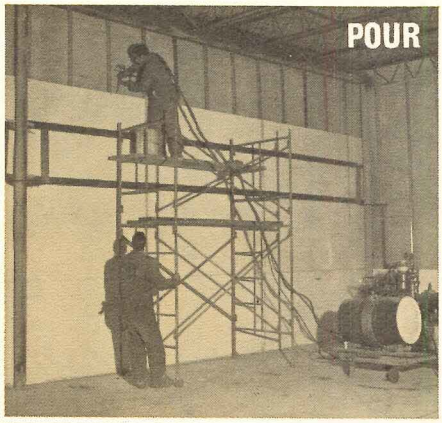

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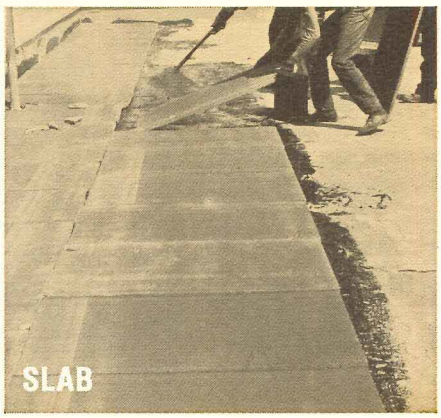

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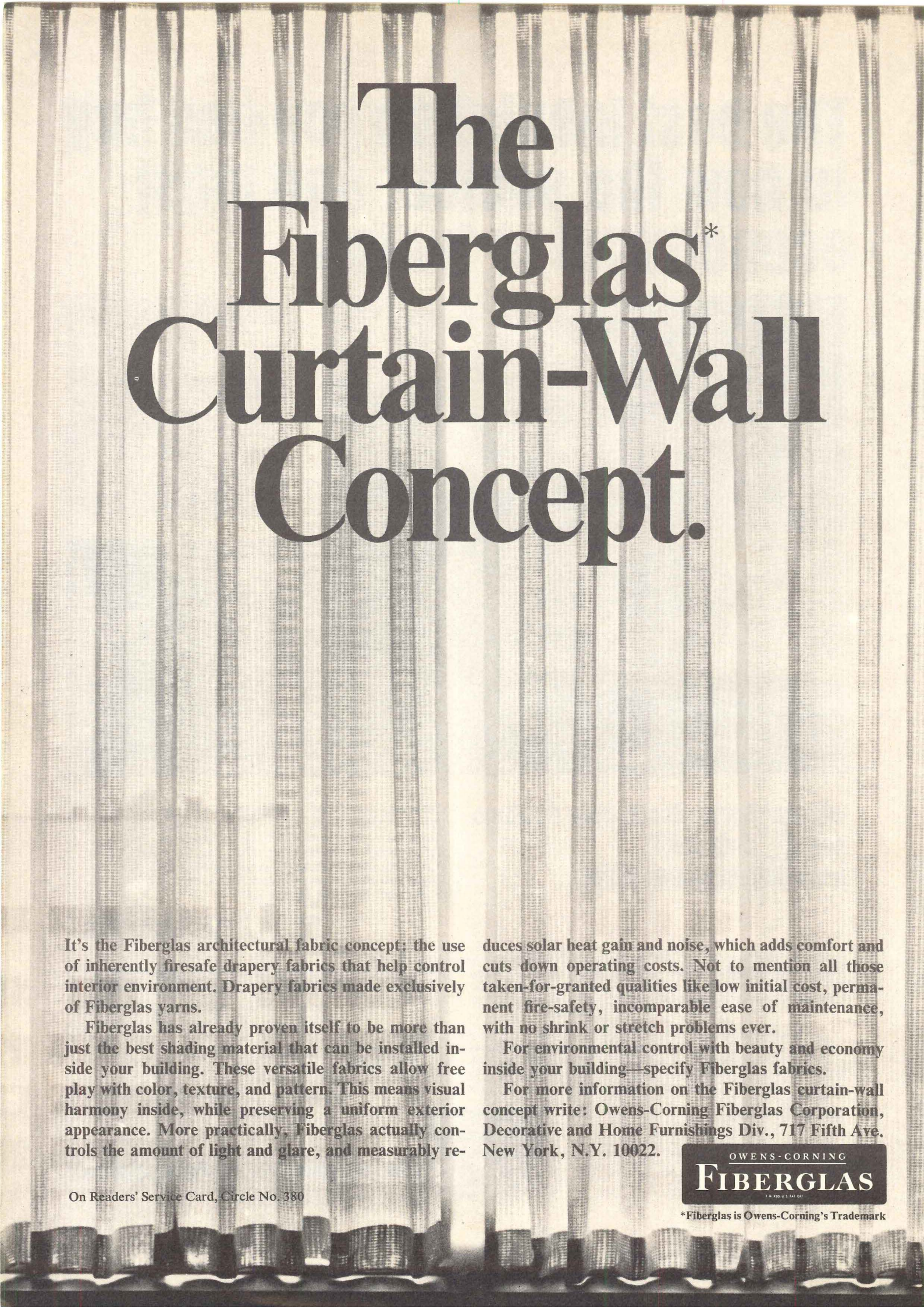

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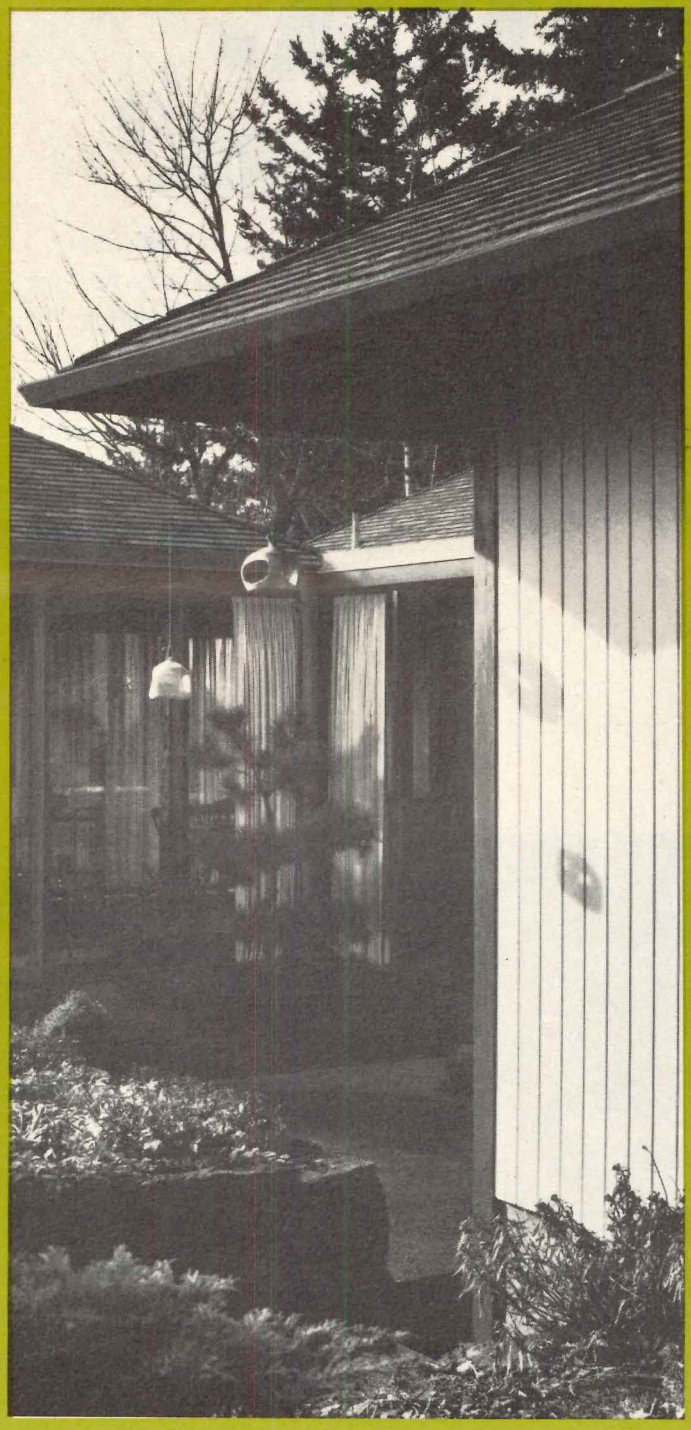

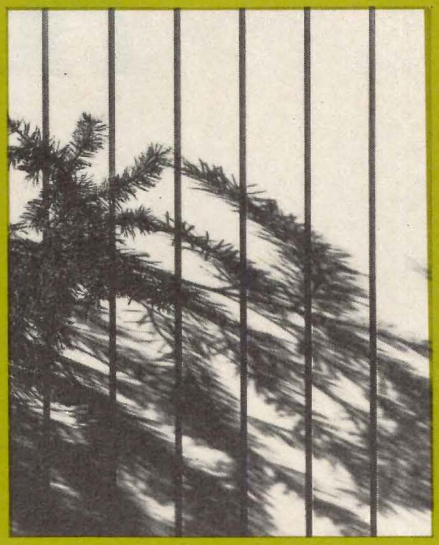

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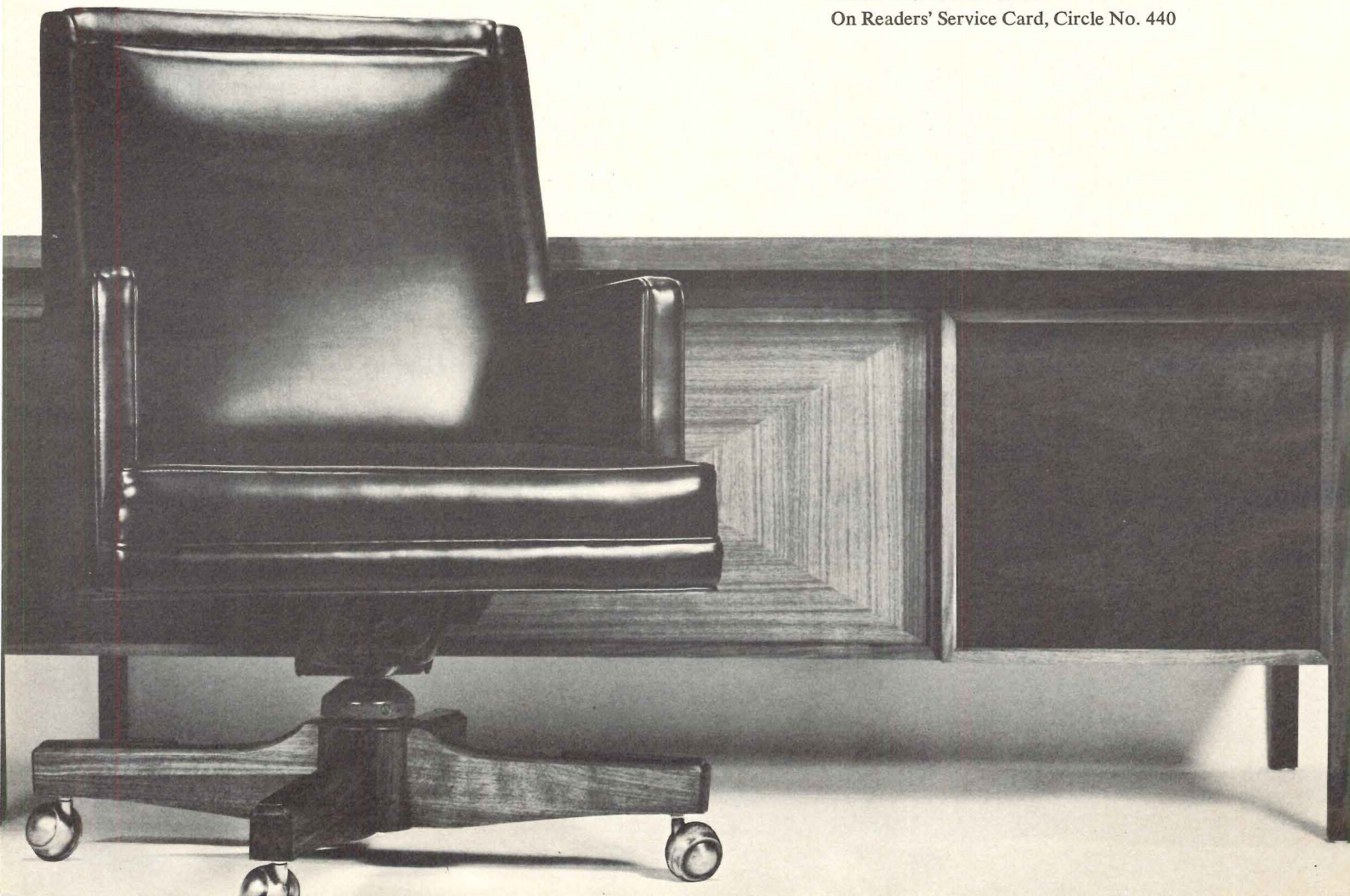

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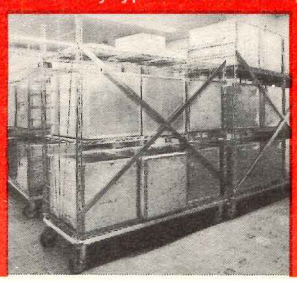

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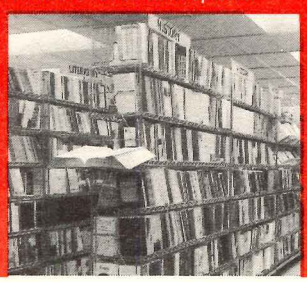

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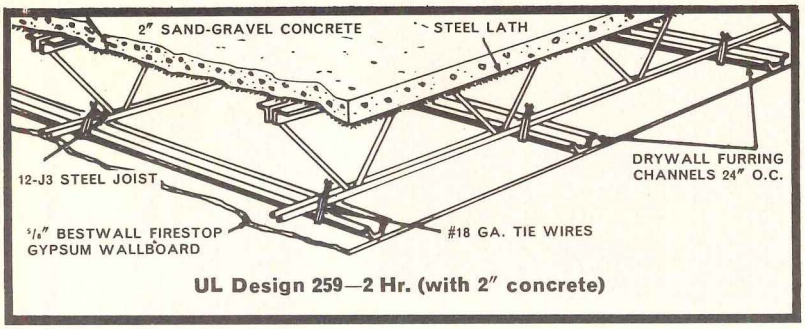

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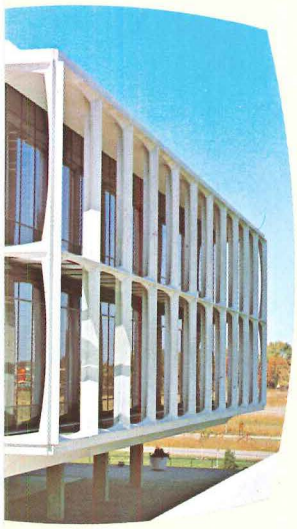
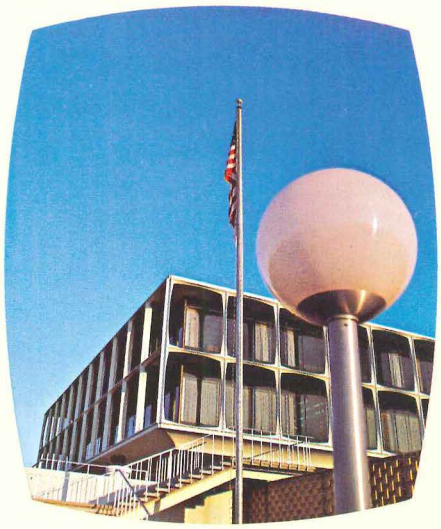
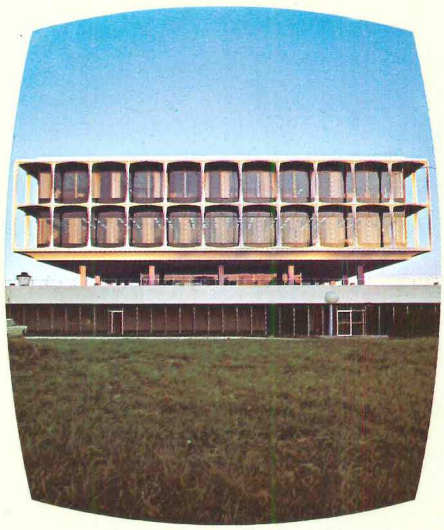
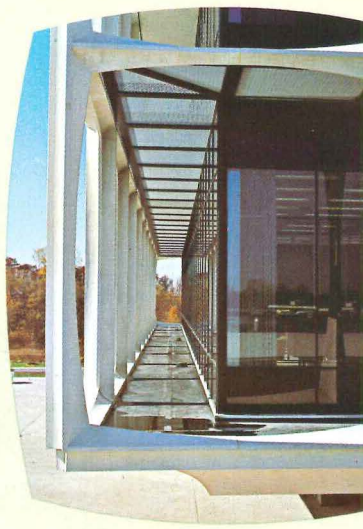
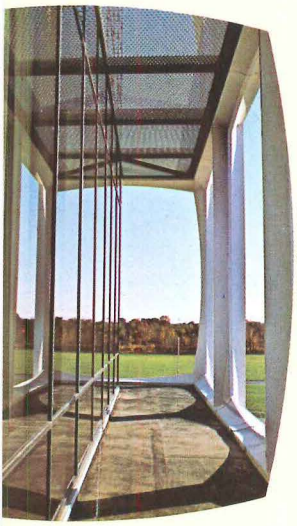
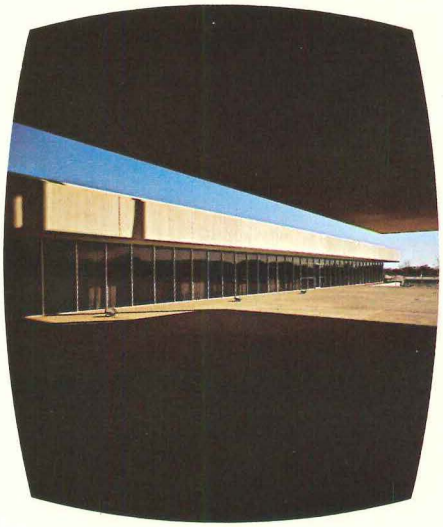

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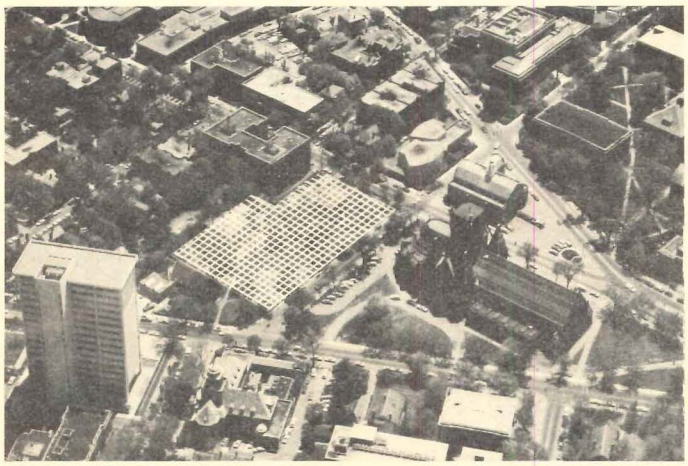
P/A NEWS REPORT

Progressive Architecture's Monthly Digest of Buildings, Projects, People and Products *April 1967*

BUILDING PLANNED FOR HARVARD'S GRADUATE SCHOOL OF DESIGN



CAMBRIDGE, MASS. Harvard University has most of the funds, a name, and a site for a $6 million center for architecture, city and regional planning, urban design, and landscape architecture. It will be called George Gund Hall, after the late Cleveland banker-industrialist who was long active in Harvard affairs.

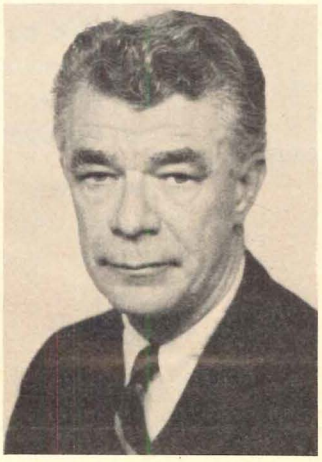
Grants from the Gund family, the George Gund Foundation, the Department of Health, Education and Welfare, plus money to be realized by a transfer of University property leave only about $1,500,000 to be raised. Consolidated in the new facility will be all the activities of the Graduate School of Design.

George Gund Hall will be located on Quincy Street across from Memorial Hall and adjacent to Yamasaki's William James Hall for the behavioral sciences (see site photo).

As P/A goes to press, Harvard's Corporate Board has yet to decide how an architect will be selected.

DANES TO LEAVE DEANSHIP AT YALE

NEW HAVEN, CONN. Dean of Yale University's School of Art and Architecture, Gibson A. Danes, will leave his post July 1 to take over as Dean of Visual Arts as Westchester Community College, Purchase, N.Y., a new campus in the State University of New York system. In switching, Dean Danes leaves the nation's oldest collegiate school of art (Yale's was set up in 1866) to head the newest (the Purchase campus opens officially in 1970). He will be responsible, initially, for preparing a curriculum and for recruiting a staff.



Danes' career in the arts stretches back to 1936, when he received his B.F.A. from the Chicago Art Institute. From 1952 to 1955, he was chairman of the UCLA Department of Art and he was acting Dean of the UCLA College of Applied Arts in 1955. He has been Dean at Yale since 1958. Yale is forming a committee to find a successor for Danes by September.

FDR MEMORIAL COMMISSION PUSHES BREUER DESIGN

WASHINGTON, D.C. Although turned down by the Fine Arts Commission, the Marcel Breuer-Herbert Beckhard design for a Franklin Delano Roosevelt Memorial is getting strong support. The newly elected chairman of the FDR Memorial Commission, Minnesota Senator Eugene McCarthy, plans to put forward resolutions in both houses of Congress, announcing intent to proceed with the Breuer-Beckhard design. According to McCarthy, "The Fine Arts Commission will be able to present its position during committee hearings by the appropriate committee of Congress." McCarthy says he hopes to have the resolutions ready by the beginning of April.

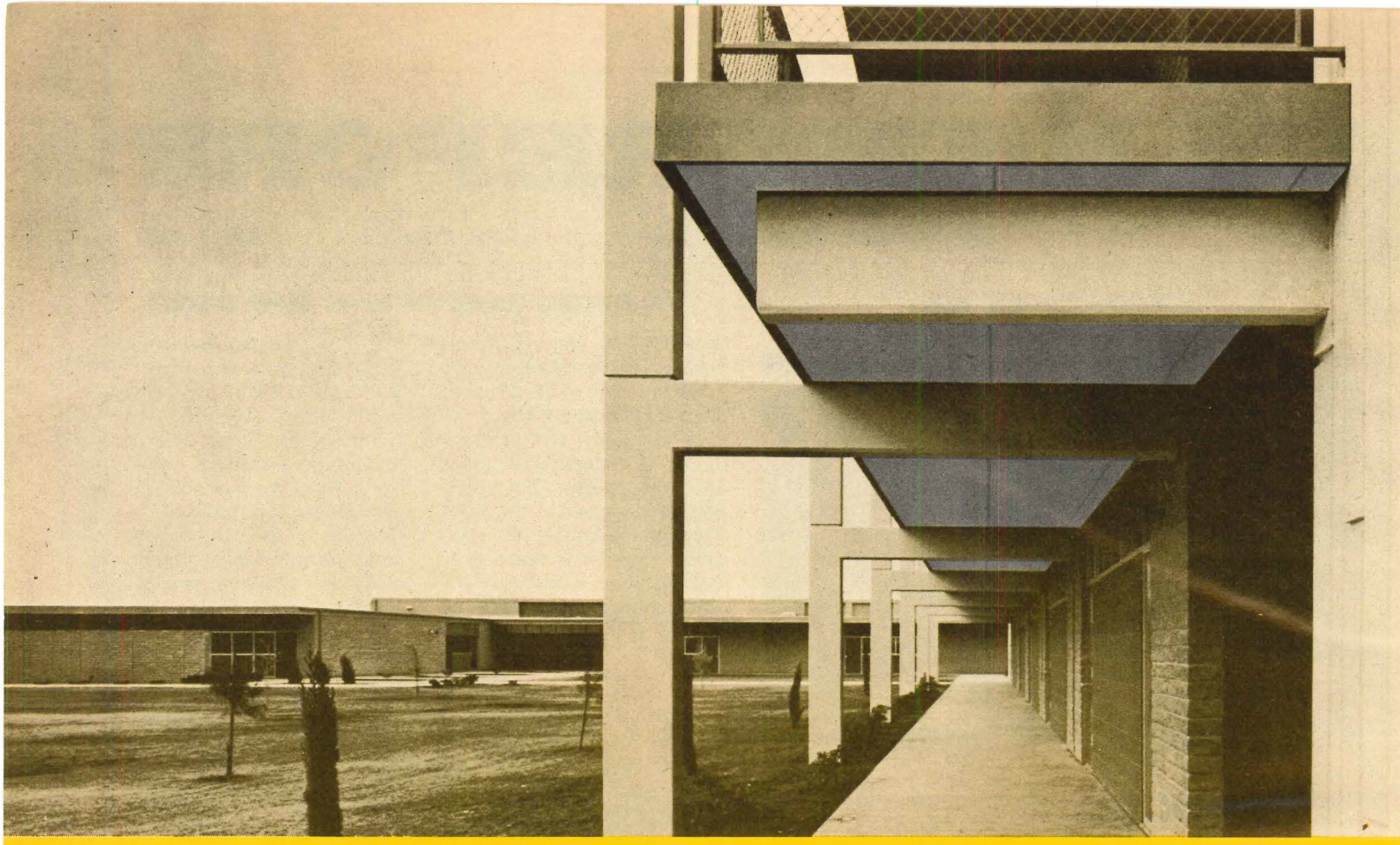
*I*N*T*E*R*A*M*A*

Sert, Rudolph, Breuer, Kahn, Weese, Stone.

MIAMI, FLA. As every good Taoist knows, "Oneness is all." And Interama, the permanent inter-American exposition "for the people, governments, industries, cultural groups, sports, and leisure activities of the Western Hemisphere," which is being constructed on landfill island between Miami and Miami Beach is, perhaps ironically, setting out to attain one of the ultimate precepts of Chinese philosophy. "The atmosphere of this mission of talent," said Louis Kahn, in explaining his cooperation on the project with architects Breuer, Rudolph, Sert, Stone, and Weese, "was that every man wanted most of all to be one, and we all *were* all one."

Since the idea of an inter-American trade and cultural center (first proposed in 1918) was actively revived in 1961, under the leadership of Dr. Irving Muscat (see p. 57, MARCH 1966 P/A), Interama has attracted the notice, if not always the support, of visionaries and skeptics. It is a tribute to Muscat's determination and diplomatic skill that not only is the vision nearing reality, but also that he was able both to obtain and contain this wealth of architectural talent.

Each architect was assigned the design of an individual building or a cluster of buildings on a predetermined site, and speaking of the cooperative experience, as plans were announced in late February, each architect seemed genuinely pleased with the results of the cooperation. "We hadn't had this oppor-



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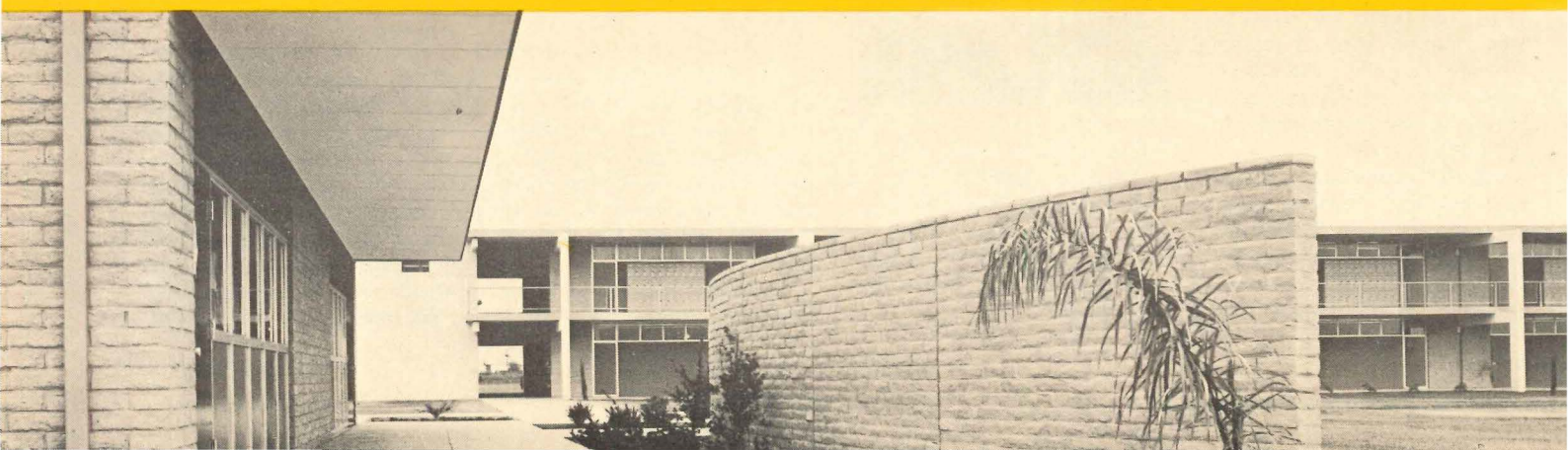
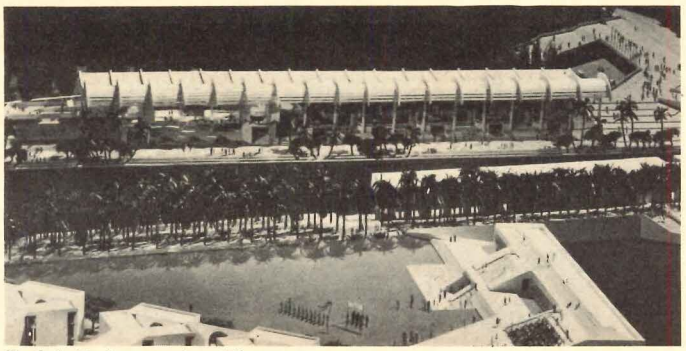


Apache Elementary School
Scottsdale, Arizona
Architect: P. E. Buchli, AIA
Structural Engineer: Sam Caruso
General Contractor: Hal Grammer Construction Company



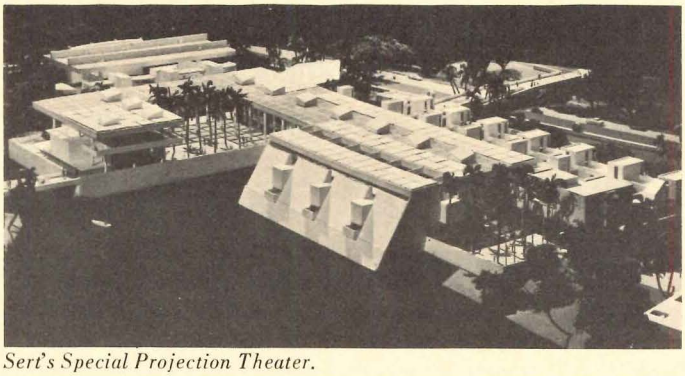
Rudolph's International Bazaar.

Weese's National Houses.

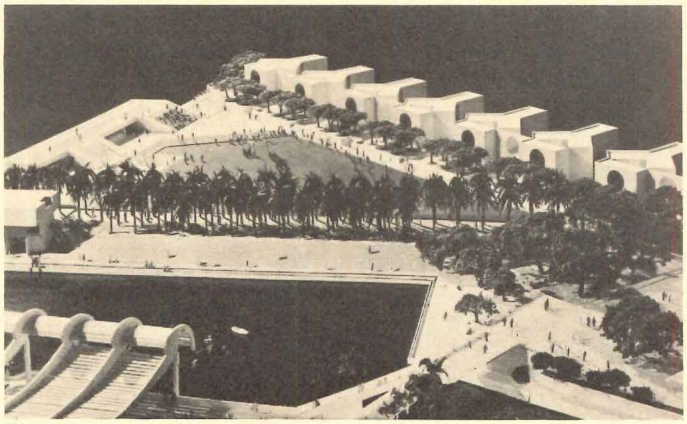
tunity of getting together for many years, and we didn't know how far apart we have drifted," said Dean Sert. "Fortunately, we still have general principles, and while we were working so separately, we continue to be the same and have so many things in common." A large dollop of credit for whatever the results may be should also go to Miami architect Robert Browne, who is the coordinating architect and site planner for Interama. Browne held a light rein on his designers. As Sert pointed out, "People like Bob Browne understood that we wanted to be left alone and completely free to work together to do this planning." Results of the freedom are seen here. Working drawings are in progress and most observers feel that ground will be broken at Interama by July at the latest.

Also to be included at Interama is a "theme tower," being designed by Minoru Yamasaki. At this point, Yamasaki's design, which is said to be a needle-shaped spire with a restaurant at the top, is undergoing revisions.

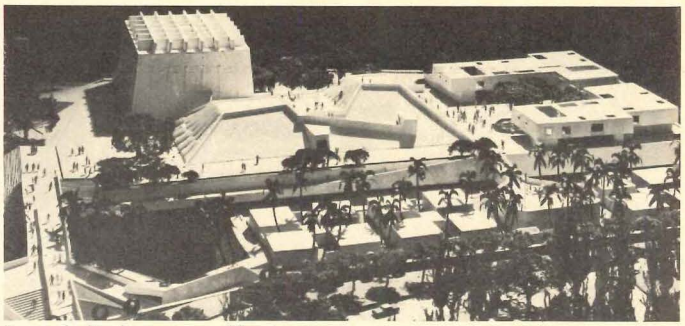
When completed, Interama will be, as Muscat envisions



Sert's Special Projection Theater.

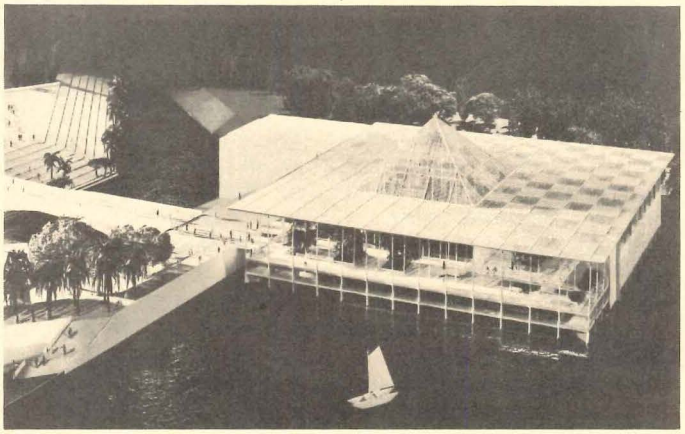


Kahn's Ceremonial Plaza.



Breuer's Parliamentary Meeting Center.

it, a microcosmic international community. He points out that, in the areas designed by the six architects, "there will be 450 to 500 permanent residents. This isn't one of those things like a theater or football park, or something that you look up and go home at the end of the day . . . and come back in the morning and open it up. They're going to live there. Their commissioners and ambassadors will live on the grounds. . . . We're not just going to talk about cooperation, like you have here in the United Nations. No, we're going to practice it. We're going to work together; we're going to play together; we're going to enjoy life together; we're going to learn to understand one another."



Stone's United States Pavilion.

AIA AWARDS TO BE PRESENTED AT NEW YORK CONVENTION IN MAY

WASHINGTON, D.C. The AIA's rarely awarded Architectural Firm Award will be presented this year to the Cambridge, Mass., office of Hugh Stubbins & Associates. The firm selected to receive the award, which has been bestowed only three times previously, was cited for "awareness of human needs and improvement of humane understanding, particularly as expressed in finely executed homes and schools; for perceptive integration of buildings through color and material of exterior and interior; for sensitive respect both for environment and tradition, and for the high quality of its works . . ."

The award to Hugh Stubbins' firm was one of the nine major citations announced by the AIA in advance of its annual meeting, to be held in New York City, May 14–18.

The Citation of an Organization will be extended to the Boston Architectural Center, formed in 1889 as a club for the encouragement and mutual help in studies of those involved in or interested in architecture.

Medals honoring achievement in five specific categories will be awarded to individuals for their work in fields related to the architectural profession. Winner of the Fine Arts Medal is Costantino Nivola, of New York City, for his work in incorporating art with architecture. For his achievement in graphic design, Ivan Chermayeff of Chermayeff & Geismar Associates, also of New York, will be honored with the Industrial Arts Medal. Slated to receive the Medal for Architectural Photography is William C. Hedrich, Chicago proprietor of the Hedrich-Blessing Studio. Originality and skill in textile design will be recognized in the AIA award of the Craftmanship Medal to Sister Mary Revor, chairman of the art department at Mount Mary College, Milwaukee, Wis. And Richard Kelly, New York specialist in lighting design, will accept the Allied Professions Medal for his outstanding work as a consultant on all aspects of planning, design, and specification of elements affecting visual environment. Kelly was previously the recipient of AIA awards for his work as lighting consultant on the Seagram Building and the Four Seasons Restaurant.

From among entries of 20 architectural schools, the design by Kent C. Underwood of a "Retractable Aluminum Dome" has been chosen to receive the 1967 Reynolds Aluminum Prize for Architectural Students. Underwood, a 22-year-old student at Ohio State University, has designed a dome composed of 12 telescoping sections that move simultaneously to enclose an area, or retract to form an exposed surface area surrounded by a handsome silhouette.

This year, the F. Stuart Fitzpatrick Memorial Award for great individual achievement on a national scale in the unification of the building industry will be bestowed on Leon Chatelain, Jr., who is a past president of the AIA. Chatelain has served on the Building Research Institute, the Construction Specifications Institute, and, as chairman, on the American Standards Association committee. His firm, Chatelain, Gauger & Nolan, was selected by the Associated General Contractors of America to design its headquarters building.

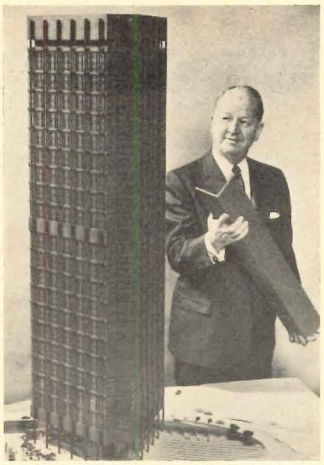
TRIANGLE FOR THE TRIANGLE

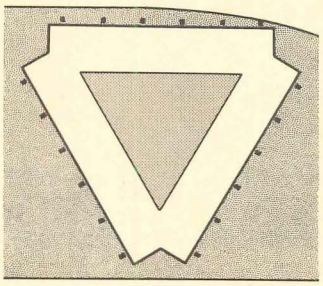
PITTSBURGH, PA. The triangle of land between the Monongahela and the Allegheny Rivers may be golden but the name of the material is steel. U.S. Steel plans to use 42,000 tons of it in the structural part of its new corporation headquarters building here. Ground was broken last month for the building, which was designed by Harrison & Abramovitz. When completed, sometime in 1970, it will be, according to U.S. Steel, the second-largest high-rise office building in the world. At 841′ and 64 stories, it will be at least 20 stories taller than any other building in Pittsburgh. Shaped in an open triangle, the building will offer three rectangular (221′ x 45′) office areas per floor, 2,900,000 sq ft of space in all. On the façade, the 18 exposed supporting columns will be weathering steel, and so will the mullions and spandrels. The third, thirty-fourth, sixty-third, and sixty-fourth floors will house mechanical equipment, the sixty-second floor will have a restaurant, and the roof a heliport. Below grade will be parking space for 650 cars.

Shaped triangularly with inwardly V'd corners to provide more corner office space, the

building will offer three rectangular office spaces (221′ x 45′) per floor, 2,900,000 sq ft of space in all. All ducting, elevator banks, and stairwells are in the triangularly-shaped interior core (*see diagram*).

One of the building's most striking innovations is its array of exposed Cor-Ten supporting columns. Standing out 3′ from the weathering steel, panel and glass curtain wall, the columns are connected to the main structure at every third floor, creating, in effect, a series of three-story buildings, each with its own framing, resting on the column connections. To make the columns fireproof, each is filled with a mixture of water and antifreeze. Divided into four equal, vertical segments, the hollow box columns will contain about 500 gals of liquid; each segment will be fed by a separate, 2000-gal storage tank. Heat will be carried away by gravity circulation of the water; should steam develop, there will be devices allowing it to escape. According to estimates, the water will keep the column temperatures down to between 600F and 700F during fire.





Structural engineers are Worthington, Skilling, Helle & Jackson and Edwards & Hjorth; mechanical engineers are Jaros, Baum & Bolles.

NEW YORK CITY MOVES TO CLOSE THE BUREAUCRACY GAP...

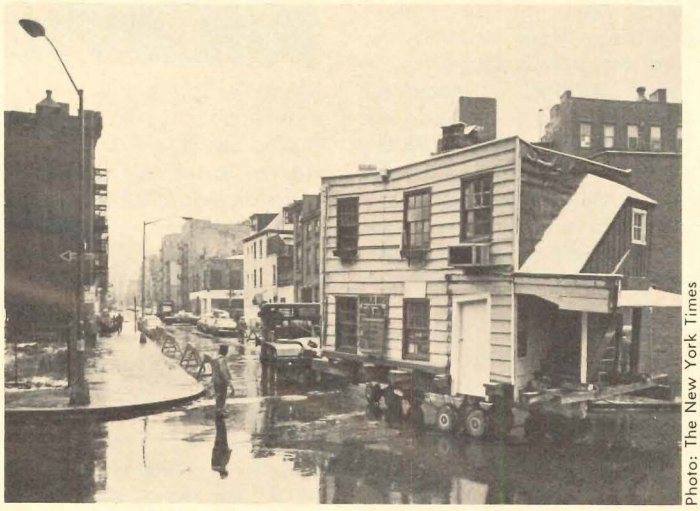
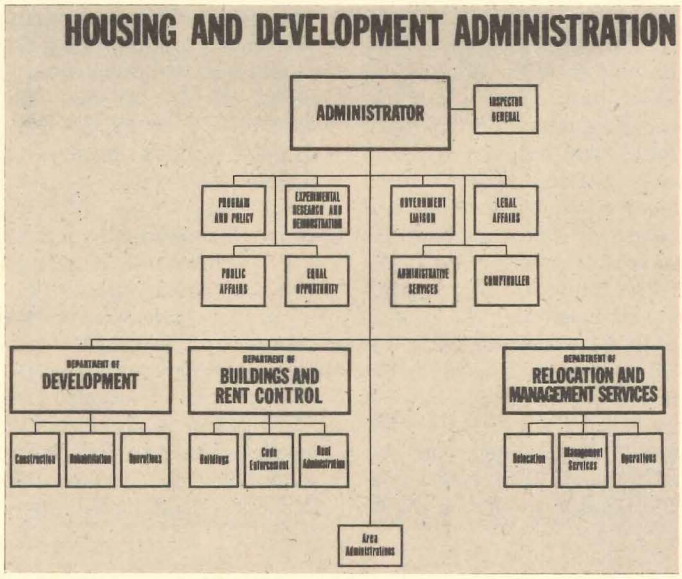


Photo: The New York Times

NEW YORK, N.Y. Late in the evening of the day President Kennedy was assassinated, former New York Mayor Robert Wagner appeared on local television with a personal message for his constituents. It had, of course, been a harrowing day for most Americans, and so closely had television and radio focused on the events in Dallas that everyone was feeling lost, leaderless, dejected, uncertain. Into this vacuum stepped the Mayor, the local father figure, with what many viewers hoped would be reassurance. Perhaps, they thought, by speaking of the grief felt by all New Yorkers, he could help assuage it. Instead, Wagner said that in the face of the personal tragedy we had all sustained, only skeleton crews of the sanitation, fire, police, and transportation departments would report for work the following day. Other departments would have the day off: The Air Pollution Control Department, The Alcoholic Beverage Control Board, The Anti-Poverty Control Board . . . on and on went the list . . . The Board of Education, The County Clerk's office, The Board of Estimate, The Housing and Redevelopment Board. The New York City Manhattan phone directory has more than three pages of city government phone listings — about 1135 in all — and Wagner's itemization brought home, in more ways than one, the ponderousness of city government.

Over the years, New York's city agencies, bureaus, and departments have become enclaves of private power, often run by their commissioners with a militant autocracy reminiscent of the way feudal lords ran serfdoms. What happens on an operative level is that if, for example, someone wants to put up a building in the city, he has to get no fewer than 49 approvals from half a dozen city offices. Sometimes this takes months, even years. And that's not all. According to Jason R. Nathan, Lindsay's newly appointed housing administrator, "*Three* agencies deal with hazardous buildings. Each of *four* agencies operates its own slum rehabilitation program. *Six* agencies, acting separately, all collect and use data — often the same data — on housing, buildings, and real estate. And *eight* agencies all take part in the winter emergency repair program." New York found that, not only was the system leading to inefficiency and waste, but it also was cutting the city off from Federal funds that could not filter down through the system. With no clear channel through which Federal money could pass, with hundreds of bureaucratic pockets clamoring for it, proportionately little was forthcoming. Even when the money was available, building plans languished on desks so long that they became obsolete, if they were remembered at all. New York City's backlog of building projects was the largest in the nation.



The new mayor, John V. Lindsay, took almost immediate action. His task forces, as he called them, scoured the city looking for both symptoms and possible cures. Symptoms were rife. One group, which included architects Philip Johnson and I.M. Pei, concluded that the subway system was "the worst public environment in the country." Almost all reports offered the same basic recommendation: consolidate city agencies. In housing, for example, six agencies are now strung together loosely by a coordinator's office, set up under Wagner. Since the coordinator has little power, little is achieved. Under a reorganization proposal, the six agencies, with a total expense budget of $133 million and a staff of more than 12,000 (the size of a U.S.

Army division) would become one — the Housing and Development Administration, under the control of an administrator responsible for all city building. In all, the Mayor called for 12 of these superagencies.

In December 1966, Lindsay presented a bill detailing his reorganization to the City Council. Hearings are now being held in front of each of the many separate agencies involved. If the bill passes the very hurdle it is set up to eliminate, those 49 steps now confronting builders may be cut to 24. A consolidated housing agency alone could save the city an immediate $500,00 a year, and the ultimate savings and advantages are incalculable.

As city bureaucracies throughout the country grow fat on their own self-indulgence, New York's regrouping, patterned, of course, after the Federal system, will certainly be worth watching closely.

. . . WHILE THE MAYOR KEEPS HIS FINGER IN THE DIKE

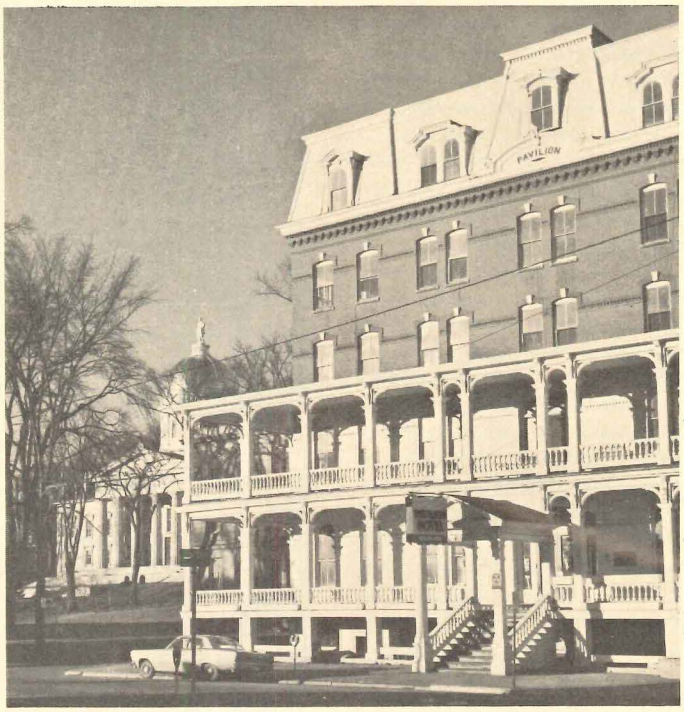
In the meantime, Mayor Lindsay is doing what he can to cut bureaucratic red tape. His personal intervention becomes a haphazard operation, of course, seen, like Harvey the Pooka, only now and then by some people in some places. One example was reported in *The New York Times* last month. A young travel agent and his wife were faced with eviction from an old wooden farmhouse, hemmed in by hospitals and apartment houses, which has somehow survived since the 18th Century on Manhattan's Upper East Side. The Roman Catholic Archdiocese of New York owned the land beneath the house, and it wanted it for a home for the aged. The couple, on the other hand, liked *their* home and wanted to save it. With the aid of architect William C. Shopsin, they found a vacant lot in Greenwich Village, then decided to move the house — all 12 tons of it — through five miles of city streets to the new site. The move, however, wasn't that easily accomplished, for it required the permission of about 10 city agencies. Despite several extensions of the original eviction deadline by the archdiocese, no final word came from the city. Only a last-minute letter from the Manhattan Burough President to the Mayor, telling of the efforts to save "the unusual and historically valuable building," provided the catalyst that unraveled the burly snarls of bureaucractic indifference. All the house needs now is a foundation under it — and a new porch.

HORSING AROUND IN CENTRAL PARK

NEW YORK, N.Y. Like true love, the course of good design does not run smooth. When Kelly & Gruzen won the $10,000 first prize in a closed competition to design a police station, stable, and exercise ring for police horses (see p. 64, MARCH 1967 P/A) in Central Park, most observers thought the plan a happy marriage of parkland and necessary law enforcement facilities. Now, because of cavillers who could not forever hold their peace, the marriage will not take place as planned — not completely, anyway. Some thought Parks Commissioner Hoving was providing riding facilities for his rich friends in Westbury. "I don't even have any friends in Westbury" snapped Hoving. The plan called for two riding rings: One, on top, ringed by an earth berm for public use, and a smaller one below for police use. Now, because of pressure brought by the City Council and the Board of Estimate, the upper ring is being scrapped. "We will take off the top ring and reduce the size of the one under it," says Hoving, "so that those fools who call it a polo field can put an end to this mendacious talk."

Not incidentally, the removal of the upper ring will probably save some parkland from the encroachment of unsuspecting horses. Parks are, after all, for people — though not, according to the plan's detractors, for people who like horses.

PRESERVING THE PAVILION



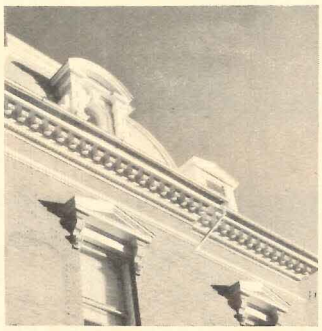
Photos: Robert Burley

MONTPELIER, VT. In 1808, when the Vermont Legislature first met in Montpelier, many of the legislators stayed at Davis Tavern, a solid, brick-walled structure next to the State House. In 1829, the tavern was enlarged by Mahlon Cotrill, wooden verandas were added, and the name was changed to the Pavilion Hotel. The Pavilion it has been ever since, although the original building was razed in 1875 to make way for the present Pavilion. With verandas on two sides, it is considered a good example of post-Civil War Vermont architecture. Taken in conjunction with the State Tax Building across the street, which went up in 1870, it forms a pleasant gateway between the Montpelier business district and the Capitol Green.

Recently, there has been talk of razing the Pavilion once again and putting the land to better use. Many maintained that a completely new building could be built for less than it would cost to restore the old one. But no one knew for certain, and no one bothered to check — no one, that is, except Robert Burley, architect for the State's Master Plan in Montpelier. The controversy surrounding the Pavilion is somewhat reminiscent of philosophical arguments in the Middle Ages that centered on such verifiable topics as how many teeth a horse has. One monk would say 13, another 18, and they would discuss their viewpoints at length, but no one would think of going out to the stable, opening a horse's mouth, and counting. Burley counted. According to his calculations, the wooden interior of the Pavilion could be removed and replaced by a steel frame at a cost of $20.86 per sq ft. This figure compares with about $30 per sq ft for new office structures in Montpelier. Total cost of renovation, Burley believes, would be about $1,150,000, compared to $1,721,200 for a comparable new structure. Burley's figures impressed at least one person — a contractor who had argued for demolition. He pointed out that it was much harder to figure out how to save an old building than just tear it down and build a new one.

Last fall, the State purchased the Pavilion for $148,000 in hopes of converting it

for use as a State office building. The Vermont Historical Society would use the ground floor for its museum and offices, and would reconstruct some of the old Victorian interiors within the new steel framework. But the State Legislature is not certain it wants to retain the Pavilion, even if it would save money, and the Montpelier town fathers are concerned with the potential loss of tax revenue from the valuable site.



Whether or not funds will be forthcoming for renovation will be decided by the legislature this year. Old-time legislators can recall meeting with the Governor in the Pavilion, which came to be known as the Third House. And the hotel even withstood the waters of the 1927 flood, which ran 12′ deep outside on State Street. No one knows whether it can withstand legislation.

TOWARD INTERNATIONAL STYLE

LONDON, ENGLAND. If architecture is frozen music, or even if it isn't, an architect should be able to practice his profession in a foreign country as easily as, say, a pianist can. The premise is sound, but current national restrictions make the premise look like a mirage seen through a minefield. To do something about it, representatives of eight professional architectural groups, which in turn represented some 89 countries, met recently in London.

Stated objective of the meeting was to agree, as an initial step, to solve the problem between the United Kingdom and the United States. These countries are best suited to a freer exchange of architectural talent because of similarities in education and professional regulations.

According to C.J. Paderewski, who, as chairman of the National Council of Architectural Registration Boards, was one of the U.S. representatives and also P/A's official reporter, the meeting "was an extremely cordial one and all those present were anxious from the start to reach agreement and place as few impediments as possible in the way of agreement." In fact, an initial accord *was* reached by the NCARB representatives and those of the Architectural Registration Council of the United Kingdon — one that could lead to a much freer interchange of architects between the two countries. Each group will recommend to its parent body that registered architects be allowed to practice in either country, provided they pass an examination testing their professonal background. Representatives also agreed to recommend that a joint committee be set up, consisting of members of both councils, to draft all necessary documentation as well as to prepare the procedure of implementation.

Paderewski, for one, was optimistic about the outcome. "We are," he reported, "most enthusiastic about this breakthrough in relations between architects on an international level and are hopeful that similar agreement will soon be reached with all countries that have educational and pre-registration requirements equal or similar to those of the United Kingdom and the United States."

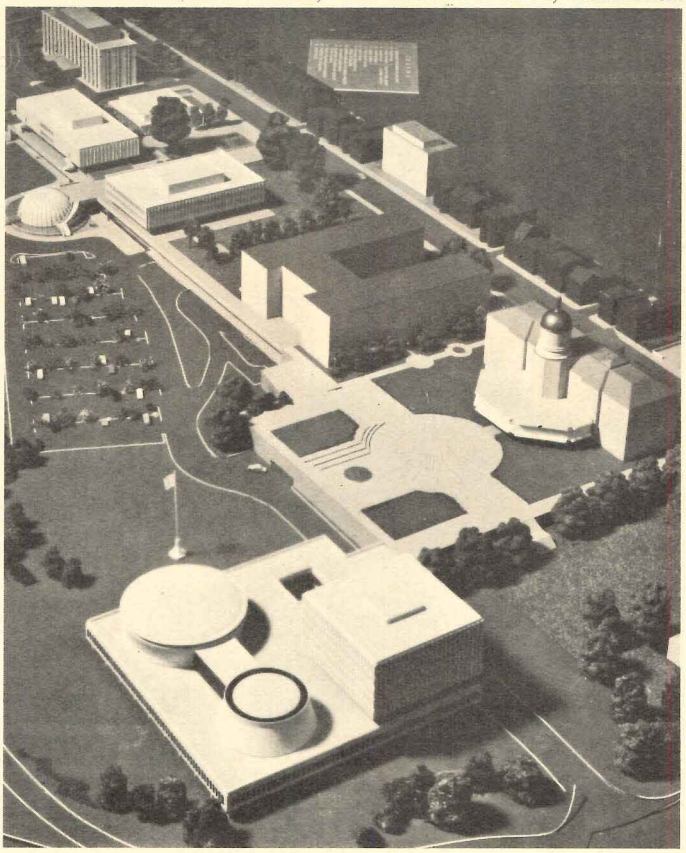
It is hoped that, eventually, countries not having similar standards and requirements will achieve them, thus laying the foundation for a truly worldwide interchange of architects.

CUTTING CAPITOL CLUTTER

TRENTON, N.J. A plan that would go a long way toward reducing the clutter that has become the New Jersey State Capitol complex was proposed recently by the State Capitol Development Commission. Prepared by Newark architects Frank Grad & Sons, the proposal calls for a three-step program. In the first phase, a new legislative building would be constructed. Immediately following its completion, the annexes and wings that have been added haphazardly to the State House, just south of that building's rotunda, would be demolished and the area turned into a landscaped plaza, beneath which would be parking for 550 cars. In the third and final phase, a fan-shaped structure would be erected around the south face of the State House rotunda to house the Governor's Offices,

a memorial to Woodrow Wilson, and a New Jersey Hall of Governors.

Grad's plans for the new legislative building show a building with four distinct elements: a raised, horizontal



slab containing supporting facilities for the State Assembly and Senate; a five-story rectangular office building, rising from the horizontal slabs' northeast corner; and two conical elements, connected by a glass-walled foyer, that rise above the Senate and Assembly chambers.

The added legislative space is badly needed, for the current State House quarters are already overcrowded; by 1968, the New Jersey Senate will expand from 29 members to 40, the Assembly from 60 to 80 members. Grad estimates the completion of phases one and two would cost about $10,500,000; the third phase, $4,750,000.

HONOLULU CHAPTER AIA AWARDS

HONOLULU, HAWAII. In its annual awards program, the Hawaii Chapter, AIA, presented seven honor awards to six local architectural firms for outstanding work. Serving as jurors were last year's winners: Kenneth Akiyama, Richard Dennis, Frank Robert, Edward Sullam, and John Tatom. In addition, the Chapter presented its Allied Arts Award to Jean Charlot "for his continuing outstanding contributions as artist, teacher and critic."

Photo: Herbert Bauer

Ala Moana shop, Great Things, by Thomas O. Wells.

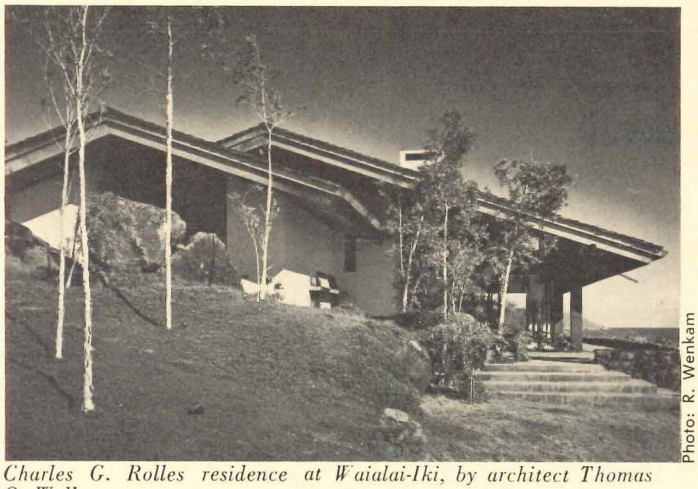


Photo: R. Wenkam

Charles G. Rolles residence at Waialai-Iki, by architect Thomas O. Wells.

Pago Pago International Hotel in American Samoa, by Wimberly, Whisenand, Allison & Tong.

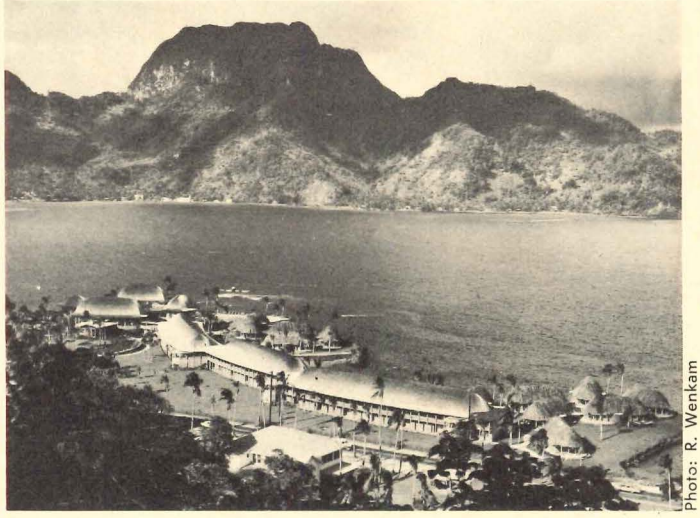


Photo: R. Wenkam

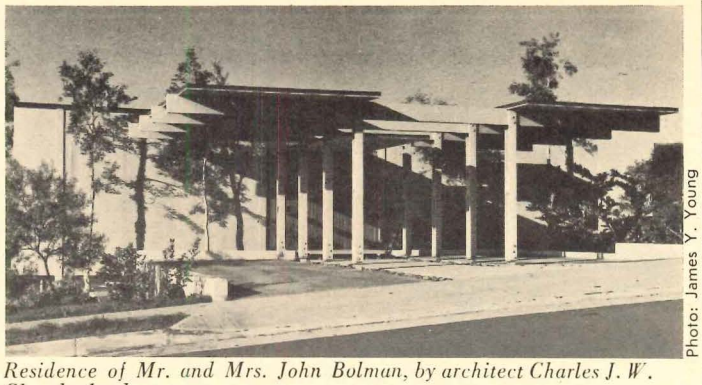


Photo: James Y. Young

Residence of Mr. and Mrs. John Bolman, by architect Charles J. W. Chamberland.

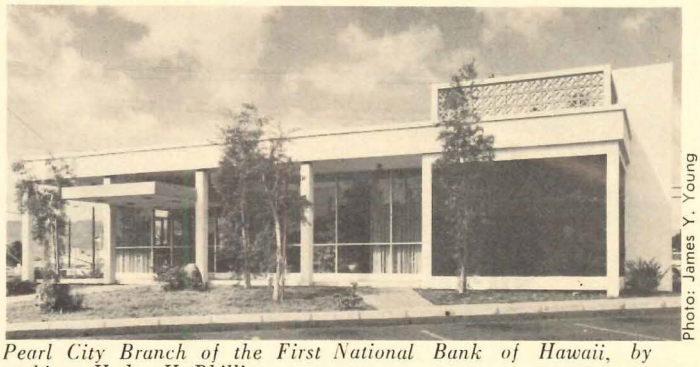


Photo: James Y. Young

Pearl City Branch of the First National Bank of Hawaii, by architect Hadyn H. Phillips.

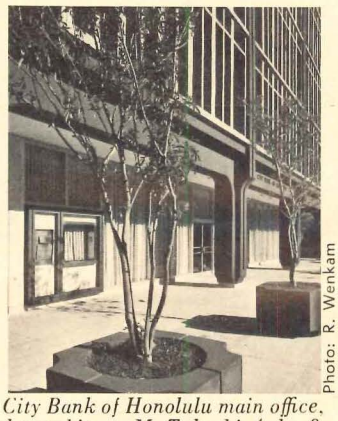


Photo: R. Wenkam

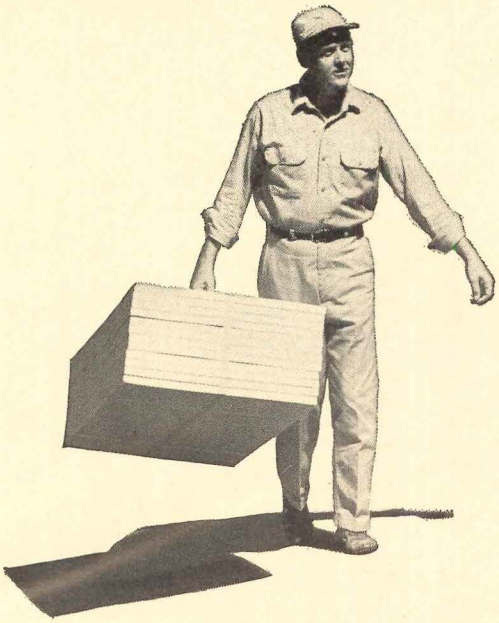
City Bank of Honolulu main office, by architects M. Takashi Anbe & Associates and Walter M. Tagawa & Associates.

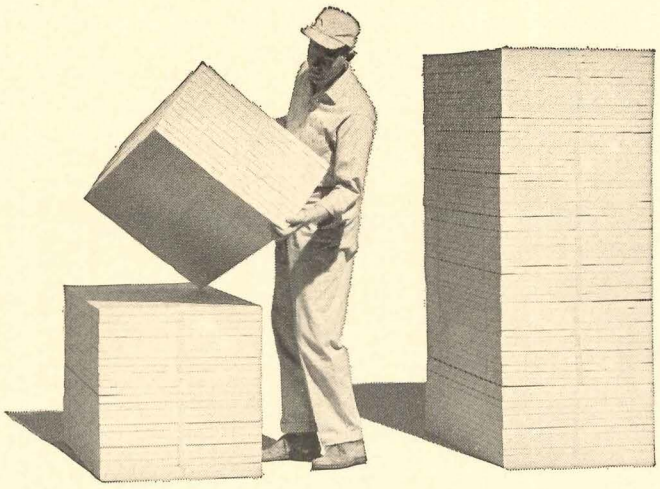
Photo: Nelson Zellers

The Marc Seastrom for the Gard and Mary Jewelry Shop at Ala Moana Center, by architects Vladimir Ossipoff.

PERSONALITIES

Six men have been selected by the AIA to receive honorary membership in the Institute at its annual convention, to be held May 14–18 in New York City. For their "distinguished service to the profession of architecture or to the arts and sciences allied therewith," the AIA will bestow honors upon **Joseph F. Addonizio,** executive director of the New York State Association of Architects; **John D. Entenza,** executive director of the Graham Foundation for Advanced Studies in the Fine Arts; **James V. Fenelon,** executive director of the Minnesota Society of Architects; **John Erik Jonsson,** Honorary Chairman of the Board, Texas Instruments Inc.; **Edgar Kaufmann, Jr.,** adjunct professor of architecture at Columbia University and author of five books on Frank Lloyd Wright; and **Denton Murdoch Spruance,** lithographer, painter, and chairman of the Fine Arts Department of Beaver College . . . In anticipation of its annual convention, the AIA has also announced four "theme" speakers, who will deliver lectures at the convention's afternoon sessions. The first of these sessions will be headed by **Dr. Harold Taylor,** whose topic will be





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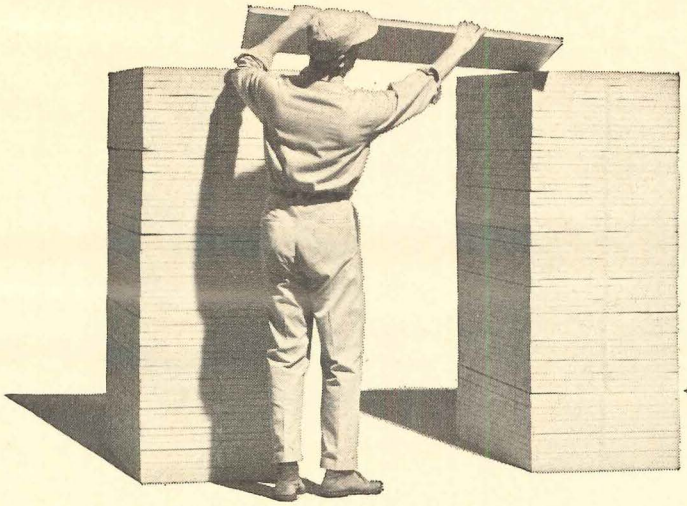

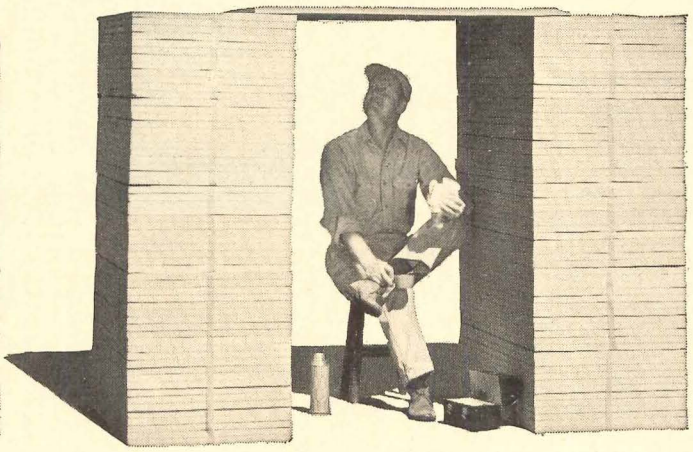

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DOW

"Education and the Future of the Architectural Profession." Architect **Charles Luckman** will address the theme seminar on "Architectural Practice" at the second session; New York City's **Mayor John V. Lindsay** will head the third session, on "Design" with New York as a case study. At the final seminar, **Arthur C. Clarke** will address the seminar on "technology." . . . **Marshall McLuhan** will deliver the annual Purves Memorial Lecture at the opening of the AIA convention.

FROM ARCHITECTS COMES ART

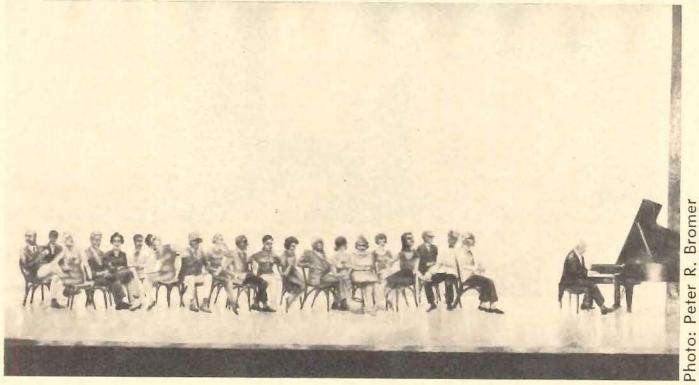


Photo: Peter R. Bromer

Painting is about as unusual a hobby for an architect as orchid growing is for a botanist. It therefore comes as no surprise that, around the U.S. this winter, several architects had gallery showings of their paintings. As might be guessed, architects paint in all styles and media, and for subject matter they choose almost anything — except buildings.

Morris Lapidus, New York-based designer of such palaces as Miami's Fontainbleau and Americana hotels, had an exhibit at the University of Miami's Lowe Gallery that went far beyond his paintings. Included were photographs and drawings of his 40 years of architectural work. Although the Lapidus exhibit was not typical, he feels that it represents the type of "exhibit that any reputable firm can some day hope to have if all conditions are as propitious as those which brought about the Lowe Gallery exhibit."

The propitious conditions started on a plane ride from Miami to New York with University of Miami president Henry King Stanford. Receptive to the idea of the exhibit of the work of one architect, Stanford set up a meeting between Lapidus and Dr. August Freundlich, director of the Lowe Gallery. Talking of the exhibit recently, Lapidus told P/A, "The exhibit entailed a great deal of work on my part and would entail a great deal of work on the part of any architectural firm fortunate enough to be invited to have a major exhibit in a gallery. It entailed not only the collection of the work, but also the actual design of the exhibit itself." Lapidus and his firm had to foot the bill for additional lighting and for exhibit devices. In style, Lapidus' paintings range from the abstract to the representational (top, both columns).

Photo: Nickerson Photography

Herb Greene, who had an exhibit of his paintings at the Fine Arts Gallery of the University of Arkansas, sees his painting as at least in part related to architecture. Although he recognizes strict limitations to this relationship, he states: "Outside these limitations, however, there is one motive that has influenced both my painting and architecture. This motive stems from the consideration of how events that happen independently are related to and become dependent upon each other when we attempt to understand each event."

Photo: Peter R. Bromer

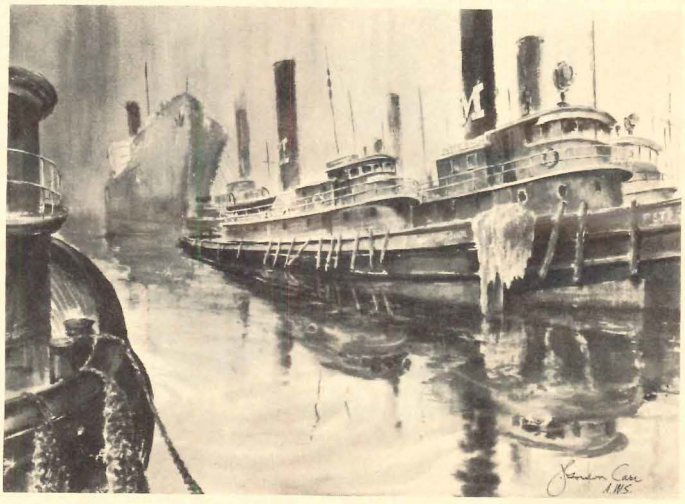


Photo: Peter A. Jubey & Son

In his current painting, Greene is involved with evoking a pattern of feelings generated by photographed events or objects. Starting with one or several photographs, such as the one of Lincoln seen here, Greene paints around and between the photos, tying them together in abstract, colored swirls, dabs, and washes or paint. Greene sees the result as exemplifying the ultmate process of cerebral understanding.

If Greene's painting can be described as a confluence, as in a dream, of abstraction and concreteness, then the pen-and-ink drawings of architect Jerry F. Weiss, whose show hung at Cleveland's Karamu Gallery, represents an overlay of reality with abstraction. Shown here is "Sand Beach Cove" (middle).

Architect J. Walter Carr, whose watercolors were on display recently at Manhattan's Grand Central Galleries, picks as subjects people, boats, and the sea. In 1964, he spent three weeks aboard the aircraft carrier U.S.S. Essex as combat artist in the antisubmarine warfare games in the North Atlantic. Of the four architect-artists shown here, his paintings and his building design are probably the most representational. "Rafting Tugs" is seen above.

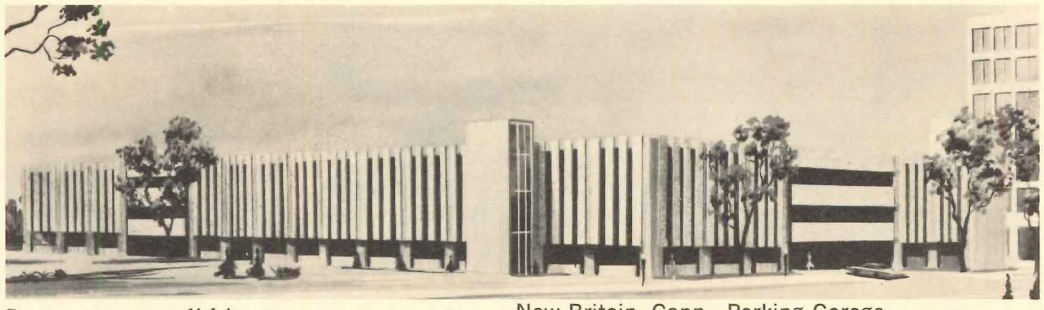
THE PRESCON MEMO NEWS

THE PRESCON CORP.: 502 CORPUS CHRISTI STATE NATIONAL BUILDING — CORPUS CHRISTI, TEXAS 78401

PARKING GARAGE

58′ SPAN WITH POST-TENSIONED 23″ TUBE SLAB

Cost of this five level parking facility 304′ x 174′, including two large rental areas, added restroom facilities, mechanical, electrical, traffic control, and landscaping was $6.20 per sq. ft. The structure uses Prescon positive end anchorage tendons for post-tensioning prestressed concrete and the Tube Slab System, a monolithic one or two-way concrete slab using uniformly spaced large diameter hollow paper or metallic tubes to create voids in the concrete.

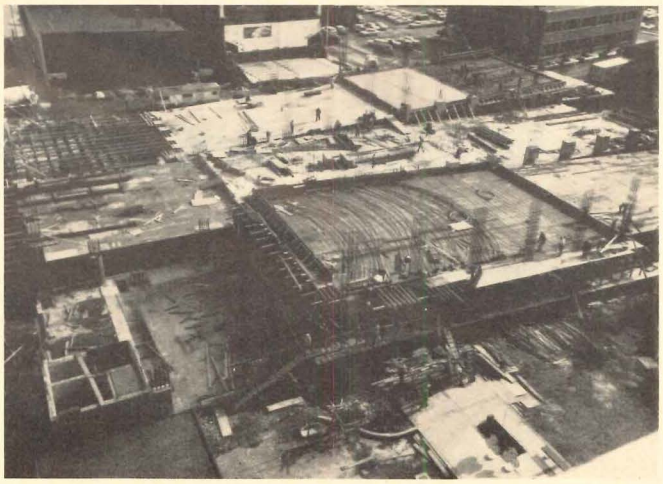


New Britain, Conn., Parking Garage.

Designed by A. J. Macchi, Engineers, Hartford, Connecticut, it provides for one-way directional traffic with one spiral movement upward, one downward, and a level portion at the center common to both movements. The 58′ spans use 20-wire Prescon tendons stressed to 165 kips. Where the slab is 174′ (3 spans), 16-wire tendons were stressed to 133 kips. Tie tendons in bridging members transverse to tubes and tendons were placed at ⅓ span points.

The floor slabs are 23″ deep with 18″ round metal tube voids at 22¾″ on center positioned approximately at mid-depth of the slab. This forms a 4¾″ rib between voids and reduces dead load to 142 psf. With a 10′ floor to floor height this gives 8′ 1″ clear headroom. Temperature steel is used at the top and bottom of the slab. Tubes were omitted at the periphery to form solid edge beams.

Three hundred piles were used in the foundation. The exterior columns are 1′ x 4′, and interior columns are 4′ x 3′. Double columns were used at expansion joints. In level areas the slab forms were sloped a maximum of 3″ for drainage. Basement walls and pile caps used 3000 psi concrete; columns, slabs, and beams used 4000 psi concrete.

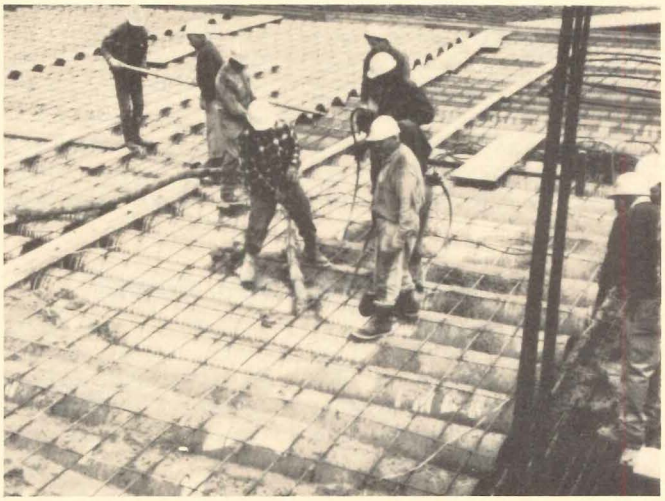


Tendons have been uncoiled on slab forms in foreground; in upper right, part of the concrete placement has been completed with additional concrete being pumped into place.

Two parking rows plus a 22′ wide traffic aisle is provided at every level. Parking is at 60° to the traffic direction. Column-free areas facilitate self parking. Monthly patrons have separate access to parking space in the basement level.

Architectural treatment consisted of exposed aggregate precast concrete panels 3⅝″ thick for the facade. The exterior columns and stair towers concrete has a board marked finish.

This parking garage, scheduled to open in March 1967, was built for the City of New Britain, Connecticut. A. J. Macchi invented the Tube Slab System used in this project. Angelo Tomasso Inc., New Britain, Connecticut, is the general contractor.



Pumping of concrete to form the slab. Temperature steel and tubes can be seen in place. Tendons are positioned in ribs between the tubes.

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On Readers' Service Card, Circle No. 451

GATEWAY FOR BALTIMORE

Photo: Gene Washnik

BALTIMORE, MD. "I think it is dramatic and exciting. It looks as if it is going to take off," said Baltimore's director of Recreation and Parks, Douglas S. Tawney. "I don't know much about the structural problems, but it sort of appeals to me," put in Park Board president Samuel Hopkins. Under discussion was Lev Zetlin's design for a bridge to cross Baltimore's inner harbor. Known as a tension bridge, it incorporates structural principles of tension used in the New York State Pavilion at the 1964–65 World's Fair, but never before in a bridge. Sets of cables strung from two Y-shaped towers at each end would evenly distribute all stress, making possible construction with only 100 lbs of steel per sq ft, much less than in conventional bridges. Three roadways would carry 15 traffic lanes 65′ above the water, 14 for cars and trucks, one for pedestrians.

The narrow, Y-shaped towers straddle only the middle roadway, making these Y-shaped structures, which will be either steel or concrete (Zetlin is inclined toward steel), much less bulky than conventional towers. Moreover, the system of interacting rigid cables eliminates the need for stiffening trusses and permits the use of a very thin deck, only 4′ deep.

When Mayor McKeldin saw Zetlin's concept, he said simply, "This is it." But approval will not come quite so easily. Baltimore's Public Works Department is studying the design, along with more conventional proposals.

ARCHITECTURAL MODELS, ANYONE?

ST. PETERSBURG, FLA. The Museum of Fine Arts in St. Petersburg hopes to assemble an exhibition of architectural models. What it has in mind is an exhibition showing examples of great buildings throughout history, from the Parthenon to the Gothic cathedrals to Lever House and Falling Water. Anyone who knows where the museum can borrow or purchase such models can write to Mrs. Robert J. Haiman, Museum of Fine Arts, 255 Beach Drive North, St. Petersburg, Fla. 33701.

ARCHITECTS EXEMPTED—AGAIN—FROM PLANNING EXAM IN NEW JERSEY

TRENTON, N.J. Can you or can't you in New Jersey? According to a decision handed down by the New Jersey Supreme Court in late February, you can — if you are a registered architect, engineer, or land surveyor — practice planning there without taking a special examination. This decision perhaps settles an on-again-off-again dispute in which planners decided that an original 1962 planners' licensing act had been too lenient in granting examination exemption to architects and engineers. Following a lower court decision last year (see p. 57, APRIL 1966 P/A), the paragraph granting an automatic professional planner's license to architects and engineers registered in New Jersey was stricken from the Licensing Act. Now, the paragraph is back. It is not unconstitutional, says the New Jersey Supreme Court. In part, the decision read: "We are satisfied from the legislative history and from an examination of the statute as a whole that the Legislature would not have adopted it without the exemption provision." The appeal to the Supreme Court was made by the New Jersey Consulting Engineers Council, the Consulting Engineers Council of the U.S., the American Society of Civil Engineers, and two individual CEC members affected by the lower court decision.

FISHERIES RESEARCH-EXHIBIT BUILDING

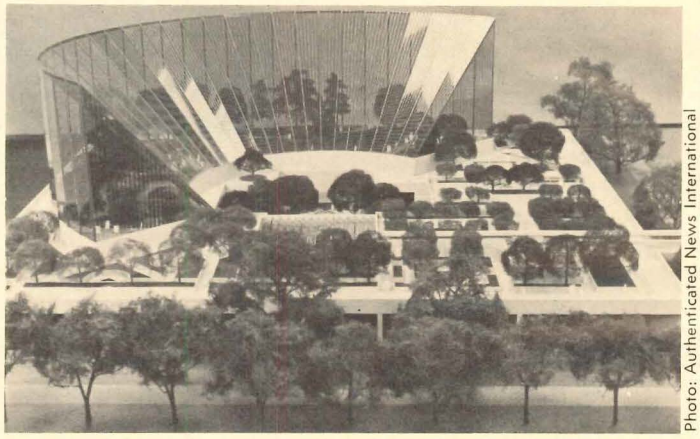

Photo: Authenticated News International

WASHINGTON, D.C. The architecture of Federal bureaus may take an unexpected turn if plans for the National Fisheries Center and Aquarium here are approved. Designed by Kevin Roche, John Dinkeloo & Associates, from a concept outlined by designer Charles Eames, the building consists of a raised, square 432 ft shell, supported on 20 ft columns from a concrete deck. Rising from one corner of this shell is a large semicircular glass enclosure above a re-creation of an ecological section of the Florida everglades. The roof of the deck will be used for outdoor exhibits arranged in a garden-like setting. Within will be an aquarium, two 500-seat theaters, and main exhibit halls. In every case there will be an effort to display live organisms. "It must demonstrate a responsibility deeper than that of entertainment," comments Eames.

So far, the $10 million building has the approval of the Fine Arts Commission and awaits only the verdict of the National Capitol Building Committee.

WASHINGTON/FINANCIAL NEWS

by E. E. HALMOS

Architectural Bids? — Efforts of architects and consulting engineers to raise the level of allowable Government fees for their services (from the present flat 6%) took an unexpected and possibly ominous turn in late March.

If the General Accounting Office insists on strict interpretations of what it says is existing law, the result could be enforcement of bidding for A-E services.

At least as serious, from the viewpoint of the professionals, is that it could mean adoption of such procedures by state and local agencies that buy A-E services — even before any action is taken by Congress or by Federal agencies.

Details of what GAO will recommend were due to be revealed officially when a full report on A-E fees was sent up to Congress in mid-March.

