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For samples and technical data on Cambrian Vinyl Corlon, write Armstrong Cork Company, 310 Watson Street, Lancaster, Pa. We'll also send you copies of new studies of comparative use costs of resilient flooring versus carpet. One presents data compiled through independent research by the Wharton School of Finance and Commerce, University of Pennsylvania. Another, "A Fresh Look at Flooring Costs," is based on 113,000,000 square feet of floors installed in commercial and institutional buildings. For personal assistance on any flooring need, contact the Armstrong Architect-Builder-Contractor Representative at your Armstrong District Office.

Specification data on Cambrian Corlon: composition: vinyl chips embedded in translucent vinyl surface, on foamed vinyl, Cushioncord backing. Gauge: nominal .175". Surface properties: excellent impact and indentation resistance (200 psi); good resistance to grease, chemicals, alkalis.

Available in: 8 colorings, in 6'-wide rolls up to 75'long. Installation: above, on, and below grade. Cost: \$1.35 to \$1.50 sq. ft. installed.



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Progressive Architecture ® October 1966

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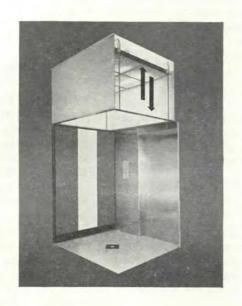
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VIEWS

Some Psychedelic Comments

Dear Editor: Your cautiously unsigned article, "LSD: A Design Tool?" in the August 1966 P/A, could be easily ignored as a sensationalist sop for architectural impotence. All the clichés in the English language, so generously employed, cannot prevent the conclusion that "there is really no thinking process involved" in this store-bought creativity, and that no amount of LSD, mescaline or P/A will make silk purses out of "a mass of protoplasmic jelly."

What is less hilarious and impossible to ignore is the devastating effect your irresponsible, medically blatantly incomplete invitation to "a delightful experience" will have on architectural students. In the time-honored escape from jaded middle-aged frustration, you celebrate in your Editorial the flaming youth that will revolutionize design to a point where it "will finally join the ranks of humanity." But these creatively pregnant "jazzy, oppy, poppy, teenyboppers" (dear God!) are sold by you into the sickest, most destructive and most permanent drug slavery imaginable because the natural restraints of fear and guilt have been removed. It is a criminal misuse of your influence to advertise conceptual shortcuts (at three bucks a journey) to the slow, painful and self-achieved integration process of designed vision with pragmatic reality. Architecture has nothing whatsoever to gain from "the glow of (synthetic) spring mornings," from "the feeling of being separated from other people and the physical environment," "the losing of structures one functions with," or the "midwife quality" of neurologically destructive "facilitators." No one objects if you enjoy "swinging (P/A in your free hand) from a tree with a lot of other people . . . all pretty much simian."

But I for one am appalled and disgusted that such double-talking nonsense is added to the already alarming confusion of the next generation of architects.

SIBYL MOHOLY-NAGY Professor of Architecture Pratt Institute Brooklyn N.Y.

[If Mrs. Moholy-Nagy had reacted with less emotionalism and used a more reasoned objectivity instead, she might not so easily have imputed motives to us that do not exist. We are not advocating selling architectural students into drug slavery, any more than "we enjoy swinging from a tree with a lot of other

people." These are Eric Clough's words, not ours. The way in which Mrs. Moholy-Nagy has used the quote unhappily characterizes the distorted reading she has given the whole article. Obviously, we were not "inviting" anyone to "have a delightful experience," but merely reporting the facts. Finally, Mrs. Moholy-Nagy's implication that an interest in the younger generation represents a "time-honored escape from jaded middleaged frustration" suggests that she may have reached a stage in life where an ability to identify with the young, the new, the vital has passed sadly out of reach.-ED.]

Dear Editor: LSD: A Design Tool? was one of the finest and most objectively written articles I have read on LSD.

ARNOLD WOLMAN Chicago, Ill.

Dear Editor: I really feel you did a marvelous job on a difficult subject. Most of the articles I have read so far contained much misinformation lacked scientific basis, and tended to sensationalize the subject.

> HENRIK BULL San Francisco, Calif.

Dear Editor: The "sketches by architect Eric Clough of art center designed under the influence of mescaline" are barely distinguishable from the design for an art center made by Le Corbusier in 1910, and published as his first architectural design in the Gesamtes Werk. This does not invalidate the euphoric argument that "any copying of or taking directly from any past age or any other culture is ludicrous, meaningless, and has no validity in a fresh design approach," but it does suggest that Le Corbusier's Complete Works are just as inspiring as a dose of mescaline, without inducing delusions of grandeur or harmful aftereffects.

Professor Architecture, McGill University
Montreal, Canada

Dear Editor: Re your article on LSD in the August issue.

As a student of architecture, I was extremely pleased that you had the foresight and progressive attitude to include this article, which is certainly of great interest to those students and practitioners who are indeed in tune with the times.

I was prompted to write this letter because I am sure you will receive much mail expressing opposite sentiments.

However, as long as journals of your stature exist as relatively free spirits (not being intimidated by the powers that be), there is still hope that the art of architecture will not decline. Thank you again for your awareness and curiosity. You serve well those architects who are still creatively-oriented, though the number be few. How sad!

RICHARD SWIFT CAMPBELL Syracuse, N.Y.

Stereotyping the Establishment?

Dear Editor: In your August Editorial, why have you stereotyped the extant Establishment, the Original Avant-Garde, now the Old Guard of Design, into guilty disgrace with your mighty editorial frown? Do you condemn them all?

Who Designs America? Mass intuitive generation or divinizing of new waves of design ideas is a concept categorically denied by history itself.

Your official declamation that rockand-roll dives, with their relaxed atmosphere and their piercing electronic sounds, are the fountain source of modern design inspiration, is appalling.

Having seen habitués of such "Cultural Centers" perform their blank-faced marionette-like rituals, we assume that such entranced individuals have taken leave of the reality of our world, rather than vice-versa.

The inference is that our artificial economy has developed such sophistication that an artificial reality must be generated to balance it, plus an artificial culture to define it, and with an artificial oppy-poppy-boppy language to explain it.

The critical substance of your August Editorial does not come through as pertinent to the subject matter of the conference itself. Such gatherings are 90 per cent social, 5 per cent organizational, and 5 per cent spiritual food. To expect more is to be hypercritical.

JOHN W. LEDFORD V'Soske San Francisco, Calif.

Robert Durham Clarifies His Campaign Platform

Dear Editor: Thank you for reporting my election as president-elect of The American Institute of Architects in the August 1966 P/A. The quality of your reporting, however, should leave P/A's face red. Regardless of the reason for my election, "sweetness" was not one of my campaign platforms.

"Sweet Old Bob," as most AIA members know, refers to Robert H. Levison of Clearwater, Florida. The quotation you used in your report was from remarks by Sam Krusé, newly elected director from Florida, in making Levison's nomination for vice-president. He, as well as a host of architects from both Florida and elsewhere, can testify that Bob has earned the title SOB through years of service to AIA and its chapters. I may

Continued on page 10



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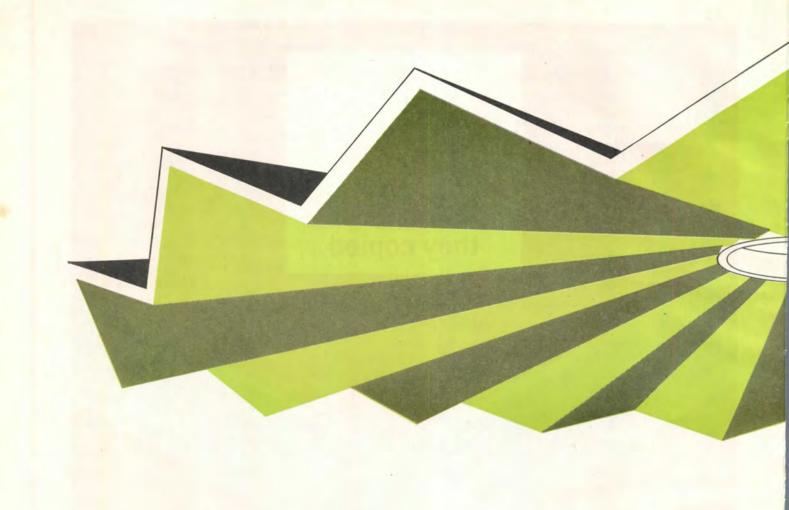
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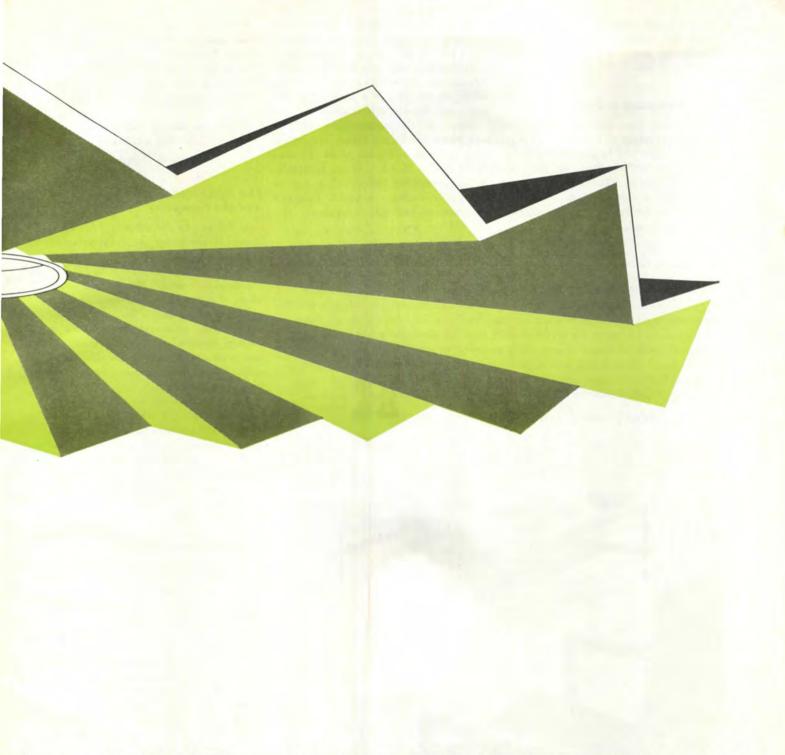
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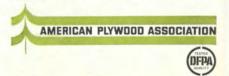


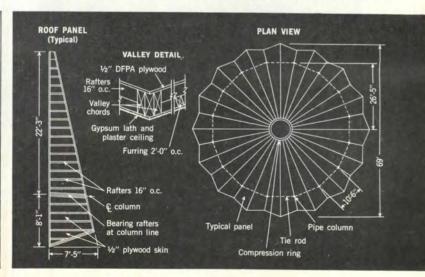




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Continued from page 6

strive for sweetness during my regime, but in the meantime there is only one Sweet Old Bob.

ROBERT L. DURHAM Seattle, Wash.

Just Following a Trend

Dear Editor: How well deserved is your excellent coverage of the design by Howard Barnstone and Eugene Aubry of our new offices in New York (p. 160, Au-GUST 1966 P/A). The architects came forth with a daringly simple interior that reflects the spirit of Schlumbergersober and dynamic.

We do not, unfortunately, deserve your . . . with a discriminating collection." Schlumberger, in all its 250 offices throughout the world, owns but three works of art. One is a large Magritte, which has become our trademark.

Almost all the masterpieces that furnish 9-to-5 life in our offices are rented from the loan collection of St. Thomas University, in Houston, or are borrowed. A "discriminating collection" is due to the discriminating eye of St. Thomas's chairman of the art department, who selected the works.

As do many corporations, we use flattering description as "art wealthy, rather than possess works of art. Rental, such as from the New York Museum of Modern Art, is not expensive. Nor is the purchase of 18th- and 19th-Century engravings, and of contemporary litho-

> Thanks for all the compliments, but we're just following a trend.

JOHN DE MENIL Schlumberger Limited New York, N.Y.

The Specifications Writer And the Computer

Dear Editor: In the August 1966 P/A, Harold Rosen writes about the necessity of introducing computers "or some less sophisticated type of search unit" into specifications work. He is concerned about the tremendous accumulation of information and says, "Reliance on the human mind to absorb and commit to memory thousands of bits of information and to recall this data is virtually impossible. Filing cabinets are likewise becoming inadequate."

As a specifications writer, I have direct experience of what he is talking about. But I think he is ignoring certain facts about the building industry. Only now, thanks to the CSI format, has the industry standardized on names for components that it uses. This is still a long way from standardizing the design of those components. It is only when that stage is reached that the use of computers will become practical.

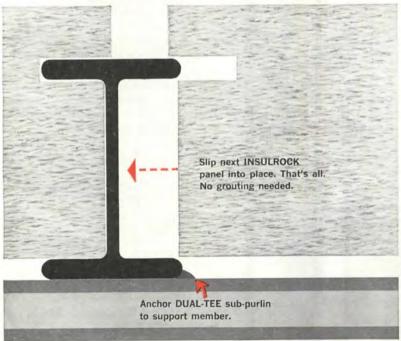
In the interim, the average architect will have to live with his filing cabinets. However, a change from the old AIA Standard System to one based on the CSI format should be made. Let me illustrate why with one typical example. In the old AIA system, "Dockboards" are filed under 35-i-1.41. In the CSI format, this equipment would be filed under "Loading Dock Devices" in Division 14. For all practical purposes, this would put it under 14-L, using the first letter of the name as suffix. In the same system, "Monorail Systems" would be under 14-M.

The difference between the complexity of the AIA number and the CSI number is significant. It illustrates the distance we are traveling in rationalizing the building industry. The CSI format lists all industry components under 16 divisions, which can be memorized. Division 14 of my example covers all Conveying Systems and includes all such "which utilize power to transport people or materials." (The words in quotes come from the CSI people. I admire their grand objectivity.) The old AIA system, on the other hand, has 41 divisions, which, because of the arbitrary nature



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of some of them, were hard to memorize. Then, too, it got very tangled up, as the example I have given illustrates. Note that there is a whole number, then a letter, then a whole number followed by a decimal. But this system was the best available for many years and credit should be given to Theodore Irving Coe of the AIA, who developed it. He must have spent sleepless nights wondering how to list new products within the categories that he and the others had devised. In his time, much was said about the "building industry" that didn't square with reality. An activity becomes

an industry only after it has been rationalized, not before. By the same token, only a rationalized activity can use computers. In our semirationalized state, we shall have to continue with filing cabinets as rudimentary data processors, supplemented by our poor old overstrained memories.

Also, there is a need to simplify the catalogs we put in our files. On a catalog, a photograph of a young girl standing in a cornfield alongside slabs of metal is a wonderfully incongruous, existentialist Madison Avenue device for jolting our attention. But young girls are in a

natural category; metal catalogs are in a CSI Division. *Vive la difference*. Young girls should not be placed in a file drawer.

> ALAN MATHER Detroit, Michigan

R. M. Hunt at the Metropolitan Museum

Dear Editor: It was good to see the piece on Hunt and the Tribune Building (p. 57, July 1966 P/A). I wish, however, you had mentioned one of the last things Hunt did in New York-the entrance, "great hall," and grand staircase at the Metropolitan Museum. The present Fifth Avenue front of the Metropolitan is about 1000 ft long, and the central portion of 300 ft was built around by McKim, Mead & White. The contrast of the portions is quite strong. Hunt is very Beaux-Arts, in what must have been by then an oldfashioned way, with very broad, low archways, tremendous ressaults (meant to hold trophies), and Corinthian capitals and other details odd in proportions or odd in themselves-the whole being naive, brash, and highly effective when seen from up or down the avenue.

McKim, Mead & White were doubtlessly obligated to subordinate their wings, but you get the feeling that they could not approve of Hunt's ideas of relief and proportions, and were only too happy to construct effective terminal masses clothed in a Corinthian order of the utmost blandness to echo and possibly tone down the central theme. In any case, I think that Hunt provides a very pleasurable experience, and I would suggest that visitors to the Metropolitan make a leisurely approach on foot in order to get the benefit of it.

Incidentally, the Tribune's tower now under demolition looked exactly like the one in your old photo. I conclude that when the new floors were built, the upper stonework was simply raised, Abu-Simbel fashion, to the new level, somewhat to its detriment.

WALTER C. KIDNEY Brooklyn, N.Y.

The Ell Center: Deserved Recognition

Dear Editor: I enjoyed your article on the Ell Student Center (July 1966 P/A). From your opening euphemism to the last photograph, it was excellent. As a 1966 graduate of Northeastern, I am very happy that the new student center, and hence the university, has been accorded recognition in the form of a feature article in your journal. Northeastern needs and deserves such recognition almost as much as it needs and deserves more buildings like the Ell Center.

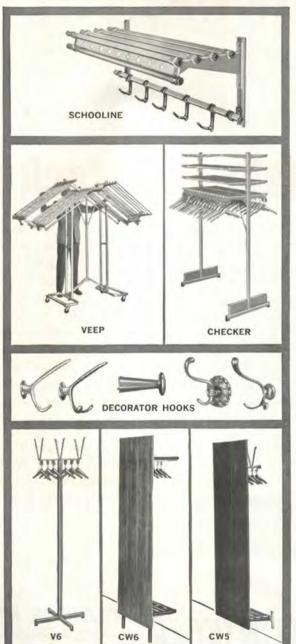
I have used nearly all the facilities in Continued on page 16



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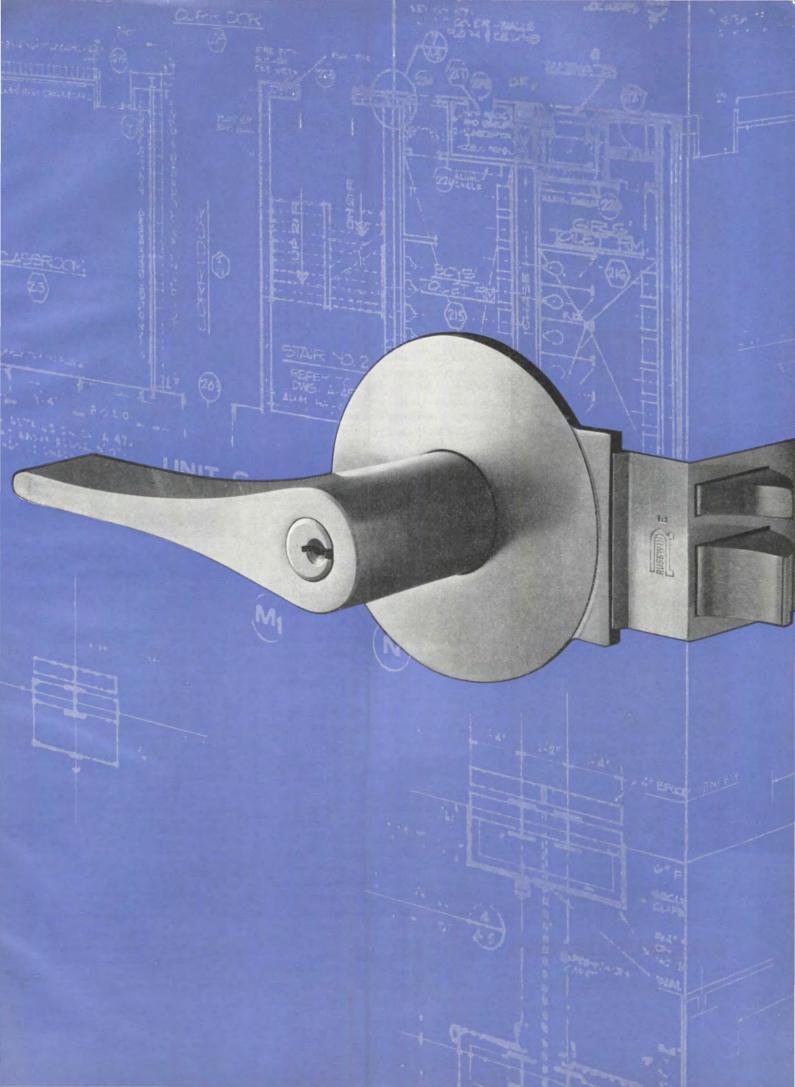
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Continued from page 12

the student center, and I don't believe I am far from the student consensus when I say that it is a refreshing departure from the unimaginative monoliths which surround it. I hope your just article may help somewhat to turn that departure into a trend at Northeastern.

JOHN H. LONG

Tongue-in-Cheek Editorial

Dear Editor: I threw something lovely away today and it came right back. It was my wife. But then she always does, for no good reason.

I have read Jan C. Rowan's Editorial in the June 1966 P/A. I quickly adopted a tongue-in-cheek attitude, volunteered at the recruiting station in The Playboy Club for the war on ugliness, but was promptly rejected for what looked like an habitual case of mumps.

Like the classic Red Skeleton's TV Christmas program, the New Year's Eve dropping ball on the Times Building, and a Sousa summer in Central Park, Rowan's tongue-in-cheeker should perpetuate itself each year and forever.

MICHAEL J. BEECHER Beecher Associates Jericho, L.I., N.Y.

Tax Exemption And the Church

Dear Editor: My attention has been called to an enlightening article on p. 151, June 1966 P/A, dealing in part with the tax exempt status of churches.

I should like to make it clear that our trustees have never taken a position opposing the exemption of worship places from real estate tax. We have, however, definitely positioned ourselves in regard to the existing exemption from the corporate profits tax for the "unrelated business" of churches. We regard this as an inequity within the business community and are opposed to it.

I should say, too, that we have done considerable study in the matter of tax exemption for church property.

C. STANLEY LOWELL Associate Director
Americans United for Separation of Church and State
Washington, D.C.

A Footnote to the Germantown Planning Study

Dear Editor: Your recent article "Taking the Cure: Some Case Histories" (June 1966 P/A), while informative, interesting, and useful, does contain certain errors in connection with our Germantown Planning Study, done for the Philadelphia City Planning Commission:

- · The book Historic Germantown was written by Harry M. and Margaret B. Trikcom and Grant Miles Simon.
- · We were neither retained by nor paid by the Redevelopment Authority. Our

Continued on page 20



SYMONS STEEL-PLY FORMS GANGED AND LINED



Gerace and Castagna, Manhasset, New York, contractor; Warner, Burns, Toan and Lunde, architects.

Hofstra University, Hempstead, Long Island, recently constructed a new library tower which expanded their facilities three times.

Four 140' high mitered and tapered corner shafts, poured in place, form the library design base. To form these corner shafts, Symons Steel-Ply Forms were assembled in 11' x 15' x 20' gang sections, and lined with Spruce and Pine, 4" wide and varying in thickness. A rough finish was obtained by staggering the varied thickness boards, and by intermingling circular saw cut boards.

Symons Forms were chosen because they could be ganged and hold an irregular mitered shape. Also, careful formwork construction was essential to insure that the texture of the roughsawed lumber butt-joined pattern showed. The mitered corners, which have a 11° angle, were formed with Symons hinged corners. Two gang sections were joined with the corner and a 2" steel filler to complete the formwork. Finishing was easy because Symons Gang Form Ties with their posi-tive breakback and a .225 diameter, left small tie holes which were easy to fill.

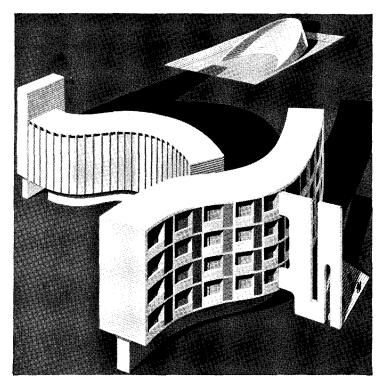
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Note how it serves this modern school interior. Because the lighting layout possibilities are virtually limitless — as you can see from these photographs this ceiling can be perfectly tailored to the functional requirements of any room.

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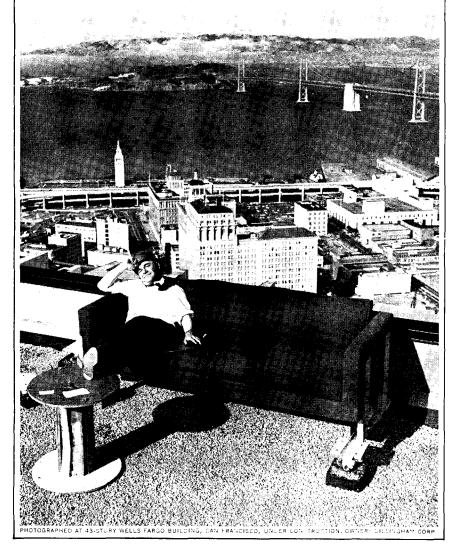
"What's a nice sofa like you doing in a place like this?"

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Continued from page 16 client was the Philadelphia City Planning Commission.

- The Victorian museum is not yet open. What did happen last year was that the Germantown Historical Society initiated a financial campaign to restore a fine Victorian mansion and convert it into a museum of the period. (As chairman of the committee, I must regretfully report that we are still very far from the \$200,000 we need before we can restore the building and open it as a museum.)
- While it is true that, at the outset of these projects, my associate was Preston Andrade, representing the firm of Wright. Andrade, Amenta & Gane, later in the work Andrade went to India and withdrew from the study. However, his firm did continue with John F. Gane as my associate for this project.

HENRY J. MAGAZINER Philadelphia, Pa.

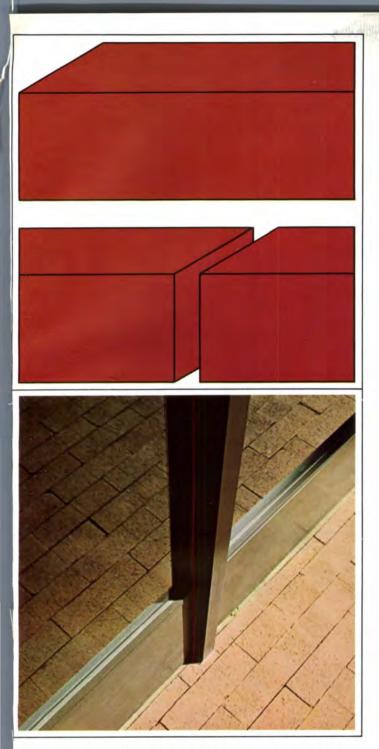
Neglected Consultants?

Dear Editor: We have been subscribers and readers of your magazine for some years and have appreciated your efforts to improve the standards of architecture in this country. There is, however, one area where we feel you are not fulfilling your function, and that is your practice of not naming consultants to architects or naming only the major ones (traditionally the structural and mechanical engineers). Admittedly, we are not disinterested in our complaint, since we were the acoustical consultants to the Northeastern Student Union, which you reviewed in the JULY 1966 P/A without including a complete list of consultants.

But we are not prompted solely by our need for publicity. Your readers have also been deprived. The effectiveness of a consultant's contribution is really gaged by the lack of evidence of it in the architects's whole design; the general public should not be aware of it. To paraphrase a Space-Age proverb; "If all goes well, it is an architectural achievement; if not, it is an engineering failure." Thus it is only the professional critics, such as editors of architectural magazines, who can supply the recognition any craftsman needs for incentive, and also supply the architects with information as to which consultants are performing successfully and which not. And the size of the consultant's fee does not necessarily reflect the importance of his contribution to the over-all success of the project.

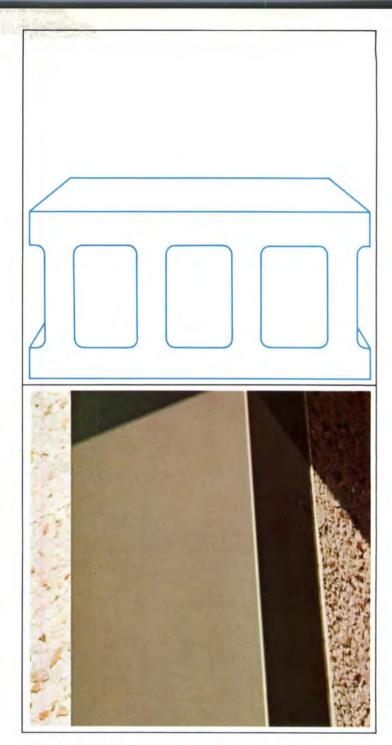
We realize that the task of crediting the many consultants an architect employs is not easy, since their areas often overlap.

Continued on page 30



The sun glares on, scorching the strong, regimented brick patterns. Duranodic finishes, creating fascinating design and color variations with the brick surface, riumphantly withstand the tarnishing effect of sunlight.

Duranodic 300 finishes are particularly well-suited to continuous exposure; they resist punishing salt air and spray conditions in coastal regions; and hold up under the barrage of the most contaminated ndustrial atmospheres.



The walls of the city cool as the intense sun begins to lower. Duranodic finishes blend naturally with the oblique patterns of concrete, absorbing the quiet shadows of night.

Duranodic 300 finish is the most recent refinement of Alcoa's finishing experimentation. Its predecessor, the Alumilite* hard-coating process, is still used when there is a need for an extremely hard, dense anodic surface of superior abrasion resistance. Duranodic finishes retain these qualities of toughness and combine them with improved design and texturing capabilities.

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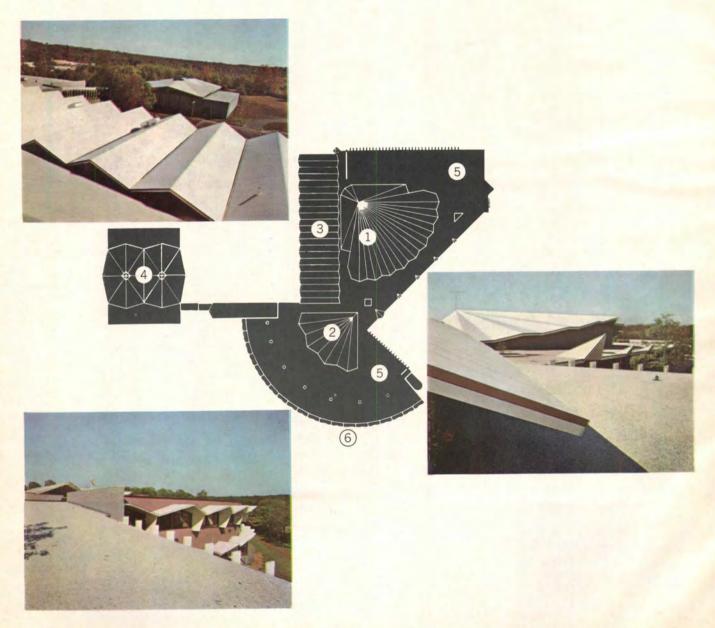
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Roof design declared in



independence Connecticut

Johns-Manville roofing materials meet unique needs of Coleytown Junior High School-Joseph Salerno, Architect.

The Coleytown school in Westport, Connecticut, illustrates the new freedom in roof design—with the new generation of built-up roofing materials from Johns-Manville. Here's how advanced J-M roofing products were used with imagination in this functional modern design:

J-M Last-O-Roof® was the choice for the fan-shaped folded plates over the auditorium (1) and the library (2); for the roofs of the arts and crafts rooms (3); and the octagon roofs (4) of the detached gymnasium, Last-O-Roof is a single-membrane plastic elastomer roof. It adapts to practically any roof configuration and can be used on practically any slope. Application is fast because the membrane and cements arrive ready to use, require no on-site preparation. The roof is finished with a reflective coating of Last-O-Lume®-white here, but also available in colors.

J-M Gravel-Surface Roofing was used on the flat roof area (5). It's built up with Johns-Manville base and finishing felts, plus a flood coating of the J-M bitumen, Aquadam®, and a white gravel topping. Here the gravel surface contrasts attractively with the



gleaming Last-O-Roof surfaces that rise from the flat areas.

J-M No. 80 Flexstone® Roofing covers the "eyebrow" sunshades (6) over classroom windows. The top ply in this asbestos roof specification is No. 80 Flexstone cap sheet. Its felts are 85% asbestos fiber, so they are actually flexible coverings of stone. These asbestos felts are asphalt-saturated, then asphalt-covered, then firmly embedded with a layer of ceramic granules. No. 80 Flexstone can be furnished in white or in a variety of colors.

J-M Last-O-Flash® was specified for all of the flashings. This is a heavy polyisobutylene film embedded with woven glass fiber for extra toughness. Developed as a component for Last-O-Roof, it can also be used with other

roof specifications at parapets, eaves, vents, skylights, even as a throughwall flashing . . . in fact wherever flexible, durable flashing or waterproofing material is required.

You may not need the variety of roofing materials and specifications used for the Coleytown school. Or all of the other versatile roofing services available from Johns-Manville. The important thing is that they're at your disposal, offering you complete freedom in the design and construction of any roof. Explore the possibilities in Catalog BU-165A. For your free copy, write Johns-Manville, Box 111, 22 East 40th Street, New York, New York 10016.

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Continued from page 20

For instance, your article on the Northeastern University Student Union refers to well-handled acoustical treatment but points out the noisy ventilation equipment. Our commission did not include a review of the mechanical engineer's selection of diffusors or sound traps for the possibilities of high noise levels or cross-talk. Often the architect leaves this aspect in the mechanical engineer's hands, with the result that defects an acoustician would detect go unnoticed.

We sincerely regret the necessity for writing a critical letter, when in other respects we applaud your article and the magazine in general.

KLAUS KLEINSCHMIDT Senior Engineer, Cambridge Acoustical Consultants Cambridge, Mass.

Dear Editor: In your article on the Chelmsford Junior High School (JULY 1966 P/A), you neglected to mention the following consultants: Structural Engineers, Souza & True; Mechanical Engineer, Leo J. Crowley; Electrical Engineer, Vern Norman; Landscaping, Laurence Zuelke.

ELIZABETH FITZGERALD The Architects Collaborative Cambridge, Mass.

Hospital Design: Consulting the Nurse

Dear Editor: Today, with the increase in building hospitals and nursing homes due to the increased demands for beds, little or no consideration is given to planning of these buildings.

They are not planned hospitals and nursing homes, just a series of rooms with labels attached. Each doctor is only interested in the area where he works, and in the end he comes up with his usual complaints.

The administrator is not a nurse and knows little about daily nursing care duties. Therefore, his planning is highly concerned with money and what he can get to show for it.

The important person on the team, the one who will use this hospital or nursing home, is the nurse who tries to do her best with all the errors.

If an architect planned business buildings as poorly as he does hospitals he would soon have to change his line of work. This is a specialized field and should be improving with each new institution, but many of the same mistakes are made time after time.

A nurse experienced in planning and management should be on the team from the first day. The architect who will consider a nurse's opinion when planning a nursing home or hospital will find that he has built the "better mousetrap."

MILDRED L. HARVEY Escondido, Calif-

Freedom to plan imaginatively... with versatile Southern Pine



Architects: Desmond Miremont & Associates.

The modern applications of Southern Pine laminated beams, decking, siding and paneling open new dimensions for design creativity. Here, in this striking library foyer one immediately senses a promise of tranquility and permanence. The inspiring sweep of maximum spans achieved by the high stress value of Southern Pine affords unique and economical planning latitude.



Architects: Marshall M. Burton & Associates
Pre-shrunk to full American Lumber Standard sizes, Southern Pine provides stability and precision essential to engineered construction, as in this country club. Standard grades can be utilized for cantilevered and continuous members without special grading.



Architects: Roberts & Barksdale, A.I.A

In this church, you see how the warmth and beauty of Southern Pine create a truly spiritual feeling in contemporary setting. Its enduring qualities provide economy for today's modern construction programs, with extremely low maintenance cost assured through the years.

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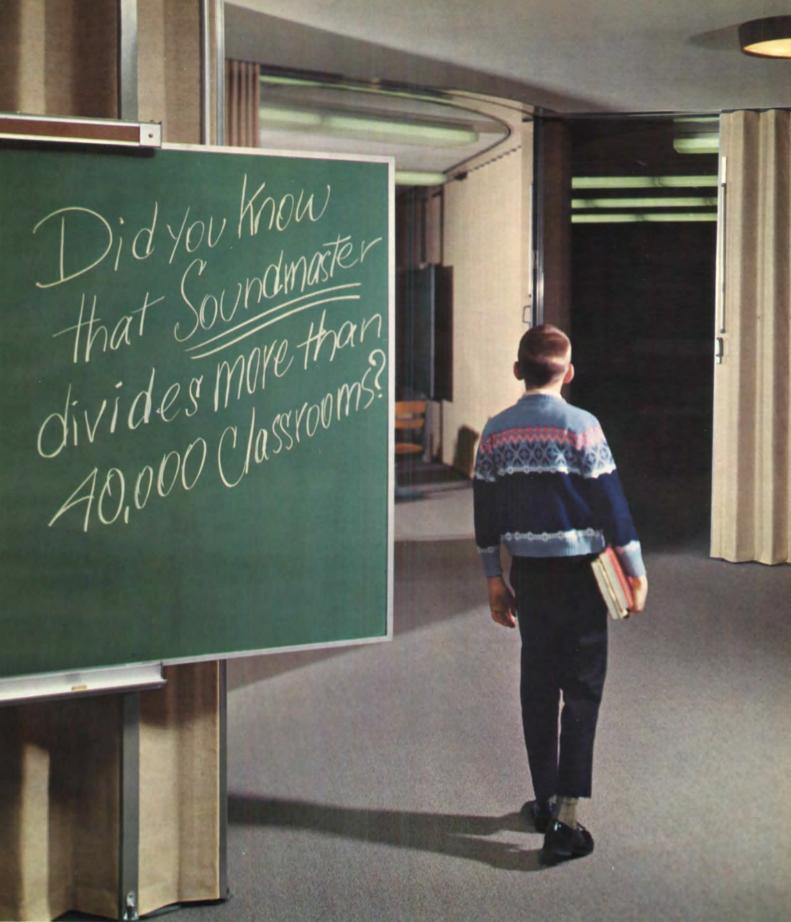
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Soundmaster Installation: Kelvin Grove Elementary School Lockport, Illinois

Architects: Alexander, Borkon, Westphal & DeYoung Joliet, Illinois



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*Sound Transmission Class 51—Geiger and Hamme full scale 14'0" x 9'0" test (ASTM E90 61T) compared to all published data available

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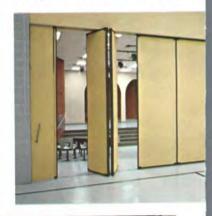
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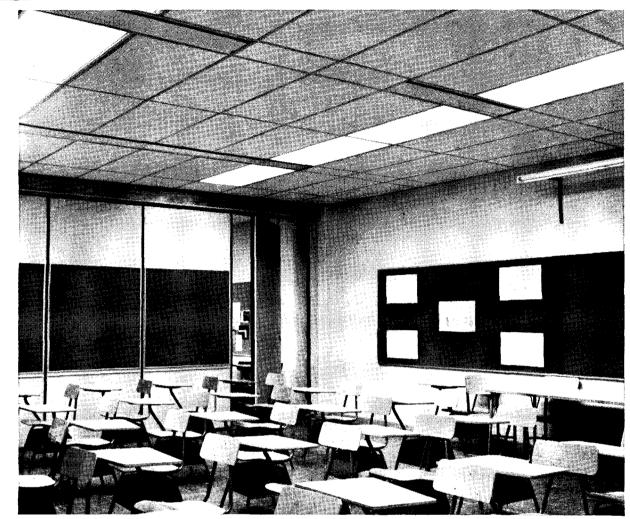
COIL-WAL—A giant coiling wall of wood for subdividing gymnasiums, auditoriums, and other large areas.

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NEW CASTLE PRODUCTS, INC

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Classroom of Randolph Junior High School, Montgomery County, Maryland.

Architect: Burket, Tilghman, Nelson Associates. Consulting Engineer; H. Walton Redmile Associates.

Will you step into this classroom for a moment, please?

We'd like to call your attention to two things.

One that you can see: our new Carrier Moduline® Ceiling Air Terminals with automatic self-contained temperature control.

And the other you can't: a new kind of air conditioning system using the Moduline units in a Dual Conduit System[®].

Classroom walls can be folded back to create a large team teaching area. Yet expansion or contraction of teaching space poses no problems for the Carrier Dual Conduit System with Moduline units because of its inherent modular air distribution and control.

The Moduline units provide Randolph Junior High and other schools with a space-saving all-air system that heats or cools in each module at the command of a built-in thermostat. Operating costs are low because it always "follows the load," taking full advantage of diversity afforded by unoccupied areas.

Moduline units also make possible a very simple variable-volume *single duct system*. It is ideal for economical automatic temperature control in office

buildings and hospitals. Control zones as small as 100 square feet are highly practical. Partitioning modules may be as small as 25 square feet.

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We've covered both systems in detail in a brochure that illustrates many attractive ceiling arrangements achieved by architects using Moduline units.

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Architect: Bruce and Parrish AIA and Glenn Quincy Johnson AIA; Engineer: John A. Bedingfield & Associates; Structural Engineer: Matthew Bodo; Steel Fabricator: Coastal Steel Construction Co.; General Contractor: Earl Lamb.



Architect: John F. Lipaj Associates; Engineer: R. M. Gensert Associates; Steel Fabricator: Republic Structural Iron Works; Steel Erector: Tri-County Erection, Inc.; General Contractor: Dileno Construction Co.



Architect: Pope, Kruse & McCune; Engineer: L. H. Doane Associates, Inc.; Steel Fabricator: Pilgrim Steel Company; Steel Erector: Erectors, Inc.; General Contractor: William C. Ehret, Inc.

Look what they're doing with steel framing for schools these days

Azalea Junior High School Pinellas County, Fla.

This 1,000-pupil junior high was designed with a steel frame, and low bid was well within the budget. Steel framing also helped speed construction: the school was occupied only 10 months after the contract was awarded.

Arlington Elementary School Parma, Ohio

Taking advantage of the flexibility of steel design, the architects came up with this steel-framed school-in-the-round. Each room has its own entrance from outdoors, and the classrooms are exceptionally spacious as well as attractive.

Thomas McKean High School Wilmington, Del.

Steel's flexibility is strikingly exhibited in the hexagonal steel pods which make up this functional design. Each pod contains six classrooms. The design led to economical fabrication of steel because of repetition between pods. And the overall effect is unique.





Architect: Pharo & Haas Architects; Engineer: G. Edwin Pidcock Co.; Steel Fabricator: Bethlehem Fabricators, Inc.; Steel Erector: Posh Construction, Inc.; General Contractor: William P. Doall, Inc.

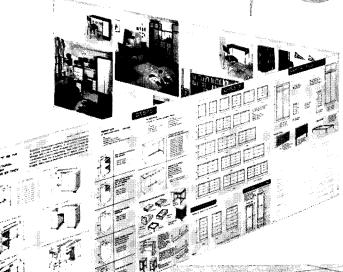
East Hills Junior High School Bethlehem, Pa.

Steel framing in the roof structure gives this gymnasium completely column-free space below. Separated from the rest of the junior high school, the gymnasium is an attractive structure on its own. Folding doors inside increase the usefulness of the main floor.

Many advantages are yours when you build with steel: economy, freedom of design, adaptability to difficult sites, ease of future expansion both laterally and vertically, low maintenance over the years.

BETH EHEM STEEL





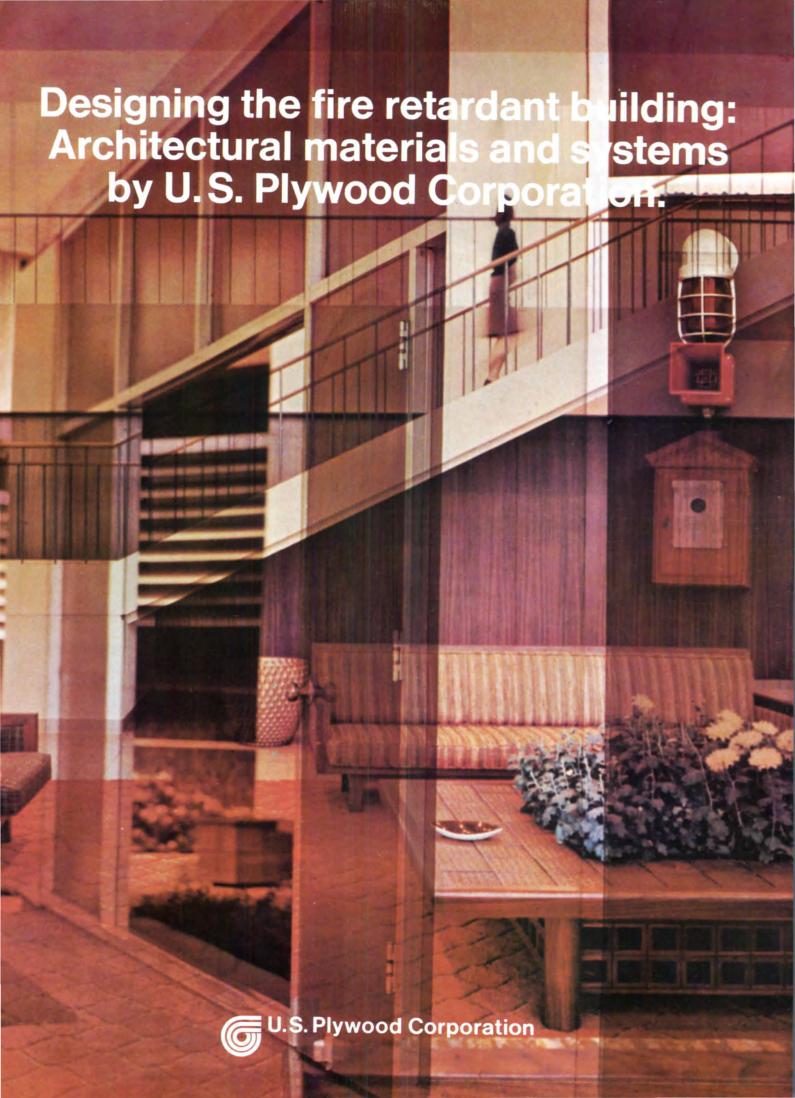
See how versatile it really is. Send for our new color brochure. You'll see why we call the System '70 Architectural Dormitory Furniture line our "Big Package"... how easily you can custom tailor its standard components to specific dorm requirements. Wardrobes, desks, chests, study carrels, chairs, tables and headboards—all are covered in eight colorful pages of dimensional drawings, general specs and installation photos. Write The Troy Sunshade Company, Division of The Hobart Manufacturing Company, Troy, Ohio.



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Do fire codes cramp your style?

Feel free to design an office lobby in rich, rare English brown oak architectural paneling. Or in avodire, zebrawood, paldao, teak, or walnut. Mix or match your grain patterns. Specify any finish of your choice, or choose from our clear Permagard® or colorful Permacolor® dry film finishes.

Work in a movable wall system if your requirements demand. Or use Flexwood® for wood paneling on a curved wall, or an extra tall or long one. With wood-faced doors, or vinyl, paint, or plastic-surfaced ones.

And let color—the permanent, weatherproof, flat inorganic color of Glasweld®—add impact and accent to your building exteriors.

Feel free. Then come to U. S. Plywood for the architectural materials and systems to execute your designs. We'll supply them and see that they comply with the particular building code having jurisdiction, wherever you're working.

So there. There's really no reason to let fire codes cramp your style.



Weldwood 8' 1" fire doors with plain sliced American walnut faces and Weldrok® cores. Office of the president, Martin E. Segal & Co., Inc., New York. Arch: Van Summern & Weigold, N. Y. Inst: W. J. Barney Corporation, N. Y.



Glasweld window inserts. Robert Morris Junior College dormitory, Moon Township Campus, Pittsburgh, Penna. Architect: Tasso Katselas. Gen'l Cont: Navarro Corp., Pittsburgh. Inst: Columbia Architectural Metals Co., Pittsburgh.





Weldwood® teak faced mineral core movable walls and matching storage units. Reception area, American Dental Association, Chicago, Illinois. Architect: Graham, Anderson, Probst & White, Inc., Chicago. Inst: Woodwork Corporation of America, Chicago.



Blueprint matched Weldwood fire retardant architectural English brown oak paneling in lobby and auditorium of world headquarters of INTERPACE (International Pipe and Ceramics Corp.) Parsippany, N. J. Architects: Smith, Smith, Haines, Lundberg and Waehler, New York. Cont: White Construction Co. Inst: Schroeder Bros., Union, N. J.





Weldwood movable walls and storage units: book-matched teak faces on mineral cores. Conference room, American Dental Assn., Chicago.



U.S.Plywood Corporation

Zebrawood Flexwood, Executive House, Bronx, N. Y. Des: Emily Malino Associates, New York. Inst: Kalflex, Inc., New York.



Specification details of Architectural materials and systems by U.S. Plywood Corporation

Name			
Firm			
Title			
Address			
City	State	Zip Code	

6. 2. 7. 3. 8. 4. 9. 5.

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U.S. Plywood Corporation, Dept. PA 10-66, 777 Third Avenue, New York, N. Y. 10017

- 1. Weldwood® architectural doors: Information on a complete line of standard construction doors and special purpose construction doors, factory finishing, fitting, machining, detailing, facings, guarantees.

 2. Weldwood architectural paneling: Specifications and grades, veneer selection and matching, cores, finishes, coordinated products.
- 3. Weldwood prefinished paneling: Specification information, grade description, recommended installation and design usage for the full line of prefinished
- 4. Weldwood guaranteed sidings: Specifications, features and variety of designs, finishes, installation details, guarantees for a full line of sidings.

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- 6. Weldwood Movable Walls and partitions: Design and structural specifications, maintenance and cost studies for a variety of both standard and custom de-

signed wall systems.

- 7. Micarta®: Technical and application information, color selection, pressure decorative laminates made by Westinghouse, distributed by U. Plywood Corporation.
- 8. Glasweld®: Description of properties, color and pattern choice, installation suggestions and examples, guarantee, and specifications for an exterior grade inorganic panel with a permanent finish.
- Weldwood Flexwood*: Wood selections, dimensions, fire rating specifications, and installation details for a completely flexible wood veneer and backing ap-plicable to almost all surfaces, curved and flat.
- 10. Weldwood preservatives and finishes: Product and specialized use description for Weldwood preservatives (Woodlife®, Penta®, Stormy Weather®, Rainchek®, and Woodhealth®) and Weldwood finishes (Color Tones®, Deep Finish Firzite®, P.A.R.®, Patiolife®, Satinlac® and White Firzite®).

Weldwood architectural paneling in a variety of fire retardant constructions offer the architect unlimited freedom in designing natural wood and colorfully prefinished walls. Constructions include 1/4", 3/4", and 1" panels with mineral cores for Class I requirements (0-25 flame spread) and treated wood cores for Class II (26-75 flame spread) and Class III (76-200 flame spread) installations. Dry film Permagard® and Permacolor® as well as custom wet finishes may be specified.

Weldwood movable walls are offered in 5 different systems that permit the architect to select faces from a full range of domestic and exotic architectural hardwoods produced on fire-rated Weldrok® core. These are approved by the Board of Standards and Appeals for use in New York City. Also approved by the Uniform Building Code. Wet or dry film finishes may be applied at the factory. High-pressure laminate, paint, and vinyl surfaces are also available.

Weldwood fire doors are hardwood and plastic laminate faced for Class II and Class III openings. They are labeled by Underwriter's Laboratories, Inc., for 11/2-hour, 1-hour, and 34-hour. Doors can be supplied premachined for hardware, pre-sized for the opening, and prefinished in either wet or dry film finishes to meet your requirements.

Glasweld is an exterior grade, steam-cured, asbestosreinforced, incombustible panel with a permanent allmineral enamel coating. It is available in 24 standard colors, It is strong, weatherproof, economical to install, and requires a minimum of maintenance.

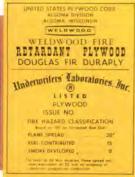
Flexwood is fabric-backed veneer available in more than 80 of the world's most desirable woods. Applied to an incombustible surface such as plaster, it requires no fireproofing. The use of Flexwood is permitted without restriction by the Administrative Building Code of New York City under provision C26-667.7b and C26-721.0b and approved by the Board of Standards and Appeals under Calendar #637-49-SM.















FUEL CONTRIBUTED SMOKE DEVELOPED





Multiply Billy Edwards by 48,800,000

to measure



the challenge of school construction

Figures on school enrollment are only part of the picture.* Education today is a living, changing thing. The idea is to equip Billy Edwards for his own future—not for his parents' past.

Doing this job calls for new concepts in school design—concepts made possible with *prestressed concrete*. Teaching space must be quickly changeable in size and shape. A gymnasium this evening may be four lecture halls tomorrow morning. The *most adaptable* schoolhouse is the *best schoolhouse* since education

must meet changing needs and accommodate sophisticated teaching aids with multi-purpose space.

Now, school planners bring wide-open spaces *inside* as the long-span muscle of prestressed concrete invites them to forget about space-wasting columns. At the same time, this truly 20th century material points the way to impressive economies in speedily erected, fire-safe, quality schools.

See your local PCI member for details on the use of prestressed concrete in schools.

Send for your free copy of ''PRESTRESSED CONCRETE—applications and advantages'' and selected literature on prestressed concrete in schools.



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* Public and private school enrollment, first twelve grades, 1965—1966 school year, is 48,800,000. Enrollment will increase 400,000 annually through 1975.—U.S. Office of Education.



DAVIS, California
Architect:
Gardner A. Dailey, FAIA, & Associates
Engineer:
T. Y. Lin, Kulka, Yang & Associate



AMBASSADOR COLLEGE Pasadena, California Architect: Peter J. Holdstock Engineer: Johnson & Nielsen



HENRICO HIGH SCHOOL Richmond, Virginia Architect: J. Henley Walker, Jr. AIA



PARSONS RURAL ELEMENTARY SCHOOL near Salina, Kansas Architect & Engineer: Anderson—Johnson AIA



ACADEMY OF THE HOLY ANGELS Demarest, New Jersey Architect & Engineer: J. G. Phelan and Associates

New facts on Gas vs. Electric Heat

Eight Pennsylvania schools are bid both ways.



The comparative figures at the right tell the story of the actual alternate bids. First costs of Gas and electric heating are virtually the same. And the operating economy of Gas heat made it the choice in 7 out of the 8 new Pennsylvania schools.

This study is not an isolated case. Far from it. The Better Heating-Cooling Council has data on 32 pairs of bids from four other states. Figures show Gas first costs actually averaging 2.4% *lower* than electric resistance heating.

Interested in school heating costs? Now you have a double reason to consider Gas. Its economy has been proven, initially and over the long term. Your local

Gas Company Sales Engineer can tell you the full story. See him soon.

AMERICAN GAS ASSOCIATION, INC.

For school heating...Gas makes the big difference

Result:

no basic difference in first costs. Gas heat is chosen for operating economy.



	TOTAL CONSTRUCTION BIDS				
Location, Name of School	Square Feet	Gas	Electric (Resistance)	Date of Bid	System Installed
Monroeville (South Jr.)	104,000	\$1,580,700	\$1,636,300	July '60	Gas
Claysville (Findley)	14,000	205,633	204,173	July '59	Gas
Claysville (Blaine-Buffalo)	14,000	216,459	217,725	July '59	Gas
Claysville (South Franklin)	4,600*	96,952	95,938	July '59	Electric
Mount Morris (Perry)	18,000	267,285	270,132	Jan. '61	Gas
Westmoreland Co. (West Point)	39,071	729,620	715,666	Apr. '63	Gas
North Braddock (Fairless)	17,000	345,279	348,679	Apr. '61	Gas
Plum Boro (Holiday Park)	35,000	5 30,790	522,970	Dec. '61	Gas
a Padition					



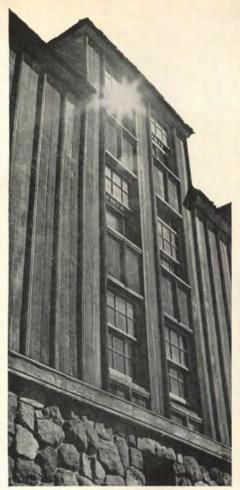
Timberline Lodge (left) sits at the 6,000-ft. level of Mt. Hood, about an hour from Portland, site of the 1968 A.I.A. National Convention. Winters are long and harsh. Its exterior board and batten (large picture right), the stairway (top center), the hand-hewn exterior columns (lower center), the interior beams above the main lobby (top right), and the hand-carved door (lower right) are all Western Wood Products. All suggest Timberline's massiveness and durability.

Timberline Lodge has weathered 29 winters, 100-mile winds,

25 ft. snows,

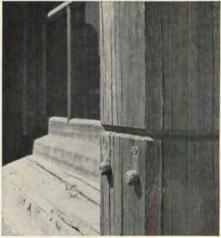
and 8½ million

tourists.











It's easy to tell when wood's new. But try telling the age of old wood. Especially Western Woods. Like the Douglas Fir and Ponderosa Pine in Timberline Lodge.

A significant influence on Pacific Northwest architecture, Timberline is massive, graceful, compatible with its environment. And needs little maintenance.

Designed by a team of architects, the lodge was built in 1937 primarily of native woods and stone. It's the height of an eight-story building (96-ft.), has some 50,000 sq. ft. of floor space, and holds 173 guests plus staff. It also provides facilities for thousands of daily skiers, hikers and sightseers.

How has it held up?
Here's what A. P. DiBenedetto,
Forest Service architect, Pacific
Northwest Forest Range Experiment
Station, Portland, Oregon,

and the man responsible for maintaining Timberline's architectural continuity says:

"Sometimes I wonder if
Timberline will ever wear out. Not
that it never needs maintenance. It does.
But it's surprising how little it
needs when you consider that it
wasn't designed for anything like the
tourist traffic it gets."

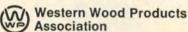
What wears so well at Timberline is the Western Wood. There's quite a bit of it: 7-ton, hand-hewn columns of Ponderosa Pine; beams, purlins, decking, and exterior of Douglas Fir; knotty Ponderosa Pine paneling in the rooms.

And according to Mr. DiBenedetto, "As the years go by, the wood in Timberline grows richer in texture and color.

"Structurally, Timberline's interesting, too. Take the roof and ridge system. The whole thing deflects slightly under the heaviest snow loads. And as the snow melts, the roof line returns to its original position."

The lodge was designed by Project Architect William I. Turner, Linn A. Forrest, Dean E. R. Wright, and Howard L. Gifford. Ward W. Gano was Structural Engineer.

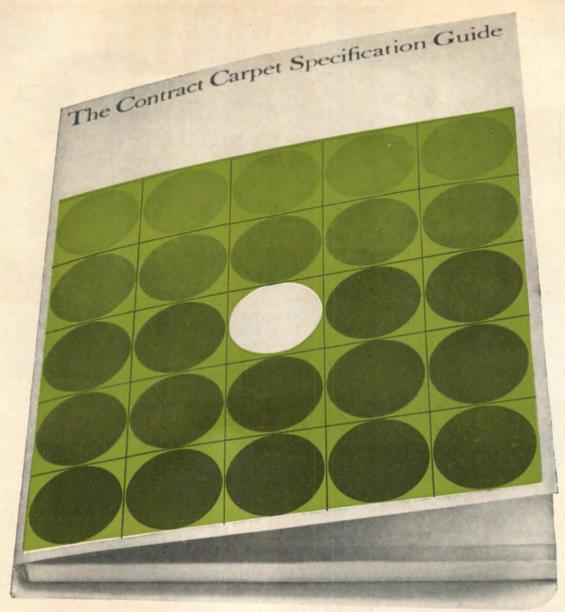
When you specify materials, consider the many advantages of Western Wood Products. Especially when you want durability. You can't be delicate and resist 29 winters on the slopes of 11,245-ft. Mt. Hood.



Portland, Oregon 97204

You'd never know it.

A. P. DiBenedetto, Forest Service Architect, Pacific Northwest Forest Range Experiment Station, Portland, Oregon.



BALONEY-BUSTER

This Trend folder contains no flowery carpet words, no soft carpet sell.

It just gives you the straight scoop on contract carpet specifications like pitch, gauge, and density. It tells how they relate to the ultimate performance of the carpet. And explains why economic factors like tax depreciation may affect the type of carpet you specify. Naturally, we also include a few of our own carefully engineered specifications for your inspection.

Why do we want you to be fussy about specifications when a lot of other guys are just trying to sell you good-looking carpet? Because specification selling is what made us America's fifth largest carpet manufacturers in only five years.

When we get a chance to show you what we can deliver, and at what price, we almost always beat out the other guy. And if you think *that's* baloney just try us.

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The Contract Carpet Specification Guide.

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Company
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Zip Code



"We design 'ALL-AIR' systems for office buildings because ...

"... our experience on buildings of the American Management Association type indicate a savings up to 20% in the heating, ventilating, air conditioning contract when compared to the perimeter induction and interior air system" says S. E. Kallet, Chief Engineer and Associate of Sidney Barbanel, Consulting Engineers, New York City.

"Also, an overhead 'ALL-AIR' dual duct system supplemented with perimeter radiation provides many advantages for the owner, architect, tenant and mechanical engineer."

The owner benefits because:

"The basic building first cost is lower with an 'ALL-AIR' overhead system throughout with supplemental radiation opposed to a perimeter induction unit system with an 'ALL-AIR interior zone which satisfies a basic prerequisite for the office building market."

"We are able to design a base building heating, ventilating, air conditioning system with extreme flexibility."

"Operating costs are saved by using 100% outside air for the intermediate seasons."

"Maintenance costs are lower and the flexibility of a dual duct system permits owner to satisfy tenants with varying space usage.'

The architect benefits from an aesthetic standpoint because there are no protruding perimeter units to interfere with interior space design or drapery arrangements.

The tenant is offered a wide choice of zoning, partition, and private office layout.

Mr. Kallet also says the Mechanical Engineer benefits because:

"Adequate ventilation rate throughout is readily attained and noise control is easier to effect with a total air system."

"From a load flexibility standpoint, the total 'ALL-AIR' system can handle any magnitude of load by simply introducing additional air."

"Maximum design flexibility can be achieved for perimeter and interior since any individual space can have its own mixing box and ther-

"And there is no problem meeting code requirements for conference rooms, meeting rooms, cafeterias in connection with supplying the proper quantities, etc., of outside air.'

For additional information on S. W. Barbanel's approach to the 'ALL-AIR' split-system, write Connor Engineering Corporation for "A Dual Duct Approach for Office Buildings." Danbury, Conn.



Emery Roth & Sons: Architect Raisler Corp:, Mechanical Contractor

Member of Air Diffusion Council

Sidney E. Kallet



CONNOR



LIONS GATE HOSPITAL, North Vancouver, B. C. P&L products used: Vapex Wall Primer, Lyt-all Double Duty Primer, Lyt-all Stippling Eggshell, Vitralite Enamel, Eggshell, Effecto Enamel, House Paint, Vapex Masonry Paint.







SIMON FRASER
UNIVERSITY SCIENCE
COMPLEX, Burnaby, B. C.
Vancouver, Architect. P&L
products used: Primafil,
Vapex Wall Primer, Lyt-all
Double Duty Primer, Lyt-all
Stippling Eggshell, Lyt-all
Flowing Flat, Tonetic Wood
Stain, "38" Pale Trim
Varnish, Alkatite Cement &
Stucco Paint.



RICHMOND SQUARE SHOPPING CENTRE, Richmond, B. C. Dundee Developments, Ltd., Developers; John H. Hanson, Vancouver, Architect. P&L products used: Primafil, Vapex Wall Primer, Vapex Flat Wall Finish, Effecto Enamel, Vapex Masonry Paint, Verdura, Exterior Rustic Stain.



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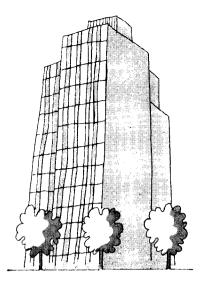
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Is this in store for your new building15 years from now?



Statistically speaking, the average building needs to be remodeled at the tender age of 15. Tenant space requirements change constantly. Utilities demand renovation as they become more sophisticated. Office machines place new demands on the building. If your building isn't designed to accommodate basic structural and service changes, it can become obsolete almost overnight.

Anticipate change in the initial design by insisting on steel. Steel floors and columns can be beefed up to carry heavier loads. A steel frame can be modified to accept additional floors. New wiring

and ductwork can be installed in steel floors and walls. Steel partitions can be moved to suit changing space requirements.

By contrast, it may be so expensive to alter some other types of construction that it frequently isn't worth the cost. Or a completely new building at much greater cost is the only way out.

A USS construction representative will be glad to detail how you can plan for change with steel. Contact him through our nearest sales office or write United States Steel, 525 William Penn Place, Pittsburgh, Pa. 15230.



United States Steel: where the big idea is innovation



Conved Lo-Tone enduring Beauty Ceiling products Woodcarved English Tudor paneling detail typical during reigns of Queen Elizabeth and James I. Circa 1590 to 1620. (The Minneapolis Institute of Arts)





beauty that endures

Lo-Tone Fissura Ventilating Ceiling Tile, a simulated travertine marble, adds to the beauty of this distinctive interior.



PROJECT: Chateau Louise Motel
LOCATION: Dundee, Illinois
ARCHITECT: Larsen-Wulff & Associates, Inc.
GENERAL CONTRACTOR: Moyle Construction Co.
ACOUSTICAL APPLICATOR: H. L. Wolf
and Associates

beauty that endures

. . . combining classic design with effective air distribution throughout this restaurant

Selecting a ceiling to complement the beauty of this rich old English decor-while contributing to a modern air distribution system—was the challenge in this fine restaurant. The ceiling that met the need was Lo-Tone Fissura Ventilating Acoustical Tile—a classic pattern simulating travertine marble, and engineered to integrate with the heating and air conditioning system. Lo-Tone ventilating acoustical ceilings provide a balanced distribution of cooled or heated air. Unique controllable jet slots permit plenum pressures sufficient to propel air down into the room. Distribution of air is so uniform that drafts, temperature variations, air stratification, diffusers, even dirt-soiled areas are virtually eliminated. Because of high acoustical efficiency, the ceiling provides an elegant solution to noise problems, too. Sound is absorbed and sound transmission reduced with Lo-Tone acoustical ceilings. There is, in fact, hardly a ceiling problem that can't be solved with Lo-Tone products. Lo-Tone ceilings are available in Class A, non-combustible and FR (Fire-Rated) types. When used as a component of



approved structural design. FR types have a listed U.L. fire rating—protecting against flame passage and heat transmission. They often provide economy by eliminating the need for intermediate fire protection above the ceiling. Still other Lo-Tone ceilings are vinyl coated for washability—an important feature in clean-room areas, computer rooms, laboratories and kitchens. Lighting products are easily integrated with Lo-Tone ceilings. A variety of CONWED translucent panels and lighting fixtures will meet most design and installation requirements for the ceiling you select.



FISSURA

Ceiling solutions come easy with Lo-Tone products.* For full facts and ideas, see AIA File No. 39-B in Sweets. Product samples are available from your local Lo-Tone Acoustical Contractor. Consult the Yellow Pages or write Wood Conversion Company, St. Paul, Minnesota 55101.

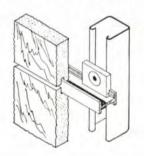
*International Testing Laboratories, a subsidiary of Wood Conversion Company, can help you with any acoustical evaluations you may require, Write for details of facilities, equipment and rates.



REMODEL WITH MARBLE AND SAVE

with the new Zibell system for anchoring thin veneers

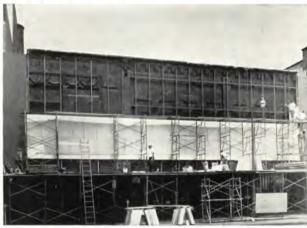
A unique arrangement of metal struts and special fastenings that provide support and anchoring for marble as thin as 7/8", creating a weather-proof wall with or without structural back-up. That's the Zibell System — for interiors and exteriors, for remodeling or new construction. It offers



substantial economies in construction and affords the architect new design freedom in working with marble, the finest of all facing materials. May we send you the complete details?

WRITE FOR OUR NEW BROCHURE ON THE ZIBELL ANCHORING SYSTEM

ROBERT P. BYRAM, Architect



In remodeling work, the Zibell struts simply bridge over the projections and recesses in the old wall, obviating much costly remedial work. A Zibell installation is comparatively



light which can be critically important in remodeling old structures whose footings and walls might not support the weight of many of the other popular facing materials.

COAST TO COAST CONSULTING SERVICE
Our staff of engineers stands ready to assist you on
any project involving the use of marble or limestone.
A phone call will put one of our men across the
desk from you in a few hours.



11 Pryor Street, S.W., Atlanta, Georgia 30303



Designer: Pietro Belluschi in collaboration with George M. Ewing Company, Architect
Construction Management: Turner Construction Company (Rohm and Haas served as its own general contractor)

You might have to play the waiting game for a taxi, your laundry, or a haircut.

But not for Haughton Computer-Controlled Elevators at the Rohm and Haas Building.

There's no "hurry up and wait" for elevator service at
Philadelphia's magnificent new Rohm and Haas
Building. The fully-automated Haughton elevators
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It puts cars where the people are. On the double.

Precision electronic systems constantly monitor building traffic from top to bottom, and dispatch cars on a regulated basis to meet traffic needs at any moment of the day or night. Even during rush hours, when demand for service peaks, calls are answered with incredible speed.

The unique Haughton electronic control system is an advanced development of our continuing program in Elevonics.* Let us show you how it can improve service, save time for tenants and visitors, and cut elevator costs.

Your Haughton representative will gladly assist you with design counsel, technical advice or any information you might need in planning new buildings or modernizing existing ones. Call him soon, or write us for complete information.

*Haughton's advanced program in systems research and engineering, with specific emphasis on the creative application of electronic devices and instrumentation for betterment of systems design and performance. Reg. U. S. Patent Office.





The office is never routine

when the decor projects a frame of mind ...
for example, this I-Frame series
from Hugh Acton. A design concept which
embodies a look of elegant
simplicity tells even the casual
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Reineman is psychologically sound.

Beautiful, comfortable and inviting; it works psyche-soothing wonders in any office situation. Buttonless, tufted upholstery and the soft sheen of lustrous metal combine with the Reineman modular concept to make this newest collection from Burke your surest way to winning decor.



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PANEWS REPORT

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

October 1966

CHAGALL MURALS STEAL SHOW AT MET



NEW YORK, N.Y. As openingnight patrons entered the new Metropolitan Opera House at Lincoln Center (see this month's P/A OBSERVER), they had two things to look at besides other patrons: to the right of what is called the grand staircase, above a restaurant area, is "Les Sources de la Musique" (above), a 30' x 36' mural painted by Marc Chagall; to the left, over the bar, is his "Le Triomphe de la Musique." Unfortunately, because of the narrow space, these can be seen only by craning one's neck, and then only in distortion. It matters little, for with their bright

colors and movement they lend joy to a building that needs it. Writing in The New York Times, art critic John Canaday commented that apparently those who commissioned the murals were more interested in Chagall, who is now 80, than in what he would paint. "Chagall in return has given them an excellent summary of his virtues," wrote Canaday. "If he has repeated himself, it makes little difference. Few people have anything so agreeable to repeat, and virtually none of us who have anything to repeat will still be repeating it so happily when we are octogenarians."

The bulk of their raw material is available practically anywhere, in unlimited quantities, since, according to company estimates, one-third of the earth's surface and subsurface soils are suitable as raw material. The earth is prepared by blending, grinding, and heating. Binder and additive are also heated, then mixed with the earth. Esso claims that the structural qualities, freeze-thaw properties, and moisture absorption of their blocks are comparable to those of conventional materials. Its advantages include smooth surfaces and close tolerances that permit use of a special mortar. This mortar, a polyester-base, noncementitious adhesive, is more easily applied and can do the job with smaller quantities than conventional mortar. It can be applied with an ordinary paint-roller, and results in a fine, hair-line joint with a strength at least equal to the block itself. This technique results in substantial savings (up to 25¢ per sq ft, according to a company spokesman) in both labor and mortar costs.

A conventional cementitious mortar with polymeric additives may also be used.

Blocks are compaction molded and heat-cured. The end product has an inherent black color, not unattractive, which, if the block is well made, will weather evenly to a slate gray. Surfaces require 50% less paint than porous concrete block, the company claims, and need only one coat of gypsum plaster.

Sayre & Fisher Company of Sayreville, N.J., is the first licensee and is producing market-development quantities of the new material. Already the Building Officials Conference of America has approved the block and mortar system.

Obviously, the impact of any new material is uncertain. This product has been tested for only five years. Taken at face value, it would seem a good substitute for masonry units. But perhaps the comparisons are not so clear-cut. In an attempt at clarification, one Esso spokesman told P/A, "Our material has limitations; so do all materials."

EARTH BUILDING-BLOCKS COULD LEAD TO NEW CONSTRUCTION ERA



Building-blocks made from common soil with petroleum asphalt binders may eventually have far-reaching repercussions in the building industry. According to the developers, the Esso Research and Engineering Company, the blocks will cost from 2¢ to 5¢ less than comparable concrete blocks.