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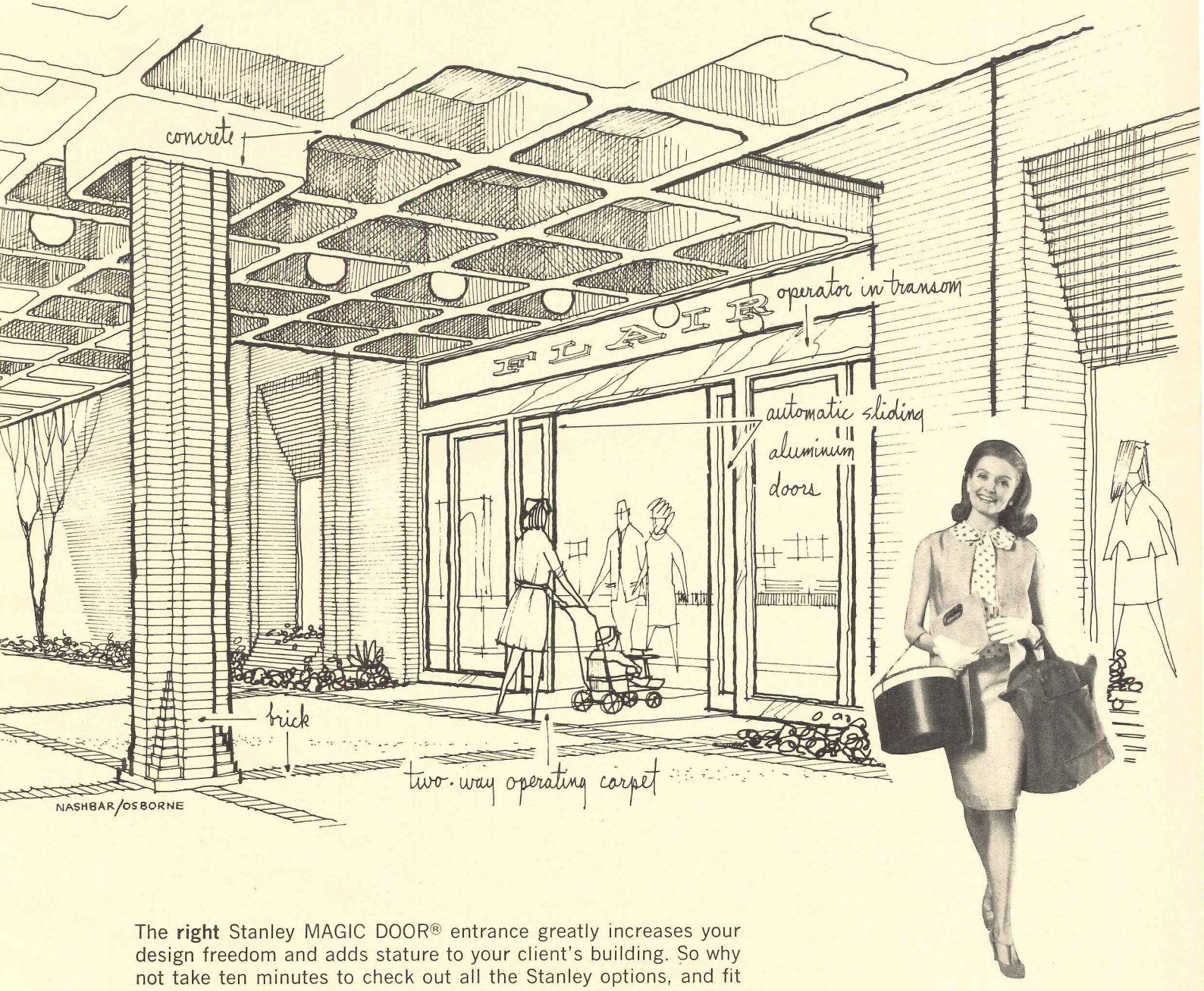

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But the watchdog fiscal agency had taken the somewhat unusual step of asking professional societies and Government agencies for comment on a draft of its report. While this was placed on a "top secret" basis, enough of the content leaked out for a good view of what was contemplated.

Genesis of the GAO study was a growing clamor by consultants last year that the 6% fee isn't high enough, results in poorer work, and keeps many firms out of Government activities. This resulted in a Congressional directive to GAO to study the matter, and to come in with a report and recommendations on the subject.

First results were disturbing enough: GAO sent letters to Army and other construction-buying agencies, insisting that the 6% fee "imposes a limitation on the total compensation payable for all A-E services, regardless of whether the cost of these services represents consultant fees, travel expenses, supervision of construction, preliminary effort, or the like."

Then came the real shocker: GAO said that the Armed Services Procurement Act of 1962 contained a provision that requires "competitive negotiation" for professional services. States the provision: "Competitive negotiation is defined as soliciting proposals from the maximum number of offerers . . . covering the complete range of considerations . . . price and others included." GAO also made a point of this matter in letters to the Secretary of the Army.

It also reportedly was prepared to recommend application of cost and pricing provisions (the "Truth in Negotiation Law") to A-E contracts and enforcement of other laws (PL 87-653) requiring that all materials and services be secured by competitive negotiation with fee as a "major" consideration.

If this is done by Congress, then GAO would recommend repeal of the 6% fee limitation, since minimum fees would then be assured.

Professional groups and others received the drafts of the report on February 10, with instructions to return their comments to GAO by February 24. The gist of the comments was that enforcement of such provisions would wipe out years of effort in educating the public on selection procedures for professional services and years of effort to raise professional standards, and would result in poorer work for the Government.

One professional organization in Washington reported early in March that several Governmental agencies on state and lower levels had already written to ask for copies of the GAO recommendations, indicating they would move quickly to apply the regulations to their own operations.

More Dollars for Highways — Another matter of major import to anyone concerned with the construction industry developed very quickly out of lengthy Congressional hearings (most unusually held by the full Senate and House Public Works Committees in joint session) into heavy cutbacks (more than $1,100,000,000) in highway construction funds, as announced by the Administration on November 23, 1966.

Aside from the clamor of state governments, contractors' groups, and others as to the effect of the cutbacks on business, a central point emerged:

Congress thinks that the President may have acted illegally (or at least improperly) in tampering with the Highway Trust Fund at all. Legislator after legislator made the point that the fund is to be used for highway purposes only, and that nowhere in the 1956 Highway Act is there any leeway for use of the trust fund for Administration experiments in controlling the U.S. economy. (The cutback was justified as an anti-inflation move.)

Reason for the concern was obvious: If the Highway Fund, which was carefully circumscribed to provide a "pay as you go" atmosphere, can be used at the Administration's whim, then why not special funds for the Veterans Administration, agricultural programs, or anything else?

The paradox is that most Congressmen admit that there's no way they can force the Administration to spend money, even if appropriated. It was clear from the tone of the hearings, in which new Transportation Secretary Alan Boyd got a very rough, though polite, going over, that Congress intends to build up a record on the highway cuts that can be used to club the Administration into restoring the full money on pain of real political damage. (An Administration announcement on the day the joint hearings opened, to the effect that $575 million of the cut funds would be restored "soon," caused the angry Congressmen to adopt a wait-and-see attitude.)

Public Housing for Handicapped — If Congress approves a bill now before it, the long-standing, but entirely voluntary, attempts of the Federal Government to design public buildings to accommodate the handicapped, will become mandatory.

The bill (S. 222) would put teeth in expected recommendations of a National Commission on Architectural Barriers, which is due to submit a report a year or more from now. It would require that any Federally financed public building (which would include structures on which Federal financing takes the form of loans or grants) must contain "express provisions" providing for compliance with regulations to be established by the Administrator of the General Services Administration, setting up "such standards for design and construction of public buildings as may be necessary to insure that all public buildings will be reasonably accessible to persons who are physically handicapped."

As of the moment, some 25 of the states have enacted legislation under the general heading of "Architectural Barriers," prescribing some accommodations for the handicapped. According to information in Washington, other states now have similar legislation pending.

The problem, according to Alaska Senator Bartlett, who introduced S. 222, is that both state and Federal action has been "a policy honored more in good intentions than in fact. What is required is a consciousness of the problem, an interest in its solution, and a little forethought in the planning stage of construction."

Capitol Plan Watchers — The yearly — and now almost traditional — go-round over the architecture on Capitol Hill is in for its usual revival.

Among bills now in Congressional hoppers is one by New York's Rep. Ogden R. Reid (HR 94). It would establish a "Commission on Architecture and Planning for the Capitol," which would be required to approve any plan for "construction, alteration, or repair of any public building on, or landscaping of, real property comprising the U.S. Capitol Grounds."

The proposed "commission" would have some 15 members and would include at least one architect, one landscape architect, one sculptor, one artist, plus members of Congress.

Financial — The furor over funds for highway construction was apparently only the beginning of Congressional unhappiness with the President's efforts to enforce cuts in construction spending. The lawmakers are obviously equally unhappy with the token cuts in money for public buildings, rivers and harbors work, and military construction. Problem is that there's little that Congress can do to get the money spent, even if it restores funds in appropriations bills, except to bring as much pressure as possible on the President.

☐ Taxpayers, however, were still giving strong support to public works construction, as evidenced by monthly bond-election results. In January, for example, they approved a total of $121,300,000 worth of bonds — nearly 80% of all issues presented to them — with the bulk of the money ($97 million) to go for elementary and secondary educational purposes.

☐ Businessmen, under strong pressure from Washington, have cut about $2,300,000,000 from their plans for 1967 capital spending. Pressure comes from removal of the 7% investment tax credit late last year, plus Government efforts to slow down inflation.

☐ Big market for construction remains in maintenance and repair work: Commerce Department estimates it topped $11 billion in 1965 alone on residential property.

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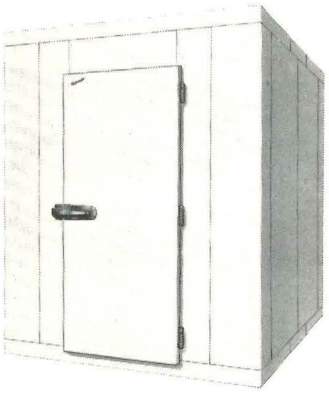

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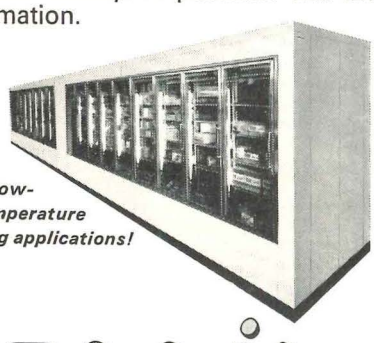

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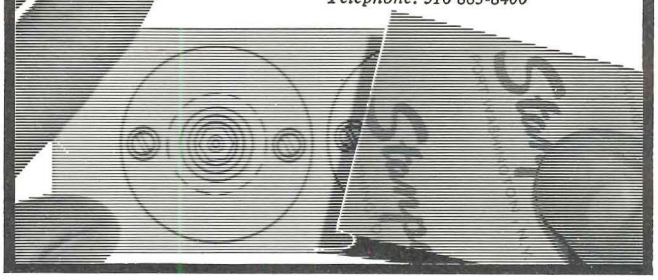

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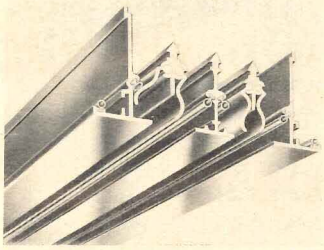

Long slot. Continuous air diffuser of anodized aluminum has vinyl bulb gasket shut-off in the adjustable vanes. "ASD" Air-Slot permits face-side adjustment of air-pattern and flow rate control with the same vanes. Standard sections are up to 8′ long, and frame styles include screw-mounted border, concealed bracket mounting border, and concealed bracket flush-recess border. AirGuide Corp., 795 W. 20 St., Hialeah, Fla.
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CONSTRUCTION

Vintage timber. Hand adzed beams of wood with a minimum age of 50 years are available from a company that also offers weathered paneling and shake shingling to "soften the austerity of modern architecture." Beams up to 8″ x 14″ and up to 18′ long are cut to size; chamfered edges if desired. Price is $1.20 per sq ft of adzed surface, plus 25¢ per board ft of material. Decor Materials Inc., P.O. Box 254, Appleton, Wis.
Circle 102, Readers' Service Card

Treated shingles reduce fire hazard. Western red cedar shingles and shakes impregnated with a fire-retardant compound now meet the Underwriters' Laboratories, Inc., specifications for Class "C" roofing material. Shingles and shakes have passed accelerated laboratory leaching tests equivalent to 800″ of rainfall over a 10-year period. After this exposure, they show resistance to lateral spread of flame, generating no flying sparks in air currents up to 18 mph. Manufacturer claims that the treatment does not affect natural color, and chemicals have no adverse effect on galvanized nails, aluminum, or copper gutters and flashing. Koppers Co., Inc., Pittsburgh, Pa. 15219.
Circle 103, Readers' Service Card

Standard flashing now in "soft" stainless steel. No-springback, dull-finish stainless steel is now being factory-fabricated into through-wall flashings, concrete reglets, masonry reglets, cap flashings, and gravel stops. Products of "Softur" stainless steel (#304) cost 15% less than the same products made of copper, reports manufacturer, who fabricates flashings of both materials. Cheney Flashing Co., 623 Prospect St., Trenton, N.J. 08605.
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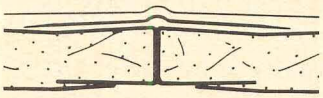

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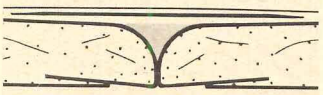
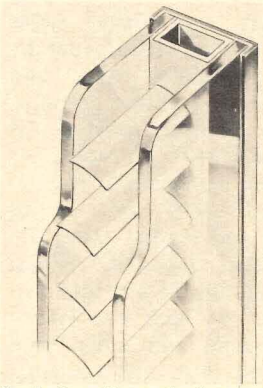


USING NEW SHEETROCK SW

Sheetrock changes shape. Wallboard system developed to relieve ridging, beading, and other joint imperfections, uses a new gypsum wallboard with a "rock-hard," rounded, tapered edge. This "Sheetrock SW" wallboard edge replaces the conventional square tapered edge, and is said to relieve joint deformity problems caused by twisted framing, poor board alignment, damaged wallboard edges, and extremes in temperature and humidity. Special compound for prefilling joints hardens with a maximum bond and minimum shrinkage, says manufacturer, and standard tools and techniques are easily adapted to the new installation system. "Sheetrock SW" is available in ½″ and ⅝″ thicknesses. United States Gypsum Co., Dept. #147–2, 101 S. Wacker Dr., Chicago, Ill. 60606.
Circle 105, Readers' Service Card

Moisture-proof tile. Polystyrene "Super Tile-Lite" ceiling tile has a highly reflective, white, pebble-textured surface suitable for use in damp climates, or in bathrooms and kitchens. Interlocking flanges of the 24″ x 24″ tiles (scored into 12″ x 12″ squares) are self-leveling, says manufacturer, or can be attached to solid backing with adhesive. United States Mineral Products Co., Stanhope, N.J. 07874.
Circle 106, Readers' Service Card

DOORS/WINDOWS



Sealed unit controls sunlight. Adjustable louvers sealed between two panes of tempered glass offer control of sunlight, heat, and glare, as well as sound. Hermetic sealing in a 2″ air space eliminates maintenance of 1½″-wide aluminum louvers that rotate through 180°. Louvers are white and may be either horizontal or vertical. Sizes for horizontal blind units range up to 92″ x 60″ wide; for vertical, up to 72″ square. Polarpane Corp., 825 Hylton Rd., Pennsauken, N.J.
Circle 107, Readers' Service Card

Big door stands up to flames. The largest wood fire door available, according to manufacturer, will withstand temperatures up to 1700F for 1 hr. Wood veneer surfaces and treated hardwood edges cover the mineral core of 4′ x 10′ door suitable for institutional installations. "Roddis Fire Door" carries a 1-hr listing by Underwriters' Laboratories, Inc. Weyerhaeuser Co., Wood Products Group, Tacoma, Wash. 98401.
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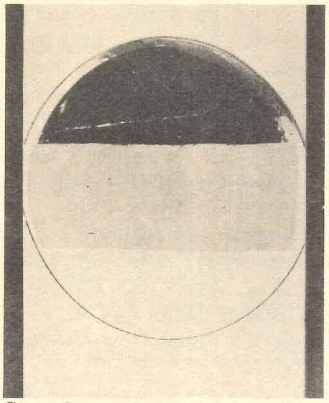
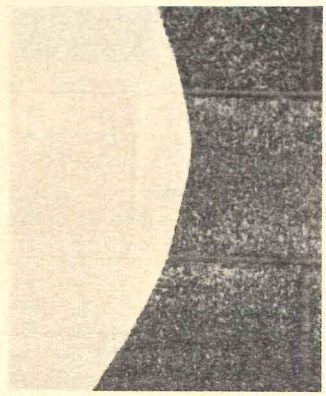
FINISHES PROTECTORS



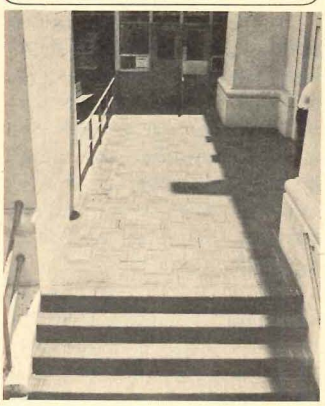
Stretchy paint retains color. Tests show new latex house paint to have excellent flexibility and resistance to sun fading, mildew, and chemical fumes. Based on a polyvinyl chloride formula, the paint has stretch and shrink weathering qualities that prevent cracking, chipping, and flaking, says manufacturer, and a mildew inhibitor that is completely nonreactive to fume staining. Photo (above) shows test sample that has been subjected to a cylinder of sulphide fumes (an air pollutant). Bottom part of circle is manufacturer's "Sun-Proof Latex"; middle is competitive latex paint; top is oil-base paint, showing the most severe damage. Pittsburgh Plate Glass Co., One Gateway Center, Pittsburgh, Pa. 15222.
Circle 109, Readers' Service Card

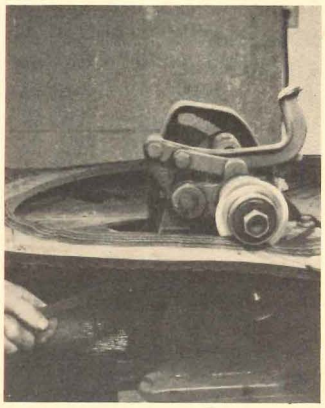


Instant Tile. Sanitile 550 is a tilelike coating system, com-

posed of a one-part polyurethane finish applied over a one-part polyester base. Suitable for interior wall and ceiling surfaces in hospitals, schools, processing plants, etc., it forms a hard, washable surface that is said to adhere well and be resistant to stains and chemicals. It comes in three systems: "PC," for dense surfaces like poured concrete or plaster; "CB," for concrete blocks (bare or previously coated); and "ILT," for concrete blocks that have never been painted or coated before. Low-cost Sanitile (17¢ to 37¢ per sq ft in comparison with regular tile systems) is applied easily with brush, roller, or spray-gun attachment. 53 colors. The Master Mechanics Co., 4475 E. 175 St., Cleveland. Ohio 44128.
Circle 110, Readers' Service Card

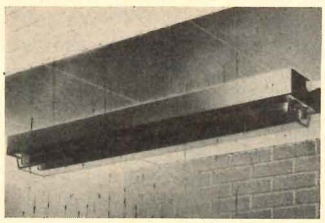
FLOORING





From tire walls to commercial floors. Ingenious design and manufacturing process make raw materials out of what would otherwise be waste items — the sidewalls from worn-out truck and bus tires. Tire casings are made into carpeting by cutting into strips (photo), and removing surface rubber to expose nylon cord. Exposed cord is then buffed to raise a short (⅛") but tough nap, and strips are bonded to fiber glass backing. The end products are 12"-square carpet tiles of variegated black, brown, white, and gray colors, suitable for heavy-traffic commercial use — either inside or outside (see photo). Carpeting is said to be weather-resistant, dirt-resistant, nonskid, and extremely durable. Maintenance is by vacuuming or other common carpet cleaning methods. Futurus, Inc., 1076 W. 9 St., Upland, Calif.
Circle 111, Readers' Service Card

FURNISHINGS

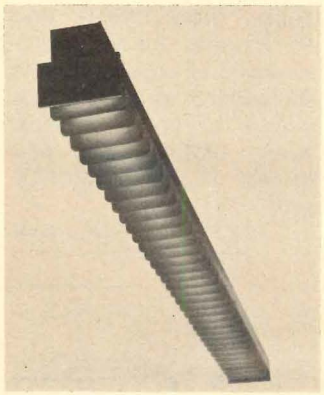


Waterproof Troffers. A line of fluorescent luminaires enclosed and gasketed (EG) is designed for use in food-processing plants, washrooms and shower areas, industrial kitchens, and other areas where enclosed fixtures are desired for added safety and cleanliness. Another group of fixtures, moisture-resistant and gasketed (MR), are suited for outdoor applications such as covered walkways, under eaves, and similar areas not completely protected against weather. Design provides protection for both electrical components and lamps from moisture, dust, and accidental breakage. Since hosing with water will not damage the luminaires, cleaning is easily accomplished. Both the EG and MR series come in 4′ models for one or two lamps, or 8′ models for two or four lamps. Lighting Products Inc., Highland Park, Ill. 60035.
Circle 112, Readers' Service Card

First guaranteed carpet. Allied Chemical Corporation's Fibers Division has announced a three-year wear guarantee on carpets. The guarantee, the first to be offered by a fiber producer in the floor-covering field, covers surface wear loss of more than 10% (per sq yd) of pile fiber. Replacement would be at manufacturer's expense. Among the carpet manufacturers already qualified for the A.C.E. label are Hardwick-Magee, Monarch, and E. T. Barwick. Allied Chemical Corp., Fibers Div., 1 Times Square, New York, N.Y.
Circle 113, Readers' Service Card

Extra-dense carpet. Tufted on fine gage machinery, "Powerbond" carpet is almost three times as dense as ordinary commercial carpeting and consequently is more impervious to normal spillage. The carpet, of 100% nylon pile in low-loop construction, has polypropylene primary tufting back and pure vinyl precoat and secondary backing. Width is 54" and colors are 11 tweed combinations. A special hard-backed version can withstand the abuse of shopping-cart traffic. Collins & Aikman, 210 Madison Ave., New York, N.Y. 10016.
Circle 114, Readers' Service Card

LIGHTING

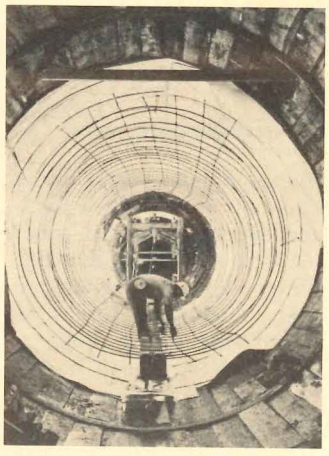


Low-light ambience. Limited area illumination and low brightness are combined in "Black Stack/Light," suitable for library book stacks, corridors and other confined areas. Four- and eight-ft units may be surface or pendant mounted. One-piece, matte black baffles for fluorescent lamps lift off easily for relamping. Litecontrol Corp., 36 Pleasant St., Watertown, Mass. 02172.
Circle 115, Readers' Service Card

SPECIAL EQUIPMENT

On film. Viewer for microfiche cards (standardized microfilm cards now widely used for reproducing information) is designed for viewing two frames simultaneously on the 14" x 20" screen. Simplified controls facilitate film scanning, focusing, and rapid image retrieval; available with 22x or 30x magnification. Eugene Dietzgen Co., 2425 N. Sheffield Ave., Chicago, Ill. 60614.
Circle 116, Readers' Service Card

Bench marks outdoors. Western red cedar timbers (treated with weather-proofing preservative) on a vinyl-clad steel frame make handsome park, playground, or plaza bench by park designer Paul Friedberg. Cedar members are fastened to frame with tamper-proof hardware; vinyl-clad stanchions are ready for concrete installation. The 4′-long units are available in eight variations, with or without backs. Colorguard Corp., 126 E. 38 St., New York, N.Y. 10016.
Circle 117, Readers' Service Card



Vapor stoppers. Easy-to-handle, lightweight vapor barriers are reinforced with a criss-cross grid of high-strength threads embedded in a plastic fabric. Standard sheets (up to 40′ x 100′) also serve as curing blankets. Photo shows "Plastilap" water barrier in place in Houston, Texas, pedestrian tunnel. Griffolyn Co., Inc., 10020 Mykawa Rd., Houston, Tex. 77033.
Circle 118, Readers' Service Card

Chateau Orleans Apartments, Wilmington, Del.
Designer/Builder: Ralph Paul, Inc.

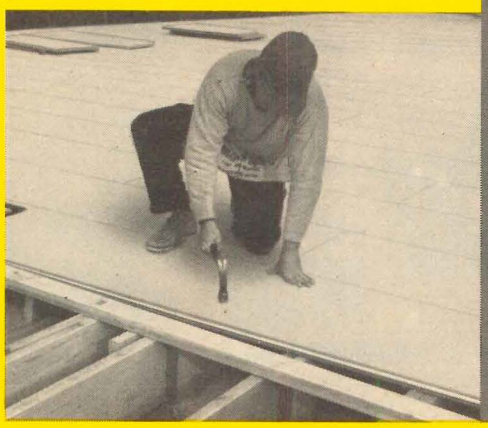
homasote—offers more than any other Floor Decking!

You win 4 ways when you specify Homasote Floor Decking. Sub-flooring, underlayment, sound control, and insulation are all there in a single specification.

Decking is nailed directly to floor joists, carpeting and pad are applied to the decking without underlayment, and insulation value is constant.

As for sound-deadening characteristics . . . INR +21 and STC 50 are obtained under ISO R-140 and FHA 750 test conditions. (Complete test data available on request.)

For all of the facts about the advantages of Homasote Floor Decking, ask for Building Product Selector Sheet 6-062.



Write Dept. D-2.

homasote Company

TRENTON, N.J. 08603

6-393

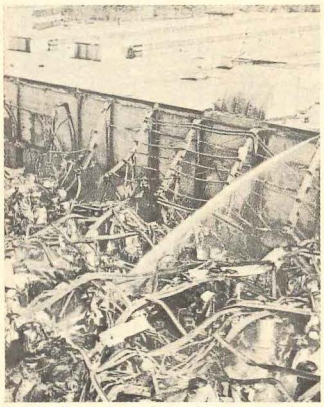
On Readers' Service Card, Circle No. 360

MFRS' DATA

AIR/TEMPERATURE

Fan fare. Changing the pitch of fan blades during operation gives precise control of air volume, according to manufacturer. "Axivane" fans used in commercial and industrial air and ventilation systems are part of a closed loop system, and are activated by sensory devices. Brochure describes operation and advantages of fans; tables show power savings at various loads and reduced sound levels. 6 pages. Joy Mfg. Co., 338 S. Broadway, New Philadelphia, Ohio 44663.
Circle 200, Readers' Service Card

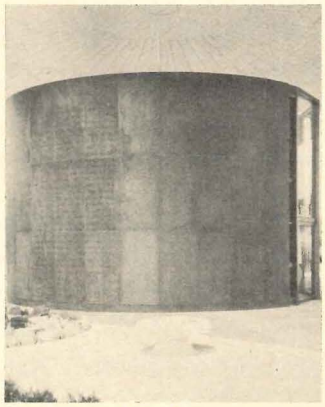
CONSTRUCTION



Isolating fire. Booklet entitled "Fire Walls in Modern Industrial Buildings" is a guide to the purpose and construction of fire walls that subdivide factories and other industrial buildings. Suitable materials and methods of construction, protection of door and other openings are covered. Photo shows fire wall that has successfully protected part of a plant from fire. Construction details, text, and photos. 16 pages. Factory Mutual System, Publications Dept., P.O. Box 688, Norwood, Mass. 02062.
Circle 201, Readers' Service Card

Condensation control. Increased use of insulating materials, glass, and other impermeable materials in modern structures creates special condensation problems in buildings. Booklet includes discussion of houses with below-grade crawl spaces and slab-on-grade buildings; the damage condensation can cause and how to prevent it; effects of wall insulation; permeability of various materials; and the effects of moisture on thermal conductivity. Manufacturer's vapor barrier membranes are also included. Data charts, formulas, photos; 24 pages. Price: $2. W. R. Meadows, Inc., 2 Kimball St., Elgin, Ill. 60120.

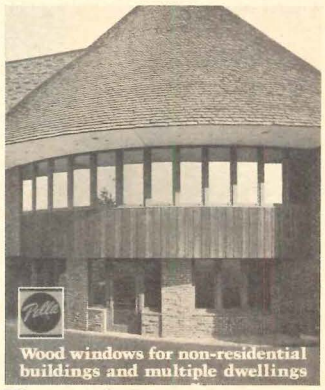
Waterproofing spray. Glass fiber-reinforced bituminous membranes are spray-applied to roof decks and below-grade surfaces (both vertical and horizontal) with a specially developed spray gun. Specifications, selection guide, flashing, and other construction details are given for the "Monoform" waterproofing system. 20 pages. The Flintkote Co., Architectural Products, P.O. Box 157, Whippany, N.J.
Circle 202, Readers' Service Card



Slate data. Booklet containing factual information on slate is designed to aid the specifications writer. Data on uses, sizes, limitations, grades, finishes, chemical and physical properties, and installation procedures are included. The final section is a series of photographs of interior and exterior architectural applications. 20 pages. Pennsylvania Slate Producers Guild, Inc., Pen Argyl National Bank Bldg., Pen Argyl, Pa. 18072.
Circle 203, Readers' Service Card

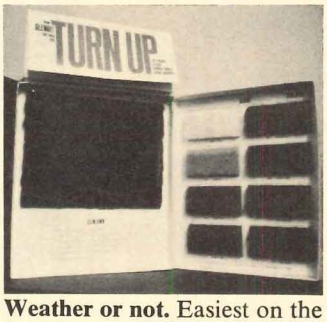
DOORS/WINDOWS

Lightweight doors. Folding closet doors have polyurethane core, plastic surfaces, and metal channel frame with enameled edges — materials that are quiet and warp-proof, says manufacturer. Brochure also describes expanding metal shelf system. Patterns, sizes, photos, and installation details are given. HC Products Co., P.O. Box 68, Princeville, Ill.
Circle 204, Reader's Service Card



Warm windows. Among a group of 1967 brochures on manufacturer's wood windows, wood sliding glass doors, and wood folding partitions, is a design booklet on nonresidential and multiple dwelling windows that include a standard casement and an awning window new to the manufacturer's catalog. Photos of completed projects, table of sizes, specifications for casement, double-hung, and awning windows of Western pine. 12 pages. Rolscreen Co., Pella, Iowa 50219.
Circle 205, Readers' Service Card

FURNISHINGS

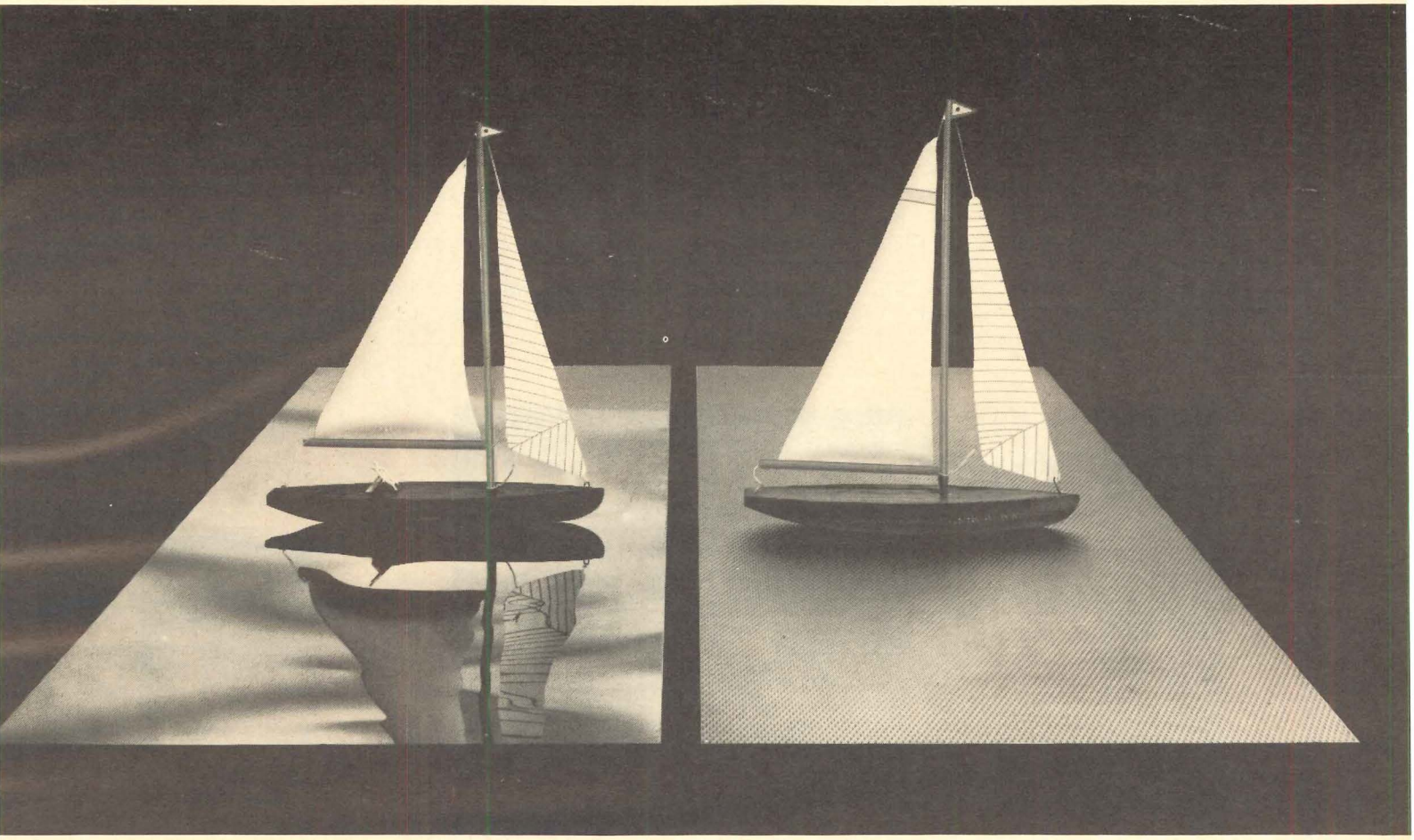


Weather or not. Easiest on the feet and plushest of the indoor-outdoor carpets is Glenlawn, sliver knit of 100% Herculon olefin fiber. It is resistant to moisture, shedding, fading, and staining. Installation is easy (double-face tape is sufficient) and maintenance is limited to sweeping, vacuuming, or hosing, depending on location. Kit shows swatches of all colors (white, black, red, sandtone, blue, gold, rust, as well as spring green and "verdian green"), size specifications (area rugs, roll sizes, and runners are available), and cost information. Glenoit Mills, Inc., 111 W. 40 St., New York, N.Y. 10018.
Circle 206, Readers' Service Card

Elegant carpeting outdoors. Deltox indoor-outdoor carpeting comes in nine patterns. Most dramatic is "Club Square," a two-color plaid in such colors as blue/green, and black/white. Also featured is "Poly Vogue," a striped, tufted design of 100% Polypropelene. All patterns (except Poly Vogue) are impregnated with vinyl and are reversible. The 14-page color booklet illustrates each pattern with all color choices, gives rug and carpet sizes, shows sample installations, and indicates durability of carpet in outdoor conditions. Deltox, Inc., P.O. Box 260, Oshkosh, Wis.
Circle 207, Readers' Service Card

Office furniture. A booklet titled "Space/Function/Structure" describes Jofco's Architect Series of office furniture. The design, by ISD, Inc. (interior design subsidiary of Perkins & Will, architects)

See the "oil canning" on the plain stainless?



Rigid-tex® stainless eliminates waviness for maximum flatness.

It's a paradox. Large areas of flat metal (for curtain-wall, column covers, and fascia) look wavy while Rigid-tex looks flat. Rigidizing takes the waves out and provides maximum visual flatness.

Other advantages are: **Fabrication.** Rigid-tex is easily fabricated, and is thus free of markings and blemishes. You obtain a uniform clean finish. **Cost Savings.** You can specify a lighter gauge than when using plain stainless with resultant economy. **Maintenance.** Far less susceptible to vandalism and easier to maintain.

Send for our sample that's one-half Rigidized and one-half plain. Scratch it, gouge it, bend it, fingerprint it . . . try anything. In short, you'll see why Rigid-tex is coming on fast in the architectural metals field. Widths to 52".

For catalogs, and 50-50 sample, write:

The Jefferson Trust & Savings Bank, Peoria, Illinois
Architects: Lankton, Ziegele & Terry
Stainless Steel Fabricator: Dawson Metals Products
Curtainwall: Rigid-tex pattern 6WL, stainless type 304, by Fenestra

RIGIDIZED METALS CORP.
688 OHIO STREET, BUFFALO, N.Y. 14203
TELEPHONE 716 856-9060

On Readers' Service Card, Circle No. 417

utilizes pecan wood components combined with vertical metal bar drawer pulls. Legs are designed as independent structural elements and are joined to the individual components with metal pins. A conference desk saves space by combining desk and table; knee wells on short sides permit utilization of full perimeter. Color brochure illustrates all pieces (single- and double-pedestal desks, credenza with top opening file units, tables, chairs, and free-standing storage pieces). Dimensions, specifications, and general descriptions are included. Jofco, Jasper, Ind.
Circle 208, Readers' Service Card

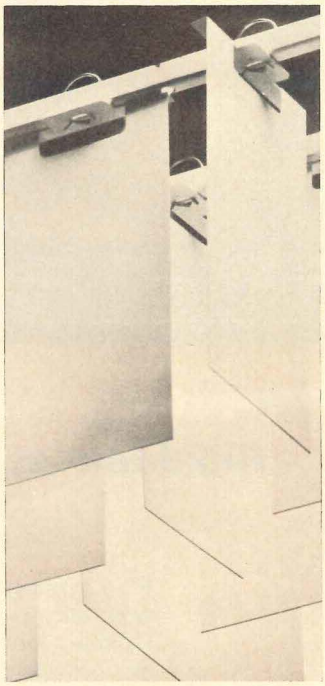
Venetian Blinds. Levolor features the "Riviera," an elegant, almost invisible blind with 1"-wide slats connected by a very slim, braided polyester ladder. Other models shown in 12-page catalogue are: heavy duty, specially designed for hard use; audio-visual, to shut out all light; detention room, with outside controls; skylight coverings, and motorized blinds. Also included are detailed specifications, construction information, and hardware components. Levolor Lorentzen, Inc., 720 Monroe St., Hoboken, N.J. 07030.
Circle 209, Readers' Service Card

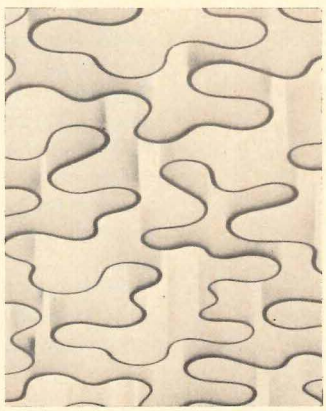
Colorful upholstery. Chroma I all-nylon upholstery offers a portfolio of cuttings of each of its 65 colors as well as a color wheel and basic guide to color schemes. To facilitate mixing and matching, swatches are removable. The criss-cross textured weave is protected by Scotchgard (also fade-resistant) and has the feel of wool. Cost for the catalogue ($5.25 including postage) is refunded with an order for Chroma I. Jens Risom Textiles, 444 Madison Ave., New York, N.Y. 10022.

INSULATION

Keep it warm and quiet. Spray-on cellulose fiber material has flame spread of "20," reports manufacturer. Suitable for acoustical and thermal insulation, the sprayed-on material will not disintegrate, rot, or shrink. Folder describes properties and includes short specs. 4 pages. National Cellulose Corp., 12315 Robin Blvd., Houston, Tex. 77045.
Circle 210, Readers' Service Card

LIGHTING





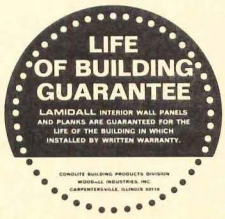
Light is a many baffled thing. Large selection of baffle systems for luminous ceilings include loose-leaf, squiggle, egg-crate, and coffered designs. Included in this cross-section of manufacturer's designs is

Guaranteed
while the building stands

Long after it ceases to be fun to sit at his father's desk. Long after it becomes a day-to-day routine. Long after *this* little lad retires. Even, long after that, the Lamidall paneling in this office is guaranteed.

It stays beautiful. It maintains its deep natural woodgrain. It remains impervious to surroundings and wear. It cleans easily.

Lamidall paneling is guaranteed for the life of the building.



LAMIDALL is a laminated plastic panel or plank in 8 or 10 foot lengths. You have a choice of 23 woodgrains and colors. It's installed with a concealed, patented clip that "floats" it to prevent buckling. And it's guaranteed in writing for the life of the building. For more details . . .

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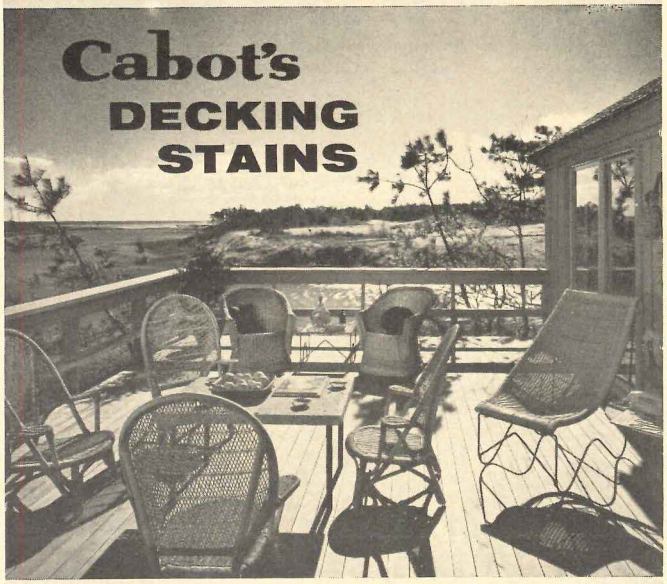
104 R

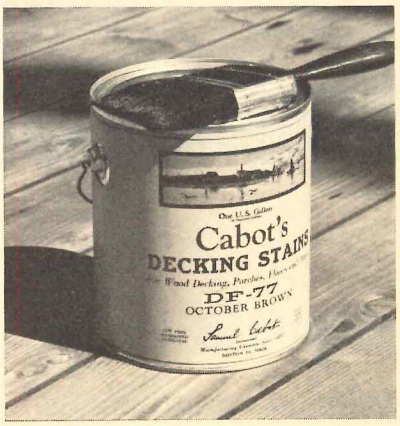
New . . . for Wood Decking



Home at New Seabury, Cape Cod, Mass.; architect: Royal Barry Wills & Associates, Boston, Mass.; developer: Emil Hanslin Associates, Melrose, Mass. Cabot's Stains used on Interior and Exterior.

A finish that stands up to heavy foot traffic and severe weathering.

The popularity of wood decking, in demand now as never before for porches, sun decks, patios, etc., requires a finish both durable and decorative. Samuel Cabot Inc. answers this pressing need with a new product, Cabot's Decking Stains. It is a product with a specific purpose . . . protecting, preserving, and beautifying wood surfaces under difficult conditions. Now, for the first time, it is possible to obtain a durable stain finish for wood decking.



- **Economical: easy to apply and maintain.**
- **Will not rub off or track off.**
- **Alcohol and detergent resistant.**
- **Suitable for all types of wood.**
- **Resists cracking, peeling, and blistering.**

Available in ten colors: *Bark Brown, Smoke Gray, Chelsea Gray, October Brown, Forest Green, Farallon Gray, Presidio Red, Cordovan, Redwood, and Black.*

SAMUEL CABOT INC.
428 S. Terminal Trust Bldg., Boston, Mass. 02210
Please send color card and information on Cabot's Decking Stains.

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On Readers' Service Card, Circle No. 331

DEMI-.5

The ONLY .5 mm pencil with these advantages:

1. **Stainless steel tip** (not brass). Won't bend or wear through.
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3. **Clutch positioned just behind the tip.** Gives lead a short travel distance—no bending and breaking.
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5. **Long or standard tips available.** Long tip on request.

Holder $1.98. Set (with a dz. H and 2H leads) $2.99. New stronger, blacker (more reproducible) .5 mm leads in HB, F, H, 2H, 3H, & 4H hardnesses: 50¢ per tube of 1 dozen leads.

Available wherever art and stationery supplies are sold.

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WORLD'S THINNEST LEAD **AUTOMATIC PENCIL**

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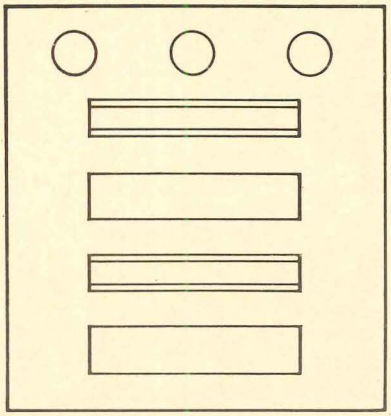
FINK DOME

A unique structure for architectural and industrial uses — designed to exacting tolerances, accommodating large vertical loads. Highly versatile as convention hall, arena, theatre, etc. Proposed dome shown is 900-ft. dia. at base and used as covering for existing ball park. For more information, forward to us the approximate size, required interior loads, together with details of application and surrounding terrain characteristics to:

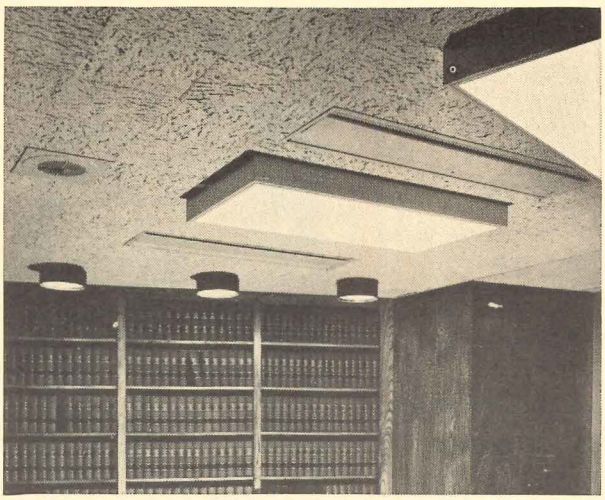
General Conveyor Inc. of N. Calif., General Domes Div.
1821 Mt. Diablo Blvd., Walnut Creek, Calif. or Phone (415) 934-9121.

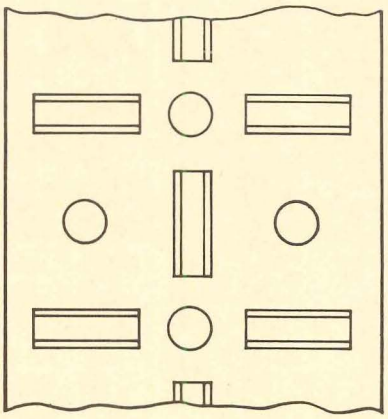
GC

On Readers' Service Card, Circle No. 354

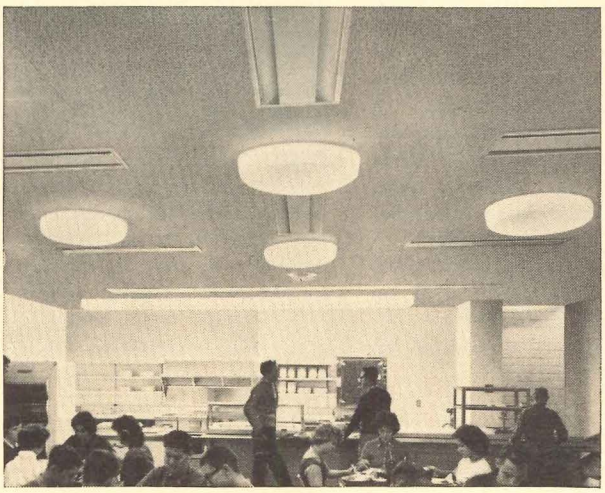


In this library and reception room, two Moduline units have been combined with circular surface-mounted light fixtures.





Moduline units in this school cafeteria are separated by incandescent lights, but can still be served by straight-line ductwork.



Adaptable Carrier Moduline air terminals have no "or equal"

You can get an idea from these examples how adaptable Moduline® units are.

They have a clean, functional 1′ x 4′ face dimension. Harmonize with any type of hung ceiling. Integrate with lights in dozens of ways. And may be installed as random singles, linked in pairs, or coupled in lines of any length.

With planned integration of lights and units, zones of any size or shape can be designed for flexibility of partitioning and space usage.

Adaptable? Very!

It is the only air terminal that compensates instantly for changes in duct pressure and is powered by duct pressure itself.

Result: You can use it with low-cost, single-duct systems for room-by-room temperature control—without the problems up to now associated with variable volume equipment.

Set up? Easy—just dial the maximum cfm to match the space load. The unit automatically balances to the desired temperature regardless of the pressure. No more probing at every outlet to check air quantity.

Air delivery? Smooth and quiet at any volume, low to maximum. No drafts, no stratification, no waterfall, no dead spots.

And factory-installed controls are powered by supply air. No external wiring, or pneumatic connections. More headaches eliminated.

For complete details, call your Carrier representative. Or write us at Syracuse, New York 13201. Represented in Canada by Carrier Air Conditioning (Canada) Ltd.

Carrier Air Conditioning Company

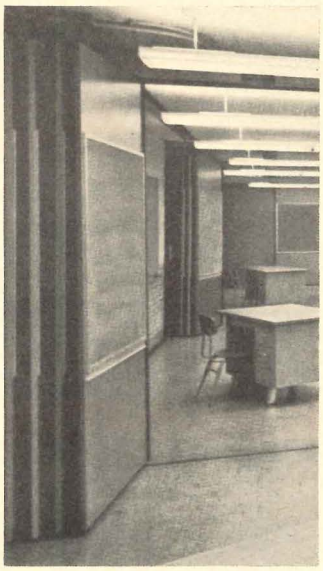
More people put their confidence in Carrier air conditioning than in any other make

On Readers' Service Card, Circle No. 333

the recently introduced blade-baffle "Quartette" ceiling that provides integrated air handling, as do several coffered ceiling systems. Dimensioned drawings, photos, fire ratings, cost estimates, acoustic qualities, and other descriptive material is included. Photos above show "Leaf-lite" and "Squiggle." 16 pages. Luminous Ceilings Inc., 3701 N. Ravenswood Ave., Chicago, Ill. 60613.
Circle 211, Readers' Service Card

SPECIAL EQUIPMENT

Department of interior. Partitioning system plus modular product display units provide the tools for designing flexible store interiors. Partitioning may be free-standing or attached to unfinished wall surfaces; vertical uprights are notched to accommodate the insertion of adjustable shelf brackets, and vinyl or pegboard surfacing is available. Display units are available in many drawer-rack-and-shelf combinations for special or general purpose. Photos, descriptions, and dimensions. 40 pages. Ready Metal Mfg. Co., 4320 S. Knox Ave., Chicago 32, Ill.
Circle 212, Readers' Service Card



Walls change spaces. Operable wall booklet for '67 details and describes the sliding acoustic barriers used to obtain more flexible spaces in meeting rooms, schools, and offices. Steel panels with rockwool cores slide on overhead tracks and have full-perimeter gaskets forming an acoustically sealed wall when in place. Color photos, detail engineering drawings and cross-sections demonstrate single and multiple system installations. 16 pages. The E.F. Hauserman Co., 5867 Grant Ave., Cleveland, Ohio.
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Smog protection. Pamphlet contains an analysis of smog, its causes and effects, and a description of equipment using "activated" carbon to remove gaseous impurities entering the air systems of buildings. Connor Engineering Corp., Danbury, Conn.
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Maintaining stainless. For architects who have been asking for more maintenance literature, here is a chart giving directions for removing smears, spots, grease, oil, and other deposits on stainless steel. Type of deposit, cleaning agent, method of application, and effect on finish are given. One page. The Committee of Stainless Steel Producers, American Iron and Steel Institute, 150 E. 42 St., New York, N.Y. 10017.
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The pure drink. Water fountains of stainless steel and vitreous china are cataloged in recessed, semirecessed, and face-mounted categories. Outdoor fountains, glass-fiber battery fountains, pedestal and counter units, and accessory items are listed. Photos, dimensioned drawings, and descriptions. 20 pages. The Halsey W. Taylor Co., Warren, Ohio 44481.
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PROGRESSIVE ARCHITECTURE
NEWS REPORT

REINHOLD PUBLISHING CORPORATION
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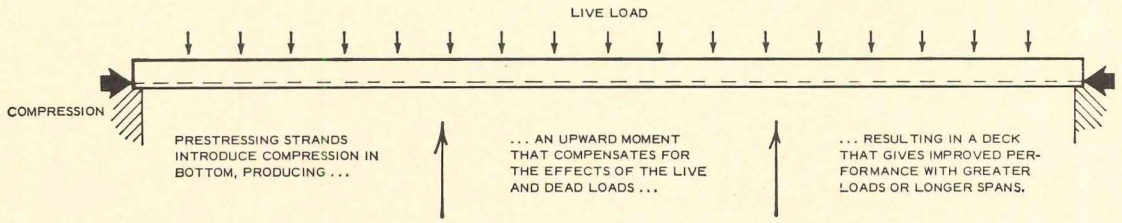


New HI-STRESS DECK gives you benefits of prestressed concrete along with high-speed construction.

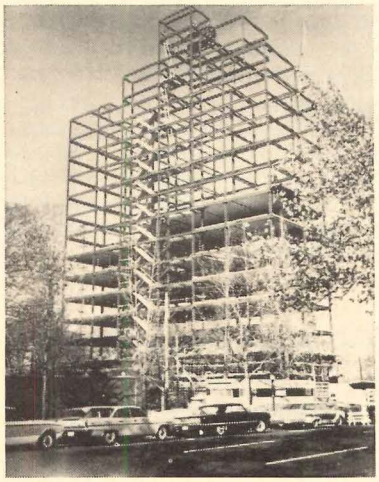
The diagram above shows how prestressed reinforcement in new Flexicore HI-STRESS DECK produces a long-span deck with high load carrying capacity. The high-tensile steel strand in the bottom of the deck has "built-in" compression that introduces an upward moment which supports the dead and live loads.

This design lets you carry a greater load or span farther with a light-weight hollow-cell deck. The accurate pretensioning of the steel strand under factory-controlled conditions results in excellent performance.

HI-STRESS DECK goes in one day and the next provides a smooth, clean surface for other trades. Installation continues through weather conditions that would stop on-the-site pours. Contractors find that Flexicore jobs are often finished before the completion deadline. Owners move tenants in weeks or months earlier.

Firesafety is another plus value. The 8-, 10- and 12-inch untopped HI-STRESS DECK has earned 2-hour fire resistance ratings from national testing laboratories (rating is 3-hour on 8-, 10- and 12-inch deck with 1¾ inch topping).

For new catalog, "Flexicore Hi-Stress Deck," write The Flexicore Co., Inc., P. O. Box 825, Dayton, Ohio 45401.



Fourteen-story Dell House Apartments, Baltimore, Md., used 70,000 sq. ft. of Hi-Stress Deck on a lightweight steel frame.

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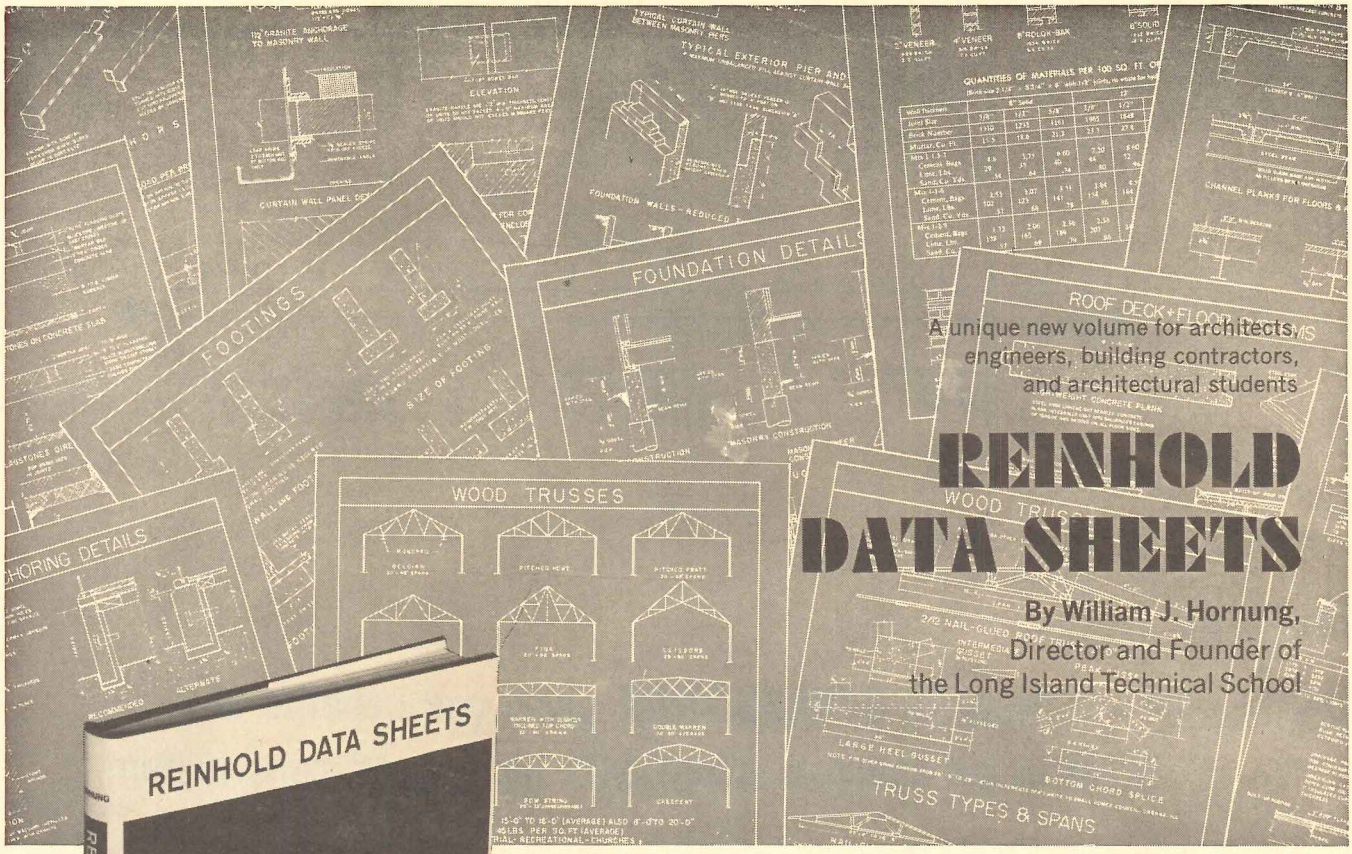

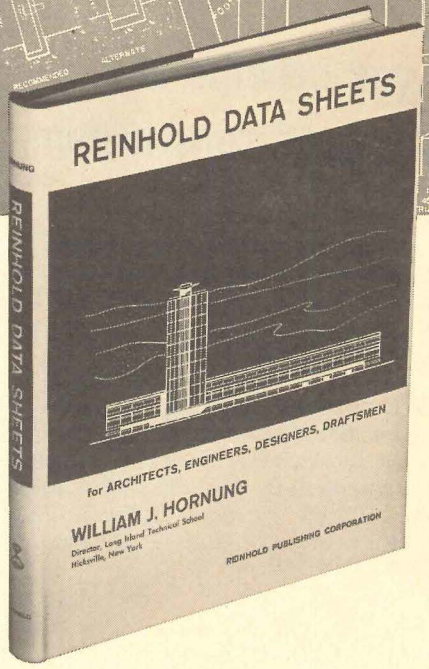

hundreds of reference diagrams and drawings

This book presents the most up-to-date reference and drawing data in the field of architecture, construction, and design. Here, in a single, conveniently arranged volume, is the latest information on new construction methods, much of which has never appeared before in book form. An extremely practical book, it features the most essential reference data required by the professional in his daily work.

The contents are organized to deal, in order, with the four main aspects of building: sub-soil constructions; wall systems; floor and roof systems; and methods of construction, including details, surface, and finish treatments. The book begins with detail drawings and data for footings and foundations, and its sequence of presentation follows a pattern similar to that used in the actual construction of buildings. Valuable information is given on the various methods of wall, floor, and roof treatments employing new uses of wood, concrete, steel, and stone.

The arrangement of the subject matter is distinguished by the fact that where materials in a certain construction system have been shown in detail, the methods of estimating quantities of these materials have been included. Questions and answers pertaining to mechanical and electrical equipment of buildings have been added for the benefit of those preparing for the Registered Architect's examination.

The practical applications of this book within the building construction, cement, building materials, and equipment manufacturing industries are exceptionally broad. Architects, engineers, and builders will find it especially useful as an up-to-date source of ready reference, and for the contractor it can prove a most efficient aid to becoming better acquainted with new methods of construction. In addition, it is highly adaptable for reference use by students of architectural design and mechanical drawing in technical schools and colleges.

1965	256 pages	8¼" x 10¼"	$15.00

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by Yusaku Kamekura, Preface by Paul Rand

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NEXT MONTH IN P/A

Human Habitations

How people live within an architectural framework is the subject of the entire May issue. Housing can no longer be adequately discussed with a collection of pretty residences, so the editors of P/A have devoted their traditional annual housing issue to showing how architects have designed for four population groups: the elderly, the student, the designer, and the wealthy.

Housing for the elderly ranges from an institutional high-rise for the Friends by Venturi & Rauch to the varied products of Rossmore Leisure Worlds, which have made old-age housing a thriving business. More than eight varying types of projects are shown.

Dormitories and student housing are on the boards of many architects these days because of the phenomenal business in projects for higher education. P/A shows a build-it-yourself dorm in Vermont, a pair of high-rises on Long Island, a boys' dormitory in California by a father-and-son team, and a handsome complex in Rhode Island that won the P/A First Design Award in 1965.

People who design for themselves frequently let out the stops and create more swinging, pace-making houses and apartments than they could get away with with more conservative clients. The residences of Paul Rudolph, Charles Moore, Hugh Hardy, Peter Hoppner, and Frederick Romley will testify to this.

A Palladian "castle" by I.W. Colburn and a Wrightean country house by Euine Fay Jones will show what can be done in quite different ways — one lavish, one rich but serene — when money is no object.

So whether your present or future clients are the elderly, colleges and universities, rich people, or even yourself, there is heady brew for you in the May P/A. Fill in and send in the subscription card at the back of this issue. You'll find that, when P/A writes about it, there's no place like housing.

Bright idea

Bradpack Lavatories—new pre-assembled wash centers with foot control. Stainless steel throughout. Truly sanitary: hands never touch soiled faucets. Specify Bradpacks for bedrooms, nurses' stations, examining rooms, first aid rooms, clinics. For motels and dormitories. For food handling areas. For public washrooms. *Wherever* you want the sanitation of foot-operation. Choice of two models: lav section only: or full-length unit. Complete with temperature selector, foot-control, and wide selection of convenient features . . . all pre-assembled and ready for hookup to piping and wiring connections. Foot-operated Bradpack lavatories. Bright ideas—sanitary ideas—from Bradley! See your Bradley representative. And write for latest literature. Bradley Washfountain Co., 9109 Fountain Drive, Menomonee Falls, Wisconsin 53055.

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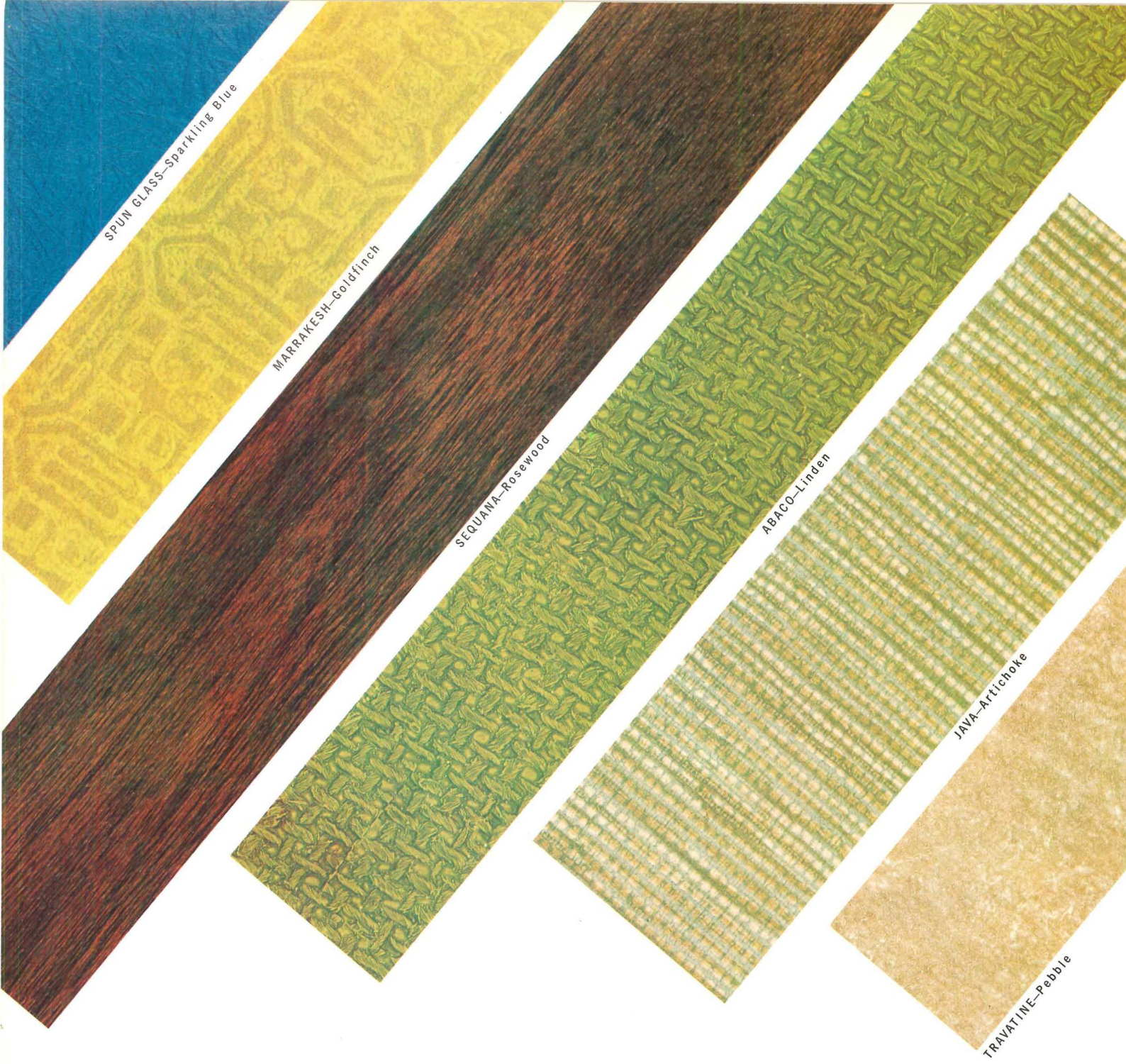

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The clerestory faces north to provide even light without the sun's rays.

An adjoining locker room and a new addition for the school's wrestling activities use an identical system on a smaller scale.

Heavy roof decking and paneled walls help blend the character of the building with the forested surroundings.

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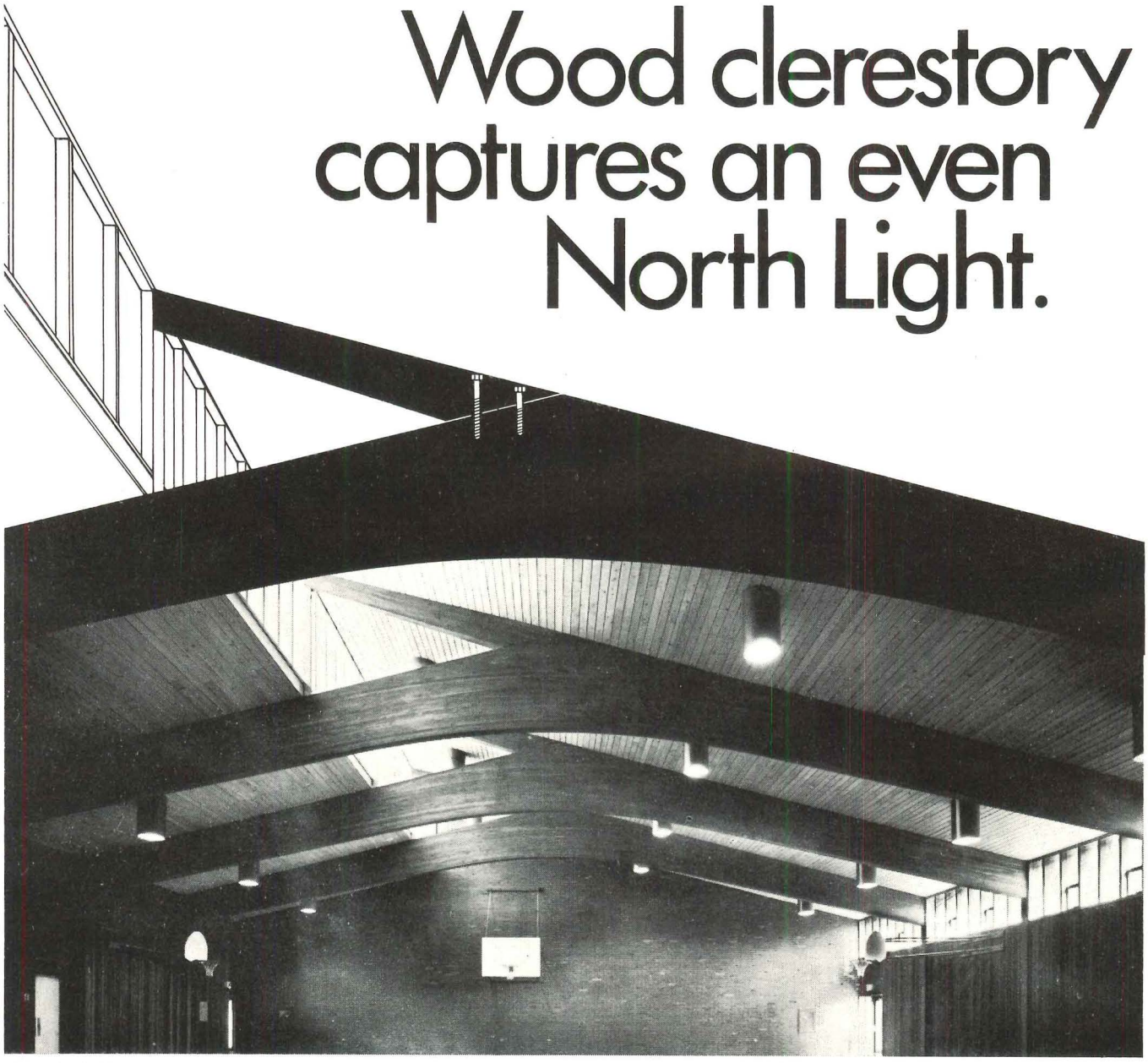
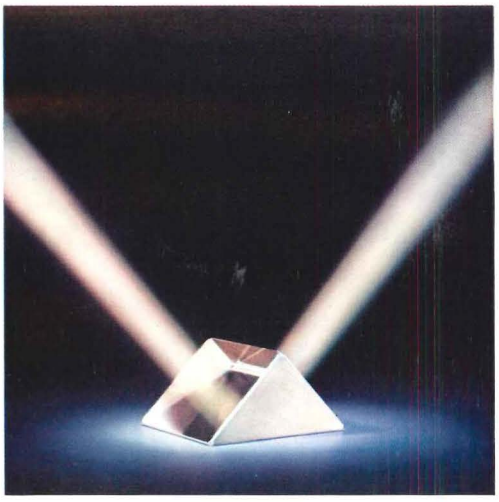
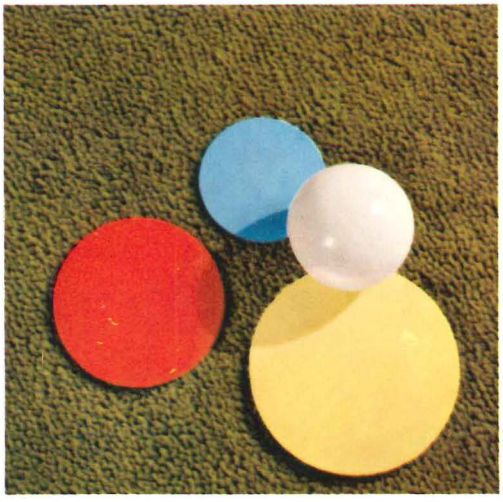


The Charles Wright Academy Gymnasium, Tacoma, Washington. Architect: Alan Liddle, A.I.A., Liddle & Jones. Contractor: McDonald Building Company. Structural Engineers: Sitts & Hill

What architectural lighting tool



—gives you prismatic control of light...



fully reveals color, texture, form...

and helps you light your design for people and the things people do?

CONTROLENS

by HOLOPHANE

the architectural lighting tool you can't afford to overlook

Good lighting doesn't happen by chance. And, as an architect, you can't leave it to chance, or to the judgment of others. It's up to you to specify the kind of illumination that delivers the right quality of light in the right amounts and in the right places. Here are some facts you should know about the lighting tool that shapes light to satisfy human and design requirements—the prismatic CONTROLENS® by Holophane.

I. Controlling light

How the Controlens tailors light

Holophane Controlens, as its name implies, is a *lens* designed to *control* light. Like a louver, diffusing panel or frosted globe, the Controlens is placed between the light source and the eye. Unlike these other enclosures, however, the Controlens actually *tailors* illumination to bring out all the color, texture and spatial relationships of your design, and to make that design a pleasant, efficient environment for people.

It does this by precisely controlling the direction of light rays. Each of the thousands of prisms on the surface of a Controlens is engineered to direct light *where it is needed.* As a result, a Controlens delivers 25% to 40% more useful light than an ordinary diffuser, and 10% to 20% more than a typical louver.

How the Controlens reduces direct glare

Direct glare—caused by improperly angled light rays striking the eye directly from a luminaire—is uncomfortable and distracting. The Controlens redirects these rays downward into the zone of vision where glare is at a minimum. It transforms harsh, unpleasant light into comfortable, useable illumination.

How the Controlens reduces reflected glare, keeps lens brightness low and uniform

Reflected glare is caused by light striking the eye after bouncing off a reflective surface, and is intensified by brightness, hot spots and streaks on the enclosure.

The Controlens reduces reflected glare by directing some light back into the luminaire for another pass at the lens. This causes the Controlens to become uniformly suffused with light. The result is low and uniform lens brightness and a significant reduction in reflected glare.

II. Lighting that enhances texture, form and color

How the Controlens reveals texture

A textured surface consists of peaks and valleys. Excessively directional illumination floods peaks with light, leaves valleys in dense shadow. Totally diffused light illuminates peaks and valleys equally. Definition is lost, appearance is bland and lifeless.

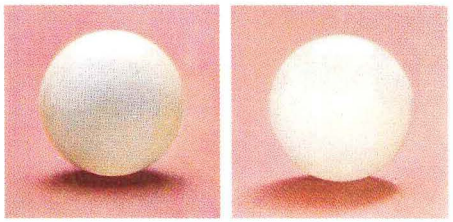
Texture is fully revealed under Controlens illumination.

Holophane Controlens avoids these extremes. It delivers a *balanced blend* of directional and diffused light—*controlled* light that produces good highlights and just the right amount of shadow to bring out all the character and detail of the materials you design with.

How the Controlens defines form

Strictly directional light obscures form by overdefining it—lighted areas are too bright and shadows too dense to convey the shape and feel of an object. Completely diffused light, on the other hand, produces insufficient contrast and creates an uninteresting, one-dimensional uniformity.

Holophane Controlens delivers enough directional light to achieve shadow and definition, and enough diffused light to avoid harsh contrast. Forms emerge fully modeled and defined.



Shapes have definition (right) under light from Controlens. Under improper lighting (left), detail and highlights are missing, shadows poorly defined.

How the Controlens enhances color

This same careful combining of directional and diffused light enables the Controlens to reduce the color-veiling effects of glare to a minimum. The result is balanced illumination that calls

forth all the richness and drama of the colors and materials you specify.

True, rich color (right) emerges when illuminated with light from Controlens. Excessively diffused light (left) veils true object color.

III. Lighting for people

How the Controlens fits lighting to design

Uncontrolled light "fills" an area haphazardly, without regard to functional or design requirements. The Controlens, however, distributes light in a specific, *predetermined* pattern. That means you can specify a Controlens that precisely meets the functional and spatial requirements of practically any job.

Lighting an office area

Offices, for example, call for efficient, comfortable illumination that's evenly distributed on horizontal work surfaces. To permit concentration and work efficiency, luminaire appearance must be clean and unobtrusive.

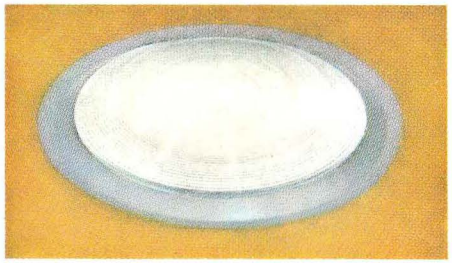
Holophane's 1′ x 4′ frameless Controlens in a contemporary office.

Holophane's frameless acrylic Controlens, in 1′ x 4′ and 2′ x 4′ sizes, is frequently specified for office interiors. It delivers a high level of uniform, glare-free illumination while keeping lens brightness low and even. And its clean styling blends into the ceiling to become an integral part of the design.

Lighting critical areas

In areas that call for the warmth and true color values of incandescent illumination, it is especially important that luminaires be unobtrusive.

A Holophane Controlens designed to meet this need is the glass Veloure lens. Its prismatic, acid-etched surface provides luxuriously soft, glare-free illumination. And with its concave shape, the Veloure lens recesses itself discreetly into the ceiling.



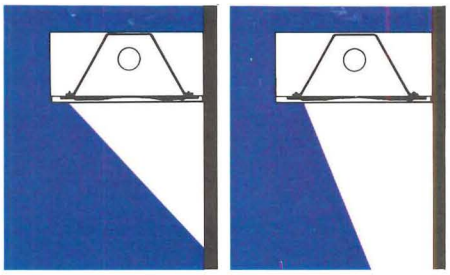
Holophane's Veloure Controlens in a recessed incandescent fixture.

Lighting specialized areas

Specialized design areas require specialized light distributions. A corridor, for instance, is intended for movement, and the primary job of lighting is to make it safe and cheerful.

Holophane's 6100 Controlens is one of several Controlens products designed to fill this need. It delivers light to ceiling and walls as well as floor, eliminating any unpleasant "tunnel" effect.

Another specialized Controlens is the 6044. This 1′ x 4′ enclosure distributes light uniformly over a *vertical* surface. It literally washes a wall with light.



Holophane's 6044 Controlens is specially designed to direct light evenly over a *vertical* surface.

You can specify the Controlens in fixtures by more than 50 top manufacturers

The Holophane Controlens comes in a broad range of shapes and styles—in both acrylic and glass—to satisfy all your requirements for fluorescent and incandescent lighting. Holophane manufactures the Controlens for more than 50 leading fixture manufacturers. You can specify a Controlens for practically any luminaire.

**Turn the page...
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Controlens Specifying Guide**

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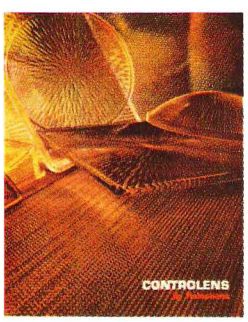

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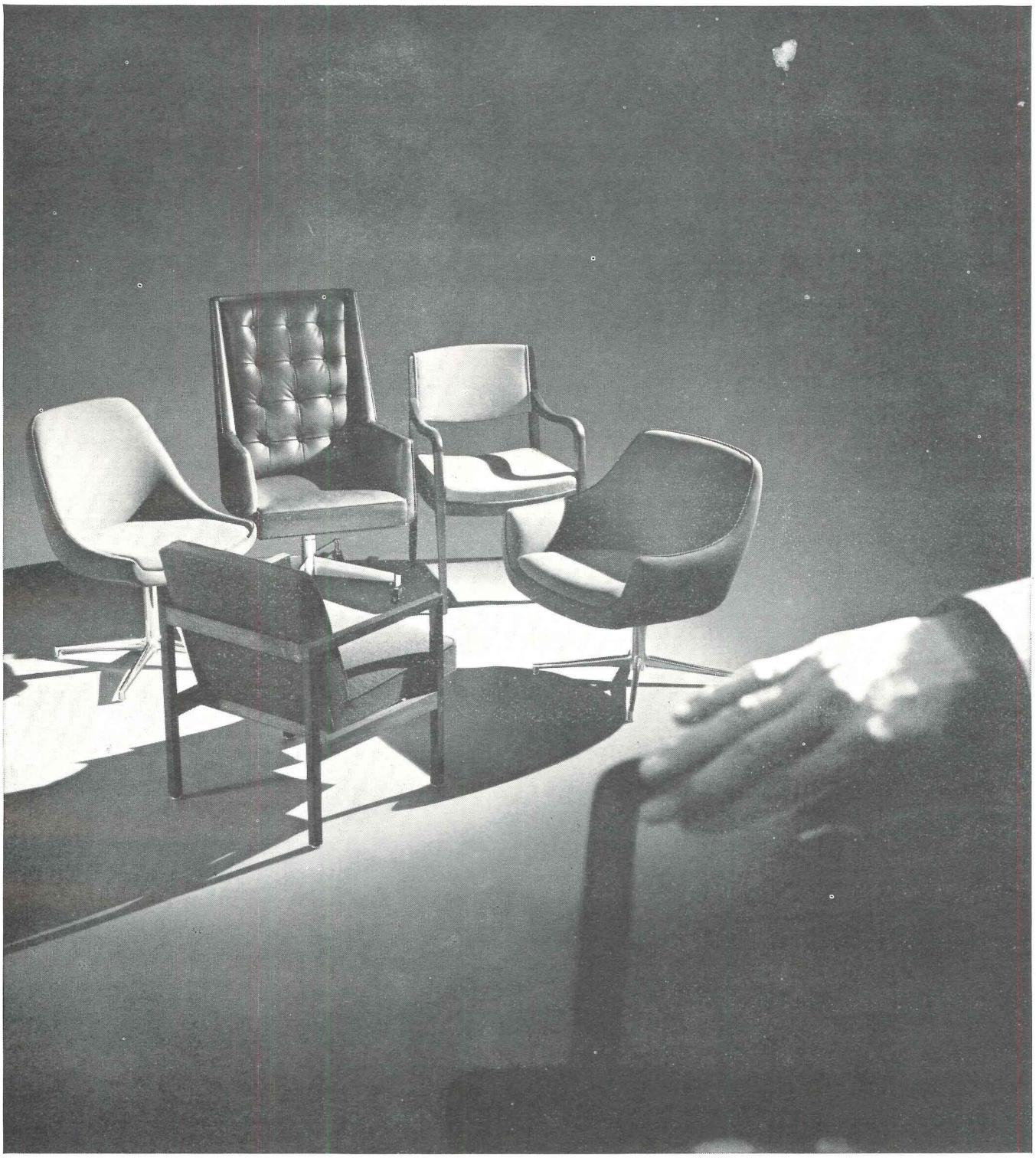

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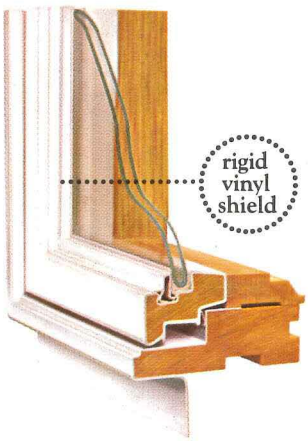

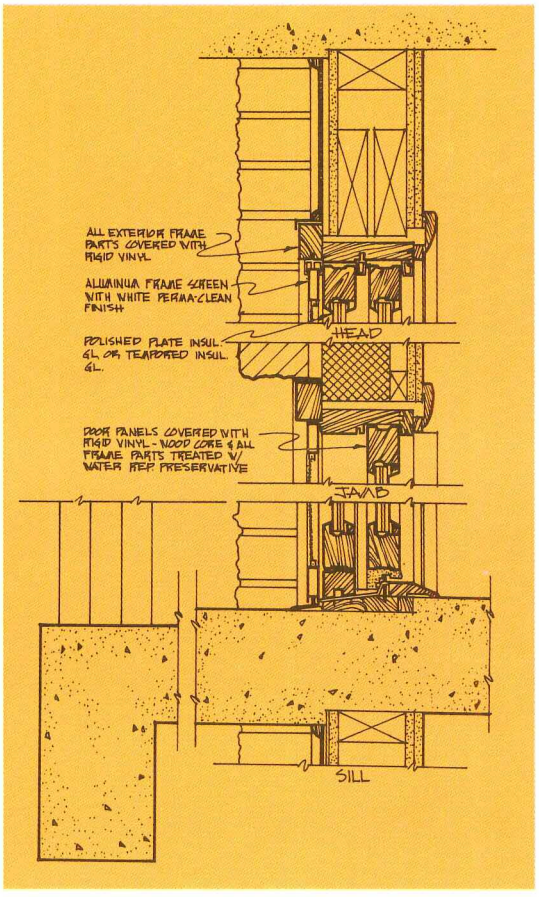

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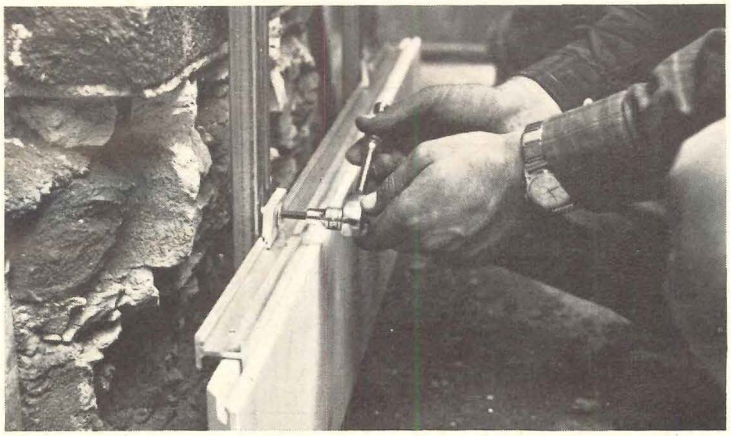

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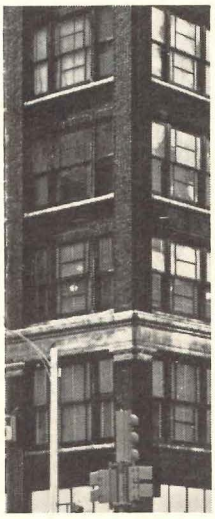

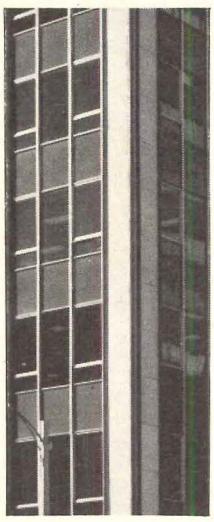

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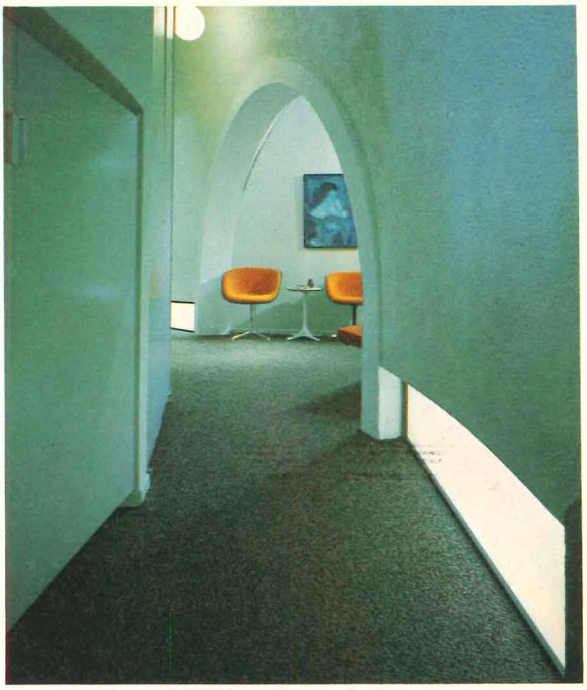

Woman's Clinic, Lafayette, Indiana
Architect: E. H. Brenner, A.I.A.