PHILADELPHIA COURTHOUSE PLANS REVISED



PHILADELPHIA, PA. Arguments in the "City of Brotherly Love" grew heated over the design of the United States Courthouse and Federal Office Building (see p. 48, SEPTEMBER 1965 P/A). Jointly designed by the firms of Carroll, Grisdale & Van Alen; Stewart, Noble, Class & Partners; and Bellante & Clauss, the buildings are to be located on In-

dependence Mall, only a block or so from Independence Hall. Detractors of the original design were both unanimous and correct in wanting the best possible building for the site. What they could not agree on was why the original design was faulty. Most of the dissent focused on two "ears" — small projections formed by courtrooms cantilevered



Swanson Public Library, Omaha, Nebraska. A.I.A. Merit Award winner. / Architects: Leo A. Daly Company. General Contractor: Peter Kiewit Sons Company. / Photo by Henry F, Kuehl,

Look alikes? Hardly! But both are Mo-Sai® Libraries

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Central Building, Lansing School District Libraries, Lansing, Michigan. / Architects: Kenneth Black & Associates. General Contractor: Sorensen-Gross Construction Company. / Photo by Hube Henry, Hedrich-Bless





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from the building line on two sides of the courthouse.

Preserving the interior plan, which had been highly praised by the Justice Department, the architects submitted revisions both in the façade and site arrangement to the General Service Administration during the summer; the final design was accepted in August.

The building is noticeably improved by the revision. Not only is the façade cleaner and less massive, but the 10-story bulk of the Federal Office Building, linked to the 22story courthouse tower by twin colonnaded walks, balances and offsets the 10-story Rohm & Hass building to the south along the Mall. The courthouse tower rises from a four-story base, which houses services such as the U.S. marshal's offices. It is set back 145' from the street, and, because the site slopes gently about 4' from Arch Street down to Market Street, a low

wall surrounding the site was added, to help define the Federal Plaza. Although both buildings have curtain walls of bronzed steel and glass, the ground floors are walled in Colonial brick, and the courthouse has large, distinct vertical strips of brick. In a way, this ties it visually to the historic buildings in the area, and the tower provides a logical transition between the Rohm & Hass building and the Federal Office Building, lessening the impact of their combined masses.

The courthouse contains 20 district courtrooms, a ceremonial courtroom, three appeal courtrooms, a library, and 40 suites, which overlook the Mall, for the Federal judges. Beneath the plaza will be a parking area for 316 cars. Arriving by car, a judge can park and take an elevator, which delivers him to a private lobby and a corridor leading to his chambers.

Because of the controversy surrounding the early design, the GSA appointed a three-man panel to review the revised design. The panel, consisting of Arthur Gould Odell, Jr., James M. Hunter, and A. Grant Fordyce, was unanimous in its approval. Fordyce made this comment: "Seldom have I seen a design, which was a compromise of too many opinions, suddenly achieve an integrity all of its

own. I believe that you now have a superior building. . . . This is a good demonstration of the integrity and persistence of the architects to solve the problem. . . . The relationship to the Mall is excellent."

According to the GSA, construction should begin in August 1967, with full occupancy expected in February 1970. In all, the 1,565,000-sq-ft project will cost a total of about \$40 million.

BILLBOARDS THRIVE ON CRITICISM

Almost nobody likes billboards except the people who own them and the people who advertise on them. That seems to be enough. In the face of mounting private and public criticism of billboards, the billboard industry announced a 3% increase in gross revenues so far this year. With a healthy income of \$221,500,000 this year, the industry talks of preparing for lean years, as fear of increasing regulations mounts. Obviously nothing succeeds like unpopularity.

COMMUNICATIONS/LECTURE HALL: NEW DIRECTION FOR MASS EDUCATION



STONY BROOK, N.Y. Underway on the campus of the State University at Stony Brook is this lecture hall building, the first of a two-building complex that will also include a communications center. The two structures, both designed by Meathe Kessler & Associates of Grosse Point, Mich., will form a focal point for one section of the campus. They are part of a continuing State University expansion program that will spend a projected total of \$1,300,000,000 on 31 sites throughout New York State.

The lecture hall building, and 12 somewhat similar accommodations on other campuses (the first is being used this fall at the University at Buffalo), are the outgrowth of a study on classrooms done by Allen Green and Morton Gassman under a grant from the Ford Foundation's Edu-

cational Facilities Laboratory. It will contain 12 lecture halls and two classrooms, grouped, in this case, around a central lounge area, and will be used by all the academic disciplines located in this general area of the campus. Most of these rooms will contain windows for rear-projection movies or TV showings. When completed in 1968, 1300 students will be able to attend lectures at one time.

The building is a two-story, windowless, monolithic structure whose concrete base and walls were cast in place over a metal grid of repeated diamond patterns, which are nailed to wooden forms. Once the concrete had hardened, the grid was hammered out of the concrete, giving the façade a patterned texture.

The communications building, which will shortly go out for bids, will be connected to the lecture hall below grade. "Communications" as taught at Stony Brook will emphasize television. The building will house TV studios, darkrooms, and facilities for originating telecasts to be carried by closed circuit to other buildings on campus, and, eventually, to other campuses in the state system. Also included will be audio-visual studios and facilities for arranging and processing film strips and slide shows.

Within eight years' time, the State University expects a total student enrollment of between 184,000 and 260,000. Eleven thousand of these will be on the Stony Brook campus.

MOTHER NATURE & THE AIA



WASHINGTON, D.C. Long live Mother Nature. Although touted in song and verse, the craftsmanship of Mother Nature has never been formally recognized by mankind in the only way mankind has of marking excellence and noting appreciation: the granting of a formal award.

To fill this gap, the AIA Committee on Institute Honors suggested to the Institute's Board of Directors that Mother Nature be given a Special Craftsmanship Award at the 1966 convention. It was an earnest proposal. But the AIA turned it down.

Speaking for the Committee, Seattle architect Fred Bassetti commented: "When we first thought of proposing Mother Nature, we considered it a joke, but the more we worked on it and collected examples, the more we decided it was serious and hoped the Board would rise to the occasion."

To support their case, the Committee submitted a brochure of color photographs illustrating the works of nature: birds, flowers, water, etc. And they suggested this

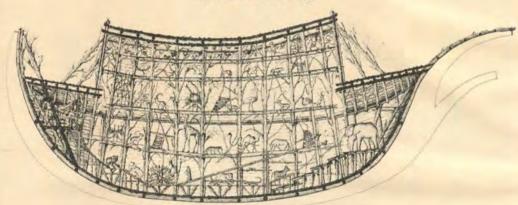
"For her myriad variety of works, unexcelled on earth, reflecting the various conditions of herself and life, responding to the sun and rain, infinite in detail, graceful in the toll of time, an inspiration to all those who call themselves craftsmen, indeed, to all those who call themselves alive, a craftsman unsurpassed, a giver bountiful beyond our capacity to ask;

"For the 1966 AIA Special Craftsman's Medal — Mother Nature. As proxy, this award will be accepted in person by Sophia Loren."

Giving awards to goddesses

is, at best, a tricky thing; and while the Committee is to be commended more for its enthusiasm than for its practicality, no one can quarrel with its choice of the mortal to be the goddess's earthy representative. She would have added a heady note to the AIA convention. She is shown here climbing a ladder from the terrace of her Paris apartment.

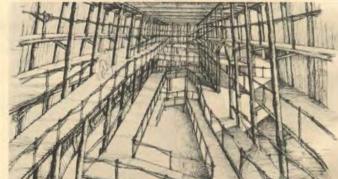
ARK-ITECTURE



HOLLYWOOD, CALIF. "And God said to Noah... 'Make yourself an ark of gopher wood; make rooms in the ark and cover it inside and out with pitch. This is how you are to make it: the length of the ark three hundred cubits, its breadth fifty cubits, and its height thirty cubits. Make a roof for the ark and finish it to a cubit above; and set the door of the ark in its side; make it with a lower, a second, and third decks."

The Lord was fairly specific in granting Noah one of the world's most prestigious commissions. But when 20th Century Fox set out to build a replica of the ark, for its film The Bible, which had its world premiére in New York on September 28, they were baffled; for no plans have survived the centuries. The ark they constructed adhered to the original only in spirit. Actually, five arks were built, the largest of these, measuring 200' long, 64' wide, and 50' high, was put up on the back lot of the Rome studio of Dino De Laurentiis, the film's producer. These measurements made it less than half as long as the original, which measured 500' long, 83' wide, and 50' high; Noah's ark was the largest ship built until the Germans launched the five-





master "The Preussen" in 1902.

Art Director Mario Chiari, who has an architectural degree from the University of Florence, based his design of the ark on the pictures of the earliest boats found on friezes and tombs in the Middle East. But he conceived the ark as growing quite literally out of

the leaves and trees of the forest in which it was built. And although it has gracefully curved lines, it is crudely built, because Noah had no experience as a shipbuilder.

The largest of the four smaller arks was built for interior shots. As Noah had been instructed, it was three stories high, with individual pens ("nests") for the animals. A great ramp circled the interior of the 68'-high model, so Noah and his family could

rector John Huston and his camera to any desired position. The whole effect is of a vast Piranesi interior come to



tend their menagerie. Structured entirely of undressed tree trunks and limbs, its only concession to technology was a ceiling-high well with an automatic elevator, to lift dilife in wood.

In all, the ark cost almost \$1 million, something Noah, whose work was for the love of God, would have little understood.

MODERN PRAIRIE CATHEDRAL





ROCKFORD, ILL. So far, four years of design planning have gone into the proposed cathedral for the Rockford Diocese of the Roman Catholic Church. Most of the work has centered on the preparation of a plan that would fit the revised liturgy, and the architect — Brother Cajetan J. B. Baumann — and his staff have prepared a 15-page Liturgical Brief, developed from research into current

and historic documents on church buildings.

Brother Cajetan's design gives the cathedral a strikingly contemporary facade, one which he thinks not only appropriate but mandatory. "A cathedral in any historic style, as was the custom until very recently, should be absolutely out of the question," he states. "No, not a Byzantine style, not a Gothic style, nor a Renaissance style, because these

were the modern styles of their day — the 7th, 12th, and 15th Centuries. We are in the 20th Century and the church deserves better than a secondhand rehash of the great efforts of another century."

Located on a prominent, partly wooded site, the cathedral will open onto a broad atrium, thought of as an area of repose from which one enters. No roads will cut in front of it. Both to provide a distinct setting and to define the area clearly, the cathedral will be set on a low, pedestallike platform. A series of steps lead into the low-ceilinged baptistry, which in turn opens onto the ambulatory and the major space of the church (some 96' at its highest point above the raised altar). Here, as Brother Cajetan points out, approximately 1400 parishioners can surround the "bishop in the midst of the church as he opens his mouth in speech and feeds his flock with teaching and with the Eucharist bread."

On the exterior, the church roof flows down from a central arch 135' high. Sixteen ribs of reinforced concrete will support the fluted roof elements, and both the concrete and the brick bearing walls will be exposed inside and out. Slanting to the ground behind the arch, the south wall will have 17 folds. A row of overhead windows surrounds the main section of the cathedral and a series of skylights are cut into each of the folds of the south wall.

Budget for the cathedral is \$2 million. Raymond F. Pavia is associate architect.

THE SEASON IS ART



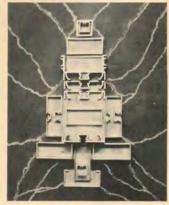
UNIVERSITY PARK, PA. Edward A. Adams, associate professor of art at the Pennsylvania

State University, spent five years perfecting a wind structure - a tower of 81 polished aluminum rods arranged in two concentric circles, anchored at the base and open at the top. Although he has only a 12' model now, he envisions a wind tower rising 40' swaying in the breeze. "The idea of the wind structure occurred to me when I was asked by a church group to design a bell tower," Adams explains. "From the beginning, I felt that sound could inherently be a part of the tower, but it was not clear to me how it could be done." The sounds that come from Adams' tower would depend on the strength of the wind, and he is considering trying to control these sounds by varying the length of the tubes.



NEW YORK, N.Y. As a little girl, Ruth Maria Kilby was fascinated by light coming through bits of colored glass. She still is. But since about 1946, she has indulged this fascination by fashioning picture-sized paintings in fused glass. The photograph above, while showing some of the variations in texture and brightness seen in her creations, gives none of the depth and richness and, of course, none of the color. Working directly in glass, without the aid of preliminary sketches, she builds layer by layer, using a sometimes bewildering array of shapes and sizes — chunks of glass, strips of glass, sheets of glass, chips of glass, crushed glass. Although her early work was representational, mostly landscape, it is now entirely abstract. All pictures are backlighted. Her work is on display through October 22 at New York's Bodley Gallery.

NEW YORK, N.Y. Don S. Lewis is an art gallery owner in Norfolk, Va., who is also an artist. Last month, Manhattan's Galerie Internationale displayed a collection of Lewis' work. He works in structural materials — metal, plaster, concrete, wood — and gives many of his "cloutages," as he calls them, a patina of colored,



glossy plastic.

Shown here is a 19" x 26" cloutage, formed by embedding an arrangement of sliced aluminum castings in concrete. Lewis calls it "The Great Society" and says the aluminum sections form a Christmas tree. But it could just as well be a computer, or some other symbol of a mechanized society.

ARCHITECTS' TOURS TO THE MIDDLE EAST

"Visit the cradle of our civilization," says the travel brochure. And that is what participants in the Architects Grand Air Treks will do during the fall and winter. The tours, whose itineraries will include Athens, Cairo, Beirut, Damascus, Jerusalem, Baghdad, Luxor, and Aswan, have scheduled departure dates of October 28 and December 16, 1966, and January 27, February 24, and March 31, 1967. United States Travel Agency, Inc., who are arranging the tours, points out that the trips have tax-deductible features for members of the architectural and construction fraternities, in that the tours include a visit to the Aswan High Dam and present the opportunities to meet architects in the various countries. Each touring group will be accompanied by an architectural historian. For further information write: United States Travel Agency Inc., 807 15th Street, N.W., Washington 5, D.C.

COMMUNITY PLANNERS MUST REGISTER IN MICHIGAN

LANSING, MICH. During the summer, Michigan became the second state in the Union to require the registration of anyone who wishes to use the title

of "Professional Community Planner" or "Community Planner." The Michigan law is not as tough as the one passed recently in New Jersey. For one thing, it does not prohibit anyone from doing planning work; he merely cannot use the title "Community Planner" without risking a fine of not more than \$500 or up to 90 days in jail, or both. For another thing, although

the law calls for a registration examination, anyone who has done planning work for six years (up to four of which may be accounted for by academic degrees) can register within the next two years without taking the exam. Furthermore, the act prohibits anyone registered as a community planner from practicing architecture, engineering, or land surveying unless registered.

VICTORIAN RENAISSANCE

CAPE MAY, N.J. In 1960, the population of this small resort town on the Jersey coast was 4477. This was not much more than it had been 10 years earlier, and it has not changed much in the last six. But despite its lack of size, Cape May contains one of the largest assemblages of Victorian architecture in the U.S.

As early as the last part of the 19th Century it was a fashionable resort, but in the intervening years many of the







older structures there have deteriorated sadly. The rundown house shown (1) was once a guest house for the Stockton Hotel, and in the 1890's rented for the season for \$2000. When the hotel was

torn down in 1910, these houses were sold to private owners, and are today in various states of repair.

Under a broad urban renewal program — the Victorian Village Renewal Project
— initiated by concerned citizens and backed by the Federal Government, work is now underway weeding out buildings found structurally unsound and restoring buildings that have historical or architectural significance. All work follows a master plan drawn up by planning consultants Kendree & Shepherd of Philadelphia.

As a first step, the city's Urban Renewal Agency undertook several surveys. One reviewed the historical



4

significance of each structure in the area. Another investigated structural conditions, made suggestions about specific repairs, and estimated costs. Finally, families living in the area were consulted about preferences and finances, and sketches and floor plans were drawn to illustrate changes and detail costs.

When the project has been completed, one street will have been turned into a pedestrian mall, a new library will have been built (2), parking will have been provided on the area's periphery, and many homes and several hotels will have been rehabilitated.

Already several homes have been restored (3, 4), and a shopping center constructed on cleared land. A competition is also under way for a motel.

OBITUARY

Carroll Louis Vanderslice Meeks, professor of architecture and art history at Yale University, died in late August in New Haven. He was 59. Meeks, who had degrees from both Yale and Harvard, spent his entire teaching career at Yale, and is credited with much of the development of the School of Art and Archi-

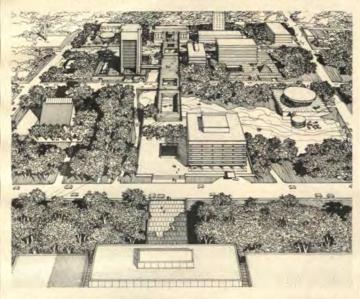
76 P/A News Report

tecture there. He was an authority on the 17th and 19th Centuries, and the author of two books: The Railroad Station and Italian Architecture, 1750-1914. A past president and a director of the Society of Architectural Historians, Meeks was also chairman of the AIA's committee on the preservation of historic

buildings.

A respected scholar, Meeks in recent years came to be thought of as the "Mr. Chipps" of the architectural department. In 1948, he studied in Europe on a Guggenheim Fellowship, and spent the academic year 1951-52 studying 19th-Century architecture in Italy.

CHARLOTTE IS PRACTICAL ABOUT HER BEAUTY AIDES



CHARLOTTE, N.C. Like many cities its size, Charlotte, which had a population of slightly more than 200,000 in 1960, expects to double in size by 1985, and to approach a million by the turn of the century. Because of the foresight of the city-county governments and the planners who work with them, this growth will not be entirely haphazard. Back in 1958, the Charlotte-Mecklenburg Planning Commission selected a site adjacent to the existing City Hall and County Court House for a proposed Governmental Center. The site was largely run down, an area by-passed as the city expanded beyond it; today, these 60 acres have been cleared and graded, as a three-phase program for its development gets underway.

This program was prepared and is being coordinated by the Charlotte firm of J. N. Pease Associates. What will result, if the plan can be successfully guided through the vagaries of political change, will be an area that serves as a focal point for the city's expansion, an area almost as much park as a location for government buildings. In pre-

paring their report, the planners worked with both the Redevelopment Commission of the City of Charlotte and with the Charlotte City Council and the Mecklenburg County Commissioners. These last two groups will implement the plan and provide funds for constructing the buildings. Each body will be responsible for the specific plans for buildings under their jurisdiction.

Briefly, the plan is this. During Phase I, already underway, a jail, a building for a law enforcement agency. and one for an education center will be completed. Date for their completion is 1970. Also by 1970, a raised pedestrian mall will be constructed, linking the County Court House to the north with a parking plaza to the south. According to the Pease plan, the roof of this south parking plaza would become a landscaped mall from which the Education Center would rise. However, the plan details none of the specifics of the buildings; these are left to the agencies who will own them and the architects they hire. In all, parking will be provided for 1500 cars. Streets in the area will be designated and constructed, and, perhaps most important, landscaping will be developed. It is hoped that a lake and two small ponds can be included; indeed, the plan will be drastically harmed if they are not. Feasibility studies on these have not yet been completed.

In Phase II, to be completed by 1985, a new city hall, an addition to the county office building, and a Federal-state office facility will be added. Germane to this phase is construction of a civic and cultural building, which would continue expansion of activities in the area and give it greater use at night. Finally, by the year 2000, a branch library will go up, a county

office building addition will rise from the top of the east parking facility, and the landscaping, including paths and special plantings, will be completed.

As its final recommendation, J. N. Pease Associates call for the establishment of a Governmental Center Commission to establish definite guidelines and controls and see that they are followed. With this commission, which must have a vast store of architectural and civic awareness, will rest the future of the plan and perhaps of downtown Charlotte.

Working with J. N. Pease Associates on the project were Charles DuBose of Hartford, Conn., and Richard C. Bell of Raleigh, N.C.

HERE COME THE TOURISTS!





PITTSBURGH, PA. A fort was probably the first structure you ever worked on. It was before you thought of becoming an architect or engineer. You were probably about five. Forts are beautiful in their simplicity. And they provide a sense of security.

Architect Charles M. Stotz, of Stotz, Hess, & MacLachlan of Pittsburgh, is lucky enough to be working on a fort — or at least the reconstruction of one — right now. He has been since 1947.

Fort Ligonier was built in 1758, during the French and Indian War, as a depot or "post of passage" for the troops of British General John Forbes just before they attacked and took Fort Duquesne, on the present site of Pittsburgh. But by 1766, the wooden fort had suffered the ravages of weather and insects and had to be abandoned.

After archaeological and historical research, Stotz drew up plans for the fort's restoration, and a portion of the stockade was put up in 1953. Since then, Stotz has made two trips to England (in 1961 and 1965) to look for engineering drawings of the fort made in 1758. He found three sets, and work is now going on with virgin white pine timber,

treated for preservation. Completion of the entire fort is scheduled for 1967.

Paul Mitchell, a Latrobe,

Pa., architect, is local representative for Stotz, Hess, & MacLachlan. The contractor is Moyher & Schultz.

THE DESIGNING CINICIS



School of Architecture.



The library wing.



An interior view

ANKARA, TURKEY. In 1923, when Kemal Ataturk, the founder of modern Turkey, made Ankara the capital of Turkey, it was a small town of about 25,000 persons, clustered around a fortress. It now has 800,000 inhabitants, who are more attuned to the theaters, concert halls, and opera in the city than to the citadel, which still stands above it.

With the construction of the Middle East Technical University on open land outside the city, Ankara gains a valuable cultural addition.



An interior view.

The University design stems from a 1961 competition won by a husband-and-wife architectural team, Altug and Behruz Cinici, who are supervising construction. One of several buildings now in use is the School of Architecture (shown), which provides classrooms, offices, library, and auditorium for 600 students and faculty. From any one point on the outside, it is im-



View from the entrance court-

possible to read the building as a totality; it is a multi-faceted structure whose constituent parts and details only reveal themselves gradually as the viewer moves around it. On the interior, the floor plans consist of many cul-de-sacs sprouting from a central finger of courtyard, entrance hall, and faculty offices. Writing of the building, the German magazine Baumeister commented: "The construction of the School of Archi-

tecture is perhaps so interesting because here the additive principle has been carried much further than it was by Paul Rudolph in his architecture building at Yale University. There, too, the outer structure is a mountain of layers, cuts into the surface, etc., and the inner construction is equally labyrinthine, but a labyrinth made of a sequence of coherent rooms. On the contrary, in Ankara, single rooms hang on the end of this net of halls; everything works like a centrifugal system of dead ends connected to the outer world by the thin thread of the main entrance." Yet the plan in Ankara is much more logical than the one at Yale, the spaces more open, while being equally full of surprises; on the other hand, the exterior concrete work is less plastic, more repetitively rigid.

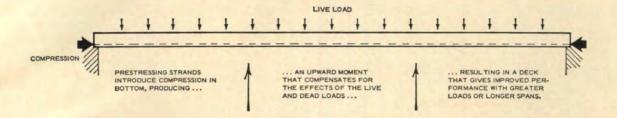
Behruz Cinici is a 34-yearold architect trained at the Technical University in Istanbul. His projects include shopping centers in Ankara and Istanbul, a business center, and two large office buildings. Although attracted by design rationalism, Cinici expresses himself in buildings that are far from static; and although his heritage is Eastern, his style is heartily Western.

A PYLON TOO FREQUENT



GLENDALE, CALIF. Probably the most striking aspects of the recently completed Municipal Services Building here are the four massively spreading pylons that hold it 21' above street level. At the same time, this stiltlike arrangement merely lets a passer-by see beneath the building to parking lots and streets beyond. The landscaped interior courtyard, which, with its

elaborate fountain, might have alleviated this view, is sunken below grade. From a distance, the three upper levels, with their white concrete precast curtain wall panels, may be striking enough to hold one's attention. Taken by itself, it is a diverting building, and is especially appropriate in its striking design, for it will house city departments whose responsibilities include



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-, 10and 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 134 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.

building, engineering, planning, zoning, and publicworks administration. Architects for the 55,000-sq-ft building were Merrill Baird and Albert C. Martin & Associates. Total cost was \$1,800,-000.

ARCHITECT HERO OF TV SERIES



NEW YORK, N.Y. With the advent of the new television season, only one regularly scheduled series has an architect as its star. It is ABC's "Love on a Rooftop," starring Peter Deuel as the "apprentice architect" and Judy Carne as his pixie-like wife. In the opening episode, the architect meets his wife-to-be by dropping his ham sandwich from the second story of a construc-

tion job into her pocketbook ("Pardon me, you have my lunch"). Once married, they take up residence on the top floor of a San Francisco building, in an apartment with no windows. This lack of architectural perception is covered by a story line that ignores architecture and makes the "apprentice architect" into the earnest befuddled male that all TV husbands must be.

AWARDS GO TO SEVEN MEDICAL CLINICS



san diego, calif. Seven medical clinics were honored for their architecture last month in an awards program sponsored jointly by the AIA and the American Association of Medical Clinics. It was the first time such a program had been held; and because the building type — a structure designed for the group practice of at least seven physicians — is relatively new, medical clinics built in the U.S. since 1960 were eligible.

The McFarland Clinic in Ames, Iowa, won the only First Honor Award. It was designed by Crites & Mc-Connell of Cedar Rapids for the group practice of 20 doctors. In part, the jury comment said: "The well-organized plan is particularly noteworthy for the efficient arrangement of the central core of laboratories and services with the offices and laboratories around the perimeter. Each office looks upon a private and pleasant terrace, which adds interest by light and shade to the exterior design."

Six other clinics received Awards of Merit. These are: the Kelsey-Leary Seybold Clinic in Houston, Texas, designed by Wilson, Morris, Crain & Anderson of Hous-

ton; the Samuell Clinic in Dallas, Texas, designed by Tie Davis-J. Murray Smith of Dallas; the Sunnyvale Medical Clinic of Sunnyvale, Calif., designed by William L. Carmen of Palo Alto, Calif .: the Lakeshore Medical Clinic of Kirkland, Wash., designed by Cummings & Martenson of Kirkland; Putnam Professional Park, Mahopac, N.Y., designed by Lee Harris Pomeroy of New York City; and the Community Health Foundation, Cleveland, Ohio, by Robert A. Little & George F. Dalton & Associates of Cleveland.

Jurors for the program were Charles M. Nes, Jr., AIA president; Francis D. Lethbridge, Washington, D.C. architect; and Dr. Bliss B. Clark, director of the New Britain (Conn.) General Hospital.

SWENSON'S BODY SHOP





BATAVIA, N.Y. Part-time sculptor Joseph Swenson believes that form should be both functional and evocative. The larger-than-life-size, glassfiber figures shown here are really pieces of furniture. Used as a chair (1) or a couch (2), Swenson figures his forms will fit a human being better

than most conventional furniture does. They are, in addition, decorative, or at least eye-catching.

"What about comfort?" some old grouch might ask. Sitting on a glass-fiber form may not be as comfortable as sitting on, say, a live Rubens model. Swenson, who makes his chairs in his garage, acknowledges this comfort gap. He has plans for switching to foam rubber.

P/A DESIGN AWARDS JURY MEETS

NEW YORK, N.Y. For two days, September 19 and 20, five jurors pored over 650 entries in P/A's Fourteenth Annual Design Awards Program. This year's jurors were: David Crane, Edward Dart, Sepp Firnkas, Charles Moore, and Joseph Passoneau. Award winners were notified immediately by wire. Results will be published in the January 1967 P/A.

PERSONALITIES

The last two Presidential appointees to the top-level staff of HUD are Don Hummel and H. Ralph Taylor, Assistant Secretaries for Renewal and Housing Assistance, and Demonstrations and Intergovernmental Relations, respectively. Hummel's post covers loans for rehabilitation, housing for the aged and handicapped and college housing. He will also be responsible for urban and community improvement programs, relocation standards, and coordination of social service activity programs. Taylor will administer the Demonstration Cities program and coordinate comprehensive planning techniques, codes and zoning, training programs, and intergovernmental relations . . . Charles Luckman has been elected to the National Board of Governors of the Library of Presidential Papers in New York. The library, founded only last year, is intended to encourage young people to enter politics by making available to students all obtainable papers, books, films, and other types of material pertaining to U.S. Presidents, past and present. The privately supported



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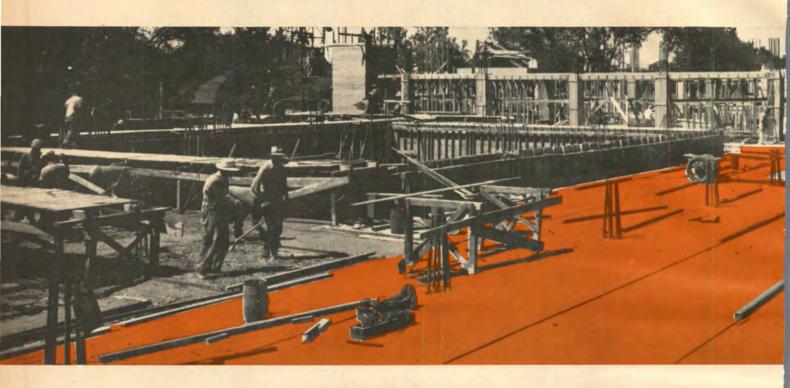
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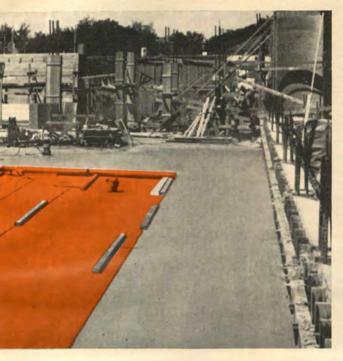


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82 P/A News Report October 1966

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foundation will be housed in the former Warburg mansion. which will contain quarters set aside for the use of the President, Vice-President, and their assistants, or any living former presidents . . . John Vance and Robert Einsweiler are replacing C. David Loeks, who held the position of Director of the Metropolitan Planning Commission in Minneapolis-St. Paul from its inception until his resignation in June this year . . . Planning to open an architectural office in Frankfurt after his release from West Berlin's Spandau Prison next month is Albert Speer, 61, former Nazi armaments chief. He is one of the last prisoners to be held under conviction of Nazi war crimes there . . . Gene R. Schaefer, Director of the Westinghouse Air Brake Company Mass Transit operations, has received an appointment from Robert Weaver to HUD's Transportation Advisory Committee. The committee has been newly formed to work in conjunction with Assistant Secretary Charles M. Haar of the new cabinet Department of Transportation ... Ted A. Niederman, a young member of the Baltimore architectural firm of Rogers, Taliaferro, Kostritsky, Lamb will spend four months working and studying with the Tokyo firm of Kenzo Tange. Rogers, Taliaferro, Kostritsky, Lamb has commissioned Niederman to report on current trends in Japanese architecture.

At a Founder's Day convocation, Paul Rudolph, architect of the Charles A. Dana Creative Arts Center at Colgate, received an honorary Doctor of Fine Arts degree from the University. In part, the citation read: "When, in 1962, a Center for the Creative Arts became practically possible at Colgate, all concerned hoped it would not only provide desperately needed facilities for study and teaching in the arts, but become in its own right a fitting example of creative art as well. The choice of Paul Rudolph as architect insured the fulfillment of these hopes. The building he designed . . . adds artistic luster to our campus. Far from merely 'drawing' plans to accommodate teaching programs, Mr. Rudolph, by the bold and imaginative use of materials and

spaces, combined form and function into an artistic whole —'full of surprises but always logical.'"

HEADQUARTERS FOR GEORGIA PACIFIC SPROUTS IN PORTLAND



PORTLAND, ORE. When completed in September 1969, the Georgia Pacific building will be, at 27 stories, the tallest commercial structure in Oregon. Designed by the Portland office of Skidmore, Owings & Merrill, the tower will rise from a full-block landscaped plaza above a concourse of shops. Despite its height, the 365' Georgia Pacific building will not seem out of place along Portland's skyline, for it will be in a line with the Hilton Hotel, (another SOM design), which is 309' high, and the Public Service Building, 286'.

Georgia Pacific plans to occupy only 5 to 10 floors, leasing the remaining space to other firms. Construction of the 97' x 158' tower, which will cost more than \$10 million, will get underway in 1967.

AWARDS

Lavette Cox Teague, Jr., a graduate research assistant at MIT, has received the \$6000 Brunner Research Award for computer study. The award was made by the AIA, New York Chapter, and is the largest sum ever to be awarded in connection with the Brunner prize . . . Also awarded by the New York Chapter, AIA, was a \$2000 grant-in-aid to architect Simon Breines of Scarsdale, N.Y., for the preparation for publication of a previous Brunner award study on "Pedestrian Islanding" . . . The city of Camden, N.J.,

has received an award from the American Institute of Planners in recognition of its "vast and dynamic design" for rebuilding and renewing major portions of the city. Credit went to Willard Cooper, Coordinator of Planning and Renewal. The only other area to receive an award in the competition, which usually makes awards in several population categories, was the Capital Region of Connecticut. This was the first award made to a metropolitan area. The region is composed of 29 towns, all but one of which have their own planning boards and city plans. Winner of the annual President's Plaque of the American Public Works Association was the Washington State Chapter this year. President Robert S. Hopson presented the plaque to Robert G. Anderson, Tacoma engineer and head of the Chapter. Important in the choice of the Washington Chapter as recipient of the award was its revision of its "Standard Specifications for Municipal Public Works Construction." Among those lauded at the

AIA convention and previously unlisted in this column are Edward J. Logue, development administrator of the Boston Redevelopment Authority, and Albert Bush-Brown, president of the Rhode Island School of Design. Both received honorary memberships for "distinguished service to the profession by a layman." AIA Honor Awards went to Keyes, Lethbridge & Condon of Washington, D. C., for Tiber Island, and to Eero Saarinen & Associates of Hamden, Conn., for Dulles International Airport and the CBS headquarters building in New York City . . . The Office of the Year Award, presented annually by Administrative Management Magazine, went to the Rohm & Haas Company building in Philadelphia. The George M. Ewing Co. was architect and engineer of the building . . . The \$4000 J. Clawson Mills Fellowship in landscape architecture, awarded by The Architectural League of New York, went to Robert G. Reimann, an instructor in landscape architecture at Syracuse University . . . The James F. Lincoln Arc-Welding Foundation of Cleveland, Ohio, has announced the winners of its annual student

design competition. First award winners were Virgil Rasmussen and Donald C. Nelson of South Dakota State University for their paper on the design of a building using long spans without intermediate supports, and Charles C. Lozar of MIT for his design of a sheet metal space frame . . . The National Institute of Arts and Letters recently presented Romaldo Giurgola this year's Arnold W. Brunner award. The award is given annually to an architect who shows promise of contributing to architecture as an art . . . Winners of the National Association of Architectural Metal Manufacturers' Student Design Competition are James Robert Brock, J. C. Wang, and D. Sweet, all from the University of Illinois . . . John Storrs, principal in the Portland (Oregon) architectural firm of John Storrs & Associates, was recently awarded the Wood Structure Design Award of the National Forest Products Association. Storrs received the award for his work on the Salishan resort and convention center on Oregon's Pacific Coast . . . The American Society for Church Architecture awarded its Fellowship Award to Charles Edward Stade of Stade, Dolan & Associates of Chicago . . . At the first annual presentation of the New York State Awards, Corning Community College, designed by Warner, Burns, Toan & Lunde, and The Syracuse Savings Bank, designed by Harry A. King, were among the eleven honored "for outstanding contributions to the physical and artistic enhancement of New York State" . . . Among those receiving honorary degrees at Illinois Institute of Technology's commencement in June was Mies van der Rohe, who headed IIT's department of architecture from 1938-1958 and was responsible for the original campus plan and many of the Institute's buildings . . . William F. Brenan, specifications writer of the Detroit architectural, engineering, and planning firm of Smith, Hinchman & Grylls, has received the first award in the annual competition of the Construction Specifications Institute for his work on the Crittenton Hospital in Detroit . . . Leo Peter Dahl, a fourth-year student at



Main chapel entrance with stained art glass doors controlled by Norton Series 1940 overhead concealed double acting closers. These doors are very heavy and place an extremely high inertial load on the closers. In addition, a natural draft, due to the construction of the building, is always present. The doors are under control at all times.

Again, at the Dominican Education Center NORTON CLOSERS CONTROL DOORS—NOT DESIGN

The quiet beauty of this Dominican Convent and Mother House is unobtrusively preserved with Norton®door closers.

DOMINICAN EDUCATION CENTER DOMINICAN SISTERS OF SINSINAWA SINSINAWA, WISCONSIN Architect: Siberz-Purcell-Cuthbert, Architec

Architect: Siberz-Purcell-Cuthbert, Architects
Madison, Wisconsin

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This beautiful convent was set into the hillside and blends naturally with its surroundings. Much of the stone used in the construction of the chapel was moved from the hillside to make room for this lovely building.

Construction of a new education center was to be complete with dining areas, living quarters, schoolrooms and a new chapel. The architecture had to tie in with existing buildings and blend into the hillside. The new Dominican Education Center at Sinsinawa, Wisconsin, meets all these requirements in a quiet, beautiful setting unique only to a religious community.

To follow through with this quiet beauty, Norton Door Closers were used throughout. There was no problem in providing adequate door control and in complementing the architectural decor. Norton closers are designed and built to give the very best in positive door control. In addition, they have been styled to give the architect complete freedom in realizing the decor and interior decorating feel he desires. Norton closers truly control doors, not design.

To meet the control need of this custom built door, Norton Series 1940 overhead concealed closers were used. These closers mount in only $1\frac{3}{4}$ " x 4" of the head jamb. They are non-handed and double acting with adjustable back check.





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The entire atmosphere of the Dominican Education Center at Sinsinawa, Wisconsin, demands a quiet beauty that is conducive to a contemplative life. The very architectural decor is symbolic of the traditions and cultural background of this institution.

Norton Series 7000 closers with aluminum covers were selected to add subtle beauty to the interior. In selecting these narrow projection closers with covers, it was possible to have perfect door control for all the various locations throughout this building and still accomplish the desired effect.



Series 7000 narrow projection closers are available with cover to match or contrast any architectural or interior design. Aluminum covers are available in clear aluminum, bright brass, and dull bronze to match door hardware. Also available with wood bonded to the surface of the cover in over 67 native and exotic woods to match room or door paneling. Covers with a prime coat of paint are also available for repainting on the job to match or contrast the interior decor.



LIBRARY DOORS

Exit doors to the courtyard from the enclosed corridors are controlled by Norton Series 7000 narrow projection closers with covers of anodized aluminum. The closers have been selected to match the aluminum door and triangular window frames.

Main dining room doors also feature Norton Series 7000 narrow projection closers. Here the aluminum cover matches perfectly with other hardware to give a striking contrast with the dark finish of the door.

Entrance doors to the chapel area are controlled by Series 7000 closers with covers. Again, these closers blend in naturally with the modern design of the doors.

Library doors immediately under the chapel have Norton Series 7000 closers with aluminum covers to match door hardware. Auburn (Ala.) University's School of Architecture, has won a \$1500 travel grant from the Alabama Gas Corporation... Michael R. Foil, also at Auburn, won the Alabama Concrete Industries Association design competition... Robert E. Simon, Jr., developer of the new town of

Reston, Va., has received the first medal of Urban Pioneer from the Department of Housing and Urban Development ... Walter A. Netsch of Skidmore, Owings & Merrill was recently presented with the Total Design Award of the National Society of Interior Designers.

EIGHT HOUSES TO A FLAT



Photo: Authenticated News International

STANFORD, CALIF. Last June, Robert L. Wendt received a master's degree in art from Stanford University. His undergraduate degree is in architecture, and his aspirations seem to lie in an interdisciplinary area that is often given lip service but seldom concrete thought.

As part of one of his graduate courses, Wendt designed a vacation home that can be wheeled onto a railroad flatcar, shipped to its destination, then trundled off and rolled to a vacation site. Nor do these homes have to be just for vacationers. With modifications, Wendt feels, they could be used by migrant farm workers, by lumberjacks, by miners, by construc-

tion personnel, or by the military. His design shows eight cabins carried by each flatcar. Half of these are one-story cabins that can hold three persons. Half are two-story units with accommodations for seven. Each cabin would, of course, be self-sustaining. Refrigerator, stove, water heater, air conditioning, toilet facilities, and lamps would all operate on bottled gas. There would be enough water and fuel to last about a week.

Wendt envisions his cabins, which have sliding glass doors on both sides, as suited to glass-fiber and steel construction. Initial talks with railroad officials made Wendt optimistic about the future of his project.

SCHOOLS

Retiring from the Harvard Graduate School of Design are Walter F. Bogner, Norman T. Newton, and Charles William Eliot, 2nd. Professor Bogner was a member of the team of Harvard professors who won the "Boston Prize" in 1944 for a master plan for the development of greater Boston. He was also instrumental in the planning of the Back Bay Center project, a proposal for a business center over the Boston and Albany railroad yards, and conducts a private practice as an architectural consultant. Professor Newton, who becomes Professor of Landscape Architecture, Emeritus, long practiced landscape architecture before joining the Harvard faculty in 1939, and has written books on design and other subjects. Known for his involvement with Federal planning and resource agencies, Professor Eliot is also a planning consultant for towns, cities, and larger areas. He has been Professor of City and Regional Planning since 1959 ... A candidate for the University of Illinois Board of Trustees is Ralph C. Hahn, owner of the firm of Ralph Hahn & Associates, Consulting Engineers, Springfield, Ill. He is the only member of the engineering or architectural professions running for a statewide office in Illinois... A 10-week course entitled "Economic Aspects of Building and Construction" has been instituted at New York University's School of Continuing Education through its Management Institute. Lec-

turers will be leading real estate men, who will base their lectures on actual cases. David Tishman, William Zeckendorf, Jr., Max Wechsler, and Sol Horowitz are among speakers scheduled to discuss such topics as "Building Costs," "Conflict Between the Builder and Architect," and "Appraising the New Building." More information may be obtained from The Management Institute, New York University, 10 E. 8th St., New York, N.Y. 10003.

METROPOLITAN STADIUM FOR DETROIT



hoto: Lens-Art P

DETROIT, MICH. If the citizens of Detroit agree to back an astounding \$60 million bond issue, the city will have a new metropolitan stadium, located on the Michigan State Fairgrounds. As designed by the firm of Louis G. Redstone, the stadium, which is now in working-drawings stage, will provide 63,000 seats for baseball and 67,000 for football. It will also have facilities for track and field. (For years, Detroit has been trying unsuc-

cessfully to attract the Olympic Games.) Movable seats on runners will slide out over the track when it is not in use. Also included in the design is a translucent roof system, supported by an exterior steel grid, in an attempt to avoid the difficulties with vision that the individual skylights in the Houston stadium gave spectators there. The span of the dome will be about 620′, and its height above the playing field 270′.

COMPETITIONS

The American Iron and Steel Institute has announced its Design in Steel Awards Program, sponsored by the steel industry. Eligible are all practicing individuals or teams of professionals in the fields of architecture, design, and engineering in the Americas. The jury will be composed of nine professionals - three designers, three architects, and three engineers, and will consider entries in the categories of consumer products, industrial products, commercial equipment, automotive products,

residential construction, lowand high-rise commercial, industrial, or institutional construction, and public works construction. The program is coordinated by the National Design Center, 415 E. 53rd St., New York, N.Y. Deadline for entries is midnight, January 27, and judging will take place February 2 and 3 at the National Design Center. Details, including the definition of categories and criteria, will be published soon in a brochure to be distributed by the AISI.



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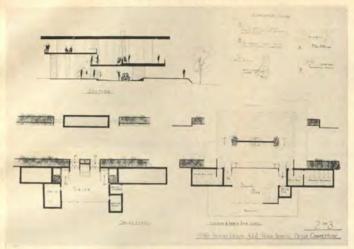
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TEEN-AGE ARCHITECTS



TOLEDO, OHIO. One of the most worthwhile things the AIA does for the profession is to stimulate young students to study architecture. Often, this activity is undertaken by the local AIA chapters, but the problem is a big one and the funds and resources of the local chapters are limited. For 16 years, the Toledo chapter has sponsored a design competition for high school students. It was a modest program until, in recent vears, the local Edison Company became a joint sponsor. Now, with more substantial resources behind it, the competition can attract more talent and more attention.

The Edison Company puts up a \$500 scholarship for the senior winner, a \$75 merchandise award for the best electrical design, and foots the bill for the awards banquet. The Toledo chapter puts up the \$150 second prize, and offers the services of 15 or 20 architects who visit local schools to set up the competition. Each February, students are given an architectural design problem - one limited in scope and one not readily solved by a trip to the library.

This year's winner was James Wright, a recent graduate of Macomber Vocational High School, whose plans for a ski lodge are shown. first "adventure" playground. The "adventure" idea (let the kids build things and tear them down) is nothing new (grown-ups do it all the time). But as an organized approach to playground philosophy, it is an inviting respite from the dull nothings usually offered city children.

Adventure playgrounds first originated in the British and Scandinavian countries, where the bombed-out wastes of war provided field days for curious, imaginative children. Now, Richard Dattner of Davis, Brody & Associates in New York has designed an adventure model for the New York child who has neither the wastes of Europe nor the

alleys of Harlem to intrigue him. The playground will have a splashing pool with a water channel for sailing boats, a series of climbing poles and mounds, a bumpy slide, a cargo net, a real boat to sail the Seven Seas and not go out of the park on, a little theater for puppets and child actors, tree houses and pits, and a jumble of wooden poles and boards to practice architecture with.

At a rate of one a year for the next 10 years, the Lauder Foundation plans to donate other experimental adventure playgrounds to the city. And if this first one is any indication, they can't build them fast enough.

HOW TO KEEP YOUR LANDMARKS AND HAVE THEM TOO



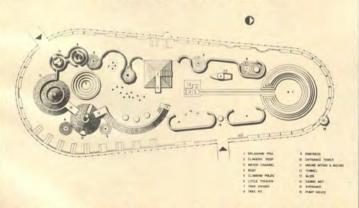
CHICAGO, ILL. On September 29, the Chicago Symphony Orchestra began its sixtysecond season in Chicago's Orchestra Hall. Designed by Daniel Burnham, it was the first permanent home for a symphony orchestra in the U.S. The auditorium, with seats for 2581 in its nine-story building overlooking Michigan Boulevard, cost \$750,000 in 1904. Last summer, it underwent a \$2 million facelifting, underwritten by a contribution from Silvain Wyler. Probably the single most elaborate item was the installation of a central air-conditioning system. As a result, certain areas of the ceiling, unchanged except for color, are perforated for air outlets and for placement of sound diffusors to improve the acoustics for the orchestra.

The auditorium was also completely redecorated, the seats reupholstered, and a new carpet laid. The main lobby





ADVENTURE IN THE PARK



NEW YORK, N. Y. By December of this year, Central Park will have another playground. The concrete and asphalt of the 67th St. playground will be replaced with sand, and the single open space there will be carved up into a series of smaller related play areas. It looks like fun. Sponsored jointly by the Estée and Joseph Lauder Foundation (which put up the \$70,000

for construction and play equipment), the Mothers' Committee to Improve the West 67th St. Playground (which will provide a full-time supervisor for six to eight months a year), and the New York City Parks Department (which will provide and maintain both the playground facilities and a continuing supply of mobile equipment), the play area will be this city's

has been enlarged, as has the gallery lobby on the sixth floor. (The gallery can now be reached by the main staircase.) Backstage, a conductor's suite was installed, dressing rooms were provided for soloists, and lounge and locker space provided for orchestra members. Under the stage are

a soundproof warm-up area, and beneath the lobby a recording room, a music library, and a chorus rehearsal room.

Architect for the renovation was Harry M. Weese & Associates, who were also architects for the renovation of Louis Sullivan's Chicago Auditorium Theater.

THE STUDENT CENTER WITH AN ANGLE



JACKSONVILLE, ILL. This fall, construction will begin on Illinois College's Student Center, a multipurpose complex that uses every trick in the book. Vaulted laminated wood beams and deck, clerestory, floor-to-ceiling and vertical slot windows, varying roof heights, sloped parapets, and

arcades will provide 14,640 sq ft of space for a two-story bookstore, a faculty lounge, and student activities offices (remember when it was student lounge and faculty offices?), snack bar and lounge and game room. Mittelbusher & Tourtelot of Chicago are the architects.

RAISING RESEARCH



BALTIMORE, MD. Ninety-nine years ago Johns (he thought in plurals) Hopkins gave the city of Baltimore a token of his appreciation and the beginnings of one of the finest medical centers in this country. Four years ago, Johns Hopkins University started a \$86 million fund-raising campaign, \$41 million of which is

set aside for construction. In September, 1965, work was begun on the \$3,500,000 research building (right in photo).

Designed by Baltimore architects Fisher, Ness, Campbell & Partners, the ninestory 110,000 sq ft Research Building will, by January of next year, house the depart-

ments of medicine, psychiatry, biomedical engineering, oto-laryngology, obstetrics, and gynecology within its poured concrete, sand-blasted walls. Capped by a penthouse housing mechanical facilities, all utilities will run in the exposed vertical and horizontal bands around the building, much like the human circulatory system. This mechanical solution allows for the maximum interior flexibility. With outlets spaced every 10'

throughout the research floors, it is possible to turn offices into labs and labs into offices by plugging into the system. To the left of the Research Building will be a 65,000 sq ft, \$2 million, 750-seat auditorium with below-grade meeting and seminar rooms. Architects hope to have this building out for bids in August. Both structures will sit on a raised landscaped plaza and will have a tunnel accessway to the university.

WOULD YOU LIVE IN A ZOO?



SAN DIEGO, CALIF. "The Camel's hump is an ugly lump,/Which well you may see at the Zoo;/But uglier yet is the Hump we get/From having too little to do." The Elmer C. Otto Center of the San Diego Zoo, will, by the time it is completed in October, deny Kipling's versification and give young and old a solid round of zooing. The

20,000-sq-ft, \$750,000, one-building zoo will house a 200-seat auditorium and space for administration and education facilities, as well as an orangutan or two. Designed by San Diego architects Tucker, Sadler & Bennett, the zoo has only one missing link — and a sad one at that. This zoo has been designed for people, not for the animals.

BOSTON SOB

BOSTON, MASS. The first building in the \$175-million, 52acre Government Center here was completed and occupied last June. The Emery-Roth designed, 22-story, \$18-million State Office Building (shown) will house nine government agencies and 3000 employees. The precast concrete building, with its thermos-bottle cap on tight, will have a neighbor in the soonto-be-dedicated, 26-story Federal Office building, designed by The Architects Collaborative and Samuel Glaser Associates. Also coming along is Kahlmann, McKinnell & Knowles City Hall (half finished), a Welton Becket Associates crescent-shaped of-



fice tower (in second construction phase), and an Emery Roth & Sons and Edward Larrabee Barnes office building (foundation under way). Weighted down by these projects, Scollay Square shall not rise again.

Eljer design matches the modernity of Grady Gammage Memorial Auditorium

When a modern structure, such as the Grady Gammage Memorial Auditorium, is built, it's only natural that modern-design plumbingware be chosen. In this case, 199 Eljer fixtures were installed.

Situated on the campus of Arizona State University in Tempe, Arizona, this auditorium stands 80 feet high — eight stories by normal building standards — and measures 300 by 250 feet. It's sometimes described as "the dream of two great men," Dr. Grady Gammage, the late president of the university, and the late Frank Lloyd Wright, world-famous architect.

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Designer: Frank Lloyd Wright / Architects: William Wesley Peters, member Taliesin Associated Architects, an affiliate of the Frank Lloyd Wright Foundation, Scottsdale, Arizona; Kemper Goodwin & Associates, Tempe, Arizona / Mechanical Engineer: Biddle & Young, Phoenix, Arizona / General Contractor: Robert E. McKee, Glendale, Arizona, with general offices in El Paso, Texas / Wholesaler: Smith Pipe & Steel Co., Phoenix, Arizona / Plumbing Contractor: Jack Dean Plumbing, Phoenix, Arizona

TEXAS COLONIAL









SAN ANTONIO, TEX. By spending millions, educational institutions in North America's oldest city are following the

example of those in many of her younger sister-cities. St. Mary's University (founded 1852) is spending \$25 million for a 10-year program of building and curriculum improvement. Construction of 10 new buildings, \$11 million worth, will be begun this year to make ready for St. Mary's expected doubled enrollment (to 6600) by 1975.

Shown here is the science addition (1), library (2), view toward the law center (3), and law faculty offices (4). All buildings will be of sand-finished local brick and will be what San Antonio architect Brooks Martin calls "Texas Colonial." The Texan forms

are evident in the buildings at first sight: post-and-lintel Texas mission arches, adobe construction with small, narrow windows to conserve heat, or exclude it, and colonnades for weather protection. But the "Colonial" part of Martin's label is strictly his own. Feeling that "basically all architecture is Colonial," that everyone borrows from the past, Martin, to judge from the renderings, has successfully combined his borrowings of regional motifs with a contemporary feeling.

BACK TO THE ROMANS



SAN DIEGO, CALIF. Architecturally, the trend is Roman. Commercial, residential, and institutional plans are increasingly focusing on the inner courtyard. Now a two-dormitory unit, the Revelle College Residence Hall Unit II at the University of California at San Diego, will soon be "atriumized." The dormitories, to be completed in the fall of 1967 at a cost of

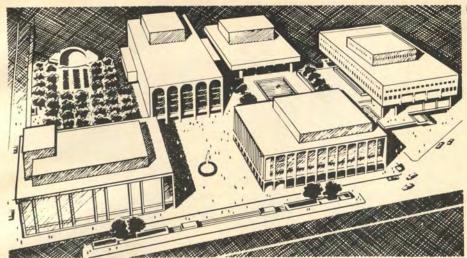
\$2,200,000, will complete the final phase of the university's first college. San Diego architects Tucker, Sadler & Bennett have designed a fourstory and a six-story building connected by a mall that will have landscaped central courts and balconied atriums for 640 students. The finned vertical elements of the buildings will provide sun protection and privacy.

CALENDAR

At the 19th annual Fall Convention of the American Concrete Institute, to be held October 24-28 at the Jung Hotel in Detroit, Mich., committees will report on two new standards, "Recommended Practice for Concrete Floor and Slab Construction" and "Recommended Practice for Manufactured Reinforced Concrete Floor and Roof Units" . . . "Toward a More Livable City" is the theme of the Pennsylvania Chapter of the ASLA's regional symposium, scheduled for October

27-28 at the Hotel Hershey, Hershey, Pa. Information may be obtained from Charles A. DeDeuwaerder, Program Chairman, 1101 Greenfield Avenue, Pittsburgh, Pa. 15217... On November 9 and 10 at New York's Statler-Hilton Hotel, The Committee for Construction Industry Product Literature plans to evaluate building products literature aimed at architects, consulting engineers, builders, and building material dealers. Registration for the conference is being handled by the

LINCOLN CENTER FOR THE PERFORMING ARTS



Therefore, when we build,
let us think that we build forever.
Let it not be for present delight, nor for
present use alone; let it be such work
as our descendants will thank us for,
and let us think, as we lay stone on stone,
that a time is to come
when those stones will be held sacred
because our hands have touched them,
and that men will say as they look upon the
labor and wrought substance of them,
"See! this our fathers did for us."

— John Ruskin
Seven Lamps of Architecture
The Lamp of Memory 1854





NAARCO

NEWS



Naarco Fascia now in three new colors, many custom shapes

NAARCO Fascia, a multipurpose aluminum facingsiding material, is now available in three durable NAARCOLOR hard coat finishes, black, dark bronze, and deep bronze.





Extruded in 5" width and lengths up to 28 feet, NAARCO Fascia is stocked in several popular standard shapes. Plus, to help architects achieve unique effects, NAARCO also supplies custom shapes that fall within the above dimensions.

Other outstanding advantages of NAARCO Fascia include easy interlocking, snap-on assembly without screws or nails, no plywood backing required. For additional information including a custom design blueprint, circle Number 1 on our coupon and mail with your letterhead.



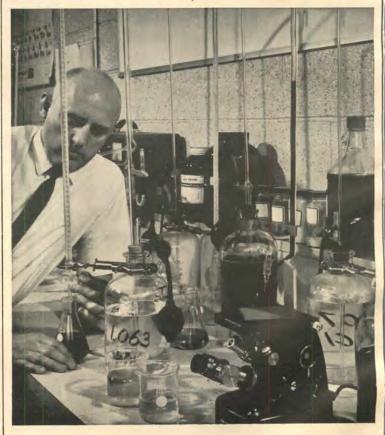
2

Naarco's chemistry lab... the search for quality

A complete chemistry laboratory for research and testing is one way NAARCO puts teeth into the old cliche "single source responsibility." Purpose of the lab? NAARCO curtainwall, mullions, windows, and other aluminum products are dependent on many allied products such as caulking compounds, laminated panels, finishes, etc. As a "single source of responsibility" NAARCO wants to be sure all supporting products are of the highest possible quality so the installation is totally satisfactory. And so they test. And test. Result? Only caulking compounds with long life expectancy and good adhesive characteristics

are selected thus insuring weather-tight installation. Only laminated panels whose adhesives can endure time or exposure to fluctuating conditions will be used with NAARCO curtainwall sections.

In addition to testing caulking compounds and panels, NAARCO's lab also has continuing analysis on weather strippings, finishes and many other materials that affect the outcome of a job thus fulfilling "single source responsibility."



3

Naarco overnight delivery keeps building on schedule

A shining NAARCO "semi" is a welcome early morning sight to architects and contractors on major construction jobs across mid-America and along the East Coast.



NAARCO's company-operated fleet, of course, means no-delay shipment of materials to the job site. But it has many other advantages too.

NAARCO President, Bob Barnard, says, "We're not in the trucking business by accident. Not only do we save valuable time with overnight delivery but we have greatly reduced partial shipments, lost goods, damaged goods and many other problems that cost everyone time and money." As another aspect of their "single source responsibility" policy, NAARCO's own fleet cuts red tape and helps architects and contractors meet their completion dates.



Naarco adds 14 agents for fast, total service

"Faster info to architects when they want it." Better availability of NAARCO products. Total on-the-job assistance when it's required.

These are the reasons NAARCO recently added 14 new agent-organizations to their marketing team, according to Ross T. Griffith, NAARCO Marketing Vice President. The addition gives NAARCO 45 agents across the U.S.

"Timing is the most critical factor in the agent-architect relationship," Griffith added. "If we're there when the architect wants us, fine. If we're unavailable, forget it. We've put men where it will help architects and contractors get what they want."

Black dots on the map indicate new agencies. Circles pinpoint where NAARCO agents already serve.



5

Naarco windows grace new office complex

Standard size NAARCO windows have been creatively, and beautifully used in this new, five-office complex designed for the Scott-Forsman & Co. of Chicago. Architect: Perkins & Will, Chicago.



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Producers Council at 1717 Massachusetts Avenue, N.W., Washington, D.C. 20036. The Connecticut Building Congress, Inc., will hold its Fifth Annual Symposium and Exposition on October 25 and 26. Members of the Congress will meet at the Park Plaza Hotel, Chapel Square, New Haven, Conn., to participate in a symposium entitled, appropriately enough, "Threshold to the 70's."

NUCLEAR POWER CENTER FOR SOUTH AFRICA



PELINDABA, SOUTH AFRICA. Comedian Tom Lehrer sings a song he composed called "Who's Next?" It starts out, "America has the bomb but that is good because we're for peace and motherhood. Russia has the bomb and that's okay, for the balance of power is maintained that way." Several other countries also have the bomb, of course, and all the rest wish they did. With the official opening of the National Nuclear Research Center here last summer, South Africa has the means to develop one if she wants to. Ostensible purpose of the center is to help the country convert to nuclear generation of electric power, and, by 1970 at least, some areas are expected to do so. Designed by Pretoria architect Bryan Sandrock, the complex, known as Safari One (for South African Fundamental Atomic Reactor



Installation), is in keeping with both its purpose and with the barren transvaal veldt on which it sits. Imbedded in the concrete facade of the reactor building is a mural symbolizing the "nuclear imprint of our age."

South Africa has one of the world's most readily available supplies of fissionable material, found in the piles of earth cast off by its gold mines. If the 1970 nuclear power goal is fulfilled, South Africa will be well ahead of both the U. S. and Russia in clean power production—even without the bomb.

BIG. BUT

LOS ANGELES, CALIF. The Los Angeles Auditorium-Exhibition Center is big: There will be 31 acres outside and 458,000 sq ft inside. Mark Twain, who thought an interior space was grand if it had enough room "to swing a dead cat," would have been

impressed. The main exhibit area will have a minimum height of 40' throughout its 300' span—believed to be the largest "high bay" area in the U.S. With the aid of a 40' folding, soundproof partition, this space can be divided to serve three separate, simul-



taneous functions. Designed by Charles Luckman & Assoc., the structure is a cable-suspension building that uses the engineering principle of prestressed high-tension cables to take the place of rigid steel trusses. "It also provides the 'architecture' of the building," says Luckman, "by giving the roof a dramatic shape, with constantly changing shadow patterns during the course of the day." Terraced landscaped parking will be provided, Los Angeles style—for 3000 cars. When completed, the Center stands to gain \$16 million yearly from conventioneers. The Los Angeles City Council approved the project last month.

EAVESDROPPINGS

"In 1906, when the \$25 million hole was dug in the old Tenderloin district for the \$112 million terminal and landmark (Pennsylvania Station), the city's and the railroad's sights were high. Now dreams of glory and broken Doric columns lie shattered in the Secaucus meadows." Ada Louise Huxtable, writing in The New York Times.

"Most, if not all, architects still consider architecture as an esoteric art, and as such take the position that as artists nobody is going to tell them what to do. I have often thought that the synonym to the word profession is arrogance, and particularly so with the architectural profession." Architect Kyo Isumi in a letter to P/A.

"After careful observation and investigation into the lack of progress in meeting the problem of building and development, it became clear that progress was essentially blocked by the interaction of proliferating, restrictive, inflexible planning and zoning regulations; archaic, nonuniform codes and inspection practices; union work rules and limitations; the highly fragmented character of the construction industry (thousands of small firms, with

limited financial capacity and unequal bargaining power); the unwillingness of mortgage lenders to support builders who might want to innovate and experiment." George T. Bogard of the General Electric Company in a speech titled, "Role of Large-Scale Enterprise in the Creation of Better Environment," given at the American Institute of Planners conference.

"Since Stonehenge, man has always wanted to organize his environment, to create the ideal in every way, including the city, the ultimate and most enduring expression of any age. He still aspires, but there is growing confusion. . . . Certainly the urban designerarchitect is impotent unless he recognizes the forces in society and translates these forces, or desires, into three-dimensional reality. What are the 20th-Century forces which must be tamed, understood, deflected? They are, number one, materialism; number two. shear increase in size necessitated by the population explosion; and number three, the scientific impact on our society." Paul Rudolph, speaking at Colgate University.

"In an opera house, everything has to be designed in terms of sound. Because sound



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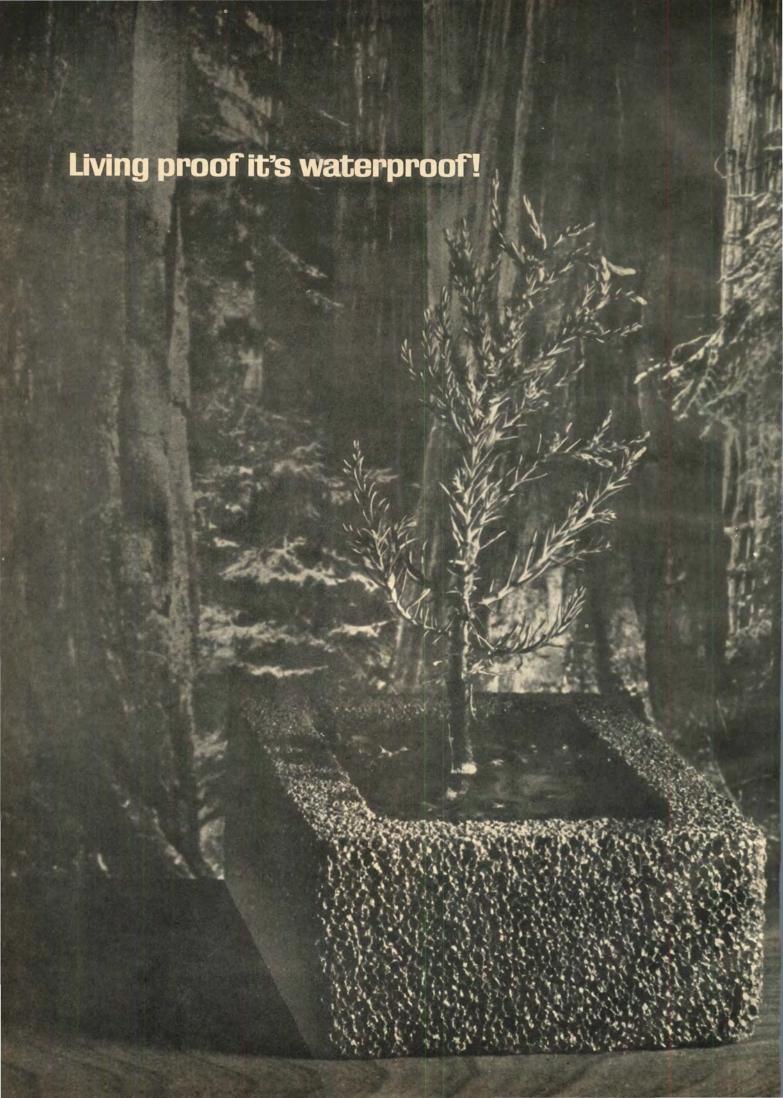
They know how to save money - especially for high rise apartment owners. The Cissell Petite is low in first cost and it's engineered to operate as economically as possible on either gas or electricity (whichever earns the lowest rate for you). In addition the Cissell Petite is as maintenance and repair free as it's possible for a dryer to be. It's also very easy and economical to install the 48" high, 283/4" wide, 30" deep Petite. It fits in compact space, does not require special high ceilings or reinforced floors and it's light enough to be easy to handle. Simple to vent, too. And in addition to all that, the Cissell Petite has features such as 16 pound dry weight, that apartment tenants want. The 2834" wide, 451/8" deep, 681/2" high Compact, with 25-pound dry weight capacity, is also efficient and economical where you need a larger dryer. W. M. Cissell Manufacturing Co., Inc., Louisville, Kentucky.







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is the main reason to go to the opera. But after the Philharmonic experience, the whole science of acoustics was washed away. Until then, everyone thought that sound travels as light does, that it bounces off a wall at the same angle as it goes into the wall. High frequencies do that. But now we know, for example, that the lower frequencies don't. They act more like mass, like a billiard ball with English; they sort of have a spin that makes them rebound at different angles and can cause echoes.

"The house also had to be bigger than it should be. We finally figured we had to make room for 3800 seats — the opera isn't subsidized in this

country — when 3000 seats is ideal for an opera house.

"I could have experimented, I suppose. There have been modern opera houses built since the war. But the bigger the involvement, the less real room there is to experiment. I just couldn't go off into the realm of theory with a building like this. You just can't experiment with \$45 million." Wallace K. Harrison, in The New York Times Magazine.

"He wore billowing silk shirts of lavender and apple green to the office. He paid dentist bills for dozens of chorus girls because he could not bear ugly teeth." Aline Saarinen, writing of Stanford White in Life.

WASHINGTON/FINANCIAL NEWS

BY E. E. HALMOS

Architects and urban planners will soon be dealing with a new, and to some extent undefined, set of conditions in planning projects to be built in or near the flood plain of a stream.

The change will be the result of a little-noted Presidential order (No. 11296), which directs all Federal agencies, including the Housing and Urban Development Department, Small Business Administration, Water Pollution Control Administration, as well as more traditional construction agencies, to disapprove any construction in a flood plain that is "uneconomic, unnecessary, or hazardous." The all-inclusive order notes that the consideration of flood hazard will affect any work in which Federal funds are involved in any way-by direct grant or loan, mortgage insurance, or anything else.

Background on the move dates back more than six years, when the Army's Corps of Engineers sought (and was denied) Congressional authority to block construction in flood-plain areas; it also stems from Administration efforts to take a posture of economy. Since 1936, the Corps and the Soil Conservation Service has spent more than \$7 billion on flood control and flood-prevention work; it now spends an average of \$500

million a year for this purpose. Complaint is that developers and city planners insist on building in floodprone areas, then demand, and get, Federal work to protect these areas. Every time the Federal Government builds a levee or flood wall, more building goes up behind it, with the result that a record flood brings more damage and more demands for protective works. Besides, says the Corps, building in the flood plains increases danger of disastrous floods, since it restricts natural water-

Under the order, requests for funds for projects in such areas must be accompanied by written "findings" by agency heads that no danger exists—or funds will be denied.

The order, unfortunately, fails to clarify a couple of important points: (1) there are no national criteria of flood danger, not nearly enough information on many streams to set such criteria; (2) the order doesn't say who in the various agencies will pass on the extent of danger.

NASA to Study Architectural Fees — Tucked away in a rider on the appropriations bill for the National Aeronautics and Space Agency is a matter of major concern to architects: call for a yearlong study as to whether the present 6% limitation on architectural and engineering fees is too low.

NASA had requested a one-year waiver of the 6% limitation on certain advanced and complex projects. Congress didn't permit that, but it did direct the Comptroller General to make a Government-wide review of the subject and report back within a year.

Professionals have long complained that the fee limitation, coupled with too-low Federal construction cost estimates, has made it necessary to reject assignments; they have argued, on the other hand, that adequate (or above-average) fees can result in savings by permitting comprehensive solutions with simplified construction.

An immediate participant was the Consulting Engineers Council, which sent out a call to its members for data to illustrate specific instances where hardships have been created because of the 6% limitation.

Running Amok in the Capital — To nobody's surprise, Congress charged right back down Capitol Hill in mid-August, and approved a compromise appropriations bill that will permit the Architect of the Capitol to continue preliminary design planning for extension of the Capitol's West Front.

Thus, predictably, another annual skirmish over the construction and appearance of the building ended just where the powerful "Commission on Extension of the U.S. Capitol" wanted it to: with a start on the work of extending the old building's crumbling West Front some 80' outward, to create new office, committee room, and restaurant space at a cost of at least \$34 million.

The House-Senate conference committee that worked on the annual "Legislative Branch Appropriations" bill, in which are contained funds for the Architect's office, was careful to disclaim responsibility. Said Oklahoma's Senator "Mike" Monroney, representing the Senate in the conference: "I believe this is a reasonable compromise [permitting continuation of design planning] that will enable both advocates and

opponents . . . to participate in whatever decision Congress eventually will make. . . . This action in no way endorses or rejects the Architect's course of action up to this point."

Monroney went on to explain that Architect Stewart had spent all but \$40,000 of some \$300,000 given him last year for planning, and that he would use the remaining money mostly for construction of a "mock-up" to show how the building will look when extended. Additional funds for this model, plus other administrative expenses, are provided — but no money for actual construction work.

(Stewart won another victory, somewhat less publicized, when the House Interior Committee adopted an amendment specifically exempting Stewart's 133-acre Capitol Hill domain from a bill aimed at encouraging local efforts to preserve historic sites.)

And while the Capitol furor died down a bit, Washington could look forward to a couple of other architectural points of discussion: a proposal to build a sort of "Ponte Vecchio" - a shoplined, pedestrian bridge - to connect the city's Southwest redevelopment area water-front with the almost inaccessible site (across an arm of the Potomac) of the planned, controversial national Aquarium on Haines Point. The 874'-long, 40'wide bridge, hopefully would be built by private developers, with "minimal" Government participation. There was no fight over this idea; most of the city's architectural critics (some official, some self-appointed) seemed pleased.

But Virginia's Department of Highways, with the cooperation of many metropolitan area planning groups, dropped a bombshell into the already heated argument over how to get commuters into Washington: a plan for a mammoth, 24-lane "spaghetti bowl" interchange just across the Potomac near the Pentagon, to merge almost a dozen lanes of local and through traffic, and handle as many as 180,000 vehicles a day in shifting patterns. Included, on three paved



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(Scale: 1"=2')

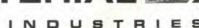
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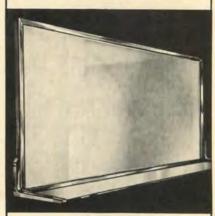
On Readers' Service Card, Circle No. 391

levels, would be some 27 bridges of varying lengths, miles of steel and concrete — and a price tag of \$30 million.

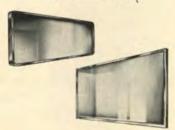
Immediate concern of architects was the impact of such a vast area of roadway, on many levels, on the attempts to beautify and dignify approaches to the capital.