ASG's Huewhite glass– a glowing band of light for a functional cluster of domes

Seven futuristic domes create an inviting, space-age setting for this women's medical clinic in Lafayette, Indiana. The cluster configuration is ideally suited to the clinic's purpose. It gives the four participating physicians separate obstetric/gynecology facilities for private practice under four domes. The remaining three domes provide common administrative, examination and reception areas. • Each of the domes is ringed at ground level with bands of ASG's Huewhite® light-diffusing glass. By day, the alabaster white glass suffuses the interior with glare-free natural light while insuring complete privacy. At night, the rings of Huewhite come softly aglow with interior light. • Huewhite is a member of ASG's complete family of plate, sheet and patterned glasses. For full information on Huewhite, including sizes and thicknesses, write: Dept. E-4, American Saint Gobain Corporation, P.O. Box 929, Kingsport, Tennessee 37662.

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"It's one thing to push earth around to get it out of the way; it's quite another to push the earth to make architecture out of it."

A COMMENT FROM THE "DISCUSSION"

EDITORIAL

The art of shaping the earth was largely ignored by the profession for the last few decades. Some of the responsibility for this long lack of interest in that most primary of all building materials rests with two famous architectural archenemies: Frank Lloyd Wright and Le Corbusier. The influence they exerted on several generations of architects led to a similar attitude toward site use in spite of the divergent design approaches preached by each side.

Wright, with his organic theory, made the earth sacrosanct. To change the shape of a mound, to move a rock, or to cut a tree was taboo to his followers. It is the building that had to fit the terrain and echo what nature already provided. The existing topography was the source of inspiration and the shaper of whatever was to be constructed. It was never to be shaped itself.

Corbu, on the other hand, treated nature as a flowing stream to be straddled by man-made structures. He elevated buildings, even highways, on pilotis, leaving below them an untouched parkland, or farmland, or whatever else existed already. Minimum disturbance of the earth by complete detachment of earth and building was Corbu's usual way of designing.

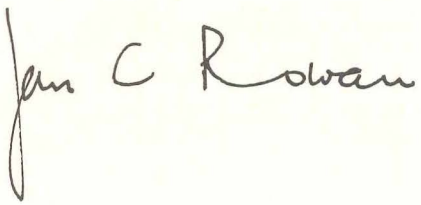
So, in both cases, the site was taken for granted and buildings either fitted the terrain or rose above it. No wonder then that the generations of architects brought up under the influence of these two men considered extensive sitework an extension of the developer's devilishness. The bulldozer became the symbol of architectural impotence.

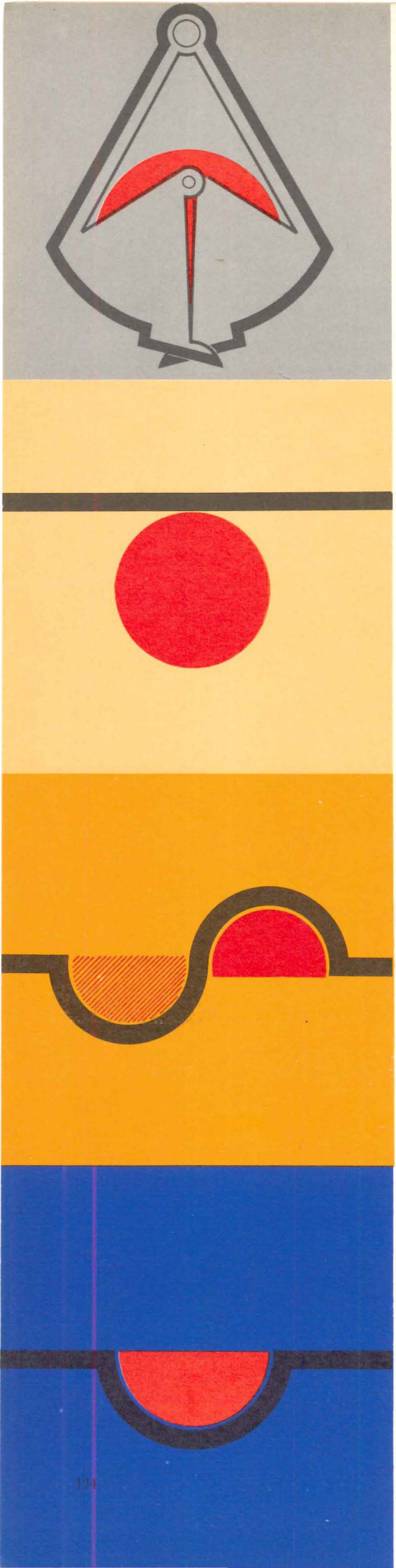
Then, in the early 60's, Louis Kahn's powerful earthlike forms, deeply rooted into the ground, began to influence the profession. Buildings of the Philadelphia School are neither spread-out bows to every crevice in the soil nor are they boxes walking on centipedal legs. On the contrary, they are like fists smashing into the powdery earth — sort of heroic statements of man's strength, of his *victorious* rootedness.

At about the same time, architects began to plead for anonymous buildings — as long as these buildings were designed by others. The conflict between the desire for form-making and realization of the need for background architecture was intensified as the landscape became more and more cluttered with sculpturesque concoctions of varying degrees of excellence. Yet architects, while preaching the anonymity sermon in increasingly louder voices, were unwilling to design form-less, character-less, eunuch-like structures. Since earth is a great neutralizer, this conflict can now be resolved. By using earth, architects can achieve both powerful forms and background architecture simultaneously. Which is one of those rare cases of having the cake and eating it too.

With the advent of nationwide architectural practices and the proliferating distribution of building materials, regionalism died a quiet death. Now, however, the interest in regionalism can be revived again, because earth surely offers a new possibility for regional differences. All the characteristics of earth — from angle of repose, through plant material, to the distinctive color of the dirt itself — are the kind of ingredients that made possible the old regionalism of buildings.

From a philosophical, stylistic, and emotional point of view, these are some of the reasons why the door is open for the art of shaping the earth to reenter the architectural vocabulary. ■





THE EARTH

INTRODUCTION

Man digs the earth. This was true in ancient times and is true even more today. Architecture and planning, as much as faith, have moved mountains. In the past, architectural magazines as well as architects have dealt with isolated buildings or groups of buildings as their principal subject matter; there has never been an entire issue devoted to the base on which these buildings stand — the earth. In this issue of P/A, we seek to rectify that oversight and remedy that lack by examining from many viewpoints man's use of the earth in his architecture and planning.

Basically, our subject is land use: on the one hand, moving earth and designing it for the better use of mankind; on the other, preserving and conserving its natural forms and growths from "improvement."

The creation of more available land has been the main objective of earthmoving. Even earthworks for defense were thrown up to prevent available land from being taken by hostile forces. The usual desire for additional territory has been to accommodate more shelters; to provide better agriculture, irrigation, and transportation; and to beautify the terrain for visual or psychological reasons.

Land preservation and conservation, a relatively new interest of both government and governed, has the aim of preserving dwindling natural resources in an age of rapidly multiplying populations.

And now, the reclamation of previously man-moved sites, such as mined-out lands, represents a newer combination of both earthmoving and conservation brought on by the quantitative necessity of using second-hand sites.

Two basic methods of earthmoving exist: One is filling in or adding new dirt to an area (whether waterfront or land mound); it is investigated in this issue under the section "Filling the Waters." The other is cutting or removing dirt from an area (whether underwater canal or underground cave); it is discussed in "Going Underground." Another section, "Cut and Fill Variations," covers the combined method of removing and adding dirt, which is probably the most common earthmoving technique. To lead off the issue, we examine the vastly improved, efficient, and economical machines that make today's enormous earthmoving operations possible.

Why has our intellectual climate coalesced today at the single point, earth? Is it a correspondent of man's adventuring into outer space and the depth of the sea? Is it an extended dimension of his now desperate "territorial imperative" to possess ever more land? And which is more justifiable: earthmoving or conservation? The practitioners themselves dig into the reasons in, "The Earth: Discussing the Basic Issues" — not without some muddy thinking on both sides.

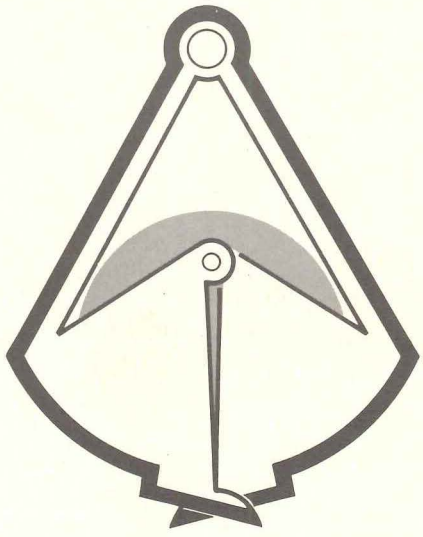
One fundamental lesson is to be learned from this issue of P/A: The most critical architectural area today is earth. It urgently requires ingenious exploration. It urgently requires intelligent conservation. Architects cannot continue their traditional practice of dotting the landscape with single buildings — no matter how perfect those buildings. That is the one point agreed on by all sides. With land shrinking as population grows, with the fantastic megalopolitan sprawl restricting the availability of sites in urban areas, and now even in rural areas, all architects must turn their attention beyond mere buildings to the broadest aspect of architecture — the earth.

Man has been rearranging the lay of the land for some fifty centuries — to make roads, to protect towns, to plow fields, and to build monuments. The Great Wall of China, begun in 246 B.C., is one of the most impressive examples of premechanized earthmoving. The brick and earth-fill fortification, stretching out for 1500 miles, is 25 ft high, with a 12-ft-wide road along the top. It originally took 37 years to build — using hand labor exclusively to move 72 million cu yds of earth fill.

Today, in the United States, an array of amazing machines moves an estimated 1,800,000 cu yds of earth, stone, and minerals every hour of the working day. This remarkable productivity, from machines that were barely thought of half a century ago, means feasible budgets and time schedules for construction, mining, and agriculture. They make it possible to reshape our physical environment on a scale demanded by 20th Century needs.

Like most tools, earthmoving equipment has the potential to destroy as well as to build. Its use for clearing and leveling thousands of acres of wooded land to make way for unattractive housing developments is widely deplored. But, together with recent advances in soils engineering and in drilling and blasting techniques, these machines offer the means for creating the best kind of land-use aesthetics — a potential that has scarcely been touched.

THE EARTHMOVER: MAN AND MACHINE



RECENT BEGINNINGS

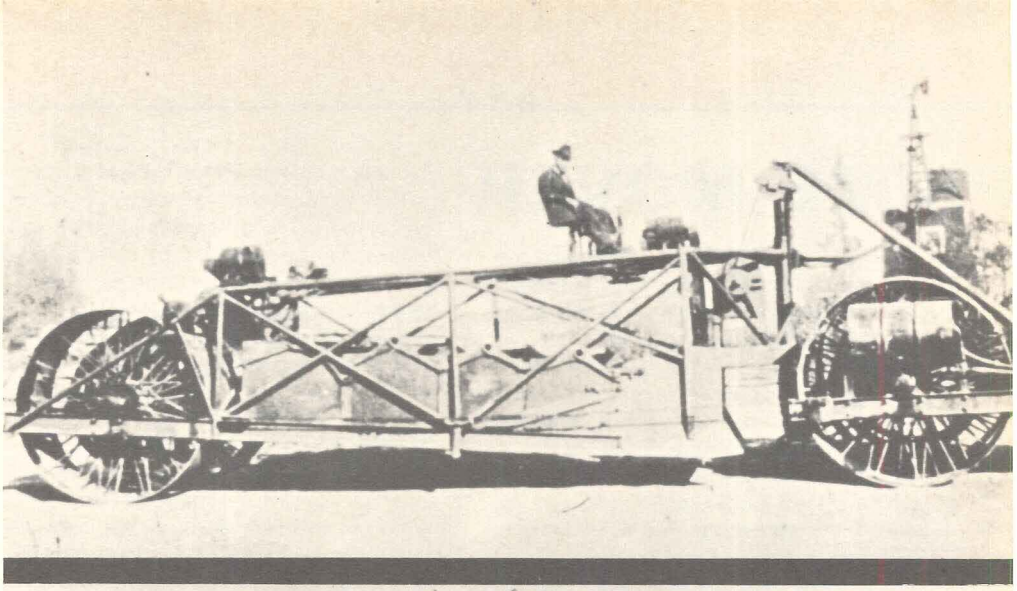
Although excavating machines probably go back as far as the 17th Century, when dredges were powered by men, animals, or water, the first dry-land excavator was not patented until 1839. This was the steam shovel, which was almost immediately put to work constructing railroads, and, later, to cut the Panama Canal.

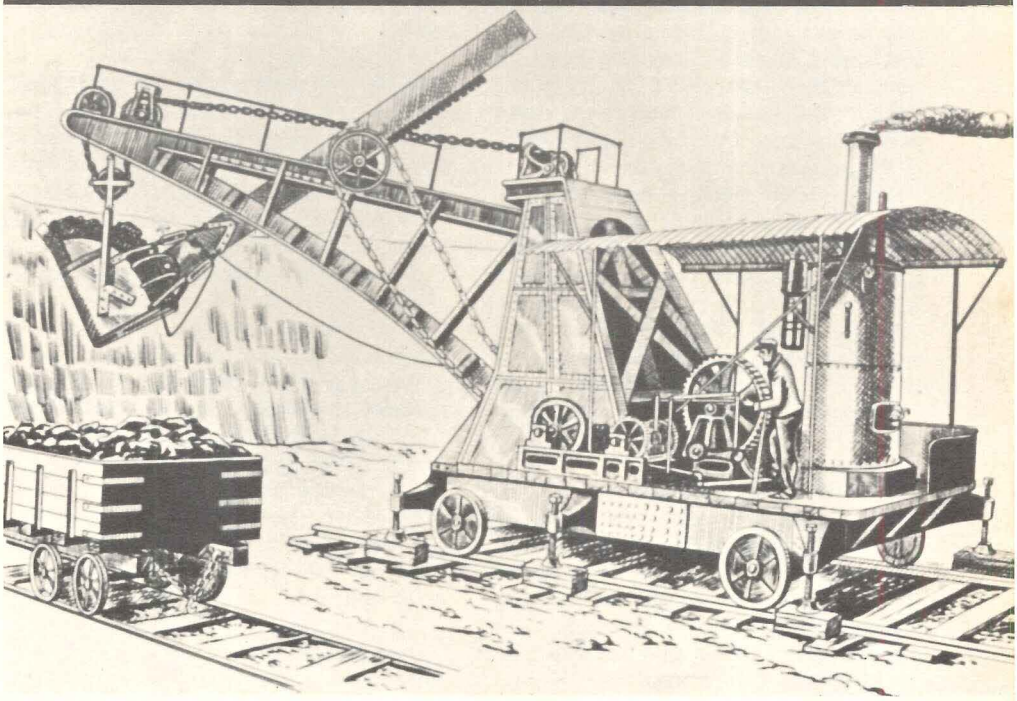
Shovels were, and still are, the most efficient diggers — so efficient, in fact, that steam shovels often outstripped the long strings of mule-drawn wagons that transported dirt from the excavation site. However, they were awkward machines with a limited boom swing, and either had to be moved around a site on skids or on rails. Moving to a new site meant knocking down and reassembling the shovel. But even with its limitations, this was the only mechanized earthmoving equipment available for more than 40 years.

Second only to the steam shovel was the mule-drawn scraper, thought by many to be the most significant addition to earthmoving tools since the wheelbarrow. It was either mounted on wheels or simply dragged along the ground, but the most popular model was the Fresno drag scraper introduced around 1880.

The Fresno was a 3-ft to 5-ft-wide scoop shovel dragged behind teams of two or four mules, with the mule skinner-operator supplying the power that forced the scoop edge into the ground to scrape up its load.

Even with capacities thought ridiculously small today (about ½ cu yd), these scrapers provided the most efficient way of digging, loading, and hauling earth on a majority of small and medium-sized jobs right into the 1920's.





Top: Scraper built by R. G. LeTourneau in 1923. Above: First mechanized earthmover, a steam shovel, was patented in 1839. Below: Turn of the century drag scrapers. Each rig moved about 10 cu yds a distance of 500 ft in a day.

PRIME MOVER

The breakthrough that would become the guts of every earthmoving fleet came when Benjamin Holt built the first steam tractor in 1885. Contractors, however, were not convinced of its economy and usefulness until tractors had been successfully used in agriculture, and proved their ruggedness as armored tanks during World War I.

By that time, gasoline engines had replaced steam, and crawler tracks had replaced the earlier cleated steel wheels. Mounting tractors on moving metal treads was a great step forward, since wheels had proved virtually useless in mud or soft ground. The crawler was another contribution from Holt, who said of his new tractor, "It crawls over mud like a caterpillar." And one of the best known names in the business came into being.

When tractors replaced mules, they took over the job of pushing crude grading blades, and so emerged the first bulldozer. Next, scrapers were hooked on behind; R. G. LeTourneau is credited with the developments that ultimately led from this modest beginning to the super scraper of today. Then followed all the versatile attachments now so familiar to construction men.

Toward the Giants

By the late 20's or early 30's, the basic earthmoving fleet had been established: The cat skinner had finally replaced the mule skinner. Viable models were proving themselves on the job, and contractors and manufacturers turned to developing refinements that have kept earthmoving prices fairly stable — despite greatly increased equipment and labor costs.

Power, mobility, and larger equipment capacities keep unit costs for earthmoving low. And better controls and articulated steering provide the maneuverability that make it possible to put larger machines to work in smaller areas.

Concurrent with the trend toward bigness has been the development of a number of small machines. These are versatile, sophisticated units that can load, tamp, or trim in constricted areas where only hand labor could once work. Several remarkable hybrids have also been developed for special, but multipurpose, jobs. One of them, with a telescoping boom capable of mounting a number of attachments, has an action very like the human wrist. It can ditch, dress slopes from odd angles, backfill, and operate in restricted areas.

Rubber: Mounting contractors "iron" (equipment) on rubber tires instead of crawler tracks increases speed on the job and offers the added advantage of mobility on highways and city streets.

Although crawlers are still indispensable on rough terrain and steep grades, the preference seems to be more and more for rubber. Traction and durability are still problems when using tires, but various solutions such as steel reinforcing are being tried to increase toughness; and traction can be improved by putting powdered lead or water ballast in the tires.

Hydraulic control: Most earthmoving contractors consider hydraulic control units to be a major development. These controls raise, lower, crowd (push up against a bank), or swing the digging scoops, shovels, and blades. Hydraulic controls offer more power, fast response, and smoother cycling (changing from one motion to another). A machine's cycle is one complete round of its job: a shovel, for example, would have a cycle of dig, swing, dump, and swing back again to the digging face.

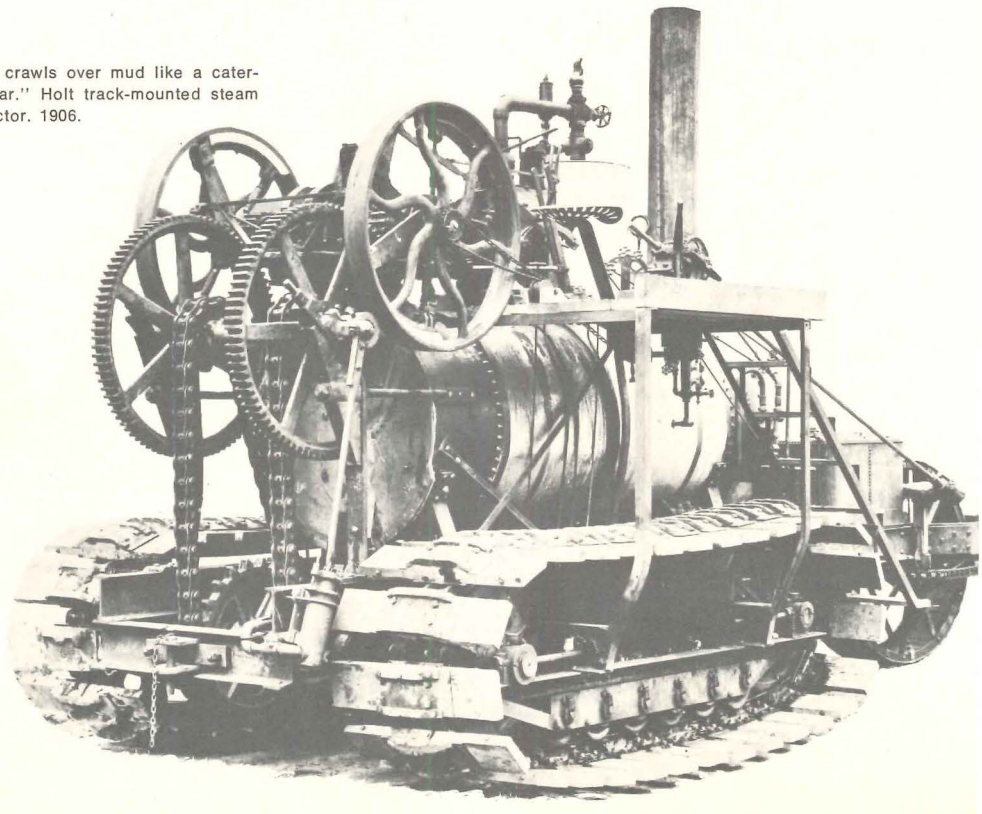
Engines and metals: New metallurgy techniques and improved engine design contribute both to ruggedness and increased power. Harder metals provide lighter, more durable truck bodies and scraper bowls, less engine wear, and stronger bucket teeth, cutting edges, and drill steels.

Power shift transmission (super-hydraulic drives similar to automobiles) and power steering contribute to faster travel speeds and ease of handling. Turbocharging and after-cooling permit engines geared specifically to the transmission, resulting in quicker response and acceleration, with faster cycle times. Although many smaller machines run most economically on gasoline engines, large units are usually diesel-powered. Some of the mammoth off-highway equipment is powered with diesel-electric engines (similar to locomotives) driving an electric motor in each wheel.

Maintenance: Minimizing downtime (time lost in making repairs) is a prime goal of manufacturers and owners. Because cycle times are calculated in seconds, and large equipment can cost well over $100,000, it is obvious that extended downtime seriously cuts into profits. Better lubricants, and sealed units that require no field servicing, simplify maintenance. However, the problem appears to remain larger than the industry would like it to be.

This summary of improvements is meant only as a broad outline. In such a highly competitive industry, new ideas are put into practice so rapidly that many excavating contractors consider equipment obsolete at the end of five years.

Much of the credit for design innovation must go to contractors whose ingenuity for in-the-field alterations is well known. The changes they make in machines to suit specific job demands are often adopted later by manufacturers and incorporated into standard models.



"It crawls over mud like a caterpillar." Holt track-mounted steam tractor. 1906.

Although not widely accepted until the late 40's, scrapers (often called pans or cans) are the most efficient and economical units under favorable site conditions. They not only dig and haul their own loads, but can also spread them in controlled depths, and are capable of doing finished grading. The beauty of the machine is that only one man is needed to perform all the earthmoving operations; this not only reduces the number of machines and operators, but also cuts down on supervision and simplifies scheduling of equipment at the site.

Scrapers work best in large, open areas on firm but easily loaded material where their large capacities, speed, and spreading capabilities can be used to the best advantage. However, they can load rock, and smaller models are effective on haul distances as short as 100 ft.

The two basic components of a scraper are the tractor and the bowl. However, the trend is toward integral, self-propelled units — bowl and tractor built into an articulated four-wheel unit with engines front and rear. These machines are available in capacities from 5 to 75 cu yds struck (leveled off). One model, with a 40 cu yd struck capacity, and combined power from the two engines of 980 hp, can travel at 42 mph.

Scrapers load soil by lowering the cutting edge of the bowl into the ground and slicing off layers from 4 in. to 14 in. thick. Earth boils up over the cutting edge to force-fill the bowl, and, at the spread area, is pushed out in controlled layer thicknesses by an ejector. Loading times for most scrapers run somewhere between 30 to 60 seconds, with an optimum load-haul-spread-return cycle of 4 to 8 minutes.

Two, or even three, scraper wagons may be hooked together in a train behind one tractor, and contractors often find it profitable to use one or more tractors to push a scraper during loading — either to shorten the loading time and get a bigger payload, or to dig difficult materials.

There is, however, one unit that is completely self-loading and independent from pushing help. This is the elevating scraper, a machine that seems to be getting increasing field use. It loads itself with a chain and paddle device that scrapes up soil and lifts it into the bowl.

Paddle mechanism on self-loading scraper digs and lifts earth into the bowl.

Big rubber-tired scraper en route to the fill area with a full load.

SUPERCAN

THE IRON HORSE OF CONSTRUCTION

A wide variety of attachments make tractors the most versatile workhorses in any earthmoving spread (fleet of machines). These attachments (which may also be built into integral units) give contractors a choice of digging power (cable, electric, air, hydraulic), articulation, capacity, shape, and size. Four of the most common and useful are:

Bulldozer blades: Synonymous with earthmover to the general public, the bulldozer continues to head contractors' lists as most useful odd-job tool. It can spread fill material, push-load scrapers, maintain haul roads, clear land, dig basements; it is also valuable in landscaping. Articulated blades and hydraulic controls further increase the bulldozer's versatility and power.

Where slopes and traction are the principal problem, there is no substitute for crawlers, but rubber tires are preferred today because they are easier to maintain than the moving metal parts of treads.

Tractor shovels: More commonly known as front-end loaders, tractor shovels are a combination of bulldozer and power shovel design. But instead of being limited to pushing along the ground (like bulldozers), front-end loaders scoop up earth, lift it, and dump it into a hauling truck. They load a variety of materials, and work well on cleanup jobs, excavation, light grading, and backfilling.

In recent years, increased digging and lifting power, together with improved maneuverability and larger capacities, have made front-end loaders more popular than small power shovels for truck-loading loose materials.

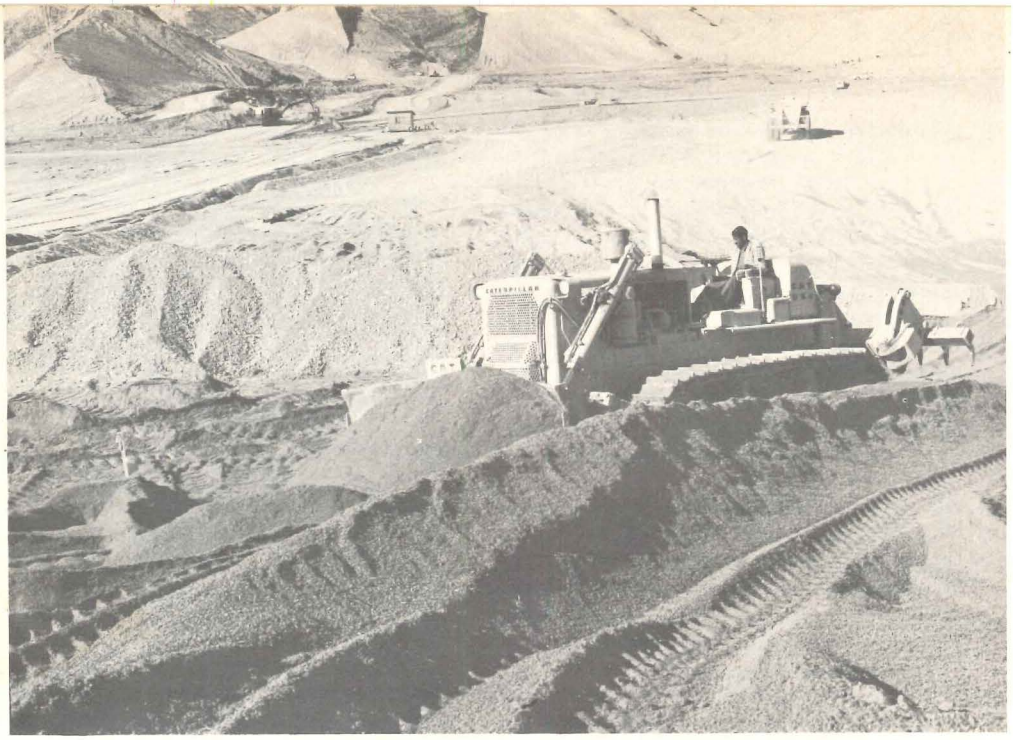
Backhoe: The backhoe, as its name suggests, works with a hoelike action by pulling the bucket back through the earth instead of pushing it forward like a shovel. The ability of this pull shovel to make precision cuts and work below its own level determine its principal function as a ditch digger and excavator of small basements. It can also be used to strip topsoil, scrape down high banks, and remove windrows. But it is inefficient at loading trucks, and has a slow digging cycle.

Ripper: Rocky material previously thought to be amenable only to blasting is now often churned up by rippers. These rugged, steel-toothed rakes, mounted on the back of tractors, bite into rocks and hard materials, loosening and breaking them up.

Loading is most often done by shovel, but some contractors have found that, despite greatly increased wear and tear on equipment and tires, they can load and haul ripped materials more economically by scraper. Thus, the traditional "shoot-and-shovel" spread is giving way to a rip-and-scrape operation.

Combinations: Pairing attachments on the two ends of a tractor has proved highly successful and efficient. With a shovel or bulldozer blade mounted on one end, a backhoe on the other, and a double set of controls and swing-around seat for the operator, one machine can ditch and backfill. Or it can push-load scrapers, excavate, load trucks, and help with numerous jobs around a construction site.

A bulldozer or shovel with a ripper can loosen hard soils and rock, then turn around and load the material, as well as performing other odd tasks — again providing a multiduty tool.



Top: Tractor with bulldozer blade spreads fill. Rear-mounted ripper attachment makes machine double-duty tool. Above: Front-end loader strips and piles soil. Left: Side-mounted backhoe works flush with wall.

CRANE AND CABLE

Cable-attached buckets perform tasks inaccessible to any other type of digging machine. Although they are less efficient and do not offer the control of rigidly mounted attachments, cable and crane buckets reach further and deeper than any other tool.

Clamshells: Apart from picks and shovels (still to be seen on all earthmoving jobs), the two-jawed clamshell bucket, in many types and sizes, is the tool most suited to digging in tight quarters. Suspended by cables from a crane boom, it descends straight down, taking up only the width of the bucket, and works around and between utility lines or other obstructions.

Clamshells do much of the excavation work for multistory buildings, and so are a familiar sight in cities. They not only dig, but load broken rock and all manner of wreckers' debris encountered on many city sites.

Draglines: Also crane mounted, a dragline operates by throwing, or casting, a cable-attached bucket out in front and filling it by dragging it back.

Since the bucket can be thrown some distance from the operating unit, draglines prove especially useful when working in hard-to-reach areas, such as swamps, and are often used in land reclamation projects.

The real giants are found in mining operations, where a $20-million, fully mobile walking dragline with a 220-cu-yd bucket and a lifting capacity of 550 tons will soon be in use.

Right: Clamshell loads dump truck. Below: Dragline digs 112 tons with each cast. Lower right: Three cranes with clamshell buckets, a backhoe, and a truck work in close quarters on a crowded city site.

DIG AND DUMP

Power shovels look much as they did a century ago, and do the same kind of work — but faster, better, bigger. Using somewhat the same action as a front-end loader, shovels have the advantage of a long reach and a 360° revolving boom. The basic revolving undercarriage unit can also serve as a mount for backhoes, and clamshell or dragline cranes.

Unlike cable-hung buckets, rigid dipper sticks (shafts connecting bucket to boom) offer excellent shovel control, and hydraulic rams or other power systems deliver great crowding force to the bucket as its teeth bite upward through a bank.

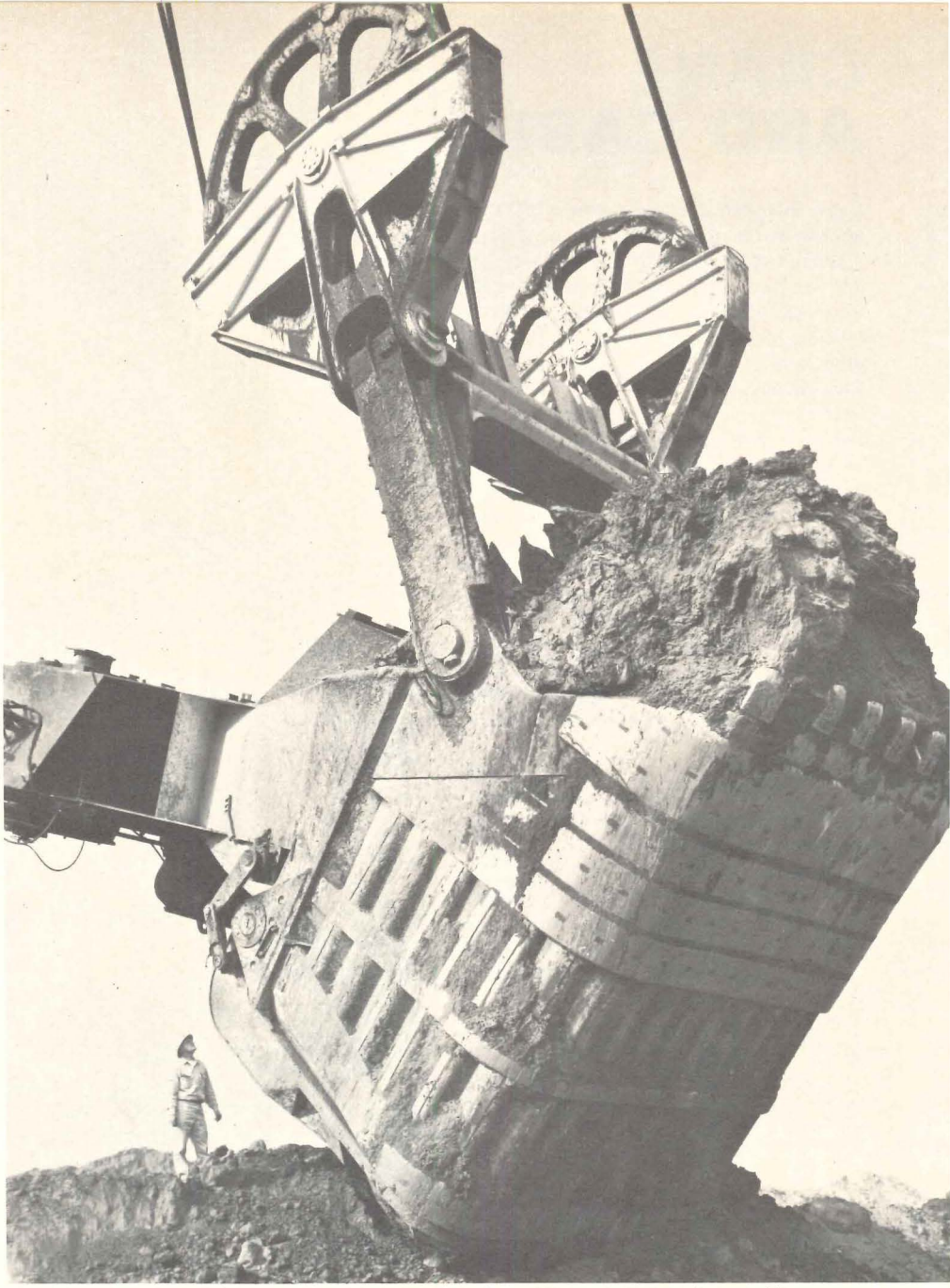
For examples of sheer size and efficiency, mining machines again take first prize. The largest mobile mining shovel in operation scoops up 140 cu yds or 250 tons at one swipe; its operator reaches the cab via a five-story elevator, and controls all machine movements with two hand levers and two pedals.

The same incredibly productive excavators that uncover and extract the earth's ores (and turn a profit for owners), can also help to restore the land. A number of land-use studies point the way to exciting design possibilities for the wasted land left by various mining operations. Under the pressure of public opinion, some mining companies have established voluntary reclamation programs, and seven states now require owners to replace top soil and replant trees.

The long haul: Without the powerful dump truck fleets, the shovel would be a very limited tool. A far cry from the mule-drawn dump wagons used until the mid-20's, today's largest off-highway hauling units now carry around 90 cu yds, a good room-sized chunk, and have an engine power of around 1000 hp.

Bottom, end, and side-dump trucks, lately rejoined by large-capacity wagons, each operate best under different conditions. Bottom dumps pay off best carrying softer material to the fill area and discharging it on the run; rear dumps handle broken rock; and side-tilts can easily spill loads over embankments onto a spoil pile. In mining or very big construction jobs, shovels often dump directly into railroad cars.

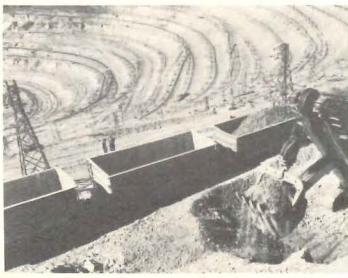
Simplified controls, air cushioned ride, increased power, hydraulic drive, and power brakes and steering aid the driver in handling ever-increasing loads.



Above: Dipper of giant mining power shovel is 25 ft high and digs 140 cu yds (250 tons) at one bite.

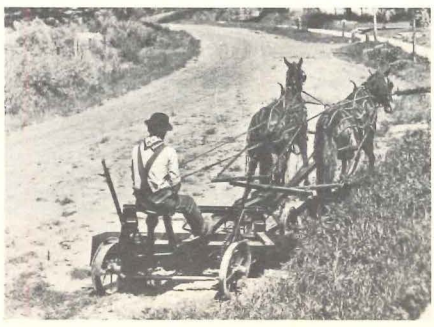
A 1909 bottom-dump wagon.

A 1966 electric wheel drive dump truck.



Power shovel in open pit mine.

WATER, TAMP, AND GRADE



Since earth swells, or expands, during digging and spreading, fill depends on good compaction for its firmness and stability. More important than swell to the architect or site planner trying to balance cut and fill or in calculating the amount of fill needed, is the shrinking of materials under compaction. When earth is watered and tamped, it packs into a smaller space than it originally occupied in an undisturbed bank. The shrink-swell factor varies with different soils, but may run as high as 30 per cent swell over original bank yards, and 25 per cent shrink under original bank yards.

Best compaction is achieved by the pack-as-you-go plan — spreading and rolling the fill in layers. The rolling traffic of heavy equipment may provide all the compaction necessary, but where it is insufficient, water wagons and special compacting machines finish the job.

Water wagons and sheepsfoot rollers make a good compacting team. The water causes earth particles to stick together and settle down, and the heavy rollers, with feet of various shapes, knead and compress the soil as they are drawn back and forth over a fill. Sheepsfoot rollers can be towed behind tractors or built as integral units with the tractor unit also rolling on tamping drums instead of wheels or treads.

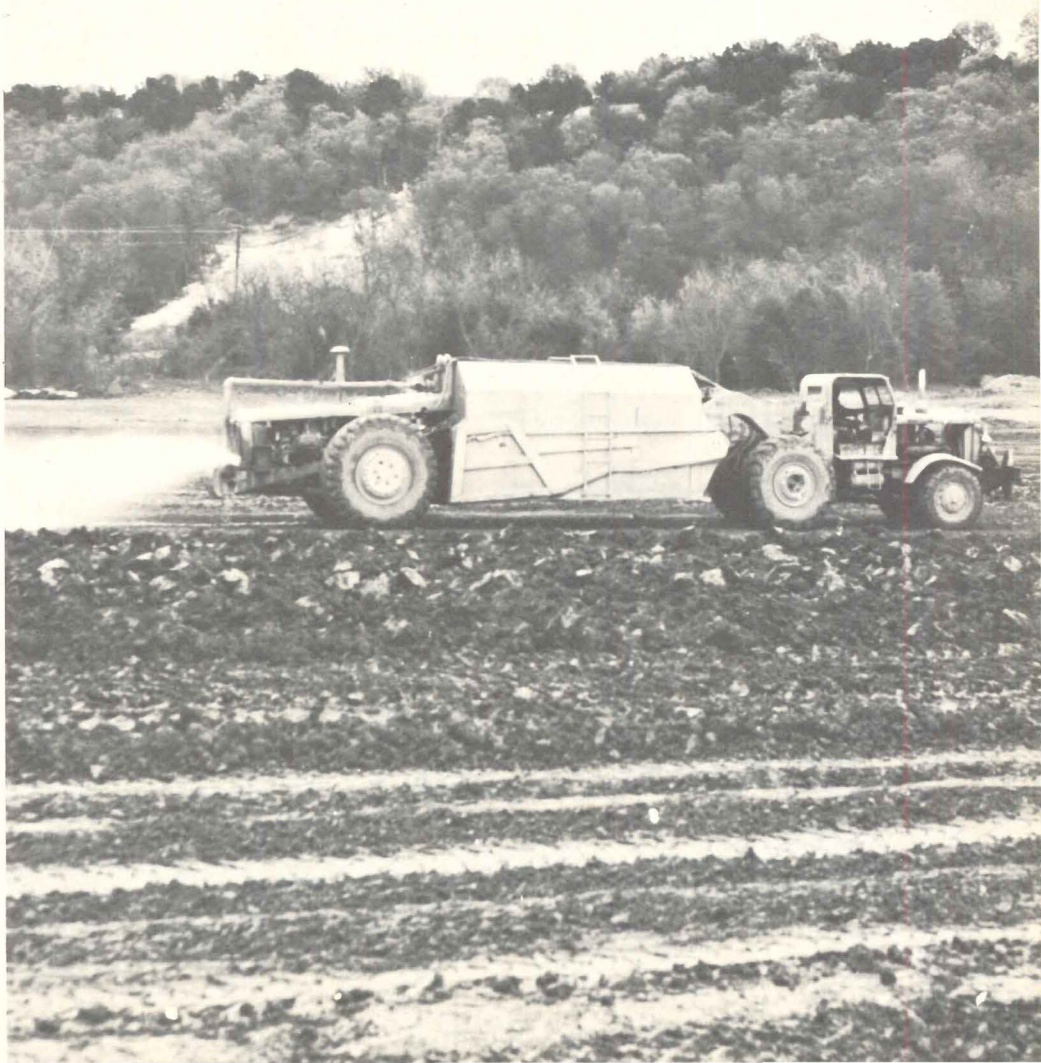
Segmented steel-wheel rollers are very effective in nongranular soils, but the most impressive design advance has been the vibrating sheepsfoot that is capable of compacting sand and gravel fills to a depth of 20 ft, compared with 2 to 4 ft by standard units.

Revolving weights inside the drums give them a vibrating action — slamming the rollers down with a force of 5000 to 6000 psi at the rapid-fire rate of 1600 oscillations per minute.

There is a wide range of compacting equipment with special capabilities, including rubber-tired units, wobble-wheel compactors with oscillating axles, and the old smooth-drum "steam" roller for surface compacting.

Motor graders: Where a fine finish may be desired, the grader has no competitor. The leaning-wheel vehicle with center-mounted blade has been adapted to other work, like most construction equipment, but it remains essentially a special purpose tool often seen on highway work.

Automatic electronic controls are now available for the 15-ton precision tool that will shift the blade from side to side without changing its angle, and hold the slope to 1/8 in. in 10 ft, regardless of uneven terrain.



Facing page, extreme left: Horse-drawn grader popular in early 1900's. Facing page, left: Sheepsfoot roller with bulldozer blade spreads and compacts in one operation. Top: Grader trims bank. Bottom: Water wagon, job-converted from old scraper, sprays fill.

PATTERNS, MEN, AND COMPUTERS

Getting the most out of the fabulous machines depends on several factors — artful field supervision, operator skill, and shrewd choice of equipment.

In broad terms, the tools chosen for an earthmoving job are determined by subsurface conditions (materials to be moved), size of the site and distance to the dump or borrow pits, and the accuracy required for shaping, cutting, filling, etc. Within these loose boundaries, however, a complex variety of alternatives must be considered in matching machines to the job and to each other.

Should rock be ripped or blasted? Should scrapers be pushed, or will it be more economical to eliminate the expense of extra tractors and settle for smaller payloads? Can larger capacities make up for added cost with increased productivity? Will it pay off to put on an extra crew and work double shifts?

It is not surprising that earthmovers, like other businessmen, are turning to the computer for help in picking the best of all possible time-machine-money schedules.

The choice of a fleet sets equipment traffic patterns to a certain extent, but the efficiency of a working spread rides primarily on the capabilities of the superintendent; his planning and daily supervision keep a fleet working smoothly. A good man has on-the-spot "savvy" that prevents costly delays and keeps traffic on the move so that everyone winds up in the right place at the right time.

Skinning the cat: No matter how well designed and maintained, or how cleverly scheduled, a machine depends on the skill of the man who operates it. His facility and judgment in turning, backing, lifting, lowering, dumping, loading, swinging, and working around obstructions determines the daily yardage moved by his machine.

When good men are in short supply, a contractor may arrange for the services of an exceptional operator months in advance of an important job. The reason for this was made abundantly clear in an interview with an earthmoving man. "I've seen shovels working side by side," he said. "One moving 400 yds a day, and the other moving 1800 yds."

But even the best of those rugged individuals handling big equipment will slow down after a day of putting 50 to 100 tons of steel through its paces. Ease of operation and operator comfort, therefore, get a lot of attention from buyers and manufacturers.

Cabs are air-cooled, seats cushioned, riding quality improved, noise and vibration decreased, controls made more responsive and less vulnerable to error; some units are equipped with foot-operated steering that leaves hands free for transmission and bucket controls. These refinements, while still not putting an operator exactly in the catbird seat, decrease the chance of error and improve over-all output.

Top: Scrapers and bulldozer jockey for positions. Bottom: crawler tractors push-load scraper through mud.

Hydraulic fill is the fastest, and usually the most economical, way to create new land. A big dredge often works 24 hrs a day, and can move up to 50,000 yds in that time. River, lake, and harbor beds frequently provide an ideal mix of sand and clay, which, if allowed to settle in layers, will need little or no further compaction.

Fill is lifted from the underwater floor by a large suction head supported on a ladder boom, then pumped up through a suction line, and discharged into barges or along the shore. Dredges are rated by the size of their discharge lines, which range from 6 to 30 in. With intermediate pumping stations, pipes may extend overland for several miles.

Suction heads, sometimes equipped with water jets around the rim to help loosen soil, erode the bank by the force of inflowing water. For harder materials, suction heads are enclosed by cutter heads that chop up the bank into fragments small enough to go through the pipeline.

The big rigs are built into barges with specially constructed steel hulls to withstand the severe vibration of dredging. During the dredging, barges are held steady by two spuds (heavy hollow steel spikes) driven into the bottom by their own weight, and raised or lowered to act as pivots in "walking" the unit.

Other underwater excavators are dipper and grapple dredges. The dipper, a waterborne power shovel, deepens channels and harbors where the bottom is too hard or the space too restricted for hydraulics. At depths beyond the economic limit of other dredges, the grapple (a cable-attached claw) cleans up loose rock and other materials.

FLOATING EXCAVATORS

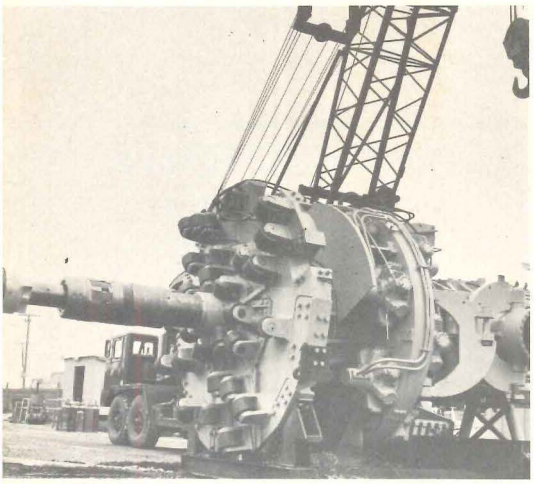
Top: Hydraulic fill gushes out of discharge line. Bottom: Business end of cutter head on hydraulic dredge.

THE MIGHTY MOLES

Some of the most fascinating machines devised for digging into the earth are the tunnelling machines, called moles. They have emerged only during the past dozen years or so as practicable excavators, and are still plagued with design failures under certain conditions. However, an impressive record of successfully completed jobs around the world has won them the enthusiastic support of many excavating men. Mechanical tunnelers are not a new idea, but only recently have they proved competitive with conventional drill-and-shoot procedures.

Rock moles, chewing through sandstone and soft shale, put a machine finish on the walls of shafts up to 30-ft diameter. In this type of rock, one mole bored nearly 200 ft of 20-ft-dia tunnel in a day. Machines have been balky in tunneling through really hard rock, but contractors seem confident of their eventual success. Several hard-rock mole designs have been tried; most of them use revolving cutter bits mounted on the face of a circular disc to chew through the rock.

One soft-ground tunneler, using cutter buckets, has been tested at 40 in. per minute — a rate that apparently outstrips the mucking system. The most popular soft ground mole is a great rotating wheel with rim buckets for removing muck; cutting is done by teeth on the spokes of the wheel.



Above: Pilot bit will anchor cutter head of hard-rock mole against the tunnel face. Below: Soft-ground tunneler.

DRILL AND BLAST

The first recorded use of black powder (gunpowder) as an explosive was in Hungarian mines in the 17th Century. There are still special situations where it is most suitable, but black powder has been replaced for general blasting by the highly sophisticated explosives descended from dynamite, invented in 1866 by Alfred Nobel.

Developments on several fronts have contributed to the art of drilling and blasting: specialized explosives keyed to particular jobs and types of rock, improved detonating caps, electric firing, better blast hole patterns, tough rotary percussion drills, and rigs that drill holes faster, deeper, and more accurately.

Construction blasting out in the open is used to excavate, clear and grub, ditch, settle fill, and produce surfacing material. In confined areas, and where precise splitting is needed, controlled blasting excavates basements and tunnels, or minimizes the trimming and dressing of slopes. Greatly refined in recent years, this technique places a row of closely spaced, small-diameter holes along the excavation line. The holes may either be lightly loaded with explosive charges, unloaded (the breaking force coming from a loaded backup row), or placed in various alternating patterns of loaded and unloaded holes. When the charges are detonated, the rock shears along the line of holes.

Controlled blasting is common on Manhattan, where a granite subsurface makes excavation a special headache. City blasting is done under cover of large, heavy steel mesh mats lowered over the blast area by cranes before firing.

Men in the business look forward to cheaper explosives and improved drills in the next few years; a jet drill that burns holes in rock is now in the field, and there is talk of using high-velocity water jets to bore through rock.

Lasers have so far proved unsatisfactory as rock cutters. However, recent experiments show that they will soften, or

weaken, rock, and this has caused speculation about their use with hard-rock moles.

The peaceful atom: Expectations remain high for moving earth with atomic energy. It has been considered for a number of projects such as clearing harbors and creating large underground vaults for fuel storage.

Perhaps the most ambitious project under study is the proposed sea-level canal across the American isthmus. The canal would be created by a row of buried nuclear explosives blasting a channel some 600 to 1000 ft wide by 60 ft deep, and 45 to 100 miles long, depending on the route. Tentative studies call for machine excavation and dredging through some portions, but research indicates that nuclear blasted sections will require no conventional machines.

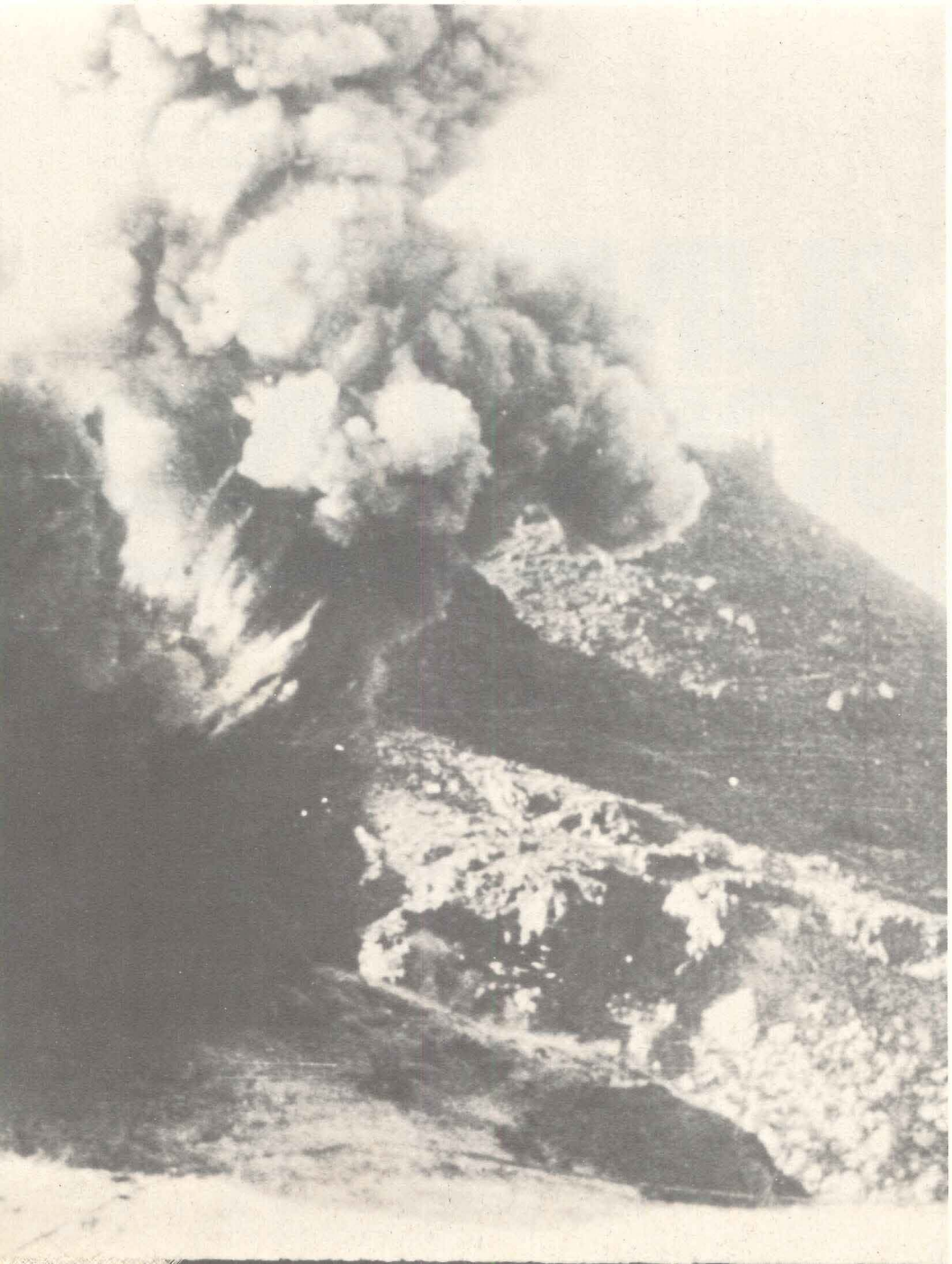
Engineers now feel that technical and fallout problems can be overcome, but politics and lack of funds for detailed research may eventually shelve the plan.

Actual dollar costs for moving a cubic yard of earth vary widely throughout the country, but the national average for 1962 to 1964 was 44¢ to 45¢, compared with the 1922 to 1942 average of 40¢ to 46¢. Unit prices today may normally vary from 20¢ to $3, depending on quantity; haul distances; type of material; and equipment, fuel, lubricant, and labor costs — hydraulic fill usually being less expensive than earth fill.

Blasting and long haul distances greatly increase prices, as do difficult sites. Generally speaking, the larger the quantity, the less the unit price. Labor is, of course, an important item, and chance factors also act to push a contractor's bid up or down.

The designer can keep costs down by balancing cut and fill (keeping in mind the shrink factor of soils), and by having soil tests taken to avoid overdesign of foundations. However, unexpected subsurface conditions may arise during excavation despite soil testing, and therefore lump-sum contracts are chancey in earthwork. The best safeguard, for both owner and contractor, is to establish unit prices for earth and rock.

Facing page: Drill marks left by controlled blasting in city excavation. Below: Big blast breaks up mountainside.



Surveys and Soils

When a designer has an opportunity to work with a large tract of land, he may find a soil survey necessary. This method for mapping soil structure and drainage patterns was originally developed for farmers and ranchers, but has been found increasingly valuable to building construction men as large projects multiply.

Aerial photographs, in conjunction with on-site and laboratory testing, provide data on moisture and drainage, permeability, and shrink-swell potential of soils to a depth of about 6 ft. Surveys also furnish the erosion forecast, and describe the structure and thickness of each layer of soil, depth of rooting, and amount of organic matter.

Surveys do not replace soil testing for a particular building, but the information they provide makes it possible to situate buildings in the most favorable locations, safe from such hazards as flooding and earth slides.

Soil characteristics: Soils can be classified in a variety of ways: physical properties, chemical composition, origin, grain sizes, and bearing strengths. But for general purposes, soils can be classified by consistency as plastic or friable.

Plastic soils are cohesive. They form a paste when wetted, and when the water evaporates the paste hardens. Friable soils are noncohesive and do not form a true paste with water. Sands and gravels are typical friable soils.

Plastic soils, such as clay, shrink and swell with changes in moisture. To reduce this action, soil should be compressed in order to squeeze water and air out of the spaces between the soil particles. Nature does this by settlement; man hastens the process by compaction.

Compaction with heavy equipment (see p. 133) is one method of stabilizing soil before loading it with roads or buildings. Soil can also be stabilized by mixing it with chemicals such as calcium chloride or cement, or installing drains to carry off excess moisture.

Each type of soil has an optimum moisture content for its maximum loadbearing capacity, and this figures in computations for designing the slope and height of an earth berm or embankment. Another factor influencing slope and height is the shearing resistance of a soil. This resistance depends upon the internal friction (the resistance of soil particles to slide or roll over one another) and the cohesion of the soil.

Thus the strength of a friable soil with no cohesion is derived from the product of its angle of internal friction and the force normal to the slope. When this type of soil is mounded, its shearing strength increases with the rise in pressure; the safe slope of the berm remains constant.

Conversely, because clays have no angle of internal friction, their resistance to shearing relates directly to their cohesive strength. And, since the cohesive strength is constant, the slope of a berm will have to flatten in order to accommodate the increased shearing stresses.

Prospects and Possibilities

Equipment manufacturers are reluctant to discuss the specifics of their multimillion dollar research-and-development programs, but the future of automation, or at least semiautomation, looks bright. Remote-controlled vehicles are already working successfully in industrial plants, where solid-state units are used to maneuver overhead cranes, small locomotives, and loaders moving hot slag. At the present, each machine requires a remote control unit operated by one man, but industry dreamers envision whole fleets of earth-moving equipment controlled from a single control panel by one man.

This would certainly be a solution to the operator safety and fatigue problem. However, one might miss the reassuring sight of men mounted on the big machines as they roar like menacing steel mastadons full throttle through a cut.

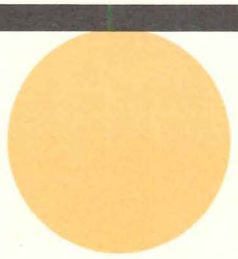
A truly science-fiction possibility has been proposed by one industry spokesman who suggests that, at some time far, far in the future, there might be an earth-mover that chews up earth and rock, converts it into energy to be transmitted by wire to the fill, and spits it out in place.

Whatever lies ahead, today's tools, mammoth or miniscule, will dig, load, carry, scrape, rip, trim, tamp, and shape just about every kind of material in the ground. Larger and more powerful, but also more sophisticated, than their predecessors, they offer the means for putting a little life into mass-scale housing developments and creating some excitement in the man-made environment.

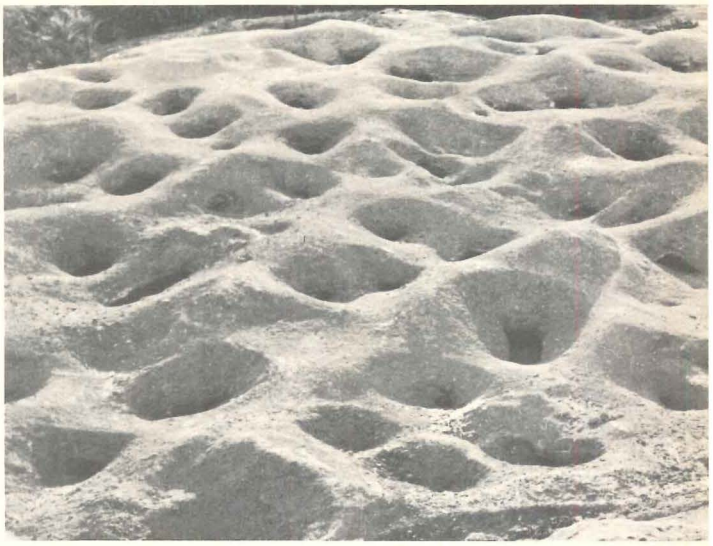
The first man to be aware of architecture was a caveman. He protected himself against the elements and against predators, he appeased his gods and buried his dead, in natural caves. With advances in technology, man began to build his own caves in the earth and to construct simulated caves aboveground.

Today, by means of new technology, and also to escape from our technology, we are again digging into the ground and going underground. The purposes are varied, the techniques are impressive, and the implications are vast.

GOING UNDER-GROUND



HISTORY IS WITH US



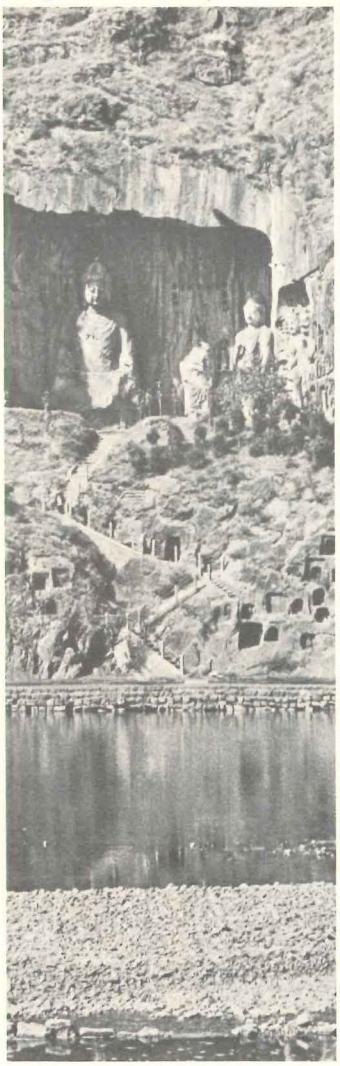
Numerous examples still exist of early types of shelter that were dug into or under the ground. Some of these are the preserved remains of a dead civilization — the Etruscan tombs and the Roman catacombs. Some early examples are still in use, although now for different purposes. An ancient burial ground in Siwa, Egypt, was converted into a community that is inhabited today. The fantastic conical towers of Cappadocia, formed eons ago by the erosion of volcanic residue and hollowed out by Early Christians who sought homes and chapels, are lived in to this day by Turkish farmers (see pp. 129–132, MAY 1964 P/A).

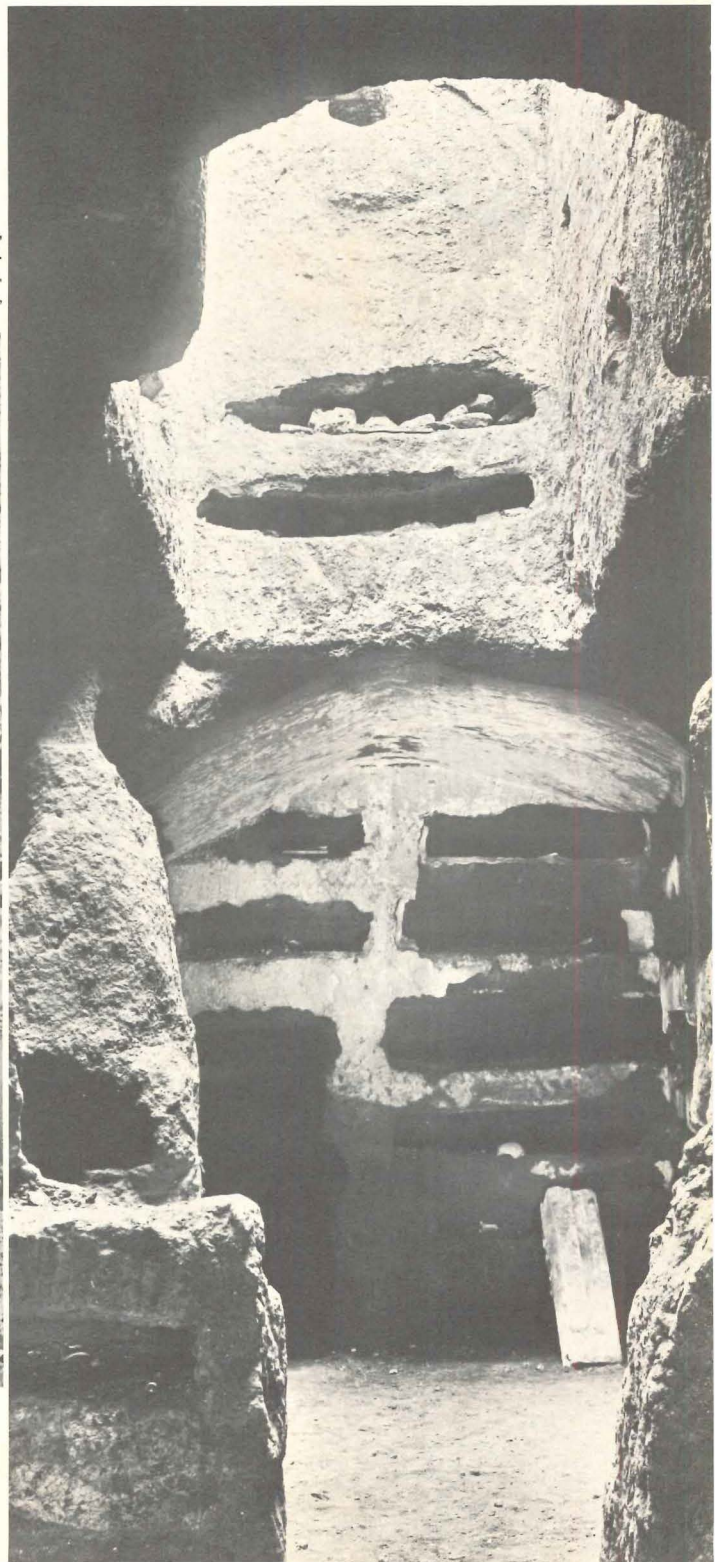
Climate and soil have combined to form several unique solutions to shelter, traditional solutions that continue today as they have for centuries. In its exhibition of "Architecture Without Architects," New York City's Museum of Modern Art showed striking photographs of underground villages in China; some 10 million people in the loess belt of northern central China live in shelter that is carved from the soft and highly porous silt.

In Israel, archaeologists have only recently uncovered 5000-year-old troglodyte settlements in the Negev. Villages that were entirely subterranean protected these agricultural people from the temperature extremes of the desert and from wind-blown sands. Extensive caves were burrowed down into the alluvial soil along dry riverbeds.

Much of the early cave shelter that remains is of religious intention, as, for instance, the Chinese cave-temples carved in the sandstone hills near Loyang, in Honan province, built in the Seventh and Eighth Centuries A.D. Fantastic feats of earth sculpture and underground construction have preceded our current efforts to seek shelter in the earth.

Below: Cave temples of Lung-men, Honan province, dating from 672 AD. Right, top: Troglodyte dwellings, Siwa, Egypt. Right: Catacombs outside Rome, dating from First Century AD.





NORAD'S COMMAND POST

The majority of the new underground facilities are militarily oriented — either military constructions for protection, communication, and weapons launching, or civilian constructions for protection against nuclear blast and radiation.

One of the most technically impressive of 20th-Century underground projects is the huge Combat Operations Center of the North American Air Defense Command, located at Cheyenne Mountain, six miles southwest of Colorado Springs. The $142-million underground citadel consists of 11 buildings (one, two, and three stories in height) — more than 200,000 sq ft of floor space — all free-standing within the mountain. Construction included excavation within the mountain of three miles of tunnels, varying in height up to 56 ft. In all, contractors blasted approximately one million tons of granite, using approximately one million pounds of dynamite.

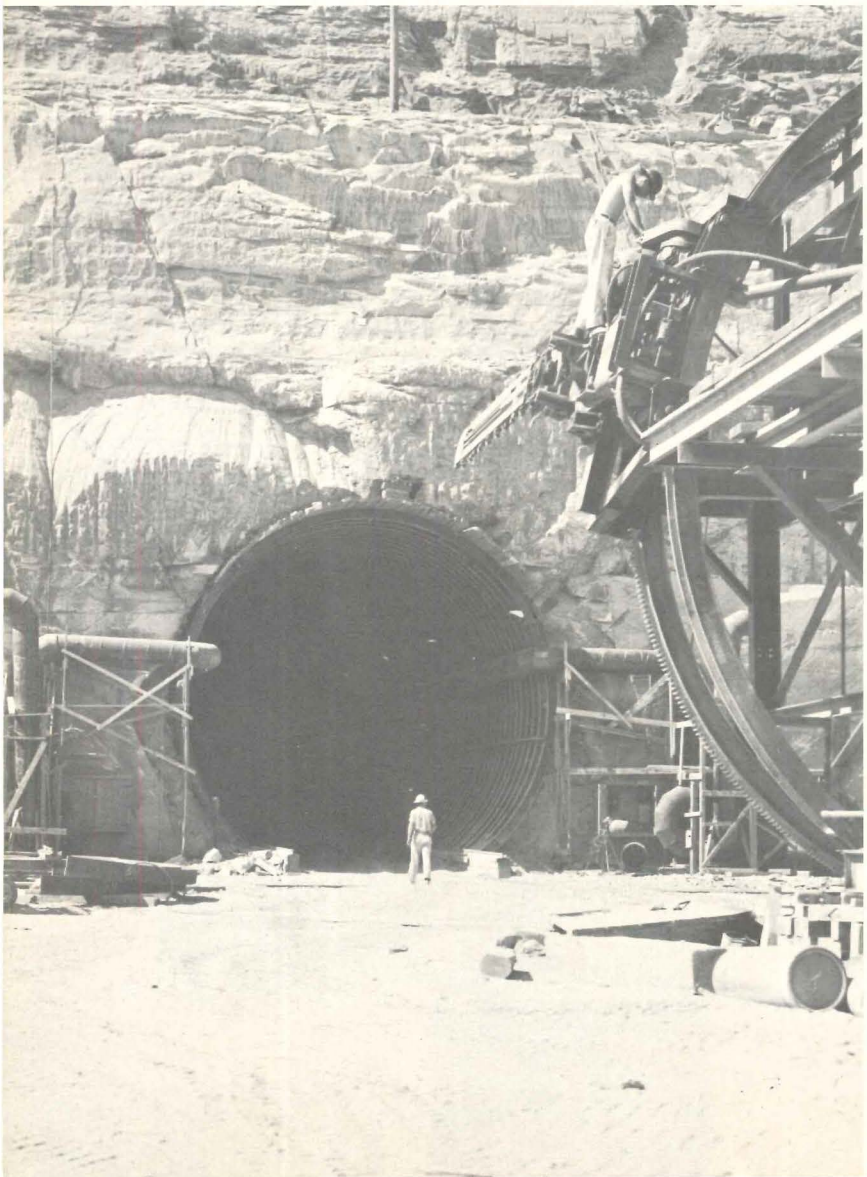
Many innovations were developed by the Corps of Engineers during the 1961–65 construction of the NORAD Combat Operations Center. A new mining technique, for instance, was developed to minimize blasting damage to surrounding granite; the smooth-wall technique for controlled explosion was perfected by careful use of various types of explosives and by predetermining the size, depth, and spacing of the hole in which the charge is placed. These methods represented attempts to retain as much as possible of the mountain's natural strength. In addition, where required, engineers used epoxy resin and rock bolts; new types of epoxy, for instance, were developed to gain better penetration into faulted areas.

For the free-standing buildings themselves, steel frames were prefabricated aboveground. All buildings are supported on springs and shock-absorbers, and have no contact with walls or roofs of the granite chambers. The idea of rigid building construction was discarded early in the planning of the NORAD center, in favor of spring-mounted buildings and flexible utility connections. The NORAD "village" thus has the advantage of semi-rigid blocks capable of independent movement. More than 900 springs were used, each 37-in. high and capable of supporting 65,000 lb under maximum compression loads.

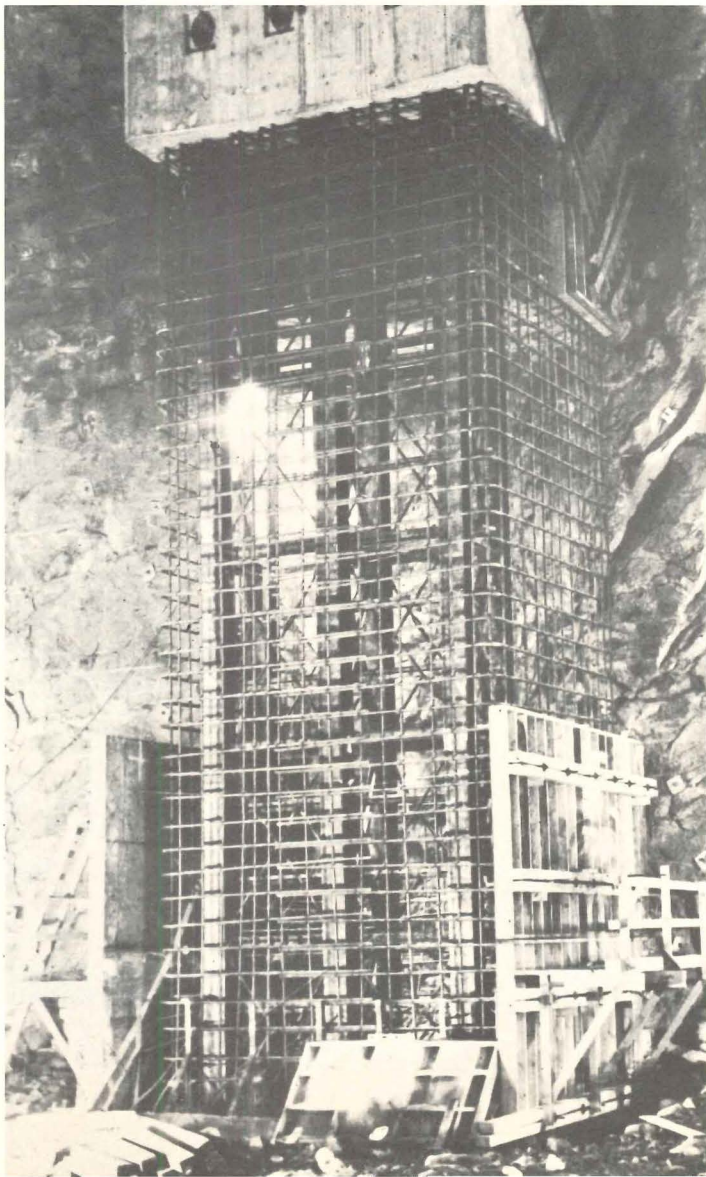
For the sensitive communications equipment, it was necessary to reduce the effects of the electrical disturbance that develops from nuclear blast. This disturbance, known as EMP or electromagnetic pulse, passes readily through earth or rock but can be reduced considerably by metal insulation. All of the facility's electronic equipment is thus installed in metal buildings.

Facilities inside the center include sleeping quarters for 450 at a time, a seven-room hospital, vast rock-cut reservoirs for drinking water and diesel oil, and equipment to dig one's way out of the mountain should both outlets be blocked.

Entrance to NORAD Combat Operations Center, Cheyenne Mt., Colo.



Free-standing building under construction inside excavation.



SWEDEN DIGS DOWN

The most comprehensive underground facilities, however, are in Sweden. The equivalent of almost $2 billion has been spent on duplicating important facilities underground, this sum divided almost equally between civilian and military uses. With a population of 7 million, Sweden spends some $28 million a year for its underground shelter system, a sophisticated system that is supplemented by the "standard" shelters required in almost all new buildings in towns over 5000.

A giant naval base, for instance, is being constructed at a cost of $60 million inside the rocks of Muskö, an island 25 miles south of Stockholm. The bombproof base in considered without parallel in any country, safe for any situation except a direct hit by a hydrogen bomb. When finished in 1968 or 1969, tunnels will be scooped out of the granite in all directions and on several levels. The naval base will have offices and storage rooms, and drydocks large enough for the largest Swedish destroyers; it will be equipped with airlocks against gases and radioactive fallout, and with fume extractors over all funnels (so that vessels can maintain a full head of steam even when moored). Drilling now proceeds at the rate of 20 in. a minute, using compressed-air drilling equipment. Altogether, some 2,500,000 tons of rock have been drilled and blasted from the mountain.

Sweden has not known war since 1814, but is determined not to be caught in the crossfire of other warring nations. Her downward burrowing began with air-raid shelters during World War II, then gained impetus with economical new deep-drilling techniques developed in the late 1940's.

Among their subterranean facilities today are hangars (for some 1500 jet fighters), complete airplane factories, and offices. A hospital of 1600 beds has been built underground. One of the world's largest power plants, the Harspranget works, is under solid rock. (More than 50 per cent of Swedish electrical power, in fact, comes from subterranean plants.) There are underground stockpiles of rubber, oil products, and chemicals. The huge underground garage, Katerinaberget, in Stockholm, can park 550 cars and serve its patrons from its own gas stations and shops, but in an atomic emergency some 20,000 people could be sheltered here. A thousand feet long and 60 ft square in section, the cavern could accommodate the Empire State Building. Equipped with a full complement of devices to keep out poisoned or radioactive air, the garage is equipped with a unique device for use during a nuclear disaster — rows of steel bars that rise automatically at the push of a button, to divide a panic-stricken mob into manageable, small groups. One hundred tons of dynamite were used to blast out these 3,500,000 cu ft of granite. Another shelter in Stockholm, which is now under construction beneath the Church of Santa Klara, will have room for 10,000 people. Drilling proceeds vibration-free, in order to protect priceless stained-glass windows above. The city of Malmö has an underground shelter for 4300 persons, which is utilized today partly for parking and partly for convention space.

Swedish interior designers have had ample opportunity to experiment with interior effects in these underground facilities. Ochre and pastel blue are frequently used colors, pleasant and soothing. In some cases, fake picture windows look out onto painted landscapes. But there are imaginative attempts, too, to work with this environment; in one shelter at Vasterar, serving now as school gymnasium and civic center, the lights are three times brighter than normal, and the narrow corridors are painted in bright orange and yellow.

Top: Tunnelling operations for Church of Santa Klara. Bottom: Entrance to naval base at Musko, Sweden.

BIG CORPORATIONS TAKE COVER

Many corporations are engaged in a serious search, at an undisclosed expense, for underground protection. According to Virgil L. Couch, assistant director of industrial participation in the Office of Civil Defense (as quoted in *The Wall Street Journal,* January 12, 1966): "It's safe to say now that almost all of the 500 top corporations have some sort of alternate headquarters arrangement."

Two-and-a-half hours north of New York City, in Hudson, N.Y., is one such facility at Iron Mountain. This mountain, which at one time yielded 1200 tons of iron a day, is now a survival shelter and disaster headquarters for the Shell Oil Company, Standard Oil Company (New Jersey), and Manufacturers Hanover Trust Company. The mountain also has vaults for some 700 other clients, who lease space only for record storage.

Deep within the mine, under 75–150 ft of iron ore and rock, are the quarters where tenants are guaranteed 30-days protection (including emergency power, internal water supply, radiation-filtered air, and septic-tank plumbing) by Iron Mountain Security Storage Corporation.

Manufacturers Hanover has room for 24 staff members; its large picture window looks out onto a grotto lighted in pastel hues.

Shell Oil's facility can sleep 16 at present, or up to 23 if more beds are brought in, and has desk space for 44. Some personnel would be permitted to bring their families. The 44,000-sq-ft layout is in a split-level arrangement, with space following the original mine contours and levels.

Although Designs for Business, Inc., only did the space planning for the Shell installation, they did the full interior design for Standard Oil's 20,000-sq-ft Emergency Operating Center. This layout is by far the most luxurious of the three, although Jerry Whiteford of DFB suggests it is extremely economical. Standard furniture by Knoll, Miller and Tanier is used, and the bedspreads, although specially designed, are relatively inexpensive.

Standard Oil's encampment looks more like a resort than a last-ditch shelter: It has vivid colors on doors and ceilings, a sound system throughout, and cheerful travel posters. For the 200 people, there are 59 bedrooms — 32 rooms measuring 8′ x 10′, 16 rooms measuring 10′ x 12′, and 11 dormitories. All personnel would bring their families. The office area is smart and efficient; desks have no drawers in which to mislay papers.

Each of the corporations expects that any disaster situation will come with plenty of warning; thus far, the facilities have been used only for company meetings.

I.M.S.S.C. builds the facilities to order for each of its clients. Ceilings are of reinforced concrete plank, with a 5-ply built-up roofing above. Walls are concrete block, often placed directly against the rock to secure maximum space, but many walls have passageways behind them for pipes and conduit. Ventilation for the record-storage vaults is interesting: Air first enters into the vault from above, then exits below through a small hole into the corridor, which is the return-air duct.

Elsewhere across America, also, the fear of nuclear blast and subsequent radioactivity is driving equipment underground. American Telephone and Telegraph Company is building a series of 26 manned communications centers underground, along the 1800-mile distance between Boston and Miami. Each building is completely sheathed in 7-oz electrosheet copper to protect electronic equipment from radio frequency interference and other electrical disturbances, as well as from the electromagnetic impulses of nuclear blast. The copper sheathing covers the entire underside of the building, extends up the walls, and across the entire top of the building. Each structure will be 4 ft below grade.

Top: Elevator entrance within Iron Mountain's underground facilities. Middle: Conference room in Shell Oil's Emergency Operating Center. Bottom: Lobby outside Manufacturers Hanover offices.

SCHOOLROOMS GO UNDER

Windowless schools are burgeoning across the nation: There are 96 already built (in 23 states), another 25 under construction, and it is predicted that a sevenfold increase will place more than one million American schoolchildren in windowless schools by 1976. This projection is made by Joseph Platzker, a building code consultant in New York City, who made an extensive survey in 1966 of windowless schools — both aboveground and below. He mentions that there are now underground schools in New Mexico, Texas, Oklahoma, and Maryland, all built for fallout protection.

The nation's first underground school was built in New Mexico, where the first atomic bomb was designed. The Abo elementary school, in Artesia, was completed in 1962. Architect Frank M. Standhardt prepared two complete sets of plans and specifications, one for a windowless school aboveground, and one for a windowless school and fallout shelter underground. Bids came in at $343,228 and $469,847 respectively. Despite the difference of $126,619, the underground design was chosen, making it possible to serve 540 children in the school and 2160 people in a two-week fallout shelter. From above, the school is a flat concrete slab 200-ft long and 144-ft wide, and is marked off for basketball. Brick entrance kiosks at three corners are each equipped with an 1800-lb reinforced-steel door, to be shut from the inside when the shelter's capacity has been reached. The roof of the Abo school is a 21-in.-thick slab, poured in two layers with a moisture barrier between. The walls are 12 in. thick, also in double construction. The floor is a 4-in. slab. Special features of this and other underground schools are decontamination showers, emergency-power generators, internal water supply, and particulate filters. After three years of operation, a joint study by the U. S. Department of Health, Education, and Welfare and the New Mexico Department of Education showed no adverse effects on teacher-pupil relations, attitudes, or scholastic achievement.

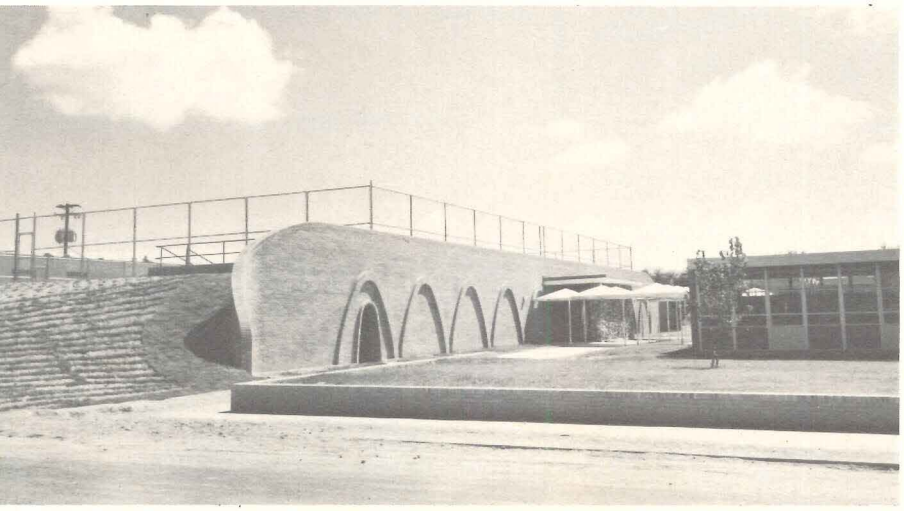
Another school by Standhardt that doubles as a fallout shelter is the new Goddard Senior High School at Roswell, N.M., site of a SAC base. Aboveground are the gym, auditorium, automotive and home economics departments, and central kitchen, for a total area of 100,000 sq ft. Belowground are 18 classrooms, for a shelter area of 82,000 sq ft. Fallout protection is provided by a 13-in. concrete slab over the basement. Student population is 2000; shelter capacity is 6500. Total cost for the school, completed in 1965, was $1,944,070, of which the shelter's share was 6.7 per cent (general construction of $13,000 plus additional mechanical and electrical equipment of $117,000). A bulletin from the Office of Civil Defense concludes that fallout protection added only 7¢ per sq ft to the cost for conventional construction — $10.42 compared to $10.35; but their computation includes only the basic construction figure of $13,000.

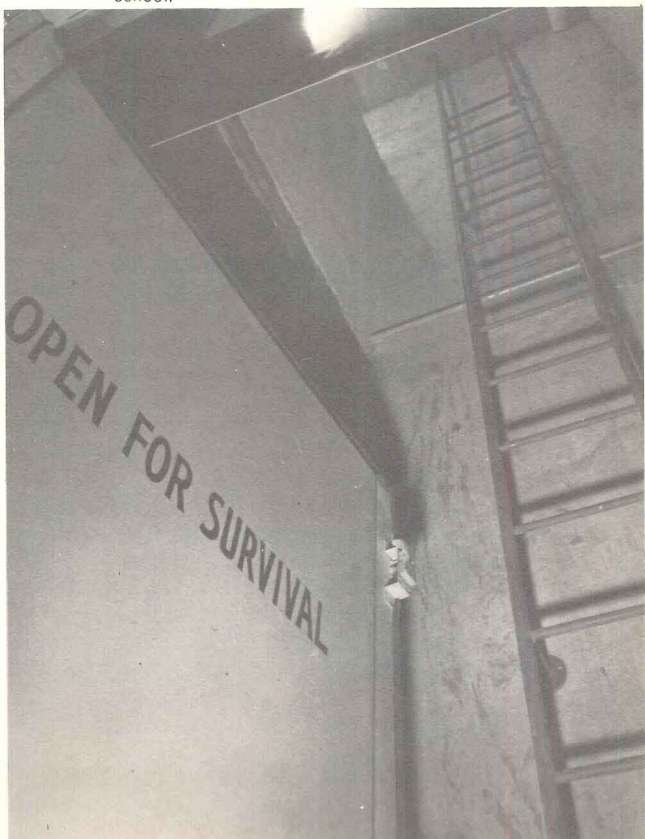
Texas has several underground schools. The United High School in Laredo, by T. Leo Dawsey, Jr., architect, is also, in effect, a two-story building with the first floor below grade, the two separated by a 14-in. concrete slab. Built in 1964 at a cost of $10.35 per sq ft, the school can accommodate 540 students at school or 2000 in the shelter. "Good environmental control in the design prevents one from being aware that he is in a fallout shelter," says the architect. It has "the atmosphere of a swank country club," according to an article in the *Houston Chronicle*. Another underground educational facility in Laredo, also by Dawsey, is an addition to an existing school — 12 classrooms built underground, with tennis courts above.

Whether such facilities are a realistic response to the threat of atomic annihilation, or offer only an illusory hope of salvation, is a subject for extensive debate. Apart from fallout considerations, though, proponents of such schools suggest a variety of points in their favor. Dr. Ervin Rose, clinical psychologist and consultant to the District of Columbia public schools, finds supportive data for the conclusion that an artificially controlled environment is more conducive to learning than a natural environment, "provided that such an artificially controlled environment is not sustained over a prolonged, continuous period of time."

A research project from the Architectural Research Laboratory of the University of Michigan, *The Effect of Windowless Classrooms on Elementary School Children,* tentatively submits that windowless schools seem to be very much preferred by teachers, primarily for the lack of distraction from the outside. The experiment, conducted over a period of two years, covered several classes at two different schools. One conclusion: "A windowless environment may also have some effect on the learning achievements of youngsters, but, if so, it is small."

The environmental controllers make a stronger point. Electric load for the Abo school at Artesia, for instance, is one-third again as much as for a conventional school. This premium, however, is more than offset by substantial savings in maintenance — there are no windows to replace and other maintenance costs are at rock-bottom.





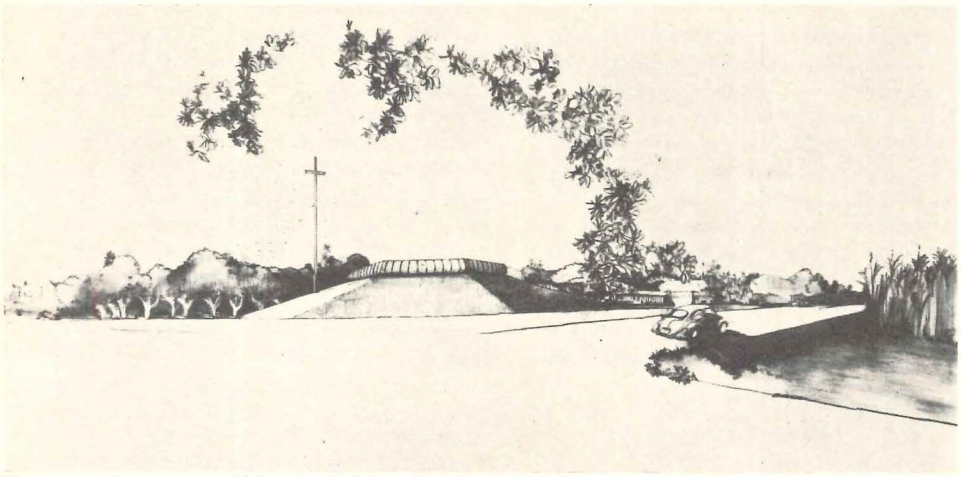
Left: Elementary school addition, Laredo, Texas. Left, bottom: Abo elementary school, Artesia, N.M. Below: Emergency air conditioning system in Abo school.

A SANCTUARY FROM THE WORLD

Not all underground buildings are constructed in response to the world's nuclear climate. Traditionally, an underground building has suggested the mysteries of otherworldliness — a symbolism that is still meaningful today.

An underground church that never got off the ground, or under it, was Alfred Browning Parker's sanctuary for the University Christian Church in South Miami, Florida. The site is a flat, treeless meadow, with heavy traffic on two sides. Parker would have covered the sanctuary with earth to create a huge mound dominated by a cross, the cross illuminated at night by light from the skylighted sanctuary. "The not-being of the outside was intended to increase the significance of the space within," says Parker. "It looks like a tomb," said some members of the congregation, who defeated the proposal when it was put to a one-man, one-vote test. The design would have come within the established budget of $150,000, would have solved site and theological problems, eliminated noise, simplified maintenance, and emphasized in addition "a community presence of repose and harmony with the earth."

This was not Parker's first experience with underground buildings. His earliest was about 1926 — "a sort of fort" built by and for the neighborhood gang out of a rocky sink hole covered with planks and camouflaged with palmetto fronds. And it will not be his last; he is currently designing an underground house for a client in the Green Mountains of Vermont. Parker is very much impressed with the ideas of Malcolm Wells (see pp. 174–179, FEBRUARY 1965 P/A, and this issue, p. 176), as indeed are a number of people around the world who are linked in a sort of underground movement, as it were.



The proposed underground University Christian Church in Miami, Fla.

NUCLEAR SHIELDING FOR OUTSIDERS

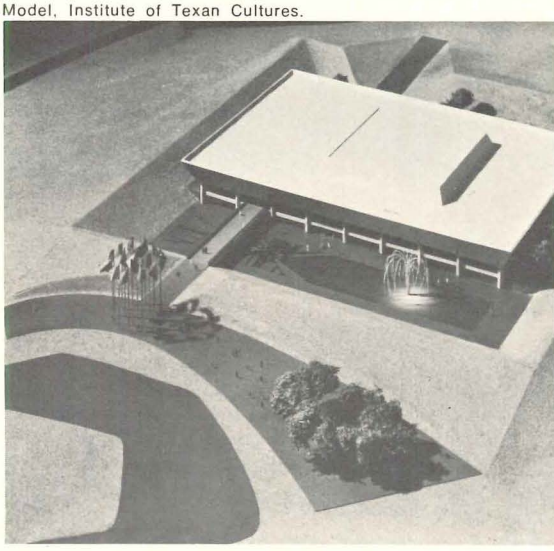
Earth protects those inside as well as those outside. Just completed at Yale University is a laboratory for the world's first Emperor Tandem Van de Graaff Accelerator, with earth used structurally as the massive shielding required for the electrostatic nuclear device inside the vault, and used sculpturally as the transitional element in an important grade change in the site. Earthmoving of 40,000 cu yds took three months (approximately one-fourth of the building schedule), and 7 per cent of the total cost. Excavation for the two-story building was approximately equal to earth used for shielding.

The reinforced-concrete structure is home of the giant tandem accelerator, designed to accelerate the full range of nuclear particles to energies not previously available; and ancillary laboratory and office facilities to make possible the ex-

TEXAN HISTORY WITHIN EARTHWORKS

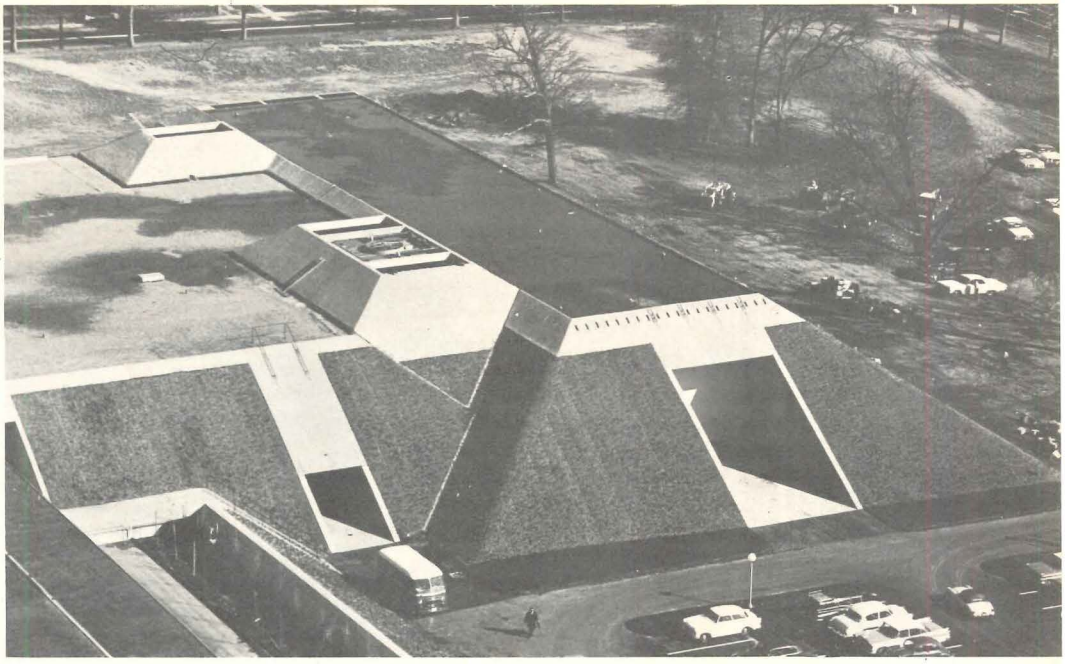
Symbolic and visual reasons have dictated the earthmoving that will result in a four-sided embankment around the Institute of Texan Cultures, now being built for HemisFair 1968 in downtown San Antonio. A three-level rectangular building will rise 64 ft high on a 13-acre parcel of the fairground. The building begins 14 ft below grade, on conventional drilled piers and footings; since the top of the berm is 14 ft above grade, only the upper half of the building is visible from the distance. Within the embankment, water flows around the building, from a series of tributaries, over rapids, to a pool, and then upward into a fountain, symbolizing the contributions of different ethnic groups in Texan history. Entry to the building is by bridge over the water. Berms will have a 2:1 slope, to be stabilized by mechanical compaction, then planted with grass and Texan wildflowers. The building will cost $12 million, including all post-fair construction that will establish the Institute on a continuing basis. Architects are Caudill Rowlett Scott (Charles E. Lawrence, Partner in Charge; Bert E. Ray, Project Manager); Callins & Wagner are Associate Architects.

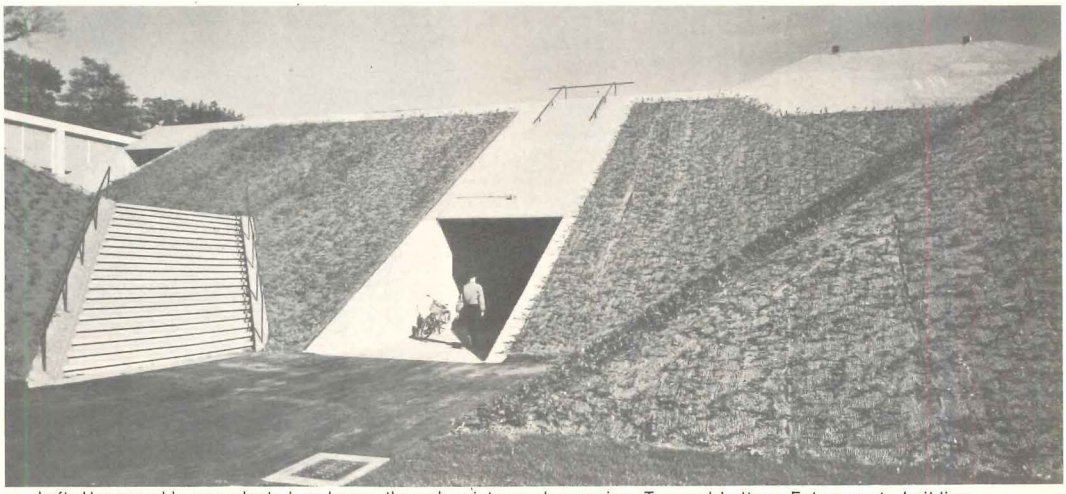
Model, Institute of Texan Cultures.

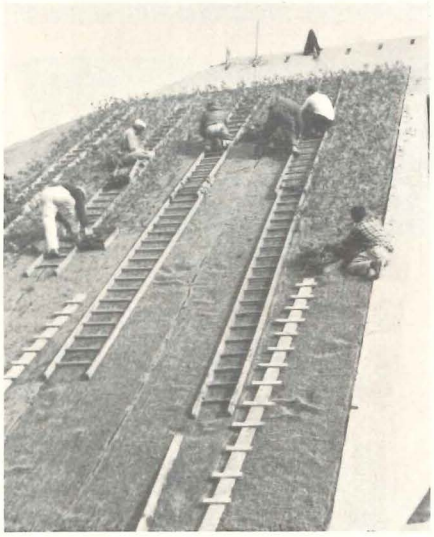


tensive study of nuclear structure and behavior. The wall between the accelerator vault and the rest of the laboratory is 5 ft thick and boron-loaded for additional shielding. The vault roof is 3-ft thick, and earth berms provide the necessary shielding for exterior walls. (Truncated pyramids on roof, continuing the berm profile, contain cooling towers for the closed-loop water supply in the lab.)

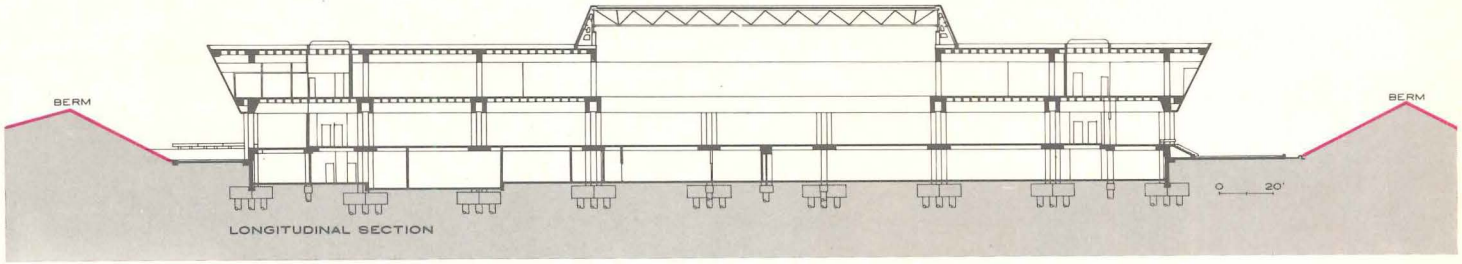
The berms are planted in honeysuckle. Ivy would have burned away, according to Robert Zion, and grass would have been impossible because of the mowing problems. Jute mesh that was put down to hold the honeysuckle temporarily will soon rot away. Architects were the Office of Douglas Orr, deCossy, Winder & Associates; Henry A. Pfisterer was Structural Engineer; Landscape Architects were Zion & Breen Associates.







Left: Honeysuckle was planted on berms through a jute mesh covering. Top and bottom: Entrances to building.



JOHNSON UNDERGROUND

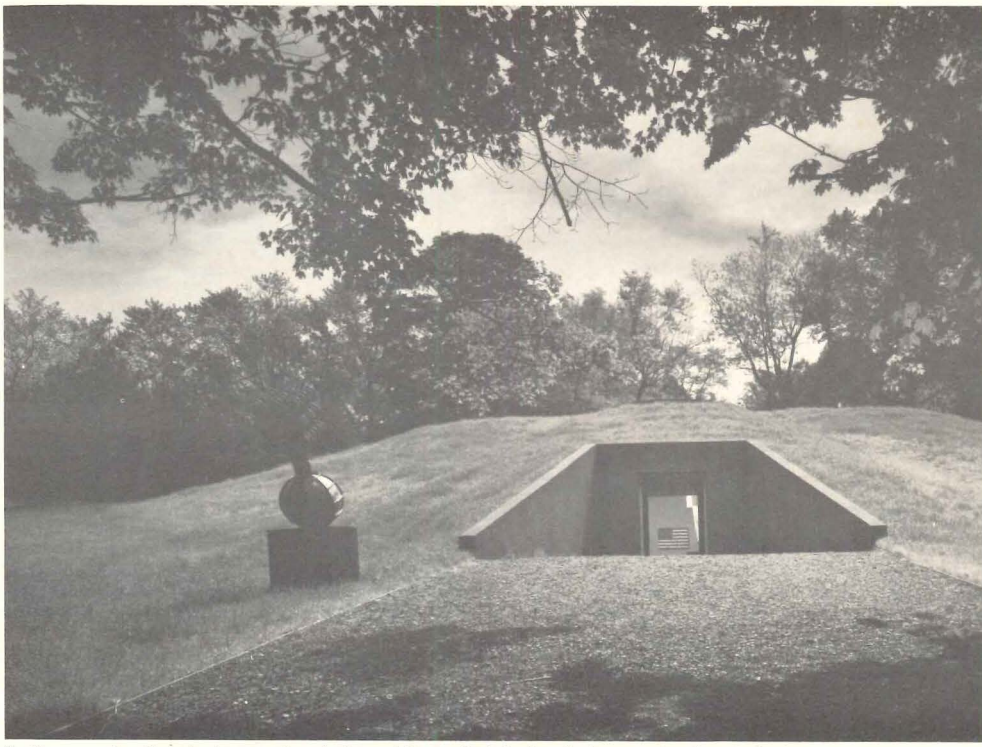
Philip Johnson's art gallery on the grounds of his home in New Canaan is as closed and free of contact with the outside world as his famous glass house is open. His new house for James Geier in Cincinnati looks underground, yet also overlooks a lake.

Actually, says Johnson, "These aren't underground buildings; I have simply placed berms around them." Since there were no trees to encircle the Geier house and he did not want to spoil the lake, Johnson raised the banks up to the height of the roof. At the gallery, he wanted almost perfect environmental control for his collection; with the insulation the earth provides, it is possible to maintain a constant 50 per cent humidity and 70° temperature all-year round. "Besides," he adds, "I didn't want a building in my backyard."

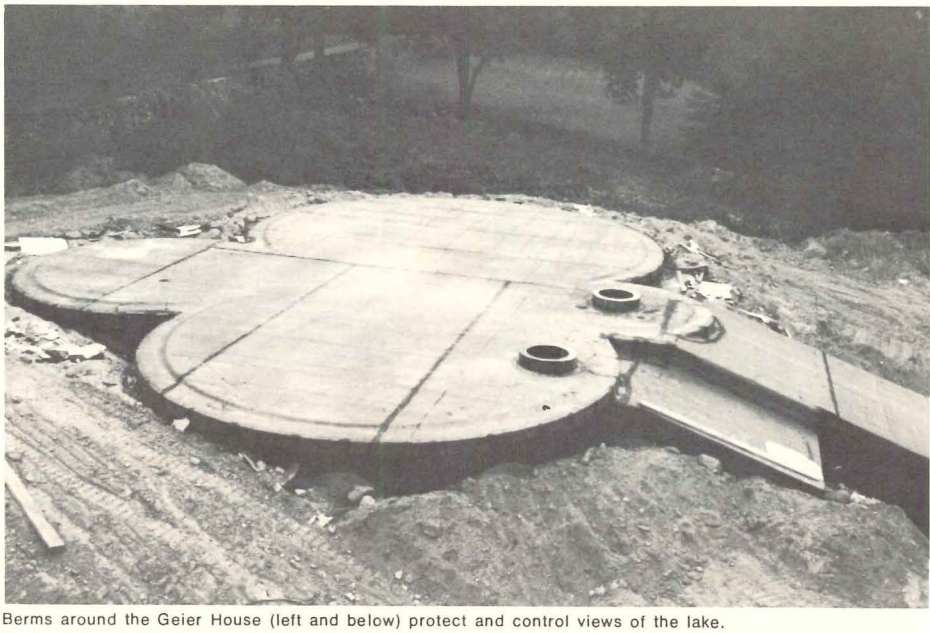
Entry to the Geier House is along a berm-surrounded "secret glade" descending from the parking pad to a level one step below the level of the house. "So you step up to enter the house," he points out. In the case of the gallery, one goes up a slight hill to enter on grade.

The Geier House berms are 1:1 — a slope maintained by 2x4's hammered into the soil perpendicular to cradle it. Vents and chimneys are concealed in exposed, weathered steel stacks that are the primary visual elements of the house exterior except for the earthworks.

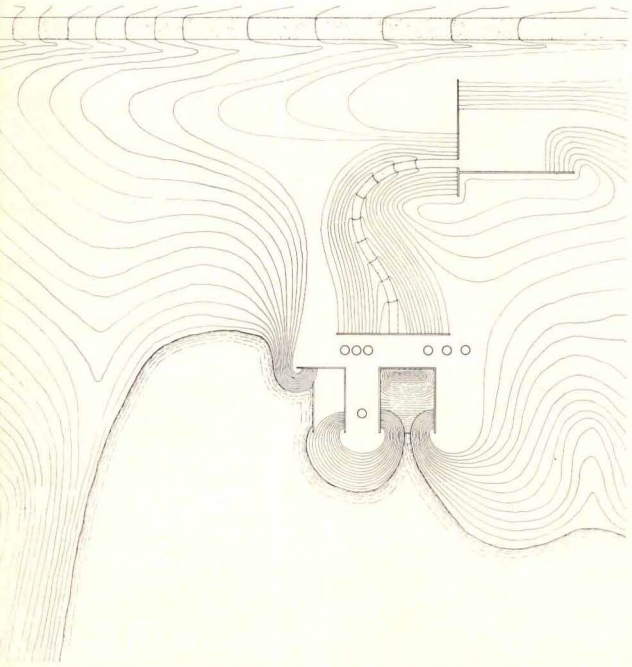
Johnson is primarily interested in the aesthetic effect of the mound as a form. He is also interested in the psychological effect of a bermed building: He enjoys the surprise and romance of an elegant cave.

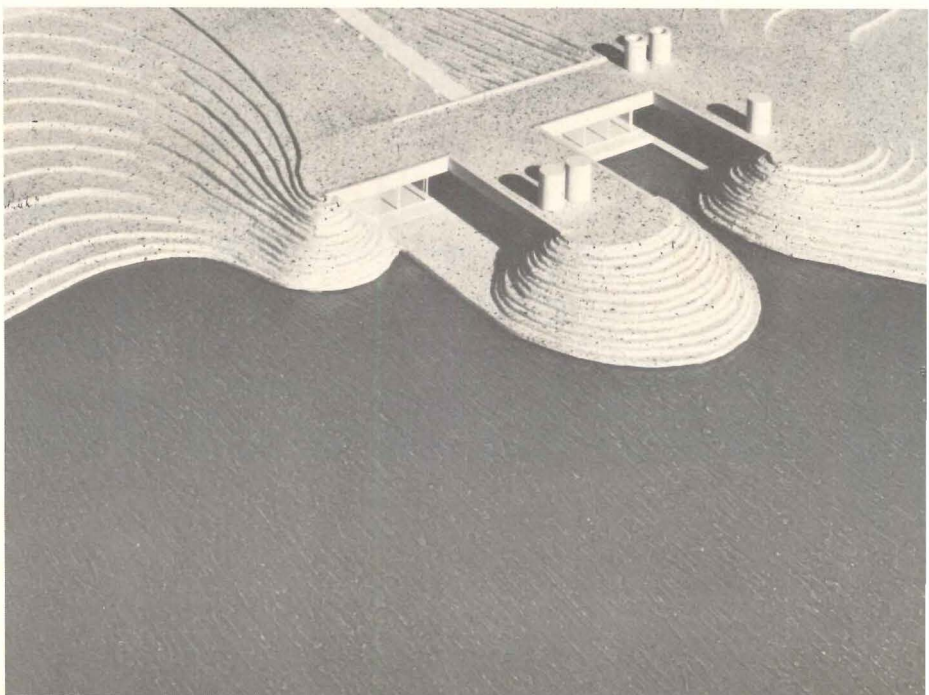


Earth-covered gallery (entrance above) showed its quatrefoil plan during construction (below).



Berms around the Geier House (left and below) protect and control views of the lake.





PUTTING BOOKS BELOW-GROUND

Height restrictions have pushed some buildings down into the ground.

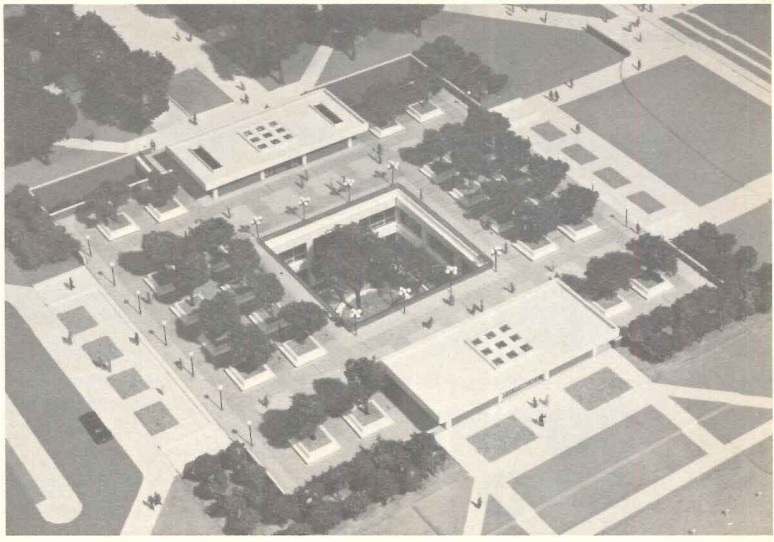
The library at the University of Illinois is going underground for two reasons: to keep the south mall of the Urbana campus relatively open, and to keep "any appreciable shadow" from the famous agricultural research area adjacent. The 98,000-sq-ft library will contain two stories beneath a landscaped plaza. Grade level has only two small pavilions, each with stairs and elevators. (There is another entrance from the existing main library, via tunnel.) The 72-ft-square court will be a landscaped reading room. The library-and-study facility is designed for expansion in north and south directions, to enlarge the building by almost 100 per cent. First phase will cost $2,950,000.

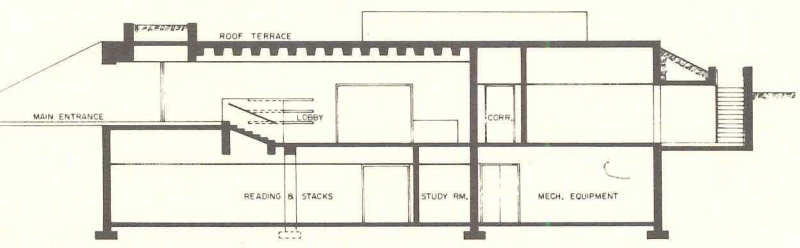
The necessity for land acquisition in a less desirable location was the major factor determining the underground solution, writes Ambrose M. Richardson, the architect. The possibility of having to procure a site of comparable size elsewhere made the cost "very favorable for the underground solution," he says. But the presence, immediately adjacent, of the country's oldest agricultural experiment field had already made impossible any substantial aboveground building. The administration was in complete accord with the move underground, reports Richardson. "Personally, I feel that such a solution would be most appropriate for problems demanding retention of open malls, retention of older buildings, or any other projects involving an extremely difficult relationship of contemporary solutions with given past conditions."

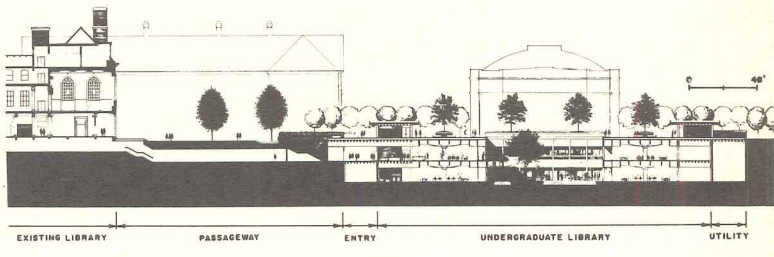
Since the surrounding buildings at Urbana are Georgian, brick and limestone are used on the visible portions of the reinforced-concrete structure. The mat foundation is designed as a flat slab, with a waterproofing membrane protected by 3 in. slabs top and bottom. Perimeter foundation walls, 16 in. for lower level and 12 in. for upper, are designed for partial hydrostatic pressure. Heating is by the university steam system, and a central refrigeration plant of approximately 345-ton capacity is located in another building. Associated Architects are Richardson, Severns, Scheeler & Associates, and Clark, Altay & Associates. Paul E. Dixon is Acting University Architect. The library design has just received a First Honor Award in the new Design Awards Program conducted by the Bureau of Higher Education, U. S. Office of Education, in joint sponsorship with the AIA and Educational Facilities Laboratories, Inc.

Another college library to go underground is located in Arkansas. Architect Philip Johnson, in conjunction with Wittenberg, Delony & Davidson, used berm architecture for the library design at Hendrix College, Conway, Ark., in order to centralize the 110,000-volume library without destroying existing campus space, or the architectural relationship of surrounding buildings. Berms, formed from earth excavated to sink the library midway into the ground and to create a sunken court around it, are used at campus entry to give this focal point a sense of approach. The building, of cast-in-place concrete bearing walls supporting concrete waffle slab system, cost $24.75 per sq ft.

Below: Partially completed entrance and section, Hendrix College Library. Right: Model and section of library at University of Illinois.

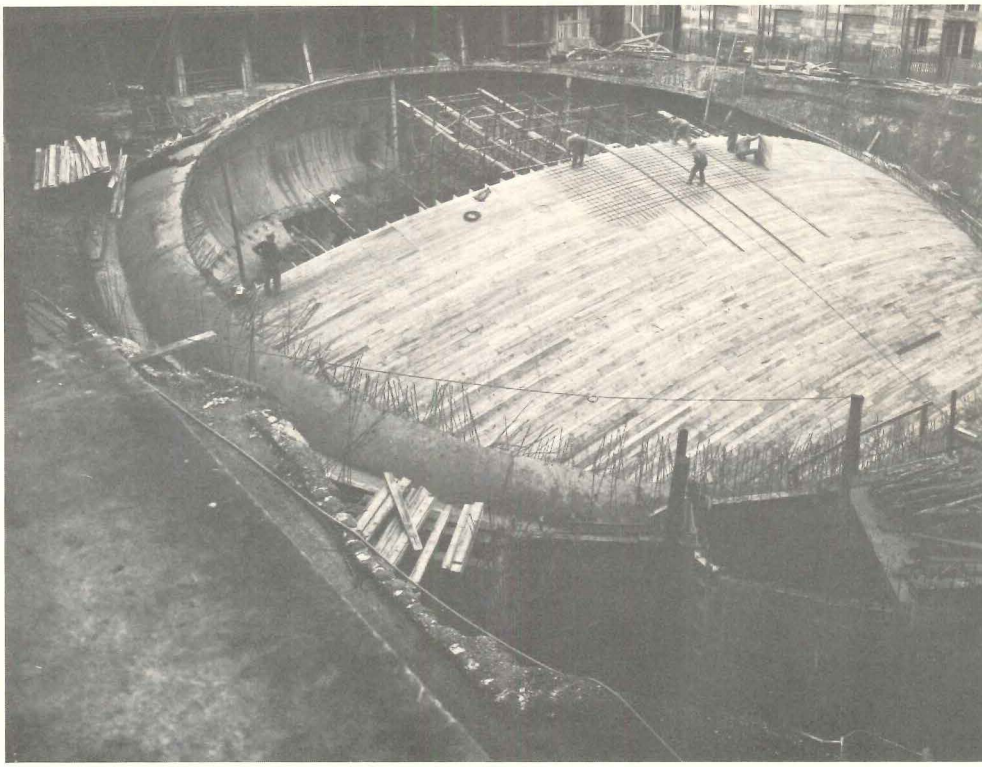


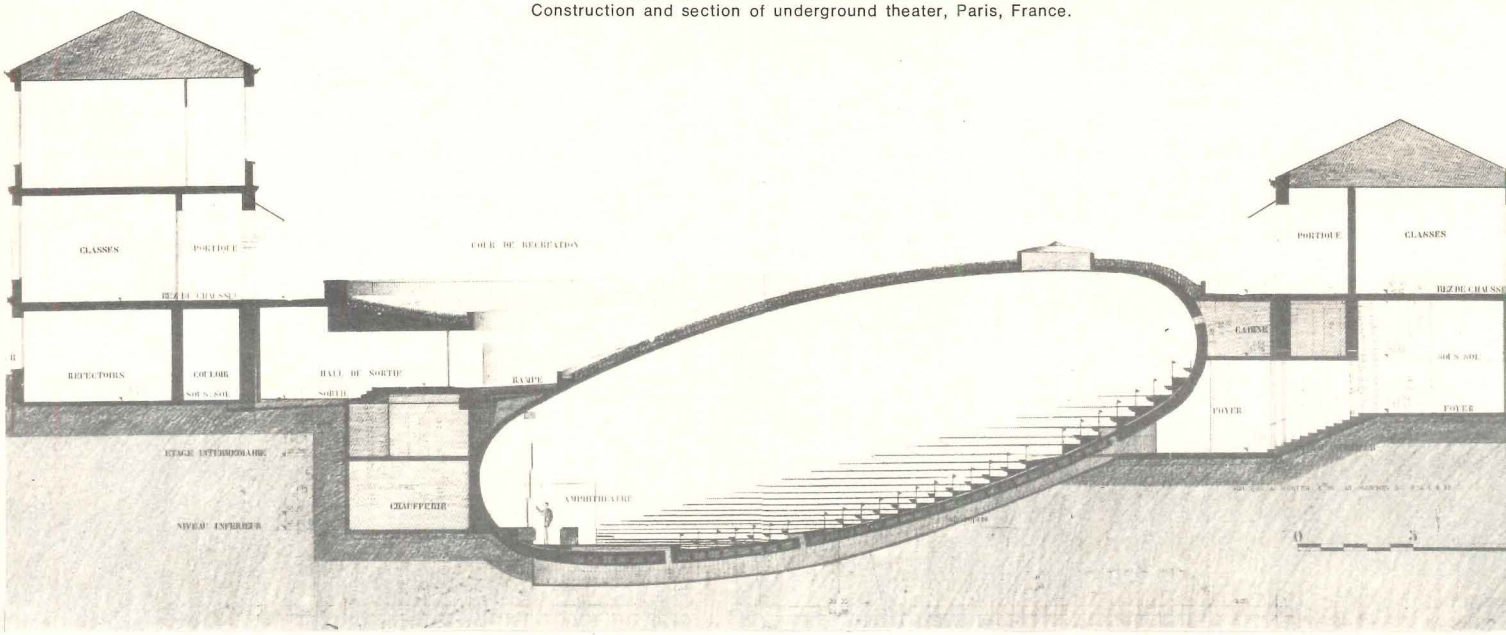




PARISIAN THEATER

Space restrictions have sent some buildings underground. When an engineering college in Paris needed a new amphitheater for 1000 students, the architects decided to build underneath a campus courtyard. The problem was complicated by abandoned mine tunnels under the site; regular flat slab construction would have required foundation piers 65 ft deep. The solution was to give the theater an ovoid shape, and thus distribute the weight over a larger area. The curved floor slab that is the underside of the egg transmits less than 50 psf to the soil underneath. This 20-in.-thick bottom slab is designed to support the structure even if the soil collapses over an area 65 ft in diameter. No forms were used for the exterior walls of the structure; concrete was cast directly against the soil. Architects for this structure of the École Nationale d'Ingenieurs des Arts et Métiers were Louis, Luc et Thierry Sainsaulieu. Structural engineer was Jean-Marie Hereng.





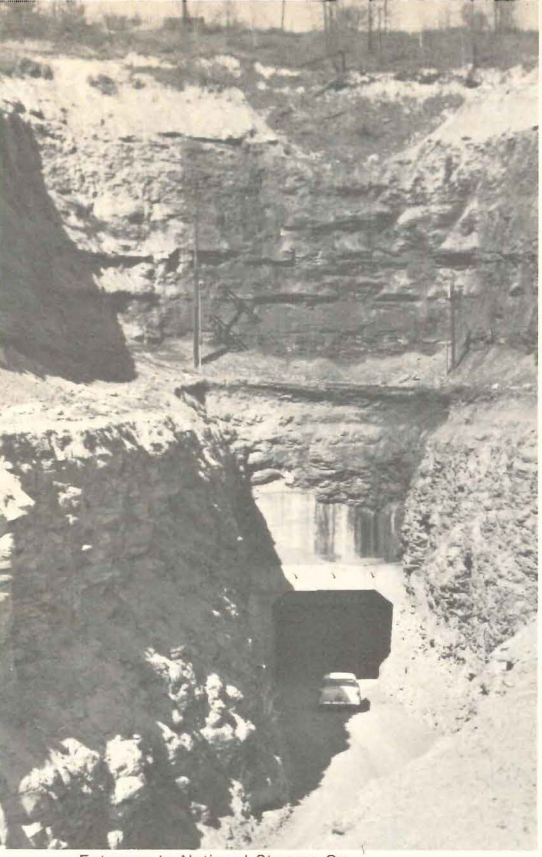
Construction and section of underground theater, Paris, France.

COMMERCE AND INDUSTRY DIG DOWN

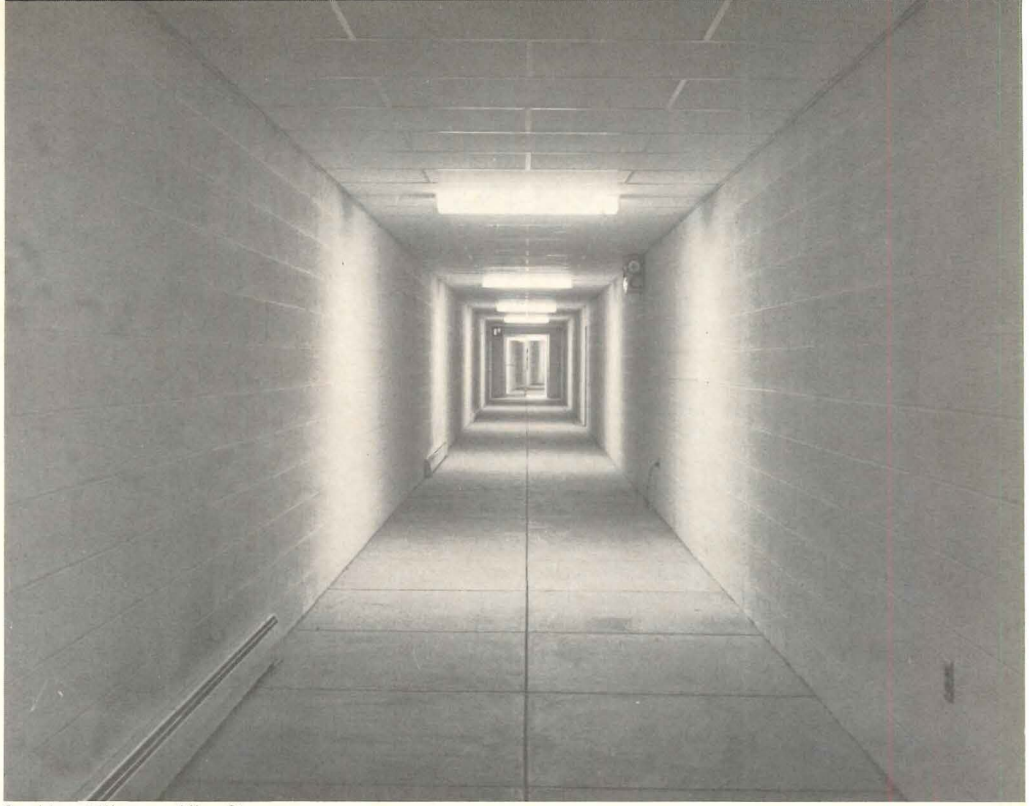
Ease of environment control and low cost of construction are two factors that are persuading some commercial and industrial enterprises to go underground.

Utilizing an abandoned limestone mine in Wampum, Pa., Medusa Portland Cement Company has constructed an 18,000-sq-ft laboratory space for approximately one-half the cost of surface installation. (Costs were lower due to elimination of excavation and roof and floor construction; 25-ft-square pillars of limestone remained from mining operations. Another factor was the constant year-round temperature of 54F, a boon to the precision work carried out by the 75 workers in the Technical and Research Center. A third factor: Heating requirements were about half the above-ground needs. A fourth: no vibration. Other tenants in the Wampum mine are Page Airways, a leader in the redevelopment of dehumidified mine storage facilities, (and part owner, with Medusa, of this facility), the Weyerhaeuser Company, and General Services Administration, which has $19 million of Civil Defense drugs stockpiled in the mine.

Another worn-out limestone mine at Boyers, Pa., an hour east of Pittsburgh, has been operated by the National Storage Co., Inc., since 1956. Among its tenants are H. J. Heinz, Koppers, Westinghouse, and Pittsburgh Plate Glass, all seeking security for their record storage,



Entrance to National Storage Co.

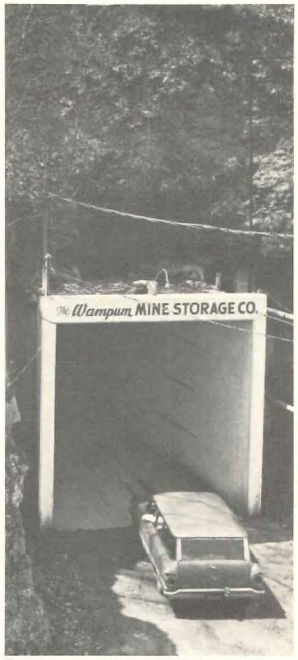


Corridor of Wampum Mine Storage.

and some providing minimal disaster headquarters. Cave walls are painted with aluminum enamel for maximum light reflection. Several hundred people already work daily in the mine. To serve the New York area, National Storage has just bought another mine along the Hudson.

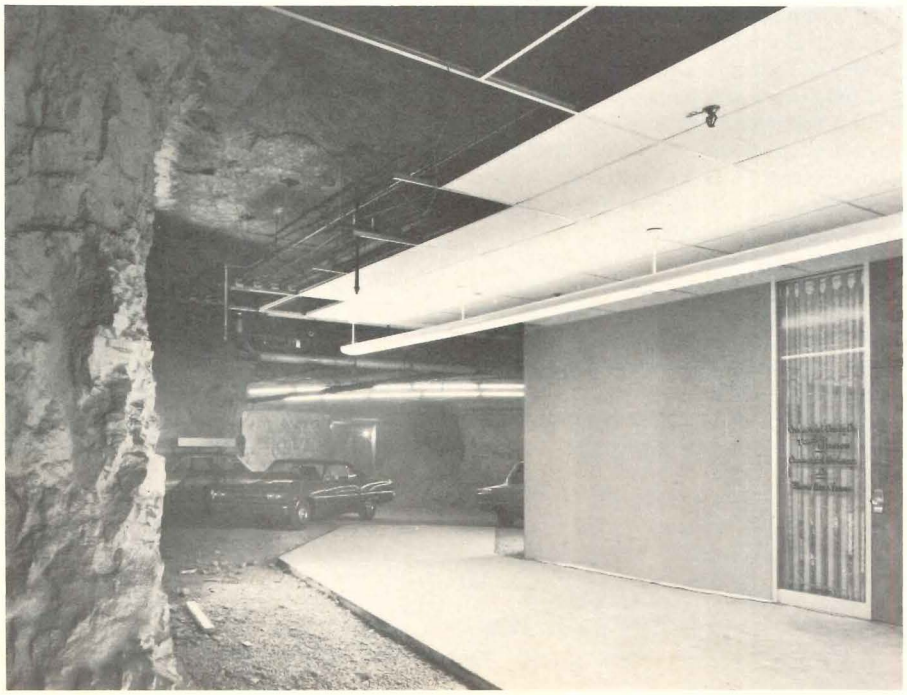
In the Midwest, 2,000,000 sq ft of underground space will represent the ultimate size of the Downtown Industrial Park Co., three minutes from downtown Kansas City, Mo. Custom-built space has been leased primarily by office-warehouse combinations, although an electrical engineer, a printer, and a commercial photographer are also among the tenants in this former mine underneath an industrial zone. Conventional earthmoving equipment is used for rock excavation, leaving huge pillars 20-ft square (which are sprayed with a cement mixture to seal in moisture and dust). Among the many advantages are rentals at one-half the aboveground rate, climate control, easy loading and unloading, safety from tornadoes, and maximum security against theft.

Constantin Doxiadis, the Greek planner, is one enthusiast of underground factories. Another is Eugene P. Foley, formerly Assistant Secretary of Commerce in charge of the Area Redevelopment Administration, who spoke on the subject at the annual conference of the Regional Plan Association last November. He has visited many underground factories, and reports that while no studies have been undertaken about the psychological effects on underground workers, the problem seems to affect chiefly those who would be ill in any dark room, closet, or crowded highway tunnel. Most people aboveground work without a window to the outside, he says, or with venetian blinds drawn over their windows.



Entrance to Wampum Mine.

Interior of National Storage.

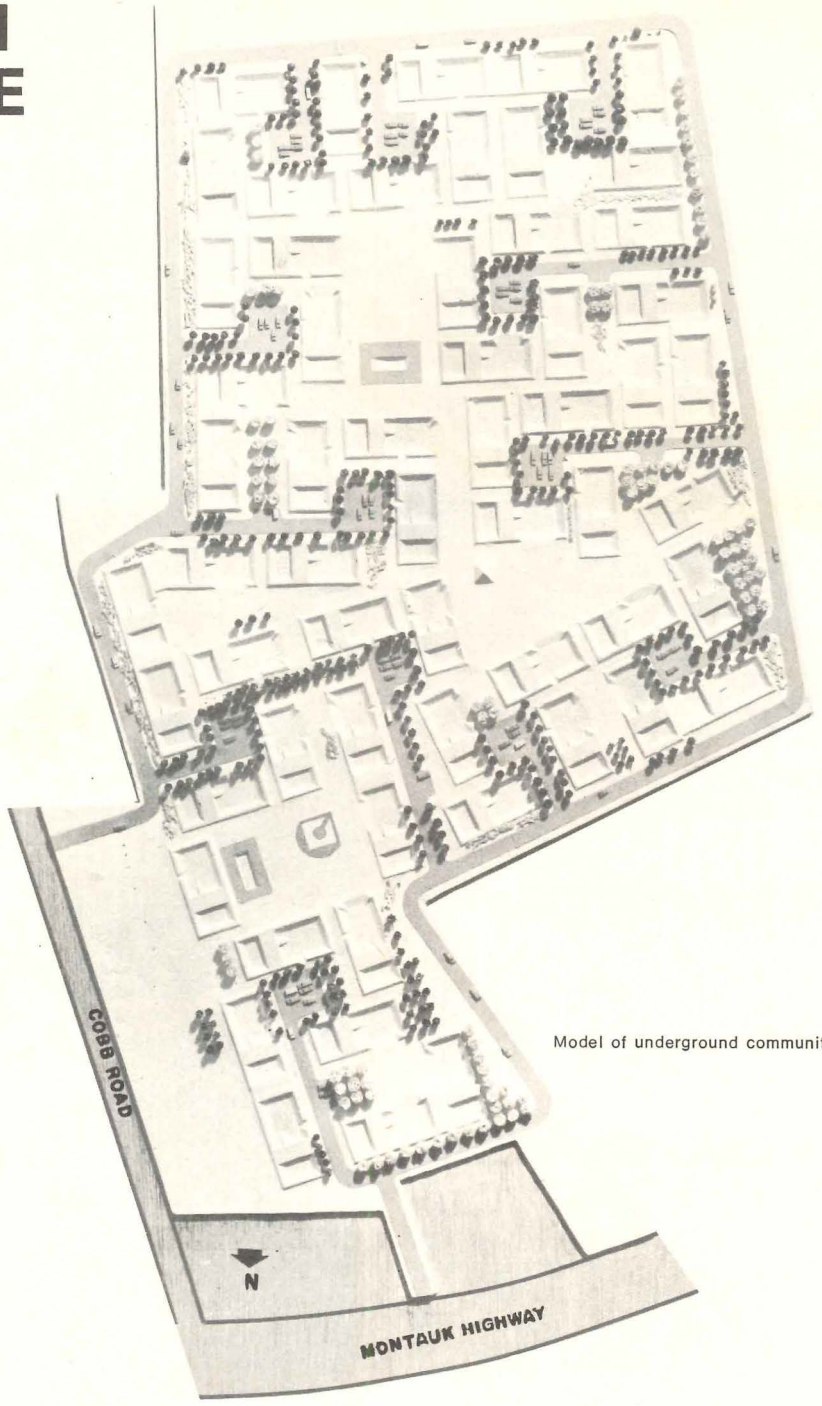


Interior of Downtown Industrial Park.

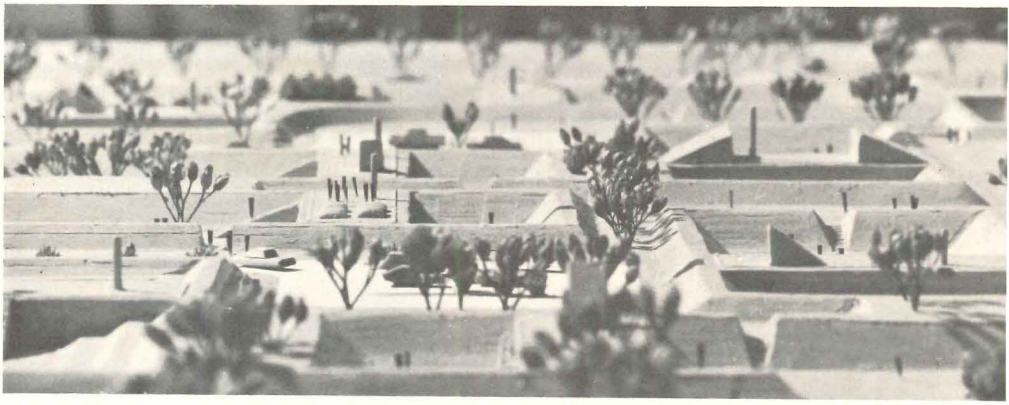
PRESERVATION OF LANDSCAPE

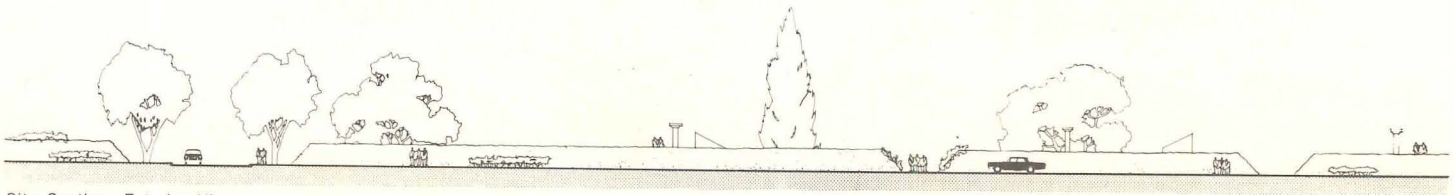
And not least of the reasons for going underground is the preservation of what remains above. Architect Richard D. Kaplan's project for a 56-acre community of homes near Southampton, Long Island, is intended to show townspeople that they can have their cake and eat it too — pressure to develop this extremely desirable area need not destroy the very values that have made it desirable. Some are skeptical, but Kaplan cites many advantages. Houses are well within the half-acre zoning, and the total is well below the 75 houses possible with a standard road plan; there are 52 houses here, with 14 acres of open space and 8 acres of roads and parking. Actually, the idea is nothing new, says Kaplan; these are just houses with fences around them. They take their shape primarily from the potato barn, with its sloped insulated earth walls, which is traditional in this area. (There is also a strong parallel to the underground communities traditional in China, as shown in the Museum of Modern Art's exhibition in New York City on anonymous architecture.) Since the houses cannot be seen from the road, it is possible to repeat virtually every house, for considerable savings. Houses are essentially row houses, but open at the sides instead of front and rear; they are adaptable for entrance along sides or end. To convince the mole-hole skeptics and also to experiment with different kinds of planting and stabilization, he will construct a trial berm this spring. Preliminary studies have been undertaken using portland cement, asphalt emulsions, or polymeric soil stabilizers to retain the slope of the berms, but higher costs for these and the inability to plant in "stabilized" earth suggest instead the use of a plant material for earth retention. Nonmowable ground cover will be used — perhaps Crown Vetch, a reseeding grass used frequently along highways. (Ivy is impractical on steep slopes, because it takes hold and grows too slowly; other excellent, although expensive, ground covers are Juniper and Rosa Multi-Flora.) The sandy soil here not only allows excellent drainage, but also permits a natural retention of the berm without hand compaction. Landscape architect on the project is M. Paul Friedberg.

Kaplan estimates that total costs will be 20–30 per cent more than conventional construction (earthmoving would be only $300–$400 per lot, but costs of earth retention and drainage are more substantial). For this premium, however, residents will have "privacy and community," and the town will have its landscape.



Model of underground community.





Site Section: Exterior View

VANISHING EYESORES

The world's largest pumped-storage hydroelectric plant may soon be built underground. Consolidated Edison has proposed to bury a new facility, at an estimated cost of $184 million, in an attempt to diminish opposition to the plant on grounds that its size and location — at the base of Storm King Mountain — would mar the Hudson River landscape. Opposition to the project succeeded in delaying Con Ed's FPC license pending further hearings that began last November.

The proposed facility would harness energy as water cascades down from a reservoir in the highlands, to produce electricity (up to 2 million kw) for use during peak loads and emergencies. During off-peak hours, the turbine generators that produce the electricity will reverse and pump water back to the reservoir (hence the name pumped-storage). The project includes the 240-acre reservoir, a 40-ft-diameter, concrete-lined tunnel leading to powerhouse and transformer galleries, all underground, and one aboveground structure, a visitor's information center. The area surrounding the information center would become a landscaped park.

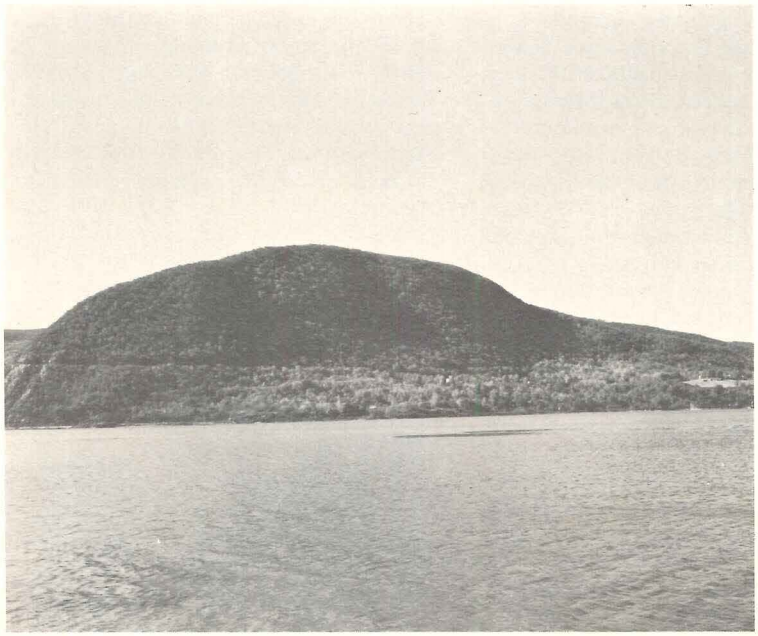
During the four-year construction period, a cofferdam will hold the river back from the construction area. The Catskill Aqueduct, supplying water to New York and the Westchester area, will also have to be relocated, since it runs under the site of the plant. As the chambers are tunneled out, excavated rock will be removed through entrance and tailrace tunnels, and used to build up the shoreline that will later be overlaid with soil.

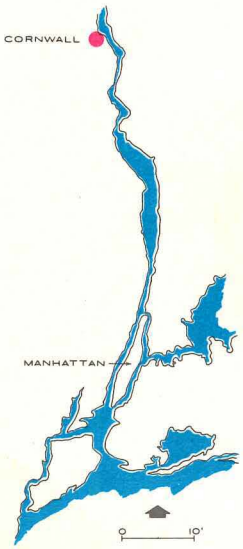
The reservoir, placed on nonerodible granite, is to be formed by five dikes, each with a central watertight core of compacted natural glacial matter overlaid with layers of compacted rock. The exterior surfaces of the dikes will be covered with topsoil and vegetation to blend with the scenery; interior surfaces will be of rugged native granite.

Con Edison also proposes to place transmission lines of 345,000-v capacity underground. However, the lines will extend only under the Hudson riverbed and inland about three-quarters of a mile. For the rest of the distance, cables will be aboveground because of the high cost (underground lines, just for the first stretch, cost $8 million more than aboveground transmission).

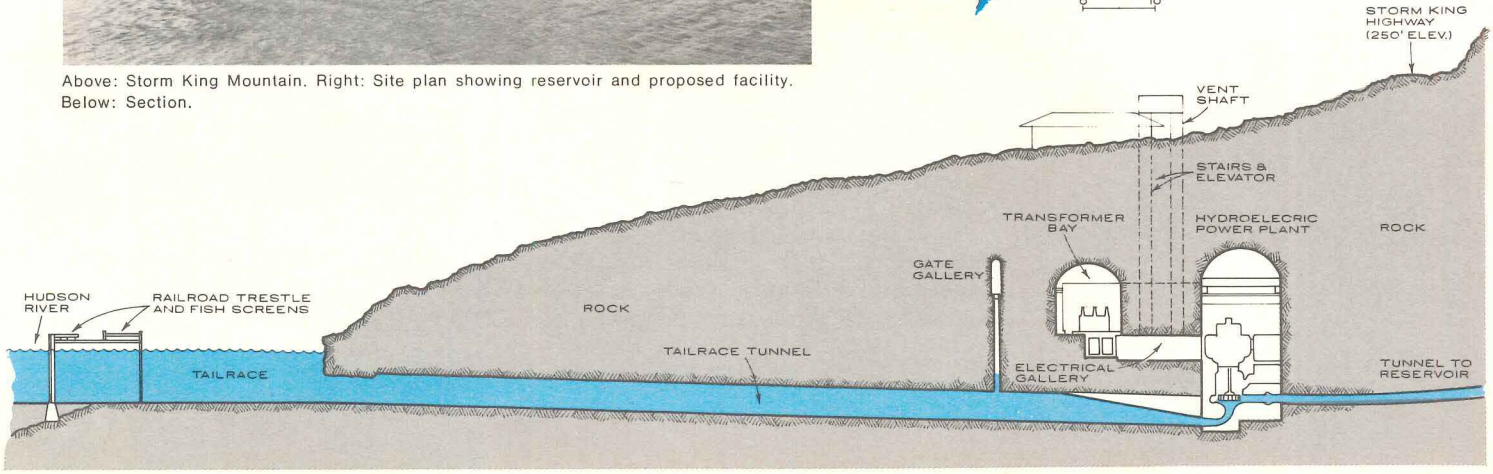
Regardless of the move underground, the Scenic Hudson Preservation Commission continues to object; their earliest protest was made in 1963, when the facility, then aboveground, was first announced. They now assert that there will be scars, and various changes for the worse all along the mountain side and the riverfront. They point out that the information center will be 37-ft high to contain ventilation and elevator shaft to underground chambers; that the bridge and its abutments carrying the railroad over the tailrace will be visible from the river; that there will be a 500-ft-long scar left from excavating rock for the tailrace; that construction roads will also leave their mark, whether turned into actual roads or removed.

At this date, the hearings in Washington, D.C., are still continuing, and will do so, it seems, for several months. All of which is quite costly for Con Ed; during 1966 alone, the company spent $197,000 in legal fees in connection with the proposed facility.





Above: Storm King Mountain. Right: Site plan showing reservoir and proposed facility. Below: Section.



CUT AND FILL VARIATIONS

The great terrace of Persepolis was 1000-ft wide, 1500-ft broad, and 40-ft high. This monumental pedestal for the most sacred of Achaemenidaen cities took nearly two centuries to build and was barely completed in time for Alexander the Great to destroy it in 330 B.C.

Two-and-a-half millenniums after the founding of Persepolis, we could, by lining hub to hub all of our operational earthmoving equipment, move the volume of earth in that great terrace in about two hours. And we would then probably proceed to cover it with developers' houses in less than three months.

The earth would be moved with a minimal labor force, using highly efficient equipment from which the ancient Persians would have fled in fear. But when it came to building the houses, we would employ techniques easily comprehended by those ancient builders, and build houses that would probably not endure the short life-span of Alexander the Great.

In his examination of Persepolis, Arthur Upham Pope found that the monumental terrace and the buildings upon it were planned as an entity. The complex subsurface systems for water supply and drainage that had been cut out of the solid rock before construction was begun had outlets corresponding exactly to their later use, although the project was in the works for about 175 years — a feat not always matched by contemporary developers on projects built in a few months. Precision, however, is not the primary difference between the ancient builders and ourselves. Their mounds, terraces, and pyramids of classic and preclassic history were extensions of the same technology that created the buildings that rested upon these mounds, as can be seen at Persepolis. In contrast, earthmoving equipment today is used to site buildings whose structural technology has not changed since foundations were dug with pick and shovel or hoe and basket.

As another example, the pre-Columbian builders of Mexico and Central America, halfway around the world from the Achaemenidaens, although a Stone Age culture, were no less consistent in their constructions. Their mounds and pyramids were built primarily with the same two techniques they used to construct their buildings. The sun-dried adobe brick of the huge pyramids of Teotihuacan were also used to build Toltec dwellings, and the rubble-lime concrete monolithic constructions of the pyramids of Yucatan also formed the cores of the temples that rested on them. Both methods are logical extensions of structural techniques of societies lacking beasts of burden or the wheel, and whose compacting equipment would have to be hand-operated.

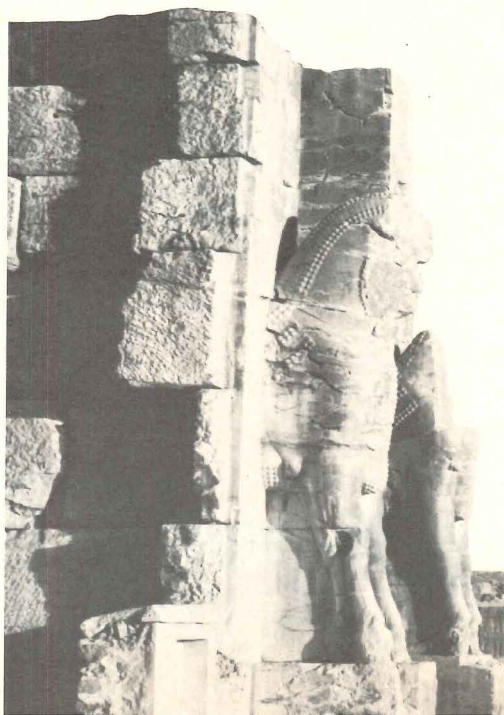
The ancients could not undertake their monumental projects unless they first possessed an abundant labor force and an agricultural surplus. Contemporary earthmoving is also dependent upon economic factors, although these involve neither agricultural nor human resources. Contemporary earthmoving is dependent upon a simple algebraic equation: The cost of earthmoving on the one hand must equal land value plus profit on the other.

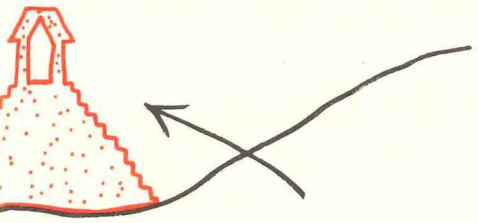
The variables in this equation are approaching unity with increasing frequency, as land value is forced up by expanding population on the one side and earthmoving technology improves and becomes more economic on the other.

Although we are dependent upon earthmoving due to favorable economic circumstances, we differ from the ancients radically in the dichotomy that exists between our moving and building technologies. We find ourselves forced into the highly developed technology of earthmoving precisely because of the demands of antiquated, uncoordinated building systems. Cut and fill in development housing must follow the contours of safe and sure profit. It is our building techniques that dictate these contours — building methods that are maintained by codes, by a fragmented industry lacking the application of major research and lacking also adequate architectural design participation.

It seems useless to find fault with developers. Architects have not devised a dwelling that solves the problem any better. Even if architects were able to solve the problem, and despite the few excellent examples of housing that do exist, the problem seems to lie elsewhere. The cost of the house and site are only about one-third of the total cost. The remainder is absorbed in financing and services, as Sim Van der Ryn of the University of California has pointed out. The recent increase in interest rates, points out Van der Ryn, wiped out a 25 per cent saving in building costs that might have occurred through improved building design and technology.

It seems that, today, our hosts of high-powered equipment are often used to change the face of the earth for as little reason as Alexander the Great had in destroying Persepolis.





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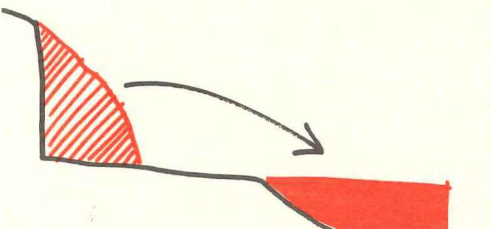
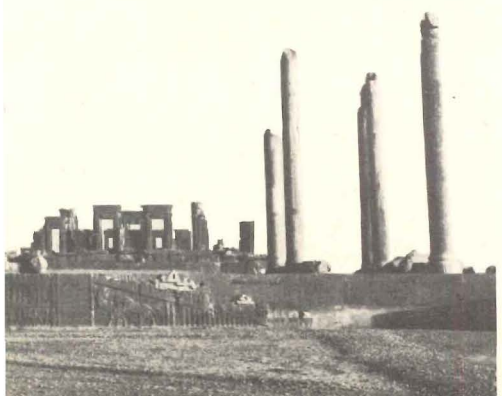




THE ECONOMICS OF CUT AND FILL

"The hilly land overlooking the Pacific Ocean near San Juan Capistrano, California, had been always considered good only for ranch use, or if utilized for residential development, the rugged hills would only allow low density use. This was the case until some progressive developers, with the help of Caterpillar 657 Tractor-Scrapers, began literally moving mountains to manufacture homesites in what will be a high-density community in the rapidly expanding Capistrano area.

"It is necessary to move about 10,000 cu yds of dirt to develop each home building site. The 657's make it possible to bring the cost of earthmoving within an economic range unattainable with the smaller, single-engine scrapers.

"Today, the market for these lots sets the earthmoving cost limit at $3000 per lot. The land is divided into 3.2 lots per acre.

"The present phase of the project is a 300-acre section containing 92 home building sites. Over 1,500,000 cu yds of fill were used to produce a 43-acre site, which will eventually house a shopping center, office complex, and multi-residential development. . . .

"A local contractor is doing the earthmoving and hopes to be engaged in moving earth for years to come, reshaping thousands of acres of land in this prime location."

From **Caterpillar News,** *Peoria, Ill.*

San Juan Capistrano.

Tandem Powered 657.

The Lot of Cut and Fill

Serramonte, a project covering 1000 acres of hilly land, has an elevation differential of 500 ft. Located south of San Francisco, along the Bay side of the peninsula, on a ridge parallel to and approximately one mile from the Pacific Ocean, the development is a joint venture of the Standard Building Company and the Crocker Land Company, which are under the supervision of Suburban Realty of San Francisco. Serramonte will be developed in several stages and will eventually take in 3000 or more lots.

Fills of 200 ft will occur between the 650-ft-high hilltops and the 150-ft-above-sea-level creek bottoms. Slopes on the site average 25°, with some 50-ft-high vertical cliffs.

The hills are composed of marine deposits, with minor amounts of clay and clean beach sand. The sands are highly erodable, and several deeply incised creeks flow through the area. Creek tributaries have created badland formations, with ponds formed in depressions created by changes in run-off or erosion. These are filled with peat to depths of 20 ft.

Soil engineers and geologists from Woodward, Clyde, Sherard & Associates' Oakland office were involved in the planning phase, consisting of a detailed geological and engineering study and supervision of work through the design and construction phases.

Major earthmoving spreads, reaching placement rates of 500,000 cu yds per month, required close supervision to insure proper foundation preparation beneath fills and proper compaction of the fill material. Soils very difficult to compact were encountered, which required day-to-day decisions as to how they were to be utilized.

The four stages presently contemplated will utilize about 50 per cent of the land area. Planning for the remaining land has not been completed. However, it is estimated that approximately 12 to 14 million cu yds of fill will be required to complete the grading. Of the 10 million cu yds of earth moved to date, the first 5 million cost 24½¢ per yard. The remaining yardage moved in the ensuing three phases averaged 27¢ and 37¢ per cu yd.

Tractors and scraper hauling units, equipment standard to any major highway project, have been used to date. A large amount of the yardage involved required relatively short hauls, in which tractors could be used efficiently. Compaction equipment was standard tractor-drawn sheepsfoot, the self-propelled tamper-type roller, and self-propelled, rubber-tired compactors.

Serramonte Development.

The Developer Who Can Either Take It Or Leave It Alone

Mountain Park is a large natural area of approximately 11,000 acres situated in the midst of the Santa Monica Mountains in California. It lies within the extreme westerly boundaries of the city of Los Angeles, with the Pacific Ocean to its south.

Los Angeles civic groups concerned with conservation and proper use of the area's natural geographic features precipitated the preparation of a master plan for the development of the Santa Monica Mountains after the Sunset International Petroleum Corporation purchased approximately 3550 acres of the total park area, which is now known as Sunset Mountain Park. The master plan was adopted by the Los Angeles City Council in July 1964.

A variety of natural features that characterize the terrain include steep inclines, rocky ridges, broad slopes, and wide bowl areas. Its dominant characteristic is the large bowl formed by the Tamescal and Topanga ridges at the rim and Santa Ynez Canyon as the basin. Elevations on the property range from 500 ft to 2000 ft above sea level. The location of the site and elevations within it provide magnificent promontories overlooking the ocean, the city, and the surrounding mountain ranges.

The developers state that they realized from the beginning that the challenge of the vertically accentuated topography and the exploitation of the potential views would dominate the architectural expression of dwellings located on the site.

Two alternatives are, of course, open to Sunset Petroleum — cut and fill, or building on an undisturbed site. Both have been proposed and designed. The former seems the closest to realization. This scheme calls for a range of residential buildings that, according to Sunset Petroleum, have been "related to projected market demand" (see plans and drawings).

A series of grading studies were conducted in which fills were placed in canyon areas in order to "buttress" the adjoining, unstable slopes. Studies were also made to remove unfavorable or potential slide areas by cutting or removing the surcharge.

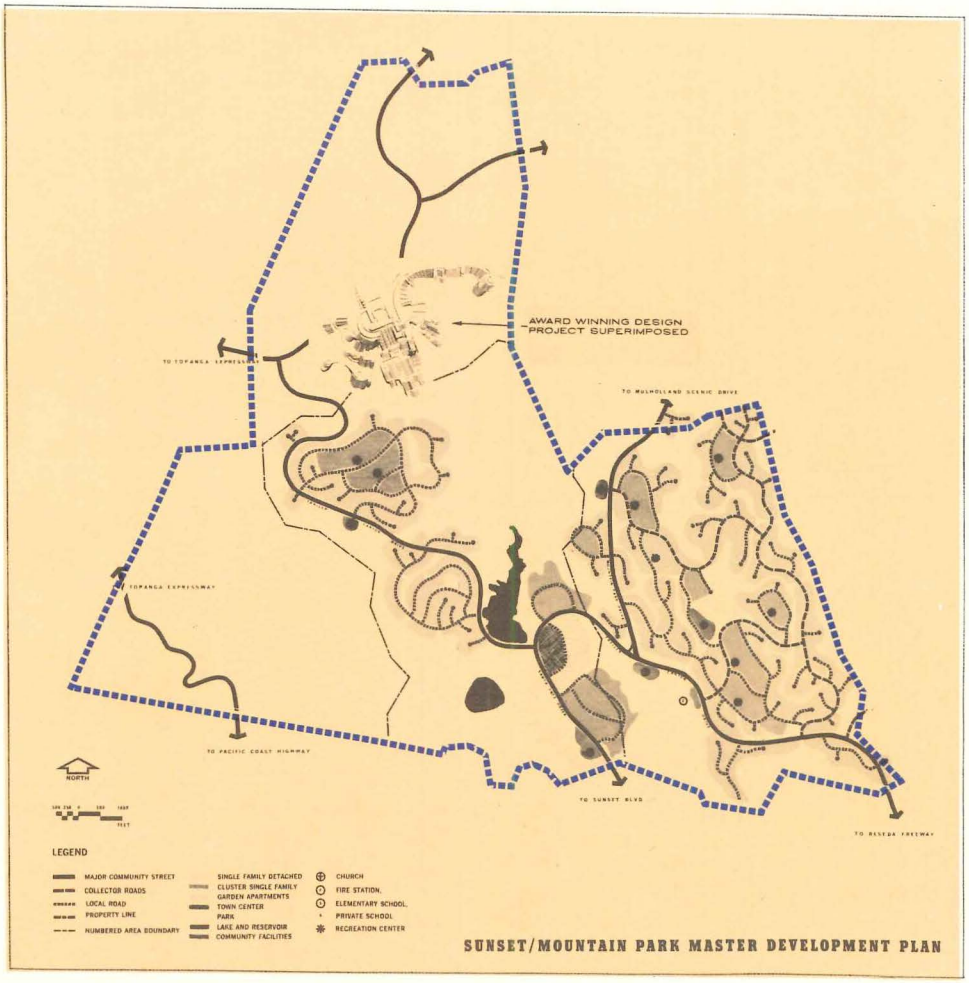
According to the developers, the results of these studies have indicated the possibility of solving geological problems through selective grading in a manner that is economically feasible. It was also found that there is sufficient land area that can be rendered usable in order to insure a logical development pattern; the amount of grading, though substantial, will not significantly alter the over-all character of the site, according to Sunset.

The Urban Nucleus design proposed by architects Daniel, Mann, Johnson & Mendenhall, for which they won the First Design Award of the Thirteenth Annual P/A Design Awards Program, is apparently

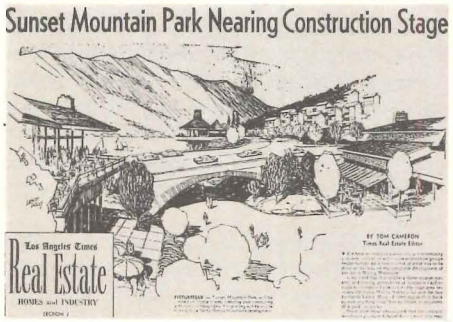
scheduled for later development, since it does not appear in a description of the first eight phases by Sunset, and was not mentioned in the announcement of impending development of the area in the *Los Angeles Times* article that heralded the imminent beginning of construction (see newspaper clipping).

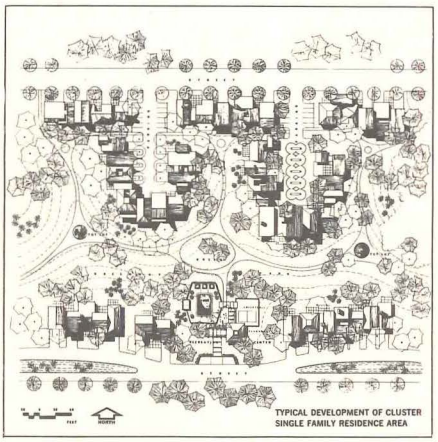
The DMJM structure would follow the contours of the site and was designed to stabilize the slope with a system of concrete anchor ties set against grade and hung from a diaphragm system at the top of the hill at garage level. Piles would pin the building against shear (see JANUARY 1966 P/A).

In describing the design feasibility of this proposal, the jurors noted, "If the land were developed along conventional lines, the whole area would be covered with houses like a carpet, leaving space for nothing but roads, parking lots, and shops. Terraced pads would require excessive grading and leave unnatural earth banks and scars."



SUNSET/MOUNTAIN PARK MASTER DEVELOPMENT PLAN


Sunset Mountain Park Nearing Construction Stage
Los Angeles Times
Real Estate
HOMES and INDUSTRY


TYPICAL DEVELOPMENT OF CLUSTER SINGLE FAMILY RESIDENCE AREA

THE ENGINEERING OF CUT AND FILL

The Balanced Art: Three Stadiums

To the engineer, the objective of earthmoving is the efficient balancing of cut and fill operations. Instead of leveling the land to meet the requirements of antiquated building technologies, he designs the earth in terms of its efficiency, as part of the architectural engineering of the structure.

Earthmoving can be a highly efficient engineering operation according to Captain Praeger of Praeger-Kavanagh-Waterbury, engineers and architects of New York City. "It's cheapest to sit on the ground," he says of the new Dodger and Falcon Stadiums. "Seats have to be raised and it's a question of whether you use dirt or steel."

By calculating for the cut to match the fill and "where we get it and where we put it," these architects-engineers devised economic earthmoving operations, two of which are presented here.

Falcon Stadium

Exactly balancing cut and fill, 900,000 cu yds of earth were moved on the rolling plain outside Denver, Colorado, in building Falcon Stadium, designed by Praeger-Kavanagh-Waterbury. In a high-speed operation, a fleet of seven scrapers, assisted by two rippers and five pushers, moved 730,000 cu yds of earth to scoop out the base of a U-shaped foothill to form the basin of the stadium structure. While construction proceeded, six pushers, two graders, two sheepsfoot rollers, and five scrapers were teamed to move 140,000 cu yds in the grading of the access roads and parking lots. The over-all cost averaged about 30¢ per cu yd.

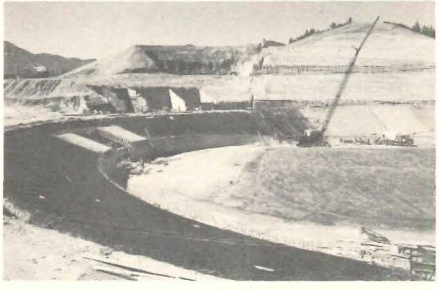
Dodger Stadium

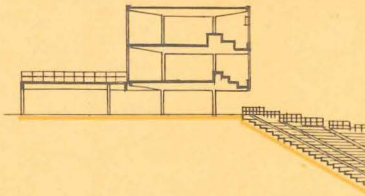
Costs were reduced at Chavez Ravine near Los Angeles in the construction of the new Dodger Stadium by cutting the main grandstand into the hillside in four terraces and stabilizing them with 2-in. air-placed concrete over welded steel mesh. Parking for each terrace is adjacent and on the same level.

The first phase of earthmoving of this Praeger-Kavanagh-Waterbury project was to cut a huge U-shaped hill to form the basin for the stadium structure. This was a high-speed operation to prepare for the precasting yards on the site. Cuts and fills up to 150 ft required the moving of 7680 cu yds of earth at a cost of 32¢ per cu yd. Scrapers were assisted by tractor pushers in this operation. Production was reported to have reached a maximum of 20,000 cu yds per 8-hour shift. The second phase, in which 5 million cu yds of earth were moved and carried to five separate fills, involved the use of scrapers coordinated with tractors. Wide variations in haul distances, the necessity of by-passing incompleted property settlement areas, and the obstruction of a large water main, lessened the scraper fleet's production average to 1500 cu yds per day per machine.