- · Financial Congressional attempts to pump new money into the housing field through a nearly \$4 billion infusion of funds to "Fannie Mae," the Federal National Mortgage Association, were being watched carefully by a housing industry that expected to see no more than a million or so "new starts" this year. Problem of tight money wasn't affecting builders so much in their own financing as it was in that prospective buyers have balked at skyrocketing interest rates on their borrowing. · Nevertheless, the general public doesn't seem to be too frightened of the future: Census bureau estimates of "buying intentions" of U.S. citizens (as of mid-July) showed little change in plans, over the past three months, in purchasing such varying commodities as automobiles and household goods.
- · Certainly, taxpayers were continuing their strong support of public works spending. The Investment Bankers Association said that, in July, voters approved 83.6% (\$50,400,000) worth of construction bonds, turned down only 11 proposed bond issues. Bulk of the new money voted (\$21 million) will go into educational work.
- · Census further pointed out that, also in July, the value of total new construction put in place was \$7,200,-000,000 - up about 6% from the previous year. Significantly, private construction was clocked at \$4,750,-000,000 - up about 5% from a year ago; but public construction, at \$2,400,000,-000, was up 11% over the previous year.
- · Drop in housing was dramatically illustrated: In July, new starts were at a seasonal rate of only 1,064,000, compared to 1,473,000 a year

SOMETHING TO LOOK INTO



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On Readers' Service Card, Circle No. 359

PRODUCTS

AIR/TEMPERATURE

Radiant-heat drywall ceiling system consists of a single layer, 5/8" gypsum wallboard with electric heating cables embedded in fireproof gypsum cores. "Gold Bond Rayboard" systems are installed with conventional wallboard hanging techniques. Each heating panel is a self-contained unit, available in seven models and three sizes. National Gypsum Co., Dept. RM-1, Gold Bond Building, Buffalo, N.Y.

Circle 100, Readers' Service Card

CONSTRUCTION

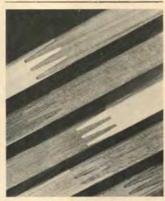


Prefab roofing system of interlocking metal sheets conceals fastenings and drain channels. Aluminum, copper, Monel metal, or stainless steel may be used for the system, suitable for new construction or re-roofing. Vertical seams are flush with sheet surfaces and form a combination drain channel and hairline expansion joint. Horizontal seams have a standard height of 3/4". Suitable for roofing over decks of concrete, wood, or steel with insulation. Overly Mfg. Co., Architectural Metal Products Div., 574 W. Otterman St., Greensburg, Pa. 15602. Circle 101, Readers' Service Card

"Duroflash," a dead soft stainless steel (no springback), can be easily bent, cut, nailed, and soldered. The Type 304 soft stainless has been developed for flashing and is said to be less expensive than "scarcer flashing metal." Widths up to 36" available in coils and in cut lengths; in 26, 28, and 30 gage — or in special-order sizes. It needs no coating and is available in two finishes. Samples avail-

able. Republic Steel Corp., 224 E. 131 St., Cleveland, Ohio 44108.

Circle 102, Readers' Service Card



"Noyo Finger-Joint" redwood lumber eliminates the waste of trimming random lengths at the site - exact lengths (up to 24'), widths and thicknesses can be factory-cut. This is said to be more economical for jobs where long fascias or sidings are needed. End-glued joints are smooth and accept paint as well as surrounding redwood, manufacturer states. Available unfinished or factory paint primed. Union Lumber Co., 620 Market St., San Francisco, Calif. 94104.

Circle 103, Readers' Service Card





Exposed aggregate concrete, bonded to foamed insulation

backed with metal, forms lightweight curtain-wall panels. Maximum size of standard concrete unit is 3'-9" x 9'-9" x 134" thick, and weighs approximately 15 psf; weight and thickness may vary with the aggregate. Cast in a seamless steel pan with 1" of rigid Styrofoam insulation, the panel has a "U" factor of .20. Edges of pan embedded in the concrete are unexposed on the exterior; metal surface may be painted for interior finish. Schokbeton Products Corp., 1270 Ave. of the Americas, New York, N.Y. 10020.

Circle 104, Readers' Service Card



"T-Wall" framing system insulates glass from metal mullions in curtain walls with Tshaped gasket and filler strips. Gaskets are pressed into continuous stainless-steel spring clips that pull the glass against filler strips fitted into mullion slots. This insulation results in a "U" value of 0.6, according to manufacturer, and no condensation with temperatures of -20 F outside, 70 F inside, and 35% relative humidity. New system is suitable for both low- and high-rise buildings. Pittsburgh Plate Glass Co., 632 Fort Duquesne Blvd., Pittsburgh, Pa.

Circle 105, Readers' Service Card

Concrete block with integral exposed-aggregate face is available with any one (or a combination) of 15 aggregates. Manufacturer claims good weathering qualities and states that fabricating the aggregate face as a part of the block cuts down on freezethaw damage caused from water seepage behind the face. Preco Chemical Corp., 55 Skyline Dr., Plainview, N.Y.

Circle 106, Readers' Service Card



Bolts to match weathering steel are now available. Maintenance-free "Weather-R" bolts with "built-in corrosion resistance" have been developed for use with manufacturer's "Mayari R" weathering steel, which forms a dark brown textured finish after long exposure. High-strength fasteners meet mechanical and dimensional requirements of ASTM specification A325. Bethlehem Steel Corp., Bethlehem, Pa.

DOORS/WINDOWS

Movable walls are now available with coverings of Du Pont's "Tedlar" - a polyvinyl fluoride which "makes vinyls as stain resistant as ceramic tile." Tedlar, laminated to Modernfold's "Soundmaster" or "Acousti-Seal" movable wall surfaces will be optional. Matching wall-coatings will also be available from Moderncote, Inc., the manufacturer's subsidiary. New Castle Products, Inc., 1721 "I" Ave., New Castle, Ind. 47362.

Circle 108, Readers' Service Card



Three-leaf door hinge needs no mortising and shows knuckles on one side, and only leaf edges on the other. Brassplated steel hinge, "4741," measures 3^{11/32}" long by 2^{9/32}" wide open. Samples available. Amerock Corp., 4000 Auburn St., Rockford, Ill. 61101. Circle 109, Readers' Service Card

ELECTRICAL



Plastic ellipsoid luminaire atop a cast-aluminum pole for outdoor lighting accommodates up to 400-w mercury vapor or 500-w incandescent light. Pole (8', 10', 12', or 14' high) is finished in baked acrylic — white, black, or dark bronze. Luminaire, 34" dia., has built-in reflector. Suitable for parks, campuses, parking lots, street lighting, etc. Kim Lighting, 1467 N. Lidcombe, El Monte, Calif. 91733.

Circle 110, Readers' Service Card

FURNISHINGS



Op Art designs on "Patent Vinyl" create slippery looking upholstery and wall coverings. Designs include "Chick-"Matchsticks," enwire," "Polka-Dots" (white on black ground or black dots on white ground), as shown, as well as black and white stripes and solid white or black patent vinyl coordinates. Available too are custom hand prints on any vinyl background. The material is 53/54" and fabricbacked with sateen for added strength. Manufacturers claim a brush will clean it. J. M. Lynne Co., 149 Sullivan Lane, Westbury, L.I., N.Y. Circle 111, Readers' Service Card





Would you believe an automatic toilet paper dispenser? Molded of egg-shell white plastic, the device uses "solid state circuitry"; designed for recessed installation, it fits flush with the wall. Just press and tissue rolls out to any desired length. Would you believe the manufacturer claims, "It eliminates unsightly toilet paper"? Advance Design Service, 23280 Gonzales Dr., Woodland Hills, Calif.

Circle 112, Readers' Service Card



St. Nick couldn't slip down into the Manchester Pierce fireplace - a free-standing floor unit to which wall brackets can be added for midwall suspension. Models come with top-mounted vertical chimneys or hidden back flues. Fireplaces are also adaptable to gas log conversion with hearth opening up to 40". Finish is heat-resistant matte black. Condon-King Company, Inc., 5611 208th Avenue S.W., Lynwood, Wash.

Circle 113, Readers' Service Card

Zefkrome, an acrylic fiber manufactured by the Dow Badische Company, provides maximum color retention for carpets made with it, because its color is added during fiber-making. Manufacturer claims that its colors have richer luster and clearer tone than normally dryed acylics. Odorless when wet, unsusceptible to silverfish and

mold, Zefkrome's practicality does not exclude the luxury of choice of weaves and textures. Among carpet manufacturers using Zefkrome are: Hugh Nelson-Columbia Carpet Company; Gulistan Carpets; and Downs Carpet Company. Dow Badische Company, Textile Fibers Department, 350 Fifth Ave., New York, N. Y.

Circle 114. Readers' Service Card



Cool are the Stellante hingedoor cabinets (shown) and sliding tambour door cabinets by Imperial Desk Company, when turned into refrigerated office furniture. Hinge doors swing out, allowing the refrigerator door to fold down, providing a serving counter. The door panel of the "slip-in" refrigerator can be made of oil walnut, to match the finish of the cabinet (refrigerator 151/2" high, 263/4" wide, 16" deep, and with 1.5 cu ft capacity and two ice cube trays, is available at the Sub-Zero Freezer Co., Inc., Madison, Wis.). Cabinet modifications can be made at Imperial upon request. Imperial Desk Company, Inc., 1312 W. Florida Street, Evansville, Ind. 47707. Circle 115, Readers' Service Card



Roll out the vinyl runner by Tenex. The transparency of the vinyl allows one to see but not to sully surfaces under-

foot. Runners have a nonslip, cross-ribbed surface with a flat, lengthwise center strip. They come with gripper undersides for carpets, and smooth undersides for resilient surfaces (such as tile and marble). Vinyl is available in "crystal clear" and four transparent tints: light blue, gold, green, and beige. Runners come in 36" and 48" widths, and lengths up to 60'. Tenex Corporation, 1850 East Estes Avenue, Elk Grove Village. Ill. 60007.

Circle 116. Readers' Service Card



Hide-'n Peek black glass oven doors are transparent when the oven light is on, opaque when it is off. Since they are full width and lift off, oven cleaning is facilitated. Handle comes in bright chrome with a decorative walnut inlay. Most gas and electric ovens manufactured by Waste King Universal will accommodate these doors. Waste King Corp., 3300 E. 50th St., Los Angeles, Calif.

Circle 117, Readers' Service Card



Caravelle is a tight, dense, multicolor carpet designed by Trend Carpet to bear institutional wear. It is constructed of 70% acrylic and 30% nylon, and has a long staple length that is said to eliminate fuzzing or piling. Backing is of polypropylene. Manufacturers claim the carpet is

Are the bugs out of all plastic flashings? Just one—

Saraloy 640R.

There's nothing new about flexible flashing, but perfected flexible flashing—that's new, and Dow has it. For flashing applications that will move, it makes good sense to use a flexible flashing, if the flexible flashing will stand up to extreme heat without weakening and thinning out... and to cold without getting brittle.

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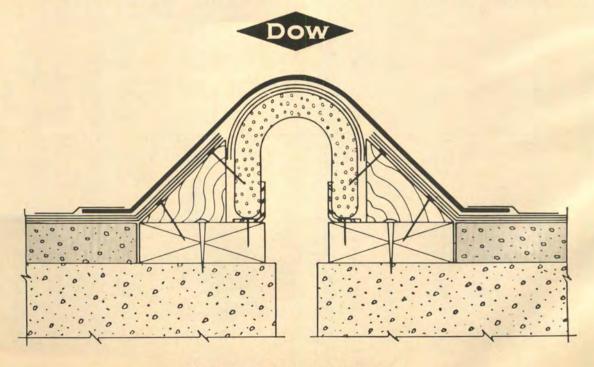
By the way, the contractors like it, too, because it's solvent weldable and so easy to handle and install.

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Write The Dow Chemical Company, Plastics Sales Department,

Midland, Michigan 48640. Or consult Sweet's Architectural File 8g/Do.



On Readers' Service Card, Circle No. 351

106 P/A News Report October 1966

mildew proof and nonallergic. It is available in designs (with color combinations toned gold, olive, blue-green, moss [brownish], burgundy, and heather) and in tweeds. Trend Contract, 866 United Plaza Building, New York, N.Y. 10017.

Circle 118, Readers' Service Card



For indoor cooking, outdoor style, Mark Stone has designed "Grate-n Grill," an alloy steel fireplace grate with a removable, hammered wrought-iron grill whose cooking surface is stainless steel. The grate's contour makes self-feeding fuel roll toward the center; it is available in 21", 27", 30" and 36" widths. The grill, 12" x 18", can be used on any grate between 24" and 36" wide. Either part can be purchased separately. Metalex Corporation, P.O. Box 147, Highway 176, Libertyville, Ill. 60048. Circle 119. Readers' Service Card



Vel-Strips are Velcro tapes mounted on rigid vinyl strips. When pressed together, the two tapes seal tightly and will support as much as 5 lb shear strength pressure per sq in. The rigid strips, designed for carpet installations, door and wall panels, furniture and drapery installations, and industrial uses, as well as for aircraft interiors and uphol-

stering, can be attached to most surfaces by means of stapling, tacking, or riveting. Kirsch Company, Dept. V000, Sturgis, Mich.

Circle 120, Readers' Service Card



Library furniture by Jens Risom has been augmented by seven tables, study carrels, and three complementary chairs. The tables are rectangular or round and range from single to six places. Shelf units, which are put on top of the same tables to produce separate study carrels or index dividers, are an answer to flexible privacy and storage requirements. Tabletops are of walnut wood, matte bayberry plastic, or Risom vinyl. Carrel shelf is faced with matte walnut plastic. The chairs are both arm and armless designs, with walnut or upholstered backs. Note recessed apron allowing armchairs to be drawn up close. Jens Risom Design Inc., 444 Madison Avenue, New York, N. Y. 10022.



The Tower of Toujay by designer Jerry Joseph has four compartments and four doors. Each compartment is 13" high, 19½" wide, 18" deep. Included are a pull-out tray for phono and tape recorder, adjustable shelf, and record dividers. A system of

interlocking columns forms the tower's 61"-high frame that comes in teak finish with ebony trim, or walnut and brass. It may be combined with additional units to create a more extensive wall treatment. Toujay Designs, Inc., 146 East 53rd St., New York, N.Y. 10022.

Circle 122, Readers' Service Card



O-Flood is a wide-beam floodlight, using a 250-w miniature quartz iodine lamp. It is finished in jet black, bronze (both with black yoke and mounting), and matte white. A deeply recessed reflector reduces glare and spill light. Flow-through convection venting cools the lamp. Available with a variety of mounting devices (among them cclamp for pipes, screw-in unit for lamp socket), accessory louver, hood, and color filters. Lighting Services, Inc., 77 Park Ave., New York, N.Y. 10016.

Circle 123, Readers' Service Card

OFFICE EQUIPMENT



Combination developer and printer for reproducing drawings has added the ammonia system to the developer section. Ammonia control container needs no venting and, after being filled, the "Diazo-Jet" may be left on all day with no further attention. Care and operation of the

whiteprinter is said to be simple and clean. Rotolite Sales Corp., Stirling, N.J. 07980. Circle 124, Readers' Service Card



Private areas for desk workers in large open spaces are possible with "Quik-Lok" partitioning system — shelving, work surface, and storage cabinets with doors. Units are said to be easily moved and rearranged; no bolting to walls or floors is required. A selection of colors is available. Aurora Steel Products, 153 Third St., Aurora, Ill. 60507. Circle 125, Readers' Service Card

SANITATION PLUMBING



For grand wazirs and other fun-loving people, the "Versa/Tub" offers another possibility for bathroom luxury. It is a 5' apronless, enameled cast-iron tub that can be sunk flush with the floor, raised or installed as shown here. It can be faced on any or all sides with ceramic tile, wood paneling, etc. Rheem Mfg. Co., 7600 S. Kedzie Ave., Chicago, Ill. 60652.

Circle 126, Readers' Service Card

Safe-shower fixture guards bather against sudden bursts of hot or cold water. Thermostatic shower-bath control will not deliver water above 115 F even if cold water supply fails, and will maintain any desired temperature from 65 F up to 115 F. One moving part—

thermostatic motor and mixing valve assembly — is said to be easily accessible from the front. The Powers Regulator Co., Skokie, Ill.

Circle 127, Readers' Service Card

SERVICES



Transparent scheme for saving drafting time uses adhesive-backed, tri-acetate sheets for preprinting repetitive symbols, title blocks, or standard details. Matte surface will take erasures, and adhesive backing is either "permanent" or "temporary." Custom or-der "Stanpats" are prepared from clients' artwork, but a typesetting service is available from the manufacturer. Plain sheets (81/2" x 11") are also available for do-it-yourself printing on a 914 Xerox; this reproduction is said to be clear, with no ghosting. Stanpat Products Inc., Covert and Main Sts., Port Washington, N.Y. 11050.

Circle 128, Readers' Service Card

SPECIAL EQUIPMENT



"Attention — an emergency message follows" . . . says the Dialalarm, which will automatically call emergency help should a piece of machinery fail, or a fire start. Wired into existing security systems, it will, for example, automatically call police and deliver its prerecorded message if a building is entered forcibly. The same unit will also call the fire department when acti-

vated by fire or smoke. It can also be used manually. Nite-Day Fire Protection Co., 7315 Lankershim Blvd., No. Hollywood, Calif.

Circle 129, Readers' Service Card

Patterned screens conceal rooftop equipment. Eight textured patterns in 12 lively colors, plus black and white, are molded into glass-fiber panels 4' x 8' with built-in mounting frame. Opaque colors are impregnated; panels are said to be fire-resistant. For access, hinged panels are available. Special designs and forms, for uses such as in ventilators, can also be fabricated by manufacturer for dressing up the rooftop mechanical garden. Color chart available. Williams-Bermuda Corp., 914 Westminster Ave., Alhambra, Calif. 91803.

Circle 130, Readers' Service Card



Control console for paging and radio sound distribution has AM/FM tuner and 10-station switch bank for zone paging. Compact unit is designed for central location such as front desks in motels or hotels. RCA Service Co., Dept. 1614, Bldg. 203-3, Camden, N.J. 08101.

Circle 131, Readers' Service Card



"Flushplate" service outlets for hospitals provide oxygen and suction connections. Sin-

gle or multiple plates are also available with electrical outlets, nurse calls, etc. Since stainless steel is frequently not required outside critical areas, states manufacturer, standard units are black epoxied aluminum — with special-order colors available. Melchior, Armstrong, Dessau, Medical Equipment Div., Ridgefield, N.J. 07657.

Circle 132, Readers' Service Card



Compact phone "booth" is all stainless steel, including perforated acoustical side panels. Shelf unit accommodates the Bell System 235G Panel Telephone mounted either on the left (40-S) or on the right (41-S). Dimensions: 24" wide x 301/2" high x 145/16" deep. Suitable for lobbies, department stores, etc. Manufacturer plans to offer a variety of side-panel finishes and various accessories. Acoustics Development Corp., 1810 Holste Rd., Northbrook, Ill. 60062. Circle 133, Readers' Service Card



Cooker-freezer meets mass-feeding needs by cooking 40 lb of vegetables every 5 min or heating 48 frozen entrees every 6 min. Directly under the two steam cooking compartments ("400 steam jets impinging directly into the food mass for dynamic cooking action") is a 300-lb capacity freezer. The "2285-FC" virtually eliminates the need

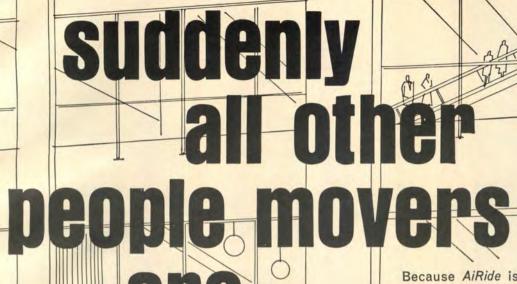
for pots and pans, and requires no ventilation system, claims manufacturer. Vischer Products Co., 2815 W. Roscoe St., Chicago, Ill. 60618. Circle 134, Readers' Service Card



Where there's smoke, this small (6⁷/₁₆" dia. x 2⁷/₈" deep) detecting device sets off the alarm. It protects an area up to 60' x 60', and can be added to existing fire-protection systems. When smoke reaches the 4% "obscuration" point, it reflects lights to a photocell, triggering the transistorized alarm relay; temperatures of 135 F or over also start alarm. Device is valuable in protecting sensitive people (the elderly or ill) and sensitive equipment. Notifier Corp., 3700 N. 56 St., Lincoln, Nebr. 68504. Circle 135, Readers' Service Card



A monorail conveyor suitable for hospital use can automatically discharge containers at programmed stations. The system, which has been operated in Swiss hospitals, conveys 220-lb-capacity containers that remain upright while moving in horizontal or vertical directions, and are stabilized to prevent oscillation. The system should ideally be designed into the original plans, but installation is possible in existing elevator shafts or corridors. Suitable for transporting such items as laundry, medical records, test specimens, drugs, trash, etc.



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Ritter Pfaudler Corp., 110 Midtown Tower, Rochester, N.Y. 14604.

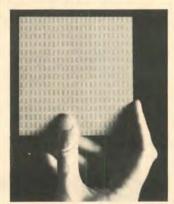
Circle 136, Readers' Service Card



Rotary food serving counters carry food to customers, who stand still until served. The large model can serve 1000 persons an hour, says manufacturer. Also, the system saves space and size of staff compared with straight counters. The Kayway Co., 3047 Madison Rd., Cincinnati, Ohio 45209.

Circle 137, Readers' Service Card

SURFACING



Three fine-line patterns, designed for Micarta laminates by architect Eliot Noves, are all based on the grid - a fine mesh, a slightly larger pattern of geometric shapes, and a "window" pattern, the largest of the three (shown). They are printed on 12 solid-color backgrounds, also developed by Noyes. Manufacturer suggests wall, door, counter, and other applications in restaurants, on ships, in hotels, etc. Matching abutting sheets should not be a problem, says manufacturer, since the designs are sufficiently irregular to allow for flexibility. Westinghouse Electric Corp., Micarta Div., Hampton, S.C. Circle 138, Readers' Service Card

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4401 Wallingford Ave. N.
206, ME 2-5686
Spokane
The Carswell Co.
123 South Wall Street
509, 747-1575

WISCONSIN 414, SP 4-1350
DIST. OF COLUMBIA
Washington
G. W. Blanchard Co., Inc.
6210 Chillum Place, N.W.
202, TU 2-6210

CANADA
Toronto, Ontario
Pilkington Bros. Ltd.
55 Eglinton St., E.
416, HU 7-2471
No. Vancouver, B. C.
Nor-Wes Contract Hard.
1075 Marine Drive
604, 988-5221

finds need projection Squibb Institute Electro Executive he

Da-Lite

for two

screens

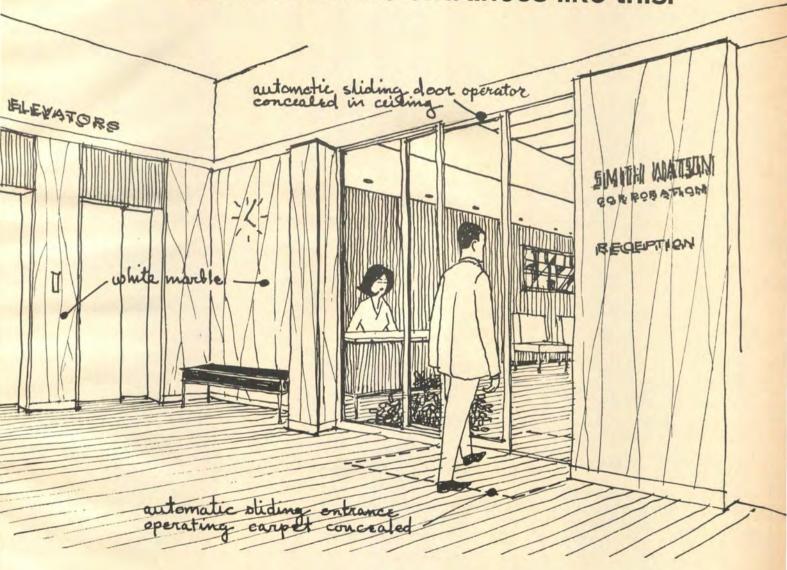
I projection screens, f the new Biological r in the Building's oom, have proved to The Squibb Institute New e room of the e other in since room, h art in The Squ in The Sqr runswick, , pair of Da-Lite Executive Electrol ne in the main conference room of esearch Building and the other pecialized Pathology conference roe useful pieces of equipment in or Medical Research, New Bruns A pair of Da one in the m Research Br specialized P be useful pir for Medical The reasons?

prices construction Sensible Built-to-last handling to operation Space conservation · Ease automatic range Long Fully

On Readers' Service Card, Circle No. 347

Who helps you to say "Welcome" impressively?

Stanley does.
With automatic entrances like this.



The people you design offices for want doorways that create favorable first—and lasting — impressions. Get information on Stanley automatic sliding entrances. Write us for Folder No. M67-COM. Look us up in Sweet's. Or check under "Door Operating Devices" in the Yellow Pages for the name of the Stanley distributor nearest you. Stanley offers a complete line of famous MAGIC-DOOR® operators (pneumatic, hydraulic, electric), controls and accessories for doors that swing, slide or fold.

Stanley Door Operating Equipment, Division of The Stanley Works, New Britain, Connecticut.

CONSULT YOUR NEAREST MAGIC-DOOR DISTRIBUTOR LISTED AT LEFT

If you think silence is golden, get a load of lead!

Silence is a big premium in today's world, and you can get that premium with the great sound proofing qualities of lead. By using thin lead sheeting as a plenum or over-ceiling barrier, you can cut down all the irritating, distracting noises that invade privacy and upset nerves.

Lead is economical too, because it cuts and shapes easily to simplify installation around ductwork, lighting fixtures, piping, and conduits.

For more information write for our
"PRACTICAL LEAD SOUND BARRIERS" brochure.
Lead Industries Association Inc., Dept. N-10, 292 Madison Avenue,
New York, New York 10017.



112 P/A News Report October 1966

MFRS' DATA

ACOUSTICS

A quiet hour in one's own "castle" is not an easy thing to come by in many new apartment buildings. A revised booklet on "Silent-Cor" sound-dampening board shows a number of simple cross-sections for wood and steel stud partitions and wood joist floors that cut down airborne noise transmission with varying degrees of efficiency. Short descriptions of physical, acoustical, and fire properties; installation instructions. 12 pages. Monsanto Co., Dept. 804-A, 800 N. Lindbergh Blvd., St. Louis, Mo. 63166.

Circle 200, Readers' Service Card

Revised edition of noise control manual, "Sound Ad-vice," includes 17 new gypsum wall assemblies plus updated information on previous partition constructions. Cutaway views detail wood or steel stud, gypsum-rib, or solid partition systems. Fire ratings and Sound Transmission Class (STC) ratings are given for each of 32 assemblies, together with additional sound transmission data and charts, materials lists, and application details. 36 pages. Bestwall Gypsum Div., Georgia-Pacific Corp., 2 Industrial Blvd., Paoli, Pa. 19301.

Circle 201, Readers' Service Card

AIR/TEMPERATURE



"Concepts on the Interior Environment" is a brochure describing integrated ceiling arrangements possible with the manufacturer's components. The backbone of all the systems is the "Modu-Flo" air bar — a slot with an adjusta-

ble bar controlling air direction by blades concealed above the ceiling in a triangular insulated duct. Seven systems are illustrated with photos, cutaway views, dimension charts. General component details; air-flow diagrams; cfm, throw, and sound-level charts. 24 pages. Sunbeam Lighting Co., 777 E. 14 Place, Los Angeles, Calif. 90021. Circle 202, Readers' Service Card

High-pressure air-conditioning unit for central systems is available in a variety of capacities between 2300 and 38,100 cfm. Booklet illustrates features of "Season-master" units, recommends steps for sizing an installation, tabulates performance, dimensions equipment, and provides brief specs. 28 pages. McQuay, Inc., P.O. Box 1551, Minneapolis, Minn. 55440.

Circle 203, Readers' Service Card

CONSTRUCTION



Reinforced concrete manual (1966 edition) contains data for specifications writers, designers, and detailers, as well as engineering students and contractors. Standard industry codes of practice, estimating data, and contract information are included. Gives specifications for placing bars and bar supports for one-way flat slab and twoway flat slab and flat plate construction. Design case studies offer data on one-way joist construction and twoway waffle slabs; R/C duct floors and metal lath ceiling construction are specified, and standard specs for various types of steel bars are given. "A Manual of Standard Practice for Reinforced Concrete Construction" conforms to ACI and ASTM codes and specifications, and to U.S. Department of Commerce recommendations. Charts, tables, design data, formulas, specs, cross-sections, etc. 98 pages. Concrete Reinforcing Steel Institute, 228 N. LaSalle St., Chicago, Ill. 60601.

Circle 204, Readers' Service Card



Concrete admixtures are discussed in three booklets. "Facts About Placewel" (F-41386, 8 pages) describes how an air-entraining agent increases strength and workability of concrete while using less water; short specs, photos and graphs showing test results. Second pamphlet on Placewel (F-41387) is a more complete, 16-page study of performance tests, including a comparison table. "Facts About Retardwel" (F-41385, 12 pages) describes a non-air-entraining admixture that helps control setting time and also reduces water requirements. The pamphlet contains charts and graphs, technical data, and photos of installations, including a Titan II missle silo (shown). Union Carbide Corp., Chemicals Div., 30-20 Thomson Ave., Long Island City, N. Y. 11101.

Circle 205, Readers' Service Card



Steel forms for waffle-slab and one-way joist construction are manufactured by this company in four re-usable types: "Steeldomes" for waffle flat-slab construction; "Flangeforms" for one-way joists; "Adjustableforms," which allow adjustment of joist depth; and "Longforms," one-piece units custom-sized for each project. Size charts, concrete quantity tables, accessory forms, profile sections, eight-page list of completed buildings, and many photos of projects built with the manufacturer's forms, ranging from the Chicago Tribune Tower (1925) to the CBS Building (1965), where a floor was cast every four days. Profile cross-sections, construction photos, and detailing of various ceiling constructions and R/C duct systems. 72 pages. The Ceco Corp., 5601 W. 26 St., Chicago, Ill. 60650.

Circle 206, Readers' Service Card





Glazing gaskets from the manufacturer of Mason jars and lids-with-a-rubber-ring (the American housewife's canning-time stand-by) are detailed in this brochure. Since the Ball Brothers' first bottle and jar plant in 1880, the company has expanded into other fields, including rubber products; and its neoprene structural gaskets are available for a number of glazing applications. A representative selection is detailed and dimensioned in the pamphlet; several vinyl reglets and neoprene channels are also included. 8 pages. Ball Brothers Co., Industrial Rubber Goods Div., St. Joseph, Mich. 49085.

Circle 207, Readers' Service Card



An arched roof that spans up to 35' is said to be com-

parable in cost to a flat roof. Interlocking, U-shaped, 22gage steel channels, curved to any radius between 7' and 50', will accept insulation with built-up roofing or poured fill. The 6"-wide by 2"-deep sections are curved to radius at the site. Hot dipped galvanized units, with a baked vinyl enamel finish, are available with acoustical perforations or without. Booklet contains architectural, mechanical, electrical, structural, and roofing details, load charts, short specs, and construction photos. 12 pages. Donn Products, Inc., 700 Bassett Rd., Westlake, O. 44091. Circle 208, Readers' Service Card

Precast concrete planks for floors or roofs are 4' wide, 8" or 12" deep, and can be cut to required length. Underside of hollow-core "Span-Deck" units is lightweight concrete with a textured acoustical surface. Pamphlets give load/span tables, dimensioned cross-sections, guide specs, brief description of manufacturing process, and construction photos. 12 pages. Blakeslee Prestress.

P.O. Box 1809, New Haven, Conn. 06507.

Circle 209, Readers' Service Card



Greenhouses for colleges, botanical gardens, and commercial use are framed with standard aluminum components. Available in several profiles with straight or curved eaves in widths from 14' to 49', they may be built as freestanding buildings or attached to an existing structure. Manufacturer also offers custom designs and smaller greenhouses for home use. There is an economy series as well as one designed for show appearance. Booklet includes dimensioned drawings and details, size charts, photos, and working drawings. 12 pages. Lord & Burnham Div., Burnham Corp., Irvington, N.Y. 10533. Circle 210, Readers' Service Card

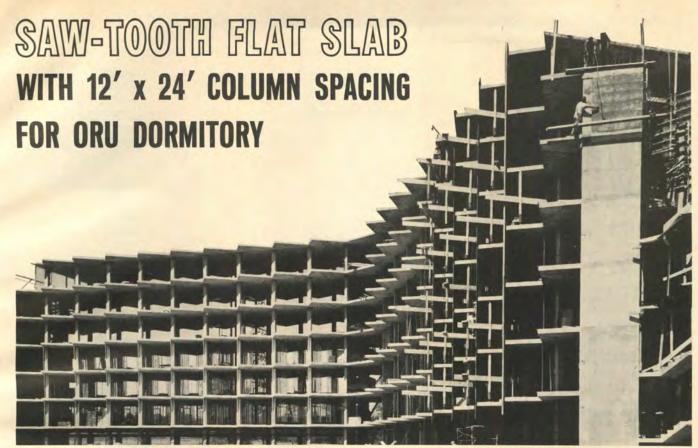
A walk calk, two-component pourable polyurethane, is said to cure to a strong rubber with high elasticity and permanent adhesion to the substrate. Calkwalking, or rather walk calking, resists permanent deformation and weathering. Data sheets on "Betaseal #450" give description, application instructions and physical properties. BFC Div., Essex Chemical Corp., Clifton, N. J. Circle 211, Readers' Service Card

ELECTRICAL EQUIPMENT

Hospital lighting fixtures pivot, swivel, and extend their arms for convenient maneuverability in patients' rooms. Some of the wall-mounted fixtures may be detached and used as hand-held examination lights. Other institutional lighting is also included in catalog, which is illustrated with photos, cross-sections, and



On Readers' Service Card, Circle No. 342



The saw-tooth 8" slabs show clearly; transverse tendons are normal to saw-tooth edge strip.

The floor framing for this Oral Roberts University Dormitory is an 8" thick prestressed flat slab, post-tensioned using the Prescon System. The saw-tooth floor plan has columns recessed 2' 10" in from the re-entrant corner with the teeth of the saw projecting 5' 3" from the re-entrant corner. Columns are spaced 24' transversely and 12' longitudinally with tendons running diagonally.

The Prescon tendons are spaced on a one to two slope with the transverse column line, with the column strip tendons extending to the tips of the saw teeth. This rotation of the Prescon tendons permitted principal cantilever reinforcement to become part of a column strip for maximum stiffness in the floor. The structural analysis was based upon load balancing applied to a flat plate. In effect, it is a pure membrane analysis. Tendons varied from 3 to 10 wires. In each 12' increment of floor, 8 tendons running the full width were used and 2 short tendons over the columns. All slabs were cast-in-place with an entire slab completed in a single concreting operation. The average prestress was 300 psi transversely and 150 psi longitudinal. The structure has performed in a most satisfactory manner.

The three wings radiate from a hexagonal 30' core which houses the elevator, lounge and stairs. Each wing is 40' wide by 120' long. Floor-to-floor height is 9' 4" except for the ground floor where height is approximately 11'.

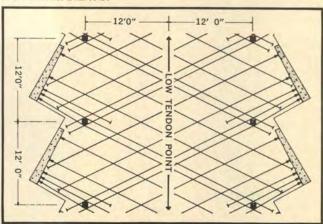
This is first of three planned dormitories. Each will be seven levels including the ground floor. Grade level includes lounges, game rooms, etc.; each of the other floors include an apartment for the house mother, laundry and linen facilities, baths and living quarters for 100 students. Floors are carpeted except for terrazzo in toilet areas. The underside of the slab serves as the ceiling and is a sprayed texture coating.

The architect for the project was Frank William Wallace, AIA; engineers were Netherton, Dolmeyer, Solnok; and the contractor was Manhattan Construction Company.

© 1966 THE PRESCON CORPORATION

G66

Among the advantages gained by using the Prescon System of post-tensioning prestressed concrete are: flexibility of column spacing, thin slabs with no deflection, and water-proofing of slabs when desired. For the complete story on the advantages to owners, architects, engineers and contractors using the Prescon System, write for brochures and the Prescon NEWS.



The tendons are placed diagonally on a one to two slope to the transverse column direction with the column strip tendons extending to the tips of the saw teeth. Structural analysis was based upon load balancing applied to a flat plate.



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THE PRESCON CORPORATION

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MEMBER OF PRESTRESSED CONCRETE INSTITUTE

At Crerar Library...

Matot lifts speed 400 requests daily



Located in a new building on the campus of the Illinois Institute of Technology, Crerar Library averages 400 reader requests daily for technical research material.

PROBLEM: To locate and make requested material available to the checkout desk as quickly as possible.

SOLUTION: Two Matot truck-in book lifts and a pneumatic tube system. First—requests are sent by tube to one of three employee-stations located on the first floor. Second—an employee takes the request, locates the book and puts it on one of two centrally located lifts. Third—the material arrives on the lift under the counter-top of the main desk where the librarian verifies it and checks it out. The entire operation takes 5 minutes. Up to 30 requests can be handled at one time. Returned material is loaded onto carts and trucked-into dumbwaiter for return to shelves.

Matot designs lifts for many uses: money lifts, food lifts and record carriers. Write for free information on how Matot can make a building and its employees operate more efficiently.

D. A. MATOT, INC.

1533 W. Altgeld Avenue · Chicago, Illinois 60614 312 Lincoln 9-2177 Specializing in Dumbwaiters since 1888

See our catalog in Sweet's



On Readers' Service Card, Circle No. 395

construction data. 32 pages. Luminous Equipment Co., 3750 N. Powell Ave., Franklin Park, Ill.

Circle 212, Readers' Service Card

FINISHES PROTECTORS



Coating precast or cast-inplace concrete with one-coat 'Modac" protects against weathering, chemical attack, and salt spray. Solvent-type acrylic coating, also suitable for cinder block, brick, stucco, shingles and wood siding, combines good water repellency with improved "breathing." Four-page folder lists test results and short specs. Insert page has color samples. National Coatings Corp., Ohio & Murray Avenues, Atlantic City. N. J. Circle 213, Readers' Service Card

FLOORING



A carpet in the classroom is a practical idea, say carpet manufacturers: They wear just as well as synthetic flooring and are just as easy to clean. Manufacturers of synthetic flooring, of course, dispute this claim, but there is much to be said for it. Bigelow-Sanford, Inc., makes the point in a brochure aimed specifically at the school market - "Bigelow Carpets Go to School." Included are reports on maintenance tests and comparative costs. Dept. New from REINHOLD



The Architect's Guide to Mechanical Systems

By F. T. ANDREWS, P. E. Reinhold Environmental Engineering Series 1966 / 256 pages / \$12.50

This authoritative reference work describes mechanical systems, including heating, air conditioning, cooling, ventilating, plumbing, and fire protection, for all kinds of buildings. It is a practical guide for solving mechanical design problems that in-volve types of systems, systems functions, space requirements, equipment weights, installation, maintenance, repair and operating costs. It presents to the specialist the basic information needed to insure proper and adequate consideration of these systems in designing a building. Simple rules of thumb have been developed to determine the space requirements and costs of various mechanical systems. The most recent equipment developments are included.

CHAPTER TITLES

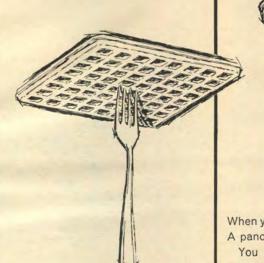
Heating; Cooling; Air-Conditioning Systems; Typical Air-Conditioning System Applications; Ventilation and Exhaust Systems; Plumbing; Fire Protection Systems; Useful Mechanical Information; Typical Building Mechanical Costs; Your Mechanical Engineer.

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Please send mecopy(ies) of (500-140) The Architect's Guide to Mechanical Systems @ \$12.50, on 30- days' approval (U.S. and Canada only) under the following terms: Total payment enclosed (Reinhold pays regular delivery charges). Purchase order attached.				
☐ Bill me (plus delivery charges). ☐ Send your latest catalog (500-011). Name				
CityStateZip Include sales tax on California, Ohio, Pennsylvania, and New York orders. Dept. M-307				

On Readers' Service Card, Circle No. 498

Waffles are stiffer than pancakes.



When you hold up a waffle, it stays flat. A pancake droops.

You can get a pancake to stay flat by using more batter. But the extra materials and the overcooking add to the cost of the breakfast.

Reinforced concrete floors are similar. Use a waffle system and you stiffen the floor. The deeper the square voids in the waffle system, the stiffer the floor

and the more materials saved...And the farther apart you can place the columns without overloading the system.

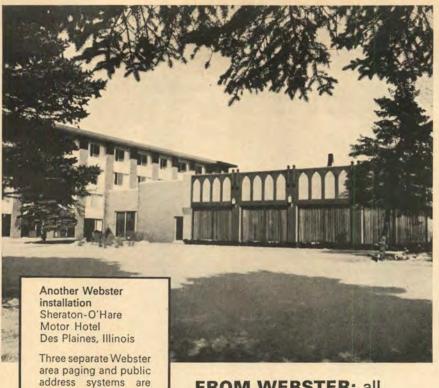
Appropriately, we do our waffle forming on a flat fee. This usually proves to be much less than the general contractor would spend to form the floors himself. With a Ceco quotation, you and your contractor have a firm cost before building starts. There are no variables such as insurance, overhead, labor, lumber, and form conditioning. The Ceco quotation includes all these. Your contractor is not subject to a sudden piling up of hidden costs. Tell him so.

Get full particulars about Ceco's Steeldome Service, for you and your contractor. Write for literature. Also see Ceco's Steelform catalog in Sweet's. The Ceco Corporation, general offices at 5601 West 26th Street, Chicago, Illinois 60650. Sales offices and plants in principal cities.



CECO

On Readers' Service Card, Circle No. 339





used at O'Hare. A small

intercom system is also

part of the installation.

Webster sound components are cased in a free-standing equipment rack on each floor. Permits flexible control of sound for each area.

FROM WEBSTER: all the advantages of a custom installation with standard components

Webster Sound gives your clients the widest choice of standard voice and program distribution components available today. And because each is physically and electronically matched to the other, it's easier and more economical to build

a custom system.

Webster components provide multiple sound services in a single system. If the project calls for it, you can blanket a multi-story building with background music, page any selected area, monitor unsupervised locations, signal, or converse with two-way intercommunications. A Webster sound system can be planned to provide for today's needs, yet expanded tomorrow without making present equipment obsolete.

Modular design of components permits custom assembly of the features required, in either free-standing or wall-recessed equipment racks. Easy accessibility means faster servicing or system changes

See your Webster Electric distributor* on your next project. Let him plan in a custom installation with standard components. Or, write direct for details.

*Listed in Yellow Pages

Free - portfolio of case history reports covering large and small installations. Illustrates and describes intercommunication problems solved with modern Webster equipment.

COMMUNICATIONS DIVISION



subsidiary of Sta-Rite Industries, Inc.

PRIVATE DIAL TELEPHONE . LOUD-SPEAKING INTERCOM . SOUND & PAGING SYSTEMS . TEACHING LABORATORIES

On Readers' Service Card, Circle No. 448

BC, Bigelow-Sanford, Inc., 140 Madison Ave., New York, N.Y. Jose, Calif. Circle 214, Readers' Service Card



Cove base and floor tile brochure gives sizes and color chips. Rubber cove is available in 53 colors — both solid and "marbleized." Rubber tile is marble- or terrazzo-patterned, chip-type, or a recently added 1/8"-thick tile with a travertine pattern (shown). Brochure also illustrates vinyl tiles, and includes floor covering comparison table. 8 pages. Burke Rubber Co., 2250 S. 10 St., San Jose, Calif.

Circle 215, Readers' Service Card

FURNISHINGS

Ilsa de Sol stoneware from Puerto Rico is illustrated in a 19-page brochure. Shown are hanging planters and lamps, candle holders, sculptured figures, and vases. Natural ware is an orangebrown that contrasts or blends with a variety of glazes (among them matte turquoise blue, semi-matte lemon yellow). Orders for special designs accepted. Carolina Craft Center, P.O. Box 38, Carolina, Puerto Rico 00630.

Circle 216, Readers' Service Card

Kentile floors are illustrated in a 27-page color brochure of room settings, which shows the variety of textures available in the line. Tiles are of solid vinyl, asbestos, asphalt, and cork; they come in 9" and 12" squares, and as planks measuring 4" x 36". Choice of 340 colors and 50 styles. Among available textures are tiles that simulate gravel, especially suited for installation near pools. ("Ripple Chip" looks like stone-chips seen beneath

a specification from Hillyard...

FOR SEALING AND CURING NEW CONCRETE AND TERRAZZO

PRODUCT NAME: HILLYARD CEM-SEAL®

DESCRIPTION:

CEM-SEAL is a modified chlorinated rubber in a volatile aromatic solvent. It forms a clear membrane surface barrier that holds the moisture in the mix for a prolonged curing period to complete hydration. Produces water-tight, dense, hard concrete. At the same time, it protects against the penetration of moisture, stains or other soil as other trades complete construction. CEM-SEAL can be used on vertical installations.

SPECIFICATION AND HOW TO APPLY:

One man, who need not have special training, can apply CEM-SEAL with a sheepskin applicator or ordinary sprayer. CEM-SEAL can be applied as soon as the slab can bear weight, and dries traffic-ready in four hours.

COVERAGE:

500 to 700 square feet per gallon. Only one coat needed.

ADVANTAGES:

Resilient floor tile, paint or surface finish may be applied when slab is thoroughly dry (free from moisture) and providing that preparatory steps are carefully followed.

SAVINGS:

Man hours and material costs are greatly reduced when compared to curing methods using—wet spraying, covering with building paper, wet sand, straw. burlap or plastic membrane.

EXCEPTIONS:

Do not use Cem-Seal on concrete slab that is to receive Bonded or Monolithic Terrazzo.

TECHNICAL DATA:

NVM – 20%. Complies with ASTM C156-55T, water retention efficiency of liquid membrane-forming compounds for curing concrete. Also conforms to ASTM C309-58 Type I as required by the National Terrazzo and Mosaic Association. Pittsburgh Testing Laboratory: Water Retention at 3 days—Average of 3 controlled tests—98.38%.

GUARANTEE:

When applied in accordance with manufacturer's directions, it is guaranteed to meet all claims made for it in the proper curing of concrete and terrazzo floors.

MAINTENANCE:

This is not a wearing surface but will leave concrete smooth and easy to maintain and free from "dusting" and efflorescence.

REFERENCES:

Hillyard A.I.A. File No. 25G A.I.A. Building Products Register Sweets Architectural File

A trained professional Hillyard Architectural Consultant will demonstrate CEM-SEAL for you, at no obligation. He serves "On Your Staff—Not Your Payroll." Write, wire or call collect.



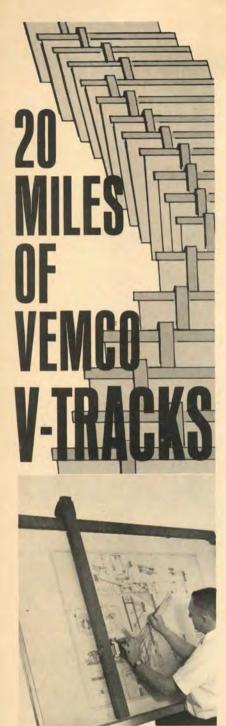


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That's about the amount of 'track' used in the VEMCO V-Track Drafting Machines being sold in 1966. Twenty miles: the distance from Boston to Brockton, Atlanta to Marietta, Dallas to Ft. Worth, Los Angeles to Whittier. If you aren't one of the 20,215 happy, highly efficient V-Track engineers daily producing more drawings of higher accuracy at lower cost with less fatigue, you'd better switch onto the right track...the VEMCO V-Track. Your free ticket to a better station up the line is the new 16-page brochure CBG66 and price list of all VEMCO products. Write or phone

V & E MANUFACTURING CO. 766 South Fair Oaks Ave., Pasadena, Calif. 91105 Telephone (213) 681-6796



On Readers' Service Card, Circle No. 474

flowing water.) One amusing idea is pegged cork planking. Catalog also describes products useful for upkeep of various materials. Kentile Floors Inc., 979 Third Ave., New York, N.Y. 10022.

Circle 217, Readers' Service Card

Visit Italy and France by placing French terra cotta and Italian quarry tile underfoot. A folding color bro-chure illustrates 11 imported varieties ("Ecaille Grand," 55/8" x 6" x 1/2", resembles fish scales; "Trefles de Provence," 9" x 6½" x ½", brings to mind cool cloisters), each given a rich "Old World" patina by oiling and waxing. Tiles are said to need no maintenance, even when used outdoors in freezing climates. Instructions for installation available. County Floors Inc., 214 E. 26th Street, New York, N.Y. 10010

Circle 218, Readers' Service Card

Library furniture and equipment are extensively illustrated in a catalog of almost 100 pages. Eye-catching is a round carrel study table for three (48" or 54" diameter, with 20"-high divider panels). Also, a system of bracket-hung shelving for perimeter or free-standing use called "Delineator." Swatch cards showing range of plastic laminates and baked enamel colors are available, together with specifications booklet. The Weinberg Corporation, Library Division, 145 W. Columbia Ave., Philadelphia, Pa. 19122.

Circle 219. Readers' Service Card

INSULATION

Vest-pocket calculator compares the efficiency of various built-up roofing materials for reducing size and operational cost of heating and cooling equipment. Three common roof-ceiling systems (using gypsum, metal, or concrete decking) are constant; variables are five types of insulation in varying thicknesses. Calculator shows corresponding heating/cooling equipment costs and annual fuel costs. An evaluation work sheet is



"It's good business to help colleges"

"The greatness of America stems importantly from our many fine educational institutions, and industry is critically dependent on their graduates.

"The du Pont Company hires a large number of college graduates each year. As these employees gain business knowledge and experience, they supply tomorrow's need for managers and leaders of our Com-

pany.

"In 1966 we will grant \$2,200,000 to 213 colleges and universities in all parts of the nation to help them educate leaders of the future. This represents the largest grant in the 48-year history of the du Pont Company's Aid-to-Education program."

Lammot du Pont Copeland, President, E. I. du Pont de Nemours & Co. (Inc.)

A major problem in the education of students is rising costs. If companies wish to insure the availability of college talent, they must help support colleges with financial aid.

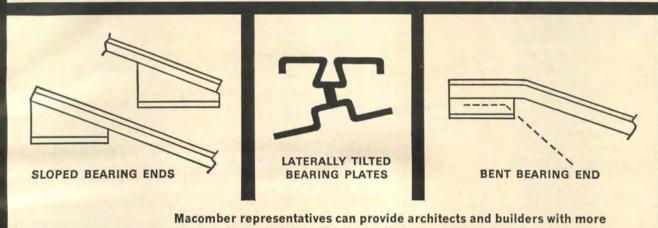


SPECIAL TO CORPORATE OF-FICERS — A new booklet of particular interest if your company has not yet established an aidto-education program. Write for: "How to Aid Education — and Yourself", Box 36, Times Square Station, New York, N.Y. 10036

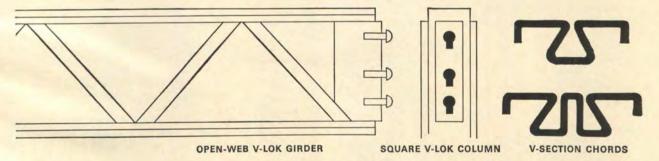
COLLEGE IS BUSINESS' BEST FRIEND

Published as a public service in cooperation with The Advertising Council and the Council for Financial Aid to Education

Macomber does a lot of little things to help architects and builders do a better job....for example:



Macomber representatives can provide architects and builders with more building for their dollar. This is no idle boast, but fact based on thousands of construction jobs. Macomber representatives are experienced building people who work closely with architects and builders in providing their clients with a custom-steel-framed building that exactly suits the need, as well as getting the most usable area from the site. Macomber V-LOK® open-web framing systems have become extremely popular because they combine maximum strength and flexibility with ease of erection. V-LOK can be modified to meet almost any requirement, including the systems approach.

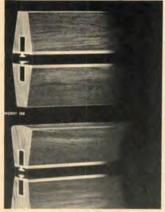


Prove it to yourself. Talk to the Macomber man in your area and discover how a sturdier custom-steel-framed building can be built to meet any specific style and set of requirements at costs equal to or even below other types, including prefabs. Literature and name of nearest representative upon request.



also included. Owens-Corning Fiberglas Corp., 717 Fifth Ave., New York, N.Y. 10020. Circle 220, Readers' Service Card

SPECIAL EQUIPMENT



Balustrades and newel posts in aluminum and walnut are cataloged in a host of profile designs for post and rail with wood, glass, or grille screens. Low-cost pipe railing systems are also shown. Comprehensive illustrations include both photos and dimensioned details showing railing systems

and installation. Short specifications, typical applications, full-size sections, and accessories (rail terminations, brackets, couplings) are included. 170 pages. Blumcraft of Pittsburgh, 460 Melwood St., Pittsburgh 13, Pa.

Circle 221, Readers' Service Card.

Ventilated athletic lockers for school gymnasiums, athletic clubs, and other institutional installations are fabricated from heavy gage steel mesh in 10 baked-enamel colors. Full-length or tiered locker styles are shown with sized drawings, photos, and descriptions. 8 pages. DeBourgh Mfg. Co., 9300 James Ave. South, Minneapolis, Minn.

Circle 222, Readers' Service Card

Josam interceptors save river and stream from pollution by oily wastes. Water containing wastes flows through a separating unit where sediment settles in a removable waste

bucket and lighter substances, such as oil, rise to the top and are skimmed off through a drain line. 95% of the oils are retrieved and can be reused, reports manufacturer. Specialized information is available from the company's Pollution Control Center whose reference files go back 50 years. Descriptions and dimension charts, suggested layouts for installation in various types of industrial plants. Also installation details. 14 pages. Josam Mfg. Co., Michigan City, Ind. 46360.

Circle 223, Readers' Service Card

SURFACING

Two vinyl wall coverings, B. F. Goodrich's "Koroseal" for Gilford Inc., are displayed with swatches on 2-page color card: "Marked Tree," a filmy cork design in 12 restful pastel and natural shades, one of which resembles birch bark; and "Karachi"—approximating rough-woven burlap, in 20

colors, including quiet bieges, cool greens, warm oranges. Gilford Inc., 387 Park Avenue South, New York, N. Y.

Circle 224, Readers' Service Card

Geometric clay squares with surface relief designs are presented for use on interior and exterior walls (water walls, murals, facades, sculptures). Ten basic types of designs are available in a variety of clay colors and stoneware glazes. Close-up as well as over-all installation pictures are included with specifications in 11-page brochure. Design Techniques, 160 East 56th St., New York, N. Y. 10022. Circle 225, Readers' Service Card

PROGRESSIVE ARCHITECTURE

REINHOLD PUBLISHING CORPORATION 430 Park Avenue, New York, N.Y. 10022



On Readers' Service Card, Circle No. 323

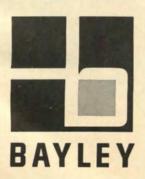


Shaky windows

Why should the architect check the financial strength of any component supplier? Because two kinds of risks threaten: building components may be cheapened below the intent of the specifications; inadequate capital and production facilities may delay deliveries beyond the financial peril point. Taken together, everyone connected with the project gets a black eye.

The William Bayley Company is financially sound, with the ability as well as the desire to meet responsibilities for quality and customer satisfaction. We deal solely with suppliers of integrity. It is the only way we know to build the finest windows and assure on-time delivery. This policy does not lower window prices, but it certainly has built repeat business. Solid windows result from responsibility.

THE WILLIAM BAYLEY COMPANY, Springfield, Ohio





Thermoproof Glass Company 4815 Cabot Avenue Detroit, Michigan 48210 subsidiary of Shatterproof Glass Corporation 44 years of glass experience

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INSULATING GLASS

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See Sweets

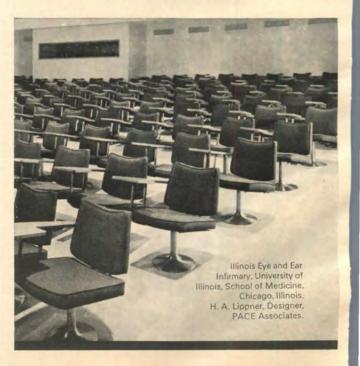


this is CHF

New CHF No. 468 used with 4° bevel mounts on flat, sloping auditorium floor—eliminates need for steps, yet gives each row of seats proper level for visibility and hearing.

Another "first" for CHF. For details on new no-step seating for schools, universities and auditoriums, write CHF 468, Chicago Hardware Foundry Co., North Chicago, Illinois.





At the ripe old age of <u>two</u> this building was recaulked with G-E Silicone Sealant.



(The original caulk couldn't stand the weather.)

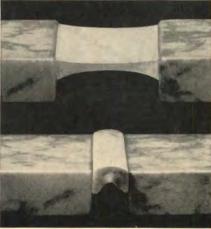
Was it the Florida heat or a hurricane named Dora?

Chances are, both caused the polysulfide caulk in this Florida hospital to break down in just two years. (And it was guaranteed for five!)

Now, General Electric's Silicone Construction Sealant is doing the job. It's providing superior protection day in and day out. And it'll survive Hurricanes Dorothy, Dolores, Donna and Dinah!

In fact, tests show that G-E Silicone Construction Sealant will take punishment of high winds and rain, intense heat and sunlight for years without loss of bond or elastomeric properties.

Because it's permanently flexible silicone rubber, it withstands severe expansion and contraction cycles. It won't crack, crumble or leak with age. And it's also permanently waterproof.

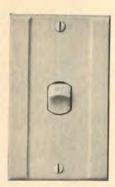


Joints expand and contract 10,950 times in 30 years. So will G-E Silicone Construction Sealant.

So recaulk with G-E Silicone Construction Sealant. Or use it from scratch and forget about recaulking. It comes in standard caulking cartridges and a range of permanent colors.

For more information and color swatches, contact your G-E distributor or write: Section Q10239, Silicone Products Department, General Electric Co., Waterford, New York 12188.





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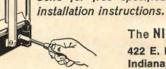


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Weighs only 3 lbs. s.f. 3/8" thick.

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required for terrazzo.

No underbed required, apply directly to concrete, brick, steel or wood.

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Creates a impenetrable surface to most materials, with more than twice the impact resistance of terrazzo.

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TRAZOPOXY'S resiliency eliminates floor crack problems. Can be applied to flexible long spans and bridgings.

Unlimited range of design and color

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115 New Montgomery St., San Francisco, Calif. On Readers' Service Card, Circle No. 436

126 P/A News Report October 1966

How can I be certain the Construction Adhesives used on my project provide a lasting bond?

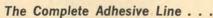
... Regardless of whether they are used to adhere to

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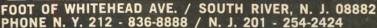




serving the construction industry for over 40 years custom formulating specialty adhesives and sealants to keep up with today's modern construction requirements.

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INC.



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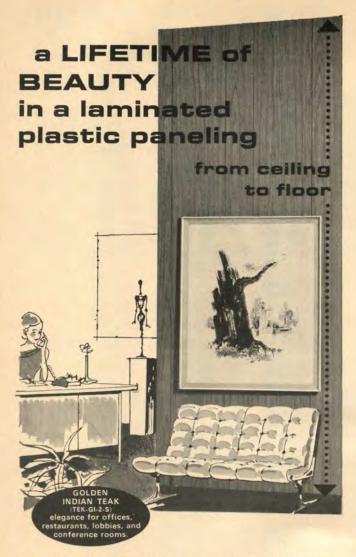




Not really new dimensions, but a new lock with the time-tested dimensions of the American Standards Association. The new Adams Rite® M.S.® ASA deadlock means that the same massive pivoted bolt used in narrow stile glass doors can be specified for nearly any door - wood, metal, whatever. Write for specification details of the new MS 1850 ASA Series deadlocks and their ASA specification strikes.







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Rugged outer layer of a continuous process polyester laminate provides a tough surface impervious to stains, scratches, heat, and wear; easily maintained—wipes clean with a damp cloth. Lamidall offers all the indestructible beauty and counter-top quality of high pressure laminates at about 1/3rd the cost.

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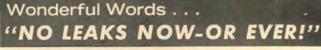
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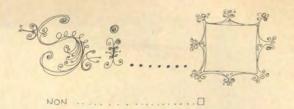
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- NO ON-THE-JOB CAULKING
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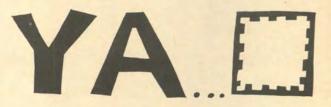
When you specify Superior Cushion-Lock Reglets, you can be assured of permanently leak-proof joints, so why take chances with inadequate or unspecified substitutes that may cause serious problems. Installation is fast and because of the labor-saving advantages, total "in-place" cost is lower. Shipped ready for application. Available in extruded PVC or aluminum. For details see Sweet's File 8g/Su or write for Bulletin CL-3.



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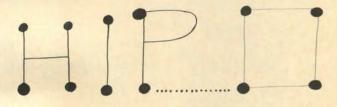




NEIN



No......



SQUARE.....

HEALTHY

The Kennedy Administration gave definition and impetus to a new kind of health building, the community mental health center. Now, a number of these centers have been developed and can be studied for their possible influence on the design of mental facilities. Four are discussed in November: in California, Ohio, Florida, and New York.

WEALTH

A source of untold (and virtually unearned) wealth is the way the interior design field has often appeared to the architect. In "Truth and Beauty," Zonk, P | A's renowned savant and delineator, will dissect that industry and see what makes it tick all the way to the bank.

AND WISE

Architects who strayed away from the folderol at the Denver AIA Convention may have seen a couple of the most interesting new educational complexes of recent years: the Engineering Science Center and the Marine Student Housing of the University of Colorado at Boulder. A lavish pictorial critique in next month's issue will present these designs fully.

WE HOPE

you are healthy and wealthy . . . we know you will be wiser from reading the November P | A (there are many more features in addition to the few we mention here, of course) and all the other forthcoming editions. All you have to do to have your consciousness expanded by P | A is fill in the subscription card (see Contents Page for location), send it in to our Circulation Manager, and get set for 12 stimulating issues of PROGRESSIVE ARCHITECTURE.

SHOWERING
IN THE
ROUND...
A UNIQUE
SHOWER ROOM

CREATION STARRING

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What's new on the shower room scene? Not Bradley Group Showers. They've been fixtures in schools for years.

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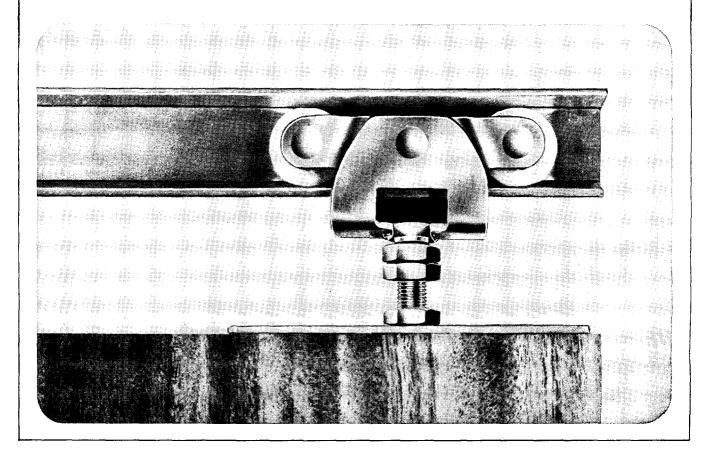
Each Grant 7000 Sliding Door Hardware carrier has four wheels. Eight per door. Sixteen wheels supporting a pair of by-passing doors. Just one uncommon feature in a very unusual line of hardware.

The 7000 line boasts innumerable other characteristics which help make it the most specified sliding

door hardware. These include: rocker arms insuring constant wheel-track contact, non-dust collecting tracks, balanced load distribution, nylon wheels, ball-socket suspension principle for misalignment compensation.

More features are shown in the Grant catalog. It's yours for the asking.

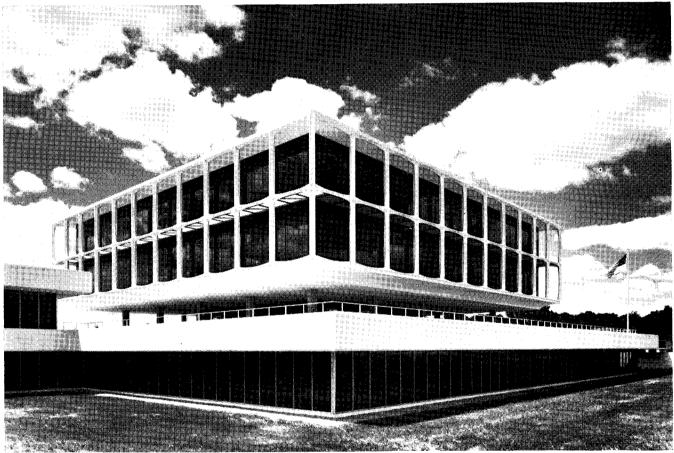
GRANT PULLEY & HARDWARE CORPORATION / 49 High St., West Nyack, N.Y. / Los Angeles, Calif.



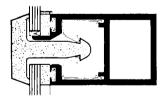


New PITTCO T-WALL Thermal framing system controls condensation, reduces heat loss in new Federal-Mogul Building





Federal-Mogul Corp. General Offices, Southfield, Mich. Architect: Giffels & Rossetti, Inc., Detroit.



The new PITTCO T-WALL has a proven 0.6* U-value. There is absolutely no metal connection from inside to outside. (See section.)

That means no condensation on the metal at room temperatures up to 70° with relative humidity of 35%—even when it's minus 20° outside. Metal framing is not chilly. Sound transmission is reduced.

Appearance is slim, elegant, unobtrusive. Face of the mullion is only $1\frac{1}{2}$ inches wide; gasket projects only $\frac{3}{8}$ of an inch from surface of the glass.

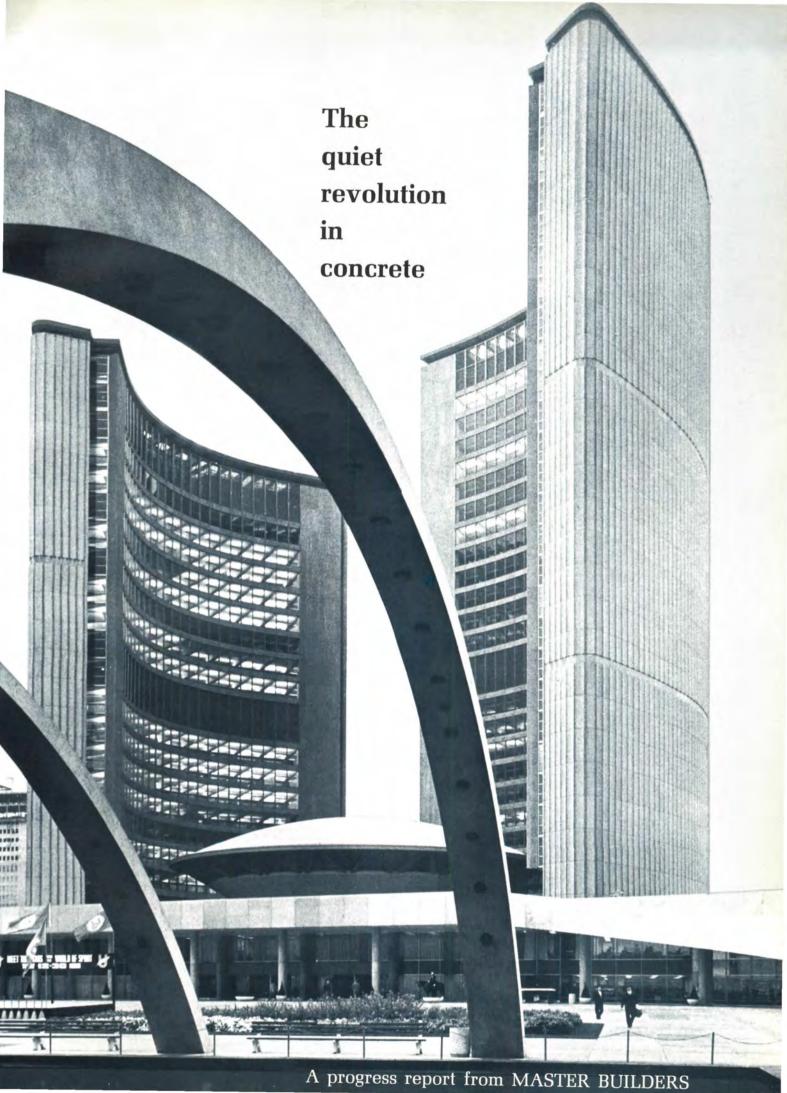
PITTCO T-WALL is available in several glazing

thickness combinations, including double glazing for maximum insulation. Standard components will meet varying strength requirements.

For more information on this new PITTCO framing system, see Sweet's Architectural File, section 3a/Pi, or write for our 4-page descriptive folder. Pittsburgh Plate Glass Company, Pittco Architectural Metals Department, Ohio Street, Kokomo, Indiana 46901.

*Performance test data published March 1, 1965, by Pennsylvania State University.





The guiet revolution in concrete

This year the world enters the final third of the 20th Century.

From this vantage point we can now see the second third of this century in perspective. Emerging clearly from the far-reaching changes of this era is the dramatic growth of concrete.

We have seen its growth as a major medium of expression. Growth in its capability. Growth in the realization of its potential. Growth in its use for myriad purposes. For this age-old material, evolution has become revolution.

Through the years designers recognized concrete's structural qualities but they frequently took great pains at great expense to keep it hidden from view.

It was not until the early '30's that a few pioneers, the innovators, in their search for new modes of expression, turned their eyes to concrete. Revolutionary design, exciting new shapes and daring structural commitments were achieved with concrete. The Quiet Revolution in Concrete was underway.

As more designers turned toward concrete as a means to achieve their design concepts, greater demands were placed on the material itself. Control of concrete resulted from advanced technical knowledge of architects, engineers, contractors, testing laboratories and ready mix producers, plus improved batching and mixing equipment.

continued . . .







- Precast concrete piers with deeply curved reveals are featured in the exterior wall system of the new American Dental Association headquarters, Chicago, Illinois. Architect: Graham, Anderson, Probst & White. General Contractor: Turner Construction Co.
- Called the most important new building in North America, the Toronto City Hall features precast, textured elements along with smooth form and acid etched finishes. Architects and Engineers: Viljo Revell-John B. Parkin Associates. General Contractor: Anglin-Norcross Ontario Limited.
- C The free-form design of Holy Family Church, Parma, Ohio, was sculptured in bush-hammered concrete. Architect: Conrad & Fleischman. Structural Engineer: R. M. Gensert Associates. General Contractor: The Martini Construction Company.

Master Builders' POZJOLITH was used to improve concrete performance in all structures on those pages.





g



- The natural color and texture of the precast concrete components were carried to the interior of the Ventura Savings & Loan Association, Ventura, California. Architect: William Pereira. Structural Engineer: Woodward Tom Associates. General Contractor: William Simpson Company.
- Architectural concrete in form board texture is the design keynote of St. John's Abbey. Designer: Marcel Breuer. Project Architect: Hamilton Smith. Structural Engineer: Weisenfeld, Hayward & Leon. Structural Consultant: Pier Luigi Nervi. Contractor: McGough Construction Company.
- Both the central tower core and the precast Vierendeel trusses of the North Carolina Mutual Life Insurance Building, Durham, N. C., were constructed of Pozzolith concrete. Architect: Welton Becket and Associates. Consulting Engineer: Seelye, Stevenson, Value & Knecht. General Contractor: Rea Construction Company.
- G Reinforced Pozzolith concrete is the key element in the 33-story, 407 ft. high Trade Mart Tower in New Orleans. Architect: Edward Durell Stone. Structural Engineer: Eller and Reaves. Contractor: Bloomfield Building Industries.





The quiet revolution in concrete

A milestone in concrete performance was reached in 1932 when Master Builders introduced Pozzolith, the first water-reducing admixture for concrete. It was an important key in controlling concrete's performance. Pozzolith, improved quality and durability, but equally important, it introduced uniformity and repeatability.

This control provided a springboard from which designers could leap into a bold new world of innovation. Design concepts were suddenly enhanced by the exciting new-found capabilities of concrete.

With the greater versatility and reliability made possible through the use of POZZOLITH, concrete began to be the preferred construction material. As architectural ingenuity grew, so did the role of concrete. Daring new applications were born—

Daring new applications

- lightweight structural
- · thin-shell concrete
- · exposed aggregate
- · prestressing
- · post-tensioning
- · lift-slab, tilt-up slabs

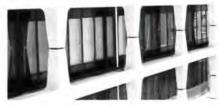
And Pozzolith rendered important contributions to all of these. It reduced unit water content without sacrificing workability or placeability. Or it increased workability without sacrificing strength, premeability and durability. It controlled setting time and improved appearance — increased watertightness and reduced cracking.

In short, POZZOLITH made concrete more useful and more versatile — more durable and more dependable. It made good concrete better and made concrete acceptable for many applications where heretofore plain concrete may have been questioned.