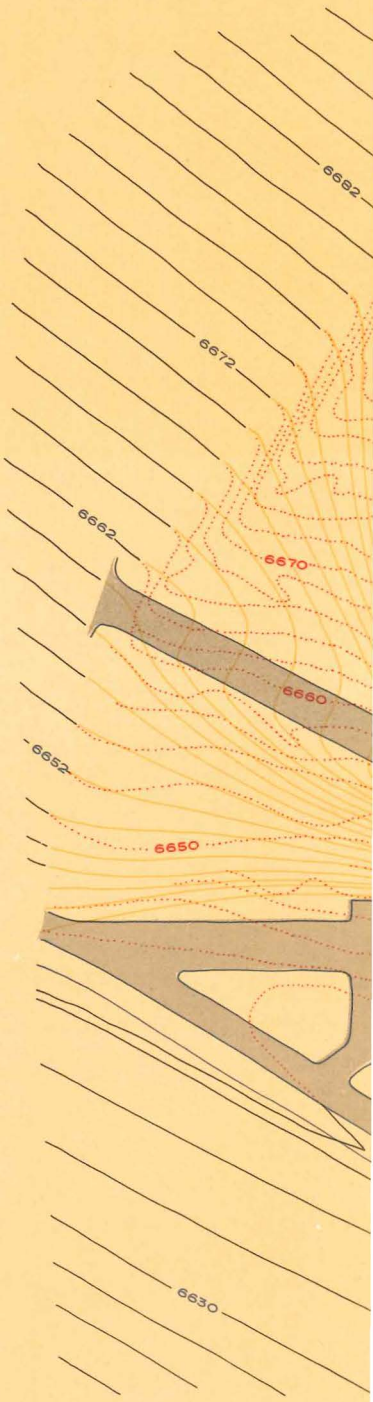
Eight benches 10 ft to 15 ft wide, following the arc on the slope around the top of the hill, were cut by the contractor. The bench excavations were made by working from the top terrace down with four backhoes, and a tractor fitted with a contractor-built 12-ft-long angle blade. The average earthmoving cost was about 30¢ per cu yd.

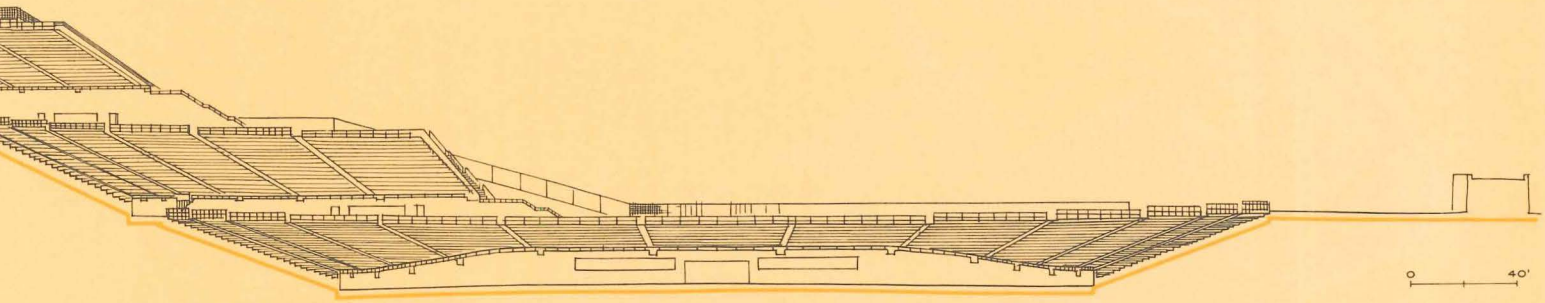
Falcon Stadium.





FALCON STADIUM

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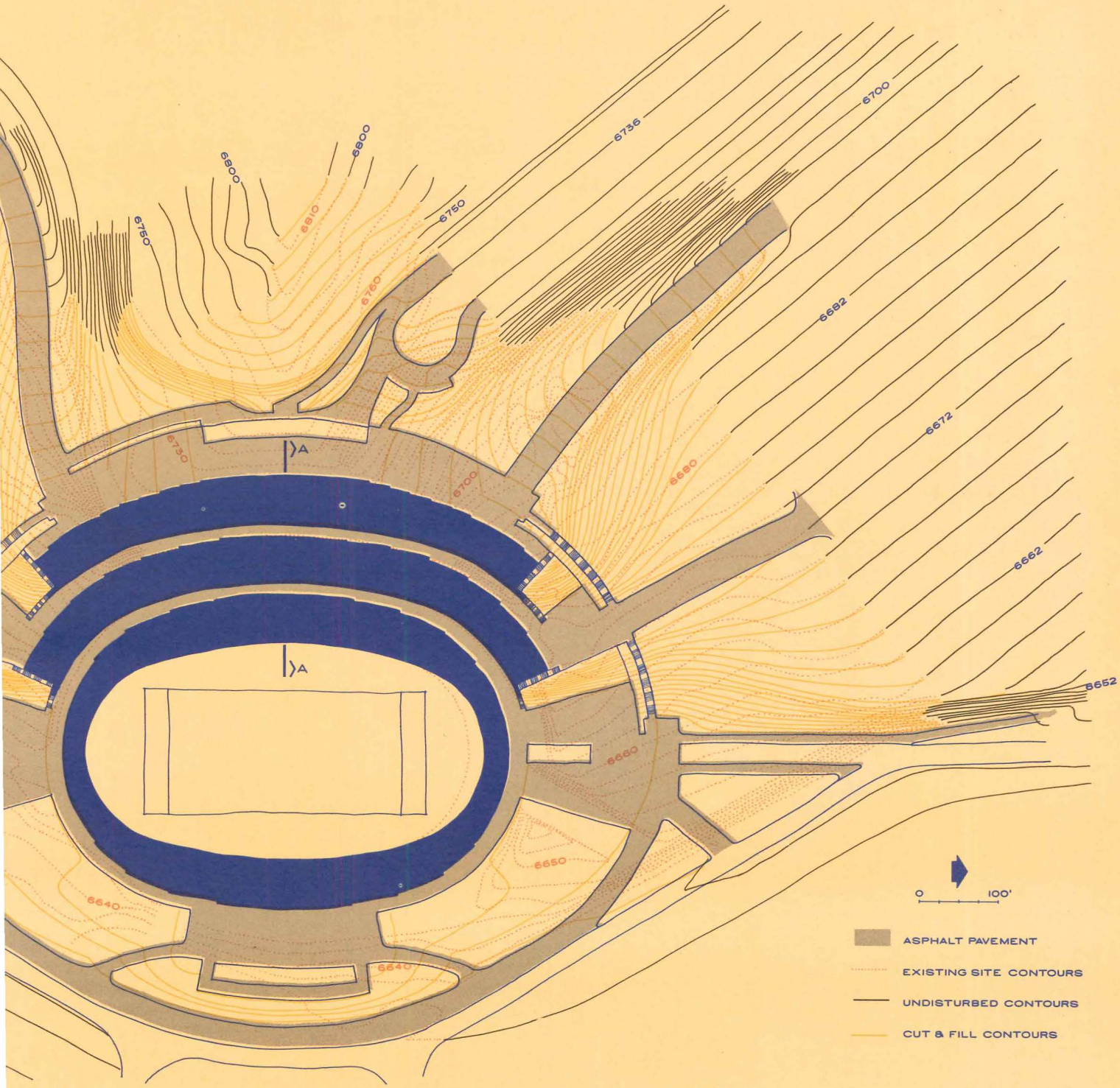
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ASPHALT PAVEMENT
EXISTING SITE CONTOURS
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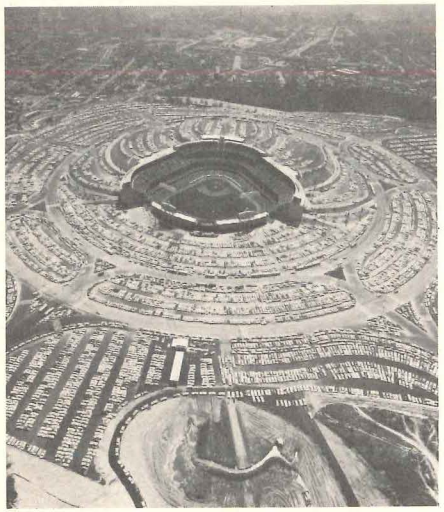
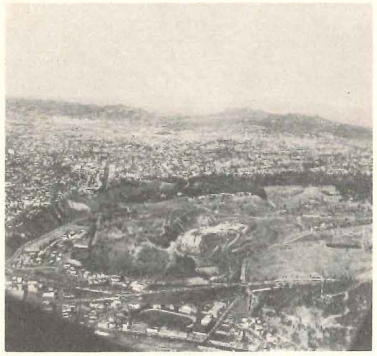
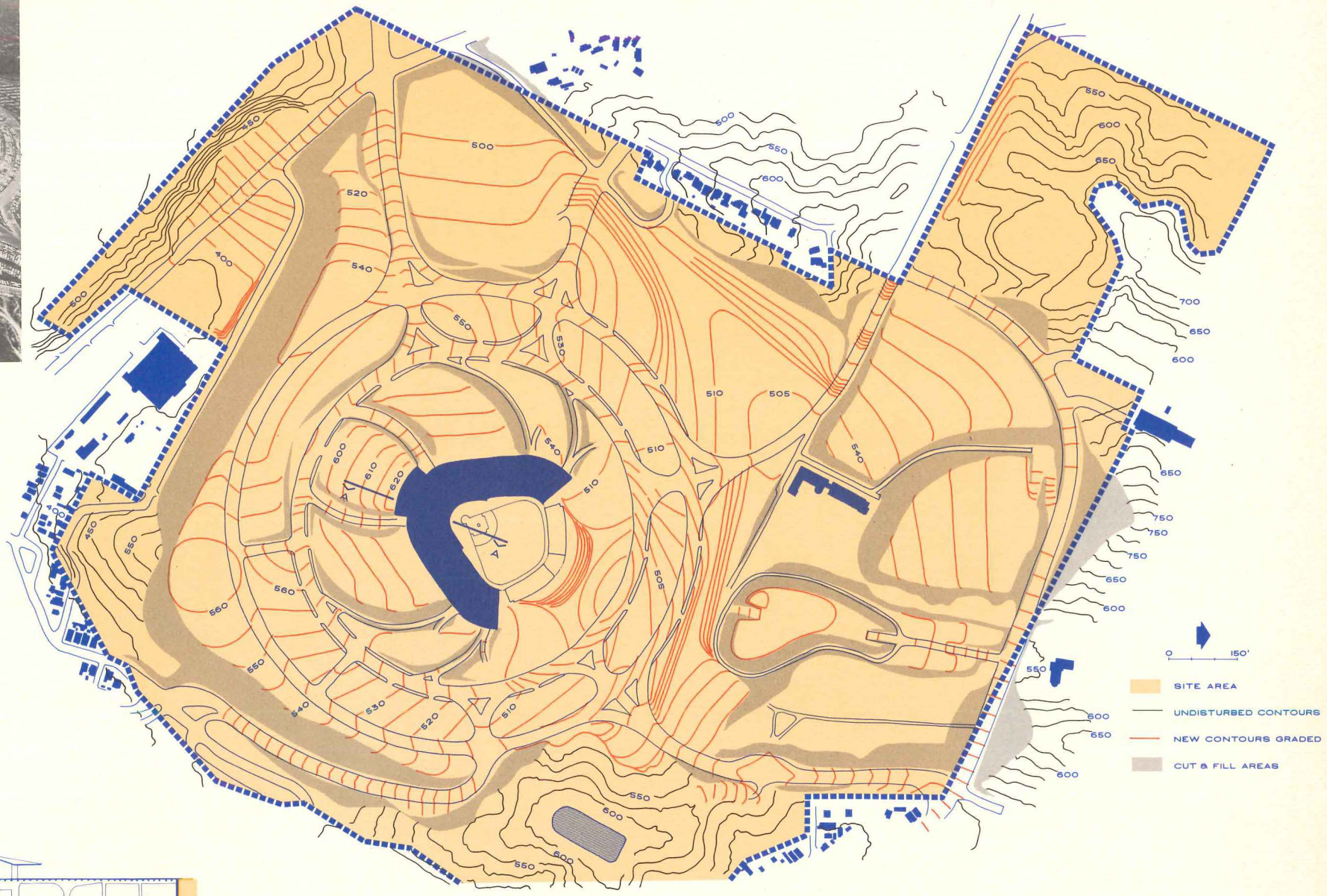
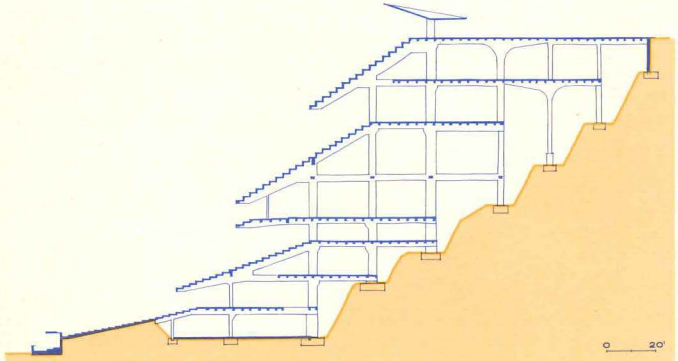
CUT & FILL CONTOURS

DODGER STADIUM









AUTZEN STADIUM

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Section B–B

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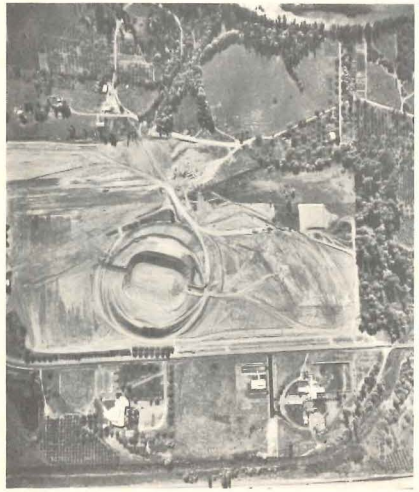
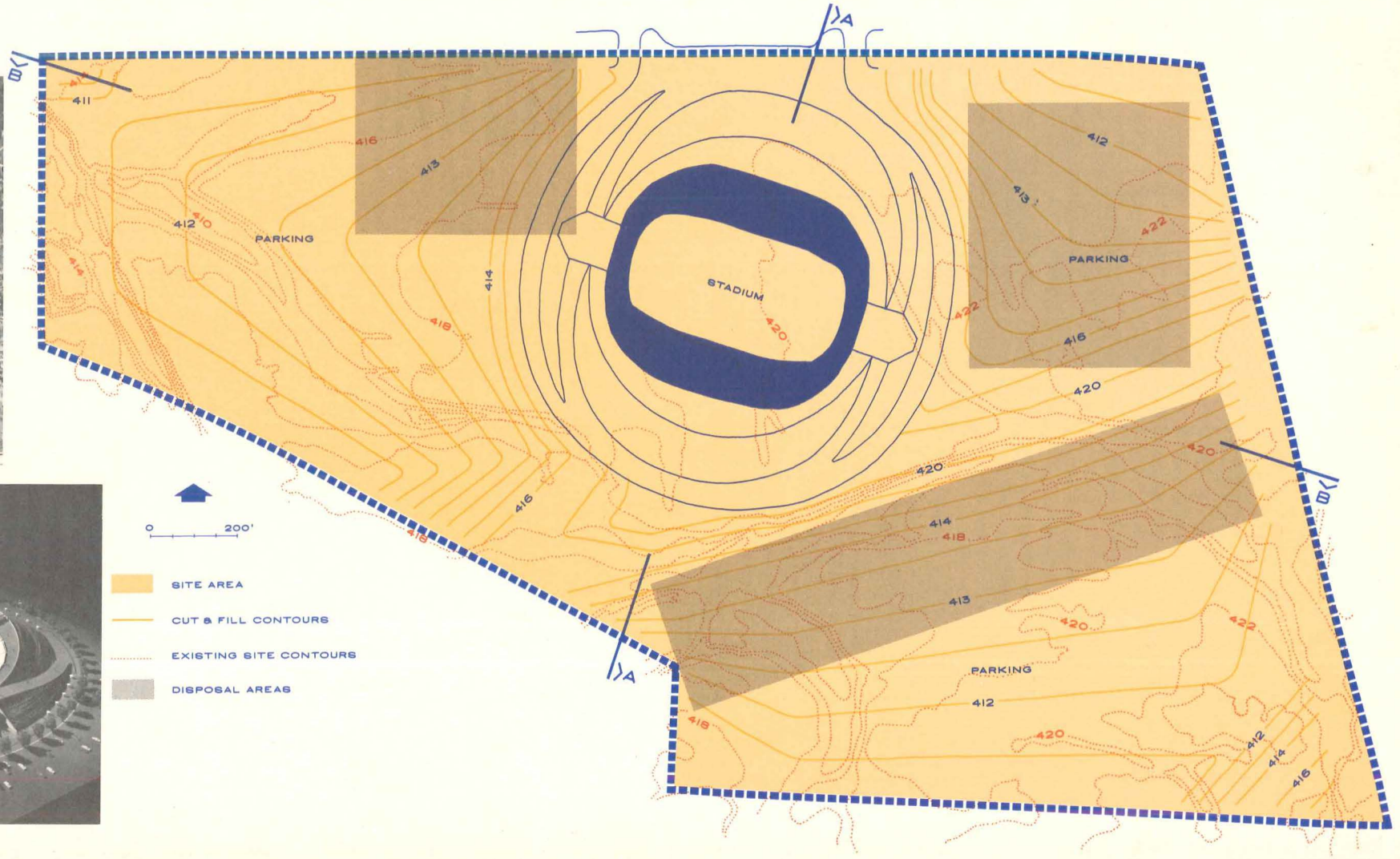




Autzen Stadium

Using fill from the site, a large earthen bowl seating 40,000 was designed by architects Skidmore, Owings & Merrill near Eugene, Oregon (see previous page). The football stadium will have all seats on grade, except 900 at each end-zone that are located above team rooms and storage areas. Broad earthen ramps, beginning at the top edge of the bowl and leading down the outer sides, will provide access.

A high water level and suitable on-site material influenced the architects in their design of this on-grade structure. The stadium, now under construction, will be completed in two phases: In phase one — grading — the top layer of inorganic silts covering the entire site was stripped, and either buried in disposal areas or stockpiled for future landscaping use. A stratum of silty sands occurred below this top level, which proved suitable for the stadium fill. This stratum varied in thickness from 1 ft to about 8 ft. Beneath this was a thick stratum of poorly graded gravels, which also was suitable for fill and was used in conjunction with the silty sands.

While materials available on the site proved satisfactory, the architects were faced with another problem in the form of a high water level. They located the finished field level at approximately 3 ft above high water level, and the outer edge of the parking area approximately 2 ft above that point.

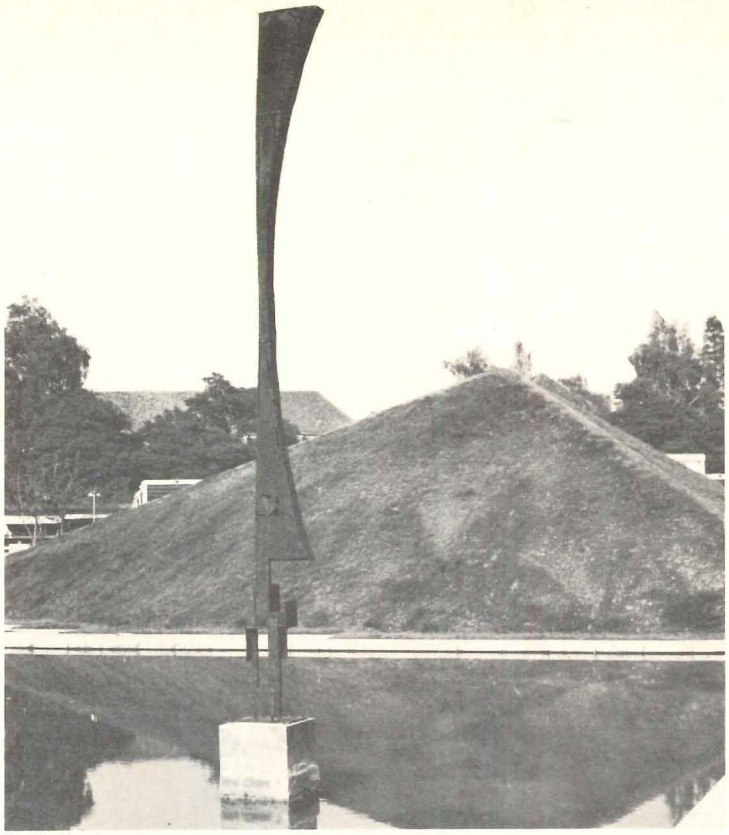
No off-site fill was required and no on-site fill was removed, since all available fill was needed to provide a maximum differential between finish grade and water level. The final adjustment between required stadium fill and excavation was accomplished by varying the slope in the parking areas.

There were two major site problems. Two large water mains 30 in. and 45 in. in diameter crossed the site diagonally. These dictated the stadium location and made necessary a slight hump through the site to maintain minimum cover. The budget would not allow relocation. The second problem was unexpectedly encountering approximately 2 acres of sanitary fill at one corner of the site. The finish contours of the parking areas were adjusted, leaving this sanitary fill undisturbed.

The architects are convinced that it was necessary to utilize this type of construction to meet the construction budget established by the university. Any other method, they say, would have nearly doubled the construction cost.

The site grading contract was accomplished with the following equipment: seven scrapers; three tractors; two vibratory rollers; one water truck.

The total construction cost is approximately $2 million. Primary unit prices are as follows: Excavation below stadium fill, 26¢ per cu yd; stadium fill, 32¢ per cu yd; watering, $2.20 per 1000 gals; parking area fill, 40¢ per cu yd.



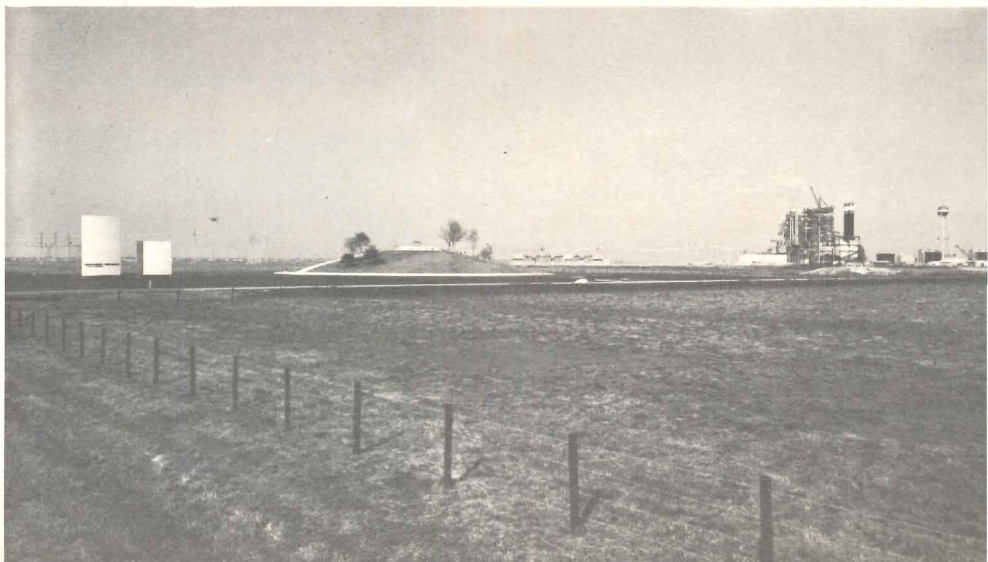
Poet's Garden.

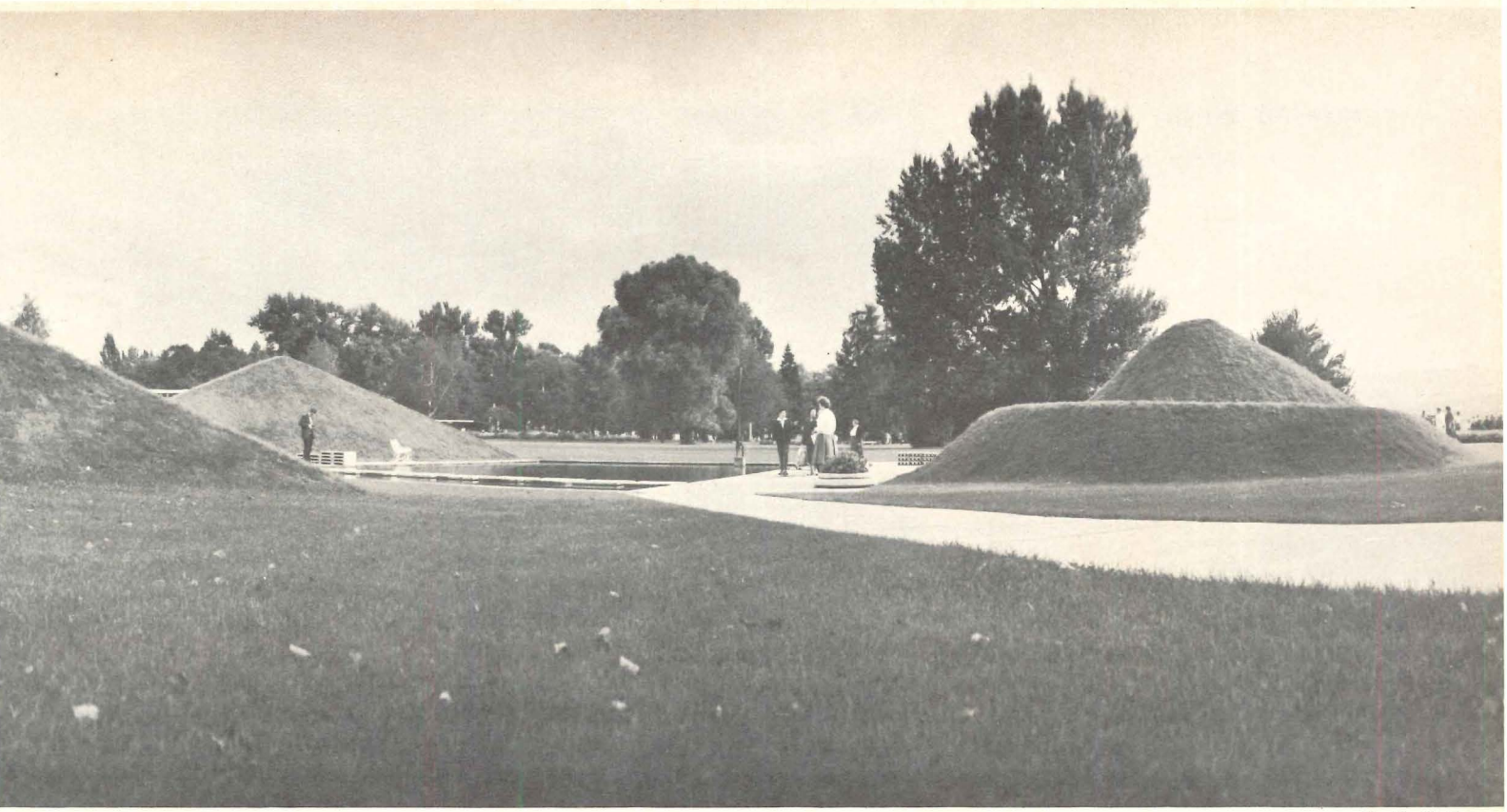
THE ARCHITECTURE OF CUT AND FILL

"The question is one of form, not technique. Earthmoving is a highly developed practice today. Specialists devote their entire lives to studying soil behavior, perfecting sophisticated machines for transfiguring the earth's surface, and executing daring projects for one purpose or another. Techniques of molding the earth are highly developed, while our utilization of these techniques in architecture and planning is largely undeveloped. The earth walls of an expressway may be arranged to spatially define a community or they may cleave it in two. A hillside may be shaped to preserve a landmark and provide a panoramic view, or it may be flattened to a monotonous plane. Earth may guide the pedestrian through a delightful sequence of interior and exterior spaces of a town quite as gracefully and conveniently as it now serves the automobile."

WILLIAM MORGAN

Generating Station Landmark.





Poet's Garden.

The Grass Mound

A circular mound that is slightly interrupted by stone steps encompasses negative and positive earthen forms. An upended boulder stands as the only other sculptural element within the sunken circle.

This entire composition, which was designed by architect Herbert Bayer at Aspen, Colorado, is covered by closely cropped grass. The height, from the lower level to the top of the mound, is approximately 5′-6″.

Sharp Cut

Spatially molding pure formal elements, landscape architect E. Cramer sought to avoid any natural analogy in this design for a Swiss garden exhibition. Sharply angled earthen mounds, combined with water and concrete, compose the only formal elements of the composition.

Mound of Power

To bring a large electricity-generating plant to the public's notice, architects Wilson, Morris, Crain & Anderson sculptured a knoll on the flat prairie land adjacent to Galveston Bay, near Galveston, Texas.

The conical earthen mound is part of an abstract site sculpture that attracts attention from the main highway. The cone is the center of the composition and is intended as an accent to the empty prairie.

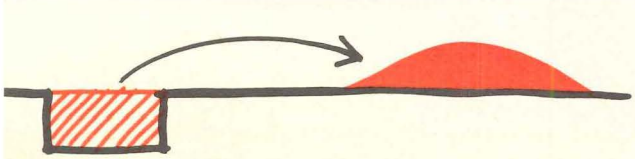
Steps lead to the top of the mound, where a terrazzo map, located between two benches, shows the position of the power plant in relation to the company's area of operation along the Gulf Coast.

The 1200 cu yds of fill was moved by trucks, and was obtained on the site from the excavation of the foundations for a neighboring power-generating building.

The mound was constructed in two-and-one-half months. Equipment used included trucks, bulldozers, sheepsfoot rollers, "dishes," and cranes. The earth was compacted and wetted; no stabilization was necessary. Costs are not available.

The landscape architect for the project was C.A. Tapley.

Poet's Garden.



Grass Mound.

Displayed Earth

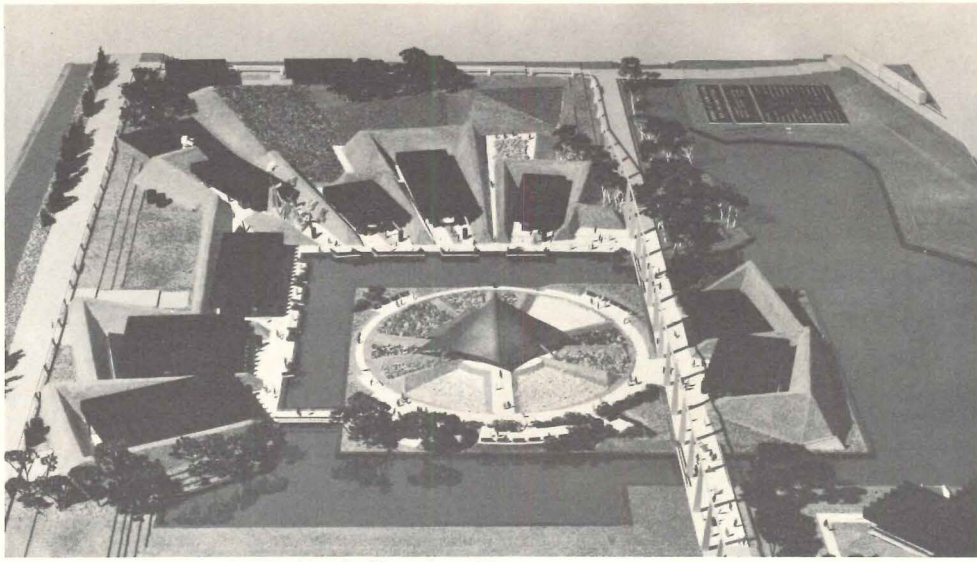
Landscaped mounds are used as walls and backdrop for the exhibitions of Man the Provider Pavilion at Expo 67 in Montreal, Canada. Dobush, Steward Bourke, Longpre, Marchand, Condreau, who were consultants to chief Expo architect Edward Fiset, state that they were "attempting to find a device that was somewhat out of the ordinary and at the same time consistent with the theme of the pavilion — agriculture."

Technically, they were presented with the problem of building on a man-made site, reclaimed from the river, and consisting almost entirely of fill of uncertain bearing capacity.

Several solutions were tried. The first was to construct under the mounds a "bearing plate" of dense shale, and then to reinforce the steep slopes desired with embedded steel mesh, which would hold back the topsoil and to which grass sods could be pegged. This solution was rejected for budgetary reasons.

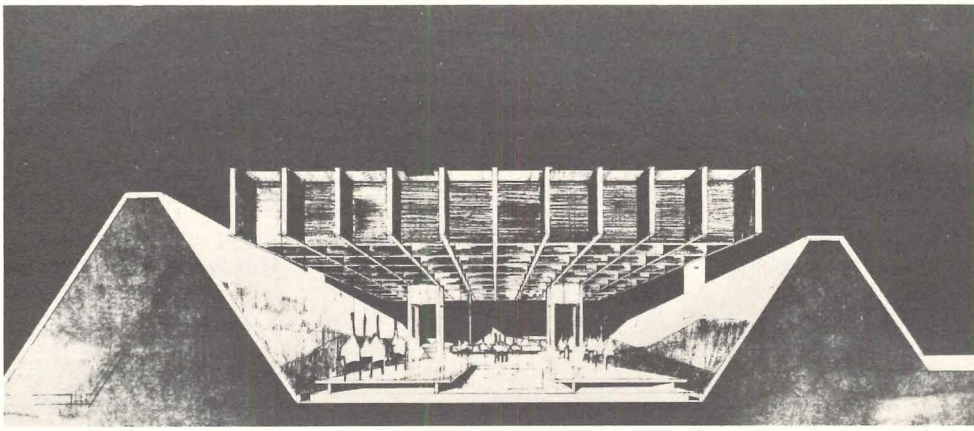
The final decision was to use local soil, and attempt, with compaction, to achieve a high angle of repose and to repair rather than resolve by design any possible failures from settlement. The architects utilized nearby site fill to attain the desired slopes. This limited the purchasing of additional soil and will facilitate the return of the site to its original condition after the exhibition.

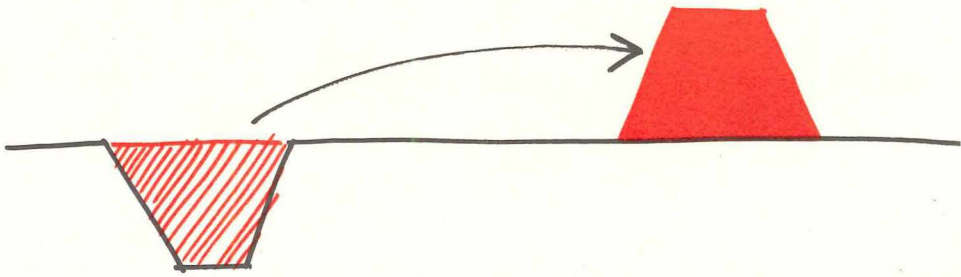
What little additional fill was used came mostly from excavations for adjacent pavilions. The site was levelled and mounds were built up in 2-ft layers with a continuous compacting. When properly compacted, the soil permitted a higher than normal angle of repose. The base of the mound was also compacted.



Preliminary Model: Man the Provider Pavilion, Expo 67.

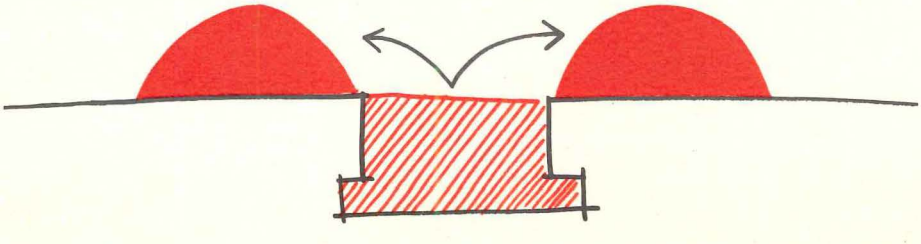
Below: Typical Sectio





A Penny Saved Is a Penny Bermed

For the first unit of a planned multiple-dwelling complex, Hampton Beach, New Hampshire, architect Ralph Harris used the 200 cu yds of foundation soil bermed around the site to create an intimate interior space for the residents of the three-family units. Earth was pushed into place by a backhoe after excavation and seeded. Compaction was only necessary in paved areas. Cost for creating the berms was less than the charge for earth removal.



THE AMBIENCE OF CUT AND FILL

"Machinery now readily available makes it literally possible for us to move mountains and create totally new topography at truly monumental scale. (Some of the technical problems resulting from such efforts are truly monumental). There is a direct relationship between this potential, the design, location, and site development of new buildings, and the fascination with form of all sorts that all designers share."

GARRET ECKBO

Hillside Campus

According to architects Carson, Lundin & Shaw, creating a community on a hillside produces an immediate need for level areas such as plazas, walks, terraces, and entrance areas. The alternate solution would mean reshaping the hillside by earthmoving or creating architecturally constructed platforms rising out of the hillside. The former alternative is in general simpler and less costly. The latter solution is useful where the space below the platform can house a program function. Perhaps another alternative is the choice of a different, level site. In the specific case of the New York State University Agricultural and Technical College at Canton, N.Y., this would have meant that the campus turned its back on the village, straddled a power line, and ignored the amenities of the river.

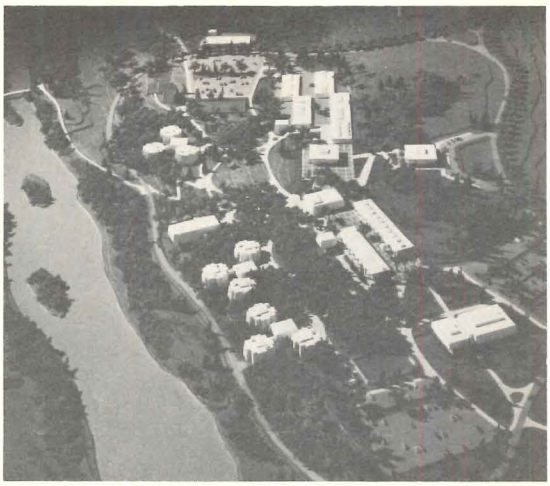
To retain the maximum impact of the site, academic buildings were planned on each side of a pedestrian avenue — a shelf of land cut into the hillside parallel to the contours. In this manner, the major amount of earthmoving was confined to a single lineal cut and fill, taking full advantage of the pattern in which large earthmoving equipment operates. The architectural design of the dormitories allows them to be positioned in the most heavily treed and steepest slope with a minimum disturbance to the natural environment. Additional earthmoving was necessary along the perimeter of the campus to provide proper gradients for the campus drive and parking areas.

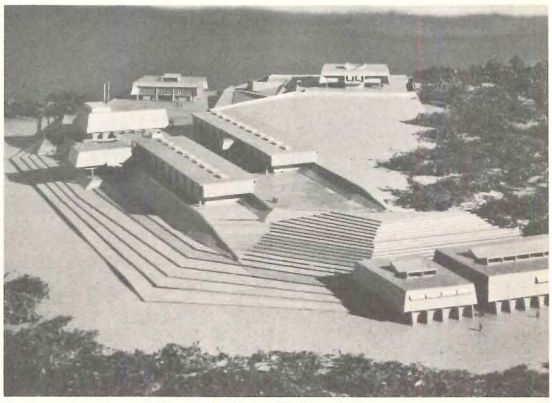
Cut and fill of 475,000 cu yds of earth was almost equalized by a negligible amount of excess fill. Unexpected problems were an unusual wet condition, which included a high water table, perched water, and seepage. Dewatering was necessary to obtain stability.

The earth was stabilized by retaining walls, slope angles, and seeding with asphalt mulch. The cost for earthmoving was 46¢ per cu yd.

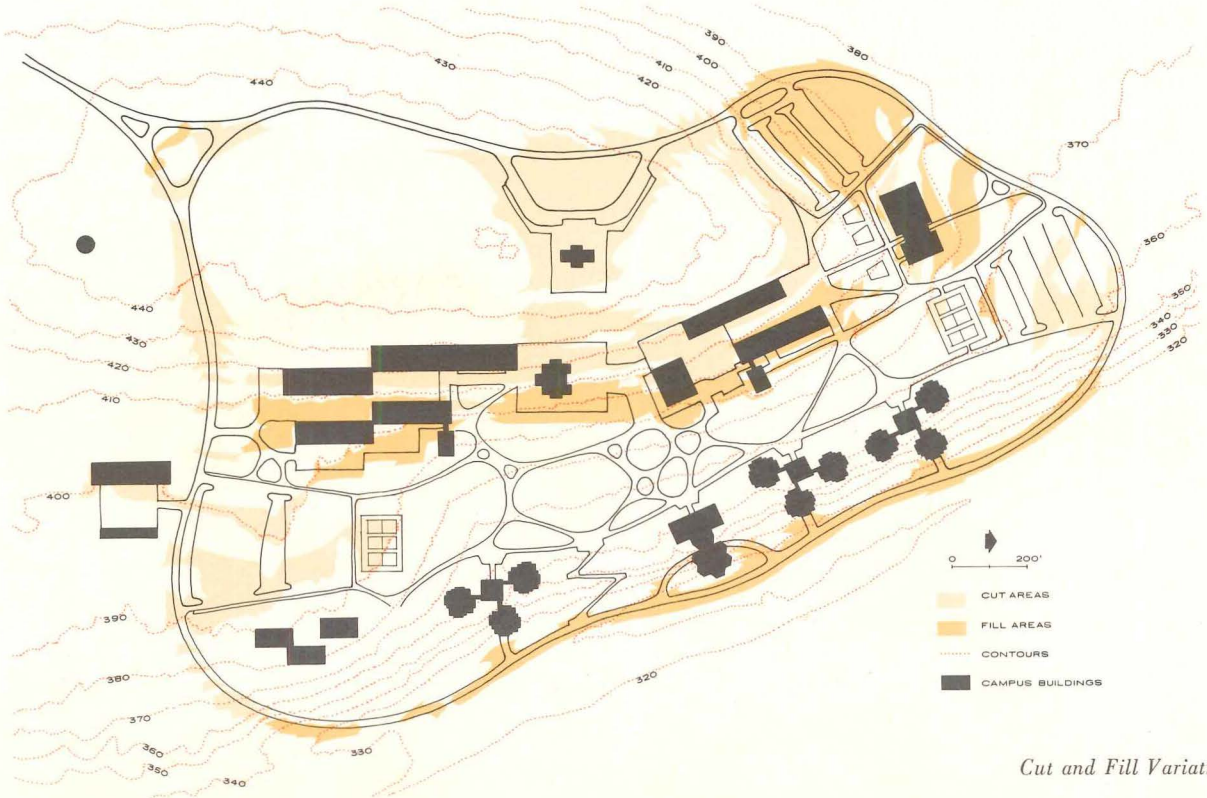
Equipment employed on the project included: nine scrapers; three front end loaders; two graders; one tandem roller; one three-wheel roller; two backhoes. Forty-two cu yds of material was blasted.

The landscape architects were Johnson, Johnson & Roy.





Architectural and Technical Institute at Canton.



Terraced University

Following site and sun, the facilities of the University of Madagascar at Tananarive are terraced and sculptured into the hills overlooking Tananarive. The buildings are being sited over a 212-ft elevation, about 4 kilometers from the center of the city.

The 370-acre campus is spread over an irregular, hilly site, with imposing views of the surrounding countryside. In spite of its irregularity, the architects skillfully formed the earth to site their buildings, leaving large planted spaces between.

Facilities have been grouped compactly, with the dormitories situated one-quarter-of-an-hour's walk away on another hill. The sports area is located at the bottom of the slope between the two hills and forms a link between the university buildings and the dormitories. Existing waterways will be extended to the stadium area to make water sports possible.

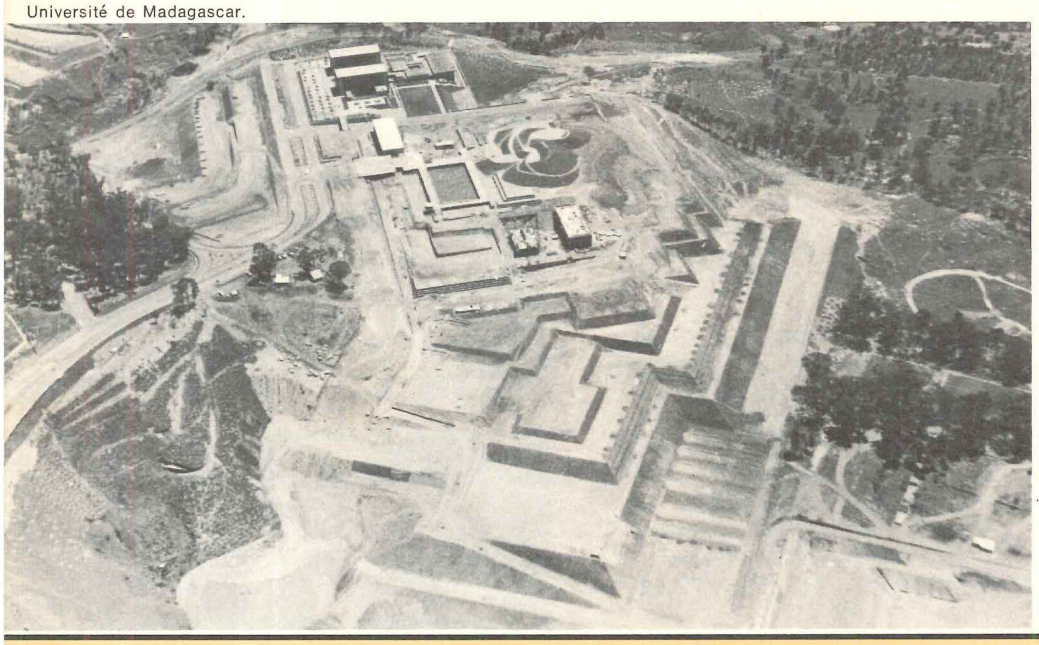
Land bordering the university has been zoned in order to control new construction; in-between areas are scheduled for reforestation. The zoning allows for future university expansion.

The campus grounds include an arboretum for the school and other developing sites in the area. A wide variety of local plantings, as well as new species of trees and shrubbery, have been introduced to the site.

Construction was planned in three stages. The predicted student enrollment for 1967 is 2300; by 1970, the last stage, enrollment is expected to stand at 4000 (see site plan for stages of construction and facilties).

Architects for the university were P. Herbe and J. Le Couteur in charge; D. Sloan, associate architect; A. Arsac, project architect; R. Simounet, project architect for the housing complex.

Université de Madagascar.



Terraced Knoll

An urban earthwork on a terraced knoll was the design solution submitted by architects Jacques de Brer, Barry Elbasani, and Donn Logan, to win second prize in a national competition for the city of Fremont, California.

The 70-acre site adjacent to what will become the central business district of Fremont, is bounded by a large park property and a lake. The lake would be used for recreation and flood control. Except for a 20-ft knoll, the property is essentially flat.

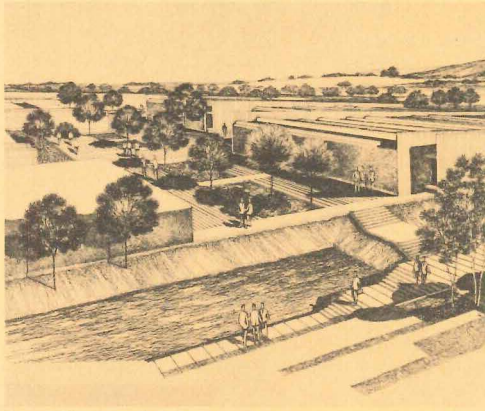
The program requirement of placing the City Government Building on the knoll offered the opportunity to form an interesting series of spaces by breaking government departments into terraced segments that step down the hill. The knoll itself has been treated as an extension of this conceptual statement through the use of stepped contours, terraces, berms, ramps, steps, and so on. "We simply tried to use the knoll to some advantage as a part of an architectural concept," stated Logan.

The various departments to be housed in the City Government Building must be capable of being expanded independently to almost twice their first-phase limits by 1980.

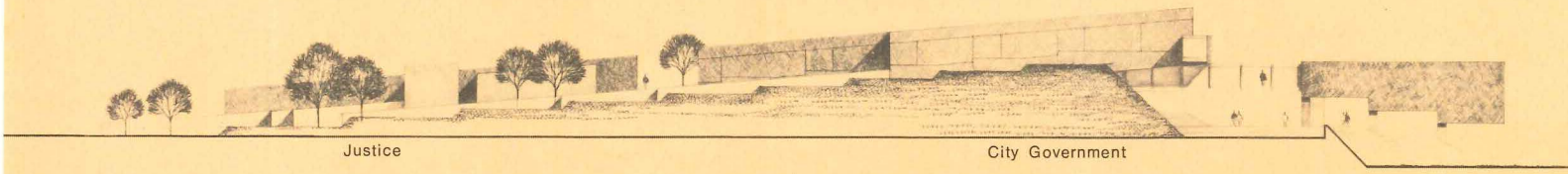
This ultimate growth potential was expressed by an earth berm contained by a low retaining wall. Physical expansion accommodated in this way is economical, since it involves no heavy initial investment in foundations, as would be required in the case of vertical expansion.

Parking is provided around the Civic Center in landscaped areas depressed below grade. Pedestrian paths lead up ramps from the parking areas and directly to the main pedestrian street.

"I guess that earthwork on the knoll would involve mostly recontouring and grading with the usual equipment," said architect Logan in speculating on what would have happened had they won first instead of second prize.



Upper Plaza and Hall of Justice



The Helicoid

"Roca Tarpeya" was for a long time considered a worthless piece of property between two of the most densely populated areas in Caracas, Venezuela.

The area was thought too steep for a building site until architects Jorge Romero Gutierrez, Pedro Neuberger, and Dirk Bornhorst conceived and designed the much publicized Helicoid — a spiral ramp combining automobile access with a chain of shops. It is a building that elevates the road to the rank of architecture, Arthur Drexler has said.

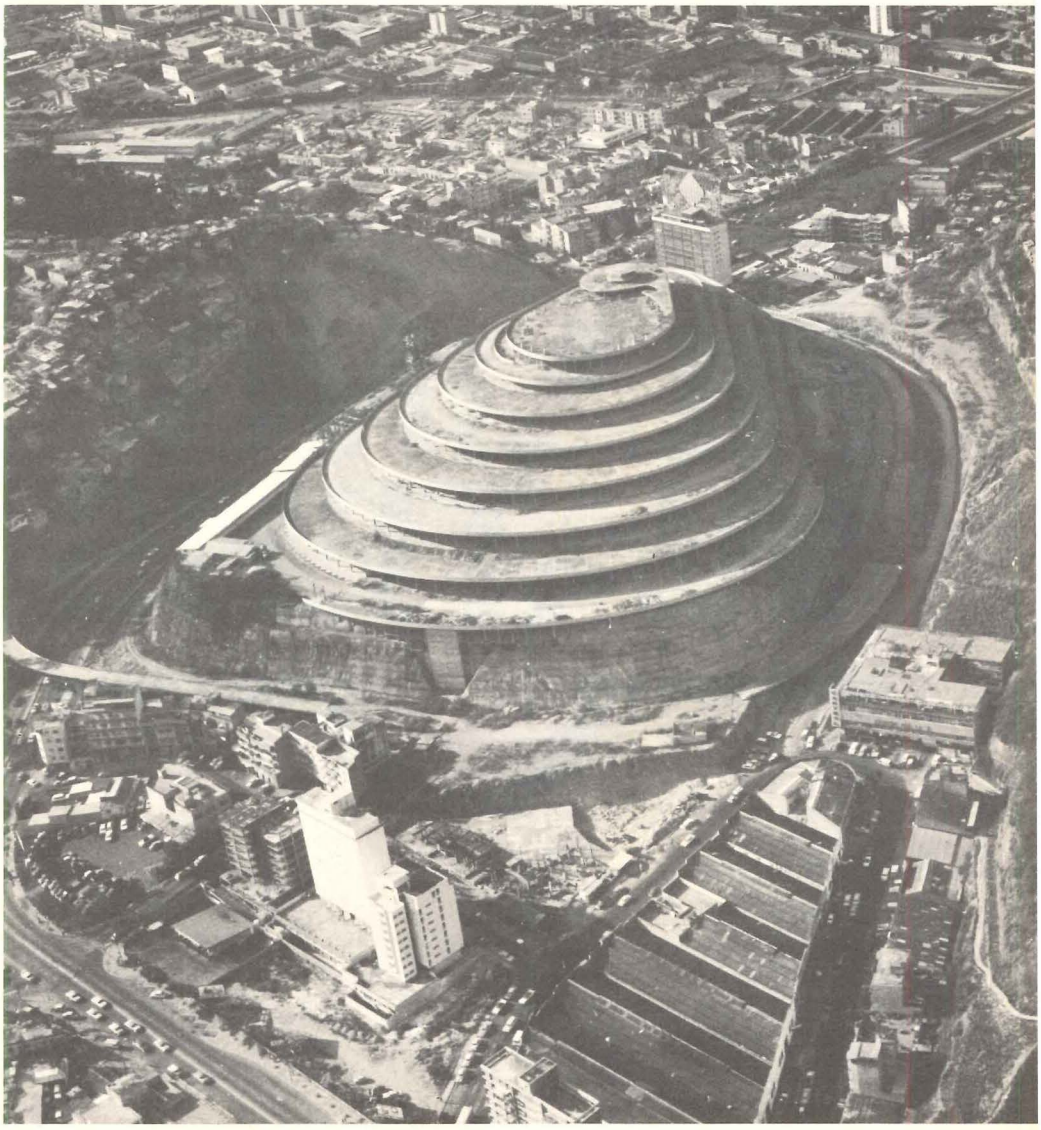
First, the entire mountain site was terraced to the contour of the basic building; it was a huge earthmoving project. The over-all form is achieved by interlocking spiral shopping ramps connected at the top by an S-shaped curve. This arrangement allows continuous, one-way vechicular traffic winding up and down the building on a 4-kilometer-long road that has a 2 per cent slope. The driveways form the roofs of the shops below.

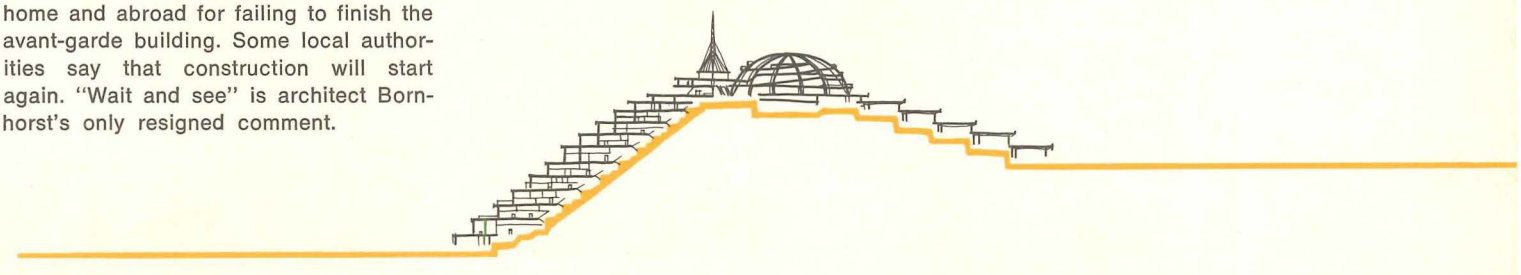
Angled parking in front of the 320 shops would accommodate 1000 cars. Vertical transportation is provided for by four inclined elevators that run on rails at a 30° angle. A continuous tunnel for mechanical installations is located between the rocky site and the back wall of the shops.

As recently as last year, however, the tremendous, 25-story road-building was a gaunt, monumental ruin, still unfinished for lack of funds, its crowning Buckminister Fuller dome still crated in a warehouse. The only function of the Helicoid, apart from embodying an architectural ideal, was to serve as a shelter for 40 families whose **ranchos** on a nearby hill were swept away by a "geological failure." Within the great concrete framework, temporary shacks of boards and tin with accompanying lines of laundry and meandering goats and children seemed a pathetic pass for so promising a dream.

The reason the Helicoid remains unfinished is that, since the end of 1957, when construction was stopped, the Venezuelan government has advanced only enough money to finish the structure. Now, architects Gutierrez and Bornhorst estimate that upwards of $8 million would be required to complete the core of shops.

Cooperative shop owners who have already invested have no recourse, and prospective buyers and financiers have till recently had their biggest difficulty in knowing which of the 180 cooperative owners they should deal with. The logical investor is the Venezuelan government, which is constantly criticized both at home and abroad for failing to finish the avant-garde building. Some local authorities say that construction will start again. "Wait and see" is architect Bornhorst's only resigned comment.





FILLING THE WATERS

Converting swampy marshlands and water into solid land has been an age-old occupation of man. The prehistoric Swiss did it with piling, the Aztecs did it by placing Mexico City in the middle of a complex of lakes, and the early settlers and merchants of New York constantly expanded the borders of the small island of Manhattan till the lower end today is approximately twice its original size. There are few water-situated cities that have not been expanded by landfill. In the old days, the primary purposes for the push outward into the water were for protection, and increased area for commerce and industry. Today, with the population explosion and the accumulated density on shore, the pressure is for new residential lands: near the old city cores; new roadways and turnpikes on new land that will not disrupt old communities; more airports in unobstructed locations near high-density centers; and, last but not least, convenient dumping holes for the piles of accumulated waste and garbage.

Landfill projects have taken on some of the aura of a new frontier: garbage dumps turn into golden developments, "worthless" swampy lands turn into landfalls for canny developers, and old towns get substantial additions to the tax base.

There is at once something stirring and admirable in the technology of creating new lands; a project like Expo 67 (page 167) has the old engineering magic and heroic Biblical dimensions that never fails to inspire: God created the earth in 7 days; the Canadians turned water into land in 15 months. On the other hand, in spite of all his technical skill, man is never quite so smart about how to use the new land he has created; and projects such as Foster City and Redwood Shores in California (page 174) are proof that man may or may not carry his mistakes with him to new lands. Finally, the new boom in landfill projects has pointed out the narrowness and incompetence of our political and social systems, which still uphold the rights of individual property owners over and above that of the public interest. Individual landfill projects proliferate, with little consideration of their impact on the entire fabric of the community and the ecology of land and water. Politics split the Hudson between New York and New Jersey, impoverishing both sides; and city politics subject the shore to outmoded special interests. On the other hand, the citizens of San Francisco are beginning to look at the Bay as a regional entity and to develop political tools that will preserve and develop a body of water that is fast disappearing. The political stories of these two sides of the continent (pages 170–172) reveal the responsibilities we may have to assume in this legacy of new lands and old bodies of water.

FILLING THE WATERS/ TECHNOLOGY

According to an engineering consultant, the first move for anyone considering a landfill project is to talk to a soils and foundations consultant. "The earlier a consultant is called in the better," says Robert C. Johnston of Mueser, Rutledge, Wentworth & Johnston, the New York engineers whose projects include the New York World's Fair, Kennedy Airport, and the Ebasco report on the New York waterfront. "An engineer can give a developer — or architect — very basic information, as basic as: Can a fill project be built *at all* on the chosen location, and if so, *what kind* of project is economically feasible. Not only can the engineer help him determine the land-use for any particular area, but he can also supply critical information on timing, cost estimates, and permit requirements." In addition, the engineer also supplies information on the nature of the underlying soils, the stability of the new fill, the stability and possible damage to existing bulkheads, the effect of the new fill on nearby structures, the possibility of lateral displacements, heave or settlements; the effects on existing channels, shipping, and silting, pollution. "One difficulty with architects," claims one engineer, "is that they tend to think of their project as an isolated development, whereas, in fact, it has a considerable effect on adjacent structures and nearby bodies of water."

The feasibility of a landfill project will be determined in part by the availability and quality of fill. In an offshore situation, one of the preliminary decisions is whether the project should be placed on fill with piles or on piles alone. According to one consultant, a project is generally better off on fill if the area is large enough, and the ratio between bulkhead (the costly item) and fill (the inexpensive item, if available) is reasonable. If the quality of fill is good and it is properly placed, this type of foundation is excellent for housing: Settlement will be minimal, there are fewer maintenance problems, and the engineer has more freedom in his choice of building foundations. However, if good quality fill is not readily available, piling may be more practical, less expensive, and more rapid.

Good quality fill is essential for any project requiring large-scale buildings, since foundation piles will be driven down through the fill, and if the fill contains boulders or heavy coarse material, the driving operation becomes difficult and costly. Unfortunately, many excavators are likely to consider their excavated "garbage" as "lucrative fill" despite its quality. In the case of the World Trade Center project in New York City, which has arranged to dump its excavated fill in the nearby Hudson for an offshore development, it is essential to assure that the material is of such quality that the future uses of the site are not limited. If the new land is to be used as a park, uneven settlement or difficult foundation construction from poor fill would not be a problem. If multi-story housing is the objective, the quality and placement of fill must be carefully supervised.

Piling, however, may be more practical and even desirable if subsoil conditions are extremely poor (complicating fill settlement), or when a project is adjacent to deep water channels. If time is of the essence, piling may also be preferred, since, in some cases, piling requires less time for settlement than fill. However, under certain conditions, piling settlement may actually take longer. Piling does have the disadvantages of higher maintenance costs and fire hazard. Oil slicks from river traffic can get below the platform and cause fires.

In high-density developments, the problems are more acute. The HRH Construction Corporation, which plans a housing project — Waterside, designed by Davis & Brody on the East River in New York — plans to put the complex on a platform supported by piles. In order to keep out the oil slick, they propose putting an "apron" around the bulkhead line and providing access through the platform to the substructure. The final point concerning a pile-without-fill foundation is that it requires more maintenance: Between high and low tide levels, the piles are subject to oxidation. In unpolluted waters, wood piles are subject to damage from marine borers; in polluted waters, concrete and/or wood piles are subject to deterioration from chemical or paint factory effluents. The process can be relatively swift: Some concrete piles on Staten Island, for instance, deteriorated from chemical wastes in two years. In the case of the Waterside project, the developer argues that, since a large proportion of the area is occupied by buildings, a considerable amount of piling will have to be done, and driving them through fill would involve an additional cost. If more of the area were devoted to open space — or park area — fill would be a more logical and feasible solution. No final decision has been made on this project, although there has been a lot of discussion.

Operation Earthlift: Expo 67

One of the most spectacular landfill projects in recent years has been the preparation of the World's Fair site in

the middle of the St. Lawrence River. In 15 months, the Canadian corporation for the 1967 World Exposition turned 313.63 acres into a site of 709.75 acres. It was a Herculean task, and, at one point, early in 1964, the corporation figured that one truck entered the site every 30 seconds, 24 hours a day, 6 days a week.

What existed originally at the site was a pier of 115 acres on the west shore, St. Helen's Island (137 acres) in the center with two outcroppings north and south, euphemistically named Iles Verte and Ronde, and a St. Lawrence Seaway dike to the east with some protruding land masses nearby. The configurations of the final site were influenced by the City of Montreal's engineers, who determined how the land could be reclaimed with a minimum effect on adjacent harbor installations. On the basis of these studies, the corporation decided to expand the Mackay Pier to take another 169 acres, extend St. Helen's Island upstream and downstream to incorporate the two islands, and form a new island of 287 acres — Ile Notre Dame — against the shipping canal dike.

Special Conditions

The height of the landfill operations was determined by special characteristics of the St. Lawrence River. Unlike many rivers, the St. Lawrence has peak periods during the spring *and* winter. The latter is due to ice damming downstream, which can make the river rise higher in January or February than it does in June. Furthermore, the volume of water has its own hydraulic gradient: If the river is flowing at 200,000 cu ft per second, there may be an 11-ft difference in water levels between the upper and lower ends of Ile Notre Dame. At 500,000 cfs, the difference is as little as 1′-6″. In order to protect the reclaimed land from flooding during peak periods, engineers established a minimum standard of 3 to 4 ft above maximum water levels.

The varying levels of the St. Lawrence River also complicated the construction of canals on Ile Notre Dame. The planners of the Fair, wishing to accentuate the aquatic nature of the site, had decided, somewhat late in the planning stage, to provide a system of canals on the island. If the canal system were directly connected to the riverfront, however, the water levels would vary considerably from one period to another and leave unsightly banks exposed. Even if the channels were not directly connected to the river, the permeability of the dike and soil construction in the original plans would lead to undesirable changes in levels. After considering making the canals themselves impervious, which would have been expensive, the engineers finally decided to waterproof the dike surrounding the entire island and asked the city to change its plans for the dike system and clear the riverbed down to rock bottom. Ile Notre Dame is now surrounded by two dikes 10 ft apart, on river bottom, and the inside face of each dike is covered with a layer of 2-in. (maximum size) crushed shale acting as a filter. The rest of the void is filled with glacial till compacted with vibrating sheepsfoot rollers. The elevation of the interior canal system was placed midway between high and low river elevations and a low head, large-capacity pumping station changes the water completely once every two weeks.

Sources of Material

The perimeters of the islands were to be staked out with dikes composed of local material, Utica shale, syenite, and breccia. The riprap material was gathered from borrow pits within the site and the pits, isolated by impervious solid cofferdams constructed from alluvial deposits in the river, were later turned into lakes within the island perimeter.

Originally, it was planned to take *all* the fill — a mixture of gravel, fine sand, and silt — from the adjacent river bottom and the landfill operation began with dredging. Water was used as the carrying agent and dredgers pumped the mixture into the Expo site through 36-in.-dia steel pipes supported on the water by floats. This operation, which was begun in the summer of 1963, continued until winter ice prevented further work. Up to this time, 1,600,000 cu yds had been deposited; 13,000,000 cu yds were still needed. A review of operations during this lay-off period revealed that dredging was running into serious difficulties: The immediate sources of riverbed material were becoming too dense and the dredges were wandering so far afield that the pumps could not handle the length of delivery pipe, so that special floating booster pumps had to be constructed. Also, due to the abrasive nature of the material, the wear and tear on equipment was high: cutterheads were lasting 24 hours; the pipeline on shore had a lifetime of two months; the floating line, three months. The same production methods were resumed in the spring, until a total of 4 million cu yds was accumulated through dredging. In the fall of 1964, it was decided to initiate a massive filling program with conventional hauling equipment — trucks — and every available contractor in the area was put to work. It was during this period that operation earthlift began; trucks arrived night and day. A good deal of the material came from the Montreal Metro excavations.

Settlement

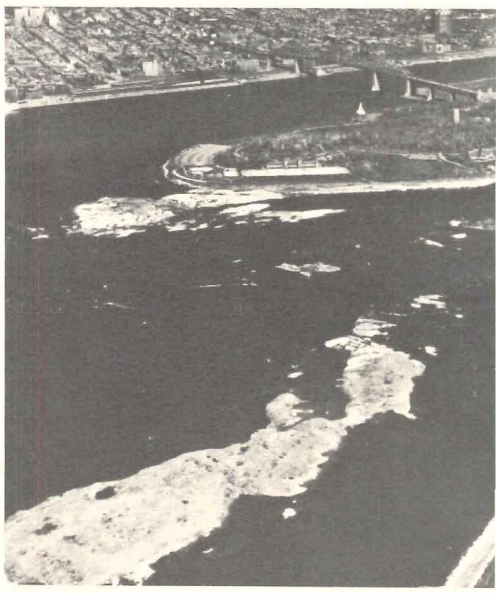
In spite of the temporary nature of the Fair itself, engineers wanted to assure a minimum amount of fill settlement, which might do damage to the more permanent network of roads and services. Instead of dumping the shale indiscriminately, which frequently leads to uneven settlement, the engineers layered the material and tested the compacting equipment and effects of sluicing. They found that spraying the soft shale material with water helped disintegrate the material, facilitated the relative movement between rock particles with the mass, and broke up the crust of fine particles that formed on the surface from the smooth-faced compacting equipment. Through experience, they determined that one-eighth volume of water to one volume of rock, with eight passes of the smooth-faced roller, were sufficient to compact the material. Over the past two years, settlement has not exceeded 0.5 per cent of the total depth of fill.

The final figures on the volume of fill were 4,000,000 cu yds of dredged fill, 10,800,000 cu yds of trucked fill — all supplied by the city of Montreal. The Fair corporation itself added 4,000,000 cu yds for a total figure of 18,800,000 cu yds.

Architectural Foundations

In spite of the low percentage of settlement, the speed of the landfill project and the initial compaction tactics led the engineers to suspect that the fill might subside as much as 1 to 3 per cent. Foundation tests suggested that heavy column loads and elements that could not take differential settlement be placed on piles, whereas the lighter buildings could be spaced on spread or continuous footings. The loadbearing capacity of the soil varied from 1 to 3 tons per sq ft. Piles, however, could be end-bearing, resting on bedrock 30 ft or 40 ft below the surface.

In spite of these provisions, the engineers can claim that "the present site of Expo, two to three years after the reclamation operation, does not present any unusual foundation features and is equivalent — in terms of construction difficulty — to an average site on the Island of Montreal."



Expo 67 site, before (above); after (facing page).

FILLING THE WATERS/ POLITICS

Pressure for new land near old city centers has led to an increase in landfill projects in cities near major waterways. Two areas — New York and San Francisco — have seen such a proliferation of landfill projects in the last few years that many people have become concerned at the total lack of coordinated planning in this area. California has been far more successful at initiating legislation regulating the development of the Bay than New York or New Jersey have for the Hudson River. It seems likely that California residents are becoming aware of the Bay as a total physical and ecological entity; the Eastern states still tend to halve the river rather than treat it as a whole. California's story, told below, contrasts rather sharply with New York's. As pointed out in our article on the Manhattan waterfront (JULY 1966 P/A), landfill developments in New York are still under the control of the Department of Marine and Aviation, an antiquated bureau that is still bent on using the waterfront almost exclusively for shipping and industry — although these activities seem to be accommodated far more easily on the New Jersey side, where large tracts of filled land are available for the new containerized shipping systems. Local longshoreman's unions also have their powerful say in trying to keep cargo activities on Manhattan. In order to use a piece of the waterfront for any purpose, a permit must first be secured from the Department of Marine and Aviation. Recently, it held up an application for an apartment house complex for more than two years. Congress must also pass legislation declaring the property non-navigable. Due to transportation and shipping difficulties on Manhattan, and the island's own housing needs, it seems clear that island shorefront is ripe for some residential and recreational development. Last January, the Regional Plan Association made a study of the Lower Hudson, urging housing for both sides of the river. It further recommended that a commission — similar to the one operating in the San Francisco Bay — be formed to design a plan for the lower Hudson; if this is not quickly forthcoming, the association proposes that each municipality undertake its own study. So far, the most encouraging step to be taken is Mayor Lindsay's formation of the Downtown Lower Manhattan Board, which will oversee renewal in the downtown area for both the interior of the island and the landfill plan prepared by Wallace, McHarg, Roberts & Todd, Whittlesey, Conklin & Rossant, and Alan M. Voorhees & Associates, Inc. On the whole, however, planners seem not to have woken up to considering the river as a whole. Samuel Ratensky of the Housing and Redevelopment Board looks upon a new agency controlling waterfront lands as just another bureaucratic superstructure: Landfill planning, according to Ratensky, should be done in each area to see that it ties in with the existing land. This last proposal is at least an improvement over the attitudes of the not so distant past, when waterfront projects were real estate dreams dumped into the river regardless of their relation to the mainland. From recent developments in the San Francisco Bay, it seems clear that the East has much to learn — from the West.

San Francisco: History

San Francisco Bay has shrunk from 680 square miles to about 400 square miles in little more than a century. Technologically, there is little to prevent man from shrinking it still further. Four-fifths of the remaining area is less than 30 ft deep, and 70 per cent is less than 18 ft deep at low tide. The U.S. Army Corps of Engineers estimates that another 248 square miles of tide and submerged lands are susceptible to reclamation, which would leave 186.65 square miles of Bay — mostly in the form of riverbeds and deepwater shipping channels.

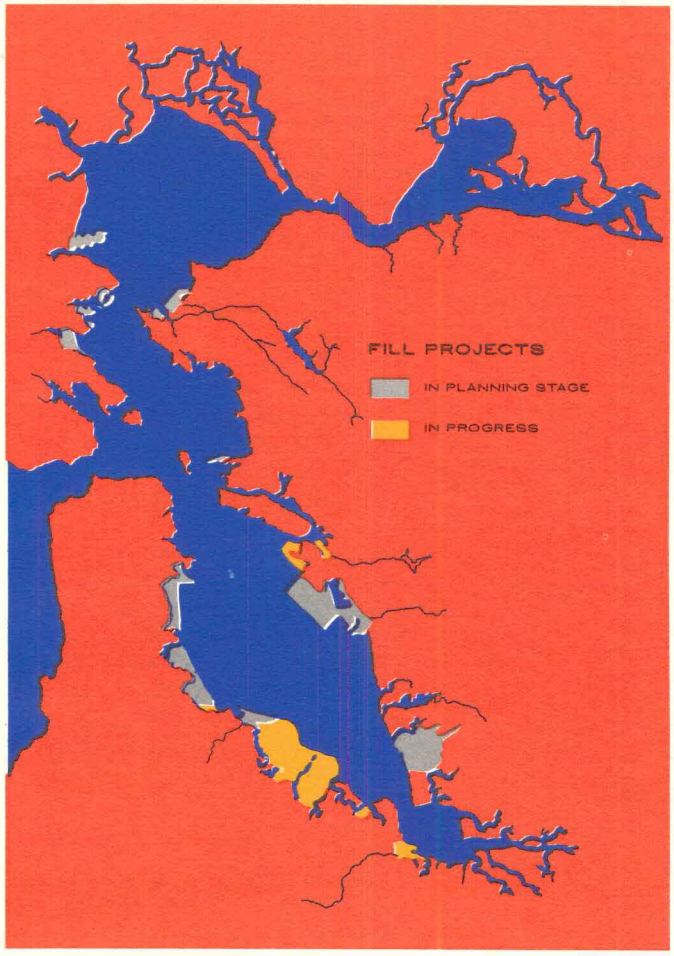
Until recently, there was nothing to prevent the Bay from filling up. Ever since California became a state in 1850, it has considered the Bay as real estate property rather than as a natural resource. By 1880, thousands of tidal lands *and* submerged acres had been sold for revenue at about $1 per acre. The fringes of the Bay are still mapped out with lots and streets — many under water. In the late 1880's, lucrative oyster industries raised the value of some underwater lands to $1000 per acre 10 to 20 years after purchase, but the industry was later forced out when hydraulic gold mining polluted the oyster beds and contributed considerable fill to the bay. Interestingly enough, the oyster beds are now "mined" by the Ideal Cement company, which considers several thousands of acres of submerged land as their property. This "land," which surrounds a good deal of Redwood Shores and Foster City, could conceivably be reclaimed and effectively upstage those water-oriented communities. Around 1910, when California foresaw a boost in East Coast and European shipping from the opening of the Panama Canal, the state legislature granted huge sections of Bay properties to individual cities, stipulating that the land be reclaimed for commerce, fishing, and industry. Since then, naval bases and airports have also taken their share of filled land, and a current battle rages between San Francisco and Oakland over airport expansion. San Francisco wanted some fill that Oakland was dredging from its waterways for their airport. Oakland, jealous of its own airport, refused and planned to expand its own.

A recent assessment of new landfill projects around the Bay tallies up to a total of 16,261 new acres supporting an additional population of 164,000. Aside from these planned developments, the Bay itself collects 8,600,000 cu yds of fill a year from streams and rivers, and the population of the Bay area contributes roughly 38 per cent of its waste produce; four years ago it was 48 per cent.

Rescue

Through this gradual parcelling out of property, the state had also parcelled out its power. Today, the state owns approximately 50 per cent of the Bay, and has granted about 25 per cent of it to cities and counties; the Federal Government owns about 5 per cent, and private owners 20 per cent.

The situation might have remained in its chaotic state had not Mrs. Clark Kerr, wife of the former president of the University of California, become alarmed at a landfill project proposed by the town of Berkeley. Berkeley, not unlike many towns along the Bay, proposed filling in 2000 acres of Bay for such facilities as factories and apartments in order to increase the city's tax revenues. Mrs. Kerr was perturbed by this project and evidence that, all along the Bay, hills were being pushed into the natural ravines, and earth into the Bay, gradually destroying the unique combination of mountains, valleys, and water that made the Bay area so special. After calling a meeting of scholars, community leaders, conservationists, and similar groups, it became fairly apparent that no single group was keeping track of all the activity in the Bay and evaluating its effect. Out of this initial interest came "Save San Francisco Bay Association," which promptly commissioned a researcher to take an inventory of developments around the Bay. The preliminary findings were so appalling that members of the association began keeping track of all applications to alter the Bay, and demanded hearings for every project. Conservationists began to complain and local citizens became aware of what was happing. Finally, pressures of public opinion resulted in a legislative bill, sponsored by State Senator McAteer, to make a study of the Bay. The preliminary commission and report resulted in a state law creating the San Francisco Bay Conservation and Development Commission (BCDC), whose responsibility it is to develop a long-range plan for the Bay and investigate the interests and effects of various enterprises. While it is developing its long-range


FILL PROJECTS
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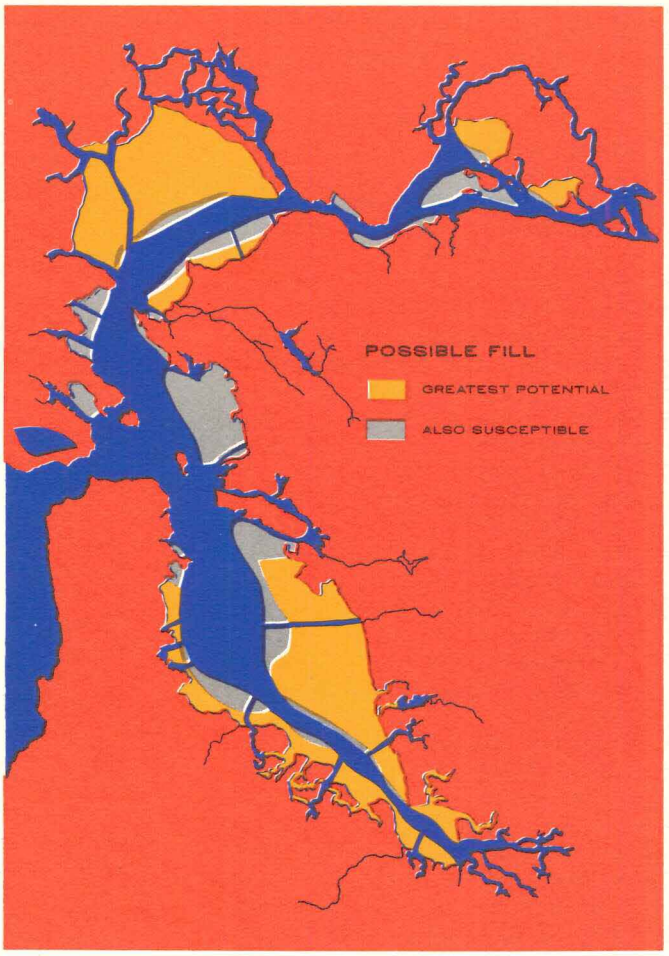
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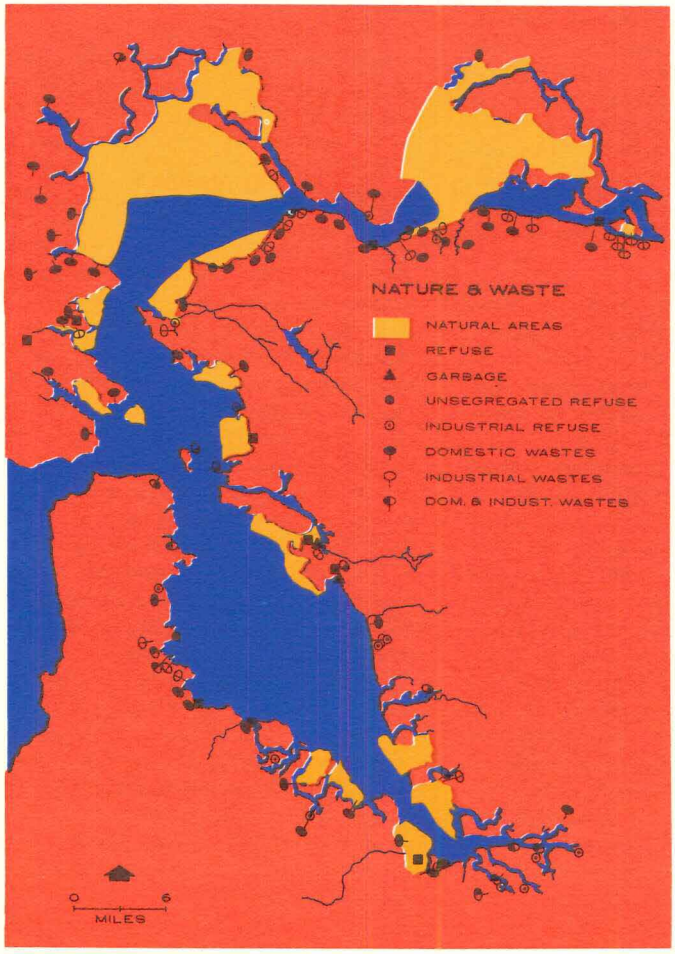
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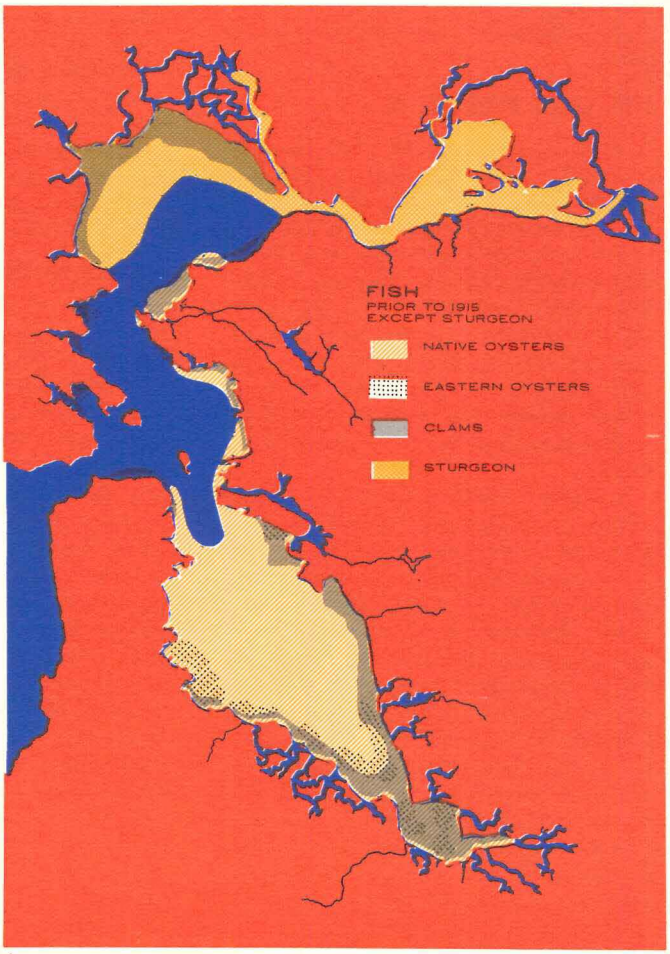
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PRIOR TO 1915
EXCEPT STURGEON
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plans, the State has placed a moratorium on all non-Federal landfill projects. In order for a project to proceed, 17 out of the 27 members of the BCDC must approve it.

The BCDC is composed of 27 members representing various public and private interests: Two are from Federal agencies — the U.S. Army Corps of Engineers, and the Department of Health, Education and Welfare; six from state — Transportation Agency, State Planning Officer, Resources Agency, State Lands Commission, San Francisco Bay Regional Water Quality Control Board, Bay Area Transportation Study Commission; twelve local — one from each of the nine Bay Area counties, three from cities; and seven are public appointees — five appointed by the governor, one by the Senate Committee on Rules, one by the Assembly Speaker.

The Commission was given three assignments: (1) to ascertain the public interest in San Francisco Bay; (2) study effects of further filling of the Bay; and (3) recommend to the 1965 legislature measures to protect the public interest in the Bay.

From the commission's initial studies of landfill developments around the Bay, it is apparent that a broad range of interests in new land exists. From its studies in pollution, sedimentation, refuse, marshland, bird and wildlife, it also becomes apparent that man's hodgepodge dumping of fill is going to lead to some surprising and often disastrous results. A quick run-down on the commission's findings is an eye opener for any city contemplating landfill and not only for those situated on a "limited" body of water.

Fill and Pollution

It is becoming apparent that the size of the Bay is critical when it comes to coping with water pollution: Reducing the volume and surface of the Bay cuts down on the amount of oxygen available for marine life and natural pollution abatement. With the increased population around the Bay area, the sewage treatment plants are also finding it increasingly difficult to process the amount of waste material and even more difficult to process it to a desirable level of cleanliness.

Although it has not been fully investigated, it is also apparent that much of the plant life in the marshy areas near the shore is an effective anti-air-pollutant. The commission's report states that mud algae, alternately exposed to light and water, produce and expel oxygen into the water and air. What effect the entire Bay has on air pollution is not clear, but it does serve to keep temperatures down during hot summers and up during the winter. If the Bay were transformed into a valley, the climate would not be nearly as comfortable, nor the site as desirable. As one citizen commented, "Let's not kill the goose that laid the golden egg."