- Clean, sharp lines of architectural concrete mark the new American Institute for Research, Pittsburgh, Pa. Architect: Tasso Katselas. Structural Engineer: R. M. Gensert Associates. General Contractor: Navarro Corp.
- Reinforced concrete reaches a new high in luxury apartments at the 645 ft. tall 1000 Lake Shore Drive Plaza, Chicago, Ill. Architect: Sidney H. Morris & Associates. Structural Engineer: William Schmidt & Associates. General Contractor: Morris Handler Co., Inc.
- The undulating free-form roof of the Eastman Kodak Pavilion at the World's Fair required controlled setting time and exceptional uniformity. Designer: Will Burtin. Architect: Kahn & Jacobs. Engineer: Lev Zetlin & Associates. General Contractor: George A. Fuller Co.
- Precast structural crosses produce striking architectural design for the John Hancock Mutual Life Insurance Building in Kansas City, Mo. Architect: Skidmore, Owings and Merrill. Structural Engineer: Paul Weidlinger, and Weiskopf and Pickworth. Contractor: W. E. Brown Associates.
- Pozzolith concrete provides structural durability and lasting beauty at the Marriott Motor Hotel in Atlanta, Ga. Architect: James M. Hunt, Contractor: Beers Construction Co.
- Bold use of exposed concrete is exemplified in the Library Building on the San Diego campus of the University of California. Architect: Deems, Lewis, Martin & Assoc. Structural Engineer: A. J. Blaylock & Assoc. General Contractor: J. B. Allen Company.
- Spectacular shapes achieved with concrete identify the Park Towers apartments in Toronto. Architect: John H. Daniels. Engineer: Reicher, Bradstock & Associates Ltd. Contractor: Cadillac Development Corporation Ltd. and Globe Building Co. (Toronto) Ltd.



The quiet revolution in concrete

Today, controlled performance concrete is the one building material that permits total architectural freedom — expression without restraint.

Designers are taking advantage of this new freedom. Structural boldness and textural expression in concrete have become the rule rather than the exception. Concrete is serving in many ways never thought possible. Radical practices have developed the aesthetic properties of concrete. Exposed aggregate surfaces, bush hammered, acid etched and form-board finishes provide natural beauty to last through the ages.

The Quiet Revolution in Concrete has grown from a murmur to a strong voice. It is heard throughout the world. More and more noteworthy structures stand as monuments to the versatility of concrete and Pozzolith plays a vital role in the majority of them. It was the first admixture to achieve predictable control of concrete. Imitators have come upon the scene, but not one has managed to surpass the repeatability of performance that is Pozzolith's.

As architects design for the world of the future, they will continue to create new and exciting uses for concrete. As Pozzolith has grown with concrete, so will it continue to meet the everchanging architectural challenges of the changing world. Concrete is better today, and so is Pozzolith. So they will be tomorrow.

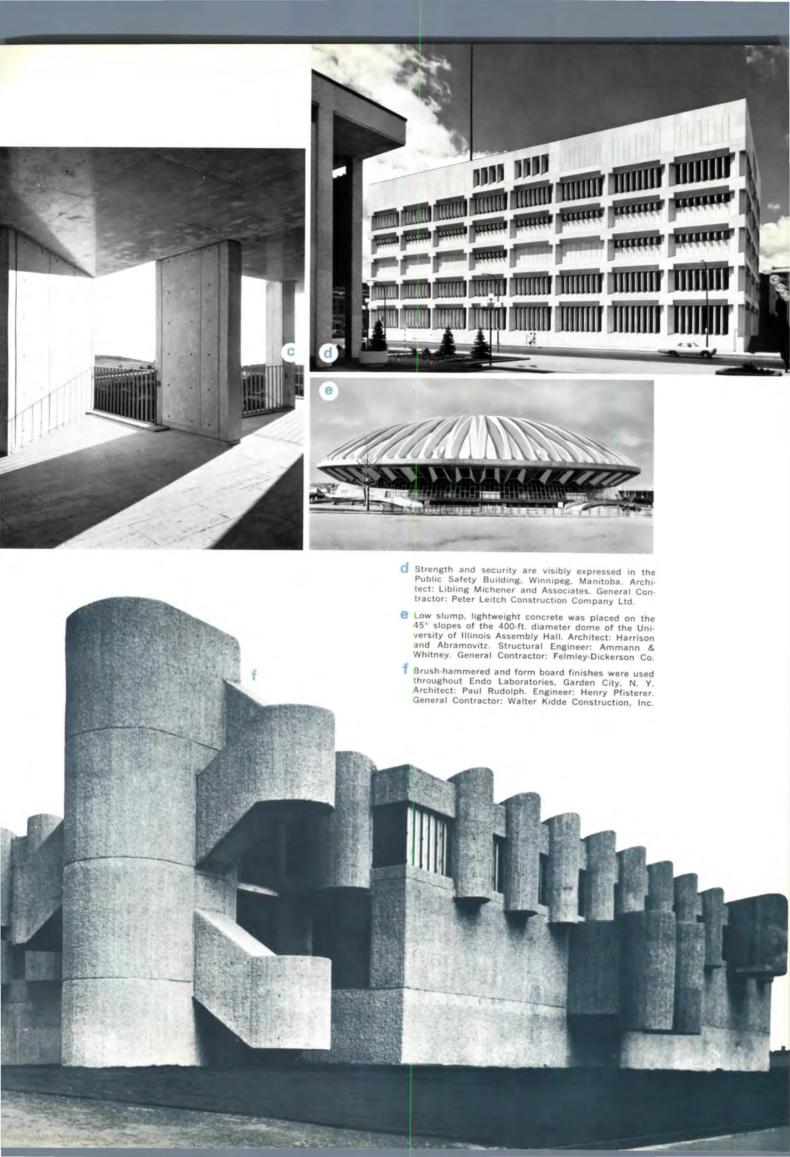
The Quiet Revolution in Concrete may yet become a tumultous roar.



- a A huge prestressed monolithic concrete girder system supports the roof and hung balcony and frees the interior of columns at the Munson-Williams-Proctor Institute Art Gallery, Utica, N. Y. Architect: Phillip Johnson. Engineer: Lev Zetlin & Associates. General Contractor: George A. Fuller Co.
- Chatham Tower apartments in New York City add twin concrete towers to the changing skyline of lower Manhattan. Architect: Kelly & Gruzen. Structural Engineer: Weinberger, Frieman, Leichtman & Quinn. General Contractor: Joseph P. Blitz.
- The raw beauty of exposed concrete sets the environmental tone of the Salk Institute for Biological Studies at La Jolla, Cal. Architect: Louis I. Kahn. Structural Consultant: August E. Komendant. General Contractor: George A. Fuller Co.







- Memphis Airport Terminal, Memphis Tenn., illustrates the control of plastic and hardened concrete properties needed in thin shell construction. Architect: Mann and Harrover. Engineer: S. S. Kenworthy and Associates. Contractor J. A. Jones Construction Co.
- Blunt honesty through the use of exposed concrete identifies the Carpenter Visual Arts Center at Harvard University. Architects: Le Corbusier. Collaborating Architects: Sert, Jackson & Gourley, Structural Engineer: William J. Le Messurier & Assoc., Inc. General Contractor: George A. Fuller Co.
- C The National Offices of the American Baptist Convention, Valley Forge, Pa., represents a panorama of modern concrete applications. Architect: Vincent G. Kling. Structural Engineer: McCormack-Taylor Associates. General Contractor: Turner Construction Co.
- d The Pacific Science Center in Seattle stands as a monument to precast, exposed aggregate concrete. Architect: Minoru Yamasaki & Associates, Naramore, Bain, Brady & Johanson. Engineers: Worthington, Skilling, Helle & Jackson. Contractor: Purvis Construction Company.
- Sculptured concrete gives a feeling of flight to the TWA Terminal at Kennedy International Airport. Architect: Eero Saarinen & Associates. Consulting Engineer: Ammann & Whitney. General Contractor: Grove, Shepherd, Wilson & Kruge, Inc.





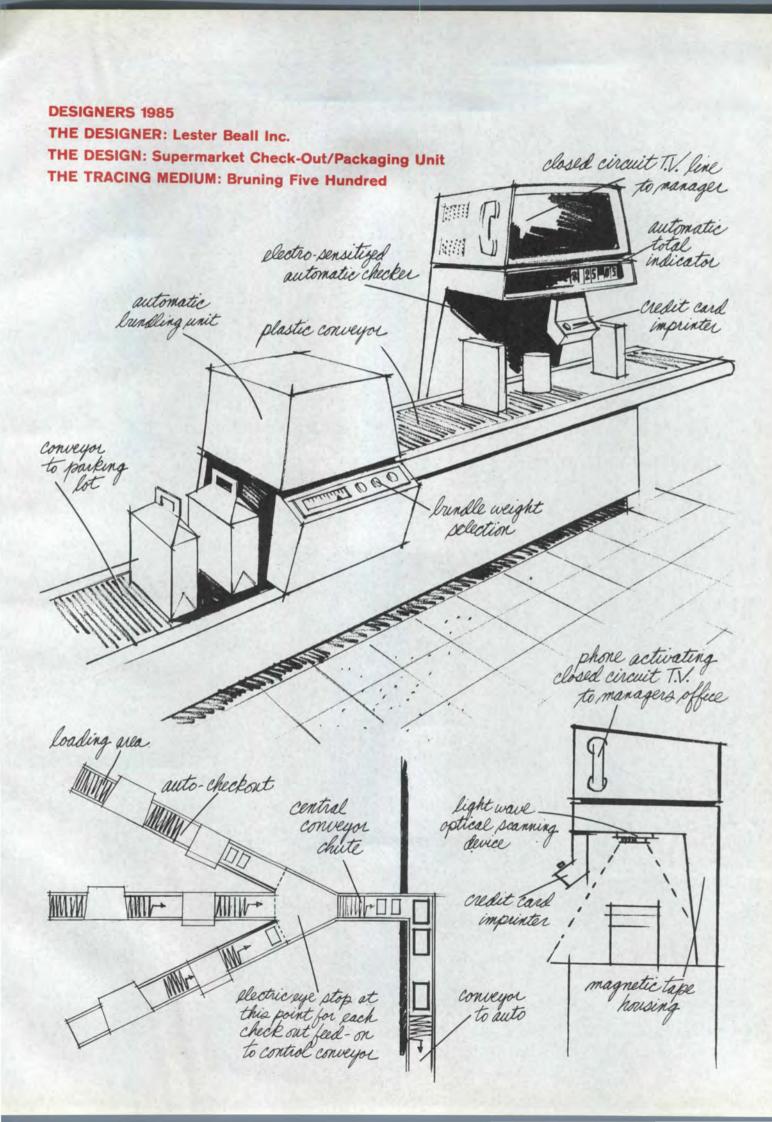






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When you want to be sure of the best possible door performance, backed up with reliable lifetime service, make certain that the door you select bears the Kinnear "Registered" name plate. It insures you of having the exclusive, time-proven design of the originator — and the leading manufacturer — of the interlocking slat-type of rolling door.

But that's not all! Every door bearing the Kinnear label is "Registered" and identified by its own registration number permanently stamped in the name plate* mounted on the bottom of the door. Complete engineering details on the door of that number are permanently kept in fireproof vaults so that genuine Kinnear replacement parts are available even for doors installed 70 years ago, in case of accidental damage or other mishap. Truly, "life extension" insurance! And it's made still more valuable by Kinnear's nation-wide service organization of trained and experienced door specialists who are always on-call to keep your doors shipshape.

Couple this door service and performance with the operating efficiency and space economy of the rolling door design and it's easily understood why Kinnear Rolling Doors have been so universally preferred for so many years. Specify Kinnear for your door needs.

Also manufacturers of Power Operators, Automatic Rolling Fire Doors and Shutters, Rolling Grilles, Rolling Counter Shutters and RoL-TOP (overhead type) Wood or Metal Doors.

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°For even your further protection the door "Registration" number is also stamped under the hood, on the end of the barrel shaft and on the motor operator plate.





What's in a name?

rasan means durability. It's the tough Gold Bond vinyl-covered gypsum wallboard. azingly scuffproof. Ideal for heavy traffic areas. And the gypsum-rock core is fireproof. rasan® comes in 8 textured, standard colors; 4 woodgrain patterns. Special, custom stylized patterns on special order. Contractors can install these beautiful 4'-wide ing-height panels at less cost than building bare walls and then decorating with of they can be used in the new Contempo-Wall Demountable Partition System. It of maintenance is negligible because stains and smudges wash right off. Ask of Gold Bond® Building Supply Dealer to show you the exciting new patterns. Or the to National Gypsum Company, Department PA-106G, Buffalo, New York 14225.

On Readers' Service Card, Circle No. 404

Gold Bond.

DURASAN



Bentley College of Boston selects all-electric design for new Waltham campus...finds costs competitive, operating advantages conclusive

When the Board of Trustees of Bentley College, a professional college of accounting and finance, started planning their new \$25-million, 102-acre campus in Waltham, Massachusetts, this was their goal:

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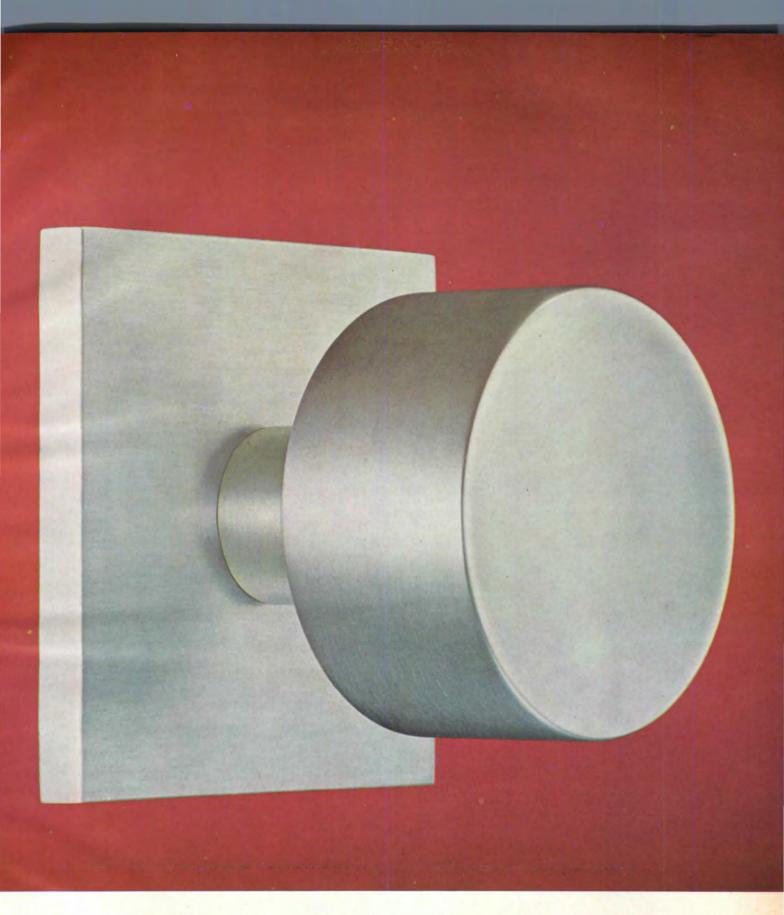
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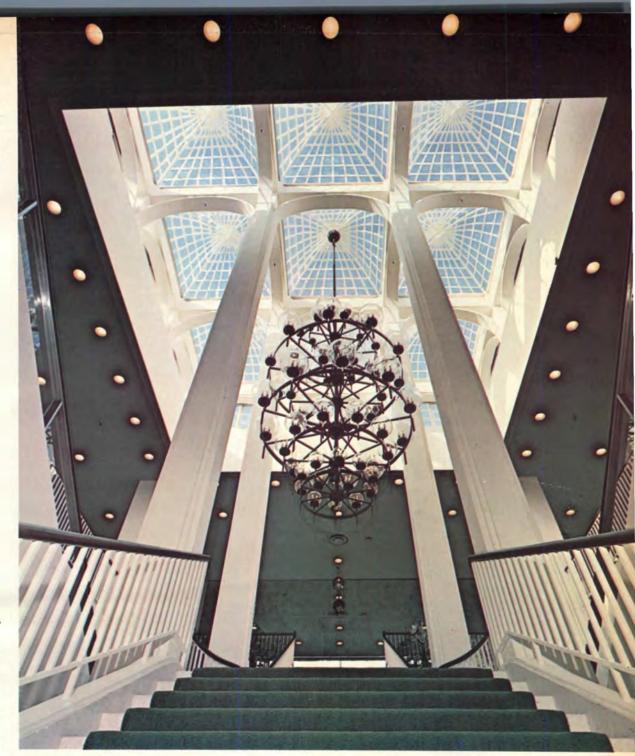


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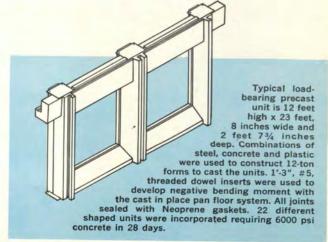
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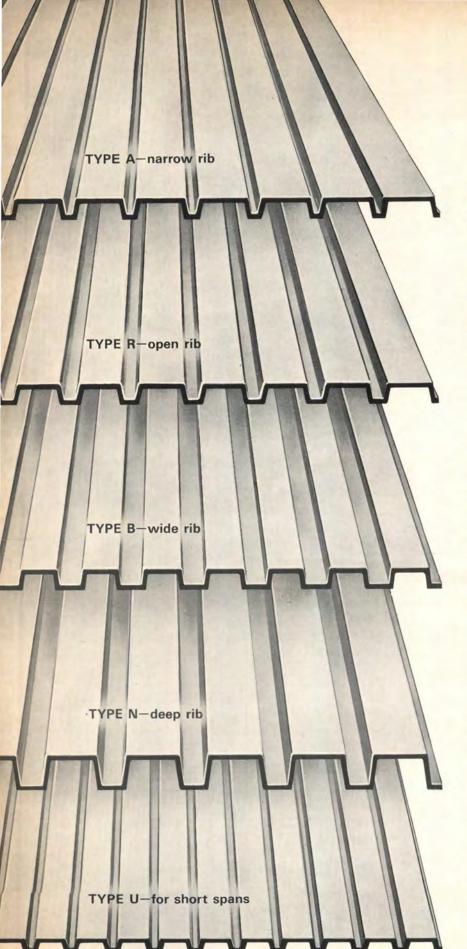




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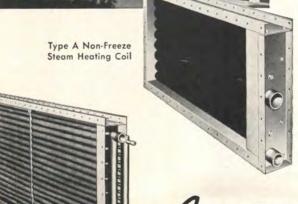
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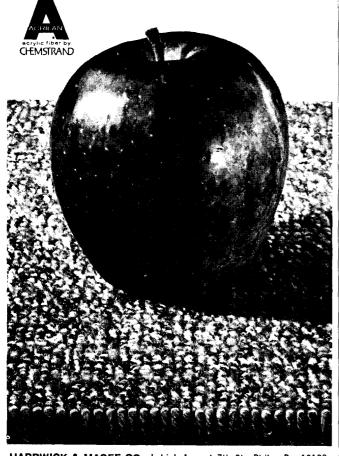
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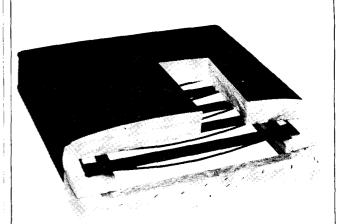
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OCTOBER 1966 P/A



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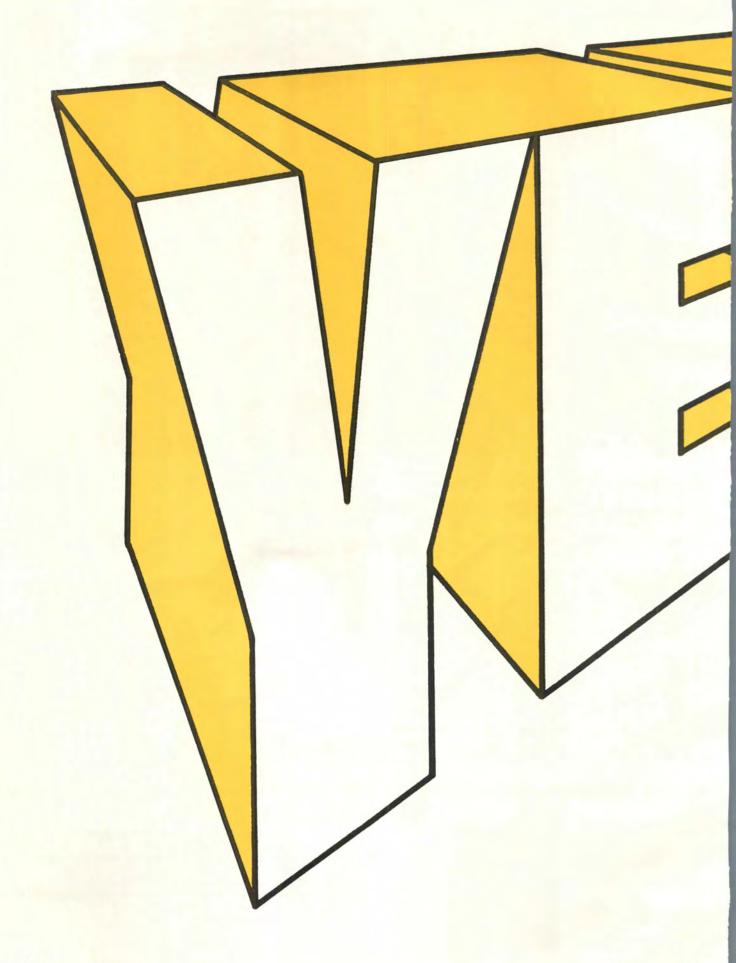
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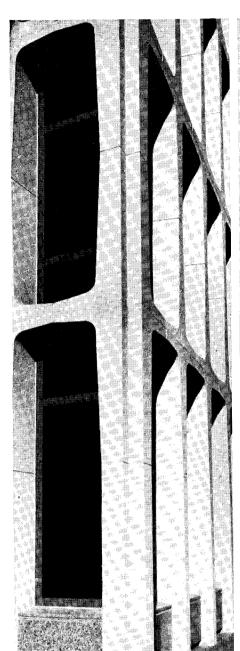
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October 1966 PROGRESSIVE ARCHITECTURE

"Concrete is mud. I work with concrete, not against it. I like mud."

PAUL RUDOLPH

"Thinking about the future of concrete, we would have the best concrete when we don't use cement at all. If we could develop an epoxy plastic and use it to replace the cementing action in the mix, we could produce a material like granite. Such a mixture would not be subject to plastic deformations, and would not change in the course of time. This. to me, would be the future of concrete."

DR. AUGUST KOMENDANT



Permanence is one of the characteristics of concrete. Not only does it increase in strength with age, but it is also weighty and, usually, bulky. Architects, as a rule, like the idea of indestructibility. Since much creative effort and hard work is involved in putting up a building, most architects resent the premise of disposability and avoid it as if it were some kind of architectural psychalia. Which is probably one reason for the growing popularity of concrete as a building material.

And yet, disposability is only a near cousin of flexibility, a concept pretty well established in the profession. In an age of vast and fast changes, permanence, in spite of its emotional allure, is simply not practical. Architects all over the world are discovering this. For example, countries that have an advanced concrete technology (such as Hungary and Poland, which I visited recently) are now re-evaluating the wisdom of building with large, load-bearing panels of prefabricated, reinforced concrete, a system popular there until recently. In Poland, there is already a tendency to build skeletal apartment houses of prefabricated concrete beams and columns only, rather than solid structural walls, so that walls could be knocked out in case of future changes in housing standards. This cannot be done, of course, with load-bearing box construction. Apartment sizes are frozen for generations to come, unless the building is dynamited and another one built in its stead. Thus, the size and type of concrete elements is a subject of live controversy in a country that goes all out for prefabricated concrete construction.

Another controversy centers around the question of how complete the prefabricated elements should be. One school of thought claims that the logic of prefabrication indicates as complete a unit as possible, and that finishes should therefore be applied before erection, not after. The opposing school looks at the results and says that building construction is a rough operation and that repairing damages inflicted on finishes during erection offsets any saving in time, labor, and material, and that, logically, finishes should therefore be applied after erection is completed.

To go back to the subject of permanence: One of the effects of standardization of building design and industrialization of building construction in Poland is the diminishing need for architects. After the basic design problems of the prototypes have been solved, the engineers and builders take over the details of production and erection techniques. Result: A severe recent cutback in Polish architectural offices left many architects jobless and a substantial number had to seek work in other countries. Presently, some 200 Polish architects are working in France, for instance. The irony seems to be that, after contributing to the creation of nondisposable buildings, they became disposable themselves.

Jan C Rowan

NHERE DOWE GO FROM HERE?

Exactly six years ago, P/A devoted an issue to concrete technology. It was a time when we thought that exposed concrete construction would become a major force in building design. This proved to be true. Now, a little more than half a decade later, after considerable work in concrete has been done, P/A editors solicited a wide variety of opinion to assess the present state of the art. As a result of our investigations, architects, engineers, contractors, and manufacturers air their views on the following pages, discuss methods and techniques, and assess the economics of this basically humble yet tricky material.

in with a bang. Will it go out with a whimper? In an explosive discussion, the answers are provided by those producing the fireworks. concrete came Exposed

PUTTERING WITH THE POTENTIAL

"Concrete is like stone; it should be in the graveyard," says A. Farch, a construction superintendent. By puttering with the potential, is the architectural profession making the future of concrete as dead as Farch thinks?

To the undoubted joy of the concrete industry, the great majority of architects do not share Farch's cynicism. They are agreed that, theoretically, the potential of exposed concrete is virtually untapped.

However, discontent with present performance was as widespread as enthusiasm for its prospects. From Canada to the United States to the Fiji Islands, architects made the same complaints, despite regional boundaries and wide climatic variations. They complained of poor control, lack of contractor responsibility, and design inhibitions caused by codes and labor.

It is possible that this discontent is the result of the natural growing pains in the development of a new material. If this is so, we can expect to solve present problems on the road to final realization of concrete's ultimate potential.

However, the very universality of difficulties may indicate insurmountable practical problems—difficulties that will bury concrete as an architectural material. Concrete would then take its place as just another "aesthetic fetish."

The Enemy Within

All of concrete's difficulties do not come from outside the designers' office. Design concentration upon finicky precision as a hangover from the shiny new metal curtain wall building era strains the use of concrete both technically and economically.

Is there a justification for manicuring "mud"? Should concrete technology be strained to produce "cookie cutter shapes" more expensive than granite, but with no

assurance they will be one-third as durable? Is making silk purses out of sows' ears the way to explore the potential of concrete or to kill it? Few architects can "take it or leave it alone." As Herbert Riemer of Morris Ketchum, Jr. & Associates states, "If concrete needs more refinement, why do it in concrete?"

Concrete technology is clearly divided into two manufacturing processes: cast-in-place and precast. Cast-in-place for the most part follows the mold of two-dimensional structural systems, because its economics has prevented exploration of the logical multidirectional strength of its plasticity. Precast without prestressing has been successfully used structurally only in low-rise buildings. With the introduction of stressing, multiple units can climb into the air, limited only by the abilities of hoisting equipment.

But is the combination of separate elements, similar to heavy timber construction, actually exploring the potential of concrete? Is not the assemblage of components a negation of the monolithic sculptural plasticity which, most architects assert, is the chief virtue of concrete?

Plastic Panacea?

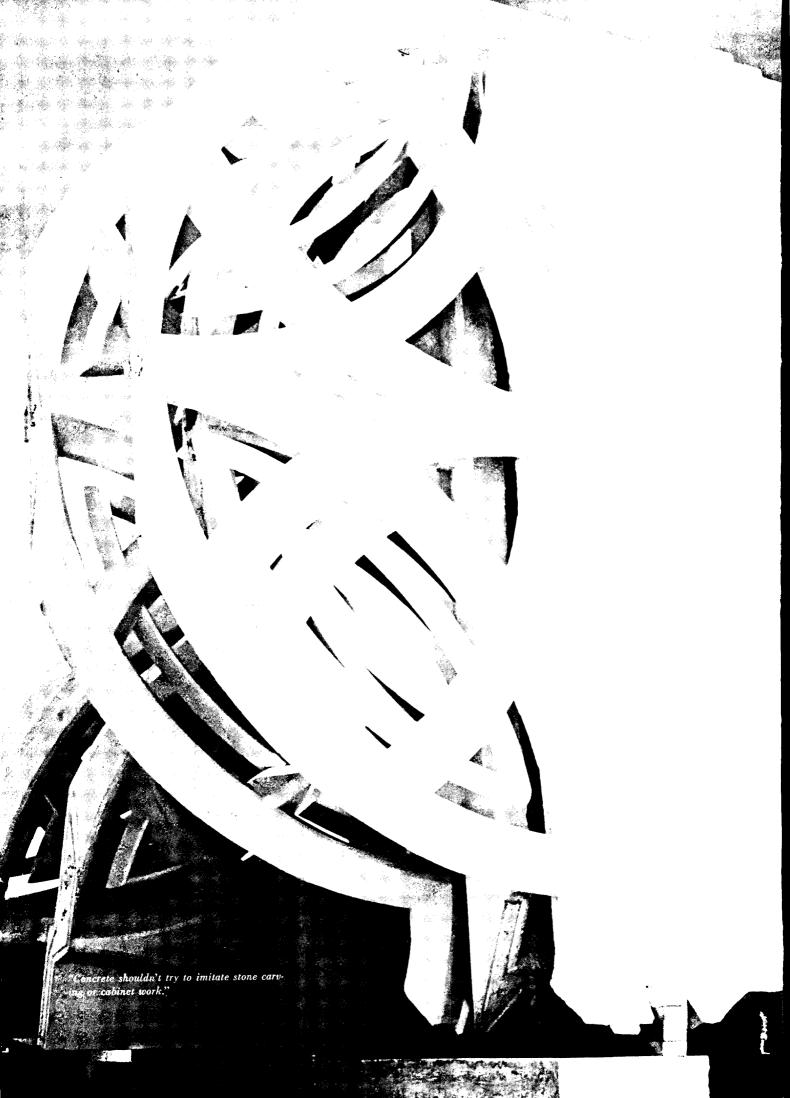
Whether the ultimate potential of exposed concrete is ever developed from its present infancy, or is relegated to the graveyard to be buried hardly more than stillborn, may be beyond the control of the architectural profession.

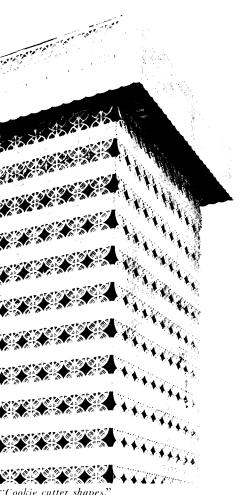
A general demand is being made for the development of a new material that will have the plastic virtues of concrete and none of its weighty faults. Many architects feel that they need a sort of super loadbearing silly putty. It would be a lightweight substance impervious to water, easily formed, without plastic flow, foolproof in handling, and carrying automatic code approval. In other words, a material giving unlimited design freedom, with no practical limitations.

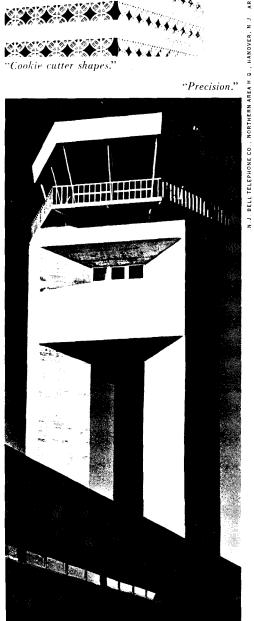
Perhaps this is a material only to be found in an architects' heaven. However, if it comes into being on earth, it will realize the theoretical potential of concrete as a building material by overcoming concrete's practical limitations.

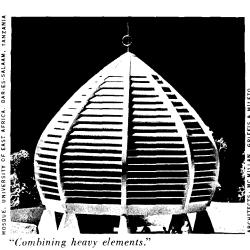
"I don't think that concrete needs any improvement," says Werner Seligman, Cortland, N. Y. "I'm satisfied with it as it is."

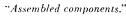
"Maybe so, and maybe not," comments Farch. "In the meantime, give me brick. That's a material a man can trust."

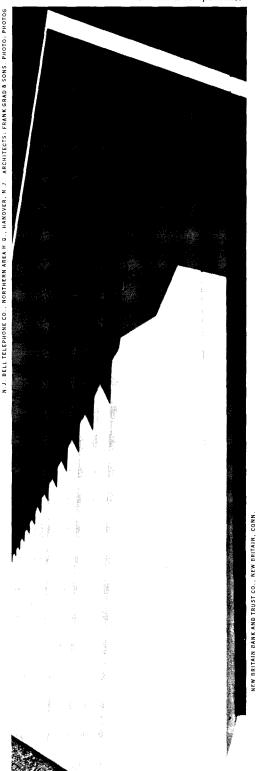


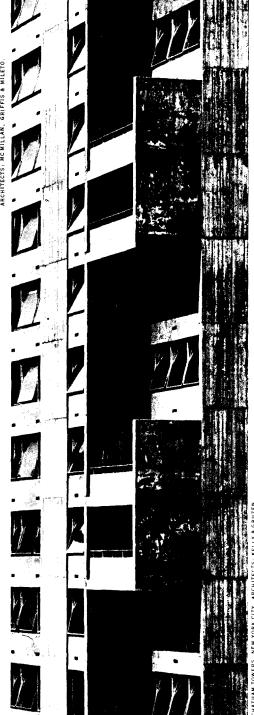






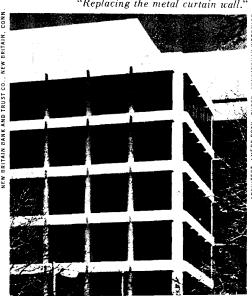






"Unmanicured mud."

"Replacing the metal curtain wall."



DOES CONCRETE WORK, WORK?

"We could have given you this concrete for one-third the price, if the building had been a warehouse instead of a church." So said a contractor after realizing that the designer wanted rough concrete walls unretouched after stripping the forms. To avoid such misunderstanding, architects will either have to disguise the purpose of a building or educate contractors.

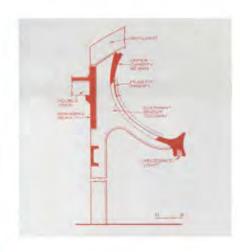
Paul Rudolph continually struggles to make contractors leave concrete untouched after stripping forms. "It's virtually impossible to get concrete contractors to leave it alone," says Frederick Frost, a New York City architect, "Few workmen seem to know how to patch a surface without becoming obsessed with patching and grinding, which defaces it."

Somewhat pessimistically, Wayman Wing, a New York City consulting engineer, says, "It is almost impossible to train a contractor to produce rough concrete with the sophistication of Corbu's work."

Rough or smooth, both textures cause problems. Following a difficult and expensive contract with a smooth-finished concrete façade, Richard Roth, Jr., of Emery Roth & Sons, noted, "After years of hiding concrete, masons do not psychologically comprehend the need for exposing it."

Concrete contractors offer to give any exposed surface that is called for. Some finishes are easier than others: "We can do a better job by accenting the form marks or removing them by sandblasting, bush-hammering, or corn brushing," says Vince Kelly of Brennan & Sloan Inc., a New York City concrete contractor.

Some contractors claim that an exposed concrete surface is cheaper than limestone, masonry, or granite, but many architects report that they switched from concrete to another material because concrete was too expensive.





Stressed canopy.

Tensioned erector set (see bottom photo, facing page).

Plastic-Formed Boardmarks

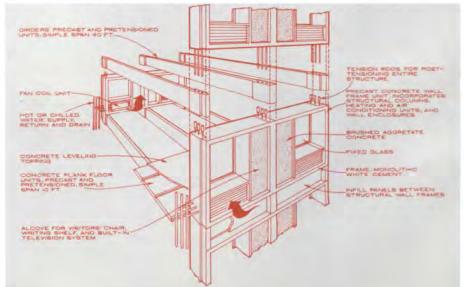
If integrity is not at a premium, concrete can be made to look like other textures. "We can reproduce practically any surface you want," says Harry Darby of Winner Manufacturing Co., Trenton, N. J. Winner makes glass-fiber-reinforced-plastic molds with slate impressions in the surface so that concrete will have the exact appearance of slate.

Darby also points out that the company could make forms with rough board marks on the surfaces. This, presumably, would enable an architect to make pencil rubbings of his idols' concrete work, and precisely reproduce the random board pattern on his own work.

Contractors would not hesitate to try casting unusual textures. Says one in St. Louis, "In this business, you have to move with innovations in order to keep your head above water." Another concrete contractor sums up the whole question of finishes: "If you spend enough money, you get a good job."

Few architectural clients come on the scene with enough money. An architect must supplement richness with skill, Good finishes are obtainable, but they need a thorough understanding of the capabilities of the materials. "The greatest problems arise when concrete is expected to perform beyond its capabilities," says Leonard Bell of Smith, Hinchman & Grylls Associates.

Not everyone wants to leave concrete untouched. Many designers and contractors advocate coating the surface. Hausner & Macsai, Chicago, say they are successful with concrete only when coated. Clifford Stewart, of Perry, Dean, Hepburn & Shaw in Boston, feels that the aesthetic purity of epoxy coatings may be



questioned, but they do enable an owner to keep up the appearance of a building.

Will Success Spoil Contractors?

"We have trouble finding contractors who can visualize the capabilities of concrete and will not persist in underestimating the difficulties involved after we point them out. We also find difficulty in obtaining accurate cost figures in advance of bidding." These remarks, by Ronald Gribble of Fisher, Nes Campbell & Partners in Baltimore, summarize the experience of quite a number of architectural firms.

Some architects believe that success spoiled many contractors and made them cautious of anything but an odds-on favorite. "Contractors won't gamble on the end product that designers are trying to create." says Wayman Wing.

"Concrete suppliers have been so busy that physical performance rather than innovation has been the problem," points out Earl Flansburgh of Cambridge.

And Walter Netsch, of Skidmore, Owings & Merrill's Chicago office, is concerned "... about the reticence of readymix concrete suppliers in using special cements and mixes that may place a burden on their broad-scale use of supply yards. This occurs because good exposed concrete requires a careful series of sample studies of cement, aggregate and sand."

Looking at the broad view, Netsch adds, "As the construction market continues in scale, there is less desire to expand the potential. This may also be justified criticism for architects."

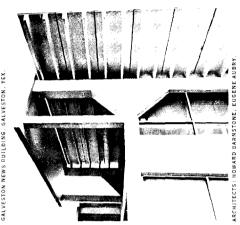
Clients, too. Remarks B. Sumner Gruzen of Kelly & Gruzen, "The city, state, and Federal governments have not been easily persuaded to try new techniques."

It is not always the contractor who drags his feet. "Probably no supplier feels his materials are being fully exploited," says Albert Litvin of the Portland Cement Association. The reason for this may be that architects don't have time to exploit new materials. Says Flansburgh, "Architects did more experimenting in the 20's and 30's because all they had to do was sit around. Now they are so busy they don't have time to experiment."

Architects also decry the attitudes of contractors who cannot be bothered to train men, or still follow familiar techniques when better ones are available. Edwin Steffian of Boston comments.



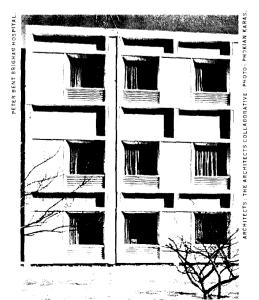
Light fantastic.



Concrete fit to a T.



Board and block precision.



"Formwork lines and blemishes are often due to lack of care by a contractor who ignores instructions in specifications and drawings."

"The average contractor," points out Gyo Obata of Hellmuth, Obata & Kassabaum, "is not used to the idea that his bid carries the responsibility to do careful formwork, mixing, casting, stripping, sandblasting, and so on."

What Workmen Put Into It

Sometimes a contractor is big with words but short on deeds. A partner in a venerable architectural firm claims that the head of a large contracting company talks a lot about good construction practices for concrete work, but does not see that his men know about them: "When I remonstrated with a carpenter for urinating into formwork, the man said nobody had told him about good practices."

Leonard Bell does not mention toilet training, but does notice a lack of craftsmanship in formwork, and would like to see "finish" carpenters employed for architectural concrete.

The craftsman, believes Bennie Gonzales of Phoenix, Ariz., "... can cause irreparable damage, raise costs of special techniques, or he can be invaluable to a project." The Southwest, he notes, has an imbalance of unskilled workmen, which is aggravated by subcontractors unfamiliar with technical developments.

Yet the northeast region of the U.S., where many designers and contractors are concentrated, generally looks to other regions for advances in concrete. Ira Hooper of Seelye, Stevenson, Value & Knecht, consulting engineers in New York City, feels that the South and West are head and shoulders above technical developments in the Northeast. H. T. Noyes, chief engineer of Turner Construction Corp., agrees with him.

It is not only contractors who err. Hedley Roy of John B. Parkin Associates, Toronto, believes that we have inadequate technology and that there is a natural resistance to change on the part of designers and contractors.

One of the larger design firms, Welton Beckett & Associates, reports that major contracting companies are always willing to cooperate creatively with the architect and his engineers. Contractors often suggest erection techniques that aid in establishing pioneering designs.

Peter Morton of The Architects Collaborative. Cambridge, Mass., compli-

ments the professional approach of many subcontractors, especially the formwork subcontractor on a recent TAC job: "They influenced the design in many ways, such as where the form joints should be, what size panels can be used, and where to put the form ties. I am thunderstruck at the importance of the form men."

The Precaster's Viewpoint

If a sub influences a job, be sure to find a good influence. For precasting work. listen to a precaster, Tom Nolan of Tecfab, North Arlington, N. J.: "If the men running a manufacturing plant have not been working in a successful architectural concrete precasting plant for at least five years, the company isn't worth a damn. Furthermore, its products are a definite risk to the successful completion of a building."

Nolan states it is not an easy business. He has frequently seen manufacturers go rapidly broke: "They think that all they need to do is make a mold, fill it with concrete, strip the mold, and ship the product to a site. But the technology of precasting is quite complex, and the rewards are slow to materialize."

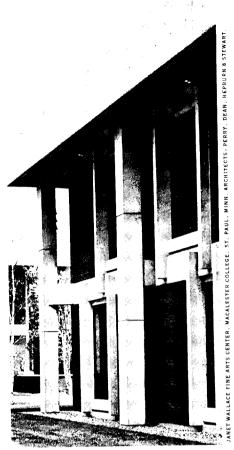
Some architects may have met the type of precasters mentioned by Nolan. Dan Toan, of Warner, Burns, Toan & Lunde, New York, N. Y., feels the precasting field is not up to what it should be: "It is competing with the stone business, and isn't set up to compete with cast-in-place concrete."

Contrariwise, Raymond Epstein of Epstein & Sons, Chicago, believes that "the precast concrete industry is well advanced with its product, but the cast-in-place field leaves much to be desired."

To capitalize on the benefits of precasting, a designer must repeat himself. "It is necessary to design repetitive elements to allow the precast-concrete contractor to compete economically." points out an architect. Fine, replies a precaster, "but few members of the profession think this way. A designer can add \$3 per sq ft to the cost of a building just by neglecting to think about the precaster's problems of repetition."

Performance, Weather, and Research

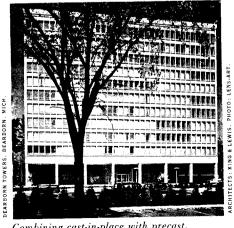
"The major difficulty is the difference between work specified and work performed." This message, in one form or another, comes through loud and clear from many architects. Sumner Gruzen:



Expressive skeleton.



The Government gives it a try.



Combining cast-in-place with precast.

"It's often necessary to perform corrective treatment to concrete to obtain an acceptable finish. The alternative is to demolish the work and cast it again."

So, concrete, to no one's great surprise, has limitations. At the design level: "Like any other material, concrete is no guarantee of unqualified success." In close-up: "I'm disappointed at the staining, spalling, and cracking." And in cost: "Limestone is cheaper."

Concrete stands up better in some climates than others. Boston is in a bad zone, according to Herman Protze, a concrete consultant, because of frequent freeze-thaw cycles each winter. Colder regions are less exacting, because they freeze up for the whole winter.

Wallace Harrison, of Harrison & Abramovitz, remarks, "Our office believes that carefully supervised concrete will work in New York City's climate, but I do not agree."

There's a lot to be researched in weathering, as well as many other aspects of concrete. "Industry should take more of a lead," says Frank Grad. "For a recent project, we had to finance developments that businesses with research resources should do. Unfortunately, too many companies make too much money to want to improve technology. The amount of money not spent on research is amazing."

Many architects believe concrete to be late blooming. Flansburgh says, "Only recently have we begun to see the true plastic capability of the concrete." And Sepp Firnkas, a Boston consulting engineer. comments, "Only in the last few months have designers begun to understand that concrete is not just a structural element, and also has no justification as a curtain wall."

Slump Causes Problems

"Concrete isn't a poor man's stone."

"Concrete shouldn't try to imitate stone carving or cabinet work."

Right. Concrete is concrete, and does not have to be dressed up. But it does have to be good concrete, and that calls for controls. "It's such a simple material, but with such little control," points out an architect. "There is an over-all lack of responsibility for the suppliers of sand, aggregate, and cement," says Grad.

Specifications provide part of the control, but the experts believe the specs should not be rigid. "Don't tie down the contractor too hard," warns a contractor. "Rigid specs cause the costs to exceed

budgets," emphasizes an architect. "Tight specs enable an architect to police a job during construction," says an engineer.

Ask a concrete contractor what single item causes most trouble, and the answer invariably is slump. Many contractors do not give it sufficient consideration, claims a concrete sub. But Kelly gives it a lot of thought: "It's very difficult to control slump when concrete is discharged from a mix truck in 90 F weather and passes through four or five containers to reach the forms on the thirtieth floor of a structure."

Changed Mixes

In the six years since P/A's last issue about concrete, its strength has risen: 5000 psi is now commonly called for in place of the former 3750 psi. Steel strengths increased with concrete. Yield strength for A432 steel is now 60,000 psi, with a working stress of 24,000 psi. In 1960, the working stress was 20,000 psi.

Design methods are also changing. Some engineers are designing columns by ultimate strength methods, instead of by working stress formulas. Designers also adapted the composite action usually associated with concrete slabs and steel beams, and applied it to precast concrete beams and cast-in-place slabs.

Material suppliers can guarantee better uniformity of grading, and batching plants offer scientific control of the materials passing through the hopper. It is not all perfect though, and Ira Hooper suggests that the ASTM C33 standards for soundness requirements of aggregates are not stringent enough to prevent trouble with concrete.

Mixes will undoubtedly change, but Melvin Charney of Montreal foresees an expanding concrete—a really lightweight, fast-setting, dimensionally-stable material that can fulfill some of the dreams of an instant architecture.

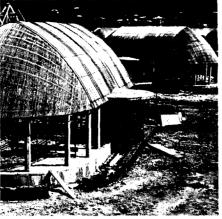
Concrete Breaks the Cost Spiral

"We have barely reached the frontier of concrete in socially important architecture because of its cost," claims Ralph Everett Harris of Hampton Beach, N.H.

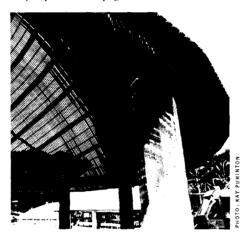
"Financial exploitation and speculation reduces the problem to simply a question of costs," believes Gonzales.

Two views, opposed by a third. Stewart says, "Concrete is not dictated by cost but by aesthetics."

Techniques may not lower costs, but



Native craftsmen thatch local materials into framework for pneumatically-applied concrete roofs (photos this page).





material suppliers do. Concrete has not risen in costs anywhere near the same rate as other materials. Despite rising labor, steel, and lumber costs, the price of concrete remains stable. Cement now costing under \$4 a barrel cost about \$5 five years ago. This can be attributed to automated cement plants, which circumvent rising labor costs and also raise productivity. Larger mix trucks, carrying three times more than the older, 5-cu-yd trucks, help to steady the unit cost of concrete.

Labor appears to influence the cost greatly. George Cohen, Euclid Contracting Corporation, who has a first-hand experience with labor, says that unions are forcing up wages to the point of ruining industry.

Formwork Makes the Job

Departing from the conventional view of casting concrete in a mold, Harris comments, "Since building formwork involves more work than casting concrete, the formwork becomes predominant and should be viewed as a positive element. The finished concrete is a negative element. Thus it may be more important to design a building in terms of its formwork and view the finished product as a negative resultant."

Many architects are aware that there is more to formwork than setting up boxes for concrete to be cast into. Many want a better method of molding concrete. And they certainly want a cheaper method.

Caudill, Rowlett & Scott offer sound "feet on the ground" advice about forms: "Forms must be watertight to prevent honeycombing. In Britain, some specs call for forms to be filled with water overnight, and not exceed a maximum leakage."

Steel forms will avoid leakage, but are not economical unless copiously re-used. Moshe Safdie, designer of Habitat (see p. 226). is happy with steel forms: "There's something about the smoothness of steel form finish that's appealing. Rough surfaces with fins and bush-hammering avoids certain finishing problems, but uses concrete in a sentimental way."

Fiber-glass forms also give a smooth finish, and some manufacturers say they can give better tolerances with fiber-glass than with steel. The Winner firm says it built a 42-ft-long form for a prestressed unit that checked out within $\frac{1}{16}$ in. Safdie's 38-ft-long Habitat units are cast to $\frac{1}{8}$ -in. tolerance in steel molds.



WHO BOSSES CONCRETE?

"Give a Dog a Bad Name and Hang Him."

Concrete control proves to be the bad dog of architect, engineer, and contractor in the following dogfight. Before proceeding to find who is top dog in the arena, we might consider the nature of the beast from an impartial referee.

"Specifications should be truthful; they should not weasel something out of a contractor," maintains Herman Protze, a consulting engineer who runs a materials testing service in Newton, Mass. "An architect must convey his philosophy to his engineers, so that they can interpret what he wants to do with concrete, and both architect and engineer should listen to a good specialist."

"Testing labs," believes Protze, "should operate under a code of professional ethics, like architects and engineers." He condemns labs that charge a client \$3 an hour for inspectors, for this low fee means that the lab has to pay men performing this essential function less than the architect pays his plan clerk.

"A good testing laboratory," Protze continues, "should be experienced, knowledgeable, and sympathetic to what the client wants to do." A good specialist will write specifications that result in the type of concrete an architect hoped for when he conceived a project.

Protze treats specifications as a narration that guides the contractor through what the spec writer believes to be the best way to make and place concrete. There is no point in writing inviolate, precise instructions for a contractor, because, if the quality of the resulting work is unsatisfactory, the contractor will say he followed the specs to the letter and the result is the architect's responsibility.

A spec should guide a contractor on quality of forms, dimensional tolerances, tightness of forms, methods of designing, measuring, mixing, and placing concrete, and so on. "When drafting a specification, ask yourself or a qualified contractor if what you call for is feasible," he cautions.

To implement specifications, Protze recommends asking the contractor who wins the bid to build full-scale mock-ups of parts of the architectural concrete work. These samples, after approval by the architect, become standards for reference during construction, but they must be built under the supervision of the testing lab or the consultant under true job conditions. He also suggests the architect first make pre-bid mock-ups of parts of a building to check that its architectural embellishments are practical in concrete, and to serve as reference during bidding.

To describe an acceptable quality of appearance. Protze has innovated a clause in concrete specifications: Concrete, when viewed under good lighting from 10 ft, should be pleasant looking, and, from 20 ft, should not show imperfections. "This clause may sound silly," holds Protze, "but people can attune to it, and the approach is surprisingly reasonable for determining acceptability."

Do Codes Restrict Design?

The quality of the concrete is, of course, important, as Protze points out. But there are factors other than the material that affect the design of concrete.

Building codes may restrict design. The degree of restriction varies throughout the country. In New York City and some parts of California, the code is presently being revised, and seems to be keeping pace with new realities.

Larger architectural firms generally claim they are not too restricted by codes. This could be due to their being in a better position to negotiate variances. However, architects working individually did not all agree that codes were a restriction. "Hiding behind codes is a punk excuse." maintains Paul Rudolph.

On the whole, there was not enough clean-cut agreement or disagreement in the survey to dog down the codes for totally hampering good design. "Codes are a continuing process and most are being brought up-to-date to include the use of modern practices and techniques," nomment Kahn & Jacobs.

A painful truth was pointed up by Clifford Stewart: "Codes may hamper, but brains and motivating hamper more than codes. Remember that architects, engineers, and builders write the codes."

Does Labor Hamper Design?

Trade practice came in for more damnation than codes, although there is by no means a consistency of opinion.

"All of our problems and successes revolve around one word—quality," says Leo Kornblath of New York. "Unless an extraordinary amount of time is spent by the architect above and beyond any fees he might be receiving, an outstanding installation cannot be obtained. The lackadaisical attitudes of foremen and workmen—or perhaps it is their lack of interest and knowledge—result in an installation that is less than successful. Satisfactory finish can only be achieved by an excessive amount of time and money."

"Trade practices and techniques pose some serious problems in the use of exposed concrete. Unions have balked at using new techniques," holds Fred Severud. Drawing from his considerable experience as a consulting engineer, he lists labor controls that hamper design and quality:

- "Site precasting is certainly severely hampered by arbitrary regulations imposed by labor.
- * "The cost of properly curing concrete on site or in precasting plants, is apparently tacitly omitted during the turmoil of competitive bidding. Chronic deficiencies in curing exist throughout the industry cast-in-place and precast alike. The full effects of this may not be known for several years to come.
- "There is room for considerable improvement in placing and vibrating really low-slump concrete. Perhaps through bad habit, the workmen themselves exaggerate the advantages of wet, high-slump concrete.

"There still seems to be too great a lag between the quality specified and that consistently achieved in practice," Severud concludes.

Engineer V. F. Leabu of Giffels & Rosseti, Inc., Detroit, agrees with Severud: "Trade practices always tend to seriously lag behind current technology. Producers of precast units do not seem to understand the technology basic to what they are trying to do, New practices do not lend themselves to rule-of-thumb approaches."

Not so, according to Roger Corbetta, a leading concrete contractor: "Quality control is the responsibility of the contractor. Engineers dilute responsibility when they attempt to share it."

Does Government Retard Design?

Problems of quality and control do not seem to loom as large in bridge and highway construction. Hardesty & Hanover, New York City consulting engineers, describe their procedures: "We use a design mix at all times. Quality in concrete is a function of control and supervision. If a transit-mix truck mixes in transit, so that there is no way of knowing the actual mixing time, the entire truck load should be rejected."

In describing the control exerted by state highway departments, Hardesty & Hanover were complimentary: "State highway staffs are professional organizations. They give us excellent control."

The one area that seems to evoke a good deal of agreement among architects, engineers, and contractors was that lack of control on Government construction was a Barry Goldwater dream. Pointed out one major New York architectural firm, "Federal control is the worst, but only a little below that is state control, and a little below that is the city."

Four of the top members of Smith, Haines. Lundberg & Waehler, including the chief structural engineer, declared that more important than the type of construction, either precast or cast-in-place, was whether the client was a private individual or a governmental agency: "Our experience so far has been that if it's Government work, forget about the precast stuff. We even like to stay away from concrete itself as much as possible. You don't have any control over the bidders, in either city or Federal Government."

When asked if the condition would change if the architect had adequate supervisory rights, they replied, "It's hard to get blood out of a stone. If you don't have a qualified contractor you can supervise all you wish, but what will you do, make him tear down all he puts up?"

"It's enough to make a man want to overthrow the Government," says Farch, archly.

A group of principals of the Frank Grad office in Newark were in full agreement in condemning lack of control on Government buildings. They cited their dilemma in having to work to Government specifications, although the Government did not yet have such specifications. On one particular job, the Grad office had

a sample panel fabricated prior to bidding to show the quality of the concrete they wanted. The successful bidder had a panel made to show them the type of concrete work they were going to get.

Herbert Riemer speaks bitterly of the disappointment of a firm trying to produce competent architecture for Government projects: "How many opportunities do you get for design service? We have financed design well above fees, only to have our efforts thwarted by poor construction over which we had no control. Many of the contractors on public agency work bid the job by weighing the plans. They are bidding to the kind of market that is geared only to inferior types of construction."

How Professionals See Each Other

The harmony, or disharmony, of relationships bring a lot of growls, but mostly the bark is worse than the bite when either the architect or the engineer puts on the dog about their prime importance. Actually, there is a great deal of cooperation between creative architects and creative engineers, coupled with mutual admiration marred only occasionally by dog fights.

The teaming of engineer and architect has often resulted in new dimensions for concrete design for both architect and engineer.

Paul Rudolph feels that the engineer is an extension of the architect's capabilities, and is subservient to the over-all demands of architectural design. Chip Harkness of TAC states the case similarly: "The factors of the formula, not the formula, are what can give you a yes or no answer."

Wm. J. LeMessurier, a Boston consulting engineer, describes his position on the design team: "To be responsible for selecting the most pleasing form among the alternatives of engineered form is a dangerous pursuit, because I might forget technology. You can forget art as long as somebody else is constantly battling for it. But the architect must not dominate the arena as an artist, leaving no room for me to think with great clarity. It is that type of domination that is wrong."

The Architect as Master Builder

The extent of architectural control is uncharted. With traditional materials, the tradesman and contractor undoubtedly



Marking the spot for a loadbearing X frame.



Blowing pans.



Pulling fiber-glass form.

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know more about their use than the architect. But the introduction of exposed concrete destroyed traditional building patterns.

Architectural concrete needs control that begins at the batching, and ends with the casting. If the architect is to be the master builder in the medieval sense, it seems that he must be a jet-propelled, Hydra-headed Nemesis to the Herculean efforts of the profit motif.

"Control is a matter of carry-through," maintains Tom Kavanagh of Praeger-Kavanagh-Waterbury, architects-engineers. "Greater controls are needed," he continues, "because of the tremendous potential of this remarkable material. As technology improves and greater concrete strengths are developed, the need for stricter controls becomes even more critical."

Another well-known engineer associated with a major architectural and engineering firm in New York City deplores the lack of adequate carry-through in exposed concrete design: "If you watch them pour concrete, sometimes you'll say, 'I'll never walk into that building.' People just dump the thing there with a lack of interest.

"Concrete is designed by an engineer under engineering conditions, and he writes precise specifications. A contractor bids the job, and subcontracts the concrete. But when a test cylinder does not come up to specification, the contractor disclaims responsibility, because the owner had an inspector watching the work.

"The owner claims he didn't mix the concrete, and the contractor had an inspector at the batching plant. The subcontractor feels blameless because it batched to specification and cast under the eyes of the other parties.

"No one has a feeling of responsibility throughout the whole process," he continues. "Even the suppliers may not furnish uniform quality materials.

"What we need is some kind of a national board of certification," he concludes. "But for this to be effective, we have to get people who are financially interested out of the picture. We must have professional people—the architect, the engineer, and the owner."

The Master Builder: A Change in Cast

"There is no supervision any more," claims a well known consulting engineer.
"This is an era of laywers and of getting whatever you can."

His implication that the architect is not the master huilder is clearly stated by Grad: "The general contractor is the master builder, and has the option to keep the building up. Once you tell a contractor to do something differently from the way he is doing it, you are dead. The contractor can shift responsibility onto you, the owner's representative, and you end up making the owner responsible for the setting of the reinforcing steel."

However, a committee is working on these problems. A joint AIA, ASCE, ACI committee has been set up to study the problem of control. It is conscious that, if unsuccessful, exposed concrete construction might well suffer the same fate as the metal curtain wall.

There is one other element of control, perhaps the most essential—the architect's man in the field.

The clerk-of-the-works, architectural superintendent, or the architect himself, must coordinate. maintain harmony, and, when "push comes to shove," maintain control. At best he is a master builder; at worst, a useless, underfoot job appendage—nuisance to the contractor, and an unnecessary expense to his employer.

Such men never have their name inscribed in cathedrals, and are known only to the men they work with, from lathing apprentice to design architect. But their influence in quality control is considerable.

The Supplier Supplies Comments

The last, but not least, influence on control is the manufacturer who supplies the essential components from which the design must be fabricated. Among these is the fabricator of plastic forms, such as William Spurr, sales manager of the Moulded Fiber Glass Co., who maintains, "We are a service business to the construction trades. We offer architects a tool which can improve design, building quality and construction economy.

"We believe in the profit motif and so does our competition... We cannot subsidize design, research, and development unless we get our profit at the sale of the end product. There is no purpose in research and development if you can't make a profit.

"Architects should learn the economics of dome (pan) production and use," continues Spurr. "We are not happy about architects designing ceilings for small bank lobbies with forms that don't exist.

However, if the same architect can design the entire bank building for the same form, then we are interested. We could go broke if we tried to provide for rental of every size and shape that architects can dream up for small volume use.

"For the most part, we find ourselves doing business with the contractor who has the choice of dome sizes, unless the architect is firm in holding to his specs." Concludes Spurr, "We have worked happily with many architects who know what they want and how to get it."

There, in the words of the representative of one of the largest plastic dome manufacturers, is a summation of manufacturer problems and attitudes to architectural design. The measure of control this manufacturer exercises on design is, of course, the measure of architectural reliance upon standard manufactured components.

Dome manufacturers are noted for their versatility. One manufacturer markets used domes for fishing pontoon floats. They report their hobbies as making plastic coffins and garbage disposal, claiming there is no end to these markets.

"We are dabbling in death. I would suggest a prototype plastic coffin with fiber glass vault combination to replace present concrete vault construction. We could also drive fiber glass pipe liners the same way concrete caissons are driven, and bury families vertically in hierarchical order, starting with grandfather, grandmother, and working up to the immediate family."

So it can be seen that, though lacking design inventiveness in architectural application, some manufacturers are alive to dead ideas. It is only to be hoped that burying architectural design in stereotyped form is not among their projects.

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WILL TASTE FINISH CONCRETE?

Who Likes It?

"They builded a tower to shiver the sky and wrench the stars apart,

Till the Devil grunted behind the Bricks; 'It's striking, but is it Art?

The stone was dropped by the quarry side, and the idle derrick swung,

While each man talked of the aims of art, and each in an alien tongue."

"THE CONUNDRUM OF THE WORKSHOPS"
How is the formless to be formulated, the undefinable defined, or the incalculable calculated? Are there no concrete formulas for concrete Beauty? This is the conundrum of the architect as he labors to make mud beautiful at a square-foot price slightly under that of a diamond tiara.

Never has the problem been subject to such disagreement among architects, clients, and the public since the building of the Tower of Babel. No matter how the mud is finished, some devil is sure to comment, "It's good, but is it Art?"

Beauty Is Only Skin Deep

Why do architects expose concrete, and are they getting bored with boards?

Most architects agree on the beautiful complexion of concrete. "When we expose the concrete structural grid, our purpose, beyond economy, is a certain skeletal crispness that we have been able to achieve only with concrete," say architects Hausner & Mascai.

Frederick Frost comments, "I find that rough-board forms, when properly put together, produce what seems the most natural texture for cast-in-place concrete."

Chip Harkness of TAC notes, "We add a texture to a building in either the form of form boarding, or sandblasting to get a three-dimensional quality."



Stressed delicacy.



A taste for spouting off.

Ronald Gribbe reports that the use of exposed aggregate concrete is primarily a design decision based on aesthetic factors.

Summing up the predominant opinion, Earl Flansburgh enthusiastically remarks, "We have produced outside textures with boards, sand-blasting, bush-hammering, and form inserts, but this is only the beginning for this material."

Most architects agree, but not entirely. "I am good and tired of the exposed board impression and the form tie holes being considered as a great finish surface," says Jules Gregory of Lambertville, N. J., unconsciously speaking for the minority. "I studied under Perret, and loved his work of the 20's. But I think that a great deal of the current application is just plain sloppy."

Beauty Itself Doth of Itself Persuade the Eyes of Man Without an Orator

Vociferous, shrewish argument concerning the beauty of exposed concrete by the public and client often obscures the quality of the architecture, and so endangers the future of concrete construction. Consequently, architects are understandably concerned over public and client acceptance, remembering well the fate of the metal curtain wall.

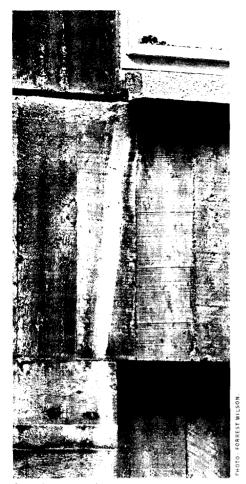
"We feel that there is a general slackening of client resistance to exposed concrete forms," is the hopeful comment of architect Howard Barnstone of Houston.

Flansburgh does not feel that acceptance is entirely dependent upon the client: "I think that the public will accept exposed concrete. The architect has to be willing to stick his neck out, even though there are a hell of a lot of concrete buildings that look absolutely miserable."

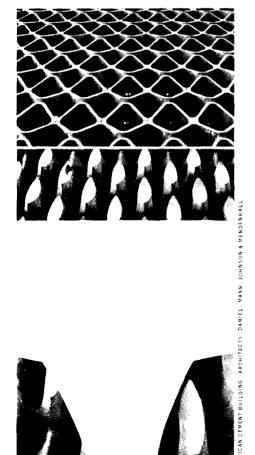
"Once a client is bitten by a bad concrete experience, he is twice shy," says Grad. "The public psychological climate is not geared to what comes out of the oven; they expect Yorkshire pudding. We are a cellophane-wrapped society; that is why Rudolph beats the hell out of concrete and why Saarinen wrapped the CBS in black granite."

"Concrete is mud," says Rudolph. "I work with concrete, not against it. I like mud."

Sumner Gruzen describes the continuing battle: "Even after we had conquered the sometimes mountainous opposition to



Dripping expression.



Flavor of precast patterns.

the use of exposed concrete, we were faced with some tenants' insistence on painting the concrete to relieve the 'austerity.' We still seem to be in the basic stages of acceptance of concrete as a finished material."

Grad summed up the majority opinion: "The architect is not an individual until the society will tolerate him".

This, however, does not concern Rudolph. "I would like the public to like my concrete buildings, but I am not primarily concerned in pleasing them," he says. "The public usually waits for the critics to tell them what they like."

Beauty Is in the Eye of the Beholder

Signs of age etched in city grime are often a disconcerting note in an era of eternal youth and this year's model building. Discussion of measures to counteract atmosphere stain elicits, for the most part, a "We can live with it" attitude.

"You cannot do anything to concrete to make it weather, because if you make a terrible mistake and the building falls down, that is a very serious thing for an architect, you know," points out Jean Paul Carlhian of Boston.

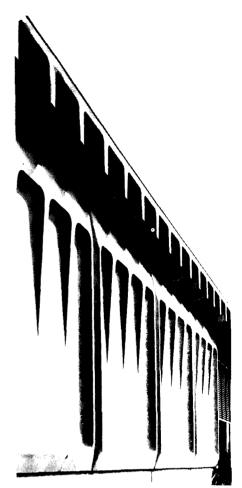
"Well, I think that buildings in a big city just get dirty," says Louis McMillan of TAC. "You have to accept the fact that buildings live in an environment," agrees Chip Harkness. Both men felt that the inevitable marks of age were not objectionable. "Have you seen the Place de la Concord after they sandblasted it? Shocking!" says McMillan.

However, many architects commented on the staining of I. M. Pei's plasticformed concrete. A great number admired the casting precision obtained by this technique, but they found fault with the uncontrolled staining, which marred the articulation of certain elements.

"You would never have that trouble with brick," commented Farch.

Sloping sills on concrete exteriors were criticized. "They just invite soot to lay on them, and the rain is going to streak the face," felt one architect who admitted that, when faced with a similar problem, he had evolved an equally unsatisfactory solution. He concluded, "We should get back to the old principle of having a drip and a cantilever."

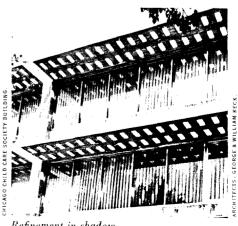
"The public is not willing to accept new. dirty buildings," believes Grad, "although the New York Public Library was accepted for years before it was cleaned."



Tilt ups fit to a T.



Chaste taste on a dairy window.



Refinement in shadow.

The Experts Argue 185

To sum up, most designers agreed that we are in for an age of dirty concrete and that public taste will have to decide whether it is acceptable.

Beauty Is That Medusa's Head

"Every once in a while, you look at a building that's been up for a while, and you get a disappointment that scares you away from using concrete. The darn buildings have a way of staying around for 40 to 50 years. You hesitate to let yourself in for that," was the fear voiced by Smith Haines, Lundberg & Waehler.

It is precisely this fear of the unknown that intimidated most architects, particularly those with large, established practices. Structural failures are, of course, fatal, but comparatively rare. It is the sight of a decaying concrete surface that makes the architect wish he were a Gorgon, whose fearful glance would turn the building to stone.

Beauty Is Bought by Judgment in the Eye

The architectural decision that selects the appropriate exposed concrete surface is a tempering of beauty and an imperfection somewhat reminiscent of Ben Johnson's admonition to the young man on the virtues of ugly women.

"Shadows crossing the irregularities caused by honeycombing take care of imperfections," believes Dan Toan Frost elaborates: "One possible solution, especially on large-scale construction, is the use of forms like 'Q deck,' to give a pattern of light and shadow to dominate the surface imperfections."

There was a jam-and-biscuit relationship voiced by architects working in sculptured form. The fluidity of the material allowed them plastic expression, but engendered more imperfections than smoothformed concrete. However, the very nature of the contrasting lights and shadow surface minimized the imperfections that it engendered.

Daniel, Mann, Johnson & Mendenhall, of Los Angeles, do not agree with rough surface concrete practitioners: "Much present use of exposed concrete, at least as seen in publications, tends to reflect the brutal school of design, which, in DMJM's opinion, will have a limited appeal."

Designing with smooth-surface concrete is also unsatisfactory to many: "Smooth forms seem imitative of stone or some other material, and also seem to create problems of surface cracking."

The accentuation of the seemingly inevitable cracks that appear in smooth surface forming was a major criticism of this forming method. "Crazing checked my craze for plastic forms," remarks a Southwestern architect.

Beauty Is Truth, Truth Beauty, That Is All

Werner Seligmann, of Cortland, N. Y., feels that the subject of the foregoing discussion is immaterial: "The basis of any discussion about concrete is the dichotomy of the nature of concrete as a material, and the idea of American technology. Even at best, with the ultimate in control. it remains a tour de force to make concrete fit the idea of industrialization. It almost appears as if architects are feeling guilty for using concrete, and as a result are subjecting concrete construction to the ideas of industrialization to relieve their conscience. For anyone who has seriously thought about the nature of the material, this seems an absurdity. So why pretend? The reasons for the use of concrete are obviously psychological and formal."

CAST-IN-PLACE VS. PRECAST

Which Is Best?

Comparing precast and cast-in-place concrete is like comparing horses and cows. It essentially involves comparing two different beasts.

However, in the same way that oxen are used as draft animals, and horsemeat is sometimes included in hamburgers, the two methods of concrete construction are sometimes interchangeable.

Quality Controlling

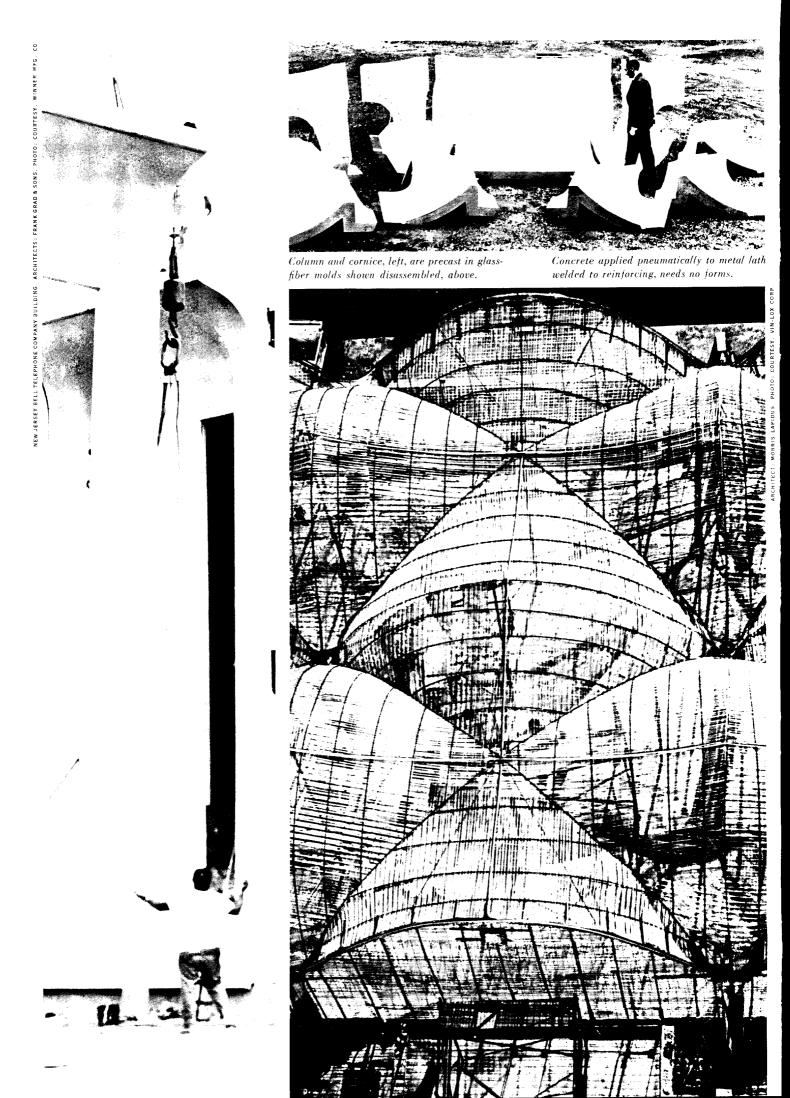
"Exposed cast-in-place concrete, unless strictly specified as architectural concrete and constantly supervised during casting, usually results in ordinary concrete, and is definitely not recommended if first-class surfaces are desired," comments Raymond Epstein.

McDonald Beckett, in typical Western understatement, says, "Cast-in-place concrete requires subtleties that we do not fully anticipate."

The lament was almost universal over the inability to control cast-in-place in comparison to the regulation possible with precast concrete. But the same enthusiasm does not extend to precast when dealing with the problems of fabrication, delivery coordination, and the multitude of indeterminate factors encountered on a construction job.

Architect Leo Kornblath maintains, "The control and technological advances in the precasting industry are heartening. However, with the greater use of precast concrete, the manufacturers do not keep pace with the needs and desires of the industry. As a result, cost is increasing with rising production instead of decreasing."

Kornblath also notes that it is difficult to control the general contractor's selection of subcontractors: "The general contractor will frequently revert to fly-by"Cast-in-place requires subtleties that we do not fully anticipate."



night manufacturers to effect savings. On many occasions, we have had to revise our design and details to meet shop limitations."

Richard Roth, Jr., of Emery Roth & Sons, feels that "precast concrete is still a craftsman-like profession, and therefore all pieces are practically hand-made." He cites the case of the Pan Am and the Bankers Trust Buildings in New York City: "We have had the experience on large jobs of having the precast concrete manufacturers going bankrupt on us, because they have neither a large enough plant nor the financial ability."

Clifford Stewart comments, "Precast concrete has the same disadvantages of the old cast stone of the 20's and 30's. There is no reason to suppose a change in name will correct the defects. Luck and workmanship will still play a part."

Vincent Kling finds that "the one advantage observed within the past six years is the increased knowledge of the tradesman."

Edwin Steffian notes that there are excellent precasting plants in the Boston area, which he uses whenever he can. "Once the impression left by 'cast stone' is eliminated, there will be great advances in the acceptance of precasting."

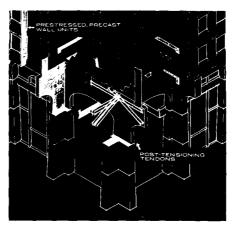
"Cast-in-place concrete is not as limited in the competitive market as precast, because the field of cast-in place is not limited to so-called specializing shops," says Harry King, of King & Lewis. "I see the cast-in-place field progressing faster because of more courageous use of exposed cast-in-place concrete by architects."

Gruzen states the case bluntly: "The precast industry has become so busy that their estimates have not been reliable at bidding time. The architect would be wise to have beams, fascias, panels, etc., designed as a cast-in-place alternative to force effective competition."

The High Cost of Precasting

"Limestone is the poor man's concrete." remarks Dan Toan. "We find the cost of precast concrete work to be often exorbitant—usually being bid much higher than estimated by the manufacturers during design. For this reason, we have recently changed two projects from precast to limestone."

"We find limestone to be often less expensive." says Louis DeMoll of Ballinger



Combined stressing techniques enable contractor to stack prestressed, precast. . . .



... concrete panels, and post-tension cast-inplace framework at 15-story building.



Co., architects and engineers, Philadelphia.

A Southwestern architect states that precast panels rose from \$5 to \$10 per square foot during bidding: "Architect says cast-in-place, engineer says not possible, but the job is out to bid anyway."

Wallace K. Harrison states unequivocally: "Everytime we have had comparative bids, the cast-in-place comes in cheaper."

Gyo Obata reports that, around St. Louis, casting and sand-blasting concrete on site is considerably less expensive than precast.

"Precast concrete is still a difficult and expensive medium," notes Roth. "And until we find a better way to manufacture and hang it on a building. I see it only as a prestige material for expensive high-rise structures. It will be easier to bring down the cost of cast-in-place than the cost of precast concrete."

"Solutions are worked out in either cast-in-place or precast concrete, leaving the option to the successful contractor and his personal practice." believes Walter Netsch. Jr. "We have discovered that precast concrete begins to move into the higher-cost limestone and granite prices. sometimes exceeding them, and this makes cast-in-place economically justifiable."

Weakness in the Joints

"Loadbearing precasting works fine on five or six floors, but on twenty it will not work," points out a contractor.

"If one devises a structure so that precast elements can give structural stability without having to make rigid connections, the economics of precast construction have an advantage," add Markus & Nocka of Boston.

This method has disadvantages, according to Philip Meathe of Meathe. Kessler & Associates, Grosse Point, Mich.: "With all the welding plates and attachment brackets needed on a precast job, there's usually an opportunity for expansion and contraction cracks in floors and walls."

Carlhian also does not think much of this method: "With precast beams and precast columns, there is always the problem of a junction point that has to be cast-in-place. If it is not cast-in-place, it becomes a watchmaking type of construction that is identical with steel. So why not use steel?"

Hedley Roy points out that it is not possible to use precast concrete alone for high-rise buildings, since lateral stability becomes critical: "This lack of stability, which makes a major problem of joints, rules out high-rise precast structures for most architects and engineers. However, there are methods of overcoming these difficulties."

"Don't you think that cast-in-place concrete should depend upon what you want to express?" is the question posed by architects Gill & Heespelink of Boston. "We think it would be terrible to govern architecture by precast or cast-in-place. We should be free to use either one, We recently solved the problem of joints in a precast building 32 stories high. The jointing problem would never have existed if engineers thought about the precast system instead of adopting it from steel handbooks. We get rigid-frame action from post-tensioning."

"Using inert forces," they continue, "the material dictates to us what we must do with it. But we should assert our control and dictate to the material what it should do. Cast-in-place is still the passive method. By introducing active forces with post-tensioning, you create positive forces you can control."

In contrast, an architect feels, "There is really more than enough to do with cast-in-place concrete without playing around with all of those fittings and junk."

The decision to use precast or cast-inplace is, of course, dependent on the nature of the design. "The advantages of both methods seem to await further technological improvement to make them fully interchangeable," concludes Farch, "not like brick, which you can use for anything. That's a horse of a different color."

SEARCHING FOR THE ULTIMATE PLASTICITY

What Will Be Done

When architects try to describe a material to replace concrete, they usually envision a plastic material that hopefully solves the faults of concrete. They do not, however, offer a true plastic as an alternative to concrete.

A few, however, advocate using steel. The type they recommend would be in fireproof sheets, and possess the characteristics of plasticity so much admired in concrete.

The concepts embodied in concrete as a material changed the context of architecture for most architects.

"The importance of the leadership assumed by architects in the use of concrete," points out Charney, "is not so much shoving the bloody material out front and exposing it, but in the context of building, which has changed so drastically in the past six years. In large-scale buildings, the problems can only be solved by materials that are of the nature of concrete.

"One can turn the whole question around and say that it's architecture not designed for, but designed by, concrete solutions," continues Charney. "And, to me, the real leadership provided by the profession has been in relating concrete to problems that are entirely new, and then coming up with new solutions that can only be solved by this material."

It Isn't Wine Either

Some architects saw concrete improving by itself. Leo Kornblath says, "With admixtures and retardants, it is possible to achieve aesthetic effects unknown before. The continued rise in research in the use of concrete form work, integral color, chemical admixtures and retardants will result in a greater use of this material."

A Boston architect prefers steel: "If we can develop integral fireproofing for steel, you will see what happens to concrete. Steel is the material of the 20th Century. It is a completely man-made thing, invented by man and produced in Pittsburgh—a fabulous material. When Cor-Ten is covered with soot, it is beautiful. It is like wine or leather, it ages well; it is like pearls on your mistress's skin that assumes a beautiful patina. This is not true of concrete."

"The future of concrete," says Frank Grad, "is tied up with the future of the entire construction industry for the next 25 years. It will follow the same pattern. The fact that a skilled mechanic will receive \$10 an hour may mean that big business will come into the manufacture of basic building products.

"When the space race is over," he continues, "and those men return to industry, and industry enters the building field, the cosmeticians of architecture will have to get off their butts."

I Like It, But...

Architects are intrigued by the possible use of plastics. "I think that we will have the best concrete when we do not use cement at all," argues Dr. Komendant. He hopes for the development of an epoxy that will bind the mix together without plastic flow. The resultant mix will set in two hours and resemble granite.

Safdie sums up the feelings of architects who look toward plastic: "Concrete is heavy; it has limited value in terms of weathering. It is like brick: It absorbs moisture and is no good in tension. But I think eventually we will develop plastics that have fire resistance, that are lighter, that have tensile and compressive strength. These materials will tend to replace concrete in 30 to 40 years."

However, Safdie and many other architects believe that concrete is the only material available right now that can be used structurally as a surface material to enclose space.

"Today, in concrete, we have the Hat School and the Snorkel School and many others," comments Grad. But he adds, "Out of this will come new direction, new expression, making it easier to sell new ideas."

"Concrete is a great structural material," says Farch. "Bury it."

CURTAIN WALLS: MORTIFIED OR JUSTIFIED?

What developments have been made in precast concrete curtain wall construction during the past six years?

An improvement in connections appears to be the most frequently observed development, and improving connections is a continuing process that could be usefully discussed again in another six years.

Connections between panels, and between panels and structural frames, both get the nod. Connections are simplified, and to a small extent have been standardized by precasting plants. One engineer notices connections are using less steel than before. There are more concrete-toconcrete connections, instead of between steel plates embedded in the panels.

Lev Zetlin, a New York City consulting engineer, comments that precast curtain wall has developed slowly because it has been connected in a manner similar to metal curtain walls: "These are two different products, and their connections should be adapted to the inherent properties of each material."

Paradoxically, concrete curtain walls are praised for having been developed into loadbearing components. Despite the contradiction in terms, when curtain walls carry floor loads or transmit horizontal forces, they become, in the eyes of many architects, better walls. Many believe such walls to be more competitive in cost, and eventually they will supersede curtain walls.

Meanwhile, curtain walls have gained favor, due to progress in insulating techniques. In Texas and New York, however, two firms note a decline or abandonment of sandwich panels. Caudill, Rowlett & Scott says it braces two sandwich panels together with ties, which achieves a trussed effect, enabling the panels to be structurally efficient for horizontal loads.

Erection techniques have kept pace with the development of large panels. The



European tower and climbing cranes significantly influenced the spread of precast walls across the U. S. These handling techniques permit contractors to install concrete wall sections without much more difficulty than metal sections.

The weight of precast concrete is often cited as a factor against its use, but Vincent Kling found it to be much lighter than granite, so he faced precast concrete panels with thin slabs of granite. If solid granite had been used alone, points out Kling, the wall would have been feet thicker than a composite panel of structural concrete and surface granite.

Among other developments: improved concrete, especially precast on vibrating tables, neoprene gaskets that dispense with window frames, new form liners, improved chemicals for exposed aggregate work, and greater dimensional accuracy, resulting in constant joint widths.

Lastly, one architect replied tartly to the question of developments: "Too much development and too much use."

What is the purpose of using concrete curtain walls: Aesthetics, or costs?

"Concrete curtain walls are justifiable only on the basis of appearance. This type of construction is almost invariably more expensive than the alternatives," said a Canadian architect who could easily have been appointed as spokesman for the majority of respondents. Another architect put it wryly: "Costs are anywhere from expensive to extremely expensive, depending on the finish and aggregate."

A voice of dissent: "For walls of comparable quality, precast concrete is cheaper than metal."

A voice of reason: "Concrete costs more, but in time it may be cheaper than metal, because of maintenance costs."

Chorus: "Architects like the concrete curtain wall because of the plasticity of the material."

The homogeneity of the material appeals to designers who want complex cross-sections without welds or mechanical fasteners: "Concrete is really like sculptor's clay in an architect's hands."

"In one hand" would be more apt, for the architect needs the other hand to balance costs with aesthetic judgments. "Concrete curtain wall is the result of an aesthetic consideration in lieu of a cost consideration." . . . "It looks more permanent, but costs more than metal; thus aesthetic governs." To keep costs in line and still produce a pleasing concrete wall, A. Epstein & Sons, Inc., forms ribs or vertical grooves in the panels. This adds texture to the panel and masks the vertical joints. It adds to the cost slightly, but is "twice as rewarding architecturally."

Concrete also gets a higher fire rating than competitive walls, and can provide both exterior and interior finish with one unit. With larger units, there are fewer joints to calk—and leak. Concrete panels do not have to warp, even though many people believe they invariably do. One engineer feels that poor joints between undeformed panels give the illusion of warped panels.

They do break, though, and one architect says breakage and delayed delivery has left him reluctant to try the material again.

What do's and don'ts would you offer in precast concrete curtain wall construc-

Whatever you do, do it big—at least with curtain wall panels. Size reduces joints; some architects avoid joints like small boys avoid soap.

Once committed to precast panels, say many voices, watch out for warpage. To prevent it: check the precasting yard before awarding a contract; insist on proper curing, handling, and stacking procedures: detail sufficient thickness of concrete and enough reinforcing; prestress thin members; check that panels are properly sealed or waterproofed before delivery.

If concrete does not warp through shrinkage, it may move with thermal changes. Avoid by detailing for thermal movement, particularly with windows that can be cracked when surrounding materials expand.

This advice is particularly relevant with panels that do not have metal window frames. "One of our single-story buildings moves at the top, but not at the cooler bottom," points out an architect. "The wracking breaks glass in windows glazed directly to the concrete." But do consider preglazing to reduce site labor time.

If concrete panels are to be insulated, do not insert insulation inside the concrete unless one of the layers of the sandwich is allowed to "slip" with temperature changes. Also, with this sandwich construction, remember to insulate the joints between panels.

Joints between concrete panels should not be less than ½ in., so they can take up some dimensional variations of precast units. Understand the dimensional tolerances, caution several men; and do not work with too close tolerances, say others.

"Do not expect large expanses of concrete panels to butt exactly, and have uniform color and texture." cautions Morris Lapidus. To avoid this, break up panel surfaces, but give thought to the finishes.

Concrete cannot compete with polished materials such as granite, says a firm from New England. Roughen it, choruses the rest of the country. But not too rough: "Avoid highly textured surfaces where dirt accumulation is objectionable."

"Don't coat concrete with emulsions or silicones if the concrete is anywhere near greasy exhaust gases from domestic incinerators or oil-burning furnaces. The coatings hold the greasy dirt, which can be cleaned only with sand-blasting."

Stains from weathering can be reduced by proper detailing. Drip molds are frequently omitted, and the results cry out for climbing ivy. Make provision for carrying down rainwater to minimize streaking.

Do not detail too many projections, because it increases the difficulty, and price, of precasting. Do avoid expansive aggregates that expand when exposed to weather, and do not detail welded anchor plates where the welding can crystallize exposed aggregate.

What structural benefits derive from precast curtain walls? How can they be improved?

Answers to this overlap replies to the question about developments in the last six years. Curtain walls are beginning to fade out of some designers' vision, and will be replaced by loadbearing walls.

Listen to these engineers:

"With proper joint details, they can be used as precast shear walls."

"In seismic areas, curtain walls can be made to provide stiffness and shear resistance against lateral deflection."

Alternatively: "They can be used for lateral stiffening, but this can be achieved more economically with other means."

And, "It's not desirable to use exterior panels as loadbearing elements because of the field-erection cost ratio between structure and architectural panels."

Another engineer foresees post-tensioned panels strung together to make long-span spandrels. Several point out the added weight on a structural frame caused by precast panels not contributing to the structure. And one architect maintains that panels can add 1½ lb of steel per sq ft of building—an enormous cost for a large building.

What are the special detailing problems?

Detailing precast concrete seems to be no more difficult than any other construction material: provide sufficient clearance between different materials; don't try to make it too sophisticated; and devote time to research.

• Waterproofing: Sometimes found to be a hidden expense that blooms late and large in precast concrete work. The Portland Cement Association claims, like a temperance society, that architects would rather not have joints. Elastomeric sealants seem to be everyone's idea of solving the problem of leaking joints. Mortared joints are nobody's idea of a good detail.

Panels should be attached to the structure at frequent intervals, and horizontal joints calked with a waterproof, flexible compound to prevent build-up of stress through plastic flow, moisture or thermal expansion, or through transference of load.

Before sealing, the concrete surfaces have to be smooth, true, and free of contaminants. To insure a good bond between sealant and concrete, many architects specify a primer to make the concrete surface compatible with the sealant.

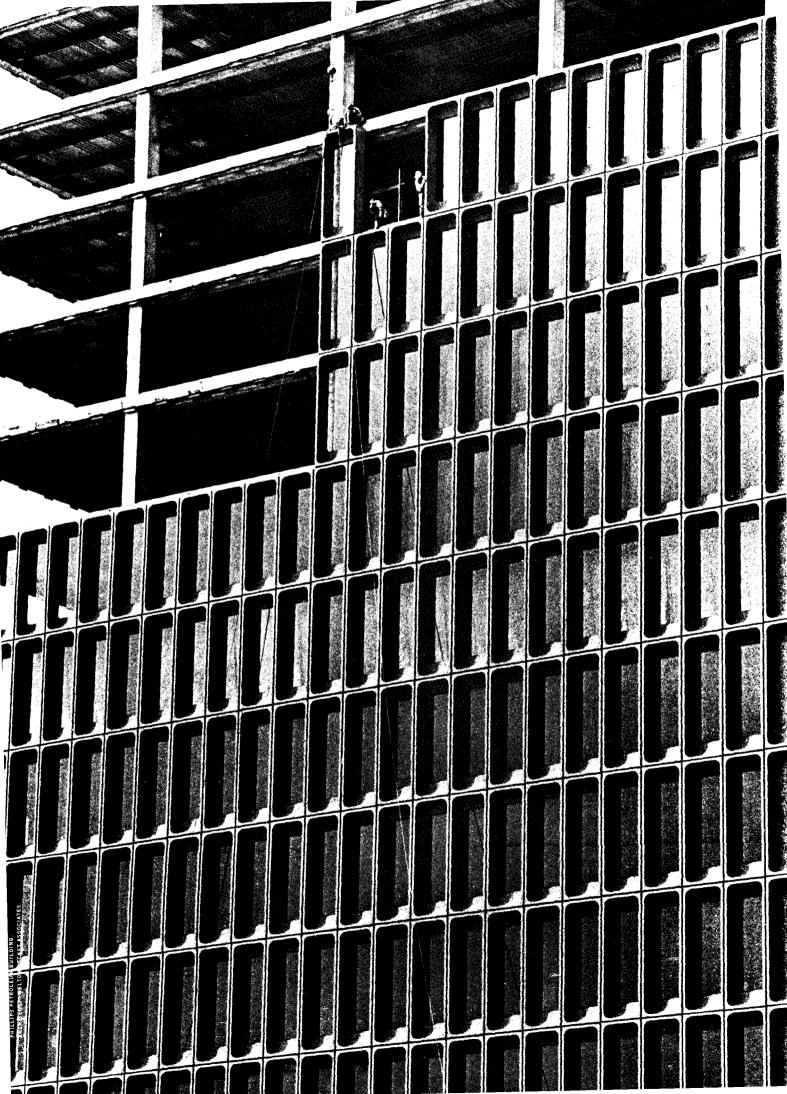
Among the general do's and dont's of sealants, this perhaps little-known news: Form release agents must be compatible with joint sealing materials.

• Sash: Avoid stressing concrete around window frames. Compression at the edge of a panel will spall the concrete. A 1-in. clearance around the frame, filled with sealant, will avoid trouble. Many advise against frames in favor of gaskets. One firm prefers not to use precast walls with operating sash.

Successful neoprene gasket installations require attention to details, particularly insuring that reglets are completely covered with the gaskets.

• Corner panels: For aesthetic reasons, many firms do away with corner posts and abut window glass with a thin plastic molding. This still requires a special concrete unit, as does a corner unit L-shaped in plan.

Special units raise costs. Since there





are usually only four corners, there is no call for repetition. Butting two regular panels at the corner is the economical solution. But an engineer cautions that there is greater wind suction at the corners of a building.

What do you predict for the future of precast concrete curtain walls?

Some prophets see a cloudy crystal ball. Life for the precast curtain wall will be over at forty. Or before.

Two men quote Paul Rudolph's remark about the rise and fall of a curtain wall, and apply it to concrete. The vogue, the fad, the cliché will fade. "It's being used to death. It will be considered trite by the public."

Two interesting views on money: "There will be a decreasing trend to precast walls because of an increased tendency to reduce construction costs."

And, "Average architects will switch to precast walls from metal curtain walls, and great fortunes will be made in precast curtain walls."

Before this happens, however, architects see hope for an increase in quality and quantity that can benefit the building industry. Some also believe that the road to successful concrete walls is through cast-in-place construction.

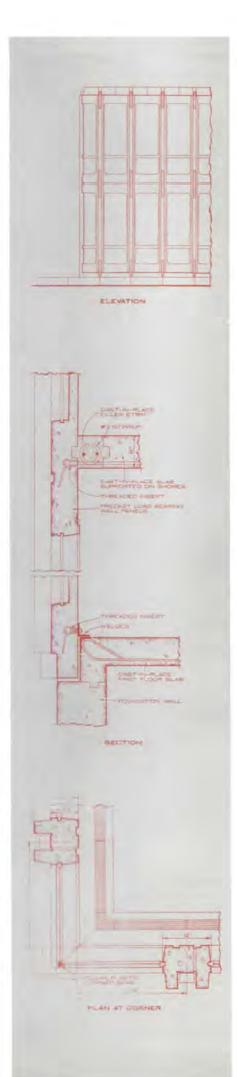
If not, precast assemblies must include mechanical and electrical components, interior finishes, vapor barriers, and eventually be attached to a structure with fastsetting compounds that do away with nuts and bolts.

This is how architects see the future. In addition, one suggested lightweight concrete panels that meet fire regulations. Well, P/A had asked some engineers about lightweight concrete panels, and, in aggregate, they gave it thumbs up.

They like it because it cuts down on dead load, insulates better, retards fire better, and has lower thermal expansion coefficients. However, lightweight aggregate wins no prizes for color or appearance, and cannot be used for exposed aggregate panels.

Lightweight concrete can be durable if cast properly. Do not make the panels too thin, do use air entraining, lower the water

Slab connection solves problem of coordination between precast loadbearing walls and cast-in-place slab. National Opinion Research Center Building, University of Chicago. Architects: Hausner & Macsai.



content, cure properly, specify durable aggregates, and, where feasible, prestress the panels.

One consultant raised the topic of commercial lightweight units with aluminum additives. He believes there is a great potential if manufactured properly, and if erected by trades other than the concrete subcontractor.

What, in the opinion of engineers, is the best way to connect panels to a structural frame?

Engineers, like doctors, sometimes disagree on a diagnosis. All, however, want a lot of tolerance to move the panels around. Connecting them is a varied story.

"Concrete directly bearing on concrete lugs is best." . . . "Positive bearing surfaces such as seats." . . . "Panels should rest on a concrete frame so that vertical support is directly on the structure. Galvanized bolts and angles make secondary attachment." . . . "Integral lugs bearing on the frame."

"The best way is to embed steel inserts in panels and frame, and weld the two steel plates together."... "Threaded studs screwed through a steel clip attached to the panel and into a steel plate on the building frame."... "Bolt through a plate on the frame and into an anchor cast into the panel."

On this note of earnest advice ends the group discussion, in which the experts, in tones ranging from harangue to despair, have argued the merits of concrete—hopefully to the enlightenment of all. By Aldo Cossutta, a partner of I. M. Pei & Partners, New York City.

It is hard to believe, in the rush of architectural events, that only 10 years ago the Denver Hilton hotel emerged from the drawing boards. When completed in 1960, it represented the first fully consistent use of concrete in the U.S.: a precast skin enclosing a concrete structure.

The hotel signaled new possibilities of architectural expression for a technique thoroughly neglected in this country. Exposed concrete construction had previously been relegated to applications of a more utilitarian nature.

In the 1950's, the then-current architecture was steel, glass, and aluminum. The mood of the architectural avantgarde was one of excitement and exhilaration over recent achievements.

One by one, the landmarks of the early 50's, such as Chicago's 860 Lake Shore Drive, the Lever House, and Pei's Mile High Center, became reality, with tangible proof that the long and persistent pioneering efforts had finally borne fruit. At last they could be seen, touched, and tested out.

Why, then, at a time when the new expression and modern technology had barely met, was it necessary to depart in such a different direction with the Denver Hilton?

Self-Propagating Building

Three coincidental circumstances led to changing from the currently popular steel frame to concrete. The first one, somewhat negative, relates to shortages, delays in deliveries, and rising costs of structural steel during the Korean War. It thus became coldly logical from the outset to build the frame in reinforced concrete. But this decision raised questions such as: Would a metal and glass skin complement the strength of a concrete frame, or deceive it? Was not the juxtaposition of the two an inherent contradiction?

The second circumstance was a happy discovery. Despite the third-rank treatment of concrete as an architectural material, scattered around the country were a number of casting yards with a residue of solid craftsmanship awaiting to be tapped. Traveling in search of evidence, I found interesting examples of work, including the Baha'i Temple in Evanston, Ill., a curious, early work of ornamental precasting; and the more recent Mormon Temple in Los Angeles.

Although very remote from the problems of the Denver Hilton, these examples offered proof that architectural precasting could be done, even in this country, and that the material would withstand the test of time. In keeping with this tradition, Otto Buehner's casting yard in the Mormon capital, Salt Lake City, accepted the challenge, and was selected to do the work. Looking back, it is clear that, without Buehner's experience, we could not have achieved the quality of the Denver Hilton.

The third circumstance, and the most important, was the vision of the building itself. The mile-high altitude of Denver, the extraordinary transparency of the air, the capacity of the sun to brilliantly delineate light from shadow and transform its tracery into architecture-those were the uinque attributes of the environment.

To respond to this meant using a material capable of taking possession of shadows rather than diluting them by reflection, and also a material that could be worked in depth. In my mind, the building already took the form of a giant beehive of carved-out niches, counterpointed by single planes, precise in shape, and repetitious in character.

So we cast the Hilton frame in place, and hung precast wall units from the edges of cantilevered flat slabs. These facade units were cast with sand and gravel screened out from soil excavated from the site. After casting the units, workmen lightly etched them with acid to expose the color of the stone. Thus, unobtrusively clad in its brownish-red tint. the Denver Hilton literally grew from its own soil.

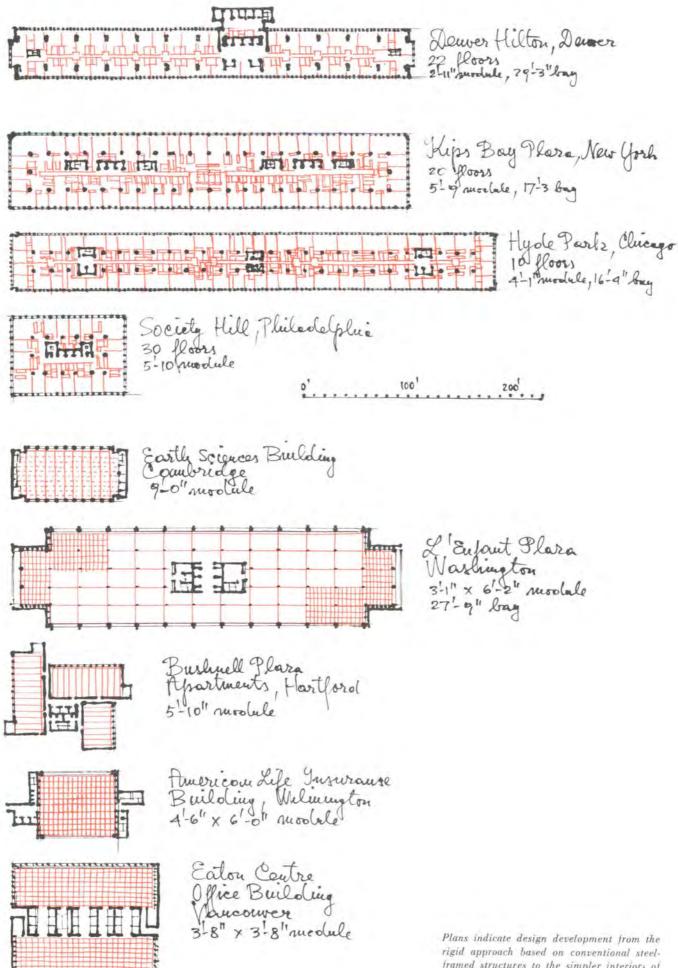
Maintaining Unity

While we were designing the building in

"A curious early work of ornamental precasting."







Christian Science Church Center Boston 4'-7/2" x 6'-2" module Plans indicate design development from the rigid approach based on conventional steel-framed structures to the simpler interiors of concrete loadbearing walls, and, later, fully integrated structures. The simpler layouts tend to produce a stronger architectural form.

'56 and '57, the material and the technique underwent a process of self-definition. I was curious to penetrate the inner logic of its existence in order to extract the architectural potential of its application.

Within the limitations of molding techniques, a new freedom could be perceived. Shapes and form hitherto unattainable could actually be produced economically if the repetition were large enough. Limitations on sizes and proportions usually found in standard building materials automatically disappeared.

The precision that could be built into the precast concrete elements equaled that of ornamental metal. Components of considerable size could not only be manufactured, but, with the huge cranes available, could also be installed.

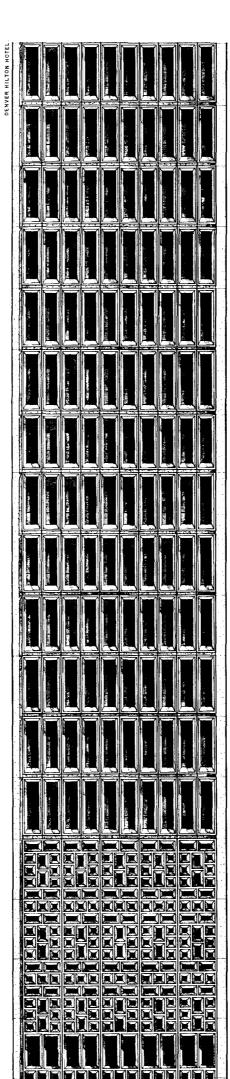
The material at hand, however, with its strikingly new scale, also posed new problems: How to fuse these thousands of separate units into an architectural unity, how to make an insoluble assemblage instead of a mere collection of parts. The answers were not readily available.

The joints in themselves were of no help. On the contrary, the joints of the story-high by 6-ft wide façade elements formed vertical and horizontal incisions that contributed to the fragmentation of the façade. The best that could be said was they were necessary, but that was not good enough.

So I designed into the surface a grid with a pattern of deep reveals: a tracery of shadow lines engendering all the joints and relegating them to a lesser role. Instead of submitting to a necessity, the design became a positive tool of architecture. Paradoxically, by this device the surface was effectively established and the illusion of a carved monolith accomplished.

But it was a device. It pointedly revealed the inherent characteristics and dilemmas of precast concrete, be it structural or not. At best, it is a material that must be produced in large components. When spanning large areas, the components become so large that their individuality continues a life of its own at the expense of the architectural whole.

Alternatively, attempts to harness the components' independence lead to a tour de force of one kind or another, a sure portent of a tenuously maintained equilibrium and lack of inner harmony. The ensuing aesthetic is in both cases imbued with an implacable thrust of its own.



Skin and Structure

There were also other questions of conscience. For example, the strength of the structural concrete was 4000 psi. But in contradiction to this, the strength of the precast concrete skin was, for reasons of precasting, at least double the strength. It almost looked as if the skin could, and should, carry all the loads.

However, a precast structure is like a house of cards. Continuity, resistance, and lateral stability are only achieved with great effort and expense. Welding, grouting, or post-tensioning the joints may be reasonable techniques for assembling low buildings. But in tall, slender structures, where the magnitude of lateral stresses and the ability to lift components become overwhelming considerations, the joinery of loadbearing and long-span units becomes a self-defeating undertaking. It can be solved, but, like all contraptions, it runs against the grain of the problem. We tried several times and failed to prove this point convincingly.

But the main lesson I learned on the exciting Denver journey was simply this: A skin always remains a skin, even when it is made of precast concrete. Whatever its virtues may be, it can never assume the natural primacy of the structure. Structure is obvious, basic, and irreducible. It is the perennial source of strength, the spring of clarity. Even when it may seem ugly, it is never false.

Are not these fundamental qualities essential to architecture as well? Is there inherently anything a skin can do that a structure could not? Could the structure be shaped to perform also the functions of the skin? From these questions to the concept of a modular, cast-in-place concrete bearing wall involved only one step.

Low Budget Spurs Research

The years between 1957-1960 were a trial of convictions, and a test of patience. New opportunities arose in the field of housing, and we soon discovered that economy of means was the essential prerequisite for this type of construction. Apart from all other reasons, cost considerations precluded the use of precast concrete. Thus it was logical to turn to cast-in-place concrete, because it was the only available low-cost material other than brick.

Concrete: "... a material capable of taking possession of shadows..."

Among apartment builders, particularly in New York City, there was very little enthusiasm for innovation. Facing this discouraging background was the enormity of the problem. The great experiment in urban renewal called for the invention of better and more genuine architectural forms for living. To realize them, as far as we could determine, was to develop cast-in-place concrete so that it would become acceptable to the sponsors, to the FHA, to the lending institutions, and to ourselves. The challenge was exciting, but the road promised to be thorny.

Original architectural form cannot be created without deeply understanding the material it is made of. Matter sustains and nourishes our inspiration, and only by the fusion of the two realms of matter and form into an inseparable unity can the resulting object be imbued with an original life of its own.

The material we wanted to understand was cast-in-place concrete—so widely used but still unknown, so humble yet infinitely versatile and eloquent.

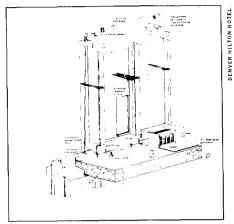
There was much to learn about this seemingly simple material, and the more we knew, the more there was to learn. This is not to say that technical knowledge was lacking about concrete as a structural material; but architecture and reinforced concrete, in the context of American possibilities and requirements, simply had not come to terms at that time.

There were gaps of knowledge, because the material was not architecturally acceptable, and also because architecture had not yet created itself in the image of the material's own potentialities. Understandably, our efforts were oriented toward filling those particular gaps.

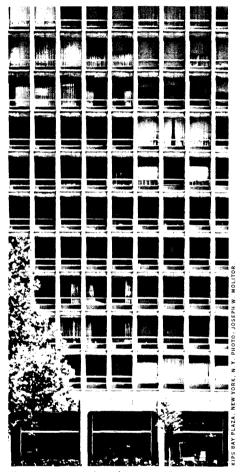
Beyond the Research

We were concerned with sources of materials and their effects on the appearance of the finished product, coloring and pigmenting action by natural aggregates, sands and chemical additives, phenomena of surface crazing, shrinkage, and thermal cracks and ways to minimize them, finishing techniques, testing programs before construction, elaboration of controls during construction, ways and means of translating intent and experience into drawings and specifications. The goal was an architectural material that would be strong, durable, easily maintained, and remain good looking.

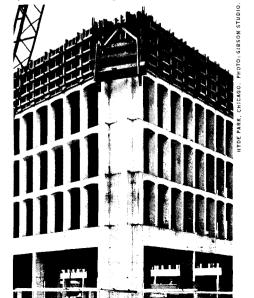
This may sound as if a complete program of research had been formulated



"... façade units cast with sand and gravel excavated from the site."



"... a structural grid ... rigid in its own plane ... dense enough to assume the plastic qualities of a bearing wall."



from the beginning. But, in fact, it started from the most obvious notions, enlarging itself step by step: sometimes by design, sometimes by intuition, occasionally by accident. It combined the initiative and experience of many before a substantial matrix of knowledge was formed. It is unlikely, however, that our curiosity in concrete would have been as intense, or that it would have lasted for as long, if we had not seen behind this vast field of technicalities a vista of new architectural possibilities.

Farewell to the Curtain Wall

The immediate result of this vision, and of the work we put in, was a prototype idea applied to the first generation of our cast-in-place apartment building: Kips Bay Plaza in New York City, Hyde Park in Chicago, and Society Hill in Philadelphia.

The one characteristic common to them all is the exterior wall: the façade. These walls are a structural grid modularly spaced to permit different layouts of apartments, yet rigid in its own plane to take wind loads, and dense enough to assume the plastic qualities of a bearing wall.

Structure and architecture were molded into one and the same form, and built in a single operation. Only the window frames and glass were needed to complete the elevations and enclose the buildings. And these buildings had real walls: the curtain wall was left out.

Much of our concrete research was applied to these three projects. In Chicago, for instance, we were lucky to have the McHugh Construction Company as concrete subcontractor. One of its side activities was producing forms. Faced with the prospect of casting 4000 identical window modules, and with some encouragement on our part, McHugh decided to form them in fiber glass instead of wood. Again, as in Denver, the key to the decision was the large repetition.

I believe this was the first full-scale application of this kind of forming in the U. S. The advantages were obvious. The molds could be made large enough to form four typical windows in one piece; they were light and strong, needed minimum assembly and disassembly, and could be re-used many more times than plywood.

I still remember my delight and disappointment over the first test pour. The absolute precision of the corners and the perfection of the planes, which were so smooth as to be almost shiny, were marred all over by innumerable air pockets. We soon found out that the imperviousness of the plastic form was the cause of it. The air and water in the concrete had no place to go, and could be easily trapped unless the placement of the concrete and the vibration method were adapted accordingly. I only mention this episode because the development of precise, shop-manufactured plastic forms is an important stepping stone, and much of what we are doing today would not be possible without this development.

In Hyde Park, little advantage was derived from this inherent precision, for it was not merely a question of molding concrete; rather, it was a process of remolding architecture.

The transformations that took place in these three projects were striking but not complete. Today, an examination of the three plans reveals their hybrid nature. The exterior wall, which serves both an architectural and structural function, encloses a conventional interior plan.

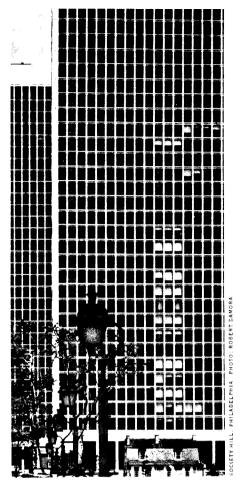
At that stage, we were unable to liberate ourselves from the servitude of interior columns. Hidden in closets, or surrounded by bathrooms and kitchens, these columns, although structurally necessary, lacked any architectural purpose, and, if anything, impeded rather than helped the development of apartment plans.

They were there because we were unable to conceive an economical configuration by which these parasitic elements (in the sense of an organic approach to architecture) would be made superfluous. But even if we had been able to advance such a solution. I doubt it would have been adapted. The drastic changes on the exterior were as much as circumstances would bear. One more step and Kips Bay Plaza, along with the other two, might never have been built.

MIT Buys a Tower

By 1960, isolated experiences with architectural concrete began moving closer, and even flowing together, with other ideas. Like a jigsaw puzzle, these first pieces, placed correctly next to each other, started outlining an idea not quite comprehensible in its entirety. We were able to use the new, although rudimentary, alphabet of cast-in-place architecture with more self-confidence and articulation.

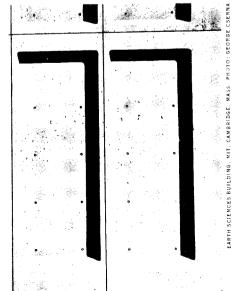
The immediate object of attention was the Earth Sciences Building that I. M. Pei



"Structure and architecture were molded...
and built in a single operation."



"We used cast-in-place architecture with more confidence and articulation."



and I were designing at MIT. The circumstance was fortuitous, because the building program, which called mainly for laboratories and offices, allowed the concept of a tall and slender tower. Small floor areas, stacked on top of each other, instead of being strung along corridor-streets, were a drastic departure from MIT's horizontal way of life.

The effect on the traditional silhouette of the Institute was certainly another departure, but the Eastman Court, with seven architecturally different buildings surrounding it, desperately needed a strong focus to rally the space. Besides, scarcity and the high cost of land warranted the best possible use of the available resources. It was a logical decision on MIT's part, both in space and time, to go vertical.

In addition to changing the exterior pattern, the Institute decided that the tower was to be its first fully air-conditioned building. Before then, only essential laboratories had been air conditioned.

The scheme for the tower is simple and straightforward. It rises 280 ft high, with elevators, stairs, and mechanical services located at the two end walls. The tower is enclosed on all four sides by a continuous bearing and self-bracing structure.

Floor beams spanning 48 ft across the building provide a clear 4500-sq-ft floor at each story. This enables floors to be used for small offices, libraries, or a 300-seat lecture hall.

Fitting Glass into Concrete

The building is all muscle and no fat. Inside and out, architecture and structure are fully integrated. There is literally nothing that can be taken away or added without damage to either. We even eliminated window frames.

The slender, monolithic block was an extension of everything we learned before. The volume, with its deep carvings and recesses, aspires to the same order and scale as the original buildings by Bosswell.

The fiber glass forms used for the exteriors were a complete success—so much so, that, both in smoothness and precision, the finish of the cast-in-place surfaces was indistinguishable from the precast window sills.

Relying on the built-in precision of the forms, we omitted all metal window frames, and specified the glass to be glazed directly into concrete. As expected, the precision of the mold transferred itself



Pierced beams and lighting fixtures create a grid defining the ceiling plane.

"The slender, monolithic block was an extension of everything we learned before."



automatically into the stone, and the glaziers did not encounter any unusual difficulties due to dimensional tolerances.

It was a far cry from a similar idea in the Denver Hilton lobby. This time, we did it consistently for the entire building. The largely unnoticeable detail of plate glass framed directly into the structure endows the tower with an air of irreproachable modesty.

Sandblasting Controls Weathering

The aggregates for the concrete mix were selected to match the limestone of the rest of the campus.

After erection, all the exterior concrete surfaces were lightly sandblasted and then sealed with silicone. The sandblasting not only cleans down the building, but also removes the thin film of cement formed against the hard fiber glass surfaces that gives the concrete a "pasty" look. Besides, the rain and the acids in the air eventually erode the cement film in patterns that are completely uncontrollable.

The sandblasting, therefore, is, in effect, a preweathering process applied uniformly to the whole surface. By exposing the tough stone aggregates and sands, not only are weathering characteristics improved, but the concrete gains a more natural appearance.

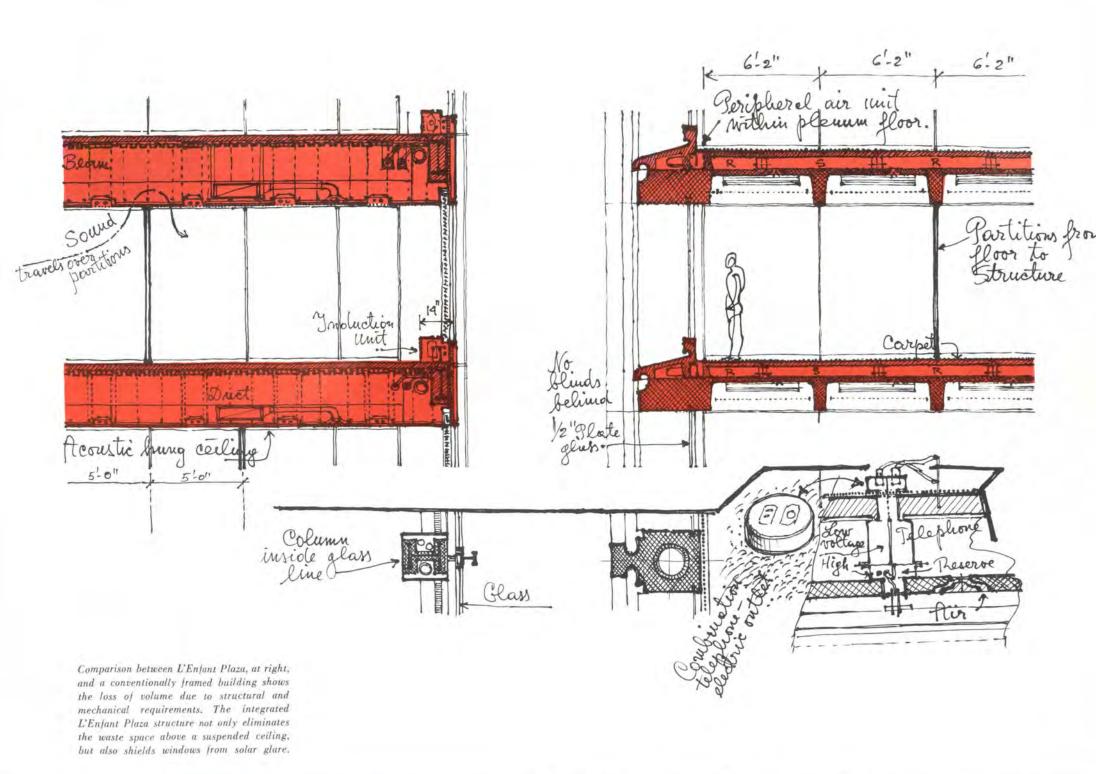
Beams Define Ceiling

The inside of the building was conceived as a simple workshop for research and study. The slabs and the 48-ft-long beams, spaced 9 ft apart, were cast in plywood forms, and, when necessary, were patched before painting.

These 42-in.-deep beams, each pierced by four octagonal holes, create a grid, with lighting fixtures hung between the bottom flanges. This construction defines a ceiling plane. Above the fixtures, telephone cables, pipes, and ducts from exhaust hoods extend horizontally through and between the beams.

Thus, the laboratory services are visible and accessible, but contained; this was a firm requirement from the beginning. The lights are contained between the beams. The peripheral induction units are contained between columns. The branch pipes and ducts are chased through the columns. The partitions are contained between the floors and the beams.

In every respect, the integrated structure and architecture asserts itself as the organizer of space in all three dimensions.



The visible mechanical network, however unattractive, is always visually controlled.

The idea of containment was not original. But dealing with mechanical elements as visible parts of an over-all architectural equation focused my attention on a world which, more often than not, is left to the sole discretion of the mechanical engineer. This focus was sharpened by the tough and knowledgeable director of MIT's physical plant, Carl Peterson.

Keep Mechanical Systems in Place

Peterson demonstrated that unnecessarily long pipes and ducts, superfluous bends and complicated connections, all result from faulty planning. They will not only produce an unsightly installation, but, even worse, will be costly and wasteful at the expense of architecture.

Such waste is intolerable. To do a job less well with more effort does not make sense. Besides, we knew very well that there was no room for waste in the case of the Earth Sciences Building.

We wanted to make sure that this would not happen. With consultants, we traced every riser, duct, pipe, or feeder from its source to the terminals. We planned and replanned the disposition of mechanical rooms, shafts, closets, chases, and sleeves until a clear, simple, and economical system of networks crystallized within the over-all concepts of structure and architecture.

It was a most tedious exercise. But the course I took was absolutely invaluable. From then on, these pipes, ducts, and devices ceased to be mere copper, steel, glass, or plastic. It seemed as if they were carrying energy and movement, breathing air, regulating their functions by automatic controls, and responding to a range of preset conditions almost as if they were capable of thought. Instead of a static installation, the image (and such images have tremendous force) became irradiated with life.

The notion carried powerful implications. I became acutely aware that this vast mechanical realm, the most revolutionary addition of our modern age to architecture, is often left out of our thinking. Instead of making it an integral part of architecture, we had invented ingenious hiding devices that assured quasi-total autonomy for the mechanical systems. No wonder that this man-made life, implanted into the skeletons of our buildings, could not find its true expression.

Low-Cost Plan for Washington

It was not long before an opportunity arose to confront this problem in its broadest sense. For a number of years, ever since the spring of 1959, I had been working on the general plan for the Tenth Street Mall and L'Enfant Plaza in Washington, D.C.

Because of its size and complexity, and since it was part of an urban renewal area, the project advanced at an agonizingly slow pace. Nevertheless, by 1962 the situation seemed ripe enough to start designing the first two of the four main buildings surrounding L'Enfant Plaza.

Specifically, the program called for the construction of two identical office buildings of 300,000 sq ft each, the realization of the Plaza between them, and an underground parking facility for about 1400 cars.

The conditions of the program were difficult. The concept of the Tenth Street Mall and the Plaza implied nothing less than a monumental design approach. At the same time, they had to compete both in initial cost and rental with the run-of-the-mill, speculative office buildings mush-rooming all over Washington. In practical terms, it meant building for less than \$20 per sq ft.

At first glance, the requirements were irreconcilable. A superficial survey of buildings on a similar budget was more than discouraging. And, as I looked at "successful" projects in Washington and elsewhere, my sense of orientation sometimes almost left me. Was I in Atlanta, Los Angeles, or Peoria, Illinois? It was impossible to tell by the buildings I was in. They tried so hard to be different, but the more they tried, the more similar they became.

But Not At Any Price

Looking at buildings in this cost range, I could not find even the seed of an idea that would help me solve the L'Enfant Plaza problem. There were, however, buildings like the Seagram and the Union Carbide buildings—the real pace-setters in office design. Quite apart from their outstanding architectural qualities, these buildings carried out, within their own assumptions, the systematization of the modular theory to what seemed to be the ultimate boundaries.

Unfortunately, the price for such per-

fection was completely beyond our range. Although the amenities provided should be part of any office building, the budget dilemma appeared insurmountable.

But were these crystal towers and glass prisms, passed down to us with such transcendent force by the cubists and purists, truly invulnerable in their logic? Was their implied simplicity intrinsic or only apparent? Did the poetic prophecies of some 40 years ago remain valid in the face of an evolution that followed a logic of its own?

In short, had the time come to reevaluate and realign our own dreams with the changed realities perceivable from our new vantage point. Without being sure of any of them, I was eager to learn at least some of the answers.

Ascending Technology

The historical evolution of the "crystal box" and the tracing of its morphology could in itself be the subject of a fascinating study. It would show how, through a series of fundamental mechanical innovations, major changes in the configuration of buildings became possible. Undoubtedly, the "crystal box" appeared as an idealized abstraction of things to come.

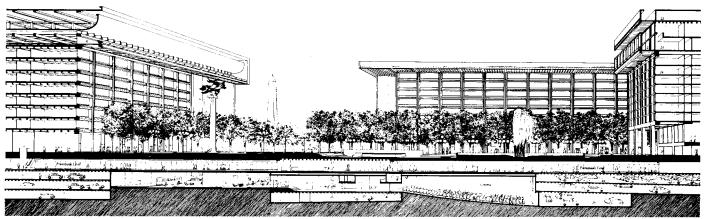
Meanwhile, progressive improvements came about step by step, layer upon layer, until the innumerable components developed into a stratified, supersophisticated collection. As the complexity of the machine grew, a parallel process of fragmentation set in, thus dividing the responsibilities for building design into a number of specialties.

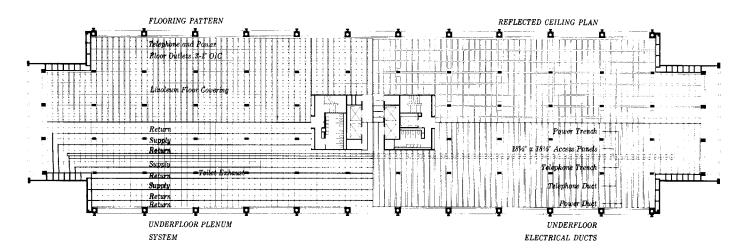
The architect's traditional grasp of his buildings as a unity was dislodged by waves of swift technological upheaval. Structural engineering became untouchable, mechanical design incomprehensible, and the manufacturers of building products showered architects with such an array of materials, in every conceivable shape, texture, or color, that they succeeded in confusing the profession and confining its freedom of action.

Instead of dealing with essentials of space, structure, and proportion, architecture became entranced with veneers, skin construction, with intricacies of the latest ceiling system, or inventing more ingenious ways of covering up the gadgetry and handiwork of the engineers.

Squandering Space Above Ceilings

Shall we look behind the gleaming curtain-





wall panels or remove a portion of a luminous hung ceiling? What we see there has little to do with the abstract purity and simplicity of the "crystal box." In these shadowy regions, beams and girders, ducts, pipes, conduits, and wires criss-cross, interlace, and intertwine in a desperate attempt to reach destinations without interfering with one another. And the higher the building standards, the greater is the squeeze, and, of course, the more costly the end product.

As I thought through these problems, very obvious questions came to my mind. I wondered whether expert builders and real estate developers also ask themselves these questions.

- Why lose one-third of the building volume in the space above ceilings when only a part of it is occupied by beams and ducts?
- Why are efficient long spans made prohibitively costly by penetrations for air distribution ducts and the need for making up air lost in the deep space above suspended ceilings?
- Why use peripheral fan-coil or induction units that occupy between 5 and 12 per cent of net rentable space?
- · Why use large glass areas that have

The lower left quadrant shows the plan of the plenum. The air supply and return followed the same disciplined pattern as the visible parts of the building. In fact, they reflect and serve the basic organization. No unilateral decisions on the part of the engineers or the architect are possible in this approach, since every component serves several functions in addition to its main purpose.

to be sealed off from sun and view by Venetian blinds?

- Why do partitions framed into hung ceilings have low acoustic properties despite high quality materials?
- How much is the real cost of tenancy in addition to rent?

Astonishing as it sounds, when a typical office layout is revised, the changes to ductwork, partitions, lighting, and electrical outlets cost more within the lifetime of a mortgage than the original cost of a building.

So Long, Suspended Ceiling

The question arose that the original preconceived shape of the rectangular or square curtain-walled office tower, hung onto and structured by the traditional steel frame, may be at the root of these many inner contradictions. Was it not possible that a highly specialized assemblage, in which every part is allowed to perform only one single function, inevitably forces vast overlappings and duplication of materials and expenditures?

If so, such inefficiencies clearly must be paid for in one way or another. In low-budget buildings, this is always achieved by cutting down on amenities and architectural quality. In prestige buildings, the wastefulness of the concept is covered up by more generous budgets. Neither choice is a happy one.

Admittedly, having experienced the freedom and flexibility of shaping stone concrete into structure and architecture at will, I was most reluctant to exchange that freedom for the shackles of steel handbook construction, which, with all its inevitable consequences, seemed in the context of other possibilities almost archaic in approach. Besides, sooner or later, the soft underbelly of architecture—the hung ceiling—has to yield its place to structure integrated with architecture.

Put Ducts Under Topping

In a nutshell, the idea I advanced for L'Enfant Plaza was that of sandwiching the air distribution between the structure and the usual 3-in. fill, instead of confining it in the customary sheet metal ducts under the structure.

Various forms of double floor construction were available for electronic computer installations. We adopted the most promising one, which had been thought out by Granco Steel Co., and I used this as our point of departure.

As was to be expected, some very hard-boiled questions followed this radically different proposal. Anticipating it, I decided with my associates, Owren Aftreth and Lien Chen, and the structural and mechanical consultants, Weiskopf & Pickworth and Syska & Hennessy, to test the idea to destruction. Surprisingly, the pieces of the puzzle fell naturally into place without strain or friction. So, instead of having to justify the system, we could explain it with full conviction.

Base Module on Space Requirements

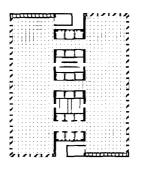
The floor structure, designed for a 100-psf live load, was conceived as an efficient two-way waffle slab with ribs spaced 3'-1" in one direction and 6'-2" in the other. The structural module and office module were purposely made to coincide.

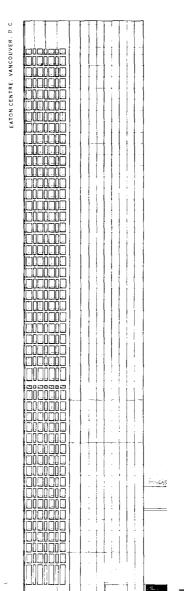
The dimensions were not derived from a standard width of metal, plywood, or plastic sheets, but from such elementary notions as desk sizes, desk spacing, door widths and the necessity for combining maximum office flexibility with best use of floor areas. We were free to form the structure in any logical size or pattern, due to the tremendous repetition of 27.000 units of the basic module.

Precision forming of the floor structure was, therefore, the logical technique. The one-piece fiber glass domes, incorporating apertures for air conditioning, lighting, and other fittings, will inevitably mold the concrete coffers to the precision and smoothness of white plaster. Air supply and returns and light diffusers provide all the advantages of a luminous ceiling, giving more than 100 ft-c of illumination without the usual surface glare.

The consistency of the unit is complete throughout. Nowhere are there odd-sized left-overs to be fitted according to job conditions. Movable partitions not only are ideally suited, but are specified as the building standard. Acoustically, these partitions will not leak (a typical occurrence in hung ceiling installations), since they are framed between floors and the underside of structural ribs.

Carpeting will be used throughout, making any further acoustical treatment unnecessary. Not only is sound well controlled, but noise emission is greatly reduced and floor maintenance simplified. In addition, each module contains in the floor a dual electric-telephone preset insert, ready to be energized where and when necessary without the need of cumbersome drilling through the concrete.





Raceways Support Topping

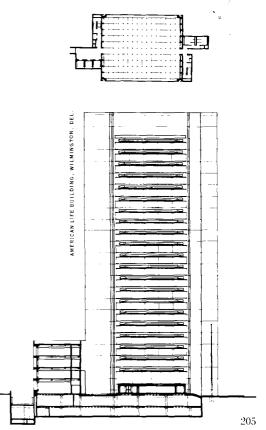
The air distribution is confined between the ribbed structure and the 3-in. secondary slab, which is supported by parallel electric-telephone raceways extending the length of the building. The three elements form jointly the 7-in.-high supply- and return-air plenum ducts.

Because the whole width of the building is used, the cross-sectional area is so simple that air can be circulated at low velocity, combining silent operation with substantial savings in first cost and maintenance. But even more valuable is the ability of moving air to and from each single office module. Once the system is balanced, rearrangement of office partitions during the lifetime of the building poses no more problems than moving office furniture around.

Partitions can be flexibly changed into new configurations, due to the complete autonomy of the module. The 3'-1" width of the module assures the most effective subdivision of the valuable window wall. The peripheral induction unit that normally projects into a room is eliminated in favor of an all-air unit set flush into the double floor.

The module itself is the measure of

"... principles of integral architecture, implicit in L'Enfant Plaza, open the doors to vast new possibilities."



today's office equipment. Each of these attributes and many others truly enhance the value and usefulness of each square foot of the building floor area.

Waste Space Drastically Cut

How does this floor construction measure up to the standard approach? A glance at the comparative section will show that at least 1 ft was shaved off the floor-to-floor height, at no expense whatever to the interior space. On the contrary, the offices benefit from the additional volume within the coffered ceiling. Instead of one third, only 15 per cent of the building is devoted to structure and air distribution.

This economy in height was particularly significant in Washington, where zoning limitations restricted us to a 90-ft height. Not only was I able to fit in an additional floor, but enough room was left for the large roof overhangs, projecting like lofty awnings some 15 ft beyond the faces of the buildings.

The vertical air-distribution shafts feeding the plenum ducts are concentrated in the four inverted, L-shaped corners of the buildings, which also serve as main wind bracing structures.

The window walls, a massive grid of beams and columns 27 ft o.c., contain the deeply recessed, 24' x 6' lights of tinted glass. Despite their size, they are so well shaded by the projecting structure that Venetian blinds are unnecessary for controlling heat gain or glare. The sun shading is done externally, where it is most efficient and does not impede the view.

Better, But Not Dearer

At L'Enfant Plaza, the mechanical network is integral with the architecture. Each part performs double and triple duty. Overlappings and duplications have been cut out wherever possible. The result is a new breed of building, with amenities matching any office building in the U.S. Uniquely adapted to its function and unmistakably individual, nobody will ever confuse it with another place.

Last fall, all of us who participated in the realization of the project had a moment of satisfaction and gave a deep sigh of relief. When the bids were opened, the original budget figure given to us in 1962 was fully and irrevocably confirmed.

Return to Classical Simplicity

In the great periods of stone building-

the Greek, the Romanesque, the Gothic—distinctions between structure, ornament, and architecture simply had no relevance. They were all carved out of the same external-internal continuum of architectural mass and space. The three dimensions not only are the essential domain of architecture, but, as Focillon observes, "They also are like gravity and equilibrium, its very nature."

Today, despite mechanization, and mostly because of it, the same intrinsic simplicity is again possible and within reach. We must diligently learn how to bring it about. The underlying principles of integral architecture, implicit in L'Enfant Plaza, open the doors to a field of vast new possibilities.

Already this same approach is further evolving, as it is being applied to my design for the 44-story Eaton Centre tower in Vancouver, the Christian Science Church Center in Boston, as well as to Pei's concept for the American Life Building in Wilmington, Delaware, now under construction. Even the Bushnell Plaza Apartments in Hartford, Connecticut, underwent a radical transformation in this direction. The plan and structure is a far cry indeed from the early days of Kips Bay Plaza and Hyde Park.

Concrete Makes It Possible

Paradoxically, the integrity and interior simplicity of these plans are not necessarily reflected in rectangularity or squareness. On the contrary, their metamorphosis and internal organization suggest the observance of a quite different logic. Have these plans grown into these unusual forms because of the construction material used, or some other inherent assumptions?

Undoubtedly, they would have little meaning were it not for reinforced concrete. But, "Aesthetically, concrete has neither song nor any story," as Frank Lloyd Wright wrote in *The Nature of Materials*.

If architectural mass and space is defined first of all by proportions—a system of mathematical relationships — then fleshed in by matter and brought to life by light, does the invention of such spaces or such proportions that will tell a story or sing a song, still depend on us and on us alone? The answer is yes and no.

Yes, because—to quote Focillon again—the "... action of the experiment is evident at each of its crucial points." And, by experiment in integral architecture. "... I mean an investigation that is supported

by prior knowledge, based upon a hypothesis, constructed with intelligent reason and carried out in the realm of technique."

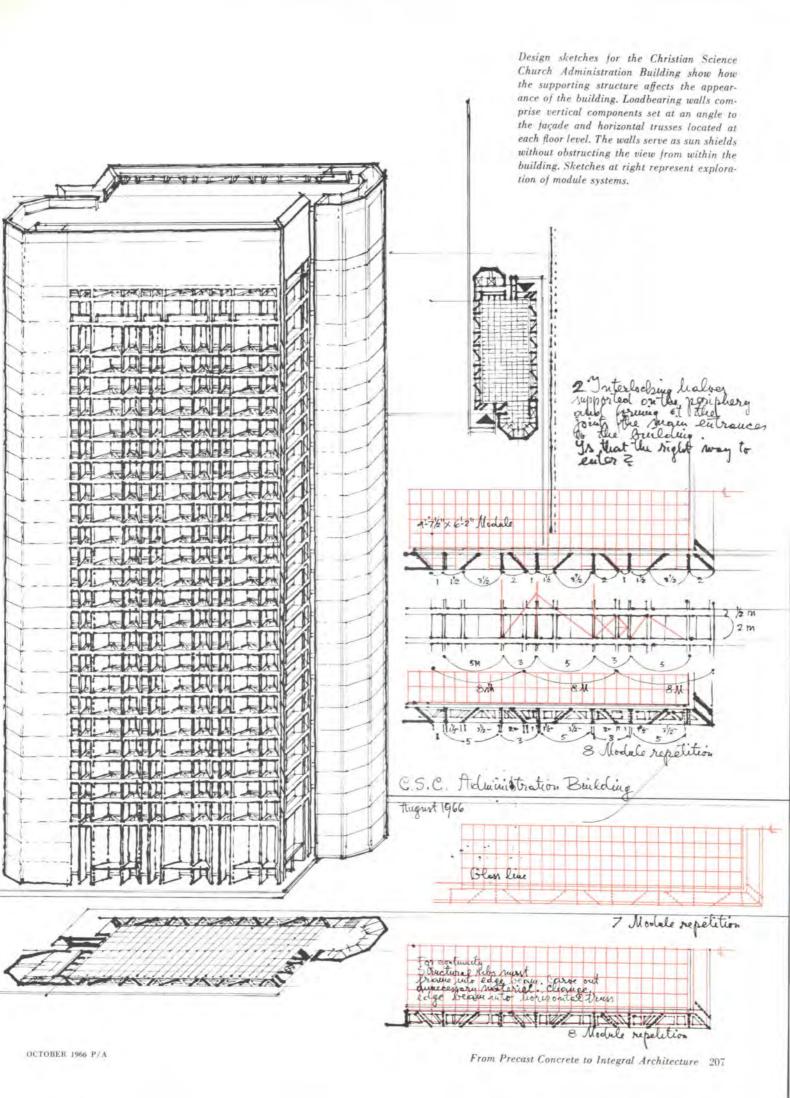
No, because, having reached the threshold of form, the process ceases to be merely a vista of the creative mind. Form takes over from there on, as if aided by a new force. Again quoting Wright: "All things in nature exhibit this tendency to crystallize, to form mathematically and then to conform." Like nature, art also molds itself from without as much as from within.

Therefore, by integral architecture, I mean forms that will result not only from an external organizing will, but also from an inner organizing logic. They shall not remain only as incarnations of our thoughts. They must feed upon their own resources, summoning themselves together by principles of their own, engendering complex laws with matchless rigor and discipline. Only then will these forms come through as true, living forms—the very essence of our time.

Unite the Profession

There is one more important observation. If the ideal of integral architecture is to be given true meaning, the cleavage between engineering and architecture must first be repaired. The stratification of the engineering and architecture disciplines, and the ensuing engineering "mystique" resulting from the drastic technological upheavals of the last 80 years, must be replaced by the fusion of all these disciplines into a union of creative action.

This vastly enhances the domain of an architect's activities. But to enlarge the limits to his freedom, he must first extend the boundaries of his knowledge. His understanding of building must become total and cease to be specialized if he is to become master of his own house once more. There cannot be integral architecture without an integral profession.



August Komendant talks about a client, Louis Kahn; a major Canadian project, Habitat '67; and some shortcomings in concrete engineering.

Instinctive Concrete

Louis Kahn has his own, extremely profound architectural philosophy, coupled with a very creative mind. He always uses a functional approach, "servant to purpose," to solve architectural problems. He uses masses, areas, and depth as a basis of architecture.

When Kahn designs, I don't think he actually considers the material. He may say that he does, but I don't think he actually does so. It seems to me that the material most closely responding to his architectural philosophy is concrete and thus his selection is instinctive.

I base this belief on the fact that his design preliminaries are almost always brilliant for concrete. He does not split the surface, and his architecture is "heavy duty." And so is concrete.

I doubt that Kahn's architecture could be executed in marble, because I don't think of marble as a heavy-duty material. If Kahn tries to use a light material, he betrays his own basic philosophy and gets confused. When he uses another material to protect concrete, his decision is based on erroneous evidence, mishaps through previous misuse of concrete, or some other contradictory factor.

You often see designs where the structural system and the material of which it is made cry desperately over their incompatibility. This is because the freedom of choice to carry out their duties most effectively, and in accordance with their special characteristics, has been violated.

Buildings can tell wonderful stories of how they are made—from the gravel pit and cement factory to the final touch of the finisher—and also how they carry out their functions structurally. Only if the story is clear, pleasant, and exciting can the building be called true architecture.

"It could be made of anything."



Of all Kahn's buildings, the most completely satisfying is the Salk Laboratories. A design is right in concrete when it could not have been built in any other material. When you look at Salk, you unhesitatingly answer that it could not have been built in any other material. As for Bryn Mawr, an unequivocal answer is not possible. It could be made of anything.

Multiple Choice

The engineer serves the architect best when he gives the architect a freedom of choice. For instance, for the church in Rochester I gave Kahn about 16 alternatives. We had lengthy discussions. I showed him all the possibilities as far as structural function was concerned. I really did not give a damn: All 16 solutions were structurally safe.

If I had had a rigid mind that said, "There is only one solution," it would be saying, that, as an engineer, I knew only one system. If you have a wide knowledge and experience, you will find there are many solutions. But the architect must make the decision as to which of these suits his purpose best, supplies the atmosphere he wants, and is most pleasing to him. The architect is qualified to make this decision; I am not. I may have taste, but he has trained knowledge in architecture, as I have in structural systems and materials.

Engineer as Critic

The second service the engineer can give the architect is to criticize. I may be completely wrong, but I have the right to criticize. And the architect will consider that perhaps there is some point in what I say. If something is perfect, you must also tell the architect, for he needs support very much. He is in continual doubt. When you encourage him, doubt disappears and the architect is a free man again.

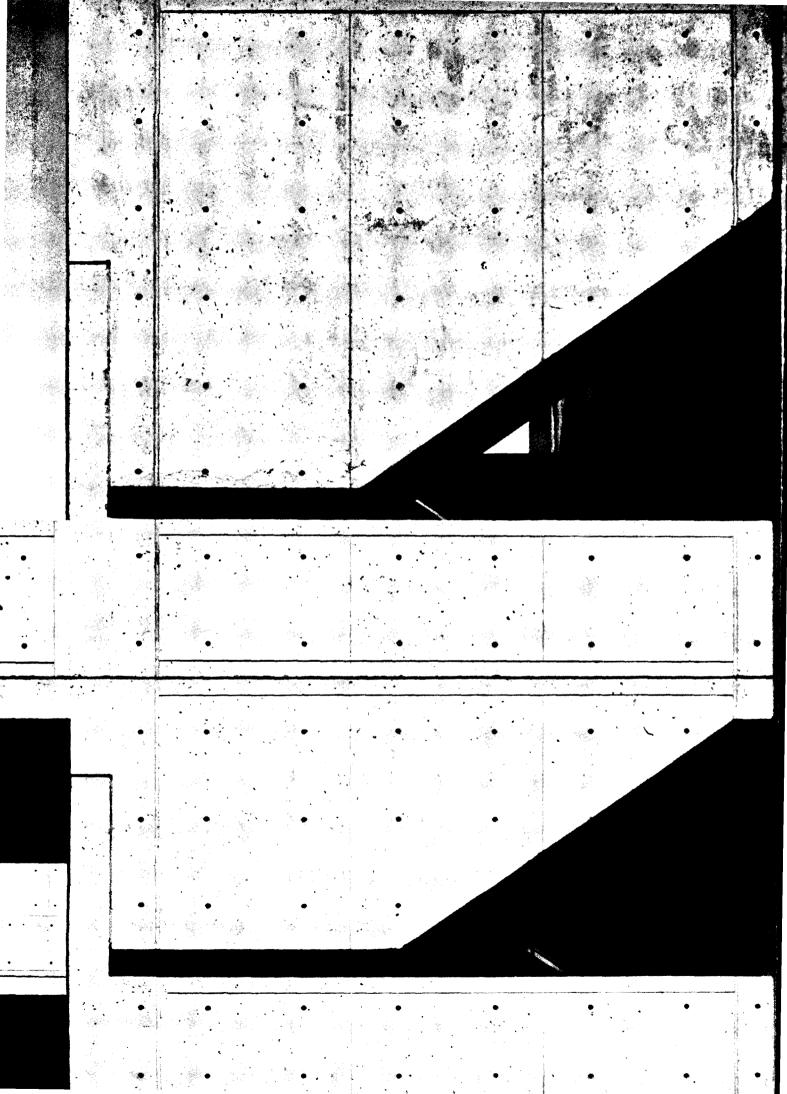
The third service is practical experience. It is as important to know how to construct as it is to know how to design.

As an engineer, you are always an outsider and simultaneously an insider, too. But the architect is always an insider, and as such he is not honestly able to criticize another architect, or assess the true value of his design.

Most architects criticize what they see and feel about a building's external qualities only; such criticism is highly subjective, often misleading, and mixed with individual taste and concepts. True criticism must be objective, and based upon



"...it could not have been built of any other material."



the internal as well as the external qualities of the building. To evaluate the internal qualities of a contemporary concrete structure requires a thorough knowledge about carrying systems, materials, and their use and behavior.

Thus, an up-to-date engineer is of more help as a critic to an architect than a fellow architect can ever be.

Stressed Concrete

There was nothing wrong with the original pyramidal structural system proposed for the Habitat project in Montreal (see p. 226). It was good for a seismic area because it kept the center of gravity very low. But, in this case, the structure was more important than the function; the servant was more important than the purpose. And, when this happens, it is not architecture; it is something else.

The system now being used for the revised, smaller Habitat is a crystal-like structure. It is very functional and expressive. It comprises a variety of cantilevers made stable and efficient by a combination of beam, suspension, and

Furthermore, the common structural theories do not apply, because the system is composed of boxes and panels, instead of beams and slabs for which the standard theories have been developed.