Wild Life

Marshlands are generally considered undesirable, messy, smelly, and ripe for landfill. Roughly three-quarters of the salt marshes originally on the Bay have been filled, leaving approximately 75 square miles intact. Filling in the marshlands went unquestioned until a few years ago, when it was discovered that they are important feeding areas for fish and wildlife. Conservationists then took up the call. It is also possible that the growing numbers of leisured citizens will form a sizable lobby demanding protection for their hunting and fishing grounds. On the other hand, many feel that the duck is doomed, and rightly so. At the commission's preliminary hearings, Raoul A. Vincilione, of the Inland Boatmen's Union, flatly stated that there was an overemphasis on wildlife. If 14 million people are to live in the Bay Area, there will not be much wildlife left, and nothing can be done about it.

A subsequent BCDC report on fish and wildlife revealed, however, that estimates of the recreational value of the fish and wildlife yield from the Bay was between $9 million and $25 million in 1965; the projected estimate for 1980 is between $16 million and $45 million. The commission's report found that, in 1965, 135,000 man-days were spent hunting, 370,000 user-days passed bird-watching, photographing, nature studying, etc., and 3,200,000 days spent behind the fishing pole. No one has yet revealed how many man-hours are spent eating the bass, salmon, sturgeon, trout, shad, oysters, clams, crabs, and shrimps, or measure the pleasure involved. Beyond these very immediate interests in preserving the wildlife of the Bay, the report reminds us that, in the near future, exploding populations may need the sea for serious farming. The Bay, which is well protected from storms, may in a few decades become a prime marine or agricultural area.

Transportation

Landfill in the Bay has been an easy solution for many transportation problems. For the airplane, the Bay offers an unobstructed take-off and landing zone, and a flight-path clear of residential areas and people who might object to noise. Filled land is also comparatively cheap, and between the two major airports of Oakland and San Francisco, 5884 acres have been filled, with proposals for 1450 more and an additional 4000 to complete Oakland's master plan. Approximately 1000 acres were required for the Alameda Naval Station. As mentioned above, there is considerable rivalry between the two major facilities, and the BCDC report suggests that a regional airport study be undertaken to establish future needs in the area and determine whether the present facilities should be expanded as planned or whether inland area in the surrounding counties would be more suitable.

Although the BCDC report on surface transportation was not complete at the time of this writing, projected highway plans have already had their effect on the Bay. Two new highways have been proposed for the east and west shores. To avoid slicing through high-density areas, the solution has been to locate them partially on fill in the Bay. On the basis of these projections, numerous prospectors have been encouraged to dream up projects for the landfill areas that may lie between the roadway and shoreline. Unless there are a few imaginative designers, as at Redwood Shores (page 174), it is likely that the roadway may become a source of pleasure to the motorist but a barrier to the pedestrian. The value of the BCDC is that it can encourage a comparative evaluation of the Bay rights: housing vs. highway vs. recreation, and so on, and will encourage communication and coordination between the Bay Area Transportation Study Commission and planning for the area as a whole. As of this writing, the commission has completed eight of the twenty-three reports, which are all due to be completed by June. In addition to the reports mentioned above, the commission is studying the geology and appearance of the Bay; the stability of filled land (there is considerable controversy about the effects of earthquakes on filled lands); economics and population growth; maritime commerce and port activity; surface transportation planning and the Bay; recreational, industrial, and residential needs; public facilities and utilities. Studies are also underway on the ownership of Bay lands.

Once the studies are complete, the commission will go into the second phase of its operations preparing the plan. During this period — July 1967 to July 1968 — the commission will seek the cooperation of cities and counties around the Bay and private owners. Once a tentative plan has been prepared, the commission will schedule public hearings. Following these, the commission will amend the plan, adopt it, and prepare a final report for submission to the Governor and legislature in January 1969. In accordance with the McAteer-Petris Act, the commission will end its existence 90 days after the adjournment of the 1969 regular session of the legislature.

Two of the final studies (not yet completed) prepared by the commission will concern themselves with the range of controls available to the community to regulate the development of land, and alternative means of carrying out the commission's plan for the area.

As of now, the commission has used its full powers to halt fill projects in the Bay. It has granted two permits for solid fill projects totaling 35 acres and denied five applications totaling about 105 acres. There seems to be good evidence that, given an effective agency, California will be able to solve its problem of the disappearing Bay.

FILLING THE WATERS/ ECONOMICS

During the last five to ten years, values of waterfront properties in the Bay have skyrocketed. Appraisal values of tidelands in Marin County, for instance, have increased 1000 per cent in the last five years. One piece of underwater property in the Bay, which was purchased for a $1 an acre during the original land sale, was sold three years ago to a developer for $3000 an acre. He spent $3000 an acre to fill it 5 ft above the high-tide level and then sold it to a housing developer for $45,000 an acre. However valuable individually developed tidelands may be, general evaluations of marshlands remain low. When a preliminary survey was made by the BCDC, it found that the 2340 parcels of land in the tidelands, currently assessed at a total valuation of $5,250,-911, yielded a total of $421,202 in taxes. This was a small percentage of the total assessed tangible valuation—$8,256,122,-125 — in all nine counties. The report pointed out that the assessors regard the tidelands as idle land with little immediate value. "In startling contrast, the potential assessed valuation of the developments disclosed to us is $473,250,000," boosted by planned developments in only a small part of the total tideland property.

Landfill projects, if backed by substantial developers, are more than welcome by local city governments: Several projects in the Bay will more than double the current tax base. According to one source, the Bay Farm Island Project (1000 acres), authorized by the City of Alameda, will cost about $117 million, amounting to an assessed valuation of $38 million, which would be just about 60 per cent of the total assessed valuation of the entire city.

With the current moratorium on Bay projects, it is likely that assessed valuations for undeveloped shore properties may temporarily decrease.

The General Improvement Districts

Some landfill projects, however, have run into considerable trouble in California due to an Improvement District Bill passed by the state in 1964 that looked like a free ride for developers — at the taxpayers' expense. The bill confirms the Constitutional power of cities and counties to engage in reclamation within their boundaries as a municipal affair, provided that the cost of reclamation be borne solely by the lands reclaimed. Under this law, the city can form General Improvement Districts and issue tax-exempt bonds for the acquisition, construction, improvement, maintenance, and operation of public improvements for such districts.

Both the developers of Redwood Shores and Foster City, California, thought they had found a golden egg in the reclamation law, which would, in effect, place the burden of developing the lands on public monies. In 1959, acres of salt beds known as Redwood Shores were annexed to the city of Redwood. In 1964, the city passed a measure that transformed the property into a General Improvement District. Meanwhile, the owner, Leslie Salt, was estimating that the brunt of the expenses of reclaiming the land would be carried by the bond issue. However, when Daniel, Mann, Mendenhall & Johnson and the city's financial consultants, Stone and Youngberg, prepared a feasibility report, they estimated that five different bond measures should be passed to cover five different aspects of the project:

Measure A:	Reclamation and Drainage	$125,345,000
B:	Streets and Highways	67,459,000
C:	Water	17,735,000
D:	Sewerage	19,048,000
E:	Recreation and Parks	6,335,000

Further projections led to the conclusion that the owner/developer would have to participate to a much greater extent in the development of the property if the taxes on the land were to be at all competitive with existing mainland properties. Since Measure A could only be repaid by tax levies assessed against the land *only*, owner-developer participation in this area was the most urgent. For the remainder of the measures, tax levies could be assessed against both the land and improvements. A good portion of a massive feasibility report was devoted to informing the Leslie Salt Company that it had to put more money into the original project than it had originally anticipated. In order to further bolster the bond issue, the consultants recommended that the district have its own tax assessor who could estimate the escalating value of property not completely developed, but benefitting from adjacent improvements, and tax it at a higher rate than the normal county assessor would.

Hopefully, Redwood Shores will have more success than Foster City has had. This development, which includes some 2900 acres for an eventual population of 35,000 people, has run into continual difficulties with local public opinion. In order to live in this waterfront community, a resident must pay $11.48 in taxes per $100 assessed valuation, which is the highest rate in San Mateo County. The local taxpayer is, in effect, paying for the development, and putting up with objectionable construction for a period of five years.

Recently, a special consultant to the Assembly Committee on Municipal and County Governments attacked the "ethics" of using public tax money to further the profits of private developers. He also attacked the special district assessor system by saying it paved the way for "favoritism, collusion, and bribery." Foster is quick to point out that he is paying higher taxes on the unimproved property to keep the homeowner's rate down. The rate might well be as high as $15 if a county assessor were used. Foster also states he bought the land for $16 million for the Leslie Salt Company and the Schilling Estate Company, spent $5 million on utilities and building improvements, and incurred $5 million in property sale expenses. He has received $12 million from land sales but spent about $3 million a year in taxes. Walter Cooper, a resident of the community, claims that the developer dominates and controls the district and "has manipulated fat contracts for his personal gain." According to the San Jose *Mercury*, a local newspaper, Cooper states that the Midwest Dredging Company is owned by Foster, and is at the same time collecting public monies for dredging and site preparation. Cooper's suit against Foster has called a virtual halt to property and bond sales in Foster City.

"What is at stake essentially," claims the paper, "is the whole new concept of private development financed by public funds. Developers, plagued by tight money and rapidly disappearing land from the Bay Area, claim the system is justified. The legislature and the courts are still uncertain."

What is also apparent is that developers can no longer play the role that they are holders of "poor" properties, requiring special help for development. It is quite obvious to all concerned that, potentially, the poor marshlands are exceedingly valuable. Whether bond owners should receive a more equitable share of the profits for their participation is a debatable point. As the present law would have it, the owner takes almost all.

The San Jose paper points out that, if Foster City emerges from the controversy unscathed, "the physical future of the San Francisco Bay will suddenly become very flexible." Aside from Redwood Shores, another project involving 4000 acres has been proposed by the Pacific Air Commerce Center, an organization backed by Rockefeller money and the Ideal Cement Company. Considering the thousands of acres held, albeit somewhat dubiously by the Ideal Cement Company, a good deal of the south end of the Bay might eventually be filled, at public expense, for private profit.

FILLING THE WATERS/ AESTHETICS

Although landfill may be the new frontier of modern living, it is quite obvious that in most cases man takes with him a packet of bad habits from the shore. Most landfill projects are simply dreary repetitions of suburban house-and-lot living, except that there may be a speedboat parked outside as well as an automobile. Occasionally, however, some developers seem inspired by the opportunity of creating better land uses, better environments. Foster City, for all the glamour of its canals, has done little more than transplant suburban loops, and lawns. The neighboring project, Redwood Shores, originally planned by The Architects Collaborative and engineered and researched by Daniel, Mann, Mendenhall & Johnson, is more promising. Although still in model form, the project betrays some interesting thinking in waterside architecture.

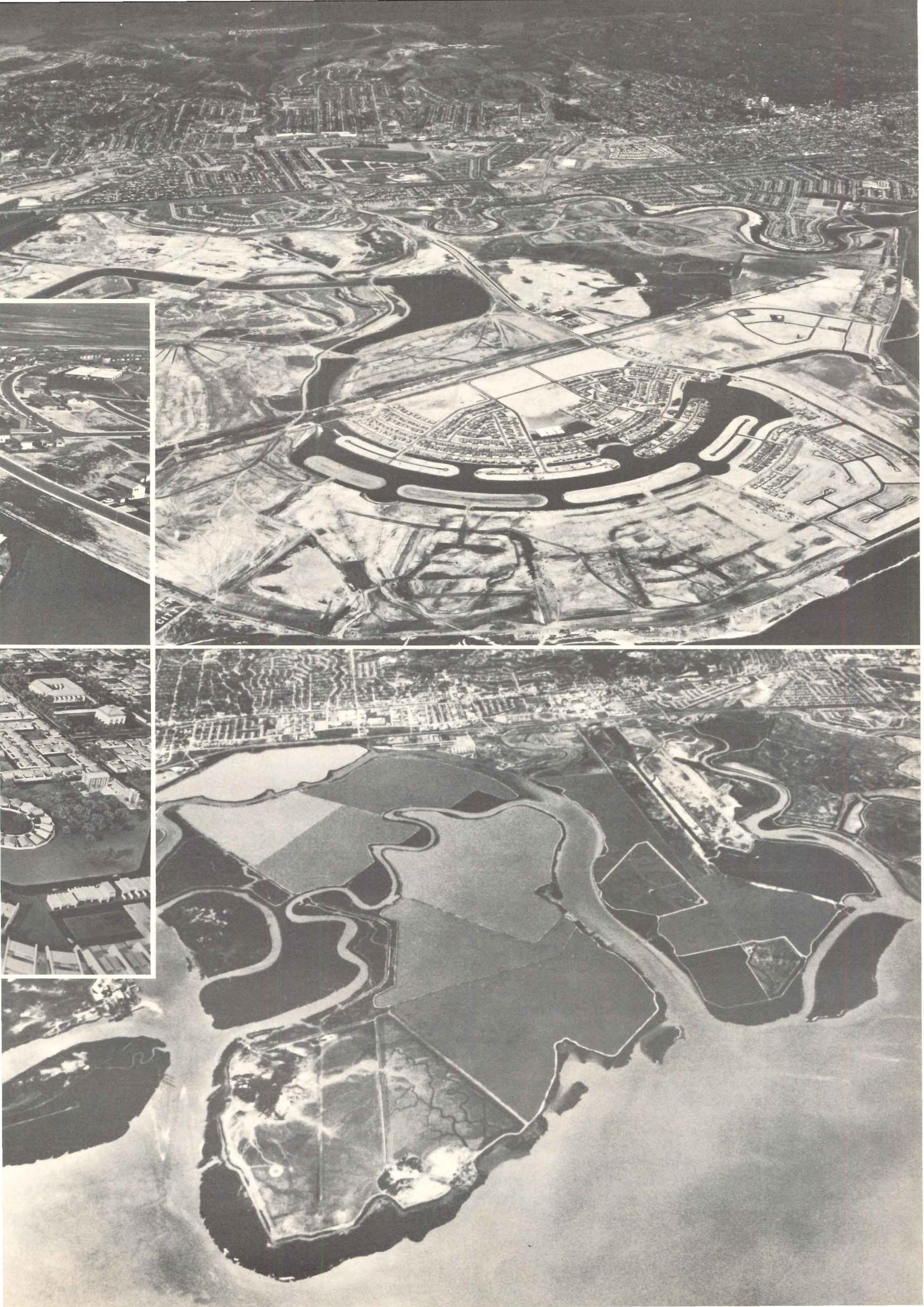
Unlike many of those concerned with landfill, the architects were conscious of tying the new community to the old town — as well as to the water. Observing that Redwood City has one of the oldest gridiron plans of the west, and that this was a logical plan for flat land, they chose to continue the pattern in the inland sections of the landfill property. This tight gridiron is used to offset the looser architectural developments around the shore. Unlike the dizzying concentric loops of Foster City, which echo the borders of the land, there is a real contrast at Redwood Shores between land-locked properties and waterside living. Furthermore, what appears to be conventional blocks are actually neighborhood clusters of 16 houses with common courts in the center. Developments at the water's edge are scaled according to the size of the waterway. Along the smaller rivers, the architects developed a type of terraced housing that binds and accentuates the waterway — Venetian style. Along the Bay there are several prominent high-rise clusters that identify the landscape. "The trouble with most of the property bordering the Bay," says project coordinator Howard Elkus, "is that there are no identifying landmarks." From the Bay, Redwood City is scarcely noticeable because of the expansive salt marshes. The landmarks of high-rise or cluster housing on the Bay will serve to announce Redwood City, which is the county seat of San Mateo. Other free-style elements along the waterways include circular housing clusters, marinas, clubs, restaurants and public facilities.

The architects have been careful to keep the shoreline open for walking, beaches, or other public uses. Instead of routing the proposed freeway around the outer edge of the land, as is usual, they place it within the boundary lines, thus keeping the shoreline unobstructed. Other, smaller, roadways follow the line of old dikes, and the architects hope to make use of terracing and mounding the shape of the otherwise flat surface. On the interior, individual communities are focused around small ponds. One pond features a library that is smack in the middle of water.

Contrasted with the more pedestrian development next door, Redwood Shores looks very promising. Unfortunately, recent feasibility reports seem to favor traditional house and lot planning, traditional sales. Whether the final product will emerge as attractive as the plan now indicates is dubious, but at least some serious thought has gone into exploring the nature of landfill architecture.

Foster City (facing page); detail (below).

Redwood Shores site (facing page); detail of proposed development (above).



Whenever P/A has sensed a new subject in the architectural atmosphere, we have gone to the architects who appeared actively engaged in doing something about that subject. In general, we talked to them separately, corresponded by mail, then combined all those statements. So, again, P/A synthesizes a cross-section of current architectural thinking — by a kind of cut-and-fill method.

THE EARTH:

DISCUSSING THE BASIC ISSUES

Why Are We Interested in Earthmoving Today?

Florida architect William Morgan answers, "Because we are technologically capable and it is economically feasible; also, we have the town planning and transportation requirements."

According to architect William Conklin, "We've got machines that can move earth very economically compared to what it would have cost our ancestors a few hundred years ago. George Washington with all his armies could not have created the Boulder Dam; we can create thousands of them."

Philip Johnson comments, "One element we think of right away — and it may be a romantic and illusory element — is that the bulldozer is the tool of our day. That the bulldozer is the only thing that hasn't gone up in price — the way crafts have. You see, crafts have disappeared; good materials are too expensive to use; and you think right away of how to cheapen them. One of the luxurious ways and one of the American ways, due to our great road-building programs, is the bulldozer. And that is a perfectly natural way to think about it. That is one element. This is a romantic idea. I am not sure that it is cheap at all."

Landscape architect Lawrence Halprin points out, "The cost of moving dirt has not changed in 100 years, as everything else has. As far as highway engineering is concerned, at any rate, the cubic-yard cost of moving dirt has not changed."

William Morgan adds, "The best proof is in the results of bridge approaches and highway overpasses, which seem to reveal that the least expensive method is to create two wedge-shaped hills and to span between them. If steel spans alone were more economical, we would not go to the expense of building the hills. The common practice is evidence of the accepted economy."

Philip Johnson disagrees, "The buildings I've done that are slopes cost about the same as the buildings covered with bricks or stone. There's no vast saving in the bulldozer, in my case. It is a romantic notion, because I noticed that I didn't change the design due to cost. I was amazed how much they cost in any case, but then I'm continually amazed at how expensive buildings are."

As Paul Rudolph sees it, "Earthmoving machinery is one of the most economical aspects of construction known, and part of the interest in it comes from highway construction, which of course is often done very well indeed. But that is just where you start, isn't it? The reason why architecture becomes more expensive is not because of the structure per se; it's because of the mechanical and electrical systems we get into and the finishes we use. Excavation work is not negligible, but the structure — the envelope itself — is somewhere between 20 and 25 per cent of the total cost of building, whereas the mechanical and electrical systems are usually between 32, 35, or even 50 per cent of the total cost. The remaining cost, of course, is in the finishes. The foundation and excavations are included in the 22 to 25 per cent for structure."

William Conklin comments, "We've found that, where it seemed functionally appropriate, it's been economically feasible to work underground. Because of the mechanical equipment available to us, the cost of controlling the environment is reduced. If you cover it with the insulating earth, the cost of external architecture is minimized."

Architect Earl Carlin concludes, "Good fill itself is becoming a more valuable commodity. It used to be expendable. Now you take a second look at what you do with excavated material, because it costs money to take it somewhere, or to bring it in from somewhere. People are beginning to recognize that it has value as an ingredient in the building program."

Has the Rise of the Landscape Architect Focused Our Attention on Earth?

Markedly evident in the past years has been the ascendancy of landscape architects to the position of site planner, architectural planner — to architect even. Landscape architects now serve on city planning commissions, advise on mass transit, freeways, and over-all city improvement; they are reassuming the command of Le Notre and Capability

Brown. The tendency has met with wide approval by all the design professions.

"The problem of landscape architecture has always been an exceedingly important one," William Morgan observes. "In the first half of this century, we perhaps avoided the question of site too much, and cut off our thinking from landscape architecture to such an extent that we now require a specialist to bring the landscape back to architecture. Today, we are beginning to realize again that the building cannot be separated from the landscape, or from planning either."

Also relevant is Edward Durrell Stone's comment when his son told him he was going to become a landscape architect: that his generation had learned about architecture, and that his son's generation will go on to learn about the landscape and the relation between them.

Landscape architect Garrett Eckbo elaborates, "It seems only natural that architectural interest should expand from the original structural core to the utilization and preservation of the landscape that surrounds and houses it. In the same way, the interest of landscape architects is expanding from its original open-space focus to include the form, character, and arrangement of buildings and other structures that shape and condition much of it. As this expansion process continues beyond the boundaries of specific projects, both professions become involved in urban and regional design, and the conservation of the larger landscape."

"Architects are becoming more respectful of site planners, at least of the consideration of site," Earl Carlin adds. "Maybe that is because we are being given different kinds of sites."

Is Conservation of the Landscape Our Major Concern?

"There is an expanding national concern, which includes the planning and design professions, about the accelerating deterioration of the American landscape — urban, rural, and primeval," states Garrett Eckbo. "The more we build and develop, the worse it gets."

Carlin adds, "The interest may start with everyone's desire to do something about the automobile and its intrusion on the eye. If we can't bury it completely, we can at least screen it."

Rudolph comments, "One of the reasons is that more easily buildable land is becoming rather scarce, and therefore the really irregular — and in a sense the much more interesting — land comes into focus."

Johnson thinks, "Although I am not able to analyze my own feelings on it, I think the impetus is anti-suburbia sprawl. In the case of my gallery, it was just that I didn't want to see a building there."

According to Charles W. Moore, chairman of the department of architecture at Yale University, "In most of the places we frequent, there are just too many buildings (and attendant automobiles) for any relation to the structure of the earth to have been remembered. Our masterworks are plopped around like raisins on a cake, with prizes for the unusually lumpy raisins (the 'burly free-standers,' this generation of architecture students call them, with a light sneer)."

Johnson agrees, "A change of scale has overtaken life — that is, there is no relation between 1850 and 1960 as to the needs of building. We need so many more. The whole idea is to get more land and to do away with the plop, plop, plop series of houses or buildings. For example, in a campus, take Jefferson's impetus for building the University of Virginia the way he did. Land never passed into his mind. In fact, he wanted to use as much as he could and he stretched the buildings out by making these endless colonnades. It was a different approach to economy of land use. So if you want to use modern techniques, of which the best instrument is the bulldozer, if you want to negate buildings, if you want to make space where there were buildings, it naturally comes up to use earth."

Rudolph concludes, "As I see it, stripped mine sites and terracing are large-scale, man-made relationships to the terrain. For me, they're siting possibilities, and I see in them visually a kind of magnificent relationship to existing land. What really interests me is the relationship of buildings to sites and how to bring about sympathy between the two. It's land use, site planning, and siting that I'm interested in."

How Does This View of Land Use Affect Our Image of Buildings?

According to Eckbo, "There is a direct relationship between this potential — the design, location, and site development of new buildings — and the fascination with forms, which all designers share."

Bill Morgan comments, "The question is one of form, not technique."

"Then, as an element," Philip Johnson concurs, "there is the love of the 3:1 angle. All modern buildings, with the English as the leaders, are using either 45° or 60° angles — flaring out at the top or coming together like a pyramid. The breakup of the International Style came not only with Kahn, but especially with English architects, who use angles, if they have to, in nothing more than a water tower to splay out over the top of the building — the arbitrary 45° angle. In fact, the more I think about it, this may be the interest underlying all the others — that is, the desire for form. True form always comes first; then you rationalize that you think it is more economical, or that it is better looking, or that we are more interested in land preservation now. Or, maybe it is all of these coming together.

"You may ask," Johnson continues, "how I can say it is a desire for form if I have hidden the form by going underground? But they don't go underground. None of my buildings are underground in that sense. It is the berm that is the form."

"History illustrates many uses of earth forms in creating visual order," Morgan points out. "The examples constitute a vocabulary of architectural cones, cubes, pyramids, spherical sections, and planes undulating and linear. I have organized seven general categories: shaped hills, mounds, retained earth, shafts, terraces, tunnels, and caves. An eighth section — on water retained — involves one or more of the preceding seven sections; and the ninth section, on cities, usually involves most of the seven basic sections."

Arthur Drexler, director of the Museum of Modern Art's Department of Architecture, fills in the historical outline,

"There is a change in attitude today — a shift from an object-oriented society. We have liked buildings that look like portable objects — indeed, which look as though they could be picked up and carried away. The intention was that you should suppose you could pick up the Seagram building and put it down on the Lever House site, and that these are two objects you could move around on the sidewalk. We are moving away from this notion of architecture as a kind of expendable, portable object. The alternative has been to move architecture back in time, to have it look like a handcrafted object — preferably massive and sculptural, and, if possible, to look like a fortification. There are some very good psychological, maybe even practical, reasons for this. Yet now there doesn't seem to be such a fervor even about this as there used to be. So if it isn't going to be object-oriented, and it isn't going to be the building as sculpture, what is there? What is left are some directions that are not part of the classical tradition, the Greco-Roman tradition. For that, one goes to the Mesopotamian, and the Mayan, and any of the earth-agriculture dominated societies in which the fundamental material of architecture is the earth and images of the earth — buildings as platforms, or mountains, or plateaus, or caves, or whatever, in that metaphorical sense. We add to it today (although it's existed in the past) the rice terrace, the agricultural terrace, strip mining, and a variety of modern agricultural techniques."

Architect Hugh Hardy agrees with this view: "The monumentalization of things, of objects, doesn't really relate to the way society works today. The shaping of a monument assumes that you have an organized, structured society to which you specifically make a statement. It's very difficult to make a statement now. The only statements that are characteristic of us are the sort of sly humor when you invert things."

"Today, the big thing to me is the angle," Johnson reaffirms. "You see, it is the logical excuse to use an interesting angle. And it is the weight; it is the opposition to the glass style. After all we have been through the last 40 years, it leads one to earth. Also, if you can create a new effect for less money, it's the thing you grab onto. Even if you only think it's less money. I can't prove it's less money, no. Maybe others can."

William Morgan's Earthform Categories.

Whatever Our Various Interests in Earth, Earthmoving, and Earth Forms, Is It Valid? Should We Do It? What Are the Justifications?

There are two seemingly opposed camps: One favors preserving the terrain, with some members proposing going underground; the other favors the improvement of the terrain that earthmoving projects can effect.

Hardy comments, "People dragging things around, digging out metal, is just as natural as a volcano pushing up something else. That's just as natural a landscape as the Rocky Mountains. You can very easily make the point that we're messing up the landscape — ping ping ping — but if you drew back and saw it in a large enough scale, we're providing more landscape, as man and nature have always done."

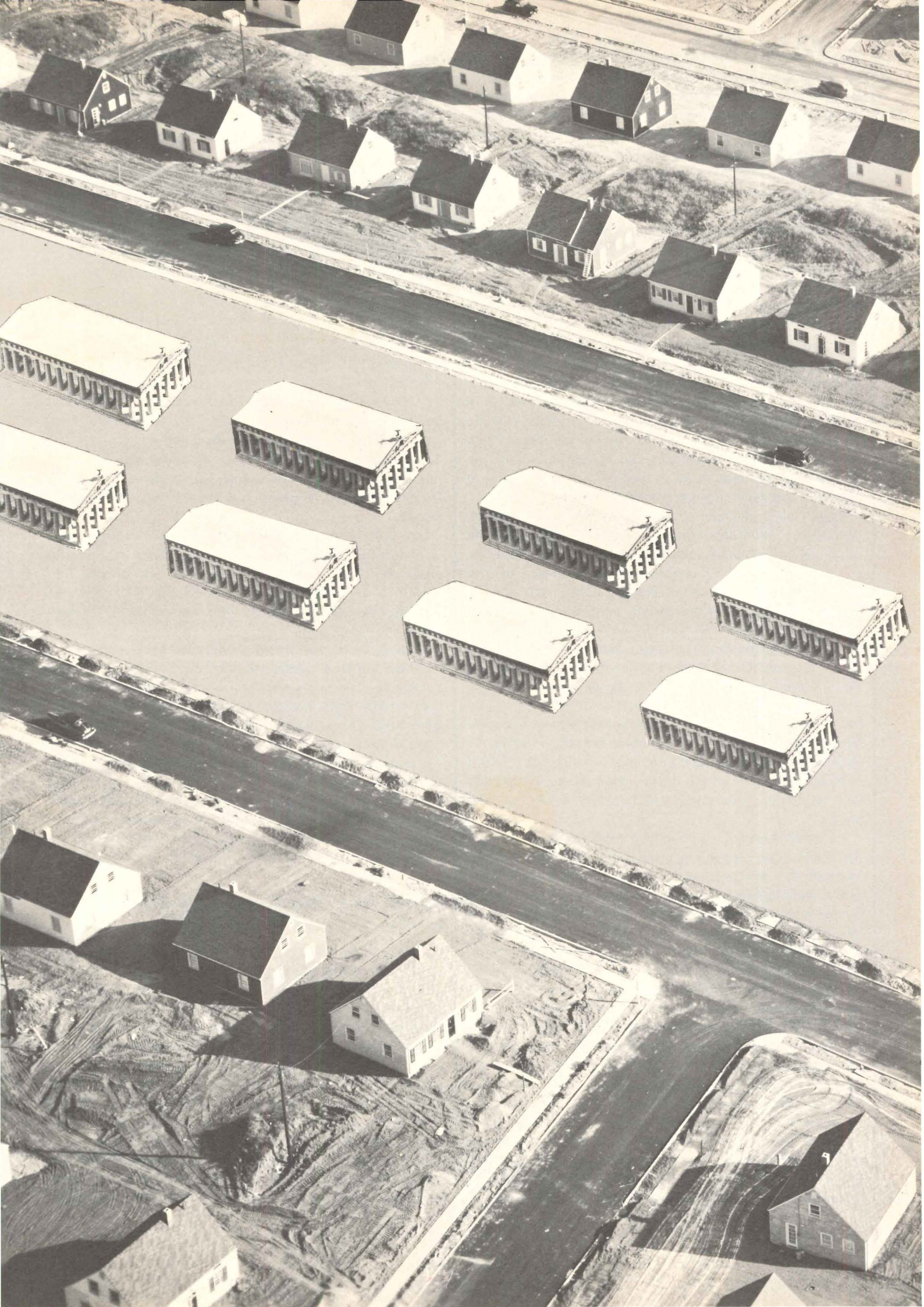
Lawrence Halprin observes, "Now that we are faced in our new towns with instant civilization, and require mass production of units of building, we are fortunate to have large-scale earthmoving equipment available."

For Conklin, "It is correct and proper for man to alter the physical environment that he inherits to fit his own patterns and needs. That he reshapes the earth to create the image of his own concept of how man should live on earth seems exactly right. Moving and modifying the forms and shapes of the earth have been man's historic activity since he first started reshaping the cave he inherited. It has always occurred; it will continue to."

Richard Reynolds, an associate of Lawrence Halprin's, agrees, "Resculpturing the earth, or just earth sculpture, is something that climate, vegetation, animals (including man), are doing all the time. Man is a leveler. He has always been — for home, hearth, and industry. So, for that matter, are most other mammals, except perhaps those that burrow underground or live in trees. Generally, without being very aware of it, we are accelerating the rate of filling in of all bodies of water just by the ordinary everyday activities we partake of. Only lately — during the last 2000 years — has man been more active at it than any other factor or agent. During the last 200 years, his rate of attrition of the earth's surface has increased exponentially."

Arthur Drexler argues the opposing view: "An awful lot of things that have to be built don't require or merit architectural treatment, in the sense of being thrust forward into your consciousness as statements about material or space or anything else; they have no particular intrinsic interest. Architecture is still thought to be a matter of buildings, when it ought to be something else. Today, all of our build-

Would the single-sculpture concept of building be sufficiently improved even if what was dotted about the countryside was the world's most perfect sculpture?



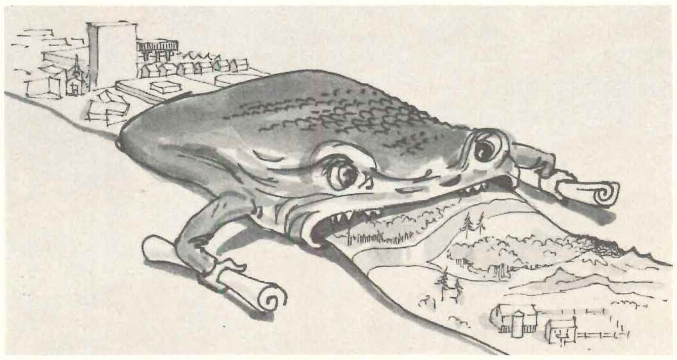
ings are designed as large, useful objects. Each year, we put up thousands of warehouses and factories, for example, which have no business existing as objects at all. They are services, means to an end. Why are they not concealed? Services belong in the ground. We should insist that whatever services are required be invisible, not beautiful. We can do with a lot less of what even Mies thinks, or still thinks, is necessary to architecture."

Architect-conservationist Malcolm Wells agrees, "Have we ever stopped to realize that what we do each day in the name of architecture is just as ruthless, just as destructive, as the work the buffalo-hunters did. Until we've seen ourselves in that light, we'll go on missing the point, always feeling that our work is somehow different, important. The simple fact remains that there just isn't any building as beautiful, or as appropriate, or as important, as the bit of forest it replaces. We forget the only reality in this world: Nature. So there's nowhere else to go but down — a most suitable direction; for instead of being a grim alternative to death, it is a chance to live again. We must start with the obvious candidates (warehouses, shopping centers, parking lots, and telephone exchanges). But unless I'm wrong, the idea will appeal least of all to architects, for they tend to find their own works far too wonderful to hide."

Paolo Soleri, pioneer of the architectural underground, proclaims, "On the premise that what makes life possible on this planet is the existence of a few inches of topsoil on the geology that is not underwater, one is aware of how good the reasons must be for scraping, digging, and altering the local balance. Most of the time, our business should be to prevent the soil from moving, rather than moving the earth. Earthmoving is an ecological undertaking. It is justifiable if the resulting ecology is better than the original one. Yet, if there is a thing that affords man an eternity of a sort, that thing is the molding of the earth's surface. In the total ecological balance, the action of Bulldozer Man will be measured more by his ability to conserve than by his ability to alter. The realistic, not the practical, planning for a future culture would start at the upper edges of the watersheds with Bulldozer Man enthroned between coherence and vision."

As Conklin sees it: "It is only in current time of tremendous population growth and urbanization that the problems inherent in modifying the earth and the atmosphere have really come before us. None of us would say it was wrong for the Indians to build camp fires, even though the smoke polluted the atmosphere above. It was no real problem, so it is not philosophically wrong. It is a quantitative matter, a question of how we do it. We have now learned some of the limitations of modifying the environment — limitations we were unaware of before. There are obvious points, such as that it is fine to have one bonfire in the middle of the plain but when you have a whole megalopolis with all its incinerators burning, then suddenly you have reached a limit. We have very rarely reached the limitations on the amounts of earth we can move about, or the way we move earth."

Concluding his crusading remarks, Malcolm Wells claims, "Every acre we build over is as effectively robbed of life as if it were flung away into space — in terms of animal and plant life denied existence, in terms of ugliness, in terms of monumental arrogance, and, perhaps most important of all, in terms of rainwater run-off, this land-paving practice we call architecture is literally suicidal. Each of us is turned loose, with a degree in one hand and a license in the other — an architecting machine — to run off and help his army of brother architects pave the planet."



Malcolm Wells's "architecting machine."

The two sides do not stand totally opposed on all points, however. Everyone seems to believe in the validity of moving and designing the earth — even Soleri and Wells — but not everyone goes along with the "antiarchitectural" desire to hide, bury, or otherwise negate buildings: Witness Conklin and Rudolph. Negating buildings is another subject, though.

One critic suspects that the popularity of terracing today is related to the art nouveau revival, which has brought about our rediscovery of the concentric and parallel line motif. The image of the contour model and of the terraced building coincides too closely with our historical rediscovery not to be related.

Landfill has a more steady historical background.

"There are areas where landfill should not occur," Conklin admits, "where great natural environments still exist in their original state. But, throughout history, we have always done landfill operations on coastlines. After all, everybody loves the riverbank of the Seine in Paris, and it is entirely a man-made creation. The social and political problems resulting from landfill operations — due to working into state and waterway boundaries — none of us clearly understands. We are gradually going to find out. There are experts on certain of the limitations; for instance, the Corps of Engineers knows something about the hydraulic flow of rivers."

What Are the Pros and Cons on Underground Buildings?

"There is an enormous validity in sinking certain structures in the earth either partially or wholly," Morgan maintains. "Our skyscrapers are greatly underground. The Chase Manhattan Building is a buried Lever scheme."

Hardy agrees: "Yes, the Chase Manhattan Building is underground for all of the computerized check-clearing apparatus: two whole floors and a real building with real people and real architectural design — not just the vault, but a lot of the way that bank works is underground. There's much more underground in buildings now than just parking and basements."

"In the warm, dry Southwest," Eckbo declares, "creative pioneering by Soleri and others has established the functional desirability and the sculptural potential for such com-

bined earth-shaping and construction. This is not necessarily relevant to other climatic regions."

"I have checked and prodded this idea of underground construction from every angle, and still find only the mildest objections," insists Malcolm Wells. "One, of course, is the problem of water and dampness. But there are rooms 50 ft underground today that are dry as bones. And, if a site seems juicy, we can build aboveground, then cover it with earth and trees — a man-made hill. Ventilation is no problem; compared to the ventilation of a mountain tunnel, or a high-flying jet, it is child's play. Cost is an unavoidable problem in structures built to carry 4 to 10 ft of earth. But what a shame if mankind's epitaph should read: They found the right way too expensive."

Rudolph has reservations: "There is a psychological problem of going into the earth for many people. It's associated with death and moisture, or dampness and fear."

Morgan, on the other hand, maintains, "People will react to underground living exactly as they do to being buried inside an office building."

Johnson concurs, "They won't know the difference; they don't even now."

"For instance," Morgan continues, "the Navy gives its psychological tests to prospective submarine personnel to establish two things: how they will react to being below the sea, and how they will react to being in close proximity to shipmates. Yet they don't give the same tests to those who are similarly buried inside close quarters on surface ships such as destroyers. That is because we have already adapted to underground living.

"Man has a psychological desire for privacy, for snugness, for being in a cave," Morgan elaborates, "a walled enclosure cut off from the world. Secluded and safe. It is a mood common to us all."

"Oh, yes, everyone likes caves," Johnson concurs. "It's that Ur feeling. People get a positive pleasure going into my gallery. Going into a building that isn't there, they get that feeling of, 'Where are we going?' Since every room is about 10 times bigger than they expect, there's a positive element of surprise and romance. Caves are probably an atavism of some kind; people enjoy being enclosed."

Rudolph asks, "I wonder if people working in interior rooms of skyscrapers would feel differently about it if they entered at street level and went down to an interior room, as opposed to entering at street level and going up to an interior room? I'm sure I would feel differently about it."

"But it's very important if you go down to it or up to it," Johnson explains. "You must come in, and not down. With all of my underground buildings, you enter on grade. After you're in them, you go down a few steps. In my gallery, which isn't a mound in a field but is up on a hill, you enter by going up the hill and then in. I don't like going down into basements. None of these berm houses is a basement dwelling."

"Well," Rudolph retorts, "underground rooms depend on artificial light, and for me artificial light can never equal natural light."

"The point is," Johnson urges, "that an underground room is unpleasant if it's a root cellar. But what if it's a theatre (you're always underground in a theatre; there's no view out), or a ballroom (take the ballroom at the Plaza; there are no windows)? People forget that it's the room, not where it sits, that's the excitement."

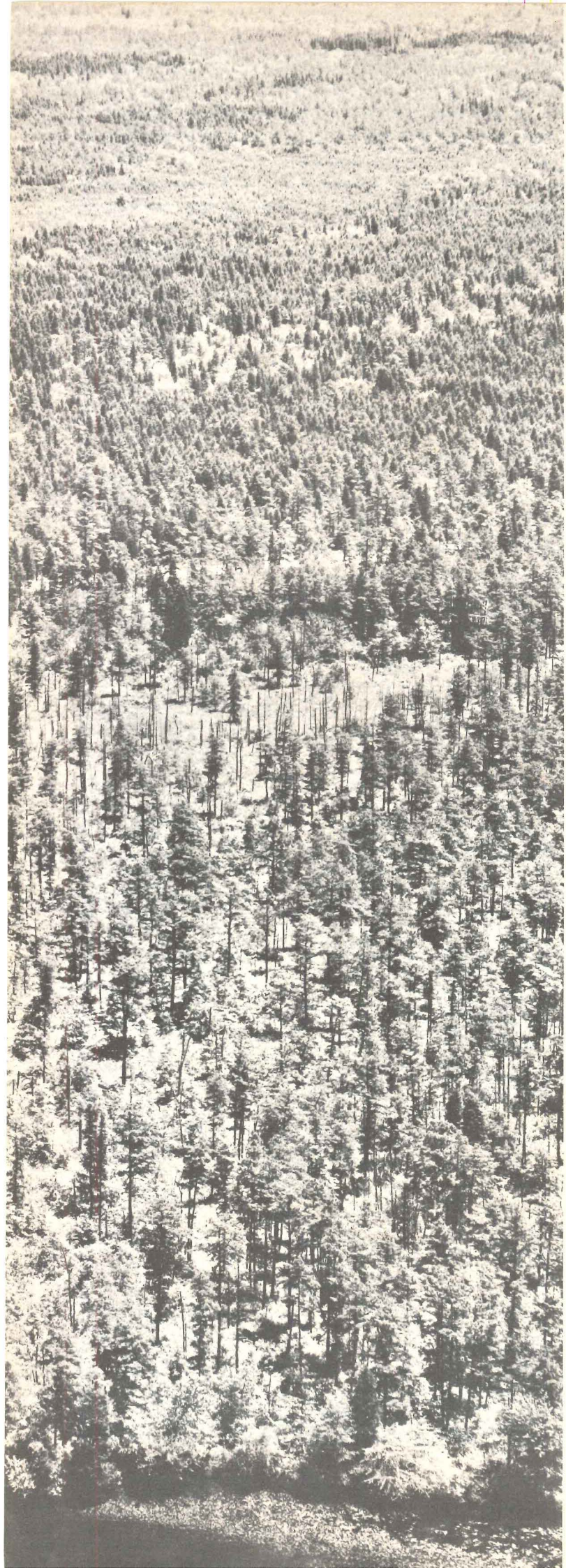
On the other hand, as even Morgan admits, "To haul off and build a civilization underground belongs to Dr. Strangelove. There is something gross about burying a civilization in the mud. It stands so forcefully opposed to a magnificent, towered skyline. We would lose great poetic possibility by abandoning the horizon to live in a pit."

Rudolph concludes, "The hell with the underground business — for me."

"Much of the concern with underground construction," Eckbo protests, "is for shelter and security from the menace of The Bomb and its by-products. It is not necessary to debate Cold War issues to see that, if they result in driving us back underground, back to the caves from which we emerged, blinking, some 10,000 years ago, then civilization will be over for that portion of the world that goes underground, and both sides will have lost."

Surprisingly, Paolo Soleri, who has designed an underground city and lives in a partly underground house, agrees: "Burrowing our dwellings into the crust of the earth is a downright and direct mortification of life. An entombed civ-

Cross-Florida Barge Canal looking toward Gulf.



ilization would probably be very efficient, but also brutalizing. The aesthetic sense is the child of the sun, the air, the light, the wind. Bury living man and you bury the reasons for his sensibility. Bury man deep in soil or rock, in the manner toads are found in excavations, then man shall have inherited the earth.

"Gravity is the number one ruler of our environment, as Bulldozer Man well knows," Soleri continues. "Thus, to start at the bottom is literally to prepare one's own burial. Man does not have to follow his machine into the underground. He must not do so either for reasons of efficiency or of survival. He must find a better future than that."

"I can't believe that anybody responsibly thinks we're going to jam all our lives in the ground," Hardy concludes. "Human beings are rhythmical or cyclical. Human beings are not a constant; you feel different before lunch and after lunch; morning is different from evening; and breakfast isn't at all like dinner. Men will not put up with an environment that is changeless, because they themselves are not changeless. To be truly underground, you would start messing around with the static environment so that it could become as change-filled as the one that we've all become used to being in. It's a problem of keeping people awake, alive, responsible.

"But we may be on the way to that: In the space program, NASA once considered changing the smells inside the space capsule. For the first few weeks, they would have had a light scent of pine, then roast beef, and so on. It was to keep the senses responsive. The idea was abandoned, perhaps only temporarily, but it does point out the constant problem in this entire discussion: designing the environment."

The Designed "Natural" Landscape: Is There a Confusion Between "Underground" and "Preservation"?

Malcolm Wells proclaims, "To most of us, tragically, a compassionate treatment of nature involves no more than a cleaned-up version of what you and I and all of our great-grandparents have been doing here since 1609: clear the land, help ourselves, and then, if there's time, toss a few crumbs back to nature. This attitude, which has grown fantastically in modern times (with no little help from architects and planners) is expressed very clearly in this quotation from *Landscape* magazine. Its editor, J. B. Jackson, writes, 'The conservationists, some of them at least, would have us rigidly excluded in the mistaken notion that nature, left to itself, is a beautiful spectacle.' This is very dangerous talk. It helps to put the seal of professional approval on a continuance of the destruction we've practiced here for over three centuries. Talk about anthropocentricity. How much hope do the Grand Canyon or the redwoods have in a world that's learning to think that way?"

Site planner Richard Dober argues, "Because nature is too little present in our environment, we should not overlook the fact that landscape art is artificial; the landscape serves ends that relate more to art than to the science of conservation. The tides of taste in designing gardens, parks, estates, campus, urban complexes, or street scenes

If a city were built underground, how would vents and chimneys look among the trees?

throughout history flow from formalism to the picturesque and back. But both aesthetics are contrivances of man, not natural occurrences."

"Putting dirt on top and planting trees to preserve landscape is pretty silly," Hardy maintains. "If you start jamming buildings underground and covering them with trees, you have obviously changed the landscape, so you've got to get to work and design nature. Nature won't do it for you. There's going to be no such thing as the natural forest on top of a shopping center; there won't be enough soil. When the English thought they'd be pictorial, Capability Brown was designing scenic versions of nature. And England, of course, lives in the image of what he made. But it's not nature. If you left that fantastically selected Capability Brown landscape alone for one year it would be chaos. Nature will just obliterate what you do. So you're going to have to make some accommodated, prettified version of nature in the same way that Capability Brown things are. What is more intelligent to say is not that you'll leave nature alone, but that you are designing the landscape, and you include in it ground with trees — the natural element. By and large, landscape design has been primarily the enhancement of objects. Here, in this case, the landscape in its own right is an element that makes architecture."

Dober adds, "Suitability, longevity, economy, and beauty in the selection and use of the elements that constitute the landscape design cannot be arbitrarily determined. A natural affinity exists between them. Ecological conditions must be respected. But the elements of most landscape designs are no more in their natural state than limestone and wood might be in a 20-story building."

Hardy adds, "People use those Vermont quarries and build their houses on them, and say it isn't natural to have all those marble blocks around. And, of course, it isn't. But, at the scale of Butte, Montana, imagine — it's just as exciting as something that happened."

Next, Hardy brings up the problem of sheer size: "Inserting man-made things in the landscape is okay if the thing is small enough to make sense. You could insert a house in a bluff and — except for the pole, and people looking out, and the tunnel — be more or less respectful of nature. But you should make the distinction between something like that and larger-scale projects. Because if you repeated that up and down — a multistory Horizon House in the bluff — it's a bluff."

Rudolph agrees: "I think that having 10,000 cars parked in a parking structure makes it a mountain — a man-made mountain. This scale and sheer volume is something new in architecture. Architecture is becoming so large that, if you put all the clear, articulated units together (depending on how they're put together, of course), they become another kind of organism. The closest thing to that organism are really hills and valleys — not underground. Buildings are becoming mountains and valleys."

"If we're going to go underground," argues Hardy, "we're certainly going to take all that mechanical stuff we got used to up in the air: our air conditioning, our hi-fi's, our vent pipes, and our soil pipes. And it's going to be really strange to see lots of vents coming out of the ground. Because that's what would happen. Either that or you'd hollow out all the tree trunks. You can't put a city down there, anyway, but you're certainly going to have to design the way it breaks the ground."

"There's no problem in designing an underground roof," Johnson points out. "A roof is a roof. The vents on the roof of the Geier House are in wonderful, big Cor-Ten tubes. You make a virtue out of them."

What Are the Predictions About the Future of Earth, Earthmoving, and Earth Forms?

"Berm architecture will only work on a one- or two-story building," Johnson admits. "It is not applicable to skyscrapers, nor does it really affect New York. One great disadvantage is that it takes up so much room. You have a 3:1 slope. You have three times the height of your building out, so that it steals space instead of creating it."

"That makes it fairly ironical, doesn't it," Johnson was asked, "to claim that the interest is due to making more land available?"

"Yes, it actually takes up more," Johnson replied. "Of course, you plant trees on the roof, too, so you can gain upper terraces. But, for me, the big thing is the angle."

"Formal reasons are a romantic notion," architect Kevin Roche affirms, "and if there is something wrong going on in architecture today, this is a part of it. I will leave it to somebody else to say whether there is something wrong or not."

"The use of earth forms in architecture is a highly romantic notion," maintains Rudolph. "I find difficult to believe it has any real use today. The reason for this is that 95 per cent of human activity basically takes place in rectilinear forms. People keep trying to go back to caves — and I am all for people doing so. I just don't think it has very much use."

Halprin comments, "Now we are faced with projects that are enormous in scale. Grading and large earthmoving devices can relate these projects to the landscape in a way that no other devices can. I don't think berms are earthmoving. This is just another scale of decorating. I don't know where the break-off point is, but the difference is that, in one, you are using land and roads and traffic and buildings as one great event, and, in the other, earth is hiding something as a decorative device. Marrying megastructures to the landscape represents an attempt to use land at big scale. Such solutions are generative of many possibilities for the future."

Kevin Roche questions the entire subject: "There is a lot of talk about the subject, the implication being that we could do more of it, but I don't know what that would be. It's one thing to push earth around to get it out of the way; it's quite another to push the earth to make architecture out of it. I find it difficult to determine when it was economically sound and a logical, feasible thing to do. Many people imagine that the Oakland Museum is an earthmoving project, but the only earth moved was what was removed to make way for the building. The building itself is concrete terracing with landscaping on top of it. The largest earthmoving we have done was the runway at Dulles."

"Do you think," Roche was asked, "that the underground buildings give any indication of large-scale activity in the

future?"

"I think that it is just an indication of playing," he replied.

Richard Reynolds raises the same question: "I'm not aware of any architectural approaches to earth sculpturing. I like the dream stuff that Paolo Soleri seems to be playing around with. Like most architectural games, though, he seems pretty much object-oriented or site-oriented, rather than taking the scale that we are actually working on these days — i.e., whole drainage basins, or whole ranges of hills and mountains. Generally, except for really big projects, such as dams or pipelines or canals, little of this has been done on the scale that really needs attention — i.e., 100-to-500-square-mile areas."

However, Reynolds also gives some reasons for this situation: "Engineering for grading and filling is quite well developed, as long as one takes a conventional approach. That is why, in effect, what I call a sculptural approach is avoided, if not outright impossible. Seldom, if ever, is the engineering approach a holistic one, taking into consideration the implications and consequences of a particular grading or filling plan to adjacent or related areas, as well as the implications of adjacent areas to the site. Too frequently, the consequences of mass grading in terms of the longer-term impacts are given no consideration at all."

Reynolds also offers some constructive, practical suggestions, "One of the best things that could happen in the whole field would be to take students with talent in sculpture on an area-wide scale, train them as civil engineers — with a lot of know-how in hydrology, soil mechanics, geology, and how to get variances through building and construction control boards — and make earth sculpturers out of them. It would also help to throw out most of the county and city building codes pertaining to this field and rewrite them, so they would cope with the fact that no two places have the same soils, climate, geology, or hydrology."

Carlin points out: "Highway rights-of-way have to be reexamined in terms of the amount of waste space involved in them, such as what happens inside a cloverleaf — a never-never, no-man's land. This is justified as green space, but it is unattainable green space. We must consider using them as reservoirs or parking garages."

Charles Moore has a last say: "The bulldozers and their kin have so far been regarded, with justified dismay, as the agents for obliterating any discernible aspects of the earth's remaining structure in order to provide an absolutely smooth surface to plop the raisins onto. In that role, they deserve resistance. However, there is a really useful role in wait for them — that of creating substructures of the earth's structure, so that buildings too numerous to be related comprehensibly one-by-one to the existing shape of the earth might be organized into a comprehensible relation to man-made earth-forms strong enough themselves to evidence a clear relationship with the underlying structure of the land."

In Conclusion

Landscape architect Dan Kiley pleads for moderation from all sides, "All these ideas should not be blown out of proportion to their functional usefulness. Since we have large earthmoving equipment and we work in big scale, it is natural that earth forms can do much to relate buildings in scale to their environment. Whether you build aboveground or underground depends completely on the economies, program, and site determinants. One shouldn't force any of these ideas; they should be taken in stride with the awareness of their possibilities in solving a site problem."

William Morgan makes a final plea: "It is clear, in the middle of the 20th Century, that we have demonstrated technological efficiency to move mountains. What we do not have is the awareness that the design potential of the earth itself has been overlooked and unexploited. The destructive possibilities of earthmoving are being investigated, but the constructive aspects are being neglected. We have seldom paid attention to the visual results of our gigantic highway and expressway structures and the earthworks of our transportation systems. We should be thinking about using earth in a creative way to establish an order in our environment. Archeological findings reveal that early man had a fundamental understanding of this. Most other civilizations have used walls to make one understand the hierarchy and elements of their cities — definitions of town squares and the Roman walls, for instance, become part of the urban landscape. We can easily and economically shape an entire city by using the earth to create spaces, bowls, dividing walls, and the like. It might be our cheapest means of forming a city."

Paolo Soleri sets forth a carefully delineated set of predictions: "The technological world of research, organization, and production will sink into the bowels of the earth, where pressure, vacuum, heat, cold, radiation, and atmospheric sophistication are possible and efficient to the performance of the production cycles.

"For each new city, there will be a colossal program of excavation and production of materials: sand, gravel, stone, cement, lime, and soil. Such quarries and the drainage structure of the whole system will suggest, case by case, the organization of a major park. Thus, the scar left by the excavating and processing plants can be transformed into a focal element for the outdoor life of the citizen, for play, leisure, culture, and sport.

"The new cities themselves will not crawl inside the earth, but their roots will reach far into the geological backbones, and the excavated ground not transformed into construction material will be used for the ground cityscape.

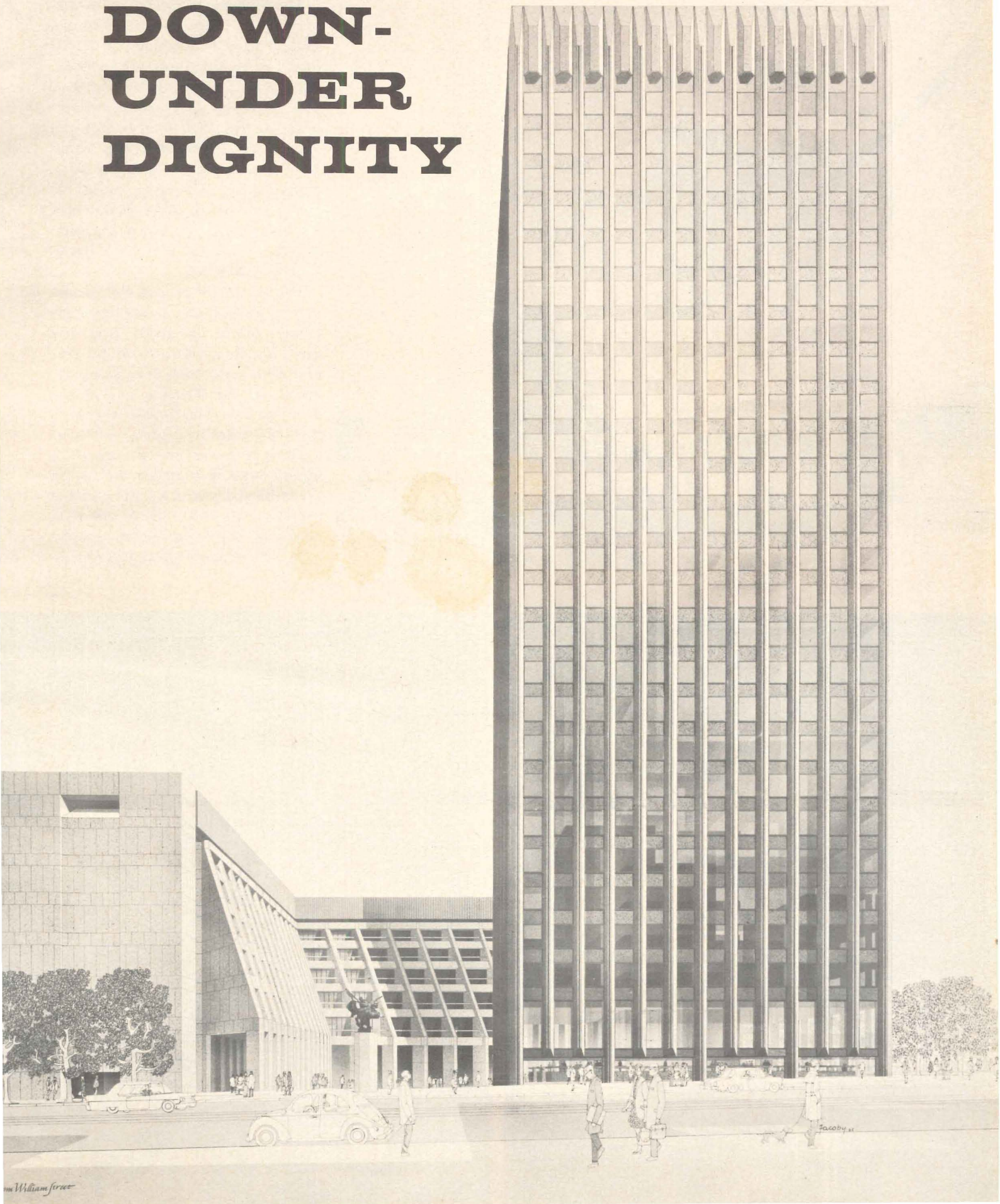
"One hopes that humanized landscape will well serve the purpose of man the creator, not man the speculator.

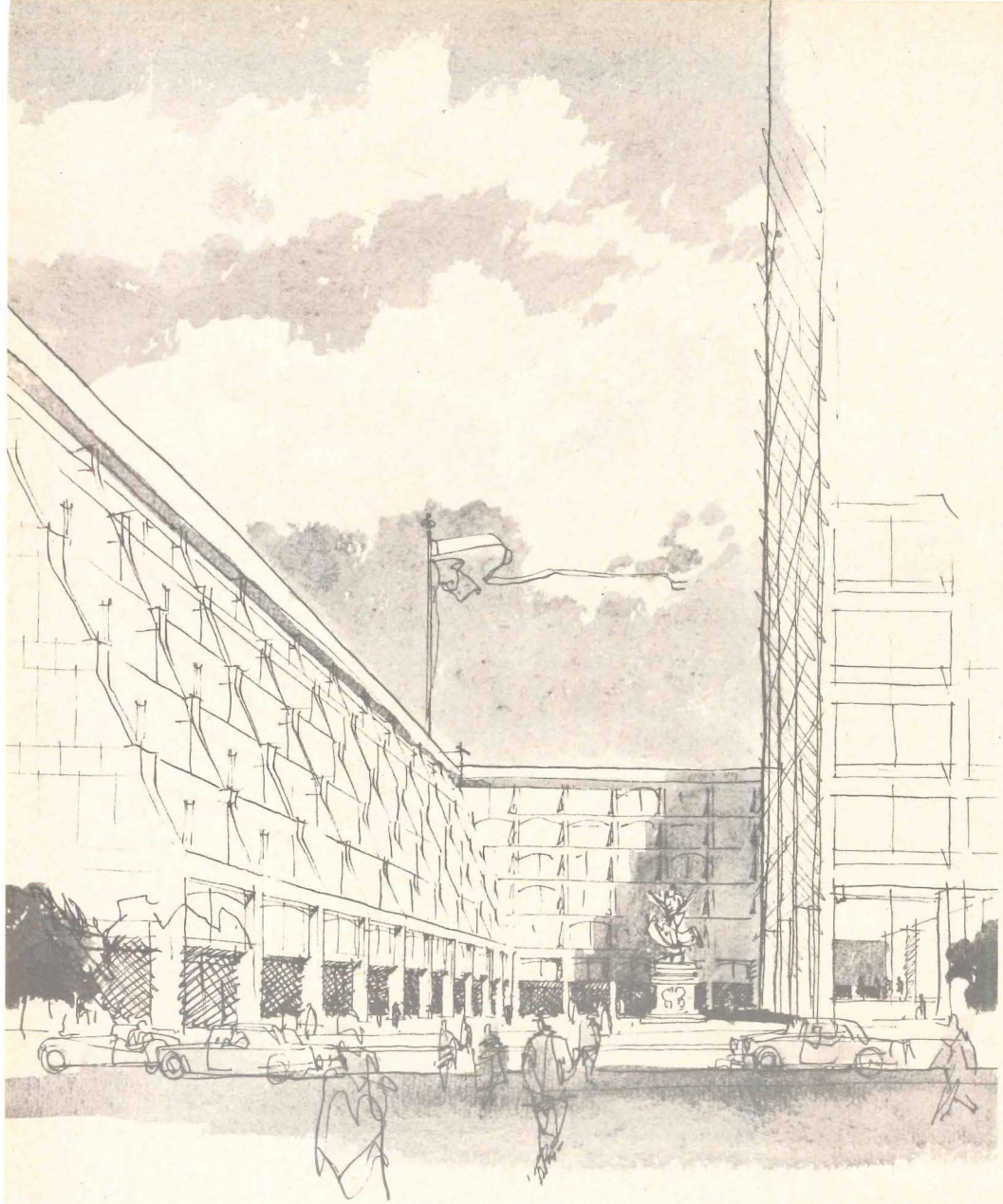
"We have the whole thickness of the earth to handle and exploit. We have only the thin, unstable skin of topsoil, and the seas, to procure for us the biological energies indispensable for life."

Malcolm Wells has the final word: "Now for my pitch line. Now for my talk on the need for birth control, the need for limited city-size, the need for underground construction outside the cities. But I'm going to disappoint you. I'm just going to leave you dangling. Fill in the moral yourself. All I ask is that, before you do, take a long, hard listen to the sounds that are coming in from the far side of this vast universe. I can't be sure, but sometimes I think they're saying, 'Slow down a little, think about the immensities of time that it took for life on your little planet to develop this far, don't snuff it out quite so quickly.' "

(For photo credits on "The Earth," see page 275.)

DOWN-UNDER DIGNITY



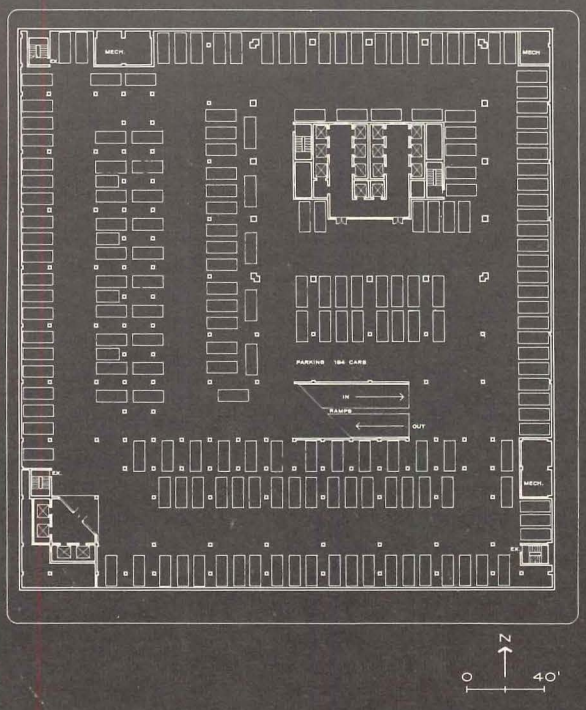


A commercial project now under construction in Melbourne, Victoria, Australia, promises to bring to that city an urban character having a strength and dignity rare in that archipelago, or, for that matter, in this hemisphere.

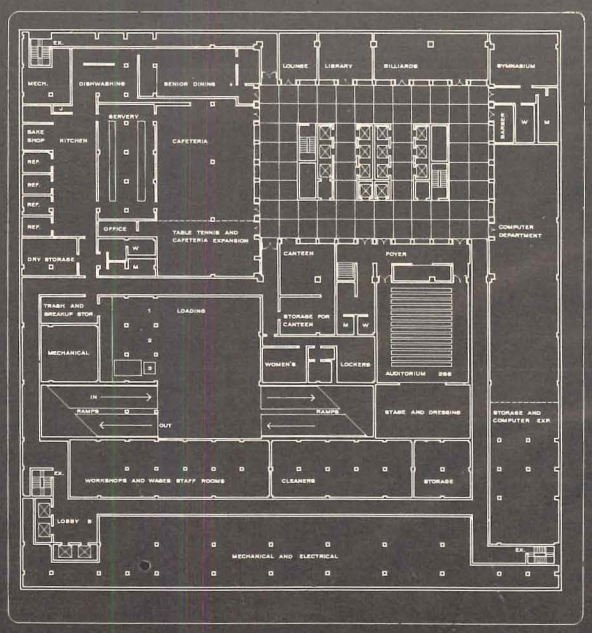
The building is the St. James Development Project for the Australian Mutual Provident Society, by Bates, Smart & McCutcheon of Melbourne, with Skidmore, Owings & Merrill of San Francisco as consulting architects. A definitive design for the project was prepared in San Francisco in cooperation with the Australian firm; then work moved to Melbourne, where contract drawings are being prepared and supervision is being conducted by BSM in cooperation with SOM.

The St. James project will occupy one of Melbourne's most important blocks, across the street from the Shell Building, which SOM did several years ago (with John Buchan), and from the Menzies, one of the city's leading older hotels. It will actually take the form of two buildings: a 26-story tower and a 7-story L-shaped building bounding the site on the south and west sides. Between the two structures will occur a generous plaza that will follow the topography of the site, which drops 18 ft diagonal-

Subbasement floor plan.



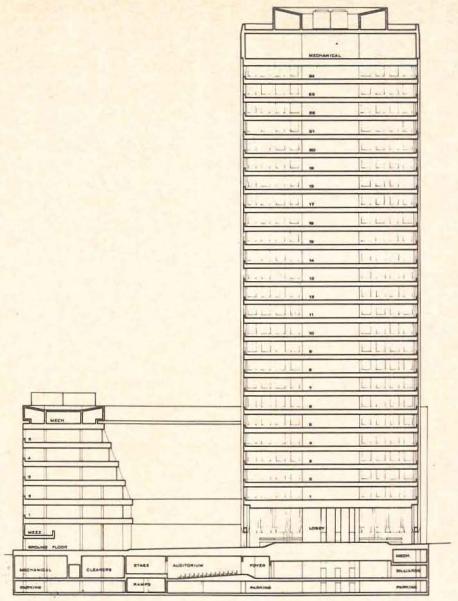
Basement floor plan.



ly from the tower corner down to the lower corner of the smaller building. The architects hope that the maintenance of the original slope will add interest to the experience of moving around the buildings, across the open spaces, and through the lobby of the high-rise and the colonnade of the low-rise. A spokesman for SOM told P/A in San Francisco that the most exciting thing about this project to the architects is that "it is the closest thing we have been able to achieve in respect to our attitude toward the urban condition," adding that he thinks perhaps there is "a moral there or a lesson to be learned from the fact that this was accomplished in Australia and not in this country."

Lower floors of the 372-ft tower will be occupied by offices of Australian Mutual Provident, with upper floors designed as open rental space around a central transportation and mechanical core. Each floor will contain about 11,500 sq ft. The lower building will terrace back as it rises, providing balconies extending at 45° angles for views across the open spaces to William and Bourke Streets. The architects feel that these offices will be ideal for barristers practicing in the nearby law courts, or for doctors and other professionals. From plaza level, the copper-topped low-rise building will form an embracing backdrop for the AMP tower.

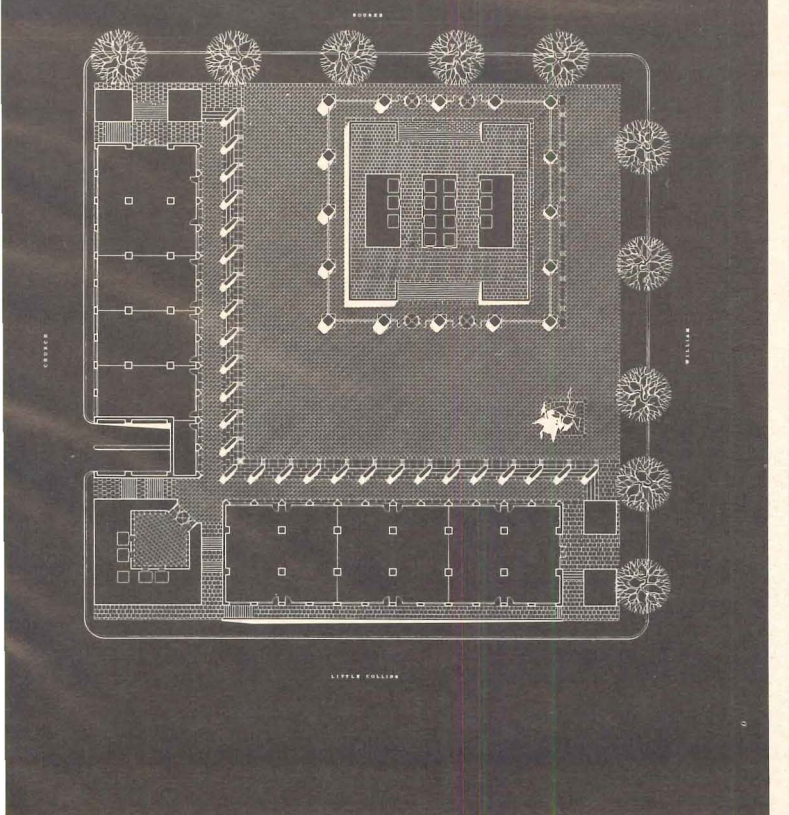
The lobby podium of the tower will emerge from the high point of the site and will be clad in cream travertine. The elevator shafts will also be of this material and the lobby ceiling will be of polished milk glass. All metal in the lobby will be highly polished stainless steel. These light, gleaming surfaces have all been designed to form a contrast to the dark reddish "reconstructed granite" (polished, granite-aggregate precast) of the exterior cladding of both buildings, and the solar bronze glass and dark-anodized aluminum framing of the windows. The plaza areas will be surfaced in bluestone. An additional contrast will be provided where the walls of the tower come down to create a kind of great clerestory over the two-story-high tower lobby, emphasizing the somber hue and power of the granite against the light background of the travertine. Exterior metalwork, besides the dark-anodized aluminum and the copper fascia of the low-rise, will be painted steel balcony railings. Structure of the tower will be concrete-encased steel, and reinforced concrete for the L-shaped building.



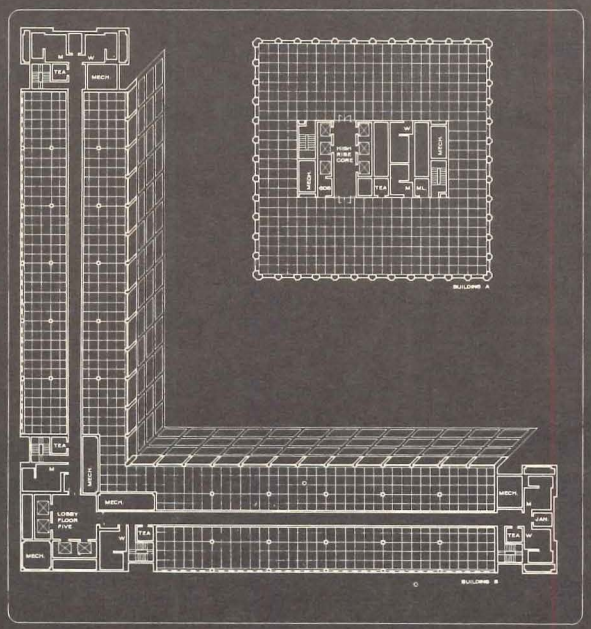
Section looking west. 0 40'

From the views shown here, the architects have achieved their purpose of creating a sophisticated, distinguished urban setting. The combination of elegant tower, boomerang-shaped secondary building, and grade-following open areas works together with the restrained hues of the exterior materials to create a commercial monument that would be the boast of any city. And the complex performs the laudable feat of turning at least three of its four corners (we are not too sure about the southwest corner) in a commanding manner. — JTB

Plan at plaza level.



Typical floor plans, both buildings.



"THAT'S WHAT A TOWN IS"

"Accomplished in the very best of taste, each complex of Ports-O-Call will be named after an international seaport, and built in the architectural tradition of that particular country. The community of Amsterdam would be of Dutch architecture; London-towne would be Ye Olde English, and Marseille, of course, would be French Provincial. There will also be an Italian port, a Polynesian port, and so on around the world."

Since that breath-taking announcement for another new community near Washington, D.C., we are glad to report that the name of the owner-developer has changed from Stafford Shores, Inc., to Chord Development Corporation, the name of the town has changed from Ports-O-Call to Stafford Harbor, and the prospect of a live-in Disneyland has evolved into a strong land-and-structure plan by Paul Rudolph for 35,000 residents and resort transients.

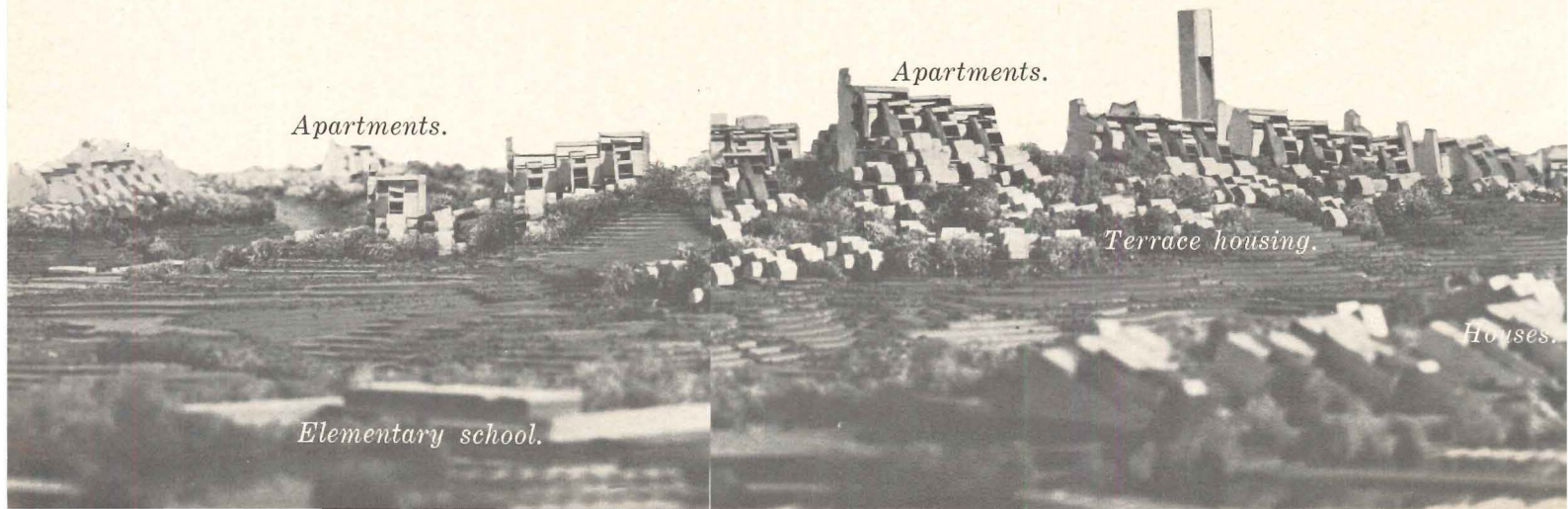
Chord was reportedly attracted to Rudolph by seeing his original hill-climbing plan for the Yale married students' housing. Thinking that Rudolph could use such a concept on a grander scale on the practically virgin hill and valley site down the Potomac from the capital, the developers contacted the architect, and, from a view of Rudolph's proposals, they were right.

The Yale design has been compared to that old standby, the Italian hill town, and Rudolph does not deny the similarity. But in a project the size of Stafford Harbor, Virginia, he says that, "From a conceptual viewpoint, a 20th-Century town with its two cars per unit can never really be or have anything to do with a Mediterranean hill town. If you put together all the articulated units of parking, apartment towers, and single-family detached housing, they can become another kind of organism and the closest things to that organism are really hills and valleys."

Given a splendid site of hills and valleys on a bend in the Potomac, Rudolph has proposed using them in a naturalistic way, emphasizing the hills by building low-rise units up their flanks to culminate at the ridges in high-rise towers, and consequently accenting the breadth and depth of the valleys. Among the only "artificial" planning in Stafford Harbor, according to the architect, would be the grouping around the marina where three creeks enter the Potomac. A marina is a man-made thing, he feels, and should appear thus, together with the more formal design of plazas and town center around it. This formality, as contrasted with the quasi-natural forms of the housing, will evidently occur wherever there is an institutional or community grouping on the site. "The hierarchy of various kinds of buildings in a community is important," Rudolph says, "and I have put the special buildings at focal points where there is something unique about the way the plan breaks or bends." But this is primarily a residential community, and the main emphasis has been given the housing by siting it up and atop the hills. Schools have been hidden in the valleys.

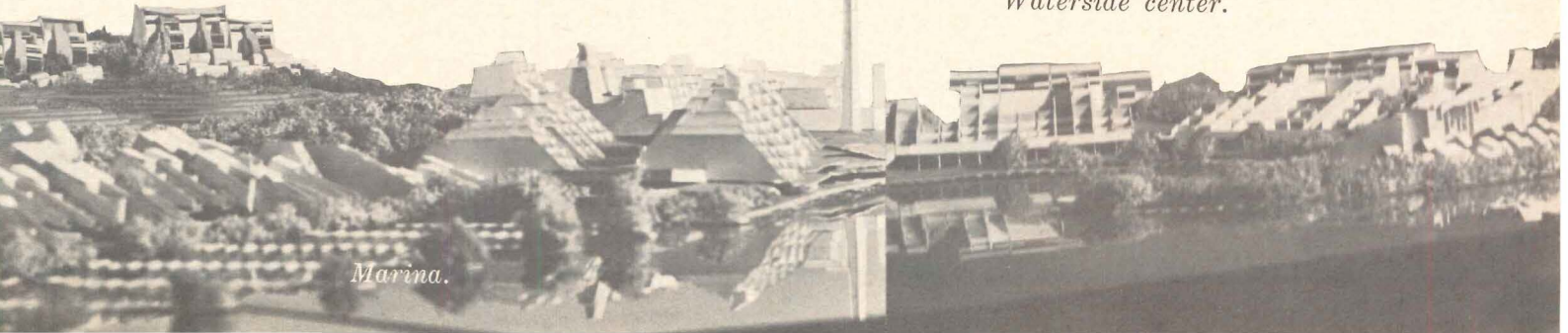
The architect's use of the terrain as the master matrix of his design obviously called forth the question whether he considered himself to be dealing in earth forms or land shaping. "I don't think of topographical architecture as being earthmoving architecture or architecture of earth forms. I am interested in siting. It's a siting concept; it's not earth architecture." However, he added, "it's absolutely true that earthmoving machinery is one of the most economical forms of construction known and I think part of the interest in topographical architecture comes from highway construction, which is often done very well indeed."

Stafford Harbor at this stage bears out Rudolph's interest in ar-



Site plan of first phase.

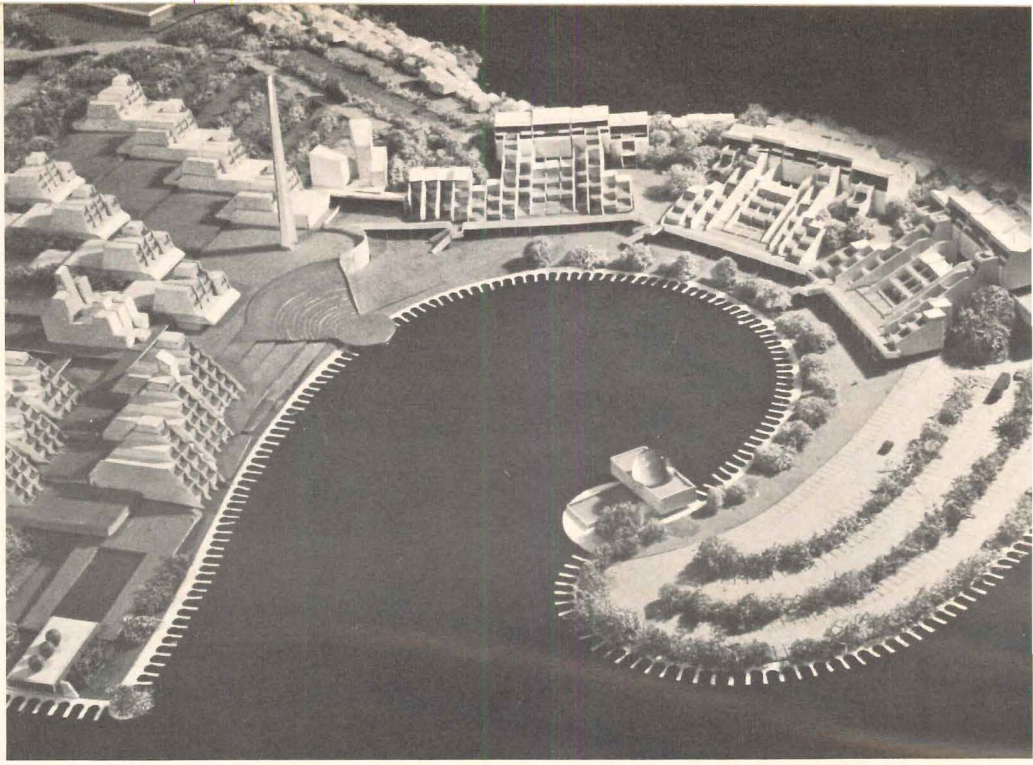
Waterside center.



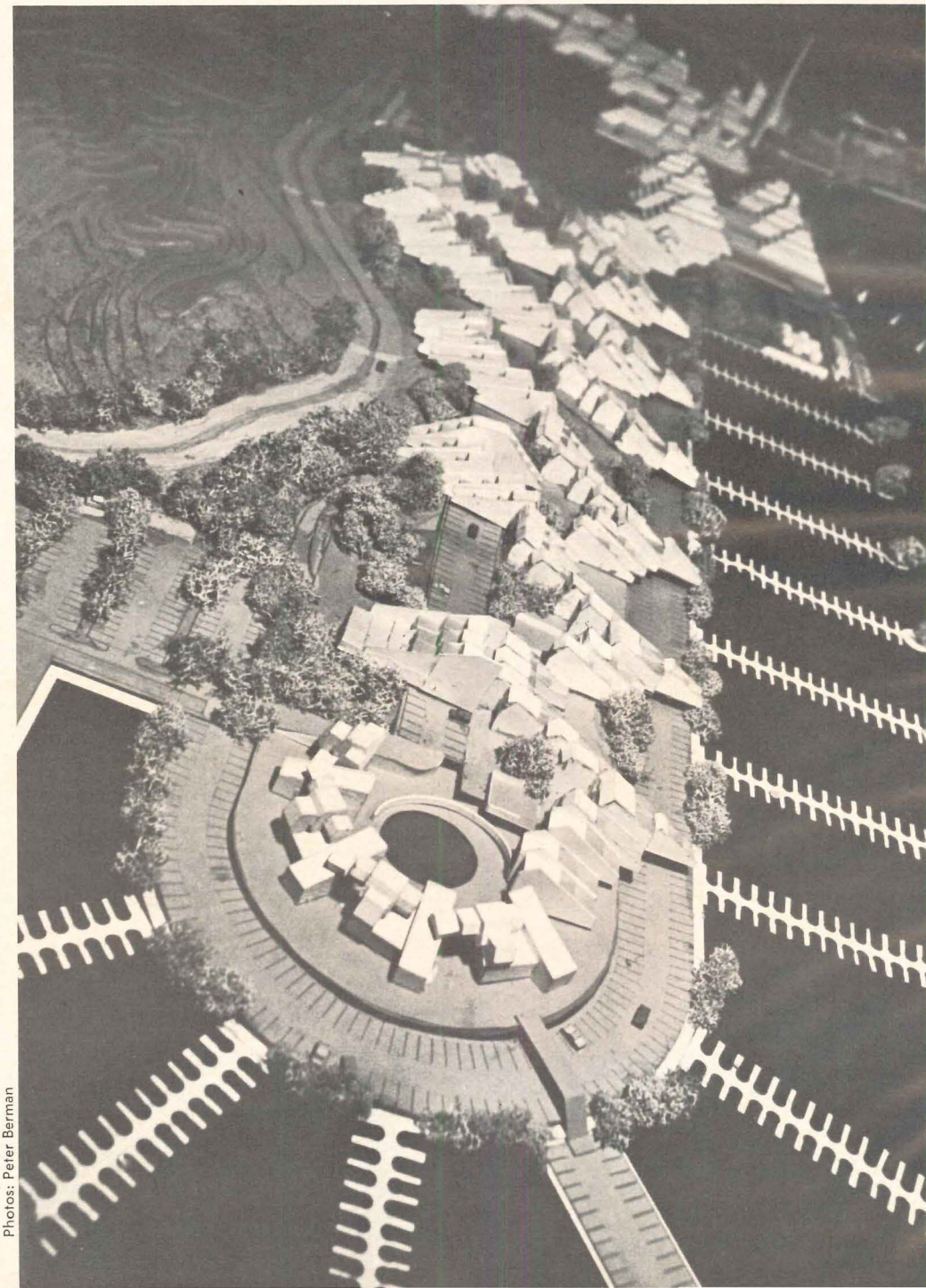
Marina.

chitecture and planning becoming topographical extensions rather than forming the earth to serve the architect's concept. He has even begun to think of a universal material for the town, a special, vertically striated, warm gray concrete block. He hopes that he and other architects who may become involved in the development will work in this material and, "more importantly, in the same scale." This, he feels, will allow flexibility while keeping a distinct "vernacular" for Stafford Harbor. "There's nothing more terrible really than to have the 'designed' feeling about everything. There should be accidents and even things that are contradictory. It should live and change; that's what a town is."