At the beginning of the project discussions, engineers of industrial associations were enthusiastic about participating, but they lost interest after they realized how complicated Habitat actually was. The excuses given were usually that they objected to interference from governmental authorities, committees, etc.

Besides the theoretical structural problems, there are manufacturing, handling, and erection problems that must be considered and incorporated into the design. If these had been overlooked in the design phase, the complex could not have been erected. The timing of manufacture, handling, and erection is determined by the erection scheme.

The street and house units are manufactured in a factory that is close by, and are transported by a 100-ton travel lift to the hook of the crane. This lifts the precast units into the over-all structural

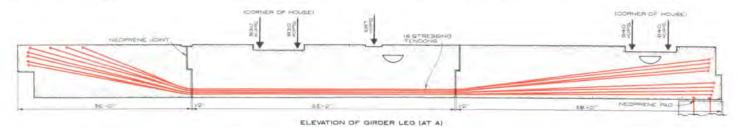
the ductility required to reduce seismic forces.

There are no members that do not participate in the carrying action of this complicated structural system. Without this concept, the project would not be economically possible.

The Habitat Team

I met with the so-called advisory committee of Habitat only once, and was disgusted because every second word referred to building codes. So I told them that if they wanted me to design and carry through the project to the end, I would like not to have any interference, I would appreciate any help that they could give me, but it would have to be up to standard.

I don't particularly like technical historians and I don't like to waste my time listening to and arguing about their obsolete views, which are at least 20 or 30 years behind the times. I told the committee that if they built a thing like Habitat, they would have to forget about codes. We don't know what the codes

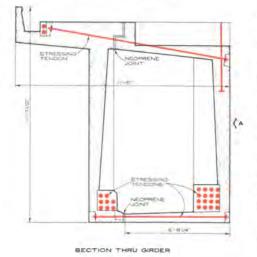


arch actions. The cantilevered house-unit clusters are vertically and horizontally supported by huge street girders spanning up to 190 ft and carrying tremendous loads (dead, live, and seismic). One of these girders has a prestressed force of more than 5000 tons.

As can be seen in the drawing, most of the loads are carried directly by suspension action to the supports. The remaining shear is carried by the girder itself. If the concrete girder had to carry the total shear, this design would not have been possible. One cannot assign functions to a material that is not able to perform.

Pioneering Design

The problem with very complex designs like Habitat is that the extent of the participation of various carrying actions can be estimated only by deformations. This, unfortunately, requires a knowledge of material constants before they can be computed.



system of stacked units.

All connections between the concrete units are provided by dowels and posttensioning. Units are separated from each other by neoprene bearing pads so that deformation can occur, and concrete is not subjected to tensional stresses. In addition, the neoprene separation provides

will be when Habitat is built.

Col. Churchill, Director of Installations for Expo '67, the owner, is a very flexible and an open-minded engineer. He told me, "No committees will bother you. You will be the code. Habitat will be your responsibility."

The architect, Moshe Safdie, is a very intelligent man. He is young, still flexible, and very creative. There is no friction between the architect and engineer because there is no other way out, if the work is to be accomplished. I respect his views and I help him as much as possible, and of course this is mutual.

Figured Concrete

Most engineers, as well as most architects, are ignorant of what concrete actually is. Architectural concrete could be 8000 psi and still be bad concrete. If concrete loads to 5000 or 6000 psi, it is considered to be good concrete. This is not the case. The 28-day cylinder test is often the only criterion used, but it is a mistake to consider

only this test of concrete.

Architectural concrete must be stable, must not stain, and its color should be consistent. I have seen the work of famous architects who thought of concrete control solely in terms of the compressive test, and the results have been very annoying.

The mix must be designed so that it is completely watertight. Absorption of moisture from the atmosphere by exposed concrete should be limited to an absolute minimum. If it is not possible to do this, other means must be employed.

For instance, a silicone treatment might be used. There is an affinity between silicone and cement, and, in a perfect application, the active silicone causes a crystallization so that the concrete surface is closed and practically everlasting.

Concrete ABC's

Handling, placing, and timing of concrete is also very important. A limited quantity of water is required for placing and to create a colloidal state. After crystallization starts, a portion of the water hydrates the cement, and the rest is left in the concrete as free water.

Free water does not help concrete. It creates capillary forces that support shrinkage and add to plastic flow. Light pressure and high frequency vibration will reduce this water considerably. I frequently check correct placing and curing on the site.

You Can't Steel Concrete

Concrete is the predominant material in contemporary architectural structure. A recent European report shows that, during the past 25 years, more than 90 per cent of most structures, including bridges, are built with concrete. Steel is available, but concrete is used for aesthetic and economic reasons.

An additional factor in the use of concrete is its sculptural quality. Steel is a strange material. You don't like to have it stare at you from odd angles, and it usually has to be covered.

Concrete Test

Whenever something goes wrong, you must investigate the causes. You have to analyze the mishap, and make small experiments. It then becomes a research project of "let's find out." You must carry out most of your tests at the site, not in the laboratory only; anything can be made to work in the laboratory.

We need industrial help to make tests. but the most important experiments are carried out by the engineer at the site with on-site material and under on-site conditions.

The Economical Cable

Economically, the factor that contributes most to the extensive use of concrete today is the use of prestressing and post-tensioning. Strands are the most economic way of carrying a load, and are more than eight times as effective as any other carrying action.

Our previous concept of beams and slabs was, in my opinion, a confusing use of the material. Analyzing a structure, it will be found that four types of stresses are required to accomplish the carrying action of a simple reinforced concrete beam: tension, compression, shear, and bond. In the sense of its carrying action, the beam is not at all efficient.

The productive action of concrete in an ordinary reinforced concrete beam is about 15 per cent. But, in prestressed concrete, the steel strands can give us almost 100 per cent efficiency in the use of suspension and arch action.

The controlling factor of structure today is economy. Cathedrals used to be built over a 100-year span. And how much did it cost? We have much more money today than was available to builders in the Middle Ages, but we are guided by different philosophies.

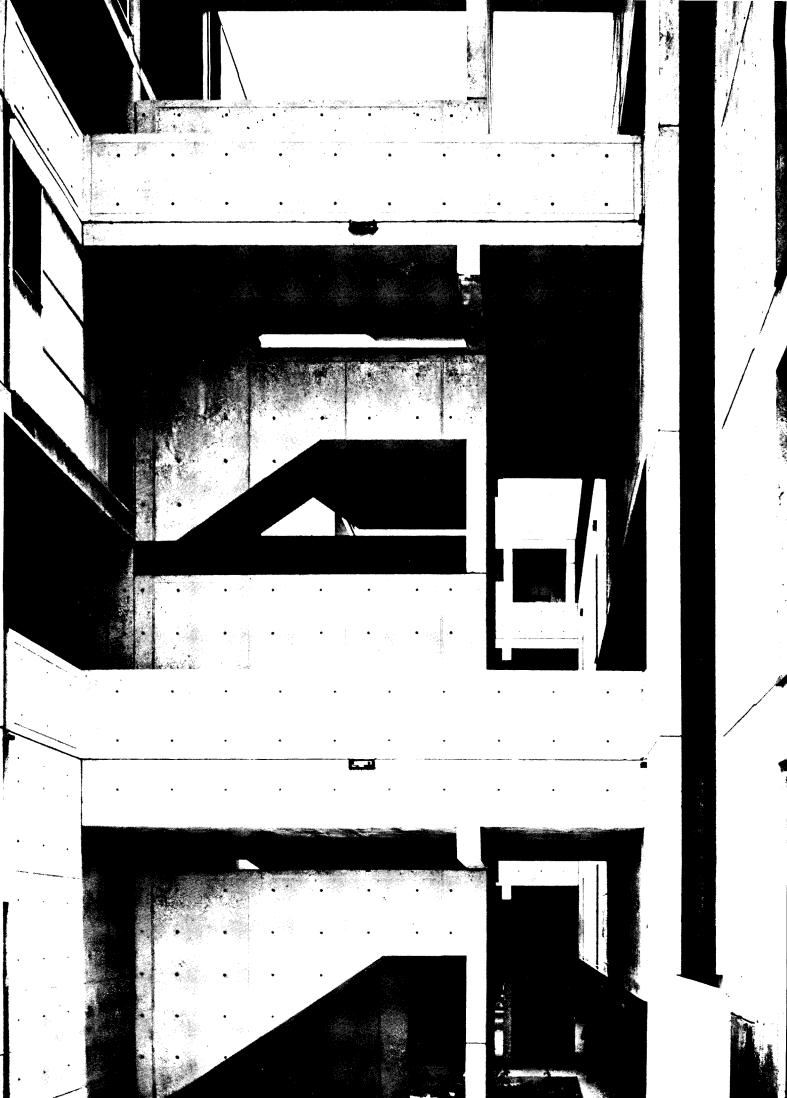
Our idea today is economy. Why should we waste money when we have the means of making economic structures? I do not use economy in the sense of money only. but in connection with engineering ends-and-means relationships.

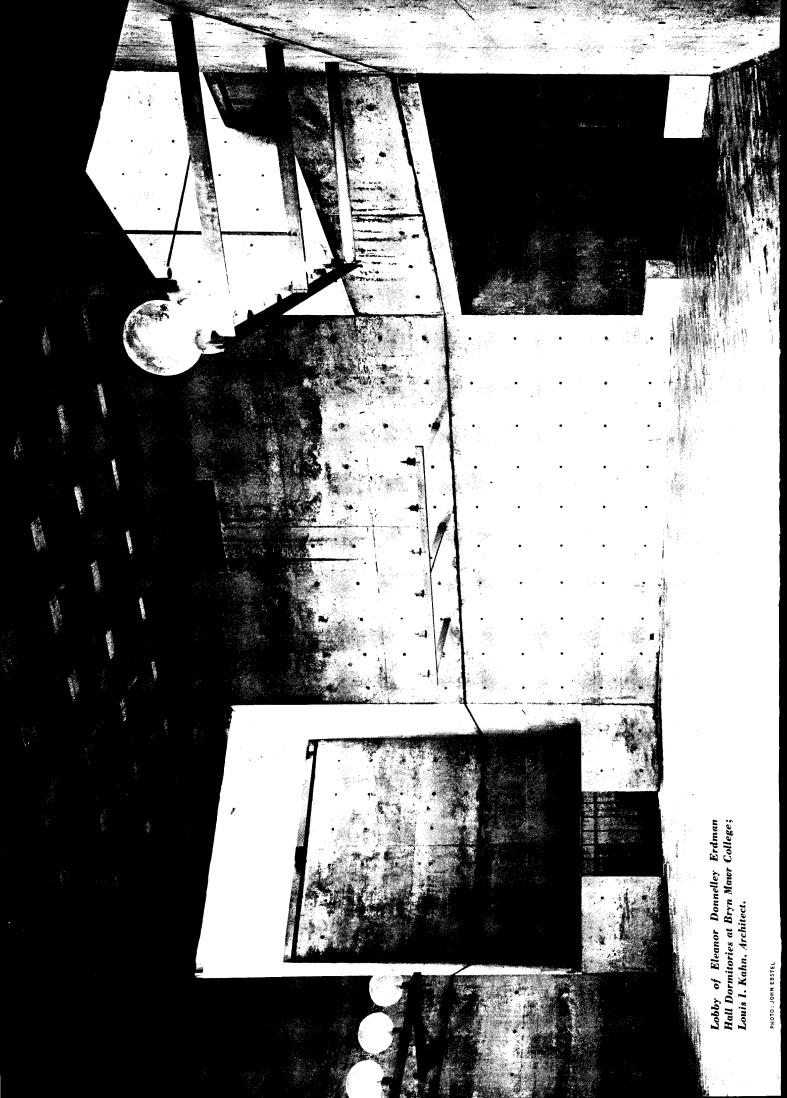
In a sense, economy is the engineer's integrity: I can do many things to show that I have money, but when I do a thing economically it proves I have intelligence.

No Cement Concrete

Thinking about the future of concrete. I would say that we would have the best concrete when we don't use cement at all. If we could develop an epoxy plastic and use it to replace the cementing action in the mix, we could produce a material like granite. Such a mixture would not be subject to plastic deformations, and would not change in the course of time. This, to me, would be the future of concrete.

Even though we do not have this perfect material, we must respect the inherent values of the material that we do have. We must esteem its honesty. Its normal, natural surface is the most valuable in architecture. To paint architectural concrete would be like painting gold.







Several architects come to mind who have been interested in exposing and expressing cast-in-place concrete extensively; Louis Kahn, of course, Gordon Bunshaft, Paul Rudolph, Walter Netsch, John Johansen. Any proposed tally of the status of this activity would make one think a lot of concrete is being used in this way to make interiors integral—organic, if you remember—with the exteriors.

The facts, however, indicate a different situation. One can probably find only two dozen buildings in this country, built in the past two decades, that show concrete used extensively on the interior with any aesthetic intent.

"We haven't done this the same way that Rudolph and Kahn have," says Kevin Roche, "The other people tend to get walls of concrete. It is not that we have consciously refused to do it; just that we haven't done it."

"We like the idea of exposing concrete on the interior," says Frederick G. Frost, Jr., concurring, "but when you come to looking at what you've done about it, it doesn't amount to much."

"It probably is true that concrete hasn't been used very much on interiors," Rudolph observes. "After all, it has taken a good time to get it used to any degree on the outside, so it is bound to take time to see much of it on the inside. It is all a matter of time."

The reasons for concrete not being used more extensively on the exterior are given elsewhere in this issue: industrial development, code restrictions, and public acceptance. For interior use, however, there are no code restrictions that would seriously prohibit using concrete. Thomas Long, of the Portland Cement Association, notes, "You would probably exceed the code requirements with concrete interiors."

Public acceptance is another matter. Clients in general, it appears, simply do not like concrete in interiors, finding it unsympathetic and visually unattractive. One critic has said that people are looking for a softer, warmer, more tender expression in interiors, and there is very little you can do to concrete texture to achieve this. Furthermore, as Raymond Epstein points out, a rough texture looks different in a small interior space than it would in an exterior application, when seen at some distance.

But concrete appears to be disliked for other reasons also. Actually, one finds a texture like monumental seersucker a rather rough emery board to brush against in a room. How hard a brutal concrete is on clothes and skin has never been seriously examined. People even wonder if you can get insurance against persons scratching themselves on rough interior concrete. Paul Rudolph says he never heard of any and counters with, "Did anyone ever get insurance against a rough brick wall or for a band of Louis Sullivan panels?"

There are also some practical difficulties for architects. Although Daniel Toan, of Warner, Burns, Toan & Lunde, says, "Concrete is the same as the Gothic tradition—the same material inside and outside." Frederick Frost finds "it better not to expose the same cast-in-place concrete member both outside and inside because of temperature conduction, which causes condensation on the interior."

Hugh Hardy points out that you have to make double walls or give up the concrete on one side or another. "We're lushed up and air conditioned, unlike Gothic times," he explains.

"If you use 3000-psi concrete to keep the water out," Paul Rudolph counters, "it becomes a dense concrete but it is still a reasonable insulator. My argument always is that it is a lot better than glass. I don't build double walls because of the expense. It is easier offset by conditioning the air."

Why architects continue, then, to be hung-up on the ideal consistent interior-exterior concrete expression seems somewhat inexplicable. It is an old argument—the matter of structure as finish. Yet no other "organic" living thing is built the same on both interior and exterior. A turtle shell, a snail shell, or the human body would not be so comfortable a shelter if they were as "consistent" as architects would like to have a concrete building.

Furthermore, in strictly functionalist terms, one is hard put to defend interior and exterior surfaces as serving similar purposes. In fact, much as we love it, the consistent use of concrete throughout both exterior and interior of a building may in time prove to be one of the major aesthetic rationalizations, if not aberrations, of this century.

Brilliant some of the interior uses have been, however.

Paul Rudolph is one of the architects most dedicated to this goal; perhaps more than any other he has cast entire buildings. He admits, however, that details such as the buckless door in what is sometimes waggishly referred to as Yale's D&D Building, where the concrete itself is poured as the buck, the attachment of the hinges into the concrete was a finicky and perhaps an uneconomical gesture.

Walter Netsch, another of the architects whose use of both cast-in-place and precast concrete is forceful and extensive, approaches this problem of attachments differently. "Since the concrete is the most permanent surface," he comments, "our technique is to keep as much off of it as possible. We try to keep circuits out of it, for instance, and put them in plaster shafts adjacent to the concrete, since plaster is a more pliable, moldable thing."

"The pouring of the concrete is the important thing," Netsch continues. "And if you have to worry about the size of a grille opening or about fiddley details in the form, then the vibrating is difficult and you get honeycombing. If you want to insure the consistency of the surface, you try to make the pouring of the material the important thing."

From this, it becomes evident that the most important reason for the lagging use of concrete in interiors is industrial development—and not only that of manufacture but also of construction.

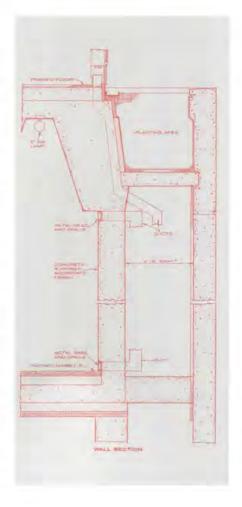
"A very good contractor is important," Rudolph says ominously.

Peter Samton of Kelly & Gruzen elaborates: "The big problem with exposed concrete as an interior finish is one of workmanship. Edges get broken during construction and the patching is never even. Workmen cannot be convinced, no matter how much talking and instructing you do, that the concrete is the finished wall. So they prop bucks against it or make notes on it with crayon or paint. Once it gets stained or broken, you can't ask the contractor to tear down the wall.

"Rough concrete," Samton continues, "is one solution. So far as keeping it fresh is concerned, smooth concrete is the major problem. It's a problem of concrete craftsmanship."

Because of the novelty of the material to the majority of contractors, even though there is considerable use of concrete in schools, hospitals, houses, and offices as hallway partitions and screen walls, the largest volume of the concrete in interiors is in block. Thomas Long of the PCA observes, "The major factor is the traditional fabrication sequencing. As we become more adept in the traditions and the fabrication, masons can utilize concrete better in interiors. But putting partitions in as we go up with the frame, as they





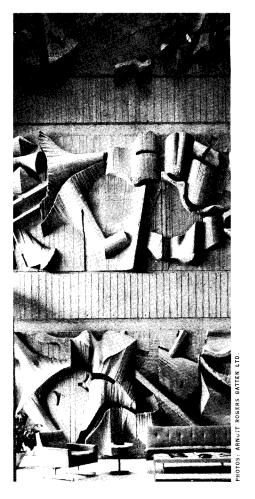


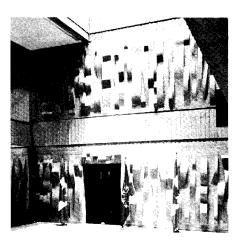
Roy Allen of Skidmore, Owings & Merrill, New York, says, "The cheapest thing you can do is a cement plaster ceiling. If you expose a concrete ceiling there are problems of getting air conditioning to the interior of the building, and problems of attaching partitions. At our Des Moines building, we had to provide a number of pool spaces for large departments of workers on the upper floors, so the exposed ceiling of tees was right for the American Republic Insurance Company's needs. But pool spaces that cannot be easily partitioned are not good for diversified uses. Flexibility governs this interior-exterior matter, and so the opportunity to carry concrete through a building-total integration of concrete structurally and in finish-is very limited. Exposed concrete architecture is not going to replace furred ceiling architecture, I am sure." (See contradictory opinion of Aldo Cossutta, p. 196.)

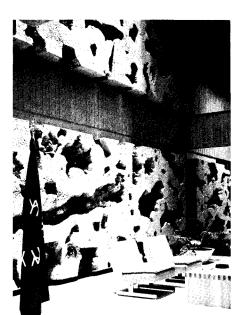
On the lower floor of the Des Moines building (top), SOM used what Roy Allen jeels is the most flexible exposed concrete ceiling—the wassle slab. The prestressed wassle slab was cast on plastic pyramidal forms, then painted. Air-conditioning vents are concealed in black spacers at base and head of exposed sandblasted concrete wall on right. The sandblasted wall is rough enough so that people stay away from it; consequently, it does not get marked.

Architects Thomas and Mary McNulty, whose house in Lincoln, Massachusetts, is of castin-place concrete outside and in (bottom), remark that "an austerity is implied in the treatment of the concrete," but also that "the simplicity of construction places an emphasis on the individual." About the building process, they point out, "The contractor considers that the biggest problem was communicating to the workmen and tradesmen what was going on. It was the liaison between those executing the architectural design that seemed so extraordinary-novel yet traditional. Novel in terms of today's mass and industrially oriented labor market, with its generally erosive influence upon craftsmanship and personal involvement; traditional in its recall of the guilds and mystic brotherhoods, which, in earlier building periods, supplied an inspiration and framework of relationship that could assure close collaboration."

Lightweight aggregate and air entrainment were used for the 8-in. silicone-coated exterior walls to improve insulation. Floors were polished and finished with an acrylic coating. Concrete can be sculptured to provide a variety of decorative textures as well as overall textures, as the three entrance courts to the administration pavilion of the 1967 World Exhibition in Montreal indicate. Each entry has a three-story well that is ornamented by floor-to-ceiling concrete creations of three different Canadian sculptors. Toronto's Tom Bieler executed a curved and fluted series of fragmented objects (top); Montreal's Ulysse Comtois designed a ribbon-like concrete weaving (middle); and Montreal's Armand Vaillancourt produced rugged sponge-like sections studded with chunks of blue-green glass, (bottom). All the sculptures were cast in plaster molds, then placed as infilling panels on the concrete walls of the building.







would most economically be installed, would require a complete new view on the part of our contractors. Eventually, this may come along. In Russia, at the present time, interior walls are prefabbed as panels, and they go up with the frame. But there is more control over industry in Russia."

There is another industry concern—the matter of maintenance.

"Every material has a maintenance problem," an architect points out. "With concrete, there may be a question of dust. Can you control the mix so you don't have to dust; what do you do when it gets dirty? Do you wash it? If so, how? Maybe the problems are so great that people should not use concrete on the inside. Maybe they are not."

"You vacuum-clean it," Rudolph says, smilingly pointing out that he is always serious. "Or you take one of those wide brooms to it."

"High-gloss paint is good for low maintenance," Walter Netsch says in a balanced way. "It makes a tough surface on a tough surface. Or we sandblast it."

Thomas Long adds, "Silicone is not necessary on interior panels. New latex oil base or plastic paints can be used on concrete surfaces, or you can stain it with ordinary stains. Rubber-base paints won't peel inside." For exposed concrete, Long continues, "Marking can be remedied by soap and water; solvents would knock off ink and crayon; and a real light solution of muriatic acid and washing would clean it, but this is messy inside. Some masonry units have a thick layer of plastic cast right on the block, so that you have a smooth surface that is easier to clean."

"Once the maintenance people take over," a critic reminds us, "they add things. At one concrete building they added a clock, and ran the cable, an exposed conduit, right across the concrete surface. It looks really ghastly. In the usual construction, you could cover those things up, because it is much more flexible. No doubt one reason concrete is not used as much on the interior as architects would like is because, as everyone knows, it is cheaper to plaster than to fiddle around with the concrete."

No serious historian would want to discourage any attempt at consistency, nor, happily, could any seriously discourage whatever will happen. But clearly, several practical problems will have to be solved before any widespread use of exposed concrete in interiors can be expected.

Several architects have things to say about the future of this direction:

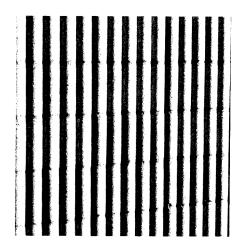
"Because of the way property is abused in a public building," says George Larsen of C. F. Murphy Associates, "it would be a good thing to use more concrete in interiors, perhaps provide concrete furniture and hoses in the ceiling so you could hose it down at night."

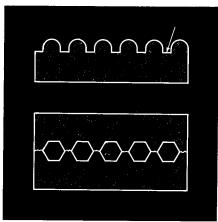
"In the future," SOM's Roy Allen says, "concrete architecture may come most predominantly in parking architecture."

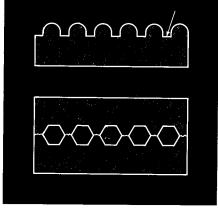
Paul Rudolph adds, "I am under no illusion that cast-in-place concrete is ever going to be very popular for any number of buildings except garages. But I do think that precast concrete will be used for many small buildings, especially because of the economics."

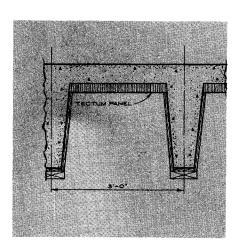
Finally, Walter Netsch concludes, "If I have any guess coming, I think that people are shying away from concrete interiors simply because not everything is a high hierarhy building, such as a church. A concrete environment is really kind of hard to do inside. Plastics are probably the coming things."

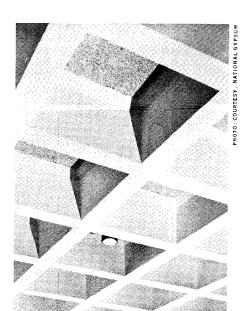
Davies, Wolf, Freeman & Flansburgh, Associated Architects, integrated Tectum acoustical panels into the casting of the concrete waffle slab of the Kennedy Junior High School in Natick, Mass. (drawing at right and photo below it). They gained, in addition to the acoustical insulation, which is also the finished ceiling, a saving in the amount of concrete in the cast slab. Squares of Tectum were simply placed on top of standard metal domes prior to the casting.

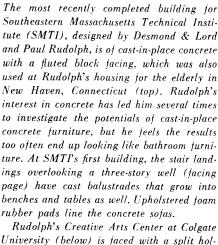




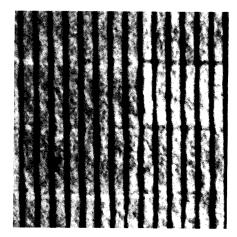








University (below) is faced with a split hollow-core block, using the ragged inner surface as the finished texture (lower part of drawing left).









fabricated and to crack, spall, or fall apart if they are

By A. I. Tenzer and Ray McNeal of the Building Materials Research Institute, Inc., New York City.

Exposed-aggregate concrete panels, with their variety of colors, designs, and textures, can be counted among architecture's most versatile developments. They also create many problems in construction and disappointments in service, but this fact is less surprising than its corollary: sometimes they do not.

What makes a totally successful installation of precast exposed-aggregate so surprising is that it can only result from the most delicate coordination of design, engineering, specification, manufacturing, and erection. Problems arising at each stage of manufacture require an understanding of what went before and what will follow after; sometimes, the information on which judgments must be based is either unavailable or already buried in a batch of cured concrete.

As consultants on building materials and material problems, we may have a somewhat unstatistical view of the proportion of failures to successes. This is not only because we see more problem jobs, but because we have to look closely for problems in the making. Sometimes it takes a magnifying glass to find them. But, sad to say, we often do.

What are these problems? How do they show themselves? What are their effects? What can be done about them? Although causes vary, failures such as those shown here can usually be traced to the portland cement concrete that is used in most exposed-aggregate precast panels. Weathering and stress cracks, spalling or disintegration are most common and most dangerous, because they permit moisture penetration that causes progressive deterioration.

Or the binder may fail to hold all of the exposed aggregate, resulting in unattractive voids that also permit progressive damage. Staining and discoloration are separate problems. They may or may not be related to structural weakness, but they can hardly gladden the heart of the architect who specified exposed aggregate for its aesthetic appeal.

Goulash Won't Do

To understand where troubles begin-

Deep etching of a weak matrix undermines small aggregate which falls out leaving dark voids shown on facing page.

and how they can be prevented-consider the structure of a typical panel and how it is affected by design, specification, quality control, and manufacturing.

The exposed face of a precast panel is rarely "ordinary" concrete. For the sake of appearance and texture, it is usually made of selected, tightly graded-and frequently costly-aggregate mixed with clean white sand and cement, and, more often than not, with pigment or coloring agent. These expensive ingredients are not needed in the unexposed, back-up portion (some are undesirable since they weaken concrete), but for strength and durability each panel has to be a monolithic mass.

Therefore, to keep costs down and strength up, most panels are cast in two steps. First the reinforced back-up is cast with a mix formulated without regard to appearance. Then, before it can take an initial set, separately mixed concrete for the face layer is cast over it. The two layers are consolidated, usually by mechanical vibration.

The panel then has to be cured. Steam curing is commonly used because it yields an ultimate strength nearly as good as water cure, and is a great deal faster and therefore less expensive. The heat of the steam chamber speeds the initial curing action of the concrete. And the moisture-saturated environment prevents loss of water that the concrete needs for a full, high-strength cure. The panel must be kept moist for at least seven days after it is removed from the steam. This can be done either by placing it in a highhumidity chamber or by covering it with a suitable plastic membrane.

The final manufacturing step consists of exposing the surface aggregate. In one method, it is etched with solutions of hydrochloric acid. In another, the curing time is retarded by applying chemicals to the surface of the concrete mix during casting. The shallow, uncured layer can be scrubbed away after the bulk of the mix has set hard enough to be unaffected by hosing and brushing.

Mistakes Multiply

As simple as these procedures sound, they are full of pitfalls. Precast panel problems can begin at any stage, from design onward; the earlier they start, the more chances they have to multiply along the way. And good components and systems may fail because they are are incompatible with each other.

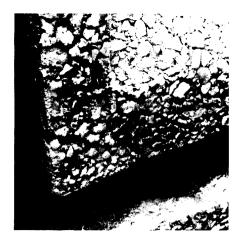
The initial design and specification of exposed-aggregate precast panels is partly architectural, partly an engineering function. Requirements of size, thickness, color, texture, strength, loading, and resistance to probable environments have to be translated into concrete-component ratios, density, air-entrainment, pigments, aggregate type, size and grading, and the size and placement of reinforcement. All of these are important to a sound and durable end product; most are critical.

The specification of concrete involves many compromises and trade-offs. Assuming that all components are of the quality and purity called for (they not always are, but we will come to that later), the design must still balance cost and appearance against tensile, flexural, and compressive strengths, density, absorption, and similar physical factors. Most of these are determined by the basic formulation-that is, the ratio of cement to total aggregate to water. Subsidiary relationships, such as fine to coarse aggregate, exposed aggregate mix to back-up mix, and all of these to pigment, air-entraining agents and chemical accelerators or retarders, if any, are almost equally important.

Where strength is a factor, high density is, of course, desirable. Exposed-aggregate panels are rarely loadbearing, but they have to be strong enough to withstand strains of handling and erection, settling and possible misalignment, and wind loading. Higher density also gives better resistance to weathering, disintegration, water penetration, dirt retention, and, usually, loss of exposed aggregate.

Since it is not usually practical to compound exposed concrete for total resistance to moisture penetration, the surface layer should entrain between 4 and 7 per cent of air. This makes it less vulnerable to freeze damage from water that does get in. Since air-entrainment reduces strength, the loss should be compensated for in mix design.

The same is true of pigment. It contributes nothing but color to the mortar and should therefore be calculated as part of the inert filler. Too often, it is simply added to the total without regard for the fact that it can change the over-all proportion in the direction of lower strength and poorer bonding. Some types may also react chemically with some types of cement, resulting in staining, uneven color, or early disintegration. Impurities in pigments can have similar, or worse, effects.



Corner of panel (top) can be expected to fall off when reinforcing fabric exposed in crack oxidizes. Corner may have been cracked during installation of panel, but deepening of crack results from weathering and mortar failure. Sandy matrix (center) provides poor adhesion for aggregate, and cracks will admit water, which will freeze and widen cracks. Stress-cracking pattern (bottom) of small cracks joining large cracks, leave ½-in.-dia. voids where aggregate fell out.





The Stone's the Thing

To a designer of exposed-aggregate panels, the component of greatest interest, quite naturally, is the exposed aggregate. Frequently, it is also the most troublesome. Although appealing to the eye, some types of aggregate are basically unsuited for this use because they react with the alkaline in cement; in exposed faces, they tend to expand and pop out of the mortar. Some lightweight aggregates are good to look at and would seem to be desirable for minimizing panel weight. However, they should usually be avoided, because they are apt to absorb moisture which, in exposed surfaces, would promote cracking and deterioration. In time, they would probably crumble out and damage the appearance as well as the strength of the panel.

When specifying aggregate, an architect should also consider how the surface is to be exposed. If acid is to be used, it is important that the aggregate be acid-resistant. Otherwise the color (and possibly the strength) for which the stone is selected may be leached out before the panel ever gets on a wall. Even if chemical retarders are to be used for exposing the surface, it is best to specify acid-resistant aggregate. For, in steam curing, the surface mortar sometimes sets up too quickly for successful wash exposure. When this happens, acid has to be used, regardless of the manufacturing plan.

The size of coarse aggregate is as important to durability as it is to appearance. Even more important is the gradation of sizes, for whatever the design reasons for mixing small and large aggregate in an exposed face, they are more than offset by disadvantages in function. Inevitably, if the surface is etched enough to give proper exposure to large stones, small ones will scale out sooner or later. Probably sooner.

Aggregate size, in the base mix as well as the surface mix, must also be considered in relation to panel thickness. As a rule of thumb, the largest piece should be no more than one-quarter the thickness of the panel.

Size may also be governed by the need to keep reinforcing steel at least 3/4 in. below the surface. In exposed-aggregate panels, this measurement should be taken from the most deeply etched valley. Some water penetration has to be expected, and, if any moisture does reach the steel, the resulting oxidation and expansion will

surely cause progressive damage. So, if a safe depth cannot be maintained for reasons of design or structure, specify galvanized reinforcement and coat the ends of cut bars with a zinc chromate primer.

No Single Cause

Careful, knowledgeable specification is essential to a satisfactory end product, but it is not enough. Everything an architect or engineer plans for in an exposed-aggregate panel can be undone by poor manufacturing techniques, or even by good techniques that are imperfectly executed.

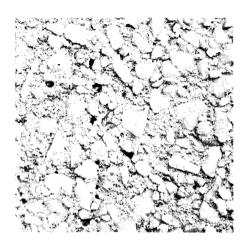
Good manufacturing must begin with careful inspection, testing, and quality control of every batch of component materials. All aggregate—coarse, fine, exposed, and back-up—should be tested for soundness, alkaline reaction, chloride content, cleanliness, and freedom from deleterious substances and minerals. They should also be checked for size and gradations of sizes. Substandard aggregates or mixed-in impurities, as has been noted, create time-delayed problems by expanding, crumbling, reacting chemically, staining, blooming, or just weakening the concrete mass.

Batching and proportioning can also be critical. In the inspection of problem jobs, it is routine to check core samples for physical properties. Probably the most common finding is that compressive strength is far below design specification. This is probably most often due to non-uniform batching and poor placement of mixed batches in the forms. There is a natural tendency for coarser aggregate to settle to the bottom. Unless this is checked by careful batching, mixing, and slump control, it will leave strengthrobbing voids in the cured concrete.

Many other factors can contribute to nonuniform, subspecification concrete:

Water-Content Variations: Even when water is carefully measured, calculations can be upset by rain or air moisture settling on the surface of stored aggregate. This must be allowed for; it should be recalculated each time the batching storage bin is filled from the stockpile. Moisture varies as the overnight accumulation dries out during the day and as the scoop reaches the inner, drier part of the pile. This kind of sliding-scale calculation may not defeat an engineer, but it could pose problems for the mechanic on the stockpile bucket. Such problems could be





Deep and wide cracks (top) can lead to serious stress cracking that may buckle panels when entrapped water freezes. Small cracks (center), extending between stones, indicate insufficient adhesion of mortar. Uneven distribution of aggregate (bottom) creates weakness because there is insufficient binder around large pieces, and too much matrix at left of picture.



avoided, or at least minimized, by requiring that all aggregates be stored under cover.

Cement: Cement quality is not necessarily uniform. Each incoming supply batch should be tested not only to confirm freshness and quality, but also to make sure of batch-to-batch uniformity. Even slight variations in color. setting time, or processing requirements between batches mixed together can cause unpredictable results. Quality control at this point should also insure that none of the cement used is already partly hydrated.

Consolidation: The separate pours of surface and back-up concrete have to be mechanically tied together at the interface. This is done by vibrating the combined mass before either layer has obtained an initial set. Unless the process is carefully handled, it could bleed some of the back-up mortar to the surface. This would be no problem unless the mortars were of a different color. But they frequently are. Somewhat worse, it could settle larger aggregate to the bottom and weaken the concrete. Or it could cluster or rearrange stones that should be spread out for visual effect.

Curing and Handling: This should be routine, but not infrequently it is routinely bad. For a high-strength cure, concrete has to be kept thoroughly and continuously moist for at least 7 days, preferably 14. Panels should be processed at a uniform rate. It is best not to handle them at all until they have taken a good set, and then they should be handled with great care through the remaining cure cycle. Premature or rough movement can set up internal cracks or strains from which concrete can never recover. The dangers are greatest when panels are moved through cure stages, and when they are removed from their forms. Perhaps some banging is necessary at this point, but in a good shop, workmen will not seize upon form release as an excuse for letting out their aggressions.

Exposing Surface Aggregate: Whether exposure is accomplished by acid etching or by the retarding method (or by both, if steam-curing hardens the surface too fast for successful wash-out), it is important that the treatment not remove too much of the binder. Acids have to be applied carefully in proper strengths for controlled times or they will penetrate unevenly and too deeply. This will result in an inert binder that obviously cannot hold the aggregate. And dead cement can

wash out later and invite water penetration with all the resultant damage of steel oxidation and freeze-thaw damage. Chemical retarders must be handled with equal care to insure adequate, but not excessive, binder wash-out.

Testing Panels for Soundness: If there are going to be any problems, it is clearly better to know about them before panels are hung on a structure. In a good quality-control procedure, test cylinders and slabs will be taken from every mix batch from which panels are cast. Before any panel is used, its matching samples should be cured for 28 days and then thoroughly tested for tensile and compressive strength, absorption, freeze-thaw stability, and other relevant properties. And, of course, the samples should be closely examined for hairline cracks, voids, discoloration, or other flaws.

Haste Makes Waste

Care at every stage of design, manufacture, and testing can eliminate most problems of exposed-aggregate panels. But until men become infallible, they will not eliminate all. Further checks of the finished structure should therefore be made hoth early and periodically. For early detection and treatment of minor faults can sometimes keep larger ones from developing.

If inspection does reveal problems, it then becomes important to analyze their causes and forecast probable effects. Minor loss of aggregate may not be serious. But if stiff brushing removes a significant amount of stone and powders out the matrix, it is likely that weathering effects will be severe.

Cracks, too, have to be carefully analyzed. If there are many of them, it may be necessary to remove a panel and project its weatherability by accelerated freeze-thaw cycling. Minor hairline cracks, if there are not too many of them, can probably be checked by a sprayed or brushed-in water-repellent. This should not be attempted, however, until the future course of crack development has been projected as accurately as possible. Many surface waterproofers are based on silicones that repel not only water but most other materials as well. If cracks should open up, the silicone treatment will not only be ineffective but will prevent the adhesion of new grout or slurry that could repair the damage. Therefore, repellent surface treatment should not be used unless there is good reason for believing that serious cracks will not develop for at least three to five years. After that, the silicones will be sufficiently worn away to permit further sealing. And, in the meantime, they could afford considerable protection for both the concrete and the building.

Serious and progressive cracking present other problems that, through exposure of reinforcing steel, could affect structural soundness. Problems like these will probably require rebuilding of the matrix with carefully worked-in grouting compounds.

Polymer types of emulsion solutions have been successfully used to overcome binder and stone defects. Corrective compounds must be developed and tailored very carefully, so that their physical properties and coefficients of contraction and expansion will be similar to those of the original panels.

Regrouting or rebuilding faulty panels is cheaper than replacing them; but not much. It is so costly, in fact, that it should not be allowed to happen.

Nor does it have to happen. At least, not any more. In the earliest days of exposed aggregate, problems developed that could neither be reasonably anticipated nor fully controlled. Even today, perfection still eludes us. But enough problems and pitfalls have been identified to teach those who can learn from experience.

An architect no longer has to hesitate in recommending or designing exposed aggregate, nor need he solve all the technical problems of specification and manufacture. He should know, however, that they do exist, and that they can be solved only by technical coordination and meticulous control at every step from drawing board to scaffold.

aggregate, with uniform color,

By Edward L. Friedman, an authority on concrete in architecture, and a consultant to I. M. Pei & Partners, New York City.

The wisest advice for an architect looking for aggregate to use in exposed architectural concrete is, "Commission a geologist to do the dirty work, and select a firm familiar with the geologic character of the project area."

Before we can understand the significance of aggregates in architectural concrete, the material must be defined.

Architectural concrete is intended as an architectural surface that does not receive a subsequent coating other than a transparent, and presumably colorless, water-repellent. The concrete may be cast-in-place or precast; left as it appears out of a form, or surface-eroded to expose the aggregate by abrasive blasting, bush-hammering, high-jet water spray, or acid bath

Obviously, the color of the aggregate grows more important with the degree of exposure of the aggregate. Only trial panels can determine the extent to which concrete color is affected by its constituent materials: brand and type of cement, and type and gradation of the fine and coarse aggregates. The crystalline structure of the aggregates also affects appearance. This depends on the erosion technique; the resulting surface texture will vary with the magnitude, direction, and frequency of strike.

Acceptable aggregate can be interpreted to mean material that is initially suitable and does not deteriorate or lose its character during a building's normal lifetime. In establishing criteria for acceptable aggregate, a careful distinction must be made between interior and exterior exposure; for instance, some aggregates do not maintain their color under prolonged weathering, or are not resistant to alternate wetting and drying or freezing and thawing cycles.

The Color Chart

Knowing what he wants, how does an architect proceed to select specific aggregates? Obviously, if color is not a factor, then the least expensive aggregate governs. Usually, commercially produced aggregates cost the same in any area; it is the distance they must be transported to market that determines the final price, and 5c a top per mile is a good rule of thumb.

But when color is a consideration, as is the case with exposed aggregate, an architect's most useful tool is the Rock Color Chart. This compendium, which is available for \$5 from the Geological Society of America, 231 E. 46th Street, New York, N. Y., is based on the Munsell Color System.

The chart indicates the entire range of known rock colors, and most effectively describes fine-grained or single-tone rocks like limestones. Coarse-grained rocks, such as granites, are of variegated colors and the chart describes an amalgam of their colors.

Unlike paint colors, however, a universal color chart listing stone quarries and sand pits by representative color chip does not exist; it remains the architect's problem to locate the closest source. Therein lies the geologist's patient search. Like a bloodhound given a scent, the geologist is advised of the desired color by the architect and his investigation begins.

Well-Informed Sources

Initially, a review is made of old and new published material on the geology of the area and its quarry industry. Some of the best sources of information are the Geodetic Survey, university geology departments, museums, departments of public works, and local geologists and quarry men. A geologist's field work may include trips to known aggregate sources to investigate color continuity, soundness, and, in the case of new sources, availability.

The final report consists of samples of the aggregates and information on the appearance, texture, mineral content, friability, soundness, uniformity, mode of occurrence, and cost, as well as recommendations for further tests. Parallel to this, an architect must determine the ability of local ready-mix suppliers to handle the material, shipping costs, and stockpiling problems.

Once all of the determinations have been made, the architect should retain a testing laboratory to design concrete mixes and prepare panels of the various potential materials, in conjunction with tests for compressive strength and workability. The panels should also be subjected to various erosion techniques to permit a final selection of material and texture, which can then be incorporated into the project specifications.

What to Specify

When specifying aggregates, the following criteria should be included in the contract documents.

Coarse Aggregate for Exposed Concrete

Material: Uniformly graded, clean, hard, durable, non-alkali reactive, uncoated particles free of iron sulfide, wood fragments, dirt, soluble salts, or deleterious materials; crushed stone, gravel, slag, or screened gravel. Material shall be free of substances that change color on oxidation.

Tests:

- a. ASTM C-289: Non-alkali reactive.
- b. ASTM C-33:
 - (1) Free of deleterious materials (Table III).
 - (2) Maximum loss on five-cycle magnesium sulfate soundness test not to exceed 10 per cent.

Choice of Test c or d:

- c. Deval Abrasion Test: Maximum loss to be 6.5 per cent.
- d. Los Angeles Abrasion Test: Maximum loss to be 50 per cent.
- e. The 10 per cent. 25-Cycle Sodium Chloride Solution Freeze-Thaw Test: Maximum loss not to exceed 3 per cent.

Color: Material shall emanate from the same basic source and strata throughout the work. Material must be quarried to produce a uniformly colored (or varigated) aggregate that does not change color upon weathering. Periodically, verify uniformity of rock face color.

Fine Aggregate For Exposed Concrete

Materials: Clean. hard, uncoated, nonalkali reactive, free of deleterious materials, soluble salts or substances that change color on oxidation; natural sand, stone screenings, or manufactured sand. Stone screenings and manufactured sand are acceptable, provided they are produced from an approved source of hard, durable rock, the surface of which is uncoated by deleterious material.

Tests:

- a. ASTM C-289: Non-alkali reactive.
- b. ASTM C-33:
 - (1) Free of deleterious materials (Table I).
 - (2) Maximum loss on five-cycle magnesium sulfate soundness test to be 10 per cent.

Color: Material shall emanate from the same source and strata throughout the work. During the supply span, color must confrom to an approved record sample referenced to Standard Rock Color Chart.

Habitat '67, a housing project in Montreal, merits attention in P/A's concrete issue because it is the first practical use of concrete precast in house-size units.

Furthermore, Habitat can be viewed in two ways: first, as an advance in technology; and second, as a breakthrough in urban design. Both these viewpoints are open to dispute, to a greater or lesser degree. This is not surprising, considering the scale of the project and large amount of public money invested in it.

But before viewing Habitat through the eyes of its protagonists, it would be useful to review these unassailable facts:

Habitat comprises 158 houses with one to four bedrooms.

These houses are built with 354 precast boxes, each measuring 38½-ft long, 17½-ft wide, and 10-ft high.

The general contractor signed a \$10,-500,000 contract.

The owner allocated a \$13,500,000 budget (without land).

Costs are rising above budgets.

Habitat is built with precast concrete boxes stacked on top of one another so that each house has a garden on part of the roof of the house beneath it. In its simplest form, the garden space is achieved by putting one rectangular box at right angles to the box below. Because these story-high boxes are stacked 12 high, with some sitting on the cantilevered halves of lower boxes, the structural engineering becomes more complex than if boxes were stacked vertically in a conventional, straight-sided, multistory building.

THE ARCHITECT'S HABITAT

Moshe Safdie, the young architect who designed Habitat, sees the project as an urban system for housing families, where, despite its city location and multistory construction, they will have the same amenities of privacy, identity, and open space as they would have in a single-

family house.

He thinks of Habitat as an inseparable advance in construction technology and town living. "It's a step toward the development of buildings systems for large-scale urban construction—both new and redevelopment. It's the beginning of a building system."

Safdie is enthusiastic but objective in his views: "Habitat is still crude, it's primitive, it's imperfect, it has a lot of things we are still learning, but it's the beginning of a system. And, as a system, it's both a three-dimensional urban pattern and a technical building system. They overlap.

"I don't think you can talk about the three-dimensional reorganization of a city without including new construction techniques, because without them it would be uneconomical. One is conditional upon the other, and is more critical in high-density construction than in single houses."

The Habitat system consists of precast, loadbearing concrete boxes, but Safdie did not start out to design a concrete project. Several years ago, when writing a thesis at McGill University, he thought of modular units installed in a multistory frame.

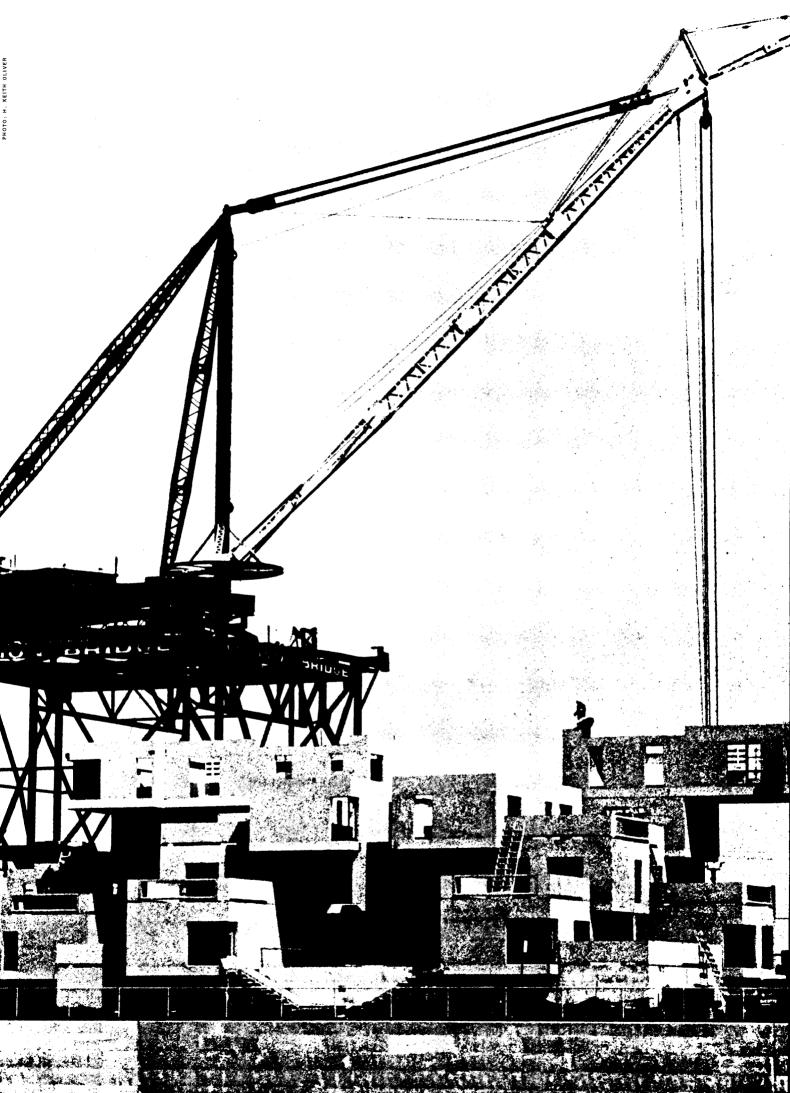
But he abandoned this concept because there were no suitable lightweight materials for the units: Plastics were too expensive, and steel has to be fireproofed. So, since concrete seemed to be the most practical material, Safdie decided to make the units loadbearing, because the codes required a wall that would have been ridiculously thick for a nonloadbearing unit.

Thus frames were eliminated from the Habitat concept, and, since then, Safdie has not regretted his decision. Recently, he said, "We should try to eliminate the redundancy of a frame with plug-in units."

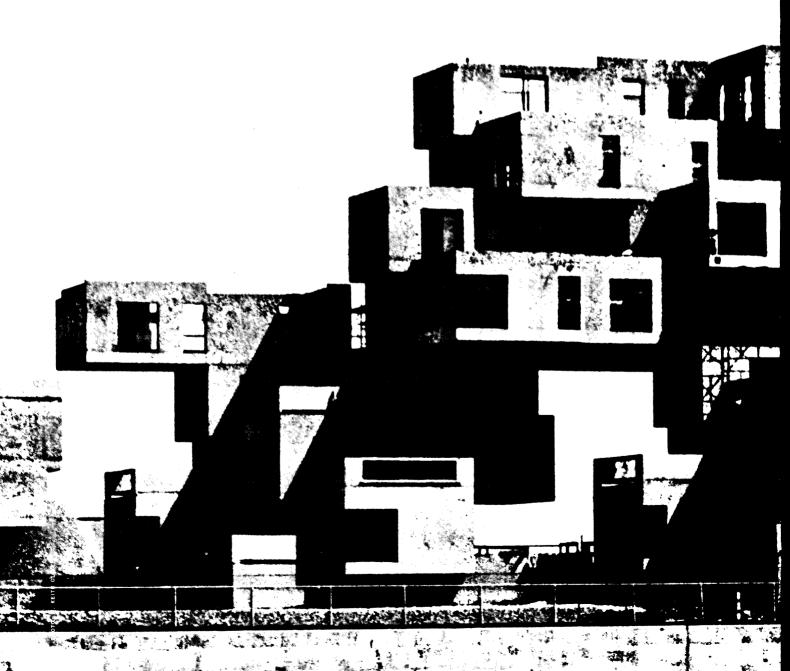
Morphology Replaces Function

Habitat has been described as an offshoot of functionalism. Safdie comments: "I believe this approach to building goes back to the so-called functionalism of the 30's and 40's, except that they tended to look at it in a restricted way, which we don't.

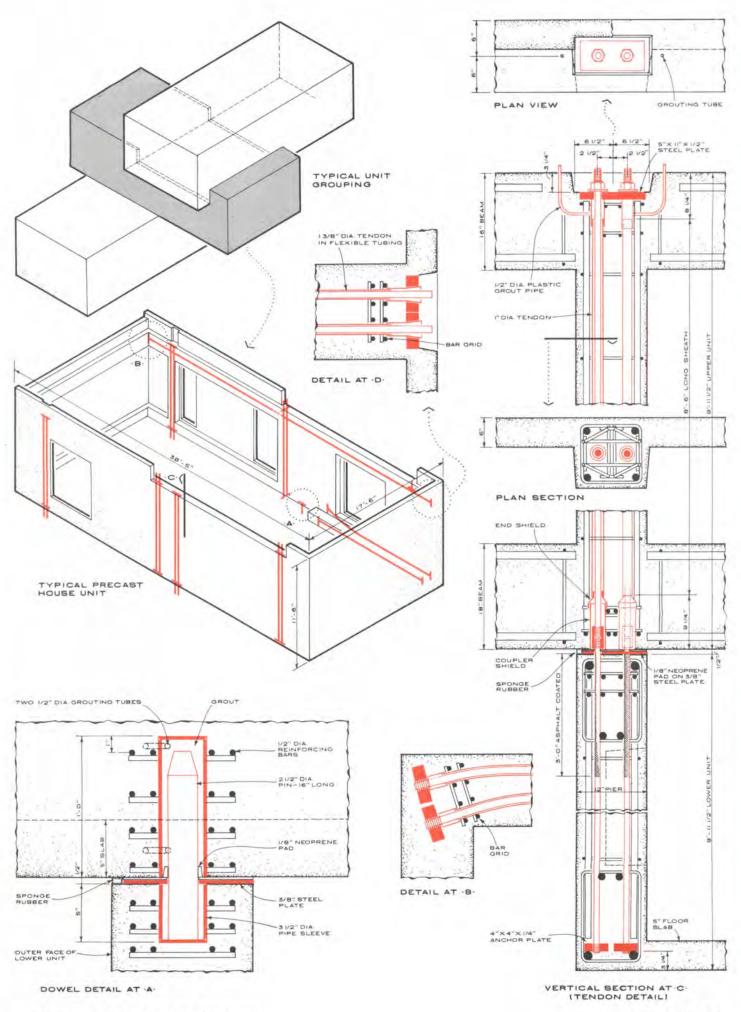
"For example, the so-called functionalism of Mies van der Rohe, where he expresses structure, is really only using steel for a frame and expressing it as a frame. But structure is more than the material holding up a building. It is concerned with all the many aspects that make up a



Associated Architects: Moshe Safdie & David, Barott, Boulva. Structural Consultant: Dr. A. E. Komendant. Structural Engineers: Monti, Lefebvre, Lavoie, Nadon & Associates. Mechanical & Electrical Engineers: Huza-Thibault, and Nicholas Fodor & Associates. General Contractor: Anglin-Norcross Quebec Ltd. Concrete Subcontractor: Francon Ltd.







building. Therefore, structure must include such things as circulation, services, sun orientation, and air movement, because each is an aspect of structure and influences the building form.

"Function is not an adequate word to describe this sense of structure. I believe morphology—the science of the evolution of form in nature—is more descriptive. What morphological forces influence the form of a building? If you explore all the forces, you start imitating the morphological process that evolves in nature, and then automatically stop looking at buildings as single entities. You have to think of cities as systems, as building systems.

"I think the Habitat system could be applied to different sites in different ways to provide varying building form and densities"

No Corner Connections

The difference between Habitat and other precast concrete projects is in the three-dimensional form of the components. There are no wall or floor panels to be assembled at the site. The casting yard turns out five-sided boxes that are lifted on top of similar units. Only the roof slabs not covered by another box are cast separately.

Two of the reasons Safdie prefers boxes to separate panels are: They eliminate the difficulty of connecting panels at corners; and they considerably reduce the cost of site labor. Box units, he believes, should be large enough to permit rooms, including bathroom and kitchen, to be prefinished before erection. In Montreal, the rooms are to a certain extent being prefinished, and more is expected when the construction schedule shakes down.

After designing Habitat, Safdie visited the Soviet Union to see builders precasting three-dimensional units for apartment buildings. He was impressed with the techniques but depressed by the result of stacking units 12 stories high and 1000 ft long, even though these conventionally shaped buildings are cheaper than Habitat. Habitat, he repeats, "is an alternative to suburban housing, and consequently must be compared with the economics of a suburban house."

Habitat houses, to be generous about it, could be described as expensive, but in actual fact they are prohibitively costly. Safdie figures an average of \$80,000 each, but others think his guess is low. He also believes the cost will diminish when more Habitats are built. This seems possible,

because the cost of the prototype Quonset hut was surely more expensive to build than the thousands that rolled off the production lines in World War II.

"Costs for Habitat units are meaningless," points out Safdie. "The \$10,500,000 construction budget includes the precasting plant set up for the job, the molds, mobile lifting equipment, and a speciallydesigned crane."

Also inflating the price is the small scale of the project. Originally, Habitat contained 1000 houses for a construction cost estimated at \$42 million. The larger scheme was more than the present project multiplied by six. Its whole structural concept was different, because the large masses of boxes, stacked 10 stories higher than the present 12 stories, required the support of big A-frames that also contained the elevators and carried the freespanning streets (see p. 211). It also included shops, library, school, and other community facilities. Lack of financing squashed the big scheme, and Safdie reluctantly drew the plans for the present 158 houses.

Enter, Government Angel

Financing problems dogged Habitat until Safdie, like a medieval artist, found a patron. The large-scale Habitat had been planned for construction by private developers. Safdie was aware that, compared with other Montreal buildings, it could not be built economically. But the Canadian government suggested that private sponsors could enjoy tax concessions on the difference between the commercial value and the actual cost of Habitat. Two or three corporations were interested in this deal until the government decided against the tax write-off.

Behind this change of heart lies an interesting aspect of a government's attitude toward research and development. The Canadian government grants tax concessions to industries undertaking basic, approved research, and this law could have covered Habitat. Unfortunately for Habitat, the government's own department of building research is said to have vetoed Habitat as a research project because it was afraid of opening the door to any developer who wanted tax relief by trying something new on an apartment building. Eventually, however, the burden of financing Habitat was returned to the federal government, for it is indirectly paying 50 per cent of the cost.

Safdie's patron entered the scene

through a momentous piece of coincidental good fortune. Montreal won the bid for hosting the 1967 World's Fair. This is a "real" world's fair held under the rules of the International Exhibitions Bureau. The fair, called Expo'67, decided to build Habitat and added '67 to tie it to the exhibition.

Expo gave part of a land-fill pier to Habitat. The architect is pleased with the site, which is close to the exhibition and to downtown Montreal. Habitat homes will face a wide expanse of the St. Lawrence River or nearby ships docked on the city side of the pier, with the city making an attractive backdrop. The site holds one great advantage: There is sufficient space for a large precasting plant and open space for storing completed boxes.

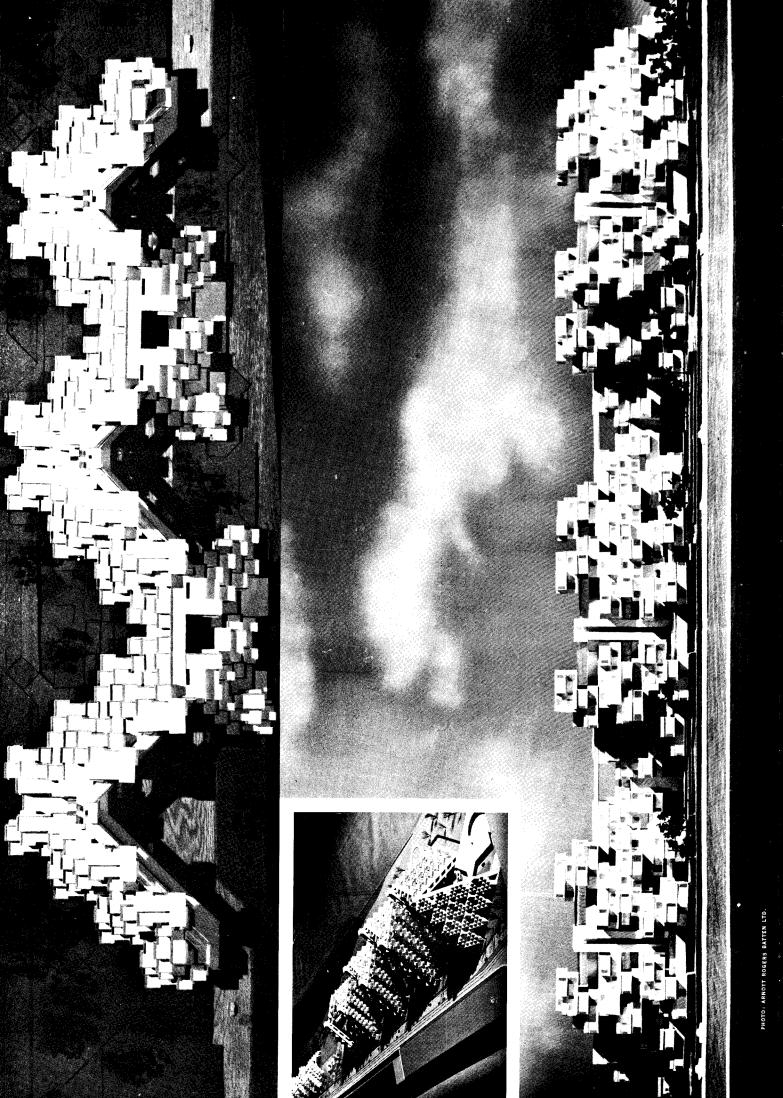
The Multiple Master

Governmental patrons are not the easiest fairy godmothers to get along with. Expo is financed by three governments: the Canadian government contributes 50 per cent; the government of Quebec, $37\frac{1}{2}$ per cent; and the city of Montreal adds the remaining $12\frac{1}{2}$ per cent. So Expo has three masters to serve, and often moves with the caution of a first-year intern.

With his client, the architect has to "go through channels," which are compounded by the form of construction contract. Expo, because of its government sponsorship, had to take lump-sum bids for the general contract. Safdie would have preferred a cost-plus contract, because the drawings were not completed and because the experimental nature of the job forced bidders to add a large contingency.

The company doing the concrete work. Francon Ltd., of Montreal, has a subcontract nearly three times larger than the \$2 million work load of the prime contractor, Anglin-Norcross Quebec Ltd.. of Montreal. (Francon's subcontract is \$5,500,000; Anglin's prime contract of \$10,500,000 includes mechanical and electrical work.) Therefore, when the architect wants to communicate with the company doing the major part of the work. he has to go through the offices of the general contractor. Apart from the awkwardness and waste of time, costs rise when a percentage of the subcontractor's work is added to the general contract.

Francon, the concrete subcontractor, invested a lot of money in molds and lifting equipment for the Habitat boxes. Safdie feels that the ownership of this equipment should have remained with



Expo, for, ultimately, the government is paying for the equipment through its contract with Francon. But the specs were not written that way, so it is now up to private developers to negotiate with Francon for future construction, and the government will have no way of recouping any of its investment.

It does own the pier on which Habitat is built, and will make 40 acres available after the Expo pavilions are removed. So, if private enterprise wants to extend Habitat at the site, it will have to talk with a government agency.

The government, maintains Safdie, will encourage extending Habitat. Officials are enthusiastic about the project-now that they can see it going up. During the six months of the fair, Habitat will house foreign exhibitors, and 36 furnished houses will be displayed to the public.

But before adding to Habitat, Expo, which is a government agency, must dispose of its ownership of the existing Habitat when the world's fair closes next October. One way to do this would be to sell the houses as condominiums, for which the provincial government is now considering a bill to legislate condominium sales in Quebec.

Plumbing Isn't Easy

Montreal relaxed its building codes to accommodate Habitat, provided that the designers could prove the soundness of their requests for variances. Concrete wall thicknesses used to be 8 in., but Habitat obtained permission for 5-in. walls on condition that they met a three-hour fire rating. It also made a major breakthrough with acceptance of a Swiss device that dispenses with conventional vents in plumbing fixtures. The "Sovent" funnels water in a way that does not create a vacuum, and therefore the fixture does not require venting.

Supplying plumbing and utility services to Habitat houses required a lot of ingenuity to meet Safdie's prefabrication demands, and overcome Montreal's perverse winter weather. All services rise in vertical trunks outside the houses. Ideally, says Safdie, he would have designed a universal connection to make a fast joint between the vertical trunk and each house, so that hot and cold water, waste pipes,

Original project (inset, facing page) rose higher, extended further than Habitat '67 but required giant A-frame for support.

and power cables could be snapped onto the underfloor distribution system of each

In cold fact, pipes are installed piecemeal in the trunks and separately connected to the houses. Each house is air conditioned and heated through a fan-coil unit located under a wood subfloor. Hotand chilled-water pipes feed the unit from a central plant. These and other plumbing lines will be enclosed in insulated vertical trunks that will be washed inside with warm air to prevent pipes from freezing.

Habitat's Safdie

Safdie is no head-in-the-clouds dreamer. Although he aspires to build housing systems with octahedral units, he was realistic enough to anticipate bad driving conditions at the Habitat construction site by buying a car advertised for its ability to travel rough, unmade roads.

He visits the site frequently, and during the early construction days he acted a little like the father of a new child: He was overanxious at first, but learned to relax as it progressed.

Safdie says, "I remember during the first few days that I was running after the fellow calking the windows, and making him re-do the work because it was sloppy. But now, the little details are eclipsed by the whole thing [Habitat].

"When the first concrete units were cast, I worried about their imperfections, But the geometry of the building is so strong that all the imperfections disappear."

The architect also is loosening his paternal grasp: "I don't think I would mind if the occupants put awnings of different colors on the houses. I don't care what people do to them. Let people use it as they want; the building stands to gain by it. It's not the kind of building that would suffer from use, from being dirty or getting stained."

Inspecting Under Pressure

Safdie still wants a high standard of construction, and agonizes over getting it. The story is familiar to architects: An owner insists on a deadline, a contractor sacrifices quality to meet it, and an architect is stretched between them.

Each phase of Habitat's construction is closely inspected. Starting in the plant, the architect's men inspect concrete, reinforcing, casting procedures, finished concrete and erection. Despite this elaborate inspection, there is one drawback: The pressures of schedules and costs make it difficult to reject any work.

Points out Safdie, "Architectural inspection is almost useless. The pressures of scheduling are impossible. With Habitat, we have to accept the best the precaster can do, and try to help it do better. Once you have trained the crew, it is possible to get a very good finish for concrete cast in steel forms."

At the beginning of the casting program, Francon refused the guidance of Safdie's office on one particular concrete box. Inspectors pointed out that forms were not lined up, were dirty, and the reinforcing had not been cleaned. Nevertheless, Francon cast the box, and Safdie subsequently rejected it. This, not surprisingly, caused bad feelings, considering the high price of each unit.

Thinking about that contretemps, Safdie comments, "We should have stopped the work before the contractor cast the concrete. In this scale of precasting, inspection has got to be done at a stage where you can stop work before it's done poorly. And, most important, the architect and engineer must enter the discussions on formwork and procedures."

THE OWNER'S HABITAT

"I think that an exposition has to examine ideas that are a curious combination of the daring and the practicable. Don't think of Habitat as either low-cost housing units or high-cost housing units; think of it as a housing exhibit," say Colonel E. Churchill. Director of Installations for Expo '67.

The housing exhibit symbolizes the fair's theme, "Man and his world," says Churchill, "We were determined not to lessen the image of the exhibition by the easy and somewhat insincere way of using a meaningless vertical symbol that people realize is meaningless, and can't identify with. You may make money with such projects if you install elevators in them, but they are of no real consequence. We wanted a meaningful architectural project for the exposition symbol."

The colonel's remarks were directed at the Eiffel Tower built for the Paris exposition of 1889, and he acknowledges that the structural innovations of the tower led to the science and art of building skyscrapers. He courteously avoided any mention of symbolism at a recent, widely criticized fair.

Habitat will lead to the redevelopment of urban areas without penalizing people for inordinately high land costs, hopes Churchill. And, for Montreal in particular, he hopes Habitat will open the way to reclaiming the riverfront from industry and making it available for the public. The city has agreed to zone part of the harbor area, including the pier that Habitat is built on, for housing and light commercial use. Anticipating this, Expo built its administration building on the pier, and intends to sell it as an office building after winding up the exposition.

The Well-Intentioned Painter

Churchill works for the Canadian Corporation for the 1967 World Exhibition, a government agency running Expo'67, which, in turn, owns Habitat. Expo administers Habitat carefully, as good bureaucrats should, and occasionally makes impulsive decisions that it repents at leisure.

Such as the time Expo agreed to let the general contractor paint the exterior walls of the concrete boxes because the contractor offered a credit for not having to carefully finish the walls or sandblast them. Painting, said the contractor, would mean a saving of 6¢ per sq ft, which totals many thousands of dollars.

Fortunately, only one wall was painted before Moshe Safdie reached the site. Then, to convince the owner that "to paint the lily . . . is wasteful and ridiculous excess," he showed him the peeling walls of a four-year-old painted concrete building.

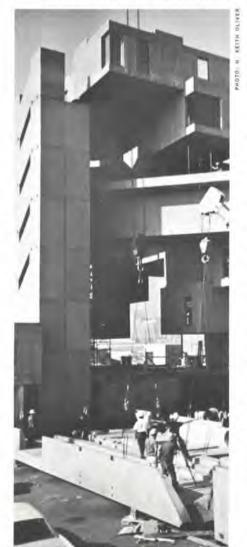
Many aspects of Habitat are experimental, and the contractors happily admit that they are learning new tricks every day. Expo views Habitat as an experiment, and Churchill says that it permitted contractors to research prefabrication methods, techniques, and equipment. It also enabled an unprecedented approach to prefabricated bathrooms and kitchens that were expensive at Habitat but will be cheaper when mass produced.



Precast planters transform one man's rooj into another man's garden.



Stair and elevator towers support girders bracing building against horizontal forces.



THE CONTRACTORS' HABITAT

"Getting these guys to accept the notion of standardization was very difficult." The designers talking about the contractor? Wrong. These words are from the precast concrete contractor's office, and "these guys" refers to the consulting engineers.

"Fifty per cent of our battle has been convincing the consultants that the whole basis of precasting is repetition. Every time we saw details that vaguely resembled a standard, we detailed them as standards." To do this detailing, the precasting subcontractor, Francon Ltd., set up an office at the Habitat site and hired 60 men to interpret, detail, and check drawings. Precasters, like steel fabricators, customarily prepare shop drawings, but Francon far exceeds the usual ratio of drawings to shop work.

The high cost of drafting falls on the owner, Expo, which pays extra for the work, even during the days when draftsmen were idle, because the structural engineer could not produce work fast enough. Francon has engineers on its staff who spend considerable time figuring out how to translate the engineering drawings into feasible shop drawings.

During the early days of construction, Monti, Lefebvre, Lavoie, Nadon & Associates, a Montreal firm associated with Dr. August Komendant as consulting engineers, called for reinforcing steel that could not possibly be placed in the concrete. Steel totaling 6 linear inches was shown in 5-in.-thick walls. Francon suggested that some bars could be omitted and others serve two purposes: such as stirrups doubling as temperature steel, and other bars resisting shear in addition to bending moments.

Consulting Could Cut Costs

Francon and the general contractor, Anglin-Norcross Quebec Ltd., believe that Habitat could have been built for less if the two companies had been consulted earlier. Jim Thomson, Anglin's project manager, says the Habitat contract should have been part of a management team comprising all interests in the project. This team would have thrashed out many of the problems before construction started.

Both companies make the same observation that the engineer, architect, and owner makes: We are learning a lot from this job. Some of the newly gained knowledge concerns the limitations of time. Thomson's hope for a preconstruction management team could not work because there was no time between Expo's decision to go ahead and calling for contract bids. And, after precasting started, there was never enough time for the architect to reject any material, because the whole project revolves around a tight schedule.

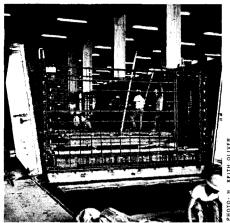
Handle Concrete Like China

Habitat's builders are pioneering in concrete technology. The sheer size of the precast units required engineers to invent handling equipment and build it for this one job. The boxes weigh 80 tons, but are subject to the same damage along the edges as a 800-lb precast spandrel panel. Says Dave Fitzgerald, Francon's project manager, "The boxes have to be handled the way you'd handle your wife's best china."

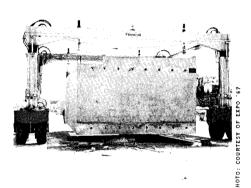
One of the handling problems arises from Francon's ability to precast boxes faster than erection crews can put them in place. Hence in June, the ground between casting plant and Habitat was covered with boxes that require double or triple handling instead of rolling straight from plant to site. These open-topped boxes are roofed by the general contractor with timber trusses enclosed with polythene tarpaulins.

Anglin's temporary roofs were clumsy and inefficient, and caused friction between architect and contractor because they leaked. In fact, the contractor had to remove all the insulation from walls and floor of one box because the material was waterlogged. Safdie thinks that a glassfiber-reinforced plastic roof fitting over the boxes would have been efficient and perhaps cheaper in the long run.

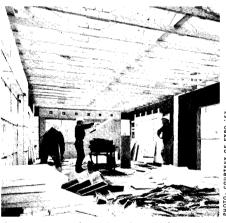
Thomson would rather change the design of the boxes to include a concrete roof. Casting a six-sided box can be done, but not easily. Fitzgerald suggests an inflated form (and this is being experi-



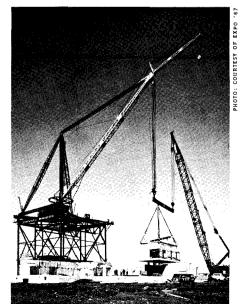
Hydraulically-operated steel walls form 80-ton concrete boxes at on-site plant.



Custom-designed lifting equipment moves precast boxes into storage yard.



Contractor insulates interiors under a temporary roof, then hoists boxes into place.



mented with at MIT) or forming the roof with the wooden subfloor raised on telescoping supports.

Casting the Boxes

Francon casts 10 Habitat boxes every week. To meet this schedule, crews work two shifts daily on four molds. In addition to the boxes, Francon also precasts stairs, elevator towers, and massive horizontal girders that tie the structure together and serve as pedestrian streets.

The streets connect the elevator towers at fifth and ninth levels. Theoretically, they will reproduce a street system in the air, and encourage people to mix instead of traveling straight from elevator to door; practically, they reinforce the piled boxes against seismic forces in Montreal's Zone III condition.

Although the Habitat units appear to be loosely stacked, the structure is bound together with miles of prestressing tendons extending horizontally and vertically. Vertical post-tensioning holds down cantilevered boxes, and horizontal tendons support the walls of cantilevered boxes. Prestressing also enabled the engineer, August Komendant, to span street girders 112 ft between towers and support boxes with the girders.

All boxes are heavily reinforced. The steel for a complete box is fabricated in jigs before being placed in the forms. Forms, or molds as they are often called, look like invasion craft with ramped bows. However, the molds are probably sturdier than the boats, and both end walls can be winched down.

End walls hinge down into pits in the shop floor so that, after casting, the contractor can haul the box out of the mold without lifting it over a 10-ft-high wall form. Side walls hinge back about 5 ft at the top of the walls—just enough to break bond and give clearance for removing the box.

Forms for the interior faces of the walls are assembled in sections that are vibrated to help consolidate the concrete in the walls. But most of the compaction is done through internal vibrators.

Francon casts the floor slab first, then pumps concrete through ports in the wall forms to cast the wall in three lifts. Immediately a crew completes concreting a box, men cover the mold with tarpaulins and pipe in steam for about five hours. When the concrete attains 3000 psi, steam is shut off, inside forms are removed, and exterior forms are tipped back. Next, tarps

are replaced, and the concrete is steamcured until it reaches 4000 psi. After cooling off, the concrete box is transported to the storage yard.

Lifting Equipment

The precaster developed a special transporter for the 80-ton boxes. It consists of two steel bents mounted on wheels. Load lines from the cross beams are hooked onto the load, and hydraulic rams in each leg raise the cross beam until the load clears the ground. Francon built two of these transporters, one capable of carrying 100 tons, the other 50 tons.

Expo also entered the transporting business, and ordered a 100-ton-capacity crane that travels on a 70-ft-wide track through the center of Habitat. Expo provides the crane for the contractor to erect the boxes, which theoretically can be spotted in any location by the crane. The contractor feels that Expo's crane is not quite what it would have developed for the job, and is using the crane in conjunction with a heavy-capacity crawler crane.

By the time boxes reach the big crane, they should be prefinished. This includes sandblasting the exterior, insulating the interior, installing windows, plumbing, kitchen, and bathroom.

EVERYMAN'S HABITAT

Montrealers not working with or for Habitat or Expo look eagerly to the opening of the fair. Some complain of the cost, but the Expo public relations staff is banging the drum and costs get lost in the general excitement.

Montreal architects critical of Habitat seem to fall in two camps in their attitude toward it. Many withheld comment in order not to prejudice their chances of an Expo commission; others observe the professional etiquette of not criticizing fellow members.

Montreal, however, is a revolutionary

city, in both a political and artistic sense, and not all its inhabitants quietly accept Habitat as a solution for housing or structural innovation. As taxpayers, Montreal's professionals are appalled at Habitat houses costing nearly \$100,000 each. They do not care for government support of an experiment on this scale for so little purpose.

Orange Crates, or Equal

"Safdie may be using repetitive elements, but, my God, an orange crating system does the very same thing," says Melvin Charney, a practicing architect and director of graduate studies at the School of Architecture, University of Montreal. He reacts adversely to Habitat's stacking of boxes one upon another, like neolithic masonry, in which the lower boxes have to carry the upper boxes.

"A building system that differentiates between framing circuit and the actual housing units would have been a more sensible process to develop," says Charney.

Habitat's engineering, though highly praised by persons involved with the project, does not impress Charney, who says that the insistence on concrete as the panacea of housing has negated real innovation. "I think that Safdie's notions of what housing should be dominate the engineering of the solution. The engineering was done ad hoc by people who worked with projected views that were not sufficiently studied in the context of the problem. They produced building elements made to resemble components and a system."

And on the purpose of Habitat: "It does not recognize the economic or the social realities of the kind of housing it pretends to provide. It is indeed unfortunate that often an *idée fixe* is mistaken for genuine insight."

There are also many men who envy 28-year-old Safdie for being the designer of such a large project at a comparatively young age. Their criticism is tinged with complaints of Safdie the entrepreneur who bulldozed the exposition authorities into building Habitat.

So Much For So Few

American visitors admire Habitat, and usually say they are glad it is being built. However, they admit their eagerness would wane if they were taxpayers. A professor from Harvard spoke enthusiastically about Habitat after visiting the site, but privately thinks it immoral to

concentrate so much talent and time for housing so few at such great cost.

The site is not every Montrealer's cup of tea. Mackay Pier will contain Habitat, some new office buildings, and maybe more Habitat-type structures—a combination that seems to preclude the friendly, corner delicatessen or bar and grill that makes a neighborhood habitable by Jane Jacobs' standards. Looking at the pier now, observers suggest that, at night, when the offices at the landward end of the pier are closed, it will be a lonely, sinister walk from public transport to Habitat.

Within the site, Habitat's concrete boxes cantilevering one from another create a feeling of excitement not found with vertical-walled structures. On the debit side, observers say that such a configuration belongs on the side of a mountain, and that Habitat built on flat ground is comparable to building split-levels on level sites,

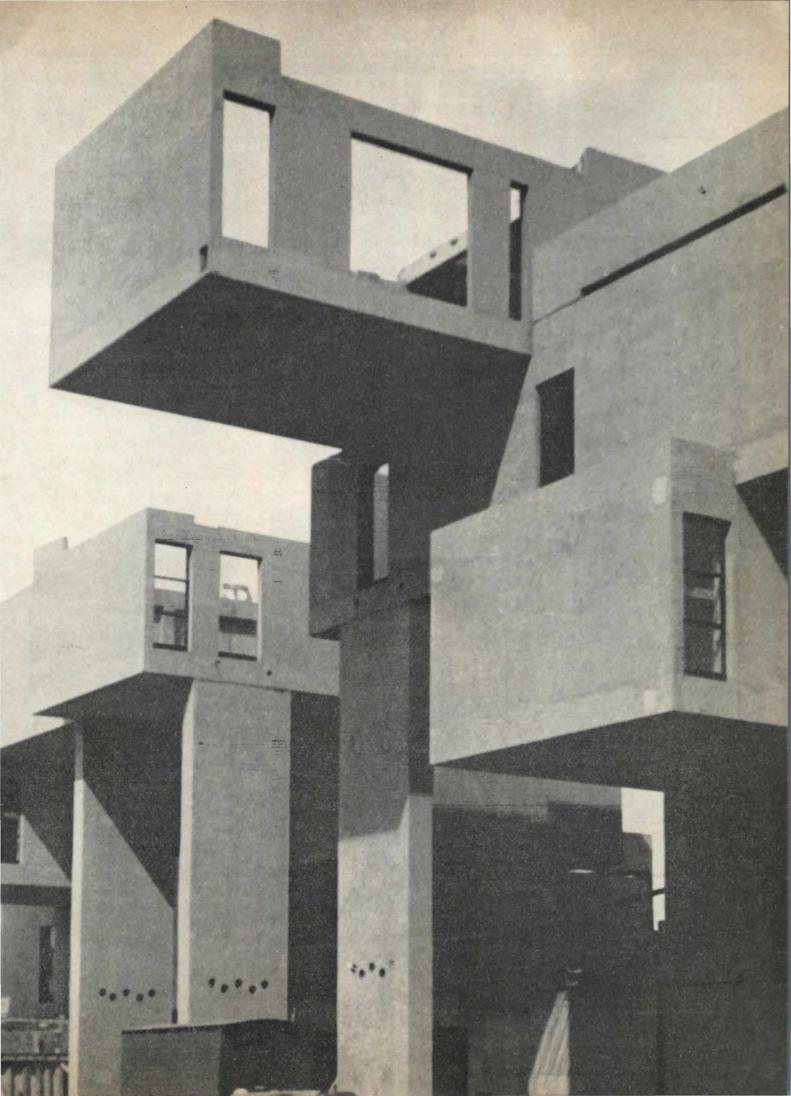
This Above All: To Thine Own Self Be True

When Expo first took up the ball and began to run with Habitat, the Canadian steel industry tried to intercept the move. To do this, the industry hired an architectural and an engineering consultant to study the project with a view to saving the country money by substituting steel for concrete.

One consultant thought that middleincome Canadians would not approve the 'New Brutalism' of Habitat, especially the exposed services. He said that for the same cost as concrete, the boxes could be framed with steel and enclosed with concrete sprayed on metal lath. This would lighten the dead load and provide better service connections.

The other consultant concluded that the housing units would best be built with concrete because that is how the designer conceived them. "There is a penalty on a material when it is treated as a pure substitution, and its own particular characteristics ignored."

Which, after all, is what this issue of P/A has all been about.



WHITNEY OPENS

The new Whitney Museum of American Art would be very easy to dismiss in flip newsmagazine terms. It has a front façade like an inverted Sakkaran stepped pyramid; its entrance canopy has a profile like a duck; its beetle-browed windows are seemingly capricious and solely for effect. There will inevitably be those superficial souls who will label it the square Guggenheim.

Actually, the building is more often a success than not. Marcel Breuer (with Hamilton P. Smith as associate architect and Michael H. Irving as consulting architect) has taken one of the most thankless sites possible—a corner lot in New York's middle East Side grid pat-

tern—and attempted to do something with it. Not just for the fun of it, either. He felt, and rightly, that an art museum is not just another building along the avenue,



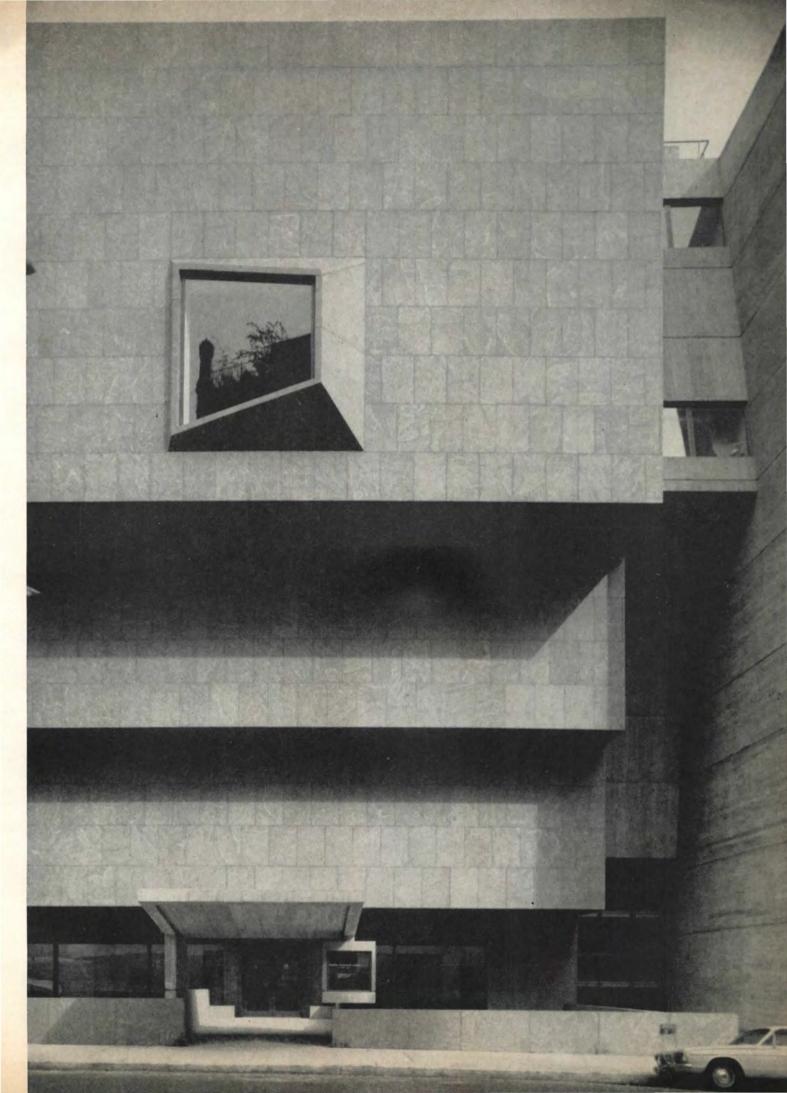
but one that should have a particular distinction, one that should announce its individuality by means of its visual presence. This the Whitney does, not only with its unique silhouette, but also by means of an open sculpture court a floor below grade on Madison Avenue, by its stately cladding of warm gray granite, and by its glimpses of gallery life afforded through the jutting windows. Breuer states that the advancing floors of the Madison Avenue front are not whimsey on his part, but a means of providing the sheltered courtyard on the lowest level and housing larger galleries on the upper floors. He feels that the effect of the overhanging elements is to "receive the visitor before he actually enters the interior of the building."

This observer is not very happy about the way the architect turned the corner on this building. The side on 75th Street appears stark and rather naked in comparison to the main façade, despite the presence of the sculptural window shapes. Of course, space would not permit the building's being a real inverted ziggurat—that is, stepping out on all four sides. But the designers might have considered introducing some visual connection with the front, such as heavy scoring of the stone at each break in the advancing prow.

On entering the museum by a concrete bridge over the sculpture court, the visitor comes into a lobby containing an information desk, sales counters, cloakroom, and waiting spaces. A very busy ceiling lighting system of bare silvered bulbs in circular white pans is a distracting element here. The materials otherwise are rich and muted: granite, wood, bronze, leather. On this floor, there is a gallery intended for "happenings" and exhibitions of an experimental nature.

The three gallery floors above, which increase in length and height



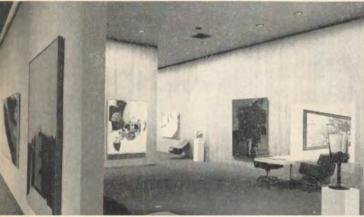




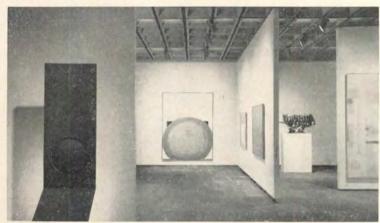
Sculpture court and entrance bridge.



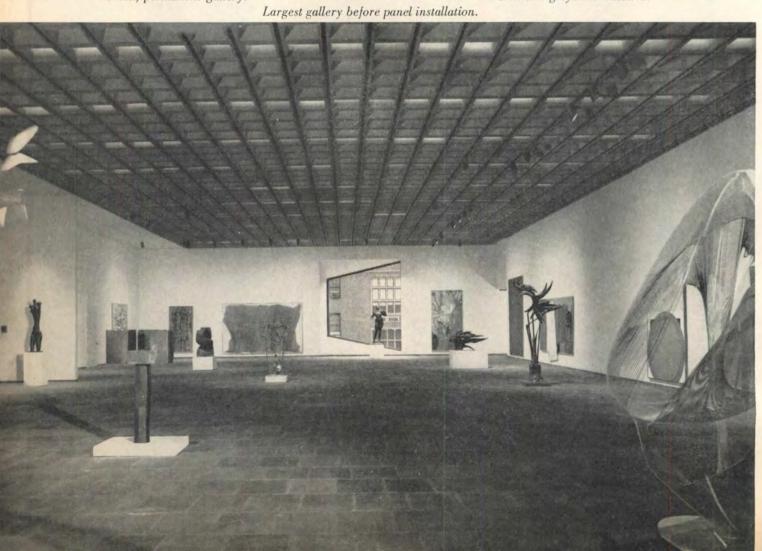
Lobby.



Small, permanent gallery.



Partitioning system installed.

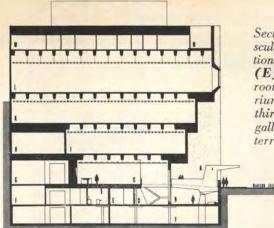


as the museum rises, contain two types of space: smaller rooms for permanent exhibitions on the 75th Street side, and huge open galleries for changing shows. A flexible system of tall panels was developed to fit into the grid of the suspended ceiling of precast concrete pan modules. Outlets for special floodlights and spotlights are integrated into this system.

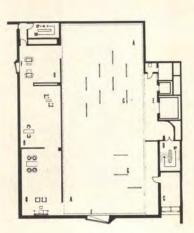
Here, in the galleries, the museum comes into its own. There is no decoratorish foolishness here as at the Huntington Hartford Gallery of Modern Art. This is a working museum that, in the gallery spaces, subordinates the architecture to the art. Breuer's palette-split slate floors, white walls and panels, light gray concrete ceiling-provides a strong but subdued background for the exhibitions. A different atmosphere is achieved in the permanent galleries, where carpeting, woven wall coverings, and comfortable furniture give a more intimate feeling. The museum offices are on the top floor, concealed behind a granite parapet formed by the continuation of the west and north walls. The structure is separated from its neighbors by stair cores and roofhigh, granite-clad walls.

The Whitney is the latest in a series of sculptural buildings by the Breuer office. Breuer states that he made "an attempt to form the building itself as a sculpture. However," he adds, "a sculpture with rather serious functional requirements"those of housing a public museum. If he has been rather more successful with the function than with the sculpture in the opinion of this observer, that is not to denigrate a commendable attempt to make a forceful and individual design statement for an important cultural repository.-JTB

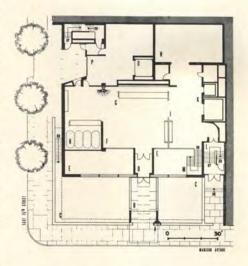
Architect: Marcel Breuer. Associate Architect: Hamilton P. Smith. Consulting Architect: Michael H. Irving. Structural Engineer: Paul Weidlinger. Mechanical Engineer: Werner, Jensen & Korst. Lighting Consultant: Edison Price. Interior Consultants: Ford & Earl Design Associates. Graphics: Architectural Graphics. Portable Walls: U.S. Plywood. Builder: HRH Construction Co.



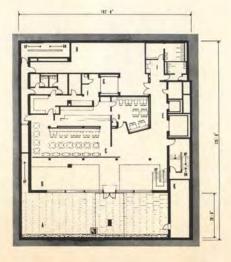
Section: (A) entrance bridge; (B) sculpture court; (C) lobby and exhibition space; (D) sculpture gallery; (E) cafeteria; (F) painting storage room; (G) truck dock; (H) auditorium; (J) second-floor gallery; (K) third-floor gallery; (L) fourth-floor gallery; (M) office floor; (N) roof terrace.



Fourth-floor gallery: (A) flexible gallery space; (B) permanent gallery room; (C) restoration lab; (D) staircase connecting gallery floors; (E) elevators; (F) eyebrow windows; (G) movable partitions.



Ground floor: (A) exhibit announcements; (B) entrance bridge; (C) sculpture court; (D) vestibule; (E) open to sculpture gallery below; (F) lobby and exhibition space; (G) information and sales desk; (H) cloakroom; (J) entrance control; (K) elevators; (L) stair to gallery floors; (M) open stair down to sculpture gallery; (N) gallery; (O) freight elevator; (P) truck dock.



Lower floor: (A) sculpture court; (B) sculpture gallery; (C) cafeteria; (D) Friends' lounge; (E) elevators; (F) kitchen and staff area; (G) freight elevator; (H) sculpture storage; (J) public rest rooms; (K) storage.

FOCUSING UNIVERSITY DEVELOPMENT

The unspoken controversy concerning open versus tight campus planning continues with almost weekly announcements of new plans from all over the country. Currently, the advocates of the tightly-knit plan seem to be in ascendance, with even some of the new California campuses beginning to pull in their belts.

When the architect or planner is handed the job of creating an entirely new campus, he is free, within the limits of the program, to follow either the tight or open approach. The question of developing a plan for an existing campus presents more stringent problems, however, including the necessity of respecting the buildings that are already there, and coming up with an over-all plan that will provide the desired new facilities and integrate them with the older plan in a manner that is, hopefully, a model of convenience and good design.

Such were the problems facing Don M. Hisaka & Associates and Sasaki, Dawson, DeMay Associates, Inc., when they were commissioned to develop the master plan for 56-year-old Kent State University in Kent, Ohio. The school has a pleasant group of older buildings at the northwest section of its 800-acre site, but more recent additions have tended to straggle out in an unplanned manner. Using the 10-minute-betweenclass period as the longest time-distance between one point of the replanned campus and any other (except for housing, playing fields, and other non-classday facilities), the designers proposed creation of a new University Center southeast of the old portion of the campus. This center would focus academic life on the geographical and activity center of the campus. A new tower Library and a broad, low Student Union would bound a wide plaza rather reminiscent of the main square in Siena, Italy. This would be the first experience of visitors with the university after passing through an arrival court from the entrance boule-

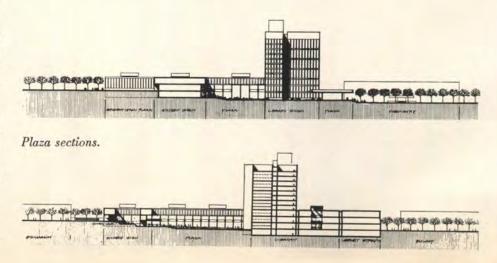
vard leading from a new expressway at the south of the campus. From this urban space, linkage to the existing campus and to future elements would be by pedestrian "streets," along which would be located new academic buildings. A new Science Center would be developed adjacent to the University Center, illustrating the enshrinement of science as the Big Discipline On Campus these days. The plan has the ability of being organically extended along these pedestrian malls as future needs require. (The current plan is based on estimated needs of 24,000 students in 1973, but has built-in provisions for a larger number in 10 to 20 years, such as a traffic pattern separating walker and auto and a system of parking-garages and fields.)

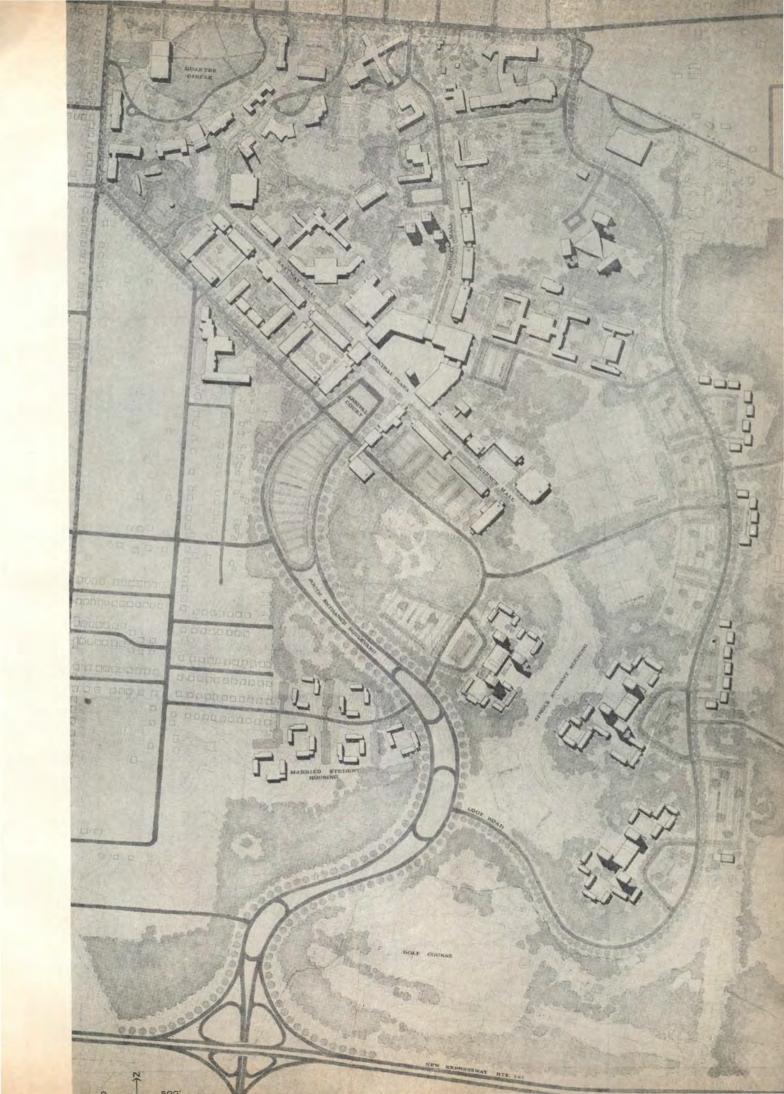


Continuing south of the new center, the architects propose three clusters of student housing atop three small hills. These units would be high- and low-rise buildings grouped around courts, with the rolling land between them left in its handsome natural state. Married student housing would be to the west of the entrance boulevard; there it would tie in with the city's residential section at the western boundary of the university.

The school's present clogged and inefficient system of roadways and entrances would be relieved by the new entrance coming in from the proposed expressway, and by creation of a loop road to take traffic around the campus and out of the way of pedestrians. Only one major road would penetrate the campus proper, for maintenance and deliveries.

The Kent State plan seems, on paper, to provide a judicious "tightness," while at the same time allowing some open-endedness for future expansion. The connection with "Quarter Circle," the older campus, appears respectful but companionable. The determination of the designers to disturb the natural shape of the terrain as little as possible and to leave a seemly amount of open land should create some very pleasant groves of Academe in the Western Reserve.





CHICAGO CIVIC CENTER:

DIGNITY AND CONTINUITY

The modernization of Chicago's Loop proceeds apace with the full-time occupation of the huge brown Chicago Civic Center. Situated across Washington Street from the new Brunswick Building (see pp. 194-197, August 1966 P/A), the center contains 119 courtrooms and hearing rooms for the Circuit Court of Cook County, two courtrooms for the Supreme Court and the Appellate Court of Illinois, related office space, and badly needed space for the City of Chicago and Cook County.

During preliminary design studies, the architects considered plans with two or three buildings arranged on the site, but eventually decided on the single, 31-story building as most economical and most convenient in containing all judicial functions in one envelope. This permitted the creation of a vast granite plaza on the south side of the building, one that has been criticized as too large and too devoid of planned incident.

Photos, except as noted: Hube Henry, Hedrich-Blessing

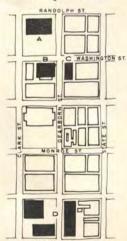


Desirable as open space is in congested mid-city, there evidently can be too much of a good thing, particularly in an area known for the severity of its windy winters. The smaller-scaled, more sheltered courts provided at the Brunswick Building and the Connecticut Mutual Building will no doubt prove more appropriate for Chicago. (As we go to press, it is announced that Picasso has given a design for a 50'-high plaza sculpture.)

In accommodating rooms and offices of varying shapes, sizes, and uses within what appears to be a straightforward Miesian office build-

ing, the architects found that a 4'-10" x 9'-8" module would perform best for most circumstances. An over-all ceiling height of 11'-10", dictated by the space required over the elevated judge's bench in a typical courtroom, was used; in the large motions courts, this was extended through two stories, affording a 26-ft height. For simplicity in circulation, separation of public and official traffic, and control of ventilation and artificial light, all courtrooms, jury rooms, and attorney conference rooms are on the interior; judges' chambers command sweeping views of the city from the east and west ends of the center.

If the thought that this building bears a kissing-cousin relationship to the Federal Center three blocks south on Dearborn Street occurs to many observers, it is not surprising to learn that the Supervising Architect on the Chicago Civic Center-C. F. Murphy Associates-was associated with Mies van der Rohe, Schmidt, Garden & Erikson, and A. Epstein & Sons on the Federal project. The kinship of the finely detailed, subdued exteriors (Cor-Ten steel and bronze-tinted windows for the civic center, flat-black painted steel columns and bronzed glazing and spandrels in the Federal Center) and their spacious open areas is readily



(A) Civic Center; (B) Brunswick Building; (C) Connecticut General; (D) Federal Center (courthouse is long building).



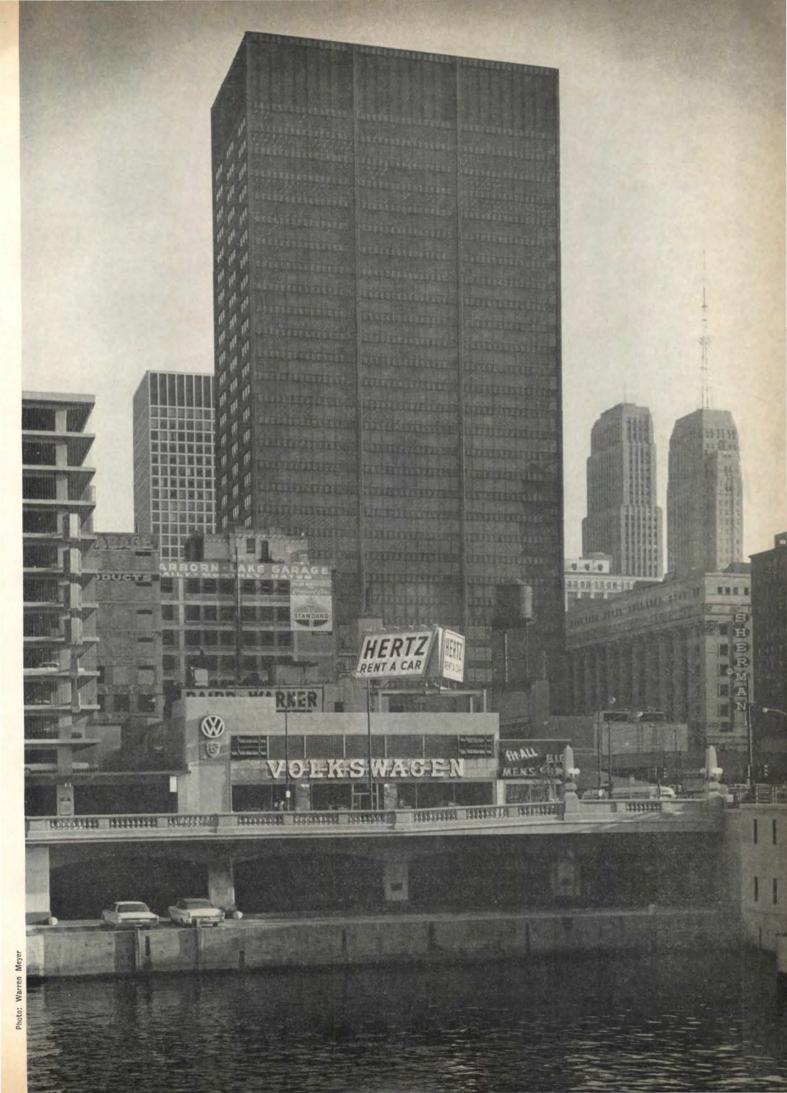
Civic Center Court.

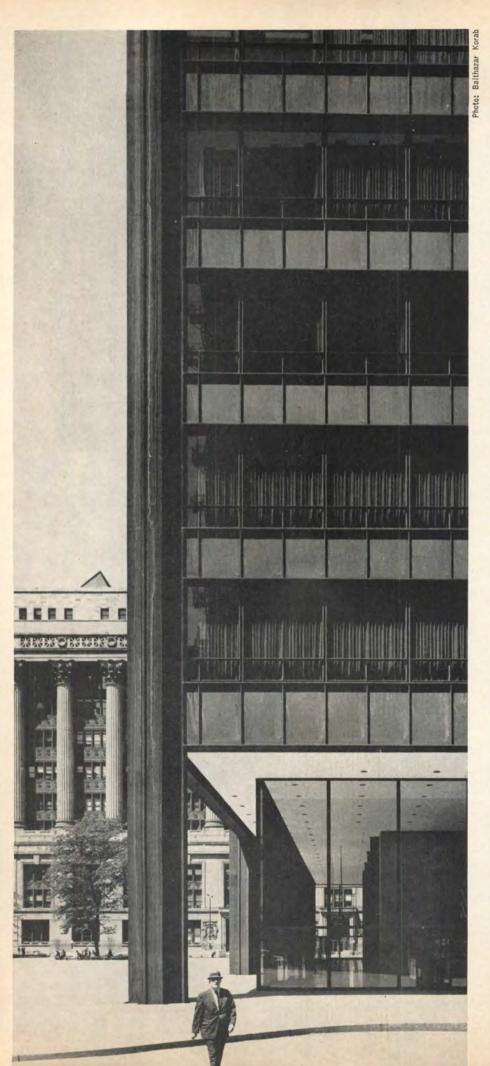


Federal Center Court.

apparent, but when one moves inside to the courtrooms, the resemblance becomes positively uncanny. One can easily imagine a confused litigant waking up dazedly in the wrong courthouse, plaintively bleating, "Where am I?" This is not to say that the interiors of the center are not impressively handsome in a rather aloof way. The meticulous detailing of furniture and fixtures and the expert handling of good materials-oak, granite, wool carpeting, white plaster, terrazzo, bronze hardware-show that the Miesian tradition is alive and well in Chicago.

Structurally, the building is a steel skeleton that has columns of flanged cruciform sections built up from plates by welding. These vary in size according to the building load: up to the tenth floor they are 5 ft overall; from the tenth to the eighteenth, they are 4 ft; from the eighteenth to the twenty-sixth, 3 ft; and from the twenty-sixth to the roof, 2 ft. This diminution as the building rises can be seen in the exterior profile of the columns. Trusses supporting typical floors are 5'-4" deep. They are allwelded and support a 51/4-in. concrete slab, being designed with a double row of steel studs on the flange of the top truss chord to furnish composite action with the slab.







Ceiling-wall detail, courtroom.



Courtroom seating.

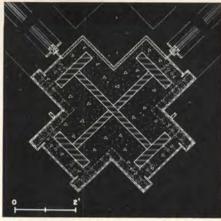


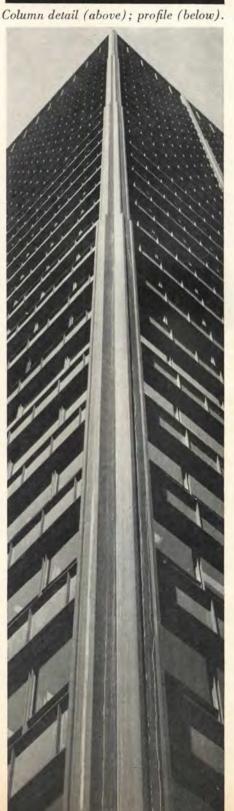
Bracing is furnished by the core area of the building. Structural steel is A441 steel for the columns and base plates, and A36 steel for other members. The fireproofed exterior is cladded with Cor-Ten steel, which will become dark brown-black.

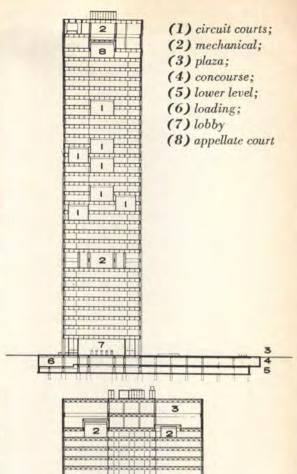
Mechanical equipment is distributed in three zones: The lowest level has three boilers and four heavy refrigeration machines; at the nine floor is located air-handling equipment servicing areas from the sub-plaza levels to the nineteenth floor: equipment serving areas from the nineteenth floor up is located on the thirty-first floor, as is a nine-cell cooling tower. Cooling units 8'-8" long, 1'-4" wide, and 1'-2" high, and delivering 9200 Btuh, were developed for the offices. Other specially designed or manufactured equipment includes an air-handling lightfixture with a saddle-shaped airdistribution system fitting over the light box; lighting systems for the courtrooms combining fluorescent and incandescent fixtures; new bronze-tinted glass; and window frames specially shaped in section that were hot-rolled from Cor-Ten.

The Chicago Civic Center does dignified justice to its site in the birthplace of the skyscraper. The attention to structure would have pleased Major Jenney; the expression of structure and function would have won the praise of Sullivan; and it is easy to imagine Mies smiling benignly from his apartment not far away. If there are questions about working those many different spaces into a uniform skin, or the advisability of such a vast, hard open space, or the perhaps too-close similarity in treatment to the Federal Center, they are criticisms in degree, not all-out condemnations. Once the architects determined to build this type of building with its own kind of interior and exterior space, they did a top-notch job of it.

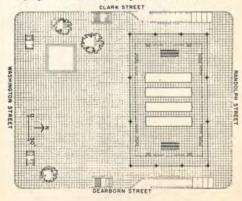
Supervising Architect: C. F. Murphy Associates. Associate Architects: Skidmore, Owings & Merrill and Loebl, Schlossmann, Bennett & Dart. Project Architect and Chief Designers: Jacques C. Brownson. Structural Engineers: Severud-Elstad-Krueger Associates. Acousticians: Bolt, Beranek & Newman. Lighting: Edison Price.







(1) circuit courts; (2) appellate courts; (3) mechanical; (4) plaza; (5) concourse; (6) lower level.



NYU AND THE NAKED EMPEROR

The NYU library may be a step closer to realization, but in the eyes of many in the Greenwich Village community, the architectural establishment is that much further from commanding serious public respect.

There were 29 community organizations opposed to the library at the time it was approved 12-10 by the New York City Board of Estimate on August 25. (In July, the City Planning Commission cast its 5-2 vote, with architect Harmon Goldstone one of the two dissenters.) For a detailed account, see the JUNE 1966 P/A; for a shirtcuff jog to the memory, recall that NYU essentially needed three changes in city regulations to build this design on this site: (1) a map change on West Broadway, narrowing the road by 40 ft; (2) another map changealso only on paper—to widen West Third Street from 70 ft to 75 ft, to accommodate a larger building; and (3) amendment of the original Housing and Redevelopment Board agreement of 1954, which limited cornice height along the south side of the park to 60 ft, and required a 45-ft setback before going higher.

The discussion that follows is not a recapitulation of all pros and cons in the controversy, one that is complicated by a long-standing animosity between those involved. Instead, it is a report on the most recent public hearing, before the Board of Estimate, particularly as it concerns the architectural profession. (It should be noted that all architects who testified at the hearing were on the side of NYU. No practicing professionals joined the opposition openly, although several are known to have been with it in spirit.)

It would seem almost a law of nature that a profession would try to avoid airing its dirty linen in public; it would seem questionable to have on record such testimony as, "My name is John Doe. I have been a member of the AIA for 15 years, and I don't think Joe Smith can design

his way out of a paper bag." And perhaps it is too much to expect serious public discussion by practicing professionals of any building. But for competent and thoughtful professionals to enter the case with less than irreproachable arguments should cause the profession at least embarrassment, and at most concern. The building that may cast its shadow on Washington Square Park may cast a longer shadow on the name of Architect.

The hearing was a four-hour, three-ring event, presided over by a bored and impatient Mayor John Lindsay. In citing his reasons for an aye vote, he seemed to grasp little of the complexity of the argument. He appeared to understand only one side well, as if he had made up his mind early in the game, and had only paid attention when his team was at bat.

Like the expert witnesses called by both sides at a legal trial, the several architects gave their supporting evidence, all in support of the Philip Johnson design. One prominent architect, speaking for the Urban



Mock-up of the proposed library has been built within the controversial 40-ft str

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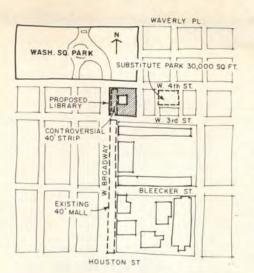
Design Committee of the local AIA chapter, reported its unanimous reindorsement of an earlier position in favor of the library. The statement made clear that the argument "was, and still is, about Urban Design for the City, not detailed architecture." Villagers feel that since the plan was not considered, this Urban Design is only an exercise in façadism. Whatever Urban Design is, and many are still struggling for a definition, 29 Village organizations and numerous other individuals do not want the kind of Urban Design they are being given here.



Looking northward to the site.

There was further mention at the hearing of European squares, as there has been throughout the controversy; and to be against them is clearly un-American. The testimony from the AIA's Urban Design Committee stated that the library will "contain the great park space, completing the urban design in the manner of great English and French squares."

Johnson also spoke of English and French squares and parks, and the need for enclosure. But, to some Villagers, Washington Square Park is too large to be treated as if it were a small European square. Its spatial qualities are different in various sections, it is pointed out, and its onetime unity of enclosure has long since vanished. (The most recent demolition removed the 19th-Cen-



tury houses called Genius Row, taken down by NYU in the 1950's. There was no unified wall around the park even at that late date, of course.)

There was mention, too, at the hearing, of space "leaking out" of the park. Johnson put it this way: "We feel that the wall of the parkroom should be as complete as we can make it. Therefore, we suggested the narrowing of West Broadway back to its present width, avoiding thereby the unsightly leak of a wide street to the south."

What happens when space develops an "unsightly leak"? And when does the flow of space (usually a Good Thing) become space that leaks (always a Bad Thing)? These matters are never defined in terms that are intelligible to the citizen who just likes grass. Or is it possible that some people have figured it out and just like their space leaky? NYU and Johnson seem to define leaky space as something less desirable than a skin ailment; to cure this condition, they are seeking to build on 8375 sq ft of public land. The community says it has been "had," a term that needs no definition.

What about the cornice height and the proposed change of the 1954 Housing and Redevelopment Board agreement? In the view of the local community, one does not have to be bound to an earlier commitment, if one's architect is sufficiently famous and he vouches that, with certain restrictions lifted, his design will be more beautiful. At the hearing, one member of the opposition questioned why NYU had not said to Philip Johnson, "Build the best building

you can without changing the restrictions."

There has never been an alternate proposal from the architects. ("We don't do things that way, and there was never any question but that we'd include some portion of the 40-ft strip.") But there has been frequent mention, from NYU and others supporting this design, of an \$800,000 already spent in design fees. The opposition calls it arrogant to design a building as if there were no restrictions on the site.

One of NYU's continuing arguments is that it is doing what is best for the Square and for the community. They point out that, when they tear down the present ANTA theater and build a new science building, they will be providing a new park three times the size of the 40-ft strip. But Village opponents contest that the substitute open area will be well within the NYU "campus," and can be expected to be used primarily by students. When asked by the Board of Estimate whether this was not so, Johnson replied no, it won't be a private park, the streets will remain open. It was an answer, but not to that question.

Concerning the plan itself: One architect was intending to testify that NYU was doing an admirable deed in going "all-out for art"; but he was not planning to mention what he has been saying privately to various people—that he thinks the building "impossible" as a library. (He actually did not testify; NYU decided at the last minute that they did not

Interior of proposed library.



need him.) Another architect testified that the atrium was necessary for the large perimeter a library needs, and did not mention the possibilities of air conditioning and artificial lighting. Johnson himself says that the 6150-sq-ft atrium is necessary as circulation space for a library that will reach a 5000-seat capacity; but one Villager privately expressed doubt about circulation in the upper levels of the atrium, unless they fasten vines to the railings and let the students swing from level to level.

And so it went. Feelings have run high, and contempt is one of the strong feelings that each side—NYU and the opposition—has shown for the other.

Immediately following the Board of Estimate vote, a taxpayers' suit against the city was announced, charging that the street demapping is a disposal of property without due process of law, since (among other things) the Department of Parks has authority over various design elements of streets within 350 ft of any park. So says the city charter, and so said Parks Commissioner Hoving, in a surprise last-minute statement at the hearing. In a comment that must have been facetiously intended, he also recalled European precedents: If the 40-ft strip remains open, the three-block strip might be nothing less than "a sort of Champs Elysées of Lower Manhattan." The suit will request an injunction against construction; when NYU has replied, a trial will follow.

The day after the Board of Estimate decision, it was reported in The New York Times that the Director of Community Relations for NYU had politically "threatened" Democratic district leader Edward Koch, an alumnus of NYU's law school, one of the leaders of the opposition, and currently a candidate for City Council. Koch was accused of hurting NYU as Ralph Nader had hurt GM, with the implication that Nader just had a grudge against GM, and his criticism had nothing to do with cars at all. In other words, Nader just made up the details once he decided to fight.

Throughout this controversy, NYU has been trying to suggest that the opposition has no valid architectural arguments-that it is a "leftover opposition," made up of people with nothing else to do, trouble-makers, fanatics. But people can know a good deal about architecturemore than architects often give them credit for. What the people of Greenwich Village seem to be saying in this library controversy is that not only is the building very possibly not the best working library, which would be NYU's problem, but that NYU is giving them reasons that insult their intelligence and integrity, which is a community problem. They sense that the architectural profession is using its expertise and what it would like to consider its exclusive possession of the Grail to "snow" the officials; and this is the architects' problem. It is regrettable

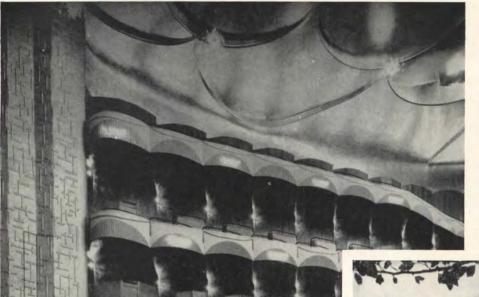
that architects enlisted on one side only; for one thing, the other side could have used the weight of professional architectural rebuttal, and, for another, it is possible that their experts would have looked no better and no worse than NYU's experts.

If the library is built as now designed, so the opposition feeling runs, it will undoubtedly be a distinguished building (so defined as one designed by a distinguished architect), and NYU can go on to become a great university (so defined, by NYU, as one with a great library). It's a great society, and it's been a great parade down in Greenwich Village. There's only one trouble. The emperor—and quite a few of the other people—has no clothes on.—EPB



he annual Village art show.

A NIGHT AT THE OPERA



On September 16, the new Metropolitan Opera House-architect Wallace K. Harrison's \$45,700,000 conservatory at the keystone of Lincoln Center—opened, providing 800,000 cu ft for the musicological delight of 3788 persons. For a change at Lincoln Center, the acoustics are favorable. Those are the facts. Since the opera for the debut was Samuel Barber's setting of Shakespeare's Antony and Cleopatra, we will let the Bard speak for the design of the opera house through pertinent passages from his play.





". . . The wild disguise hath almost Anticked us all."

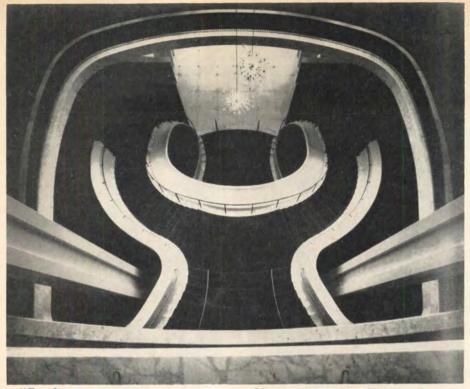


ANTONY: "It is shaped, sir, like itself; and it is as broad as it hath breadth. It is so high as it is, and moves with its own organs. It lives by that which nourisheth it; and the elements once out of it, it transmigrates."

LEPIDUS: "What colour is it of?" ANTONY: "Of its own colour too." LEPIDUS: "Tis a strange serpent." Though he be painted one way like a Gorgon,

The other way's a Mars."





"For her own person,
It beggared all description. She did to see The fancy outwork nature."

In her pavilion, cloth-of-gold of tissue,

O'erpicturing that Venus where we







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"... Nature wants stuff
To vie strange forms with fancy..."





"... Come, Let's have one other gaudy night."

"... High events as these
Strike those that make them; and
their story is
No less in pity that his glory which
Brought them to be lamented."

Architect: Wallace K. Harrison, Harrison & Abramovitz. Structural Engineer: Syska & Hennessy, Inc. Acoustical Consultants: Vilhelm L. Jordan and Cyril M. Harris. Stage Equipment Consultants: Walter Unruh, Louis Edson, Rudolph Kuntner. Auditorium Seating Consultant: Ben Schlanger. Stage Lighting Consultants: Rudolph Kuntner, Stephen J. Skirpan, Walter Unruh, Syska & Hennessy. Planning and Architectural Liaison: Herman E. Kravitz. General Contractor: George A. Fuller Co.

"The breaking of so great a thing should make
A greater crack."



OCTOBER 1966

MECHANICAL ENGINEERING CRITIQUE

BOILERS MOVE UPSTAIRS

BY WM. J. McGUINNESS

Mechanical equipment in multistory buildings is frequently installed above ground level. McGuinness, a practicing engineer in New York City, traces the reasons for this, and describes a current installation in San Francisco.

In contemporary high-rise structures, much of the mechanical equipment-such as chilled-water units, air-handling units, domestic hot-water storage, and cooling towersstrategically located throughout the building. This development to a more selective planning in locating such equipment has shortened duct runs, minimized piped connections between equipment, and in general has produced more efficient systems. And, importantly, it has reduced mechanical bulk.

Ideally, of course, the cooling tower should be placed next to the water chillers, which in turn should adjoin the air-handling center, with the latter located in the geometric center of the air-distributing system. An ar-

rangement such as this will usually result in a better mechanical balance and strengthen the architectural design of the building. We will then be expressing mechanical function in much the same way as we have always attempted to express a building's structure, or type of occupancy.

This does not mean to imply that mechanical equipment should become the predominant design factor, leading to a mechanistic architecture. The expression of function or occupancy will still frequently take precedence. For instance, it is often necessary to move equipment out of places that have more valuable and appropriate use, such as the basement.

The Trend Is Up

Traditionally, the basement was always the logical place in which to put boilers—or all equipment, for that matter. Buildings were not as high, and distribution of steam and domestic hot and cold water was on an "up-feed" basis. Boilers and their masonry supports were heavy; and periodic servicing was much more essential then. In addition, fuel supply—generally coal in those days—was also stored close to the boilers.

The advent of the high-rise building meant that first stories were often left open for better street-level circulation, which in turn led to an exodus of mechanical equipment from the basement.

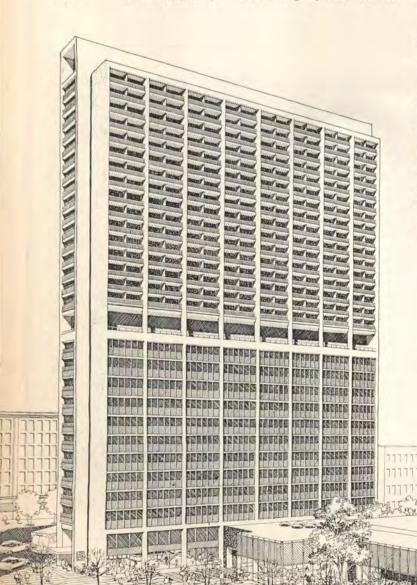
Steam mains at the basement perimeter were eliminated, together with the vertical risers ascending from them at the building façades. It was hardly practical to have the risers pass through the open first story, and difficult to hide them against the exposed columns. Instead, steam was piped through the center of the structure, to be converted at an upper story to hot water for down- (or up-) feed hotwater heating.

Cooling Rises, Too

The increased use of central air conditioning added some new elements. The cooling tower had to be on the roof, of course, but for some time the heavy centrifugal compressors cluttered the basement. When a vibrationless absorption machine became available, it was often placed on an upper floor. This was also true of compressors with improved sound and vibration isolation.

With all of these shifts of mechanical equipment, the basement boiler room was left practically bare. The boilers were still there, but largely due to custom. They were now

Continued on page 256



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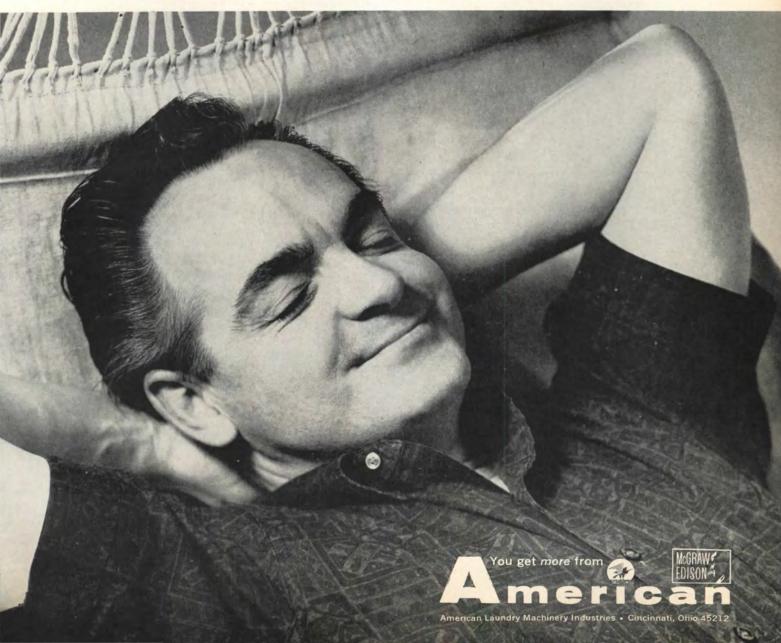
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lighter and largely automatic in operation, supervised—often from a remote distance—by an electronic console.

Fox Plaza Solves Problems

The Fox Plaza Building in San Francisco is a good illustration of the problems under discussion.

The building is somewhat unusual in its division of function and occupancy: It comprises 16 apartment floors above a thirteenth-story mechanical floor, and 10 office floors, 2 commercial, and a basement parking garage below it.

Apart from occuping a floor difficult to rent to superstitious tenants, the mechanical floor freed the basement for valuable parking income, separated the two main occupancy zones, and enabled the designers to install the shortest possible pipe runs to offices and apartments.

Split Systems

With San Francisco's equable climate, air conditioning was considered unnecessary for the apartments, but it was installed in the offices and commercial floors. The mild climate also permits designers to move the apartment heating units away from the customary location beneath windows and install fan-coil units in small closets next to glass doors that open onto terraces.

Lacking air-conditioning ductwork. the apartments could be finished without suspended ceilings. However such ceilings are used throughout the office floors to conceal a sophisticated double-duct, high-velocity air system that heats and cools the floors. To accommodate the duct space, the designers increased the floor height: apartments are 9'-3"; offices are 12'-4", with an 8'-6" ceiling height.

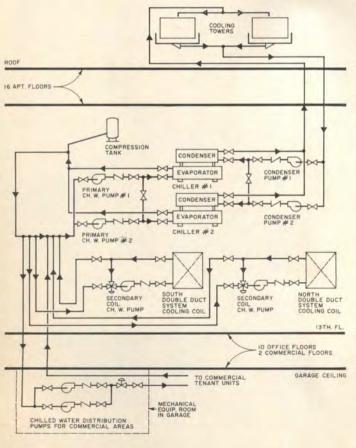
Scattered Sources

Tenants in the commercial floors can exercise some control over their air conditioning, which is supplied with chilled and hot water from a small equipment room in the basement.

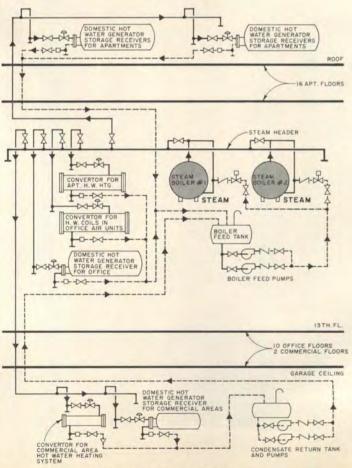
Hot water for the upper floors is converted from steam at the thirteenth floor and fed to the fan-coil units in apartments, and the double-duct system in the offices. The same equipment room supplies domestic hot water to the offices, but apartment domestic water is fed from generators at the top of the building.

The steam boilers are powered with gas supplied on an interruptible basis, with No. 2 fuel oil stored in underground tanks serving as a stand-by fuel.

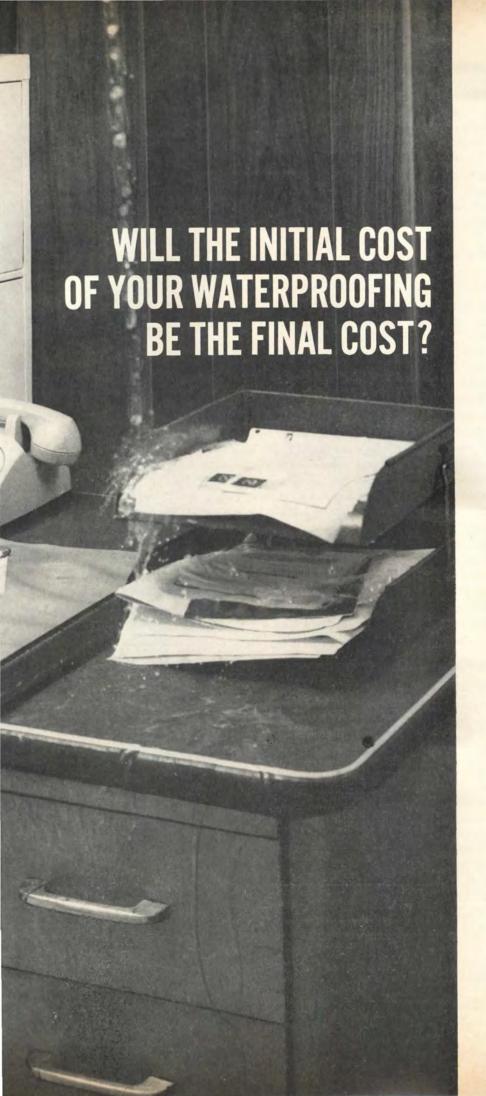
Victor Gruen Associates, Inc., of Los Angeles is the architect-engineer for Fox Plaza.



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TWO BASIC TYPES OF SPECS

BY HAROLD J. ROSEN

Not all specifiers understand the difference between the two types of specifications. Rosen, who is Chief Specifications Writer for Skidmore, Owings & Merrill, New York, sets the record straight.

There seems to be a misconception on the part of some specifications writers concerning the definition and composition of both performance specifications and descriptive specifications. This is unfortunate, since we expect the specifier to be well-versed in the art of communication, to be precise in the choice of words and exact in defining terminology.

A recent round-robin critique by several leading specifications writers on some of the major issues affecting construction specifications showed that not everyone clearly understood the difference between the two types of specs.

A review of the too few textbooks available on specifications writing disclosed that only one discusses the subject of performance specifications.

Descriptive Specifications

Descriptive specifications are generally well defined and understood. There is no dispute as to the meaning of the term or how it is used. A descriptive specification is written on the basis of methods. It describes in detail the materials to be used, and the workmanship required to fabricate, erect, and install the materials.

Descriptive specifications are used most widely by the specifier for technical sections of the specifications that involve the traditional, older crafts. Concrete, masonry, carpentry, lathing, and plastering are examples of technical sections that have a history of long-use experience and a body of readily available information.

Most architects have been exposed to these crafts, both in their university training and in their involvement with on-site construction. This permits the specifier to describe what the basic materials are; how they will be proportioned in the case of concrete, mortar, and plaster mixes; how they will be placed; how they will be finished; and how tested.

By describing the method by which a contractor performs these older crafts, the specifier will achieve a certain end result, since these instructions have produced the same result time after time.

Performance Specifications

What do we mean when we use the term "performance specifications"? The varied answers to questions concerning its use stem from the lack of a clear-cut definition of the term. In researching many sources, no satisfactory definition was uncovered.

If we assume that when we specify methods we describe how an end result is obtained, then it must follow that, if we can visualize what the end result should be but do not know how to achieve it, we must specify performance characteristics in order to obtain this end result.

We can now define the term "performance specification" as one that specifies end results by formulating the criteria for its accomplishment. A performance specification can then be written for a material or a piece of equipment and for workmanship and installation.

The performance specification is usually written for new materials and their installation. Since it is the end result that the architect is interested in, it would be far better to permit a manufacturer, who has more knowledge about a product, to manufacture a material that will provide a certain result. In lieu of telling the manufacturer what the ingredients are, specify what the end product must do.

Under this type of specification for a sealant, the manufacturer is given wide latitude in the selection of materials and their formulation by simply establishing that the sealant must exhibit certain characteristics, such as tension and cohesion strengths, ozone resistance, and other properties.

Covering the Variables

It is conceivable that a dozen materials of varying formulation could be compounded that will meet this specification. Since it is the end result that is desired, the architect is not concerned whether the sealant is made of polysulfide, ure-thane, acrylic, silicone, neoprene, or even chewing gum, if the latter could meet the specification.

When the architect is confronted by a new situation where existing materials will not satisfy his criteria, and, since he is not expert in manufacturing a new material, he will spell out his requirements for the end result by formulating the criteria for its accomplishment.

An architect can likewise specify the performance requirements for constructing a waterproof basement rather than designing and detailing it. When he does so, he places the burden of achieving the end result on the contractor.

The specification should contain certain performance criteria. What is a waterproof basement? How is it determined? The performance specification should include provisions for determining the waterproof characteristics by calling for hose tests or other water tests over a protracted period and for a guarantee to assure the architect that the construction is truly waterproof.

Another example of the difference between a descriptive specification and a performance specification is illustrated by the requirements for finishing a terrazzo floor. A descriptive specification would state that "the terrazzo shall be machine-rubbed, using a No. 24 grit or finer abrasive stone for the initial rubbing; it shall then be resurfaced, using No. 80 grit or finer abrasive stone." A performance specification would state that "the terrazzo shall be ground to a smooth finish, matching a sample on file in the architect's office."



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THE ARCHITECT'S LIABILITY AND THE CONTRACTOR: PART I

BY BERNARD TOMSON AND NORMAN COPLAN In the first of several articles, P/A's legal team discusses a recent Illinois case that has important implications concerning an architect's liability for a contractor's work.

Although there has been an evident judicial trend extending the areas of the potential liability of an architect in the performance of his duties, it had been thought relatively well settled that an architect is not liable for the method or manner in which a contractor performs his work and that he is not responsible for the safety of the contractor's employees on a project. However, a decision of the Supreme Court of Illinois in 1966, affirming in part and reversing in part a determination of the Appellate Court of Illinois rendered in 1965 in the case of Miller v. DeWitt (208 N.E. 2d 249), has serious implications for the practicing architect or engineer.

The Miller v. Dewitt case involved a suit against a firm of architects by several workmen employed by a contractor, for injuries sustained in the

collapse of a roof, which resulted from inadequate shoring. The primary issue was whether a supervising architect could be charged with liability for injuries to workmen arising from the contractor's method of performance, and whether, under the contract documents of the AIA, which had been utilized by the parties concerned, the architect was responsible for the safety of working conditions provided by the contractor to his own employees. The defending architects and the professional associations in Illinois argued that the architect only has the duty to see that construction, when completed, meets the plans and specifications contracted for by the owner, and that he has no duty to control the methods used by the construction contractor. The highest court of Illinois, however, rejected this argument, holding that an architect, in the exercise of reasonable care, should have known that the contractor's shoring was inadequate or unsafe, and had a duty to stop the work until the unsafe condition had been remedied; and that such duty, if breached, creates a cause of action for workmen who could foreseeably have been injured by the failure of the architect to stop the work.

The facts as reported by the Illinois courts were that a school district had decided in 1959 to remodel and enlarge the gymnasium at its high school, and had contracted with architects to prepare the necessary plans and specifications and to administer the construction contracts. The contract between the school district and the architects was the architect-owner agreement of the AIA, which provides that "the architect will endeavor to guard the owner against defects and deficiencies in the work of contractors, but he does not guarantee the performance of their contracts."

The contract beween the school district and the general contractor incorporated the General Conditions of the Contract of the AIA and provided, among other things, that the contractor "shall take all necessary precautions for the safety of employees on the work," and that the architect "has authority to stop the work whenever such stoppage may be necessary to insure the proper execution of the contract." The specifications further provided, in respect to bracing and shoring, that "the contractor shall provide all bracing, shoring, and sheeting as required for safety and for the proper execution of the work, and have same removed when the work is completed."

The plans for remodeling called for the "removal of the west wall of the gymnasium; the removal of a north-south proscenium truss from that point (the old west wall) to the new west wall of the new gymnasium; the removal of two steel columns in the old west wall, which, together with the proscenium truss, originally supported the west ends of four east-west roof trusses: the substitution where the old west wall and proscenium truss were of a new northsouth main-bearing truss into which would be fastened the west ends of the old roof trusses and the east ends of the trusses in the new structure."

The contractor, after examining the plans and making a personal inspection of the structure, and before any part of the west edge of the old roof had been cut away, determined to shore up the west ends of the four east-west trusses during the transition by means of four columns or towers of tubular steel scaffolding, each composed of four legs and placed generally and approximately under the west

ends of each of the four eastwest trusses with timbers composed of 2 x 10's laid on top of the legs of the towers on which the trusses directly and temporarily rested.

On a certain day in 1960, an iron-worker crew employed by the general contractor came to the scene and commenced to remove the northsouth proscenium truss and the two steel columns at the west end of the old gymnasium. When the two center east-west roof trusses were disconnected from the proscenium truss, that part of the roof load that had been supported by the west end of such two center east-west trusses and the proscenium truss was transferred to the shores thereunder. Later that afternoon, operations were begun to remove the north steel column. Upon the removal of that column, that part of the roof supported by the west end of the north east-west truss was shored up. A similar method was used to remove the south column. At the time the south column was removed, the roof collapsed, and three of the workmen were seriously injured.

In next month's column, we will discuss the legal contentions of the parties and the decision of the Appellate Court of Illinois upon the appeal from a verdict in favor of the plaintiffs and against the architects.

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FRANK LLOYD WRIGHT: A
STUDY IN ARCHITECTURAL
CONTENT. By Norris Kelly
Smith. Spectrum Paperbacks,
Div. of Prentice-Hall Publish-

BY PETER COLLINS

Div. of Prentice-Hall Publishing Co., Rt. 9W, Englewood Cliffs, N. J., 1966. 178 pp., \$2.45 (paper) \$5.95 (cloth). The reviewer is Professor of Architecture at McGill Uni-

versity, Montreal, Canada.

During the last 50 years, there have appeared about a dozen books on architectural history that can justifiably be described as masterpieces. This is one of them. It is quite short, but in it Professor Norris K. Smith expounds with sparkling lucidity an interpretation of Wright that not merely clarifies numerous hitherto apparently inexplicable facets of Wright's life and work, but deftly pulls the rug from under the whole cumbrous intellectual superstructure published so far in honor of the Master.

The chapter titles are, respectively: "The Cause Conservative." "Wright Romanticism," "The Oak Park Years," "Crisis," "A New Beginning and Its Destruction," "Depression and Resurgence," and. finally, "Assessment." But the book is dominated by two grand themes. The first is that of the fundamental and dramatic antagonism that rends assunder the personality of any proselytizing nonconformist; for, obviously, the more he finds that success crowns his preaching, the less nonconformist he himself becomes. The second theme is the influence on 20th-Century architecture of non-Hellenic modes of thought, I shall not discuss the first theme, since any commentary might diminish the intensity of the reader's pleasure when confronted with Professor Smith's impeccably organized and inspiring prose. However, the second theme is susceptible of constructive comment, since it is more controversial than the author's plausible presentation may lead one to suppose.

Basing his deductions on Thorlief Boman's Hebrew Thought Compared With Greek (a book originally written, it should be noted, in German), Professor Smith writes: "What I shall try to demonstrate is that [Roman-

ticism and Classicism] derive from the two main sources of Western thought, the Hebrew and the Greek respectively" (p. 36). He then convincingly quotes Boman to show that the Greek concept of "being" implied something objective and inert, and the Greek concept of "form" implied tranquility, moderation, and the harmonious expression of the intellect, whereas the Hebrew concept of "being" implies becoming and "the Israelite finds the beautiful in that which lives and plays in excitement and rhythm" (p. 40). Professor Smith approvingly follows Boman in commenting that the beginning of St. John's gospel (which, in English, is translated as, "In the beginning was the Word," and, in German, as "Im Anfang war das Wort") is rendered by Goethe ("who goes back to the Hebrew [Aramaic] original," p. 56) as, "In the beginning was the Deed"-a curious sort of corroboration in that (a) Goethe was not exactly an authority on Aramaic, (b) St. John's gospel was written in colloquial Greek, and (c) the quotation is from the Poodle scene in Faust. But from all this, and much more evidence, Professor Smith concludes that "Wright thought in Hebrew" (p. 39).

Now it is incontestable that a person's thoughts are intrinsically affected by the language in which he thinks them, and thus one cannot thoroughly understand any architect's thoughts unless one is familiar with the language in which they were expressed. But Wright, unlike St. John, not only shows no evidence of ever having thought in Hebrew; he was, if anything, antisemitic. rather The phrases with which, in his Autobiography, he describes the Jewish draftsmen who were working for Adler (who was the son of a rabbi); his offensive description of Ottenheimer; even his taut reference to his Uncle Jenkin's friend Rabbi Hirsh, demonstrate this conclusively. How, then, are we going to reconcile Professor Smith's conclusions abstracted from Boman with the demonstrable facts concerning Wright's intellectual growth?

The solution of this dilemma is not, I think, hard to find; and, if correct, must have important implications for the historical interpretation of the whole evolution of architecture. contemporary My contention is that, whereas it is true that Wright and especially Sullivan were primarily stimulated by the writings of-or conversations with -Jewish intellectuals, both these men were essentially stimulated by Germans, whether of Jewish or Gentile blood; and though there may well be a large element of Jewish influence in 19th-Century German aesthetic philosophy (stemming, for example, from Moses Mendelssohn), it is not hard to prove that the more obviously non-Classical aspects of Wright's philosophy, of the Bauhaus philosophy, and indeed of Le Corbusier's philosophy, stemmed essentially from a century-old synthesis of German mystical and philosophical beliefs.