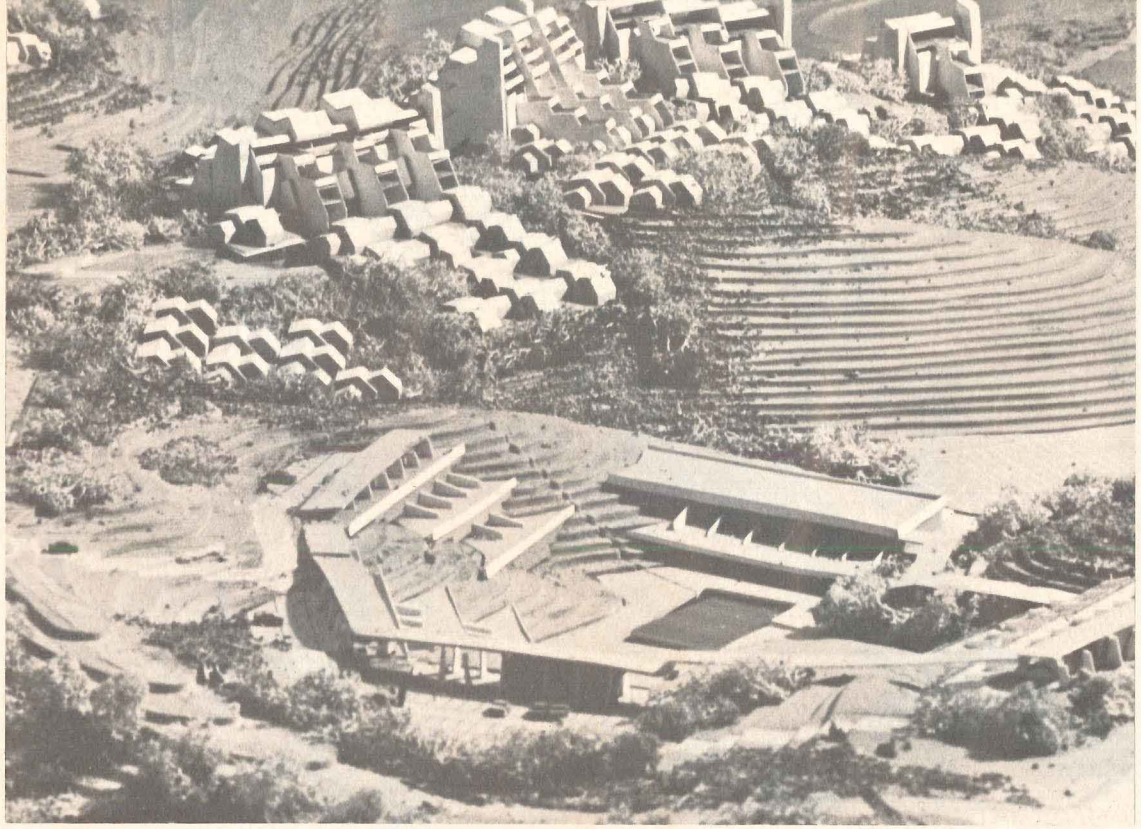
Land planner of Stafford Harbor (also involved with Ports-O-Call) is Chambers & Conrad, Inc. Mechanical engineer is Calvin B. Burns.

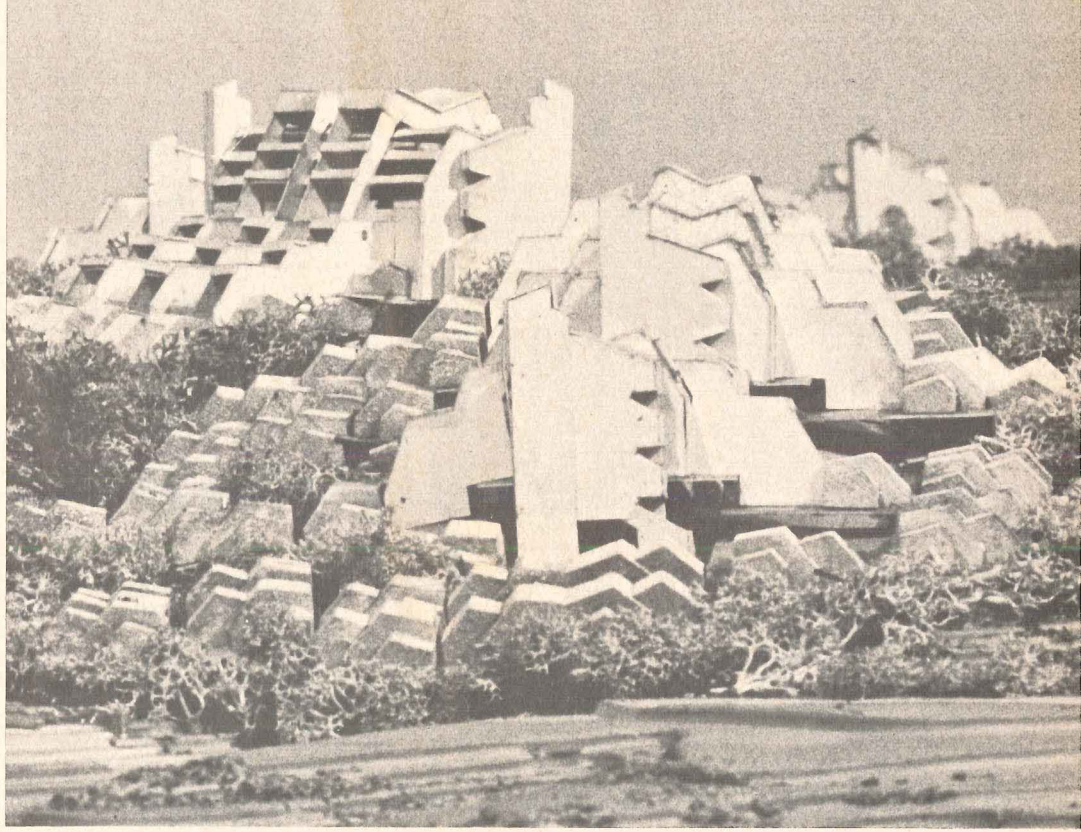


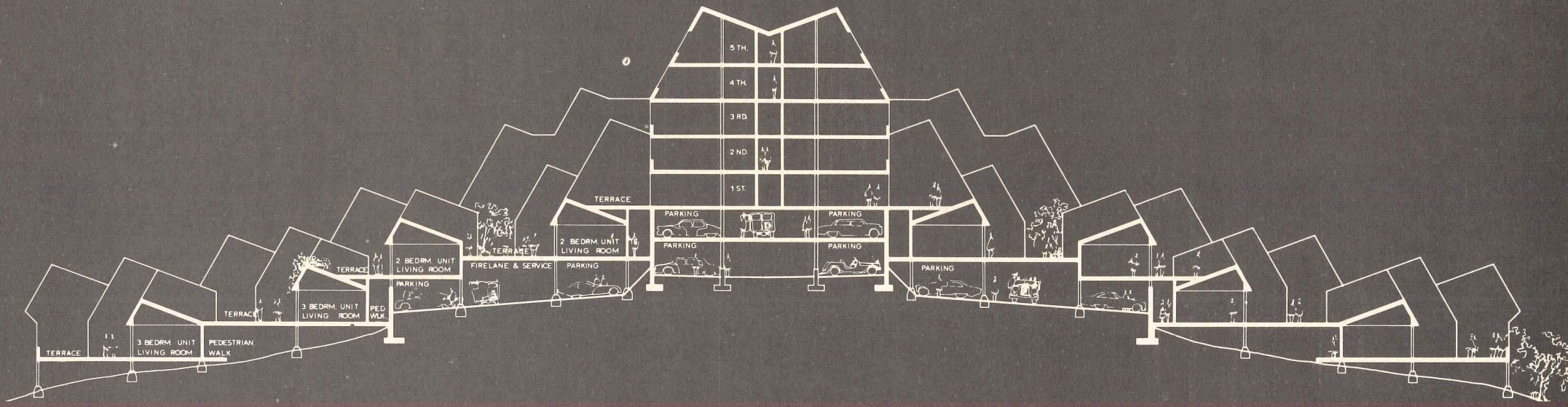
More formal areas around marina.



Photos: Peter Berman







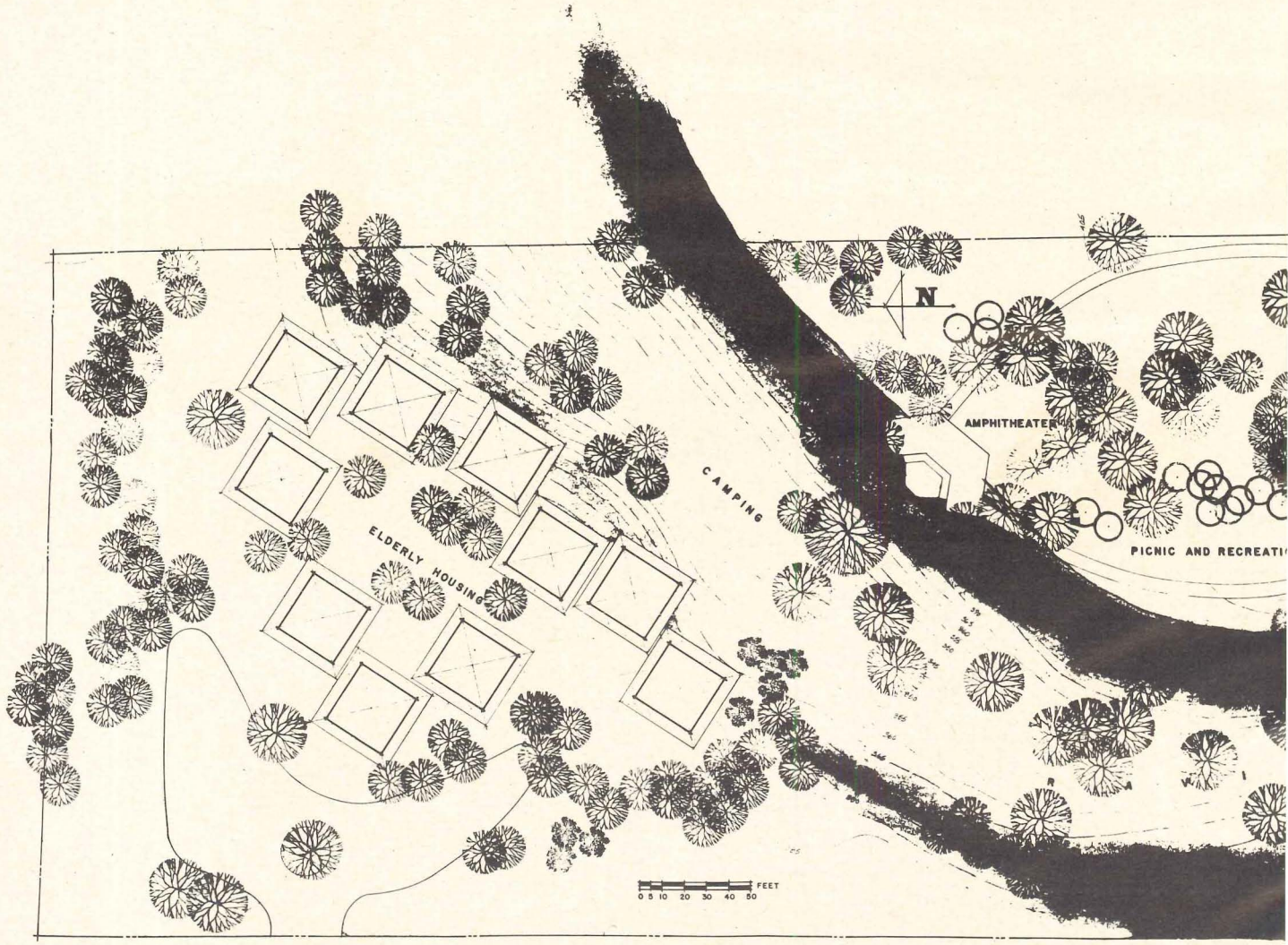
Section through terrace housing and high-rise apartments.

COMMUNITY-CONSCIOUS CHURCH

"We saw the chance to do something through architecture to indicate a new approach of religion to the community — not inwards, as before, but witnessing for their faith in an outward-going, positive way," said Robert A. Chervanek to P/A about his firm's design of Our Savior's Lutheran Church in Everett, Washington. The plan by the Seattle firm of Grant, Copeland & Chervanek provides not only the customary sanctuary for worship, Sunday School rooms, and administrative areas, but, on a 10-acre site, furnishes facilities for outdoor recreation, educational programs during the week, and housing for the elderly. When the entire complex is built, the congregation of Our Savior's will be "witnessing for their faith" on a seven-day-a-week basis in a much more socially-conscious manner than the old emphasis of some denominations on private salvation would allow.

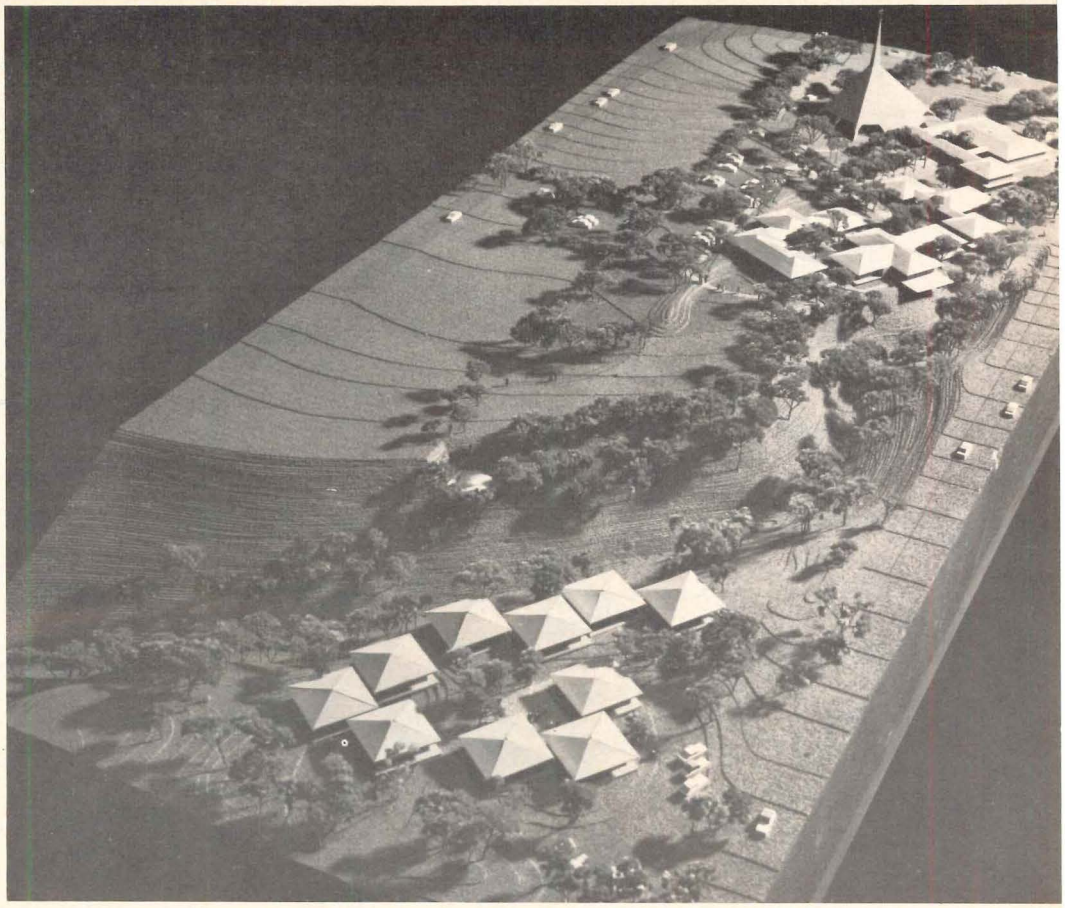
In addition to the hexagonal sanctuary, whose enveloping roof form will be clad in wood shakes and topped with a slender spire, the church will have an "education and community services center" composed of 10 separate but connected 30′ x 30′ units that will serve not only as classrooms on Sunday, but also for a variety of educational and civic functions during the week. Among the uses proposed so far are: a day-care center for retarded children; a community day-care center for children of working mothers; a center for training in teachers' aids; a place for sessions of cooperative preschool play groups; and a facility for emergency-use classrooms, should the current "Boeing boom" overtax the city's school system. The Sunday School capacity will be 600, presumably reflecting the capacity for weekday activities also.

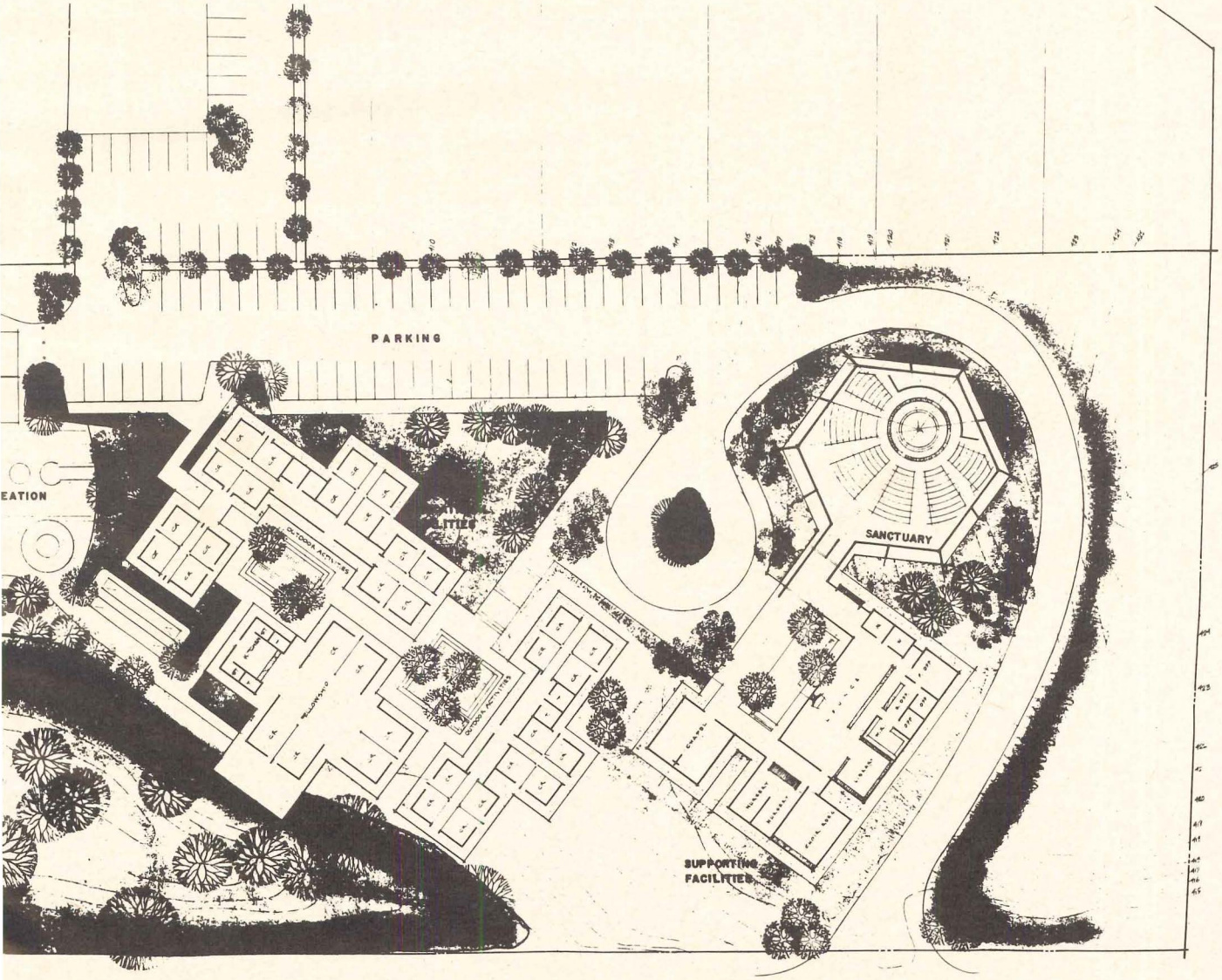
Pastor Lowell E. Knutson of Our Savior's states that plans for a small complex of housing for the elderly living on low, fixed incomes could be realized "rather rapidly be-



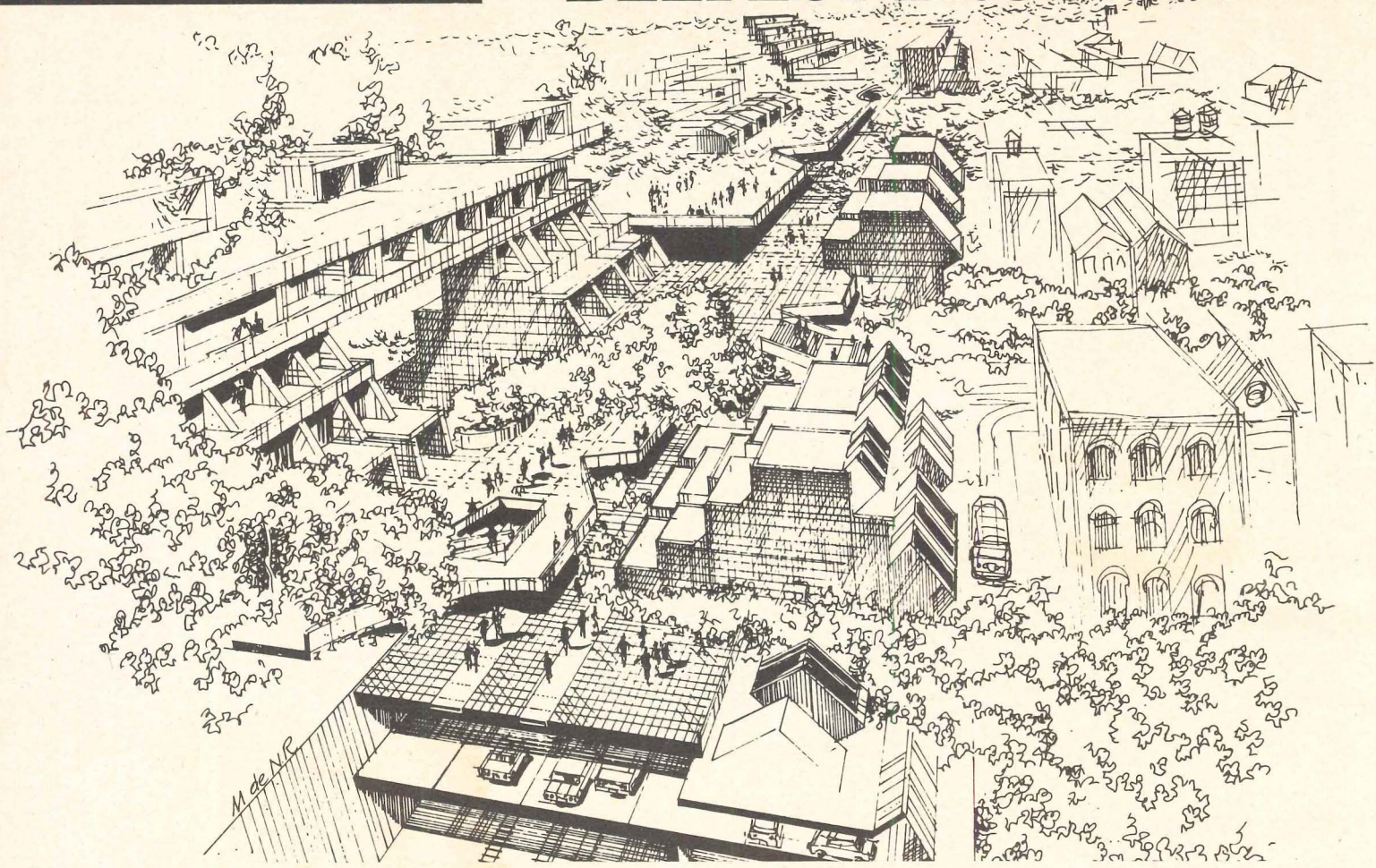
cause of a possibility for financing through a Federal loan." The housing would be situated overlooking a dramatic ravine at the opposite end of the long site from the church and community group. The rest of the 10 acres, being developed by landscape architects Dirk Jongejan and Terry Gerard of Bellevue, will boast an amphitheater for outdoor concerts by Grant, Copeland & Chervanek, an overnight camping area for the Boy Scouts, and provisions for tennis, basketball, and shuffleboard. Much of the natural beauty of the terrain will be preserved. The concrete structure and wood shakes cladding of all the structures will attempt to achieve a residential character for the group reflecting its community objective.

It appears that Our Savior's will be saving more than souls when its building program is complete. The community of Everett will be enhanced by the social and recreational responsibility shown by the church and her architects.





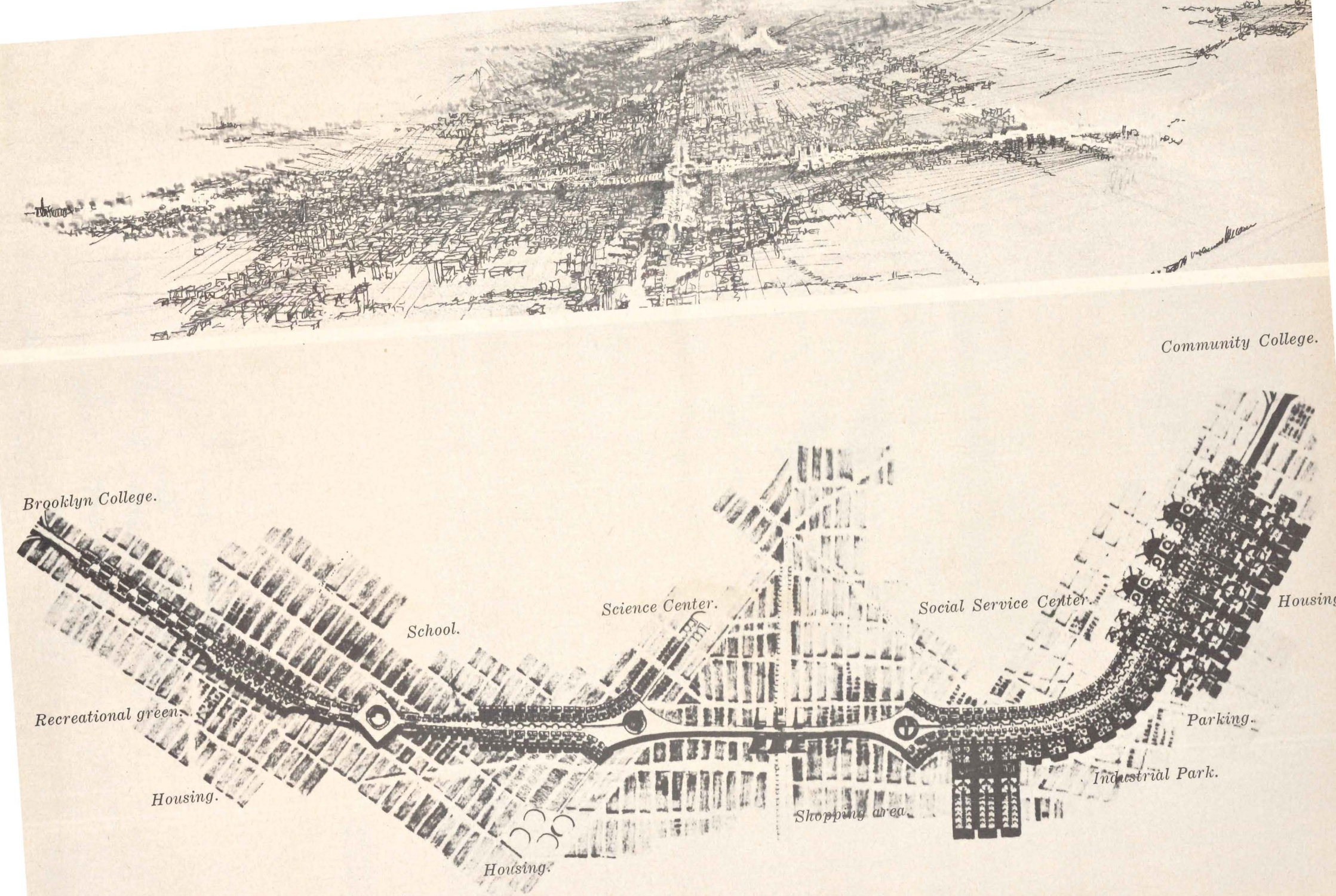
DEVELOPMENT IN DEEPEST BROOKLYN



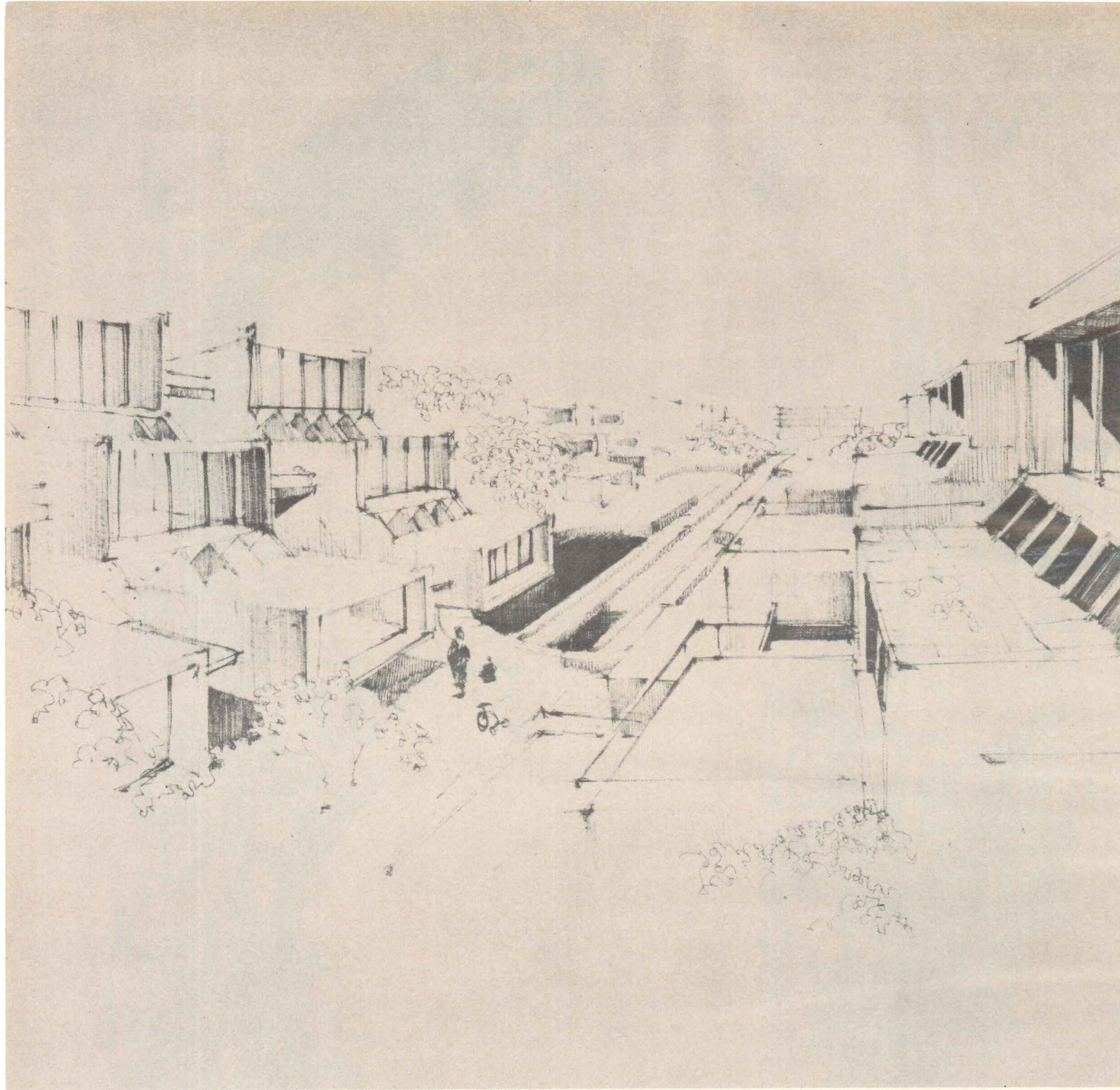
Marshall McLuhan to the contrary, the linear idea is alive and enjoying blooming health in architecture and planning circles. Latest evidence of its robust constitution can be seen in the multiuse "spine" of structures proposed to cover railroad tracks in Brooklyn by McMillan, Griffis & Mileto of New York and Rome.

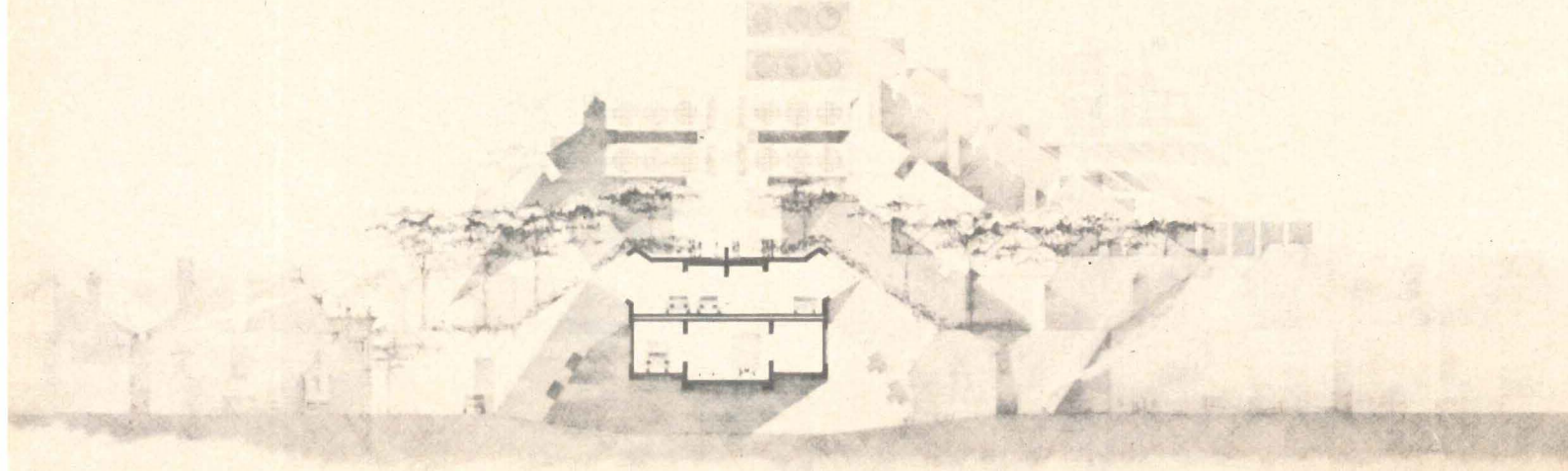
The MGM plan is the result of a two-week crash program for the New York City Planning Commission, Board of Education, and City Transportation Administration, all of which would be involved in the ultimate project. The proposal is to begin an eventual Cross Brooklyn Expressway connecting the Verrazano-Narrows Bridge and Kennedy International Airport and the Long Island Expressway by utilizing, for this five-mile stretch, the existing right-of-way of the seldom-used Long Island Railroad Bay Ridge line of the Pennsylvania Railroad. The expressway portion would be placed directly above the rail lines, which could be converted to rapid-transit use, and above these two transportation systems would rise an integrated complex of housing, educational facilities, community buildings, and landscaped pedestrian ways. The conceptual sketches by MGM emphasize that such a development should be kept in sympathetic scale relationship with the existing community, and that intersecting streets be fed through the development under or over the new highway. In this manner, they will try to avoid the two opposing pitfalls of new urban developments we mentioned in writing about the Camden, N.J., redevelopment (pp. 154–155, FEBRUARY 1967 P/A): hard-edgedness or lack of boundary characteristics. The development would run from Brooklyn College through the Flatlands section of the borough to the Brownsville area, possibly culminating in a community college. Shopping, local schools, centers for social services, an industrial park, and small parks would be spotted along the spine, together with housing commensurate with the income levels of the area. The width of the plan could expand at points where there is additional railroad land, city-owned land, or derelict land that could be obtained by condemnation. One of the great advantages of the plan is that it would cause no dislocation, unlike the cross-Brooklyn Bushwick Expressway proposed by Triborough Bridge and Tunnel Authority Chairman Robert Moses, which would slash through many housing and commercial districts. In addition, the cost would be lower because of economic ease of site acquisition and clearance.

In its present form, the proposal is admittedly a very preliminary one. MGM is now talking with systems analysts to arrange a careful study and report of the multitudinous facts and facets involved in a gigantic undertaking of this sort. John Griffis thinks that the role of the architect and planner in this situation is to examine the problem and arrive at a preliminary concept, collect all material and data, then feed it to the computers of the systems analyst. Such information could be kept continually updated; for instance, a large new supermarket or apartment development could be announced for the neighborhood, considerably altering some of the results with which the systems people might come forward.


Community College.
Brooklyn College.
School.
Science Center.
Social Service Center.
Housing
Recreational green.
Parking.
Industrial Park.
Housing.
Shopping area.
Housing.

Section showing relation to existing neighborhood.



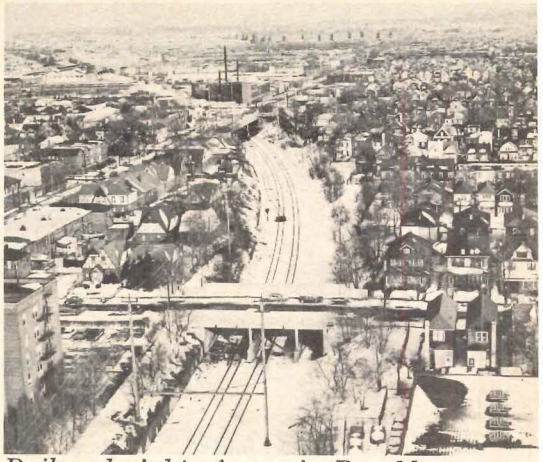


After receiving and digesting these results, Griffis believes that the task of translating them into socially responsible architecture and planning rests with the architect. "Here the architect takes over," he says, "like the doctor who feeds all his patient's symptoms into the diagnostic computer, but must also rely on good old personal tender loving care." His partner, William Mileto, says that what is important about the Brooklyn concept "is that it is based on *process,* not *product.* You can't build it all in one day the way you want it to look unless you're Genghis Kahn and can kill everybody and tear everything down." "This is something you have to be aware and flexible about," says Griffis. "You need swingers here, not pussy architects who meow and scratch if their own little design isn't followed down to the last lintel." Dealing as they are with Federal (through the highway section), state, and city funds and agencies, and with innumerable community groups and preferences along the 5-mile length of the proposed development, McMillan, Griffis & Mileto will have to do a lot of strong swinging for quite a few years to see the fruition of what seems an undeniably logical proposal. The next step, the visit to the systems analyst, will reveal a lot of practical and factual cans and cannots. Then the long community relations involvement begins. Meantime, Mayor Lindsay, keep an eye on Bob Moses. He ain't dead yet.

As this issue of P/A went to press, the Cross-Brooklyn Expressway idea had been turned down by the Bureau of Public Roads in Washington for the reason that it would not allow the substitution of one plan for the other on the interstate highway program. The Bushwick plan is the one the bureau has on the map. Warner Siems of the Bureau of Public Roads told P/A that the bureau likes the multiuse aspect of the city's proposal — indeed, has done some investigation into this sort of development itself — but that the substitution cannot be made. Asked if there were no way the proposal could be used, Siems was sympathetic and said that perhaps the 50-50 matching Federal aid program could be invoked. Although this is not the same as the 90 per cent the Moses plan is getting, it is considerable enough, we hope, to encourage the city to continue the MGM plan.

Meanwhile, at City Hall, spokesmen said the city would still try to have the Cross-Brooklyn concept accepted.

To be continued.

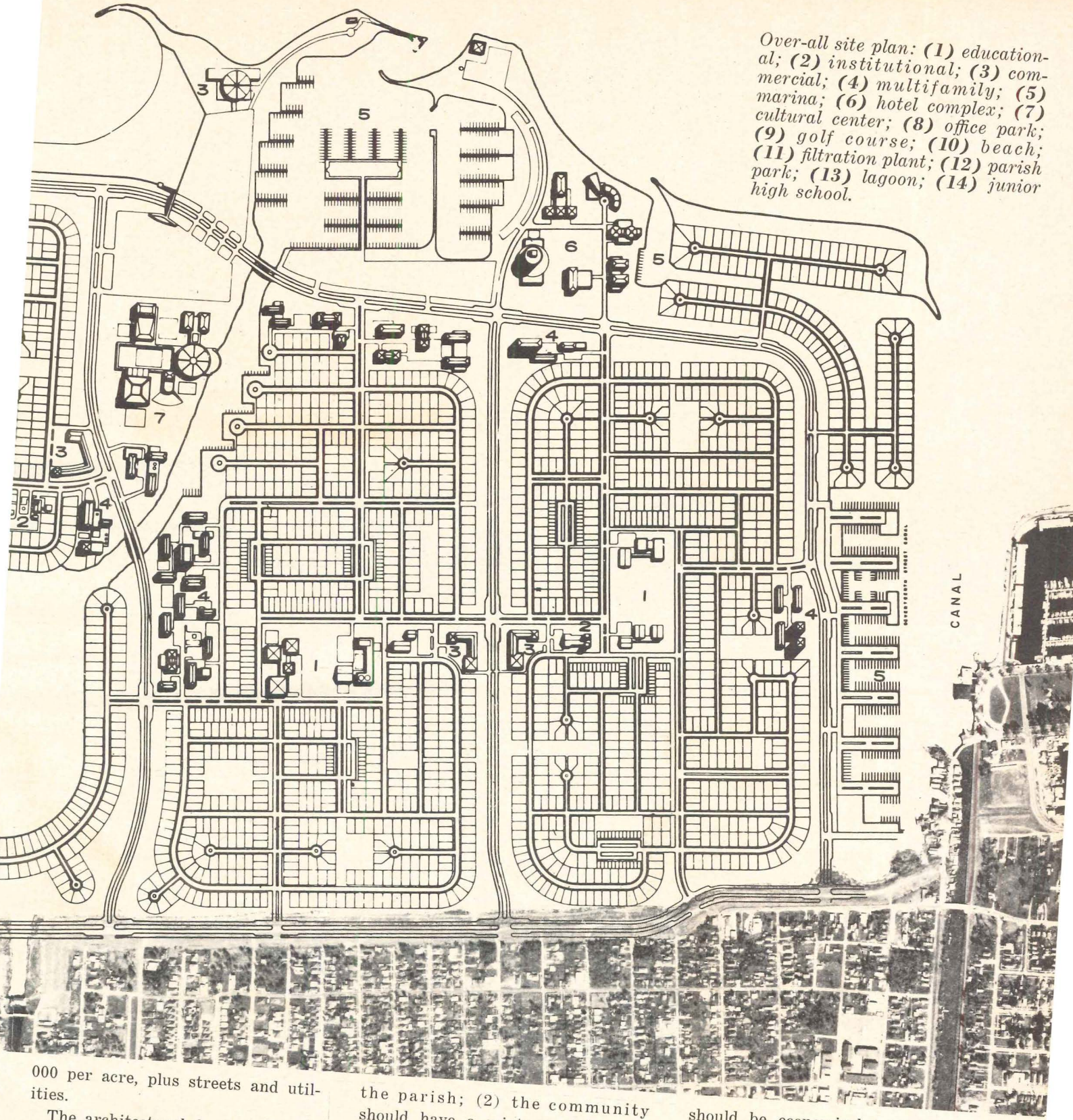


Railroad right-of-way in Brooklyn at present.

GREAT BIG FILL

When a community has to expand and most of its usable land is being used already, it has several options: go up in the air; go over current use areas (such as highways, railroads, other buildings); or, if it is available, go out into the water.

Jefferson Parish (County), Louisiana, adjacent to New Orleans, opted for the latter choice, since, for its entire 10-mile northern length, it is bordered by Lake Pontchartrain, one of the largest in the U.S. A system of hydraulic landfill has been adopted that will create 6500 new acres off the present shores of the parish in the lake, which will eventually be home for about 100,000 people. Total projected cost for the development, said to be the largest reclamation project in North America, is expected to be more than $200 million. Creation of an acre of filled land is expected not to exceed $25,



Over-all site plan: (1) educational; (2) institutional; (3) commercial; (4) multifamily; (5) marina; (6) hotel complex; (7) cultural center; (8) office park; (9) golf course; (10) beach; (11) filtration plant; (12) parish park; (13) lagoon; (14) junior high school.

000 per acre, plus streets and utilities.

The architectural firm of Thompson B. Burk & Associates, planners of the development, propose its implementation in three phases, each to include four neighborhood units of 5000 to 6000 persons apiece. The architects-planners worked on the five basic premises that: (1) park, waterfront, and cultural facilities should be provided for all the residents of the parish; (2) the community should have a mixture of housing types, age groups and income levels, and provision should be made for some inhabitants to work within the area (others will work in New Orleans or at a large space plant on the other side of the city); (3) each neighborhood unit should be practically self-sufficient, with little need for residents to go outside if they do not wish to; (4) the community should be economical to build and service; and (5) all plans should be oriented to make the place rich in such factors as squares, parks, separation of pedestrian and automotive traffic, adequate landscaping, access to the water, and other contributions to a desirable urban ambiance.

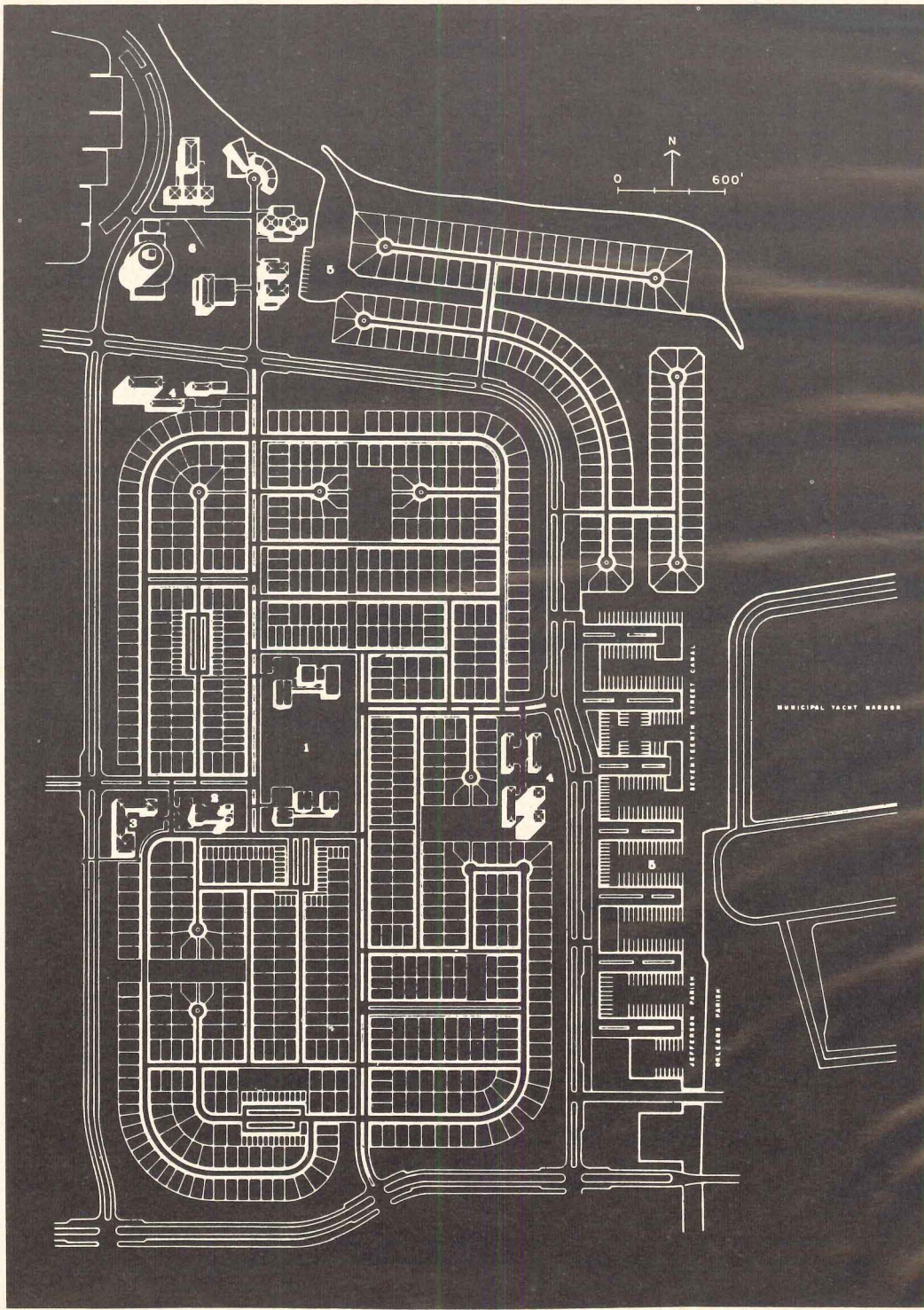
Oddly enough, the fill procedure that will create the land for the new development will be approximately the same as that used to furbish the

nearby Orleans Parish lakefront in the 1930's. Borings in the lake — it is quite a shallow body of water, with an average depth of 15 ft — have indicated the presence of desirable fill material sufficient to provide 10,000,000 cu yds of pumped-in fill per year. Filling work on Phase 1 is expected to begin in January 1968, and the 3½-mile length of that phase will be complete by 1972. Flood protection levels will be plus 13 ft, and the average altitude of the site will be plus 6 ft. Land stabilization sufficient to permit grading and construction will occur within one year after the filling is completed.

Within Phase 1 of the development, the four neighborhood units will be designed around central elementary schools *(see Phase 1 site plan)*. Semidetached housing will immediately surround the school sites, with detached single-family houses constituting the majority of the developments. Single-family attached townhouses, clustered around a central square, will be studded throughout each neighborhood unit; apartments and high-rise residential structures will be held to the periphery of the units, thereby concentrating heavier traffic on the roads bounding the development areas. Shopping and institutional sections (except for the schools) will similarly be situated at the outside bounds of the neighborhood units, where they are accessible to the residents but also convenient to automotive traffic. Cultural centers, office "parks," hotel-motel complexes, major parks and recreational areas, and water-access facilities will fill in large-scale interstices in the over-all plan *(see complete site plan)*. Major access to the development will be off an interstate freeway now under construction.

Circulation will be by means of seven varieties of roadway: the pedestrian street, with a 20-ft-minimum right of way; the local street, with 28 ft of moving lanes and a parking lane, and planting and sidewalks on both sides; the collector street, with a 60-ft right-of-way feeding from local streets; Avenue I, with a 100-ft right-of-way serving as major entrance and exit to neighborhood units; Avenue II, a major vehicular way paralleling main pedestrian ways, with a total right-of-way of 125 ft; Hammond Highway, the main East-West service roadway for the entire project area, which, with a 184-ft right-of-way, is the widest in the plan; and the Lakeshore Drive and Boulevard, a more lavishly landscaped vehicular system that will lead around the development past the neighborhood units, the parish park, cultural center, and marina facilities.

The sheer size of the undertaking in Lake Pontchartrain makes the development worth mention, but on paper it also appears that the plan has received thoughtful attention from the Burk firm to provide an interesting mix of experiences when the whole 10-mile fill is eventually complete. The circulation pattern seems commendable, working from heavy automotive traffic on the outer perimeters to uninterrupted pedestrian paths at the hearts of the individual units. And the generous provision of common recreational and cultural facilities for all of Jefferson Parish, which can certainly use them, is praiseworthy.



*First unit site plan: **(1)** educational; **(2)** institutional; **(3)** commercial; **(4)** multifamily; **(5)** marina; **(6)** hotel.*

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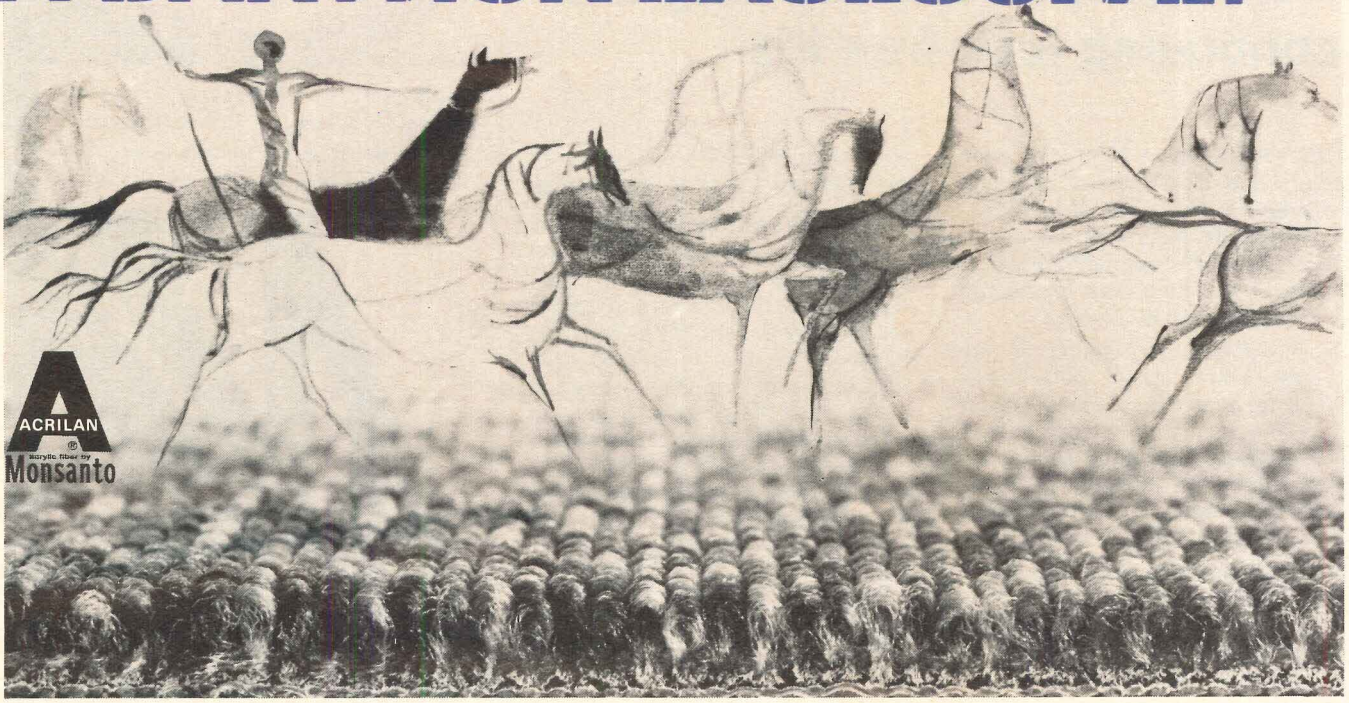

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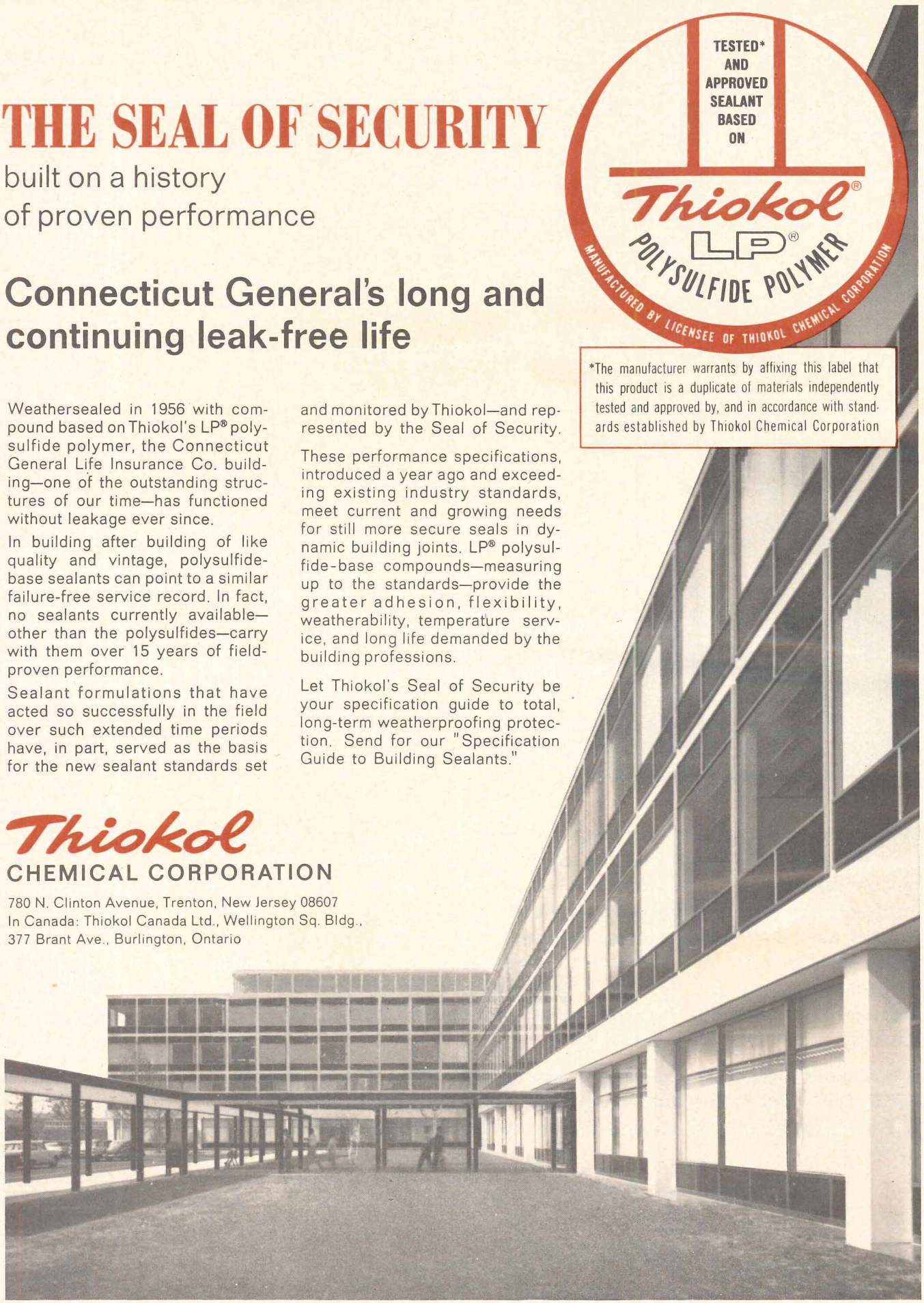


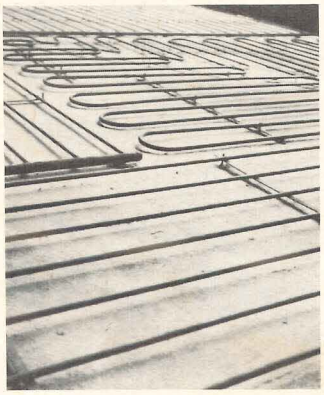
ARCHITECTS: Skidmore, Owings, and Merrill; **BUILDER:** Turner Construction Co.; **PHOTO:** Ezra Stoller Associates

MECHANICAL ENGINEERING CRITIQUE

HOT SLABS MELT SNOW

BY WM. J. McGUINNESS

Snow-melting systems have become more a necessity than an amenity in crowded public spaces. McGuinness, a practicing engineer in New York City, focuses on systems using steel pipes embedded in concrete slabs.



For several decades, building owners have removed snow from plazas, sidewalks, and driveways by melting it on slabs heated from an adjacent power source. The principal reasons for thermal snow removal have been to save periodic labor costs and to eliminate shoveling by service personnel. In addition, a new and strong reason has appeared in recent years: The growing population and congestion in busy communities have made it impractical to store large piles of snow in public areas.

The most common method for melting snow is to pass heated water through black steel pipes embedded in concrete slabs. The following brief discussion of a rather broad subject will be limited largely to this method.

Slab and Pipes

Water heated to an average temperature of about 120F is circulated by centrifugal pumps from a source of heat. The source could be an independent boiler reserved for this purpose, or a heat exchanger drawing heat from central steam or hot water. The reason for this isolation is that antifreeze must be used in the water for protection during dormant periods. An antifreeze mixture such as an ethylene glycol solution should be circulated only to the snow-melting pipes.

The heating pipes must be installed in a high quality, dense concrete. High density facilitates good heat transmission, and good quality aids in preventing external water from reaching the outside of the pipes where corrosion might occur.

A 2-in. cover of concrete above the pipe prevents mechanical damage and a 2-in. cover below it prevents possible corrosive contact of pipe with earth. Corrosion inside pipes is never a problem in closed systems. An average pipe diameter of about 1 in. with the minimum cover calls for a slab of about 5-in. minimum thickness.

For heavy trucking areas, a thicker slab is used together with extra heavy pipe instead of a usual specification: standard weight black steel ASTM A-53, open hearth "coiling and bending."

Design

This is a job for a qualified consulting engineeer who will find that, in addition to available professional design standards, he can obtain valuable information from the associations of pipe manufacturers.

Possible variations include: pipe diameter and spacing, water temperature and the choice of grid or sinuous coil types, coil lengths and arrangements for equal friction. Also to be considered is the initial balancing of flow rates in the several coils or grids.

Air-relief vents must be provided at high points, and drains at low points of the coils because no air must be trapped during operation, nor must water be trapped when the system is to be emptied. When an ethylene glycol solution is used instead of water, provision must be made for the difference in pipe friction.

Installation and Operation

Pipes should be tested to 125 psi after all connections have been welded, and the system kept under pressure while the concrete is cast in order to facilitate the discovery of pipe damage that might occur during concreting.

Special expansion joints are not necessary, as steel and concrete expand at the same rate, but shear bars between slabs aid in preventing vertical displacements (unequal slab settlement).

The system can best be started manually, although snow sensing devices are available. Manual control is perferred because it can anticipate snow by several hours if snow is predicted. A heavy slab often takes between one and several hours to come to its selected design output, which usually falls between 100 and 200 Btuh per sq ft of slab.

Budget estimates for the cost of snow-melting systems of this type range between $2 and $4 per sq ft. Melting operations cost between 7¢ and 15¢ per 1000 sq ft of slab per in. of snow melted.

Selecting the System

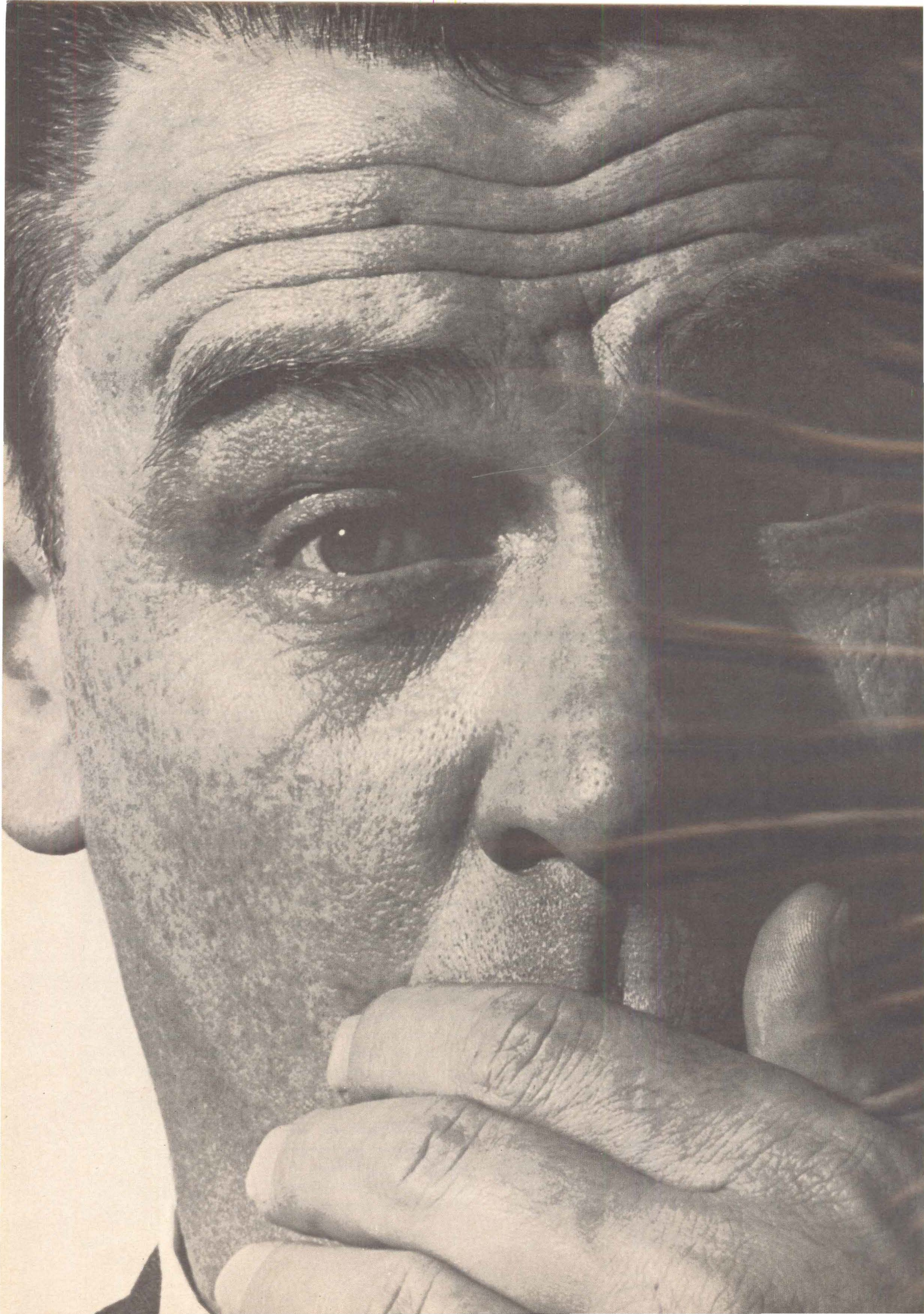
Each proposed installation must be judged for the best use of materials and power sources. Wrought iron pipe provides good corrosion resistance, but at considerably greater cost. Copper tubing is a possible choice, although ferrous piping is more rugged than copper, which finds its greatest application for indoor plumbing. For buildings using electrical power for all purposes (including heating), electric snow melting (cables-in-slab) is an appropriate choice. It is also preferable in locations remote from any fuel-fired steam or hot-water boiler.

Applications

Suitable uses are found at office buildings, hotels, stores, banks, clubs, churches, restaurants, theaters, and homes and in driveways, ramps, roadways, loading platforms, runways, and hangar aprons at airports.

When used around houses, the snow melting demand on a boiler almost equals the house heating demand during the hours of snow-slab operations. A separate or much over-sized boiler (plus heat exchanger) therefore has to be installed, which usually makes an expensive item. The snow-melting system cannot be just hooked onto the usual heating boiler.

Acknowledgement and thanks go to the Committee of Steel Pipe Producers, a division of the American Iron and Steel Institute, for information furnished for some of the topics discussed in this article.



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SPECIFICATIONS CLINIC

THE PROJECT MANUAL

BY HAROLD J. ROSEN

The AIA proposes a new name and system of organization for what has been loosely known as "Specifications." Rosen is Chief Specifications Writer for Skidmore, Owings & Merrill, New York City.

Everyone associated with the design profession (architects, engineers, and specifications writers), as well as those involved in construction (contractors, subcontractors, and materials manufacturers), use the term "Specifications" when referring to the written document that accompanies drawings. The definition has prevailed for years, even though this particular bound volume contains some documents that cannot be strictly classified as specifications.

Some specifications writers say that "Specifications" are only the technical sections. Others state that the "Specifications" constitute everything between the two covers of the book. The material usually bound in the book includes an invitation to bid, instructions to bidders, a form of bid (or proposal), a standard preprinted form of general conditions, supplementary conditions, special conditions, a form of agreement, forms for bid bonds, payment bonds, and labor and materials bonds.

The inability properly to define "Specifications" lies in the failure to define many of the documents used in construction, and in the absence of any authoritative source establishing precise definitions. The terms "Construction Documents" and "Contract Documents" are sometimes used interchangeably. Although "Contract Documents" are defined in the AIA General Conditions, a definition for "Construction Documents" is nonexistent. The term "Bidding Documents" has been used rather loosely in the past. Some have employed it to mean the drawings and specifications available to bidders in preparing a bid; others have used it to mean the "Bidding Requirements."

The "Bidding Requirements" are now defined by both the AIA and CSI as including the "Invitation to Bid," the "Instructions to Bidders," the "Bid Form or Proposal Form," together with certain sample forms such as "Bid Bond," "Performance and Payment Bonds," and similar documents.

The agreement on the definition of "Bidding Requirements" resolved somewhat the proper terms to be used for the parts that constitute these documents. "Advertisement to Bid," "Notice to Bidders," and "Notification to Contractors" have been used in place of the recently adopted term, "Invitation to Bid." Other terms used for "Instructions to Bidders," have included "Information for Bidders" and "Conditions of Bid." The terms "Bid Form" and "Proposal Form" have also been used extensively in the past, and agreement has not been reached on a single term. CSI documents call it "Proposal Form"; and AIA documents call it "Bid Form."

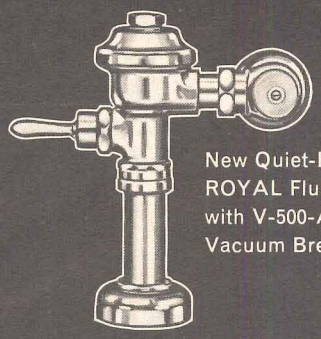
Confronted by this profusion of terms, the profession is slowly making progress in redefining some documents. In an attempt to clarify the various documents prepared by architects for detailing, specifying, bidding, and constructing a project, the AIA, through its national Committee on Specifications, produced the "Project Manual Concept." The chapter on specifications in the *AIA Handbook of Professional Practice* was updated last year to include a reorganization and renaming of the old "Specifications," and provide a new concept — the "Project Manual." The *AIA Handbook* describes its content and function as follows:

"The Project Manual is a reorganized version of the familiar volume commonly called 'Specifications.' This new title better describes the scope and content and avoids confusion of the bound volume with that part of the Contract Documents called the Specifications. This new concept provides an orderly, systematic arrangement of requirements divided into two basic parts: Bidding Requirements, which govern activities prior to contract execution, and Contract Documents, which constitute the contract between the Owner and the Contractor."

The sequence recommended by the AIA for the material to be bound in the Project Manual is as follows:

- Title Page
- Table of Contents
- Addenda (if bound in Project Manual)
- Bidding Requirements
  - Invitation to Bid or Advertisement
  - Instruction to Bidders
  - Sample Forms
    - Agreement
    - Bid Form
    - Bid Bond
    - Performance and Payment Bonds
  - Contract Documents
  - Agreement
  - Conditions of the Contract
    - General Conditions
    - Supplementary Conditions
  - Schedule of Drawings
  - Technical Specifications

The term "Specifications" has been used for a long time to describe the bound volume and many specifiers will be loathe to change, or to use the new term. We should be realistic, however, and recognize that some of the documents bound in the old familiar volume are not "Specifications," and that we cannot continue to refer to this volume as such.



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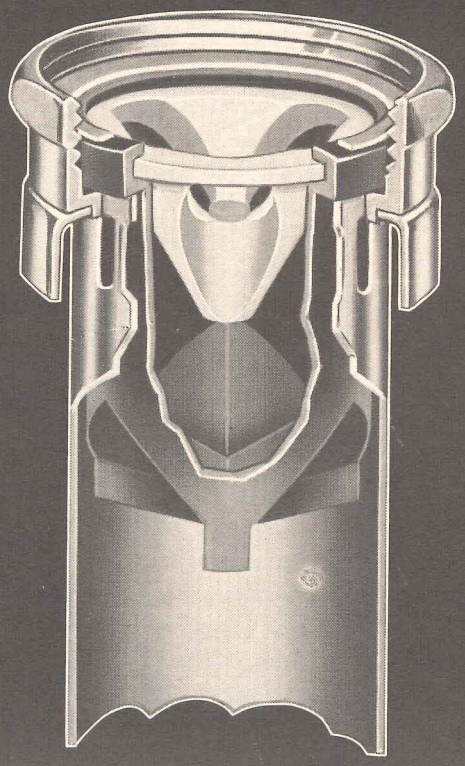

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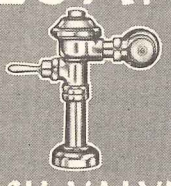

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IT'S THE LAW

ARBITRATION

BY BERNARD TOMSON
AND NORMAN COPLAN

P/A's legal team discusses two recent cases that underscore the importance of properly drafted arbitration clauses in resolving disputes in the construction industry.

Arbitration is the usual method utilized to resolve disputes in the construction industry. The contract forms of the AIA in general use provide for arbitration in the event of dispute between contracting parties; in the industry, there is a general consensus that arbitration is to be preferred to court action for the resolution of controversies that may arise. The efficacy, however, of any contemplated procedure of arbitration is dependent upon the adequacy of the contract between the parties to a dispute in providing for arbitration. It may also be dependent upon an act of one or both of the parties, which may be deemed a waiver of the arbitration provisions of the contract, thus defeating the objective originally desired. Each of these situations is illustrated by two recent cases in New York (*Transamerica Ins. Co. v. Yonkers Contracting Co.*, 267 N.Y.S. 2d 669; and *Race Company v. Oxford Hall Contracting Corp.*, 268 N.Y.S. 2d 175).

In the *Transamerica Insurance Company* case, arbitration was demanded by a contractor against a surety on a performance bond secured by a subcontractor involving a claim by the contractor against the subcontractor. The contract between the contractor and the subcontractor provided for arbitration of "any controversy or claim arising out of, or relating to the subcontract, or the breach thereof." The performance bond issued by the surety incorporated the agreement between the contractor and the subcontractor by reference. The primary issue to be determined by the Court was whether the surety was obligated to arbitrate its liability under the performance bond based upon the incorporation by reference of the subcontract, which contained an arbitration clause.

The Court pointed out that an arbitration agreement will not be extended by interpretation or by implication and that arbitration cannot be judicially mandated unless there is clear and unequivocal language that the parties have agreed to the same. The Court, in denying arbitration, stated:

"The surety here was not a party to the original arbitration clause contained in the subcontract. Nor did it evidence any intention thereafter to be included as a party to the said arbitration agreement, or to be bound thereby, merely by executing and signing the performance bond, which contained no provision for arbitration. The fact that the said surety bond incorporated by reference a copy of the subcontract cannot serve to alter the relationships of the original parties to the arbitration agreement or to add a party thereto and to bind an additional party thereby, which was neither envisioned nor bargained for by the terms of the subcontract or by the intentions of the signatories thereto."

The Court further pointed out that the bond could have contained a provision that the surety was to be bound by the same arbitration as provided in the general contract between the contractor and subcontractor. However, in the absence of such a provision, the Court was unwilling to require the surety to arbitrate a claim asserted against it.

In the *Race Company* case, an action was instituted by a contractor for the balance of moneys allegedly due it upon a contract for the installation of a central cooling and heating plant in the defendant's building. The construction contract provided that it was not to become effective until the plans and specifications prepared by the engineer were signed by the contracting parties. It further contained an arbitration clause. The plans and specifications of the engineer were never signed by either party, but the work was done pursuant to such unsigned plans and specifications.

When the plaintiff commenced the action, the defendant moved to compel arbitration, which was opposed by the plaintiff on the grounds that the plans and specifications had never been signed and therefore the written contract containing the arbitration clause was ineffective. The Court, however, in a divided opinion, ruled that both contracting parties by their conduct had adopted the plans and specifications and the failure to sign them therefore was inconsequential. The majority opinion of the Court concluded that since the agreement was effective and binding upon both parties, the arbitration provision therein excluded a legal action.

The dissenting minority of the Court, however, reached the opposite conclusion. In this opinion, it was pointed out that the parties had made the signing of the plans and specifications a condition precedent to the effectiveness of the contract itself. The conclusion became inescapable, stated the minority opinion, that the contract had never become effective, and that it therefore followed that the arbitration provision of the contract likewise never became effective. The dissent stated:

"To hold, as does the majority, that completion of the work constitutes a waiver of the provision that the contract should not become effective until both contracting parties signed the architect's plans and specifications, is to extend the contract and, necessarily, the arbitration provision thereof, which may not be done. . . . If a party wishes to bind another in writing to an agreement to arbitrate future disputes, this purpose should be accomplished in such a way that each party to the arrangement will fully and clearly comprehend that the agreement to arbitrate exists and binds the parties thereto."

There are several aspects to the formulation of a properly drafted arbitration clause. The most important and difficult is the definition of the scope of the disputes that are to be included.

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BOOK REVIEWS

FIVE BOOKS ON THE CITY

BY PERCIVAL GOODMAN

THE LIVING END: THE CITY AND ITS CRITICS. *By Roger Starr. Coward-McCann Inc., 200 Madison Ave., New York, N.Y., 1966. 283 pp., $5.95.* THE REGIONAL CITY. *Edited by Derek Senior. Aldine Publ. Co., 320 W. Adams St., Chicago, Ill., 1966. 192 pp., $7.50.* METROPOLIS ON THE MOVE: GEOGRAPHERS LOOK AT URBAN SPRAWL. *Edited by Jean Gottmann and Robert A. Harper. John Wiley & Sons, 605 Third Ave., New York, N.Y., 1967. 203 pp., $6.50.* PLANNING FOR A NATION OF CITIES. *Edited by Sam Bass Warner, Jr. 310 pp., $8.75.* THE ARCHITECT AND THE CITY. *Edited by Marcus Whiffen. 173 pp., $5.95. Both published by M.I.T. Press, 50 Ames St., Cambridge, Mass., 1966. The reviewer is Professor of Urban Design at Columbia University's School of Architecture and a practicing architect.*

All of these recent books on urban problems exhort us to plan for a nation of cities. Yet words like "urban" and "city" are so general as to be almost meaningless, conjuring up in the popular imagination towering skylines, women in décolletage, bright lights, crowded slums, Bowery bums. But the dry census definition is: "The major characteristic of an urbanized area is that it contain at least one city of 50,000 inhabitants as well as contiguous incorporated places of 2500 or closely settled areas having 100 housing units or more in each." The urban area, then, is not only New York, Calcutta, or Tokyo, but core, suburb, and exurb — 1000 to the acre, or perhaps as little as one or two. These disparities of scale give us no idea of place; furthermore, if we consider "urban" in social terms, we see that with TV, radio, central schools, electrification, and highways, living on a farm or in hamlet is also an "urban" experience.

We should plan, then, not for the urbs in the classical sense, but for the design of man-made enviroments in every scale. This is indeed a vast topic: A topic for philosophers, statesmen, for sociologists and psychologists, for ecologists and varieties of economists, for physical planners and politicians — all prophetic enough, nimble enough, courageous enough, to make forecasts in a dynamic time when forecasts cannot be based on simple projections of trends (whether social, economic, or technical). Those of us who were brought up on Le Corbusier's view that "Architecture and urbanism are in fact one problem only and . . . demand one solution only and this is the work of one profession only" have lived to rue the day when we believed that the "one profession only" was architecture.

The books under review are informative, interesting, and often written by first-rate people, but my complaint is that none present a vision one thrills to, none makes one feel a better world is in the making and the task is therefore worthwhile, none take our technical potential seriously, since there is little said about the effects of cybernetics and nothing about thermonuclear explosion — two fields that must change our thinking on human environment.

For instance, the free time being created by cybernetics adds new dimensions to planning: What happens to an urban plan when 90 per cent of the people are on a 20-hour or less work week? What is the end result of electric speed in the communication of ideas?

In *The Regional City*, Thomas Macksey writes: "One of the curious things that happened [at the Seminar] was the complete abdication of technology from a form-making role in the city. Everybody seemed to agree . . . that technology is not a determinant whatever." Here is a key to explaining why these books have such a comfortable, old-fashioned air. Even the oldest of the writers wear blinders, since today's thinkable is in fact so unprecedented as to be for all their practical purposes unthinkable. Their solution is to deal with problems that were hashed out 30 years ago, such as urban amenity, transport and conservation, or current difficulties such as ghettos.

Thus Roger Starr, author of *The Living End*, being interested in the present, finds that American cities have five problems: race and ghettos, the new architecture and urban beauty, technology and conservation, the problems of the poor, and politics. (Incidentally, these are only three problems, since the ghetto and the poor are the same; likewise for architecture and technology.) The author defends with vigor many presently unpopular things: He finds the housing project better than the picturesque tenement, automobiles in the city lively and pleasant, historical preservation mostly nonsense. His chapter on the consequences of poverty (the income gap) is good and his explanations as to why politicians act as they do is masterly.

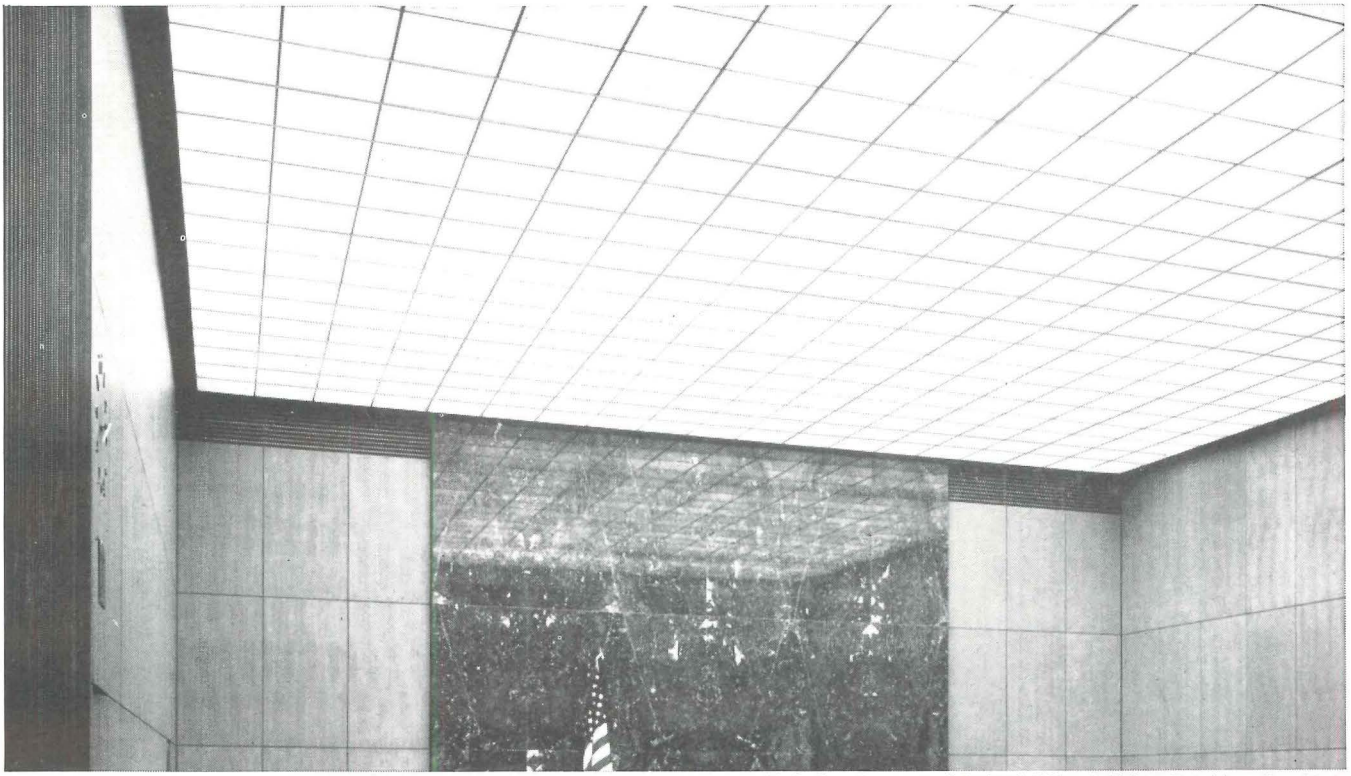
Metropolis on the Move is a set of 12 essays by urban geographers who analyze "urban sprawl." Jean Gottmann wrote the informative lead essay, reporting that most national policies here and abroad aim at decentralization of the major urban concentrations. His metaphorical solution to the resulting outward sprawl is to bury all the undesirable things: "Well, it would be a beautiful enormous garden city, the like of which even Ebenezer Howard had not visualized! This prospect is not a crazy dream; much is aready being done to bring it about."

This is not exactly a novel proposal. One wonders why anyone would go to the trouble to make it when Harold Mayer points out that in the contiguous U.S. less than 3 per cent of the land area is occupied by 85 per cent of the population.

On the whole, the geographers accept urban sprawl: "We are becoming a nation of suburbanites." They point out that, in manufacturing plant location, when freedom from both highway and railroad traffic congestion, as well as reasonable land cost and single-story operation are figured in, the choice of a peripheral site is virtually certain.

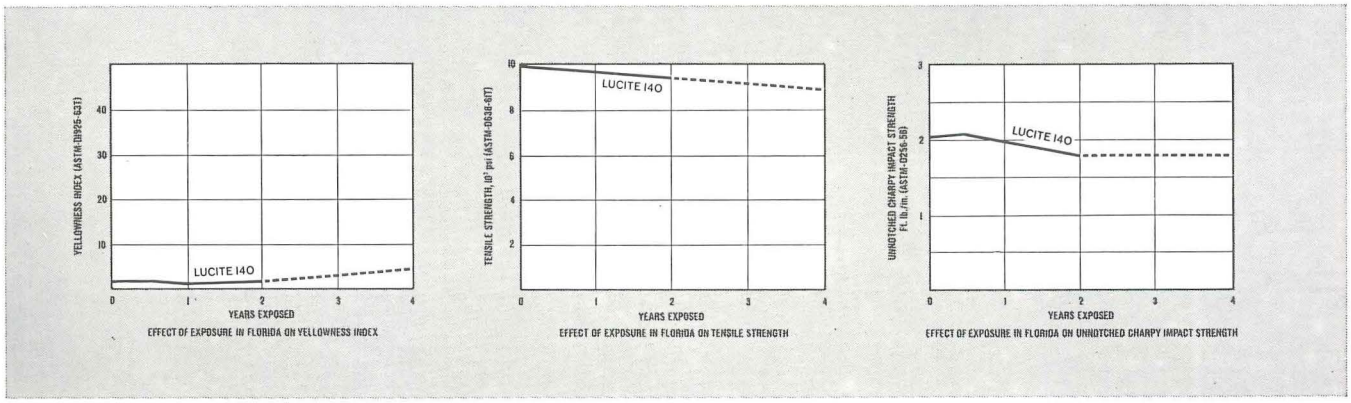
Continued on page 216

This carefully engineered lighting system has just been installed... Looks good, doesn't it?



U. S. Courthouse and Federal Office Building, Brooklyn, New York

Now let's look at it a few years from now.



The illuminating engineer who designed this installation isn't worrying. To begin with, he had carefully considered problems of architecture and aesthetics. Calculated required lighting levels. Chosen optimum transmission and diffusion values for the shields. Decided on plastic shields to reduce weight and cut costs of installation and supporting structures.

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BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

Continued from page 210

The Regional City is an "Anglo-American discussion on metropolitan planning." The basis for the seminar discussion was that "the urban region represents a new form of civilization with its distinctive possibilities and problems." In this good exchange between American and British planners, the English come out better than we do for a simple reason: The Briton has had a more desperate need for planning and so has had more experience. Another reason the English are more logical in their planning strategies is that, at heart, all Americans still celebrate Thomas Jefferson. This leads to slightly schizoid behavior, for we not only believe in state's rights and even fight bitterly against incorporated regions, but at the same time accept Federal spending and controls that preclude independent economic action on the part of cities. Most agree that Big Brother in Washington, with his big pork barrel, is less venal than all the little pork barrelers.

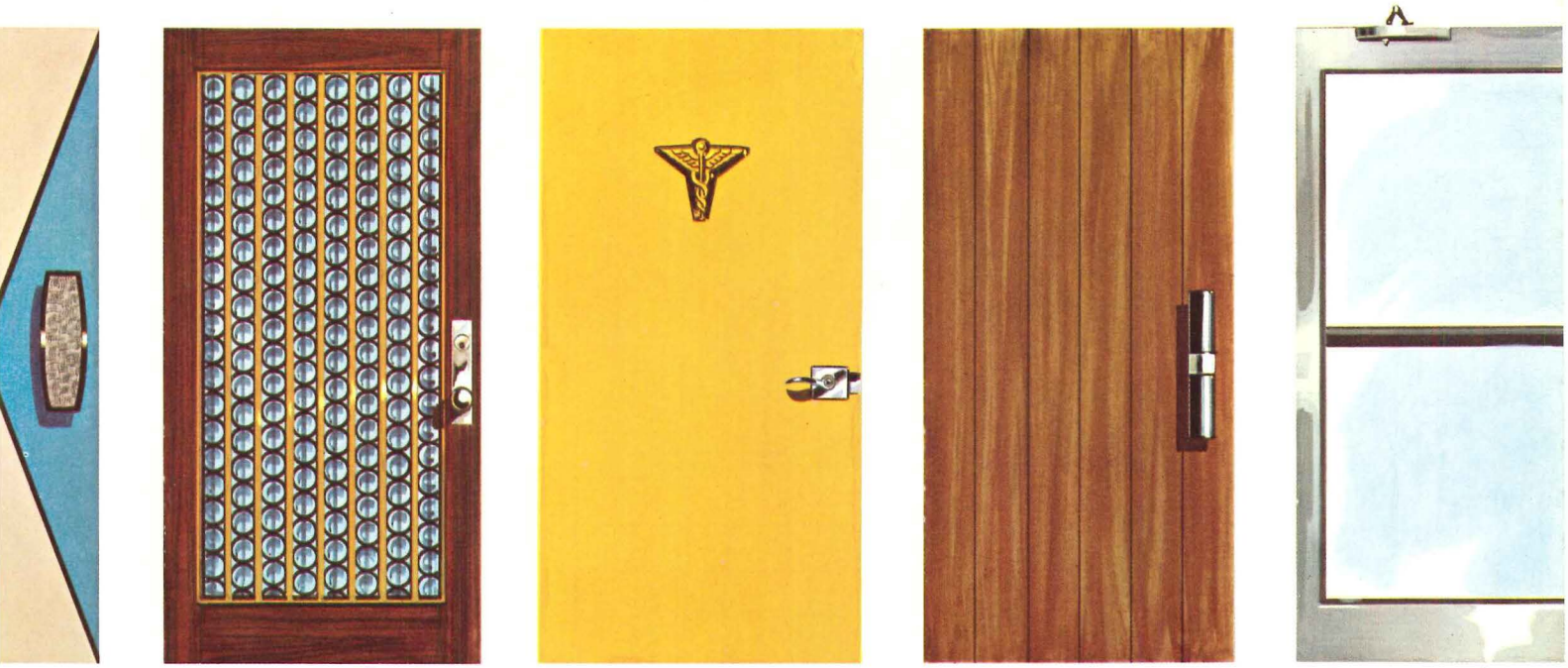
A Nation of Cities deals with the interaction between large scale and local events. Gunnar Myrdal sets the tone: "Fundamental planning for a nation of cities can be most effectively pursued at the level of national or Federal policy making. . . . If we rely entirely on policies induced at the local level, planning for the quality of urban life will become an almost hopeless task." All of the contributors come to the same conclusion: "A national urban policy is inseparable from a national manpower policy." Yet, to repeat, we are deep down Jeffersonians; we dream of cultural pluralism, of regional differences while we eat hamburgers and drink the Cokes, see and hear the commercials while riding the highways — all identical from coast to coast.

No wonder we cherish our pathetic little architectural "monuments" and when we find a Maine native saying "shut cat" we spend an evening enjoying this variant of "short cut" as we enjoy the beans simmering for eight hours on the back of a wood stove. Somehow we are sure we can have both worlds. Bennet Berger, with ironic optimism, puts it well: "America is a country dedicated to the proposition that no evils are ineradicable, no problems insoluble, no recalcitrance beyond conciliation, that no ending need be unhappy: We are the most un-Greek democracy."

The Architect and the City deals with training a new breed of student for the job that needs doing. In the introductory essay, G. Holmes Perkins writes: "We are prone to confuse architect and city planner . . . for the essence of the architect's contribution to the city and society is now, and should always be, the sincere and undivided dedication to design. . . . Yet the architect has the decisive role in creating tomorrow's urban enviroment. . . . However, there are many forces that are beyond his control." This is certainly not clear, for "Creative Design" is not only the architect's province but that of all those involved in the planning process. Surely it is a fact that the architect's voice is not the decisive one. For better or worse, the architect never decides why a thing should be, and only within tight limits decides where or how it should be.

In a book like this, based on a seminar jointly sponsored by the AIA and the Association of Collegiate Schools of Architecture, it would have been useful to have defined architecture in less general terms than "a marriage of use and beauty" or "a form of human behavior." What, in fact, is the architect's work? Surely it is not the creation of a "joyous play of forms in space" (Le

Continued on page 224



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Continued from page 216

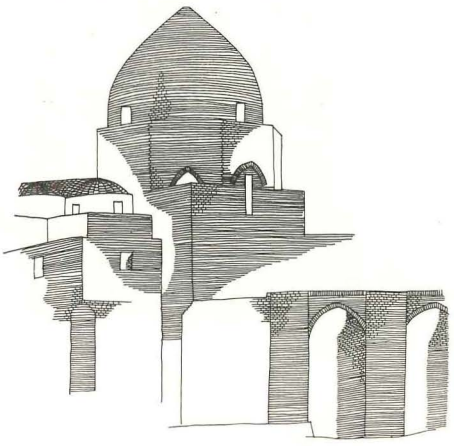
Corbusier), for this is a definition of sculpture. I would say that the architect's main job is to give form to social space. He does not plan the social action or where it will occur: In a totalitarian society, this is done by the Boss; in our society, we believe it is decided by consensus, by individual initiative, by the competitive forces of free enterprise — though, increasingly, as I've remarked, we depend on national policy.

In comparison with today's scientific achievements, a planner's knowledge is based on old wives tales, his techniques are neolithic, his organization for improving and advancing his art fragmented, the criteria on which the planning process operates limited, and the vision myopic. Until we decide that it is unnecessary to spend our best brains and resources on overkill, that the earth is more important than the moon, that people are more important than things, if, in a word, our national goals shift from war to peace, then, perhaps, planning for the total man-made environment will be possible and we can start on this remarkable project.

A Beautiful Book

BY FORREST WILSON

PERSIAN ARCHITECTURE *By Arthur Upham Pope. George Braziller, Inc., Publisher, 215 Park Ave. So., New York, N.Y., 1966. 288 pp., illus., $25. The reviewer, who did the drawings that accompany this review, is an Associate Editor of P/A.*



"I was determined to build a Masjid-i-Jami in Samarkand which should be without a rival in any country," Timur announced. "But, although it had a minaret at each corner, a dome covered with finely polished marble, and a roof carried on 460 columns, the building was not as imposing as he had expected, so he put the architect to death — a warning to timid designers."

Apparently being a Persian architect was a chancy profession. However, judging from Pope's book documenting the period of Persian architecture from the Sixth Century B.C. to the 18th Century, the mortality rate due to timid design was not excessive.

The beauty of the umbilical connection between architectural design and geometry is seldom expressed as well as it is in this book. The Greeks' love for the golden section and the simple proportions generated by the right triangle and the square root of five seem simple in comparison, and the frustration of Corbusier in his failure to conquer contemporary haphazard machine sizing of architecture with his harmonious modular becomes a tragedy when one realizes the beauty of geometry in building.

The Greeks did not employ mathematics as an engineering tool, except for Archimedes, who found it useful for sinking Roman ships. When he died at the hands of a Roman soldier, Greek mathematics died with him. Persian mathemat-

Continued on page 232

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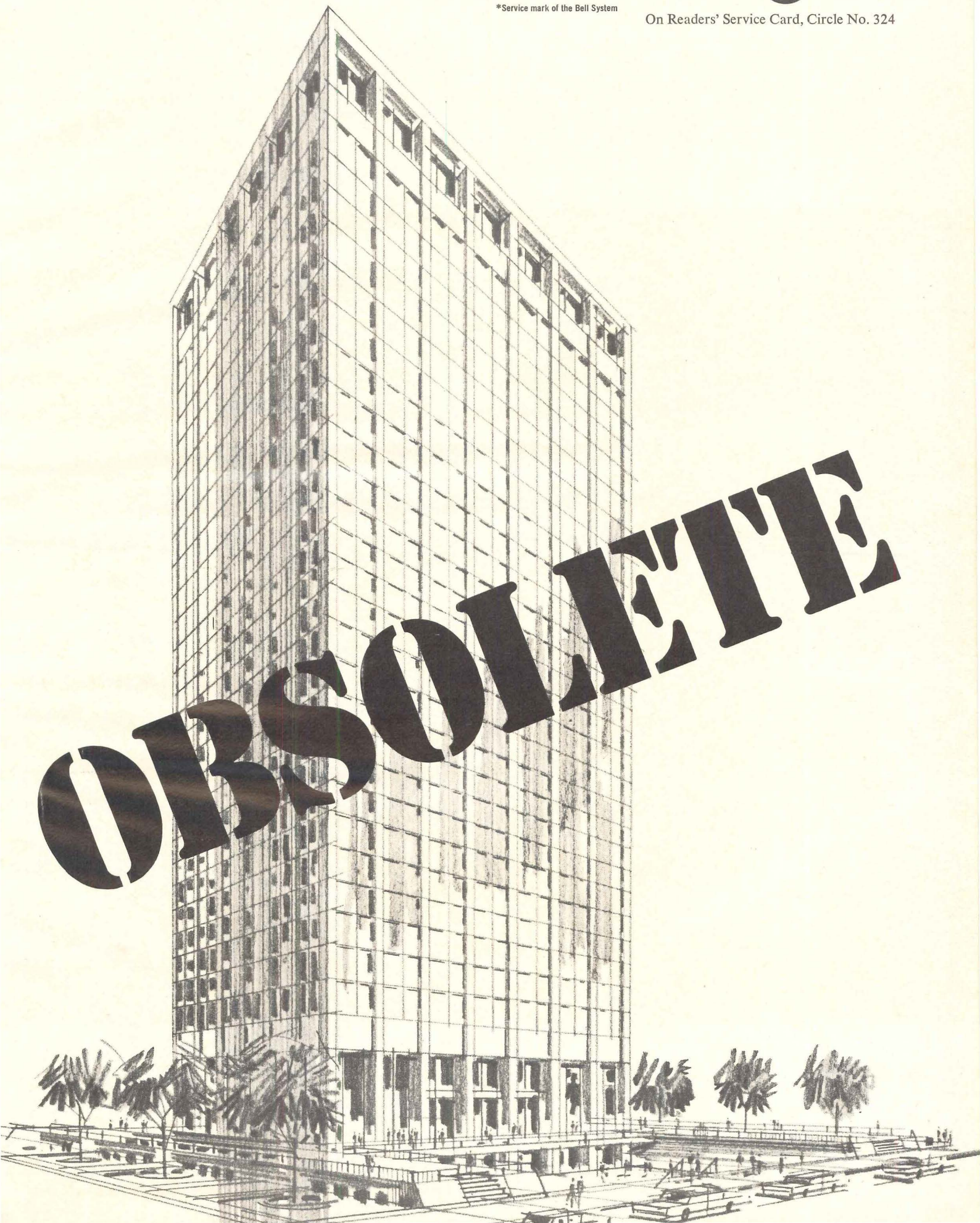

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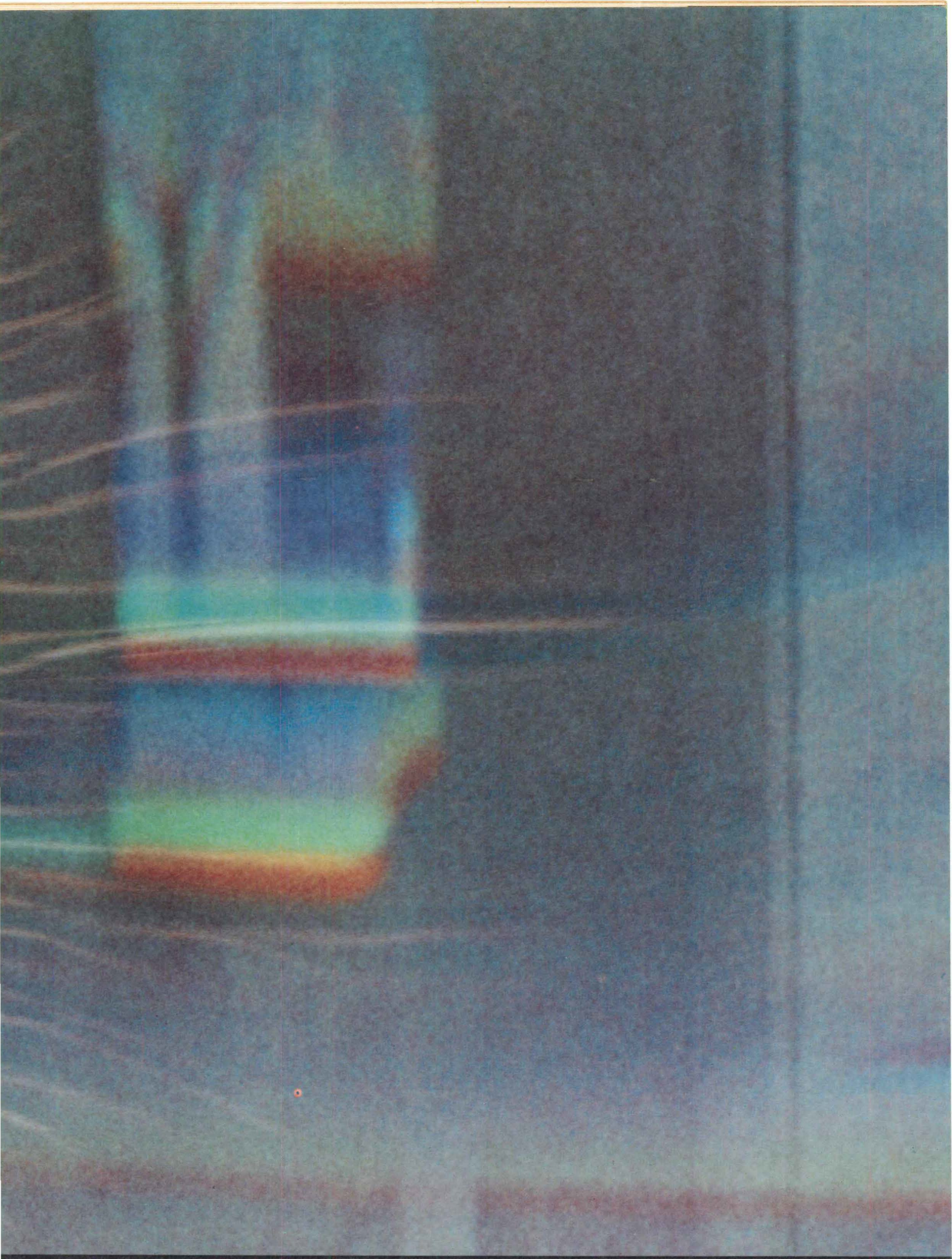

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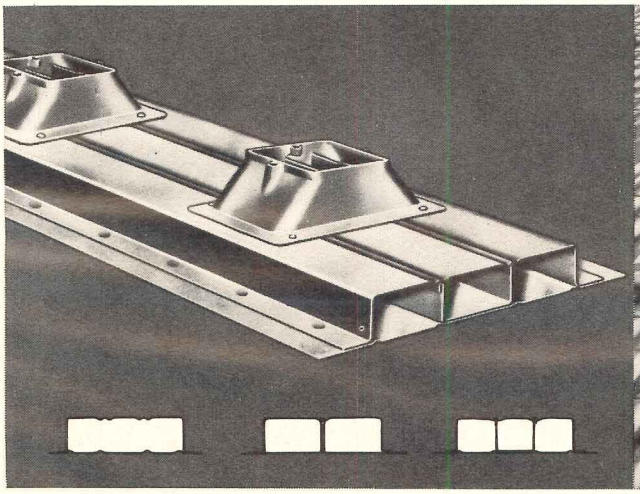

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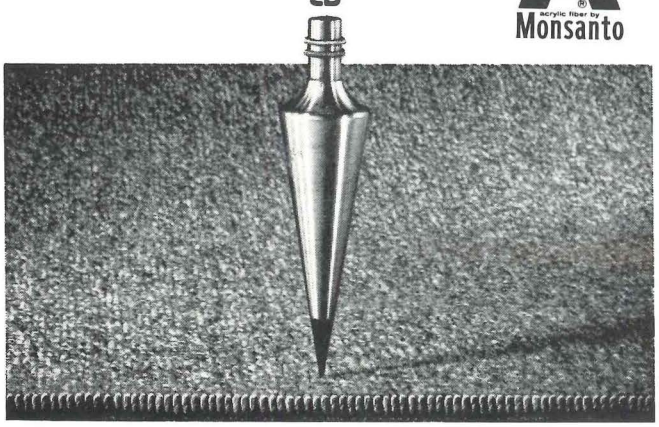

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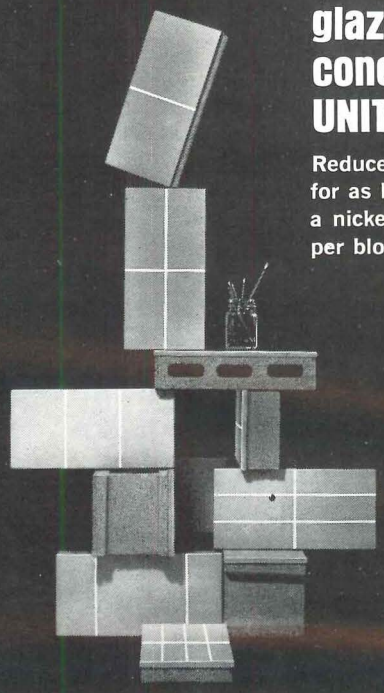

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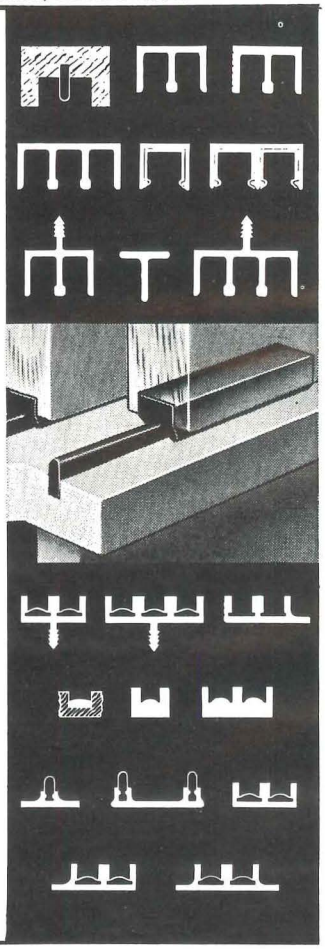

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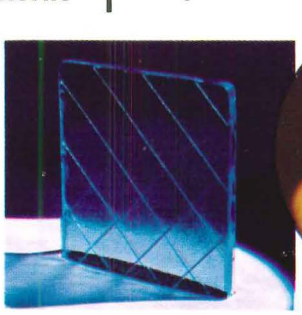

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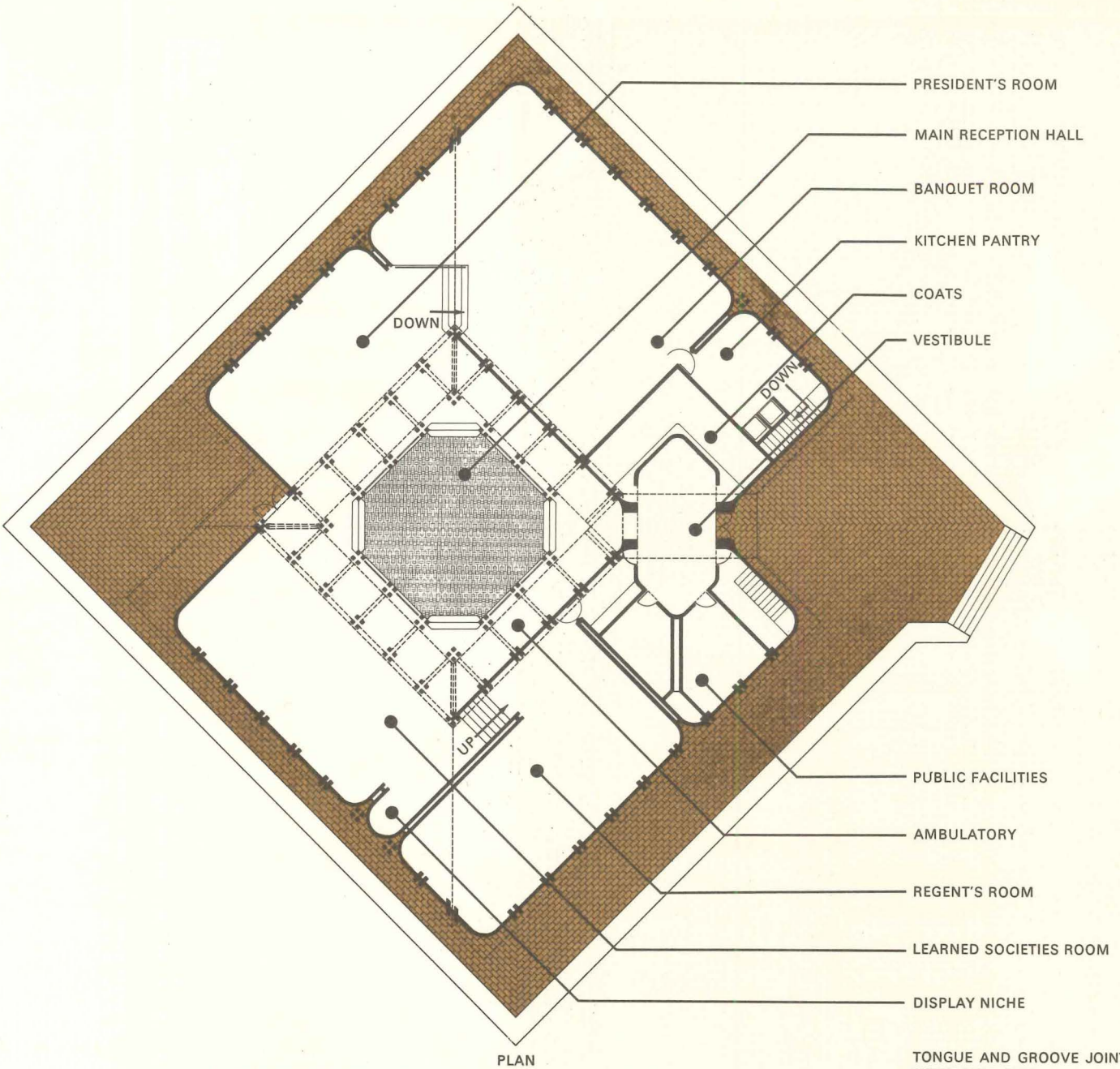
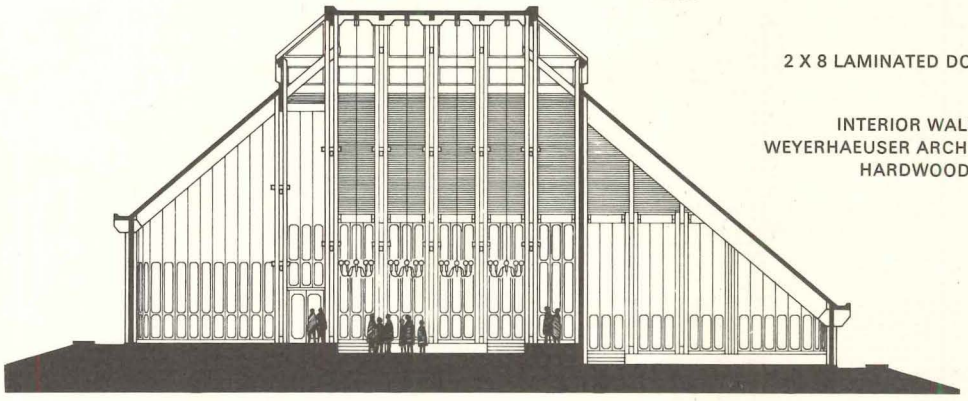
To serve these needs we propose a taut design using one of nature's most versatile gifts—wood. The design's success will develop from taste in selection of materials, from care in detailing, from integrity and consistency in fashioning the whole out of its parts. We have used thick, specially surfaced wall construction, precisely modeled laminated columns and beams, custom doors, and architectural hardwood paneling inlaid in an attempt to create spaces with quiet strength and dignity. Wood, a remarkable material, friendly to man, is essential to this design.

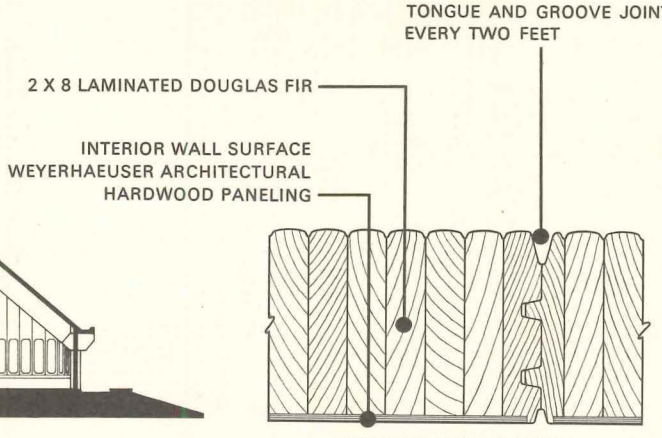
Fred Bassetti



PLAN



SECTION



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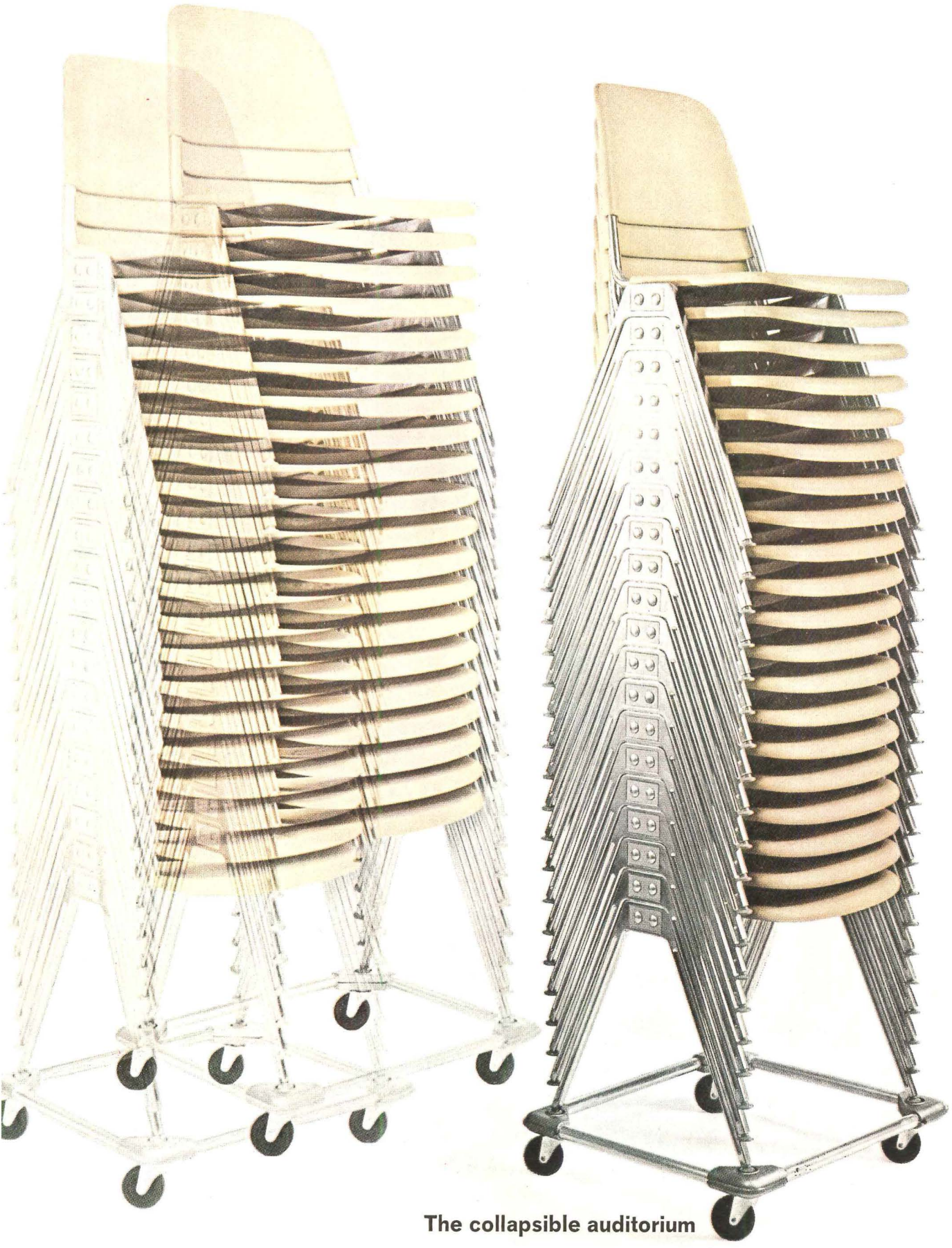

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Continued from page 238

ings, since both construction systems are doubtlessly held in place by the power of prayer.

The author is the former director of the Iranian Institute and Chancellor of the Asia Institute in New York, as well as President of the International Association for Persian Art and Archaeology. The book-jacket says that he has published over the past five decades detailed studies of many of the monuments and subjects covered in the volume under review. Pope, an art historian, writes of Persian architecture as sculpture. But his writing lacks the pedantry of the scholar, even though he is probably the foremost in his field. He displays a clear understanding of architectural structure and demonstrates this by a profusion of plans and detailed photographs as well as knowledgeable discussion. It is a beautiful book.

"Sophomoric"

BY GRAHAM FRYE

MICROCOSM AND MACROCOSM: AN APPROACH TO THE SYNTHESIS OF THE REAL. *By Michael M. Hare. The Julian Press, Inc., 119 Fifth Ave., New York, N.Y., 1966. 291 pp., $15. Dr. Frye, an Assistant Professor of Physics at the City College of the City University of New York, has written numerous articles on the theory of the interactions of elementary particles and will soon publish a paper on the quantum mechanics of composite particles.*

This book represents an ambitious attempt by an architect at constructing a "unified theory" that aims to give a coherent explanation to such diverse phenomena as the genesis of the solar system, binding forces in atoms, energy components associated with organic tissue, and psychokinetic activity. On the surface, the book appears to be a "scientific" treatise, because it uses the jargon of modern physics and is replete with mathematical formula. There is a danger that the general reader will be overly impressed by scientific authority and intimidated by the mathematics. It is helpful, therefore, to have the opinion of a physicist. My judgement is that Hare's "unified theory" is rubbish.

Hare's point of departure from conventional physics is the strong use he makes of the analogy between the solar system (gravitational forces) and the atom (electrical forces). He seeks to carry over the property of intrinsic spin of the electron to predict the period of rotation of Venus about its own axis. The idea is sophomoric, but not necessarily wrong.

Continued on page 263

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Part of a series of product-use bulletins published by Mobay to keep suppliers and applicators in the building industry informed on new developments in urethane materials for commercial and residential construction.

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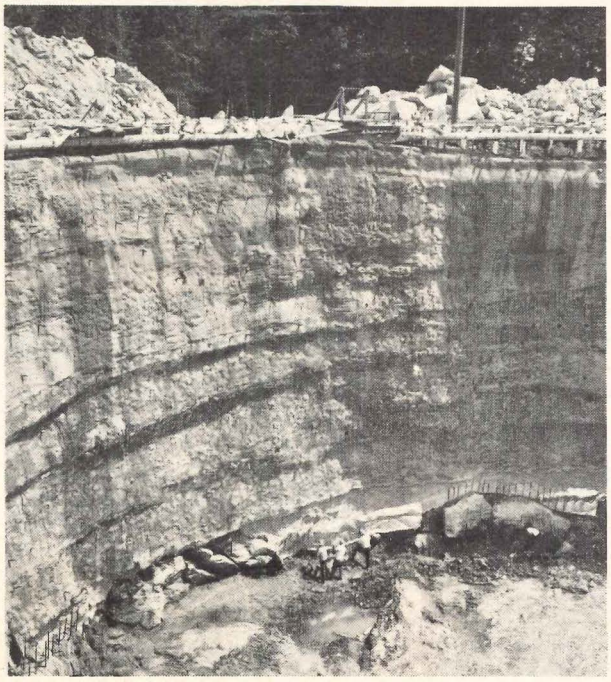
The Cryomethane Co., has the general contract to construct two shafts 135′ dia. by 175′ deep for the Tennessee Gas Pipeline Co.,* as reservoirs to store liquefied natural gas at a constant —260°F near Hopkinton, Mass. The Perini Corp., of Framingham, Mass., had the sub-contract for the excavation through glacial till and rock.

To prepare the site, Cryomethane installed piping to freeze the ground to a depth of 195 ft. around the perimeter of the intended shafts, using a two-stage ammonia refrigeration plant that was set up nearby. Circulating pipelines were laid and connected to a manifold system of 6- to 10-inch pipe supplying the freeze wells. Sub-zero calcium chloride brine was then circulated, deep-freezing the ground and making possible the excavation of sheer vertical cuts without shoring or bracing.

In the first excavation, materials used to insulate the frozen ground consisted of 2-inch thick glass fiber mats covered by 90-lb. roofing paper held in place with wire mesh and rock bolts. During work on the second shaft, it became evident that this insulation system was inadequate. Sections of thawing earth broke loose, and dirt began sloughing into both excavations. Had this condition been allowed to continue, refrigerant pipelines and freeze wells might have been exposed.

The Mine Safety Appliances Co., Pittsburgh, Pa., was contacted to see if application of rigid urethane foam would be practical. After a short period of experimentation proved the effectiveness of this approach, two applicator crews began spray-foaming the first shaft and 20 feet of exposed wall in the partially dug second hole, completing the job in about 5 work days.

About 35,000 sq. ft. of surface was covered with urethane foam to blanket the dirt wall down to solid rock, 27 ft. down in one shaft, 41 ft. down in the other. The foam was applied to a thickness of about 3 inches (equivalent in insulating value to 6 inches of glass fiber) directly over the installed fiber mats in the first hole as it would have been too costly to remove the material.



Rigid urethane foam was spray-applied to insulate frozen soil and permit wall excavation without protective shoring.

As work progressed in the second shaft, applicator crews returned at 3-day intervals to apply urethane foam over wire mesh to the newly excavated wall areas.

An 18-inch-thick reinforced concrete lining was then poured directly against the rigid foam surface to serve as the permanent wall lining.

In this project, the reservoirs will be dome-covered, sealed gastight and freeze wells closed off. Over a period of 10 months, liquid gas will be pumped into the reservoirs to gradually lower the earth temperature to the necessary —260°F, extending the freeze line many feet in all directions.

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For additional information on the use of urethane foam in other insulation and construction jobs, write on your letterhead to:

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Continued from page 256

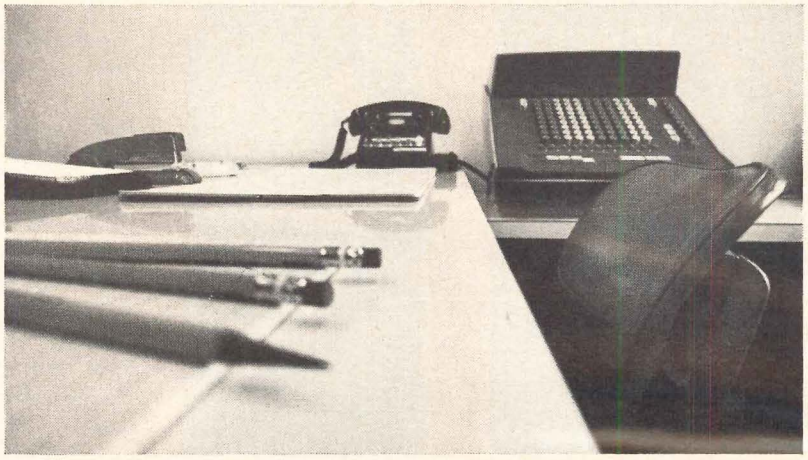
My objection to his approach is that he does not examine the physical quantities (mass, angular momentum, moment of inertia, energy levels, etc.) known to be relevant in making the analogy. Rather, he goes off into a weird hodgepodge of dimensional analysis and a crude imitation of Bohr's quantum theory of the atom. It is hard to follow the logic of his presentation in detail because his basic formulas are "derived" only after establishing a smoke screen of fuzzy speculations and misleading reinterpretations of some well known laws of classical physics. One of his speculations is that the planets originated from an earth-sun binary star, which was an idealized electromagnetic wave. At some primordial time, this earth-sun system was precisely analogous to the hydrogen atom, the present obvious difference being due to the fact that, unlike electrons, the planets of the macroscopic system have varying sizes. The arguments are obscure because Hare does not explain exactly what the analogy is or how the transition from electromagnetic wave to the planets was accomplished. There are obvious technical objections to the analogy and to the possibility of converting electromagnetic energy into planetary matter. Since he does not anticipate or answer these objections, I can only conclude that his analogy is superficial.

Although *Microcosm and Macrocosm* reminds one of Velikovsky's *Worlds in Collision*, a comparison of the two theories is unjustified because Velikovsky's is based on detailed and imaginative examination of specific evidence. As a theory of scientific astronomy, his ideas can be criticized, since they rely on unconventional sources of evidence such as Biblical stories and the insights of psychoanalysis. But they are interesting and have a substance we can begin to work with by scientific methods. In contrast, Hare's theory is without real substance and lacks human interest besides, except in the last few chapters, where he drags in extrasensory perception and the ethical problems of living in a world of "three dimensional time."

Finally, there are many outright mistakes in his application of classical laws of physics. On page 31, there is an erroneous identification of the rest energy of a particle with its gravitational potential energy in the earth's field. The idea here is related to Mach's principle that relates the inertia of a particle to its gravitational interaction with *all* the other matter in the universe. Hare does not seem to be aware of Mach's principle.

Continued on page 268

The skilled labor shortage.



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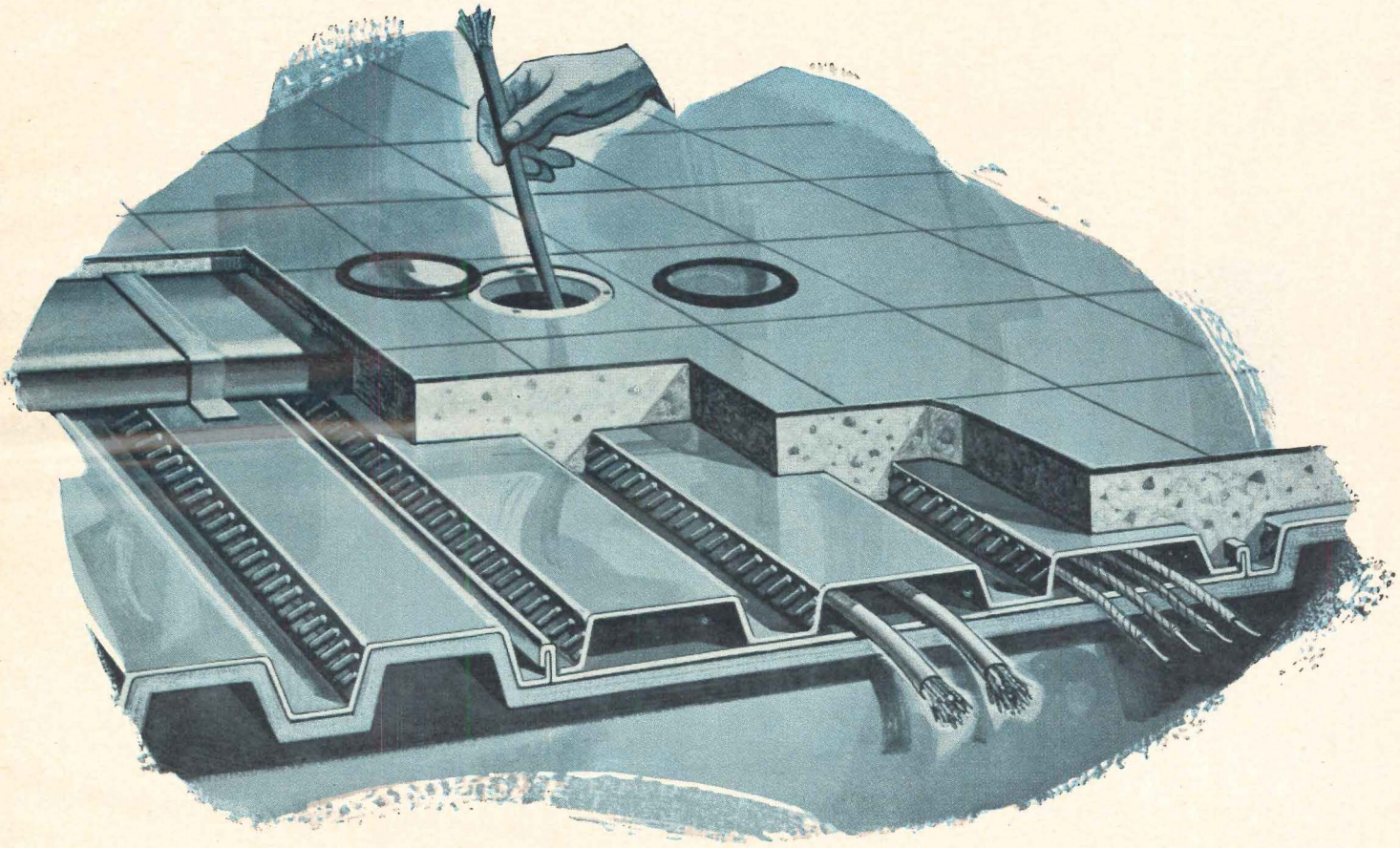

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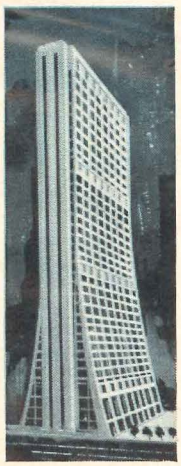

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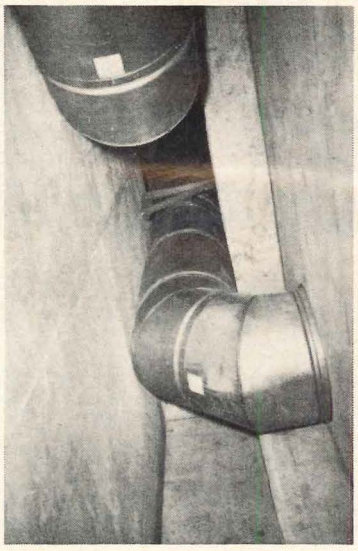
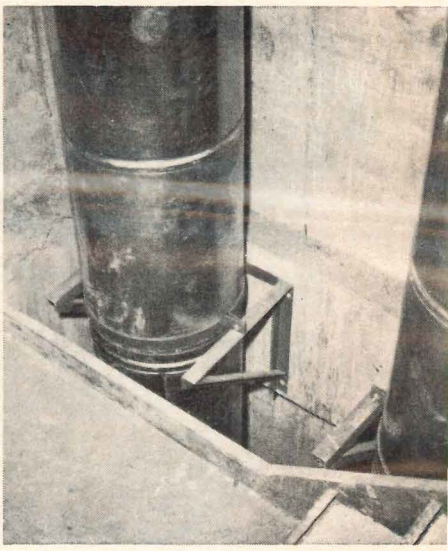
First four pre-assembled sections are inserted from boiler room breeching point thru chase wall. Two men easily handle 110 lb. length.



DWS elbow makes turn to vertical, starting the stacks on their 325-foot rise to roof termination.



Brackets and drawbands support the stacks at each of first 3 floors and every third floor above. 18″ adjustable section below drawband permits expansion, eliminates noise.

....coming from Scott Company, this is high praise.

Scott Company of California is one of the largest mechanical contractors in the United States, with a world-wide reputation for integrity, professional excellence and responsibility. Following are significant comments about Metalbestos double-wall steel stack installed in the new Bank of California building to vent two 242 HP Kewanee gas boilers, with standby capacity for oil.

"Metalbestos precision manufacture and ease of installation astonished us.

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...."we installed 650 feet of 20" Metalbestos dual-fuel stack in just 17 man days"....

. . . so says Al Millar, Foreman in charge for the Scott Company, mechanical contractors on the new headquarters building of the Bank of California. Read more of Mr. Millar's comments below.

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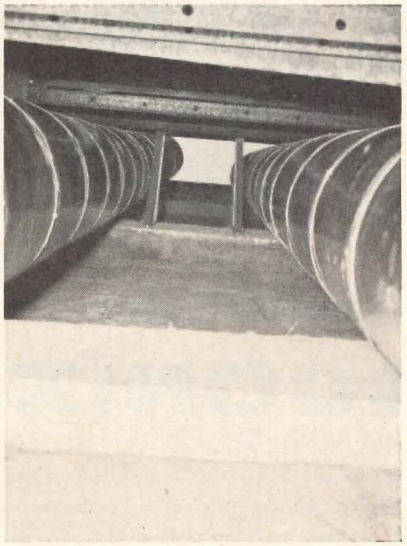

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METALBESTOS
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Continued from page 263

On page 85, the author interprets the Lorentz-Fitzgerald contraction as the result of compressive forces of the medium. He also wavers between whether it is a contraction or an expansion. Then he confuses the relativistic increase in mass as a particle moves faster (a consequence of the Special Theory of Relativity) with Einstein's non-Euclidean theory of gravitation, the so-called General Theory of Relativity.

Let me return to why the book is sophomoric: It is overly ambitious in what it sets out to do and it uses concepts that the author does not really understand. The book is a mockery of valid application of physical principles. The disturbing thing is that it illustrates the goss misunderstandings that can result from a superficial study of physics.

A Publishing Event of Importance

BY LEONARD K. EATON

JOHN WELLBORN ROOT: A STUDY OF HIS LIFE AND WORK. *By Harriet Monroe. Introduction by Reyner Banham. The Prairie School Press, 117 Fir St., Park Forest, Ill., 1966. 291 pp., illus., $8.50. The reviewer is Professor of Architecture at the University of Michigan.*

The lack of a full-scale biography of John Wellborn Root has often been discussed among architectural historians. We have all known of Harriet Monroe's 1896 book on her brother-in-law, but because it was published more than two generations ago, and because it has been available in only a few libraries, there has been a tendency to ignore it. Since the Prairie School Press has now presented us with a facsimile edition of Miss Monroe's book, there is no longer any excuse for neglect. In the field of architectural history, this is a publishing event of substantial importance, and it should be widely recognized.

The broad outlines of Root's career are familiar to most of us. In his introduction, Banham makes the interesting suggestion that Root may very well have been affected by an acquaintance with Peter Ellis, an outstanding Liverpool office block architect of the 1860's. This is quite possible. Throughout his career, Root exhibited the same kind of precocity as Louis Sullivan, and he may very well have reacted strongly to the excellent work of Ellis. He took a civil engineering degree at New York University in 1869, and, after a brief period in the office of the Gothic revivalist James Renwick, moved to Chicago, where he soon joined forces with Daniel H. Burnham. By 1880,

Continued on page 274

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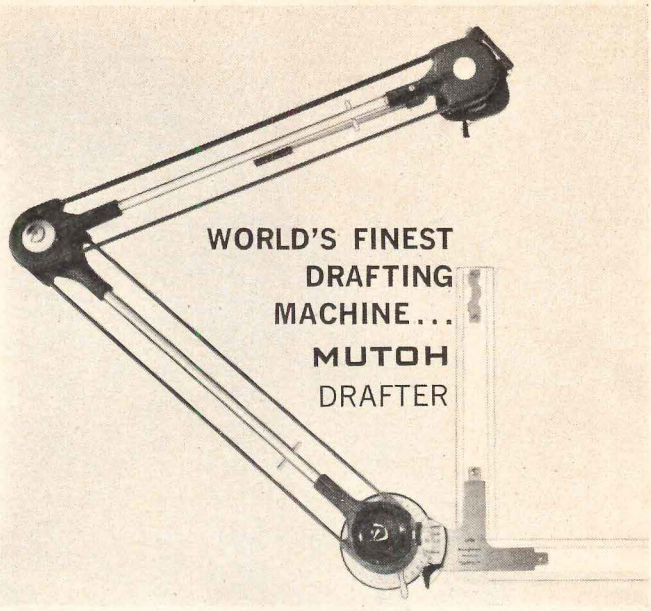

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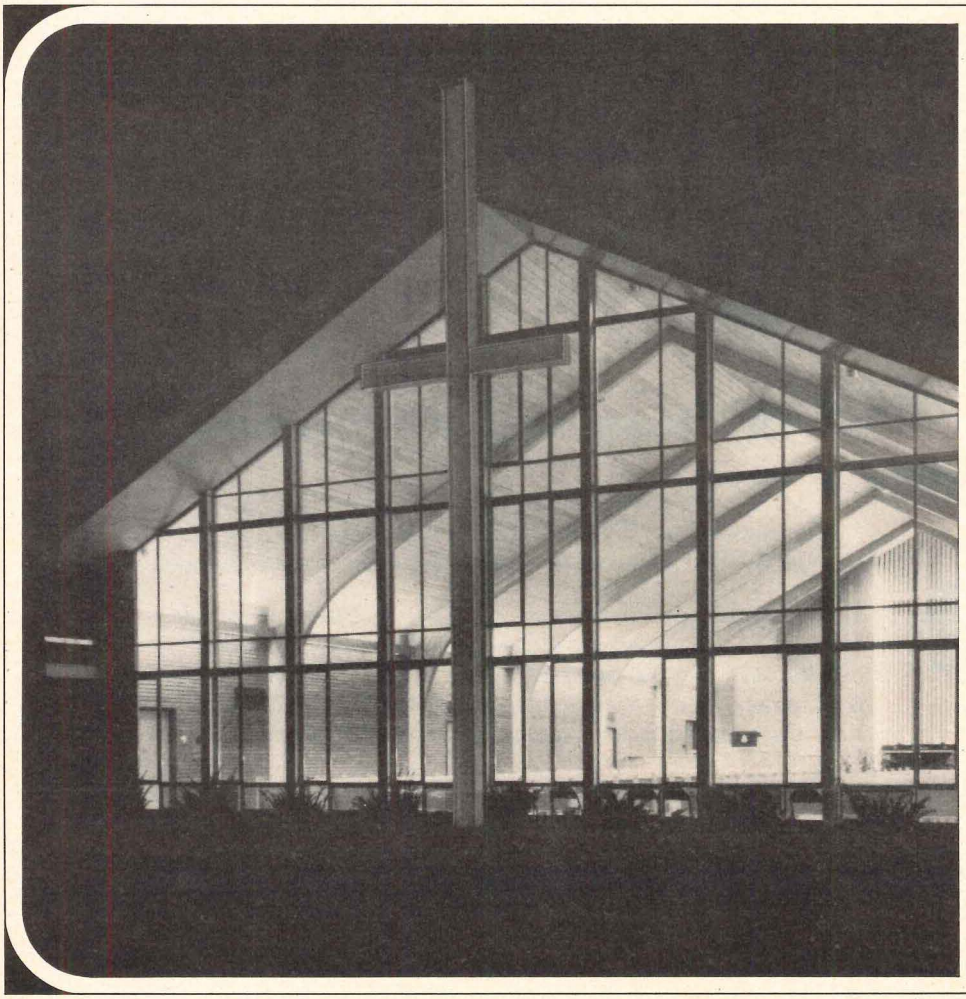

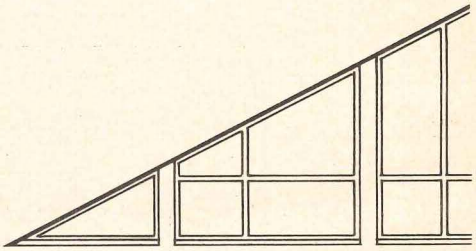

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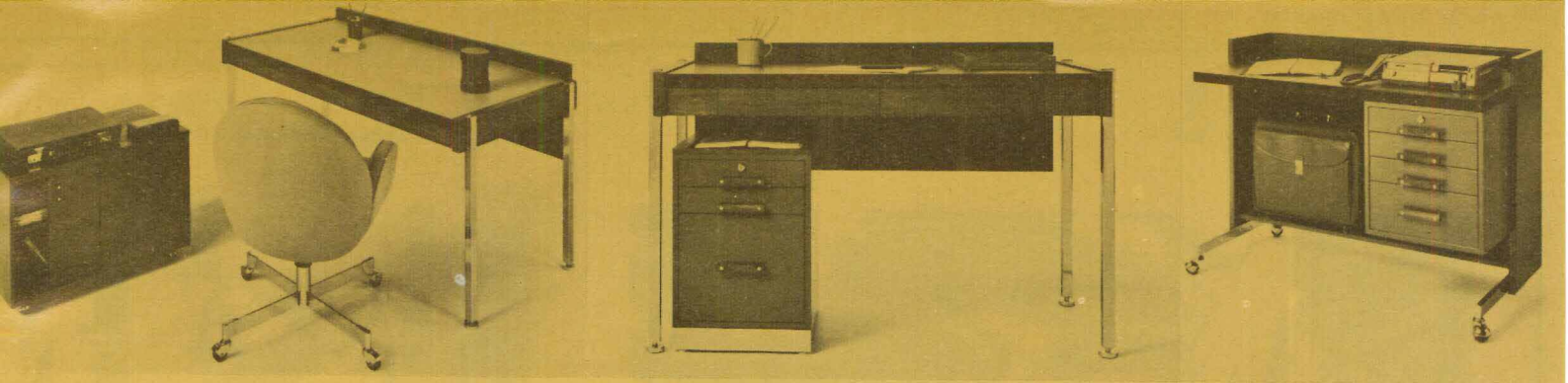

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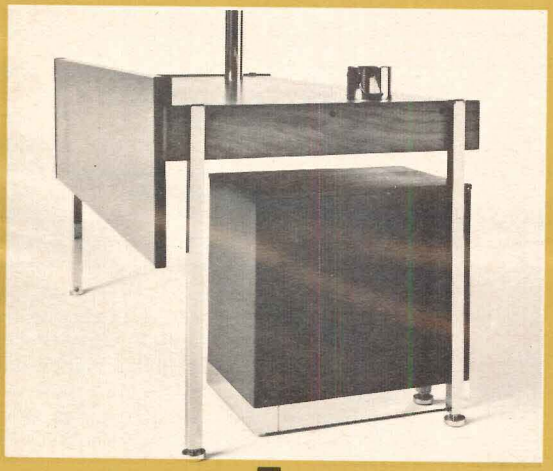

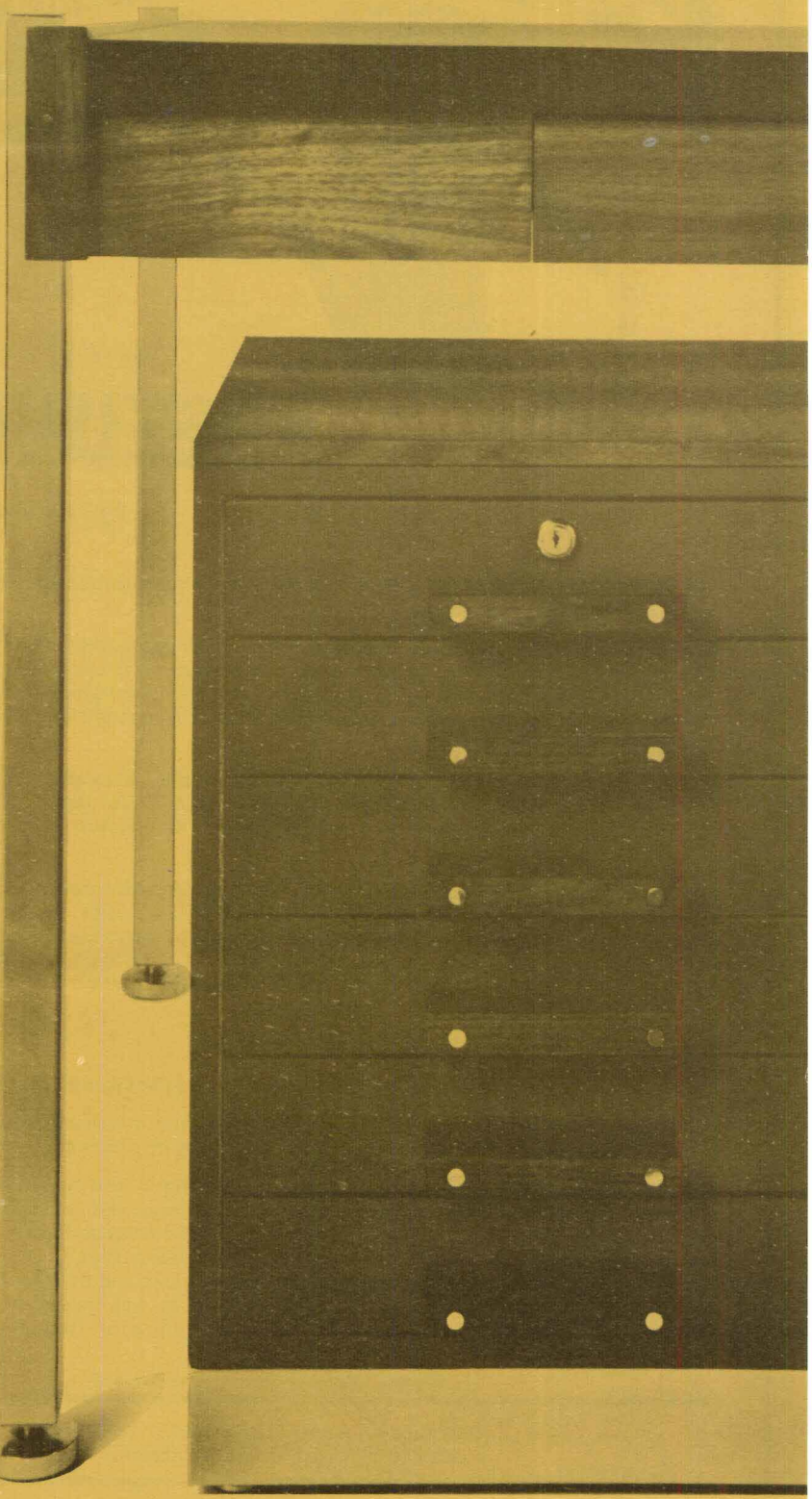

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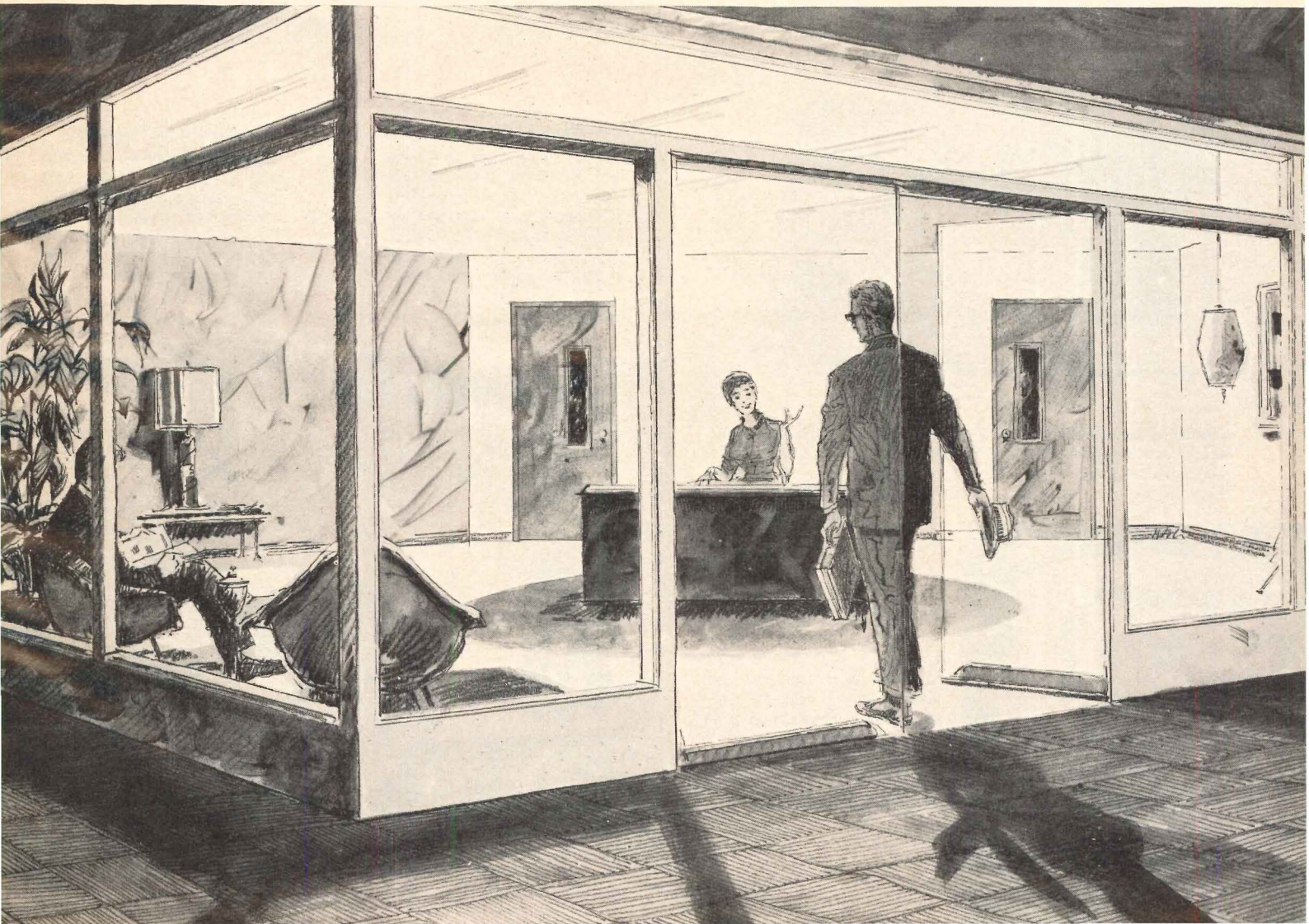

Continued from page 268

Burnham and Root were perhaps the most sought-after commercial architects in the city of Chicago. Among the important structures that came from their office during the decade 1880–90 were the Montauk (the first building in Chicago to use a modern foundation system), the Rookery, and most important of all, the Monadnock. This last edifice, the tallest bearing-wall structure ever built, would unquestionably rank near the top of everyone's list of significant architectural monuments in the U.S. Root's brilliant career was climaxed by his appointment as architectural coordinator of the coming World's Fair, but it was cut short by death from pneumonia in January 1891.

What kind of biography did Harriet Monroe write? In one sense, it resembles the classic 19th-Century life-and-letters tradition. She gives numerous quotations from personal documents and many revealing anecdotes (but nothing concerning her sister, who, after all, married the hero). Obviously, she was still too close to the tragedy to write objectively about her own family. We can be grateful for her inclusion of several important fragments of Root's exceptionally interesting architectural theory. Originally published in periodical form, these essays seem to be compounded of approximately equal parts of Ruskin, Gottfried Semper, and Viollet-le-Duc, and they still read amazingly well today. Root must have been one of the few Americans who knew Semper, but how he came to his knowledge remains a mystery.

Root emerges from this book as a good family man with remarkably wide intellectual interests, and a designer of genius in whom the structural engineer contended vigorously with the ornamentalist. In addition, he was a gifted musician, sufficiently talented to make a deep impression on his contemporaries: He must have been the only architect in American history to write and publish music criticism as a hobby. Is it a coincidence that the three giants of the Chicago school were all devoted musicians, or is this another of those interrelationships that make the history of the 19th Century so fascinating? Like so much else in Miss Monroe's volume, this cries out for investigation.

This book is more important for the questions it raises than for those it answers. Foremost among them is the nature of Root's design talent. Banham suggests that the great Monadnock was a kind of sardonic gesture, a building with a strong element of irony in it, and an aberration from Root's usual direction. However, its austerity accords very well with his theory of the need for repose in large structures, and, to this observer, it has never looked like the work of a man designing against his will. Miss Monroe's account claims that Burnham played a significant part in this and in certain other designs. Carl Condit's research has demonstrated the creative role of Owen Aldis and of the Brooks Brothers among Root's clients. Obviously, more work is needed here. More effort, too, is needed in the analysis of Root's contribution to the site plan for the World's Fair of 1893. Credit for it has customarily been awarded to the elder Olmsted, but Miss Monroe assigns it to her brother-in-law. It may be that here, as elsewhere in her book, she is, in Carl Condit's words, "excessively adulatory," but we will never know until someone undertakes a full-scale contemporary study. In any case, it is clear that Root's ideas for the Fair were quite different from what was actually done. Had he lived, the White City would probably never have been built.

In short, this book, like Mrs. Van Rensselaer's similar biography of Richardson, stands as a challenge to the present generation of architectural historians in the U.S. In many ways it will be difficult to rival, and in others it will be impossible to excel. Miss Monroe was a poet and the founder and first editor of *Poetry* magazine; her book is in some sense a testimonial to the value of having a biography done by a highly qualified literary person. Unhappily, much of the work of Root's mature decade has been destroyed, but enough remains on which to base an evaluation. When will we have a new biography of John Wellborn Root?

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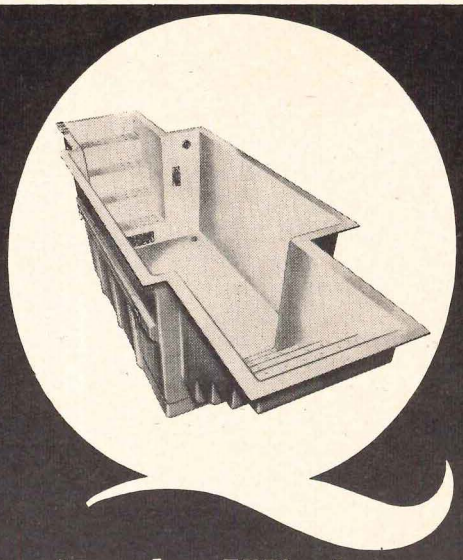

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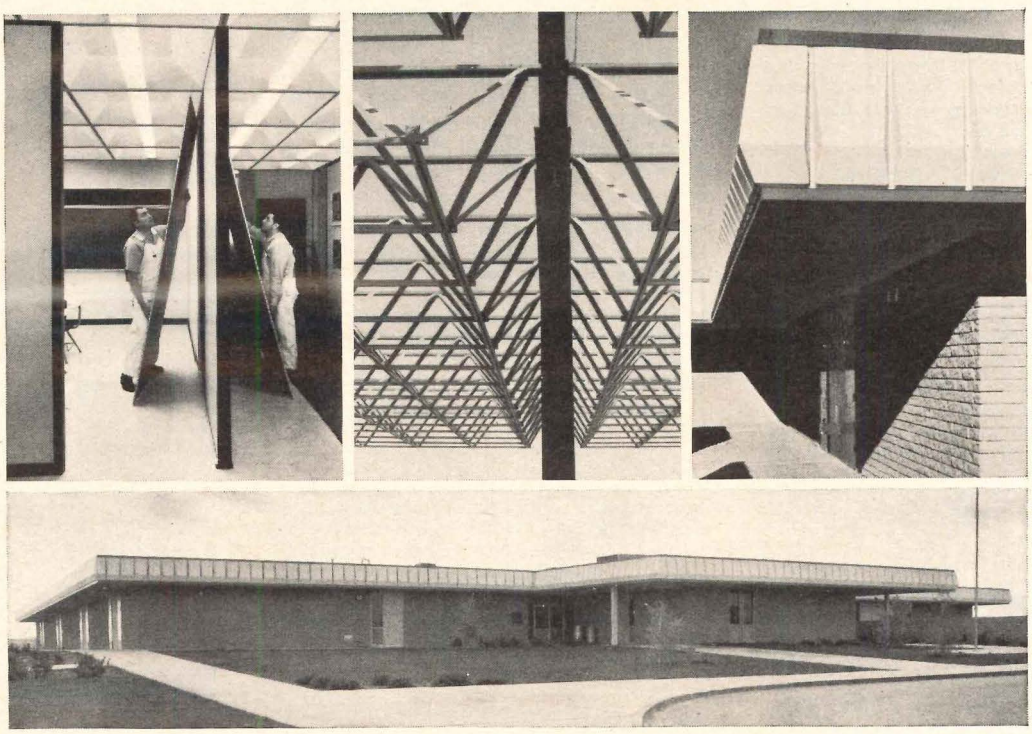

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P/A JOBS AND MEN

Continued from page 278

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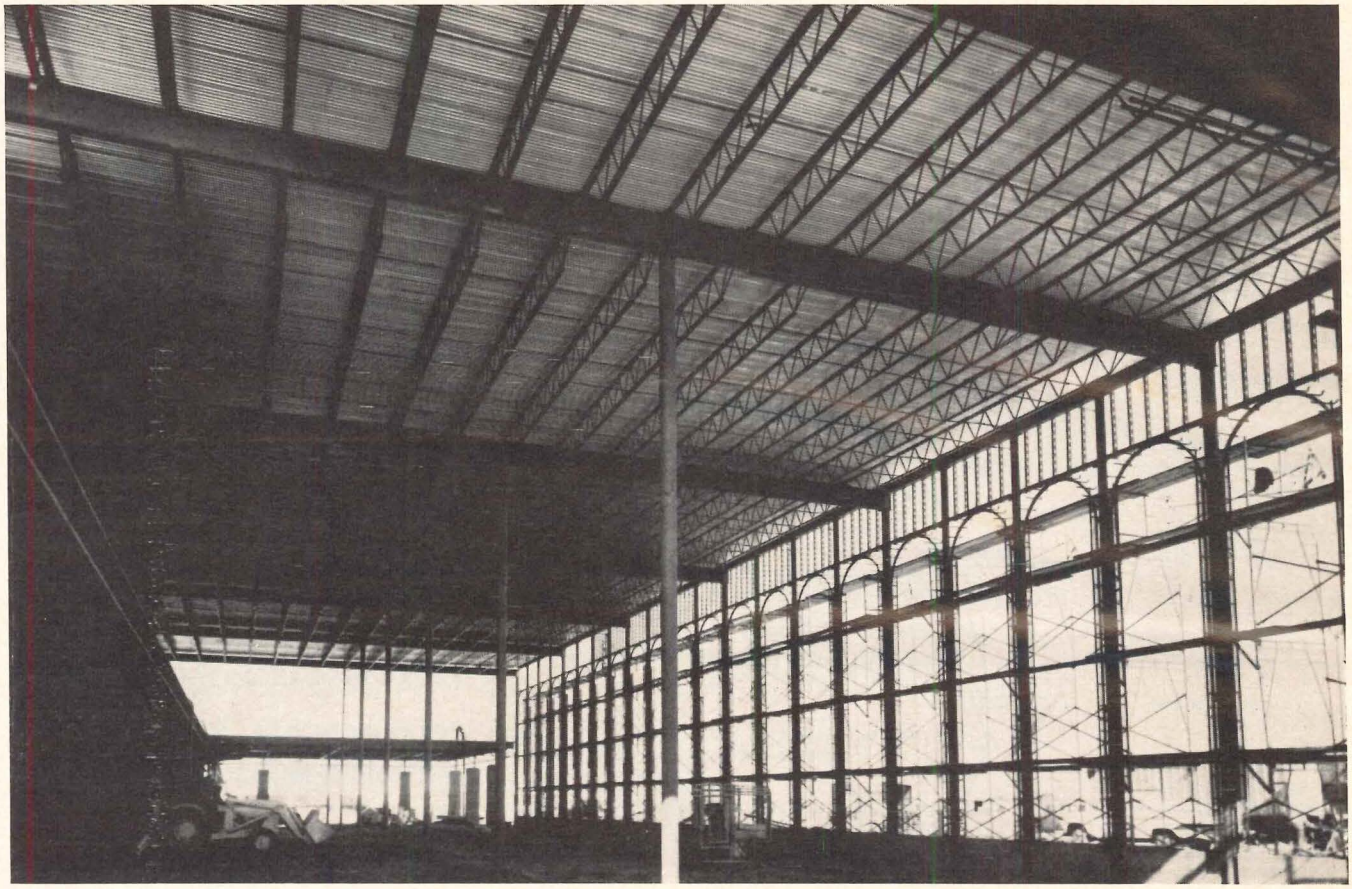

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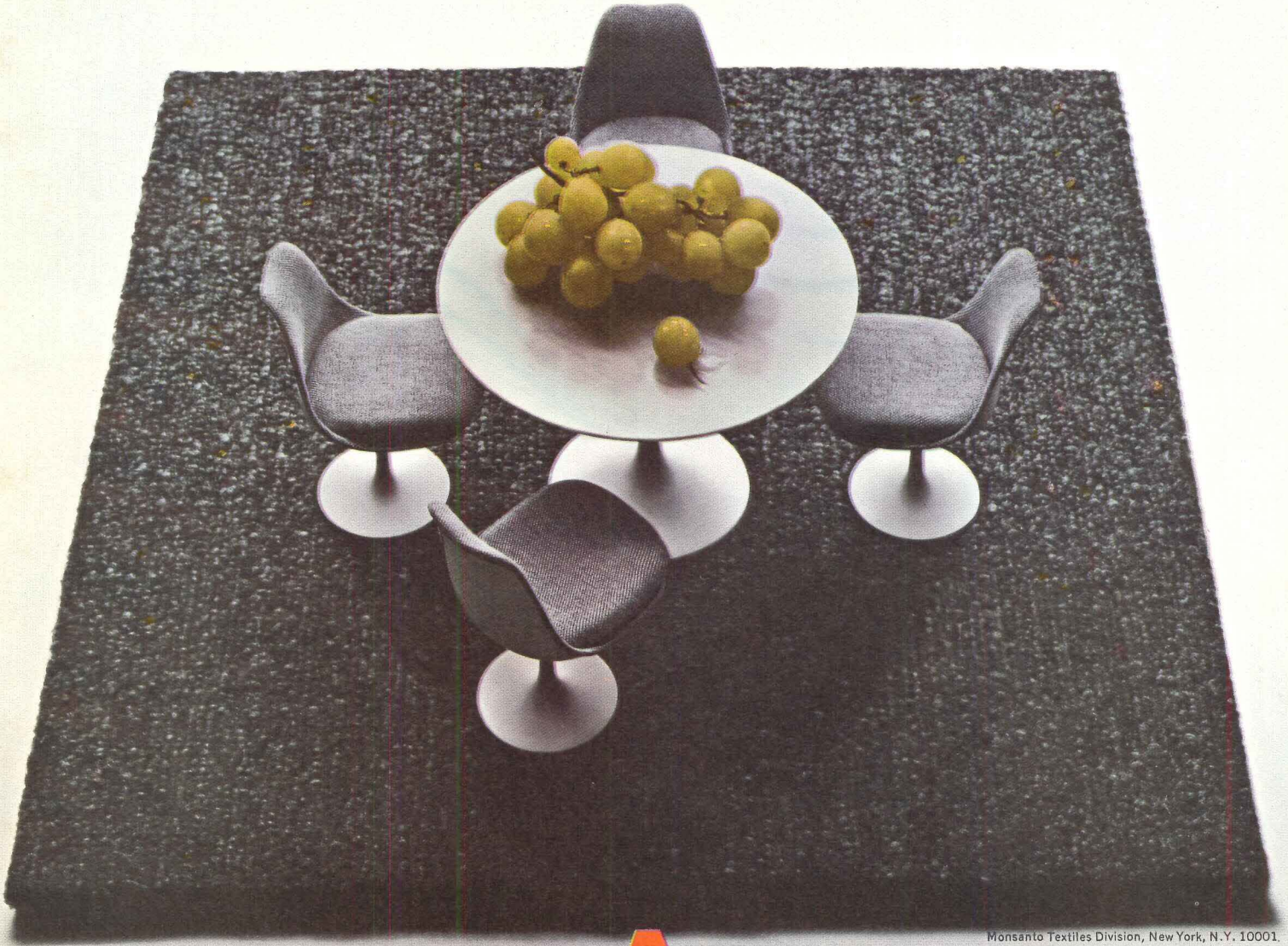

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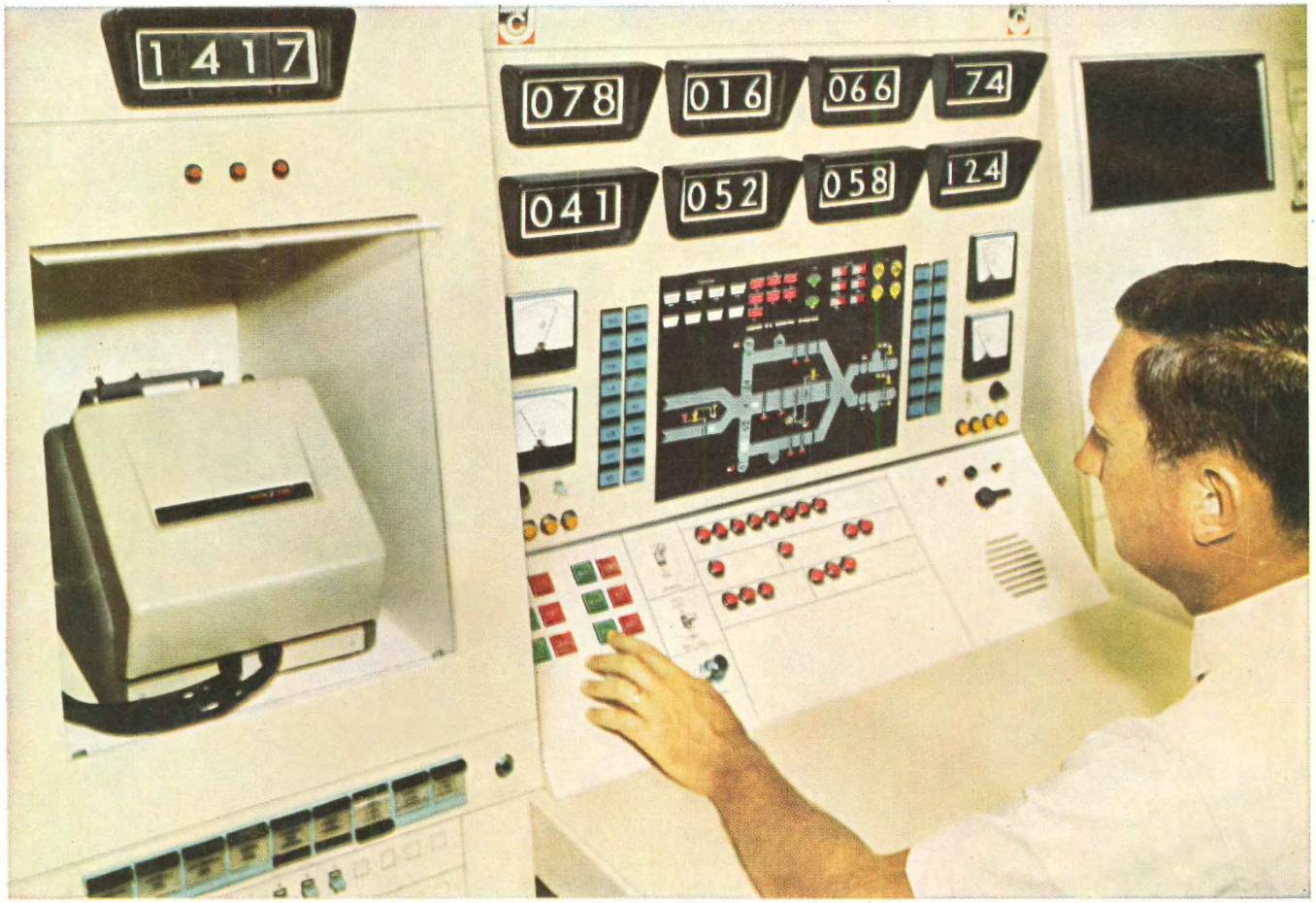

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