As regards Wright, he himself states in the Autobiography that he was mainly influenced by Carlyle, Coleridge, and Emerson; in other words, by the three 19th-Century writers most keenly engaged in promoting translations of German thought into English. As a young architect, he came under the influence of a superman who, from the beginning, he significantly refers to as Lieber Meister-a term of respect easy to understand when we realize how much Sullivan owed to his German-Jewish friends Edelmann and Adler. It was Edel-

Continued on page 268



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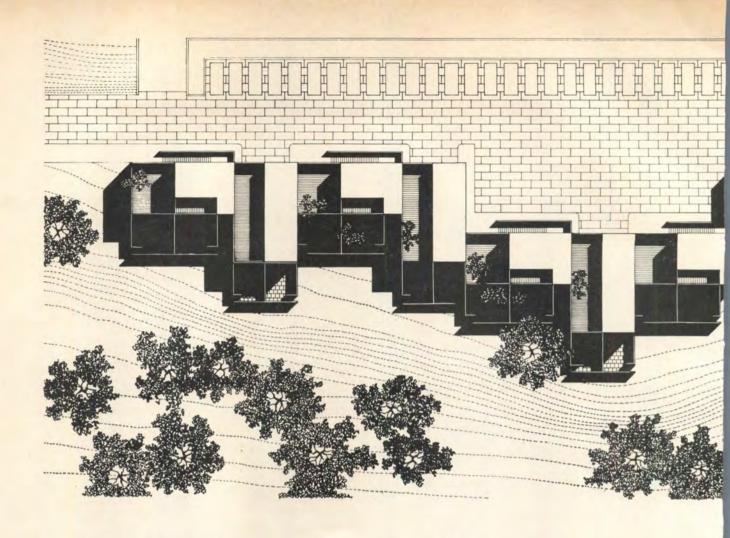
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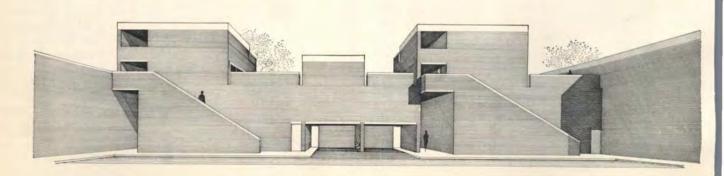


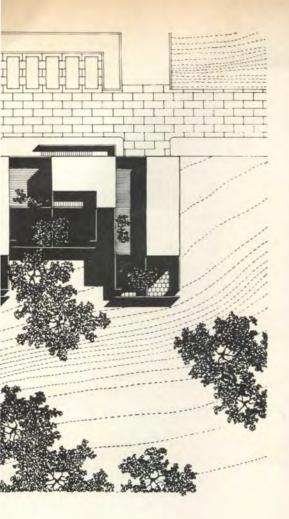
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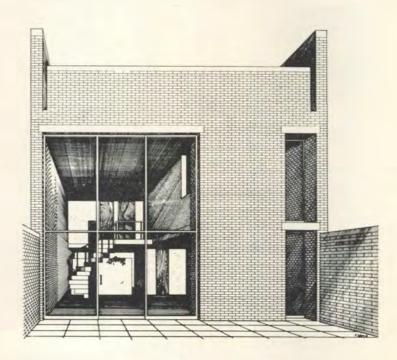


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Continued from page 262

mann who taught Sullivan "the highest transcendentalisms of German metaphysics" (i.e., Kant's doctrine that the Critique of Pure Reason was an architectonic plan for a new science) and introduced him to Wagnerian opera, just as it was Edelmann who "led Louis to Adler" (Autobiography of an Idea). Sullivan certainly did not have much respect for Adler's racial origins, since he referred to him as a "short-nosed Jew"; but Adler obviously had a great influence

on Sullivan's mind by introducing him to the works of Gottfried Semper. And Goethe, Wagner, Semper, Adler, and the Bauhaus all have this and only this in common-they were associated with

In Professor Smith's final chapter, "Assessment," quoting Karl Löwith, he calls the Communist creed "a pseudo-morphosis of Jewish-Christian messianism." But it seems more important to emphasize that, although Karl Marx's father became a Christian and cut himself off from the Jewish community, Karl Marx thought and wrote in German. And it was the affinity of Marx's abstract politico-historical theories with the Teutonic philosophy of his age that made Wagner the leading exponent of the artistic implications of The Communist Manifesto and caused Gottfried Semper to flee from Saxony after the revolution for which the "Manifesto" was written and seek protection through the British Prince-Consort. Albert of Saxe-Coburg-Gotha. Indeed, when Semper published his first book (based on his experience in organizing the 1851 London Exhibition), this book, which was the ultimate source of Arts-and-Crafts philosophy, was written not in English but in German, and printed in Brunswick.

Professor Smith is absolutely convincing in his assessment of the reasons that prompted Frank Lloyd Wright, in 1909, to desert his family and architectural practice and go into voluntary exile in Europe. But I am less surprised than he that Wright handed over his practice to "a German-born architect who had no particular knowledge or sympathy for Wright's work." Nor am I surprised that when Wright left the shores of America, he went straight to . . . Berlin.

Precast Concrete Panels BY A. GYIMESI

LARGE PANEL BUILDINGS. By Gyula Sebestyen. Publishing House of the Hungarian Academy of Sciences, P.O.B. 149. Budapest 62, Hungary. 401 pp., illus., \$12. The reviewer is Chief Engineer. Prestressed Concrete Division, Francon Ltd. (the concrete subcontractor for Habitat '67; see pg. 226.

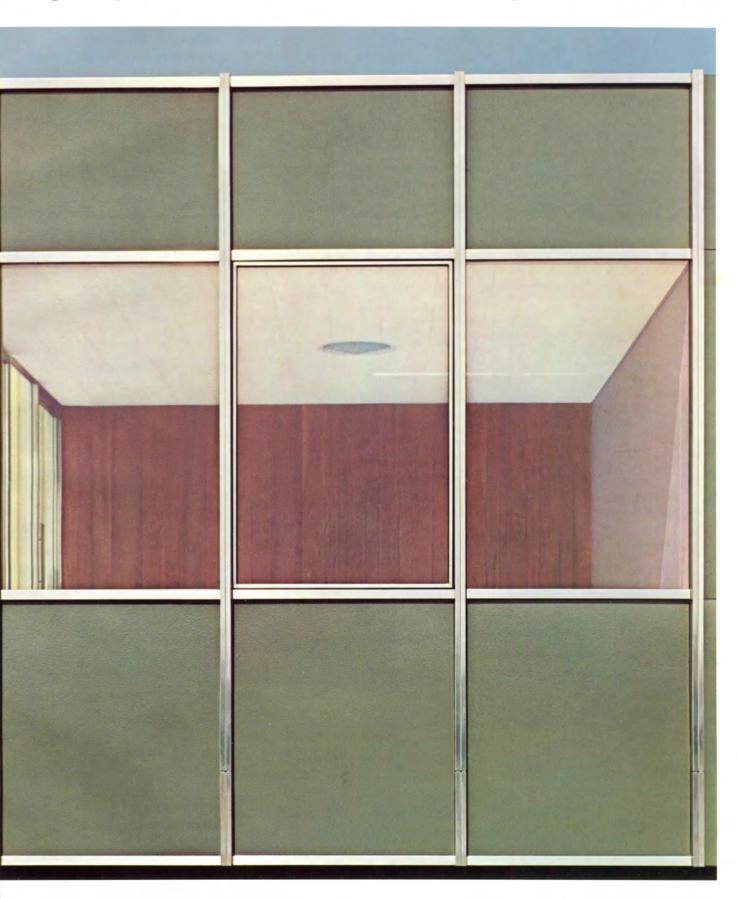
This book deals with methods of housing and apartment block construction using large precast elements. It provides a systematic survey of the experience gained in the past 10 years in Hungary, the Soviet Union, East Germany, and also describes some French and Danish systems. The book gives a very good, if short, cross-section of many existing systems and describes all the problems of materials, structural design, and mechanical design. It also discusses the questions of thermal and sound insulation, and production, erection, and assembly techniques. Finally, there is an attempt to evaluate the economy of the different methods; comparisons are made with traditional construction costs.

The chapter on materials concentrates on the various lightweight concrete aggregates, both natural and artificial. The shrinkage, strength, and thermal conductivity characteristics are discussed in Continued on page 276



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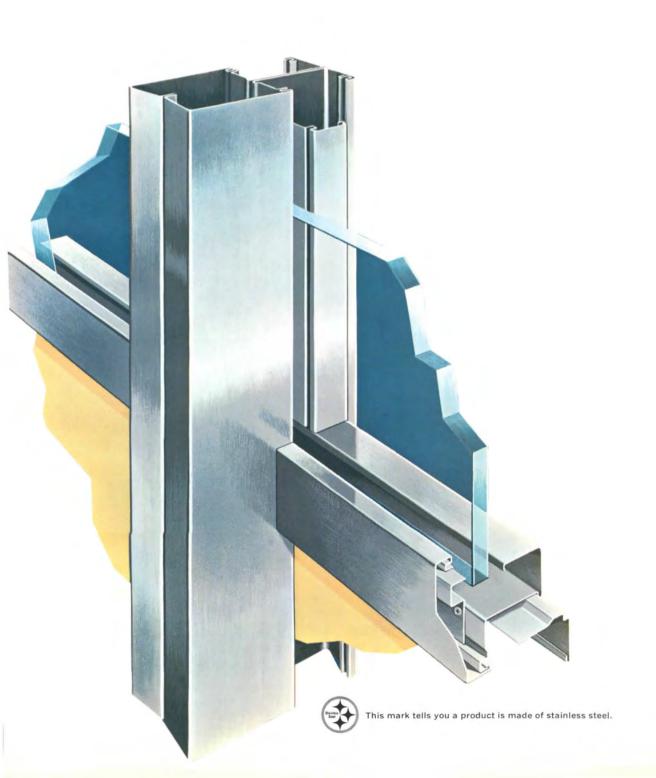
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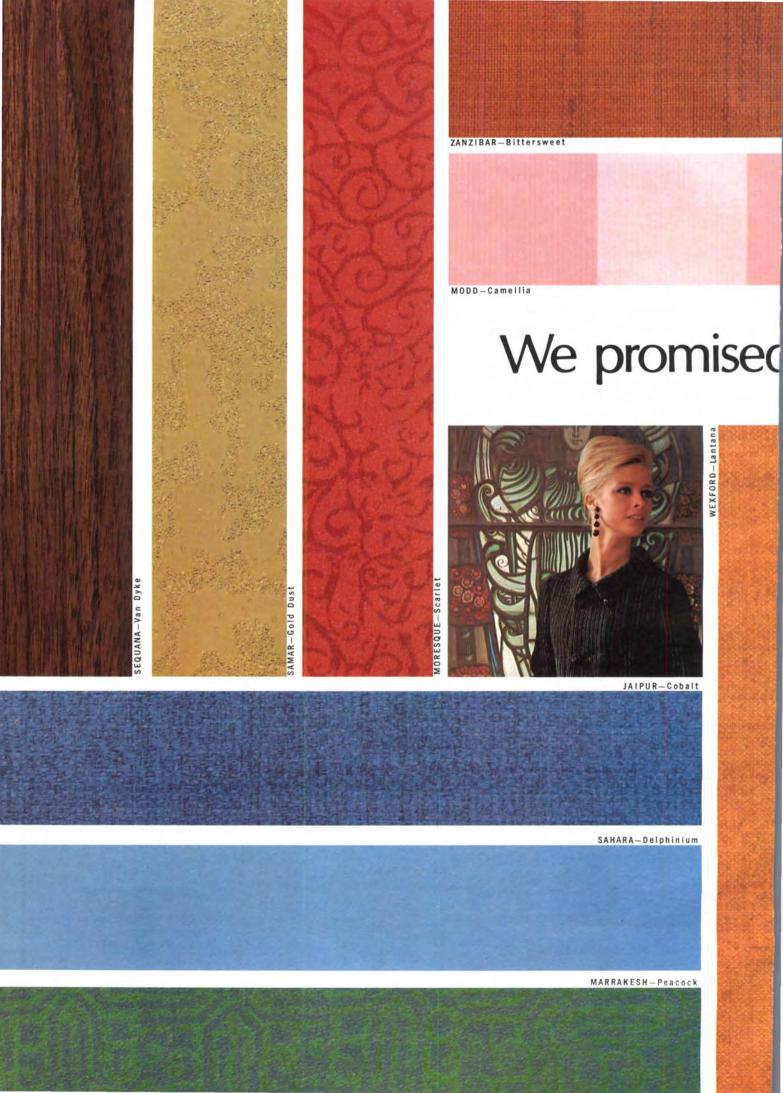
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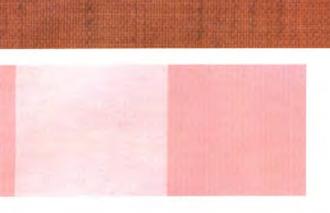
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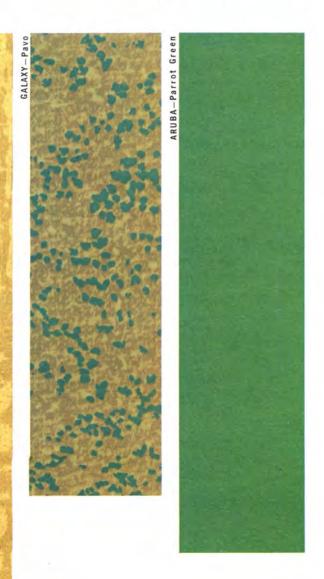
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Continued from page 268

great detail. This is followed by a short description of plastics used as building materials.

The following chapter discusses architectural and structural design. Surprisingly, there was a time, about five or eight years ago, when a whole building industry was built around intermediatesize panels. These panels are between the size of a brick and a full story-high wall panel. The panels were a third or half a story high and their existence was justified by the limited capacity of cranes available in some countries, Even

brick walls and brick pilasters were prefabricated and erected on the job site, one-half story high. The need for temporary lateral support, and the extra joints and double handling required, turned out to be more costly than the initial investment in heavier cranes, so that design and manufacturing of intermediate-size building blocks were aban-

The most important part of the book discusses the large panel systems that are one-story-high units. They are divided into two-dimensional flat panels, three-dimensional box units, and precast buildings made up by frames, Many Eastern and Western examples are cited. Systems of vertical and horizontal joints, both from the point of view of weathering and of structural detail, are shown in great number. Special emphasis is given to the articulation of external walls, dimensional coordination and modular design, connection details between the loadbearing units and partition walls, window and door details, staircases, balconies, corners and gable walls. The connections, perhaps the most important part of these systems, are well detailed.

A separate chapter discusses the problem of services: plumbing, electricity, mechanical equipment, and the intricate design of special precast units that contain these mechanical services.

Beside regular and lightweight concrete, there are several other materials in various layers incorporated in the multilayer sandwich panels; insulation materials, terra cotta, and sound insulation of organic origin.

The method of manufacturing the large precast concrete elements is described and divided into two main methods: (a) the concrete plant is stationary and the mold moves; (b) the molds are stationary and the concrete is carried to them. Each system has its merits and a description is given of the economy and drawbacks. Typical plant layouts are shown. Various layouts for steam-curing chambers and autoclave equipment are described. The merits of pouring wall panels horizontally and tilting up later. or pouring the panels in vertical battery forms, are compared.

Cranes and handling equipment are compared and tabulated. Mobile, tower, crawling, gantry, and climbing cranes are shown on several big projects; also, some smaller devices for lifting and clamping are described.

Also discussed are the job site construction method and organization of the site, the storage and handling of the units, hauling and temporary bracing after erection, and scaffolding and safety procedures.

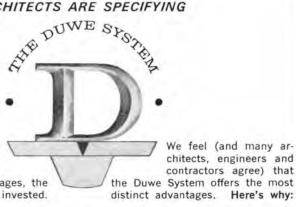
The book concludes with a chapter on the economy of prefabrication. The use of large precast units and system buildings can only be justified if they can be shown to be more economical than building with traditional methods. This is a most difficult problem and the economic calculations shown are far from convincing. In addition, there is little or nothing written about high-rise apartment buildings, earthquake design problems, and

Continued on page 284

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- 2 CASTELL #9007 Eraser Tipped Drawing Pencil made in 11 degrees, 3B to 6H. Extensively used by professionals, it is considered the world's finest writing pencil. Widely favored by executives because of its superb smoothness, extrafine quality, wide range of lead hardness choice, and long wearing point.
- 3 CASTELL LOCKTITE #9400 drawing lead holder same as Locktite Tel-A-Grade in basic parts, and

- quality. Has serrated non-slip finger grip on plastic barrel. Our ever popular Model T—a great value. 19 degrees, 7B to 10H.
- CASTELL #9030 Black refill drawing leads for Locktite and all standard lead holders. Same quality and companion to world-famous Castell wood drawing pencil. 19 degrees, 7B to 10H. Packed in green plastic tube with gold cap.
- 5 CASTELL 9201 POLYCHROMOS Crayon Pencils offer a complete range of 72 pigment colors—bright, beautiful and light-proof—for sketching, drawing, rendering and map making. Widely used by artists,
- architects, designers, draftsmen, and engineers for any coloring required.
- No. 1960 PEEL-OFF MAGIC-RUB vinyl composition eraser, paperwrapped in pencil shape. Ideal for detail erasing on drafting film. Rolls up graphite in long strips without smudging, smearing or damaging film surface.
- 7 REMARKABLE NEW HIGGINS TECHNICAL CARTRIDGE PEN, available in sets of eight or individually boxed with 2 BLACK MAGIC India Ink cartridges. An adapter also makes it a self filling pen. Only Technical Pen of its kind on the market. With fast drying
- Higgins BLACK MAGIC India Ink in each cartridge, you need never fill a pen again unless you want to. Its practical versatility should make this new Higgins pen your first choice.

11

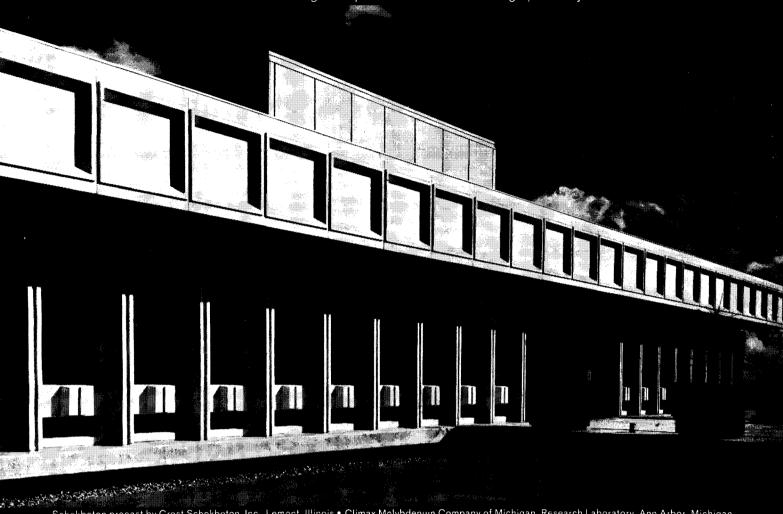
- 8 No. 7041 CASTELL PARAWHITE soft, pliable drafting eraser. Moistureless formula virtually eliminates smears, stains or smudges. Erases graphite marks quickly and cleanly without damage to drawing surfaces.
- MENTOR #50/58 Dual Pencil and Lead Sharpener. Made of brass with 3 tempered steel blades—one to remove the wood, the second to put a long sharp point on the lead and the third to point refill leads used in holders.
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- 11 No. 4050 BRASS DRAWING LEAD POINTER made exclusively for pointing refill drawing leads. Will provide a long sharp point on all diameters of leads from 8B to 10H inclusive. Has second opening for sharpening thicker, softer leads and crayons.





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Church opens outward through a soaring prow of glass

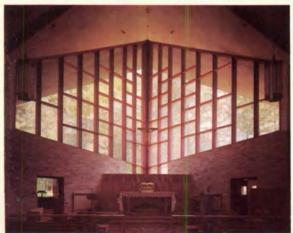
From beneath its sweeping canopy, a ship-like bow of ASG's Lustracrystal® sheet glass opens this modern church to woods and sky.

The towering facade was originally intended to shield an inner wall of stained glass. But so inspiring was the effect with clear glass alone that architect and pastor decided to forego the interior wall.

Now, the entry to the church is bright, open, pleasantly in touch with the world around it. At the rear of the church, another wall of Lustracrystal (below) bathes sanctuary and altar in light.

Clear, brilliant Lustracrystal is one of the complete line of plate, sheet and patterned glasses made by American Saint Gobain. For more information on Lustracrystal and the ASG family of architectural glasses, write to: Dept. E-9, American Saint Gobain Corporation, P.O. Box 929, Kingsport, Tennessee 37662.

Saint Elizabeth of Hungary Roman Catholic Church, West Acton, Massachusetts Architect: D'Orsi & Company



© American Saint Gobain 1966

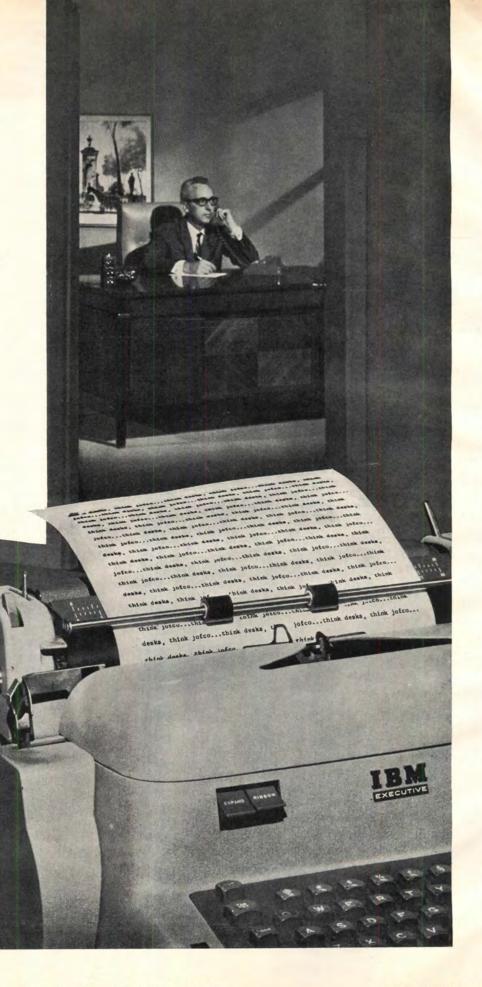


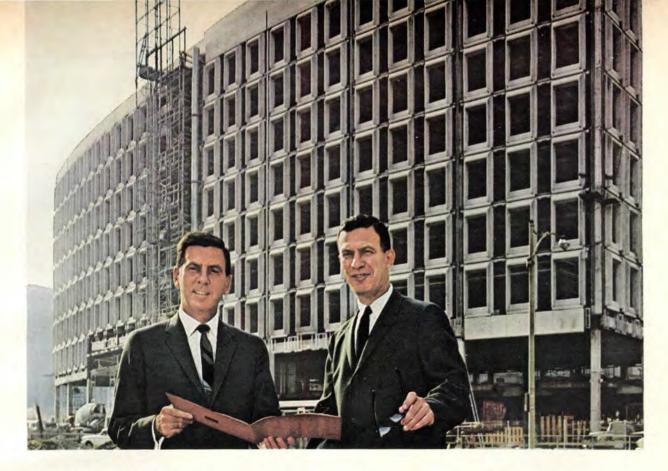


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SHOWROOMS: Los Angeles, Raub & Robinson, 1608 East 15th Street • Fort Worth, L. H. McDaniel & Son, 420 So. Ballinger • New York, Jofco, 16 E. 53rd, Chicago, Jofco, 1109 Merchandise Mart.





"Flexibility to meet any tenant requirements... prime factor in our choice of steel framing"

Norman Leventhal, President, and Robert Leventhal, Treasurer, Beacon Construction Company, owner and builder of One Center Plaza, Boston's "Horizontal Skyscraper"

"Our initial design for One Center Plaza called for a framing material other than steel. However, we discovered that steel framing allowed us to offer prospective tenants office space uniquely suited to their particular needs. Modifications, such as additional stairways, increased floor load capabilities, and other

space adaptations, could be incorporated after the main framework was completed.

"Another advantage in steel construction was that it allowed us to work right through the fall and winter, making possible earlier completion and earlier occupancy.

"The relatively light weight of steel

framing minimizes foundation reinforcement problems. Also, we found steel particularly well-adapted as a framing for precast exterior panels.

"The use of steel framing in the construction of One Center Plaza has been most advantageous for Beacon and its tenants, both in terms of construction features and cost savings."

BETHLEHEM STEEL

Bethlehem Steel Corporation, Bethlehem, Pa.

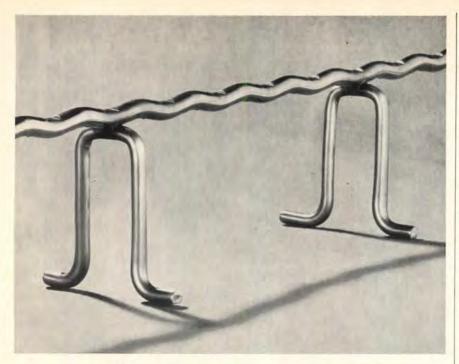


This is how One Center Plaza, located in Boston's new Government Center, will look when completed. Its 8 floors provide 600,000 sq ft of floor space.





Architect: Welton Becket and Associates. Consulting Engineer: Wayman C. Wing. Steel Fabricator: West End Iron Works. Bethlehem is supplying about 5,000 tons of structural steel for this building.



This new rebar support is made of stainless steel!

(Can't stain concrete. Eliminates plastic spalling.)

It's stronger than other supports

(Holds a greater load without spreading or dropping.)

It's priced low!

(Your total cost will usually be less than plastic-coated supports — on the average job.)

It's just one of the new Sure-Grip stainless steel concrete reinforcing supports that eliminates rust stains and plastic spalling on exposed concrete surfaces. Does away with troublesome plastic coatings that often pull off, crack or become soft.

The combination of stainless steel and the new design of the legs makes these supports stronger than others. They're less likely to spread and drop if overloaded. Keep your reinforcing in proper position.

These new supports don't cost any more than plastic-coated types, usually less; and, they're easier and more economical to place on the job.

Sure, we still make other rebar supports from different materials and with plastic coating, but architects and contractors have asked us for stainless steel supports where non-staining qualities are required. Now you can get them from us...exclusively.



Write for free sample, literature, Pittsburgh Testing Laboratory report, prices and name of your local Sure-Grip distributor. See our complete catalog in Sweet's.

THE DAYTON SURE-GRIP & SHORE COMPANY

Main Office & Factory —721 Richard St., Miamisburg, Ohio Southern Office & Factory—1400 5th Ave., South, Birmingham, Ala. Western Franchise Mfr.—Euclid Metal Products Co., 2349 Jefferson Street, Torrance, California

On Readers' Service Card, Circle No. 473

Continued from page 276 construction tolerances.

The general make-up of the book is very good, the type clear, and the diagrams easy to follow. Many good photographs are included, but it is remarkable how often these pictures depict a very poor quality of finishing work on the panels. The book abounds with ideas and is recommended for anyone interested in large panel systems and the coming industrialization of apartment construction.

Specifiers Beware

BY PETER ANDES

The Economics of Carpeting and Resilient Flooring, an Evaluation and Comparison. By George M. Parks. Industrial Research Unit, Wharton School of Finance and Commerce, U. of Pennsylvania, Philadelphia, Pa. 19104, 1966. 87 pp., \$2.50 (cloth) \$1.50 (paper). The reviewer is a Project Manager for I.S.D., an affiliate of The Perkins & Will Partnership, architects.

This book does not live up to its title. Webster's Seventh Collegiate Dictionary defines economics as "description and analysis of the production, distribution, and consumption of goods and services." This study was undertaken as a teaching example of business requirements for a postgraduate course at the University of Pennsylvania's Wharton School of Finance and Commerce. The aim was to determine which costs more-carpeting or resilient flooring. The conclusion was: "Under all conditions investigated, the total annual cost for resilient flooring is less than that for carpeting." (Annual cost is defined as the installed cost and maintenance divided by the estimated service life.) The increased annual cost of carpeting was found to vary between 125 per cent and 270 per cent.

The economics of carpeting and resilient flooring is of vital interest to all specifiers of interior finishes. Leaving aside the more subtle aspect of how these products may affect other products (china breakage, acoustics, mobility of functions, etc.), a study of the subject would be invaluable if it only examined the "production, distribution, and consumption" of these two diverse products. What is presented instead, however, is the technique of examining relative costs. To this end, many readable and informative tables and charts concerning "amortized cost of equipment, frequence of maintenance operations," etc., have been developed. These will be of great value to those who wish to quote an authority in order to win a point.

Continued on page 294

OCTOBER 1966 P/A

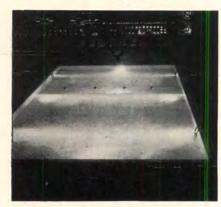
Epple and Seaman utilize ceramic tile n campus rejuvenation at lewark College of Engineering.



ABER COMPANIES: American Olean Tile Co., Inc. • Atlantic Tile Manufacturing Co. • Cambridge Tile Manufacturing Co. • Carlyle Tile Company • Continental Ceramic Corporation da Tile Industries, Inc. • General Tile Company • Gulf States Ceramic Tile Co. • Highland Tile Company • Hoffman Tile Mfg. Co., Inc. • Huntington Tile, Inc. • International Pipe Ceramics Corporation • Jackson Tile Manufacturing Co. • Jordan Tile Manufacturing Co. • Keystone Ridgeway Company, Inc. • Lone Star Ceramics Co. • Ludowici-Celadon Company shall Tiles, Inc. • Mid-State Tile Company • Monarch Tile Manufacturing, Inc. • Mosaic Tile Company • Oxford Tile Company • Pomona Tile Manufacturing Co. • Sparta Ceramic pany • Summitville Tiles, Inc. • Texeramics Inc. • United States Ceramic Tile Co. • Wenczel Tile Company • Western States Ceramic Corp. • Winburn Tile Manufacturing Co.

A four-pipe system isn't always the answer.

Want extra space for a pool and a garage?



Then consider a General Electric Zoneline heating/cooling system. The way architects Nowicki & Pollilo did with the William Penn House, Philadelphia, Pennsylvania, shown here.

G-E Zoneline gives you all the benefits of a four-pipe system. But, because it does away with pipes, ducts, boilers and cooling towers, it frees space—for a garage in the basement or a pool on the roof or both.

Other benefits:

FIRST COST can be cut drastically. The General

Electric system used for William Penn House was much less than estimates for a four-pipe system.

ROOM-BY-ROOM CONTROLS enable a tenant who is chilly to turn on the heat, even though everyone else has the

air conditioning on.

CHOICE OF GRILLWORK is one you make.
G-E Zoneline grille comes in two standard designs or can be treated architecturally to blend with building appearance.

INTERIOR FLEXIBILITY allows you to fit units over doors (Marina Towers, Chicago) or under window seats (Century House, Lincoln, Nebraska).

From motels to high-rise construction, Zoneline systems can make dramatic economies in space and first cost. Call your General Electric Zoneline Air Conditioning Representative for the facts.

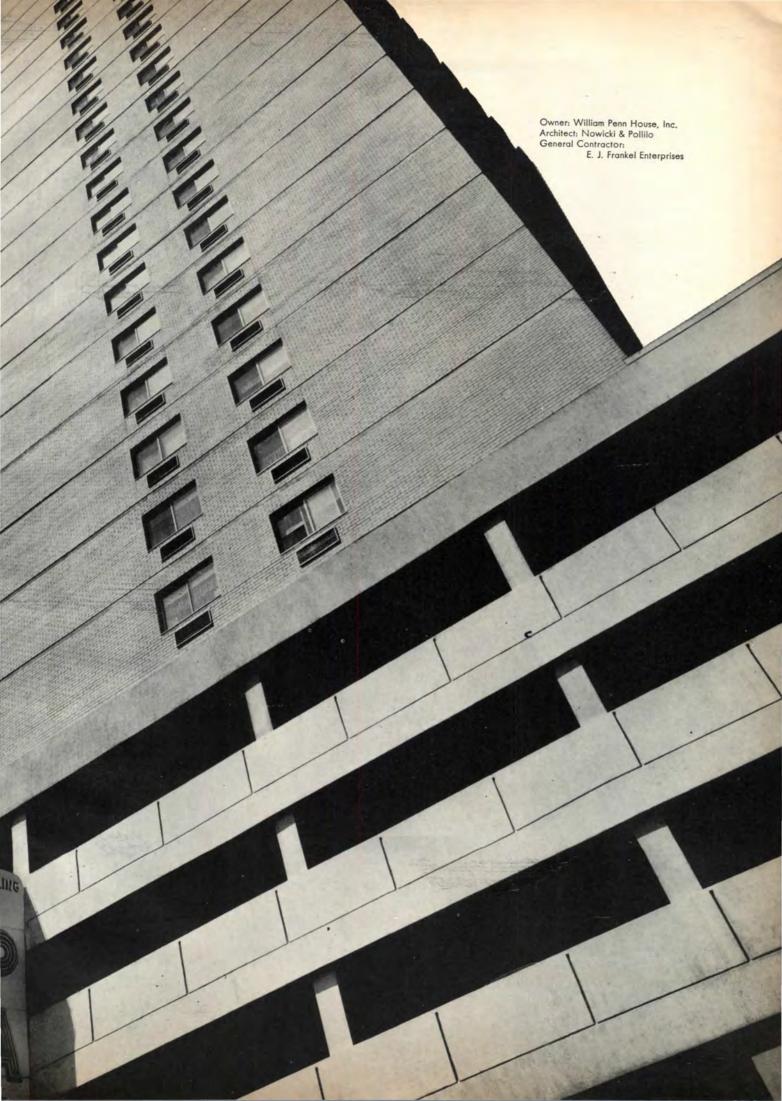
Air Conditioning Department, Appliance Park, Louisville, Kentucky



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We've got the best legs in the office.

Square. But beautiful.

And by collaborating with Knoll (the most honored designers in the field), we made sure they not only look good but work well.

On our 500 line desk we use 16 gauge polished or brushed chrome steel on the outside. Then strengthen each leg with a 14 gauge "U" channel inside. Makes the desk solid as a rock. So if you're a desk pounder, pound away. It'll never shimmy or shake.

And since no floor is absolutely level, we've added an inconspicuous foot lever to each leg. Lets you raise or lower the desk as little as 1/32 of an inch with each quarter turn. Also, as it turns, it snaps into position. Always square with the clean line of the leg.

Everything about our 500 line desk is made the way office furniture ought to be. Furniture that looks beautiful and works beautifully—a solid investment for the management who pays for it.







New office building of Elwin G. Smith & Co. Inc., Pittsburgh, Pa., has exterior metal protected with Fluropon†, made with Kynar 500.

Today's revolution in long-life finishes starts with KYNAR* 500

Kynar 500 is a new Pennsalt fluoroplastic used by leading paint manufacturers in formulating revolutionary new exterior finishes for metal siding, window frames, mullions and trim.

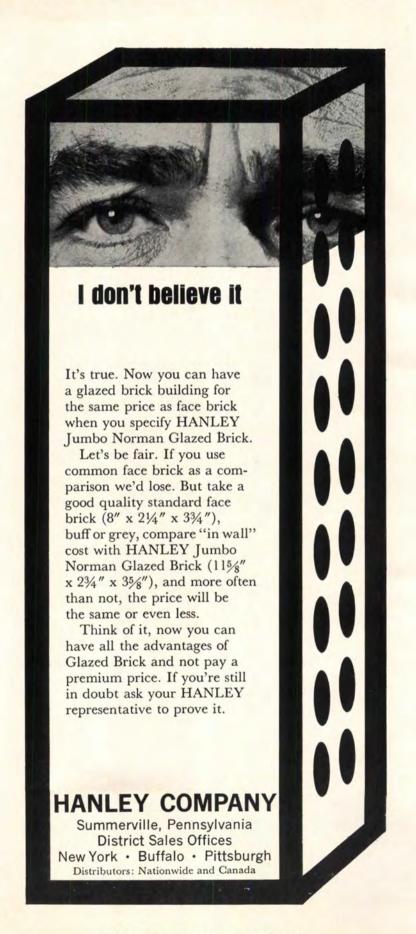
- long life—tests made by Pennsalt project 30 years or more of useful, maintenance-free life.
- perfect color match—finishes are liquid, can be roller-coated on flat stock and post-formed, or sprayed on contoured components.
- excellent color retention—tough, weather-resistant surface resists fading and chalking. Standard and custom colors available.
- lowest cost—finishes made with Kynar 500 cost less per square foot than porcelain enamel or top grade anodized aluminum.

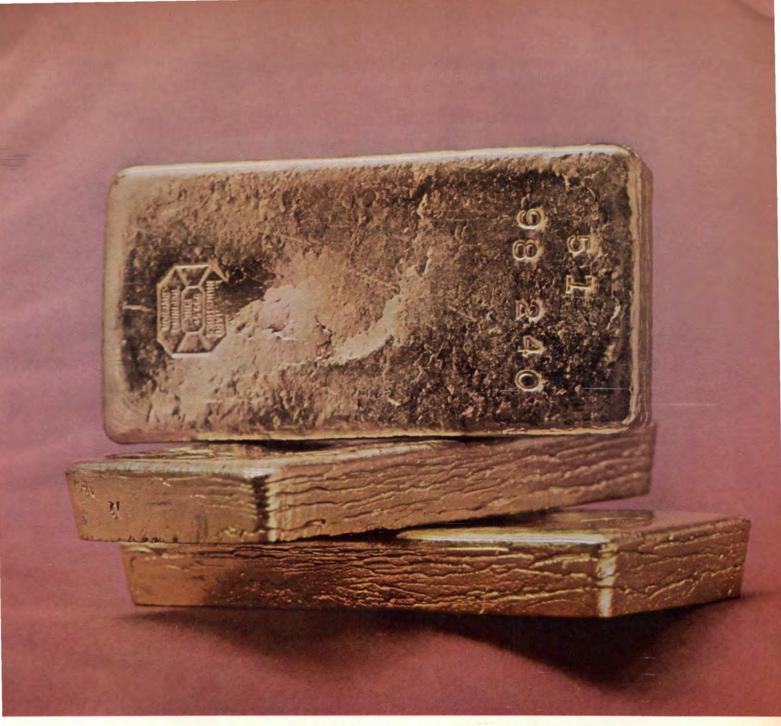
Get complete information, including test data and cost comparisons, by writing for our 12-page brochure. Plastics Department, Pennsalt Chemicals Corporation, 3 Penn Center, Philadelphia, Pa. 19102.

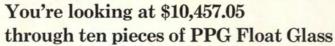
^{*}Kynar is a registered trademark of Pennsalt Chemicals Corporation. Kynar 500 is a grade of Kynar used in making long-life finishes. †Fluropon is a trademark of De Soto Chemical Coatings Inc.

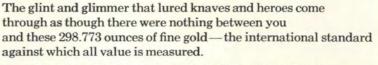


Glazed Brick for the price of Face Brick









That's because the glass is PPG Float, the new standard of perfection against which all glass will be judged.

We make it by floating liquid glass on a bath of molten metal. You see the results: a glass with new depth of clarity and brilliant surfaces.

PPG Float Glass is available now. For specification data contact your PPG Architectural Representative



the glass that makes the difference

or write: Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh, Pennsylvania 15222.

This is how the gold bars were photographed through ten pieces of PPG Float Glass. Courtesy of Engelhard Industries, Inc.

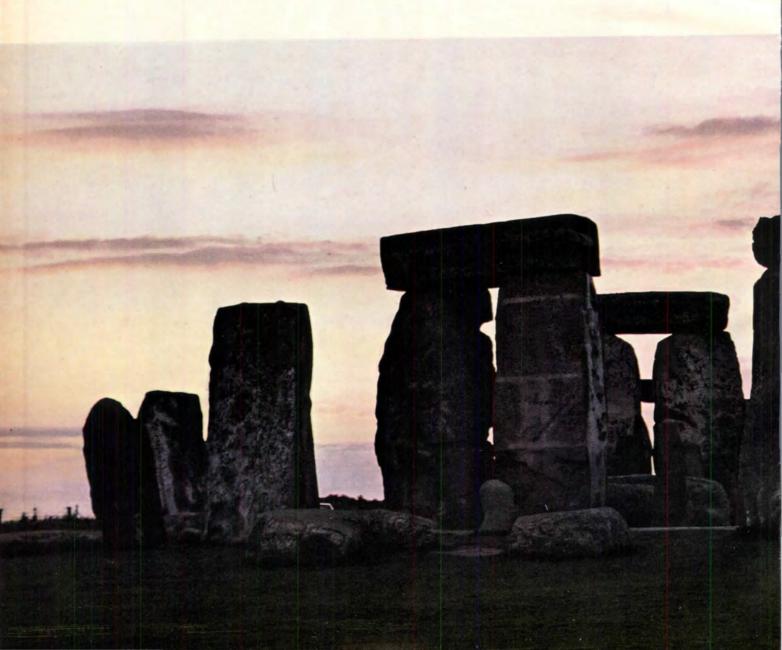
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Frozen in time, or flexible for

Steel makes the difference



This STEELMARK of the American Steel Industry on a product assures you it is modern, versatile, economical Steel. Put it on products you sell; look for it on products you buy.



The strange rocks of Stonehenge stand ominous in the waning light...never changing...frozen in time for 40 centuries.

Stonehenge was built by men who never knew steel.

Now men build with steel, with Republic Steel,

the future?

and their watchword is *flexibility*. Through the ingenuity and foresight

of Republic customers, flexibility can be specified.

MODULAR STEEL WINDOW WALLS, for example. Slim, weight-saving, space-saving walls that assemble economically — that disassemble without destruction, to open, expand, change shape or redivide into more useful space. Interior movable steel walls, too, designer-styled in "building block" assembly patterns to lend themselves to the most attractive, most useful delineations of building work and service areas.

STRUCTURAL STEEL TUBING is another innovation for building frame members — adapting the long-known remarkable supporting characteristics of tubular steel. With these tubular members accepting more of the building weight, walls can be lighter and integrate well with other architectural and structural elements.

Doors and windows in Steel, with mated frames, another element in modern, mobile building design are factory-fabricated for perfect fit and refit, for flexible access anywhere, without carpentry, without delay.

Looking for designs and building components that need not be frozen in time? Specify steel! Republic Steel Corporation, Cleveland, Ohio 44101.

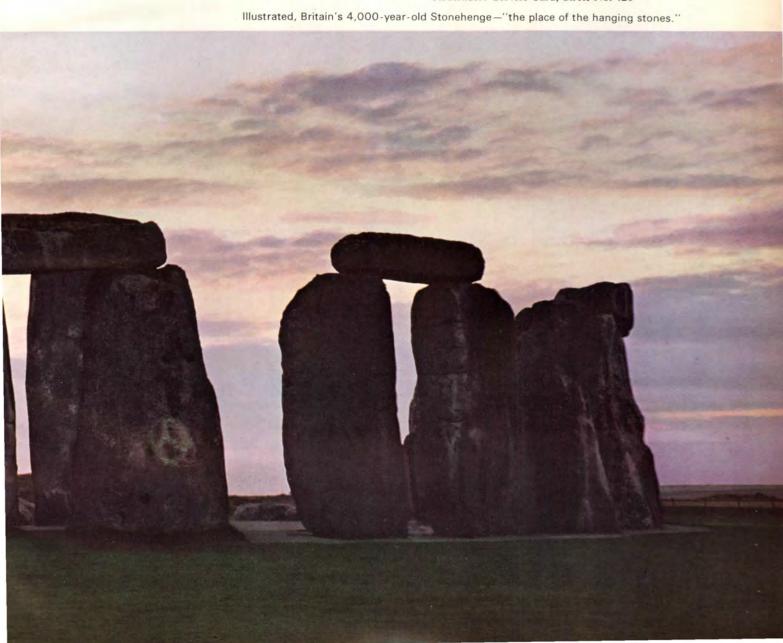


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REPUBLIC STEEL

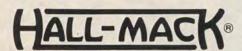
CLEVELAND, OHIO 4410

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YOU WILL sell more homes

WITH



QUALITY

IN EVERY BATHROOM!

When buying a home, one of the two rooms with the greatest attraction for Mrs. Housewife-and usually for the man of the house, too is the bathroom! And in many transactions, it is the unusual touches to the bathrooms—the things that others don't have that help sell homes. Below are a few of Hall-Mack's finest quality bathroom accessories-every one a real home-seller! By making bathrooms more attractive and convenient, Hall-Mack specialties help to clinch many a sale for smart builders and

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EVERY BATHROOM A SALESMAKER!

Just mail the coupon today! A new color brochure — "Accent on Accessories" — offers a wide choice of origi-nal designs, new ideas and exclusive features.

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I'd like complete information on these and other Hall-Mack quality bathroom accessories. Please send "Accent on Accessories."

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Company		
Street		
City	State	Zip Code

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Continued from page 284

In addition, an appendix offers a comparison with studies made by the American Carpet Institute (1963) and Armstrong Cork (1965), the latter of which helped support the data collection procedures against which its own report was compared.

Throughout the study, resilient flooring is limited to asphalt, vinyl, and vinyl asbestos. Why not cork or wood? Carpets are compared only by means of price or, occasionally, content (wool vs. nylon). Is construction so irrelevant? Correspondingly, no carpet techniques such as felting or flocking, of fibers, such as acrylic or rubber, were tested. Such a book is of interest only insofar as it examines all significant data; the limited data examined and didactic point of view fail to fulfill the promise of the title.

From Aristotle to Abercrombie BY RICHARD P. DOBER

THE NEW TOWNS: THE ANSWER TO ME-GALOPOLIS. By Frederic J. Osborn and Arnold Whittick. Introduction by Lewis Mumford. McGraw-Hill Book Co., 303 W. 42 St., New York, N. Y., 1964, 376 pp., illus., \$12.50. The reviewer is an architect with Dober Walquist & Harris, Inc., Cambridge, Mass.

Nothing is more provocative than an intelligent mind marshaling facts toward an undemonstrable conclusion more biased than one's own. New Towns are not the answer to Megalopolis, but Frederic J. Osborn, in the first half of this important book, makes a persuasive case for his own experience.

Well-honored for his contributions to planning philosophy and practice, including two decades of service as Estate Manager of Welwyn Garden City, Osborn splendidly answers the criticisms leveled against the English New Town movement and returns a few brickbats of his own.

Not as well documented as academic treatises covering the same period, Osborn's memoirs nonetheless include the important materials from Aristotle to Abercrombie. The proponent's case for New Towns is succinctly stated: secular urban evils overcome, easy communication, reduction in the journey to work, a less septic environment for family life, the consciousness of belonging to a community of comprehensible size, the economies of deliberate development as opposed to laissez-faire sprawl.

However, prejudices as amusing as they are apparent color the text. One sample:

Continued on page 308



Build better masonry walls with Dur-O-waL

and Dur-O-waL Products...

What is Dur-O-waL?

How does

Dur-O-waL

work?

Dur-O-waL brand is the original masonry wall reinforcement with the truss design. Specially designed to give greater strength and bond to masonry walls, Dur-O-waL also minimizes shrinkage, temperature and settlement cracking in masonry. Dur-O-waL is manufactured from high-tensile steel, deformed and electrically buttwelded to give you the highest quality masonry wall reinforcement material known to construction today. Insist on Dur-O-waL.



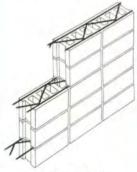
Like nothing else on the market. This truss design reinforcement increases flexural strength of your masonry walls 79 to 261 per cent, depending on the weight of Dur-O-waL used, type of mortar and number of courses. And note how the side rods are scientifically deformed on four sides for the best possible gripping contact with mortar. Choose from a complete range of Dur-O-waL brand shapes and sizes.







CAVITY WALLS



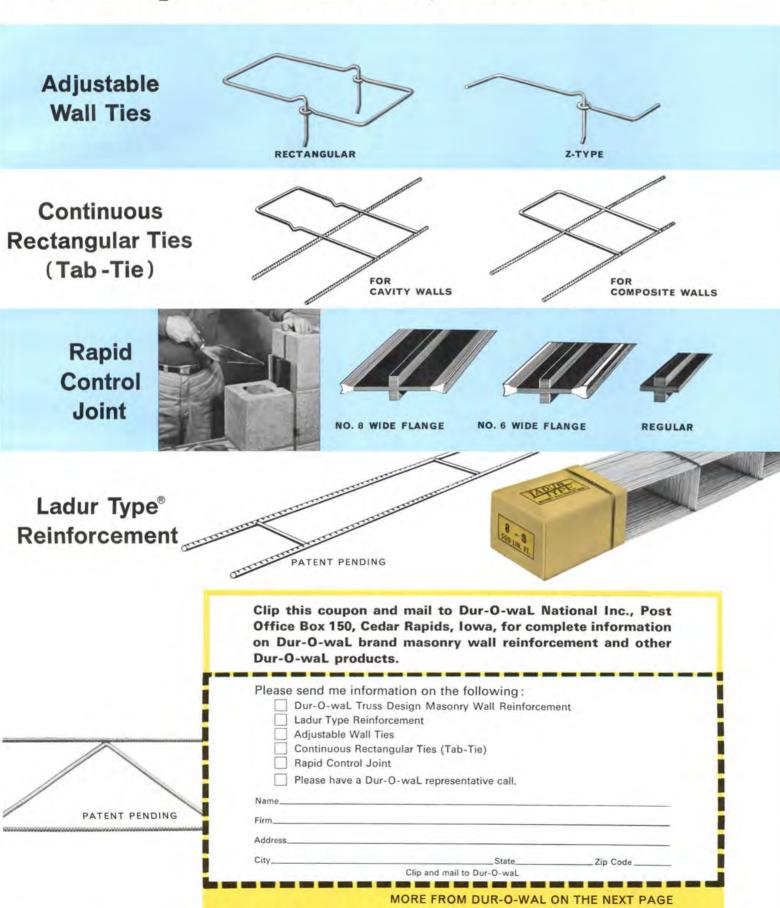
PLAIN WALLS

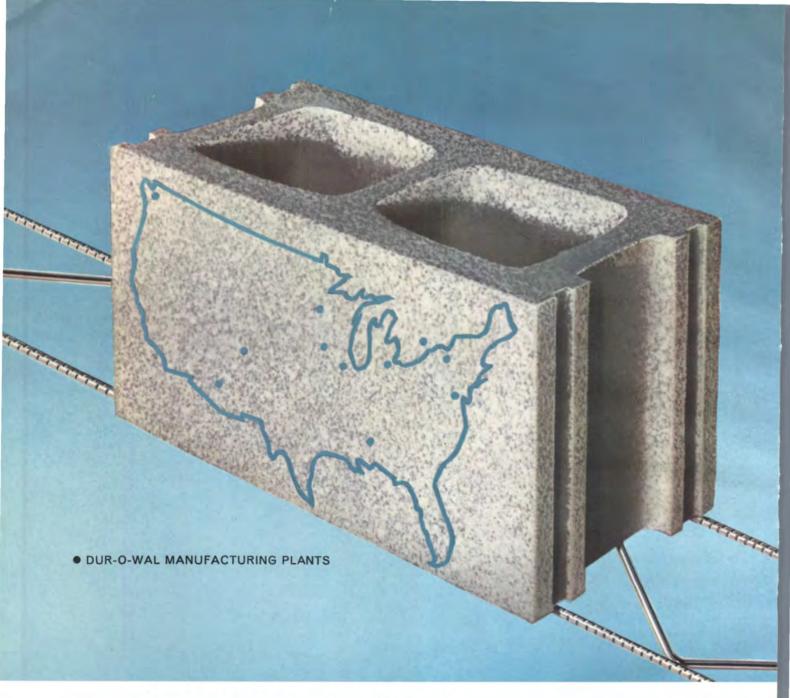
Use Dur-O-waL to reinforce plain, composite and cavity walls

Dur-O-waL gives your masonry walls increased compressive strength, increased transverse strength and marked improvement in resistance to moisture penetration in composite walls

DUR-O-WAL

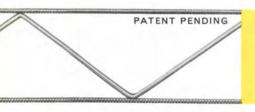
Are you familiar with these other versatile products made by Dur-O-waL?





You can get Dur-O-waL

wherever you get masonry Not only is Dur-O-waL as versatile as masonry, but it's as accessible as masonry itself. Over 8,000 dealers now recommend and stock Dur-O-waL wherever and whenever you need it. Truss designed Dur-O-waL also carries material approvals for multiple use in masonry wall construction by the following code organizations: Building Officials Conference of America (BOCA), Southern Building Code Congress (SBCC), International Conference of Building Officials (ICBO). When you specify Dur-O-waL, make sure you get Dur-O-waL. Look for the original truss design. Look for the Dur-O-waL end wrap. They're your assurance you've found the way to make masonry walls live longer than ever before.



DUR-O-WAL

THE ORIGINAL MASONRY WALL REINFORCEMENT WITH THE TRUSS DESIGN

Remember way back

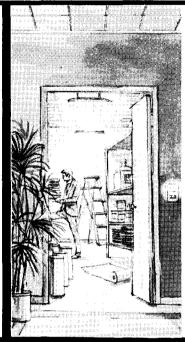
when a switch was used just to turn lights on and off?





KEY-OPERATED LOCKING TYPE SWITCH # 690

Prevents operation of lighting, motors and equipment except by authorized personnel. Key operated. A.C. quiet switches are available in several ratings, in duplex or in combination with a receptacle or a red pilot light indicator.

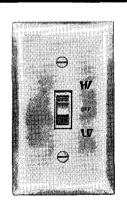




COMBINATION SWITCH # 682

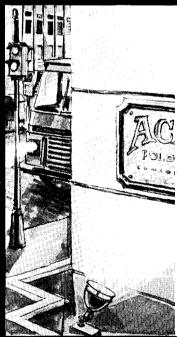
AC quiet switch can be wired as pilot light so neon glows when switch is on... or as a night light so neon glows when switch is off. Dozens of uses for safety and convenience—such as control of outdoor and basement lighting in the home, and all switches remote from the device or light they control—in both residential and commercial applications.





HI-LO DIMMER #HL-300

Incandescent dim switch provides economical 2-stage lighting for functional effect, such as a TV viewing room, or dramatic effect, such as a dining room. Hi (100% light)—Lo (30% light—off positions. Lo setting extends bulb life 40 times. Installs in a single-gang box.

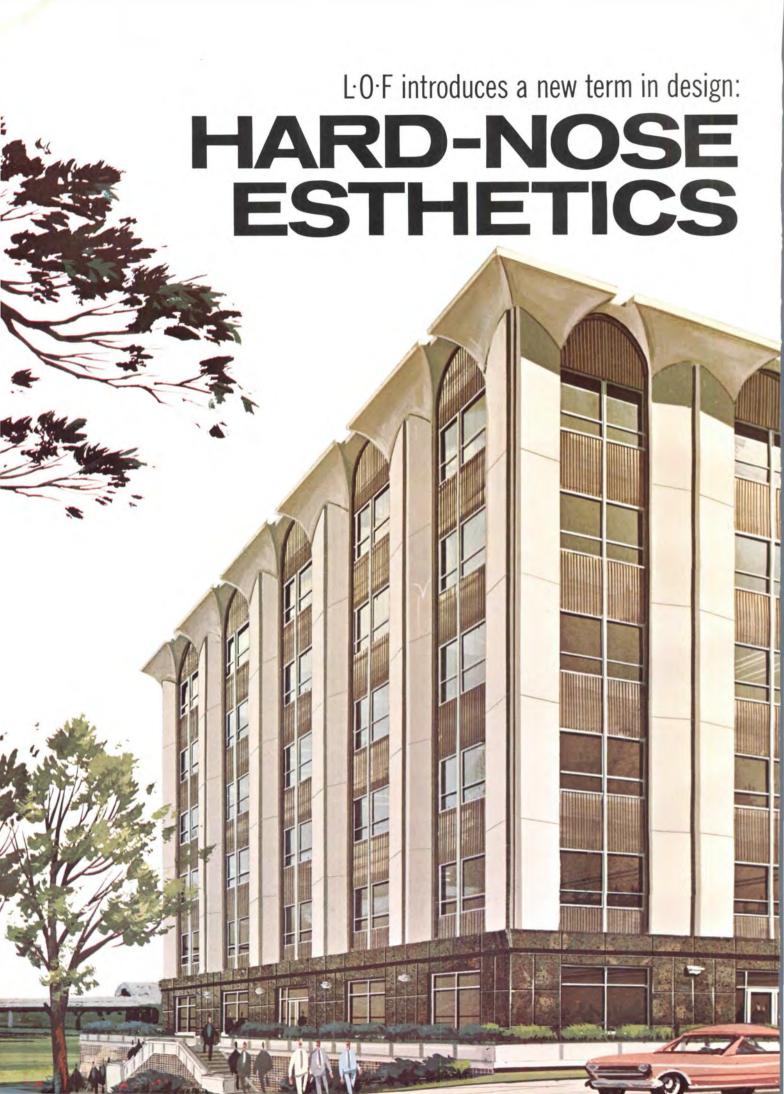




PHCTOELECTRIC CONTROL SWITCH #PS-4

Weatherproof swivel photoelectric switch automatically turns light on at dusk and off at dawn. Residential applications include garage or porch night lights, post lanterns, driveways and walks. Commercial applications include entrances, parking areas, signs and displays, store night lights, etc. Provides safety, convenience, security.





Today's architect must not only strive to create a building that is esthetically beautiful, he must provide maximum comfort for the people who occupy it. And he must justify the cost of the structure to the owners. That is why L·O·F provided a new service to architects—the glass cost analysis.

The analysis for this building compared the economics of using tinted plate glass vs. *Thermopane®* insulating glass (bronze and grey). All factors were considered: effect of heat gain and loss through each type of glass; effect of heat gain on air-conditioning load; comparison of glass costs, taxes, insurance, etc.

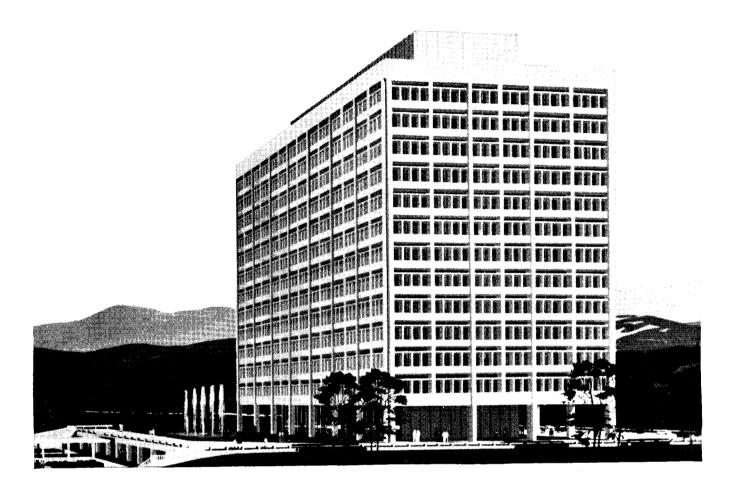
The study showed that bronze-tinted *Thermopane* insulating glass would more than pay for itself by reducing the annual cost of owning and operating the building by reducing air-conditioning and heating costs.

If you wish a glass cost analysis for any building on your boards, call your local L-O-F representative. He is prepared to work with you, or your mechanical engineer, in selecting the most economical type of glass on the basis of your plans. Libbey-Owens-Ford Glass Company, Toledo, Ohio 43624.





Post-tensioned floor system in 14-story Federal Center



Project

Bureau of Reclamation office in Federal Center, Denver, Colorado.

Architects:

Hellmuth, Obata & Kassabaum, St. Louis, Missouri.

Associated Architects:

Scott Associates, Denver, Colorado.

Consulting Engineers:

Ketchum, Konkel, Ryan & Fleming, Denver, Colorado.

Contractor

The MSI Corporation, Rockville Centre, New York.

Post-Tensioning Material Supplier: The Prescon Corporation, Denver, Colorado.

A post-tensioned waffle floor system is featured in the tallest building of the Federal Center in Denver. Because the 14-story building has exposed structural elements, special square pans, 4'-6" square and 18" deep, were used for the floor system. In order to achieve the 40' clear spans necessary—concrete joists were also post-tensioned.

Taking full advantage of prestressed concrete as an interior finish material, ceilings will be the exposed waffle floor system.

This project provides another example of the use of prestressed concrete to meet special needs. Prestressed concrete provides a unique combination of advantages: Fast construction cycle, simplicity in finishing, a minimum of maintenance, local availability, high strength-to-weight ratio, wide acceptance and adaptability to creative design.

The Prescon Corp., relied on Armco and the dependable Union TUFWIRE® for post-tensioning on this project. More than 344,162 lbs. of TUFWIRE was used.

A new booklet featuring interesting prestressed concrete projects is now available. Write for it on your business letterhead. TUFWIRE and other Union Wire Rope Products are made by Armco Steel Corporation, Department W-406, 7000 Roberts Street, Kansas City, Missouri 64125.

ARMCO STEEL

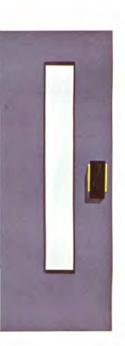


















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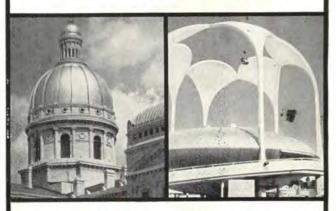
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ness, no planes of cleavage as in some natural stones.

In addition to white, Colorlith panels are available in a variety of solid



Western State Bank, Oshkosh, Wisconsin. Architects: Sandstedt-Knoop-Yarbro, Oshkosh.

colors—and in the swirl patterns of Colorvein®, and the random-particle designs of Colorchip®. Their beauty is constant from any angle because

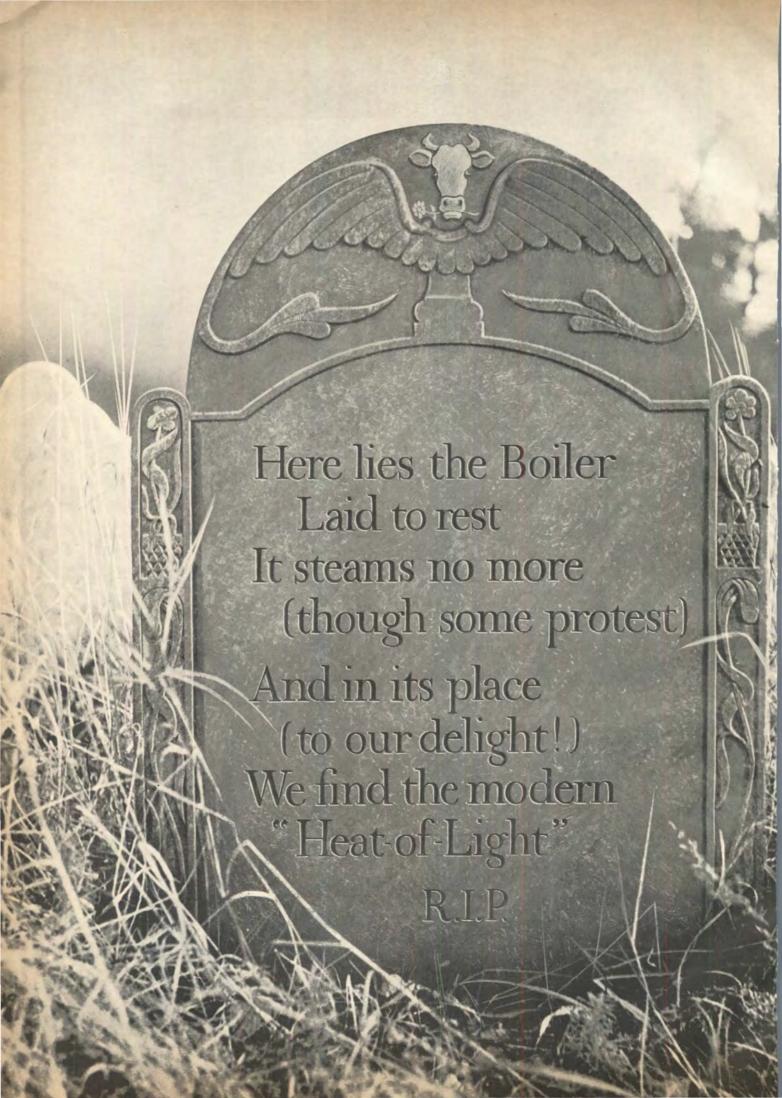
the color goes all the way through.

Wherever you need exterior or decorative materials that offer timeless protection and charm—for masonry veneers, steel and wood facings, interior panels or furniture—design with J-M Colorlith, the "stone" that leaves nothing to chance. For your copies of free literature illustrating its many styles and uses, write to Johns-Manville, Box 111, New York,

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(or some other fuel-burning heat source)

balderdash!

New Barber-Colman Heat-of-Light® Systems use heat generated by lights, people, and equipment to heat the building.

Result: You can reduce the amount of heating equipment required and lower operating costs. Clip coupon for details.

every building needs a boiler." Balderdash! What's really needed in more of today's commercial buildings is a way to use the heat that's already there (and is now being wasted).

How to harness light-generated heat

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Heat-of-Light Systems use heat-transfer light fixtures to capture up to 85% of the light-generated heat, keeping it out of the occupied space. Barber-Colman Jetronic mixing units in the ceiling cavity use some of this heat to maintain comfort conditions in interior areas—the rest is available to offset heat losses at the building perimeter, or for storage (to be used later during unoccupied hours). Result: You realize major savings in the cost of air conditioning (often eliminating the need for boilers or other high-output heat sources).

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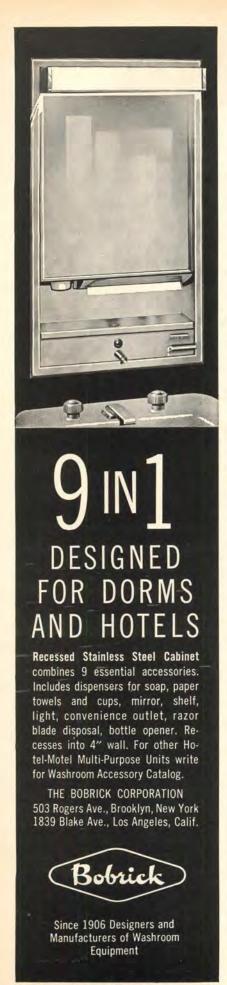


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On Readers' Service Card, Circle No. 334
308 Book Reviews

Continued from page 294

"The New Towns have been obedient to the prevailing architectural fashion. Luckily for the profession, the average Briton, though not highly sensitive to architectural design, does not mind it, so long as the things he really cares about in a house are attended to. He takes great pleasure in gardens, trees, and flowers, with which the New Towns are well endowed."

In the second half of the book, the journalist Arnold Whittick sums up the facts and figures in a chapter about each of the British New Towns. This section is well illustrated and provides a ready reference for those interested in land-use plans, circulation schemes, and densities. The underlying design concepts of each New Town are well described, though some readers will arrive at aesthetic judgements that differs from Whittick's.

The aborted plans for Hook New Town go unmentioned. I find this a serious omission. Without it, the descriptions of the more publicized Cumbernauld are but a half-told tale.

In the largest view of man and society, no one would dispute that Osborn and Company's pamphleteering disguises a consequential contribution to betterment of the urban environment. However dedicated and significant the cause it advances, the book as a whole does not take us out of the 19th Century. For, as Osborn himself soberly notes: "It is only recently that the planned redevelopment and renewal of towns, and the creation of New Towns, have become issues of social or public policy. And we are still far from clarity of thought, true consensus of opinion, or resolute action, on the chronic or emergent problems."

New Towns are a milestone, but they are neither the map nor the journey.

BOOK NOTES

Contemporary Forming Methods. By L. Mohácsy. Publishing House of the Hungarian Academy of Sciences, Budapest V. Alkotmány UTCA 21, Hungary, 1966. 320 pp., illus., \$12.

Written in English, this book discusses the building materials and methods for forming both visible and covered concrete surfaces.

Freezing and Thawing of Concrete: Mechanisms and Control. By William A. Cordon. Published by the American Concrete Institute and the Iowa State University Press, P.O. Box 4754, Redford Station, Detroit, Mich., 1966. 100 pp., \$4.50.

Modern School Shop Planning. Fourth Revised and Enlarged Edition. Prakken Publications, Inc., 416 Longshore Drive, Ann Arbor, Mich., 1965. 257 pp., \$4.50.

Continued on page 311



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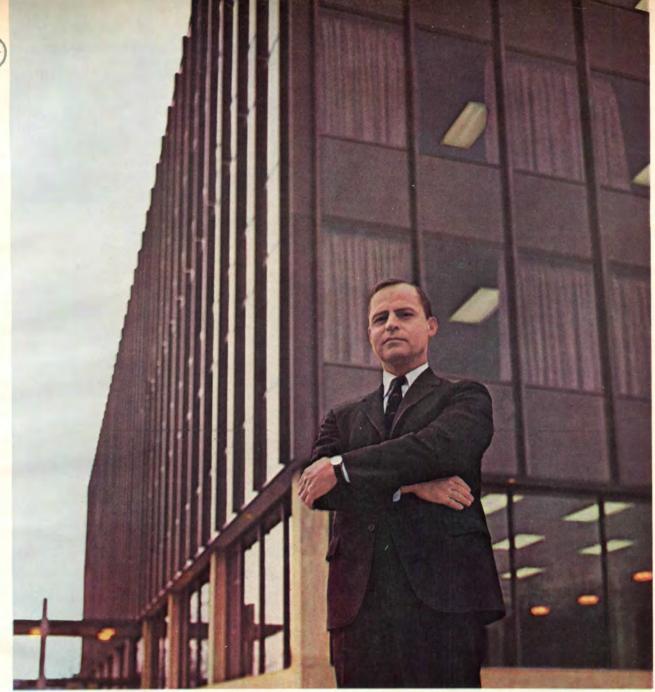
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OCTOBER 1966 P/A





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C. W. Jackson, President, C. W. Jackson & Associates, Inc., Owner-builder, The Chesapeake Building, Towson, Md.

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Architect: Smeallie, Orrick and Janka. Structural Engineer: Lamprecht Consultants. Steelwork: Dietrich Bros., Inc. All are Baltimore firms.







ROSEITA STONE — A piece of black basalt found in 1799 near the Rosetta mouth of the Nile, bearing a bilingual description in hieroglyphics and Greek. This gave the state clue toward deciphering Egyptian hieroglyphics. Photograph courtesy of Field Museum of Natural History

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Continued from page 308

National Fire Codes: 1965-66. Ten Volumes. National Fire Protection Association, 60 Batterymarch St., Boston, Mass., 1965. \$30 for the set; \$4 per volume.

The Penguin Encyclopedia. Edited by Sir John Summerscale. Penguin Books, 39 West 55 St., New York, N.Y., 1966. 552 pp., illus., \$1.95 (paperbound).

A useful desk reference work with short but well-written and up-to-date information on all subjects.

Plain and Reinforced Concrete Arches, Bibliography No. 6. American Concrete Institute, P.O. Box 4754, Redford Station, Detroit, Mich., 1966. 34 pp., \$4 (ACI members, \$2).

Planning, Zoning, Subdivision: A Summary of Statutory Law in the Fifty States. By Robert M. Anderson. The New York State Federation of Official Planning Organizations, 112 State St., Albany, N.Y., 86.50.

Regional Development Policy: A Case Study of Venezuela. By John Friedmann. The MIT Press, Cambridge, Mass. 02142. 1966. 279 pp., illus., \$8.50.

John Friedmann, who is Director of the Ford Foundation Program in Urban and Regional Development in Chile, discusses Venezuela in general and Ciudad Guayana in particular.

Significance of Tests and Properties of Concrete and Concrete-Making Materials—STP 169A. American Society for Testing and Materials, 1916 Race St., Philadelphia, Pa., 19103, 1966. 580 pp., \$12 (ASTM members, \$8.40).

Tenant Action. By The Architects' Renewal Committee in Harlem (ARCH), 306 Lenox Ave., New York, N.Y., 1966. 66 pp., \$1.25.

A handbook intended for tenants, and organizations of tenants, in older and poorly maintained buildings where housing problems are a daily occurrence and conditions are often a serious threat to life and health. The handbook details tenants' rights and means of acting on them.

Theory and Practice of Reinforced Concrete. Fourth Edition. Clarence W. Dunham. McGraw-Hill Book Co., 330 W. 42 St., New York, N.Y., 1966. 629 pp., \$13.90.

Trane Air Conditioning Manual. Trane Company, La Crosse, Wis., 1906. 456 pp., \$8. A completely updated and expanded edition of the Manual, which, reportedly, is "straightforward and noncommercial."

The Urban Evolution Theory. By Eric E. Embacher, Copi-Rite Reproductions Co. Ltd., 111 Vulcan St., Rexdale, Ontario, Canada, 1966, Illus., \$3.50.

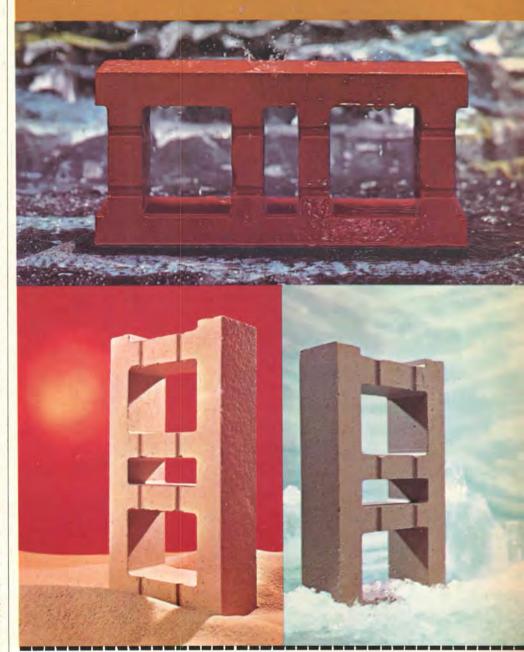
A discussion of ways of planning the growth and change of cities without submitting them to repetitive obsolesence and continuous adaptation. Embacher's method is "space-time planning," which permits urban growth without waste. The "Urban Evolution Theory" tries to relate the urban phase of global evolution to the preceding biological phase, using the "urban cell" as a unit, together with groups of urban cells and systems for grouping them, to formulate a philosophical basis for a space-time planning concept for growing but changing urban environments.

Continued on page 320

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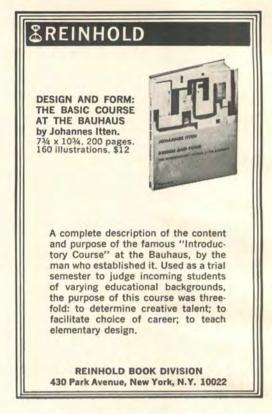
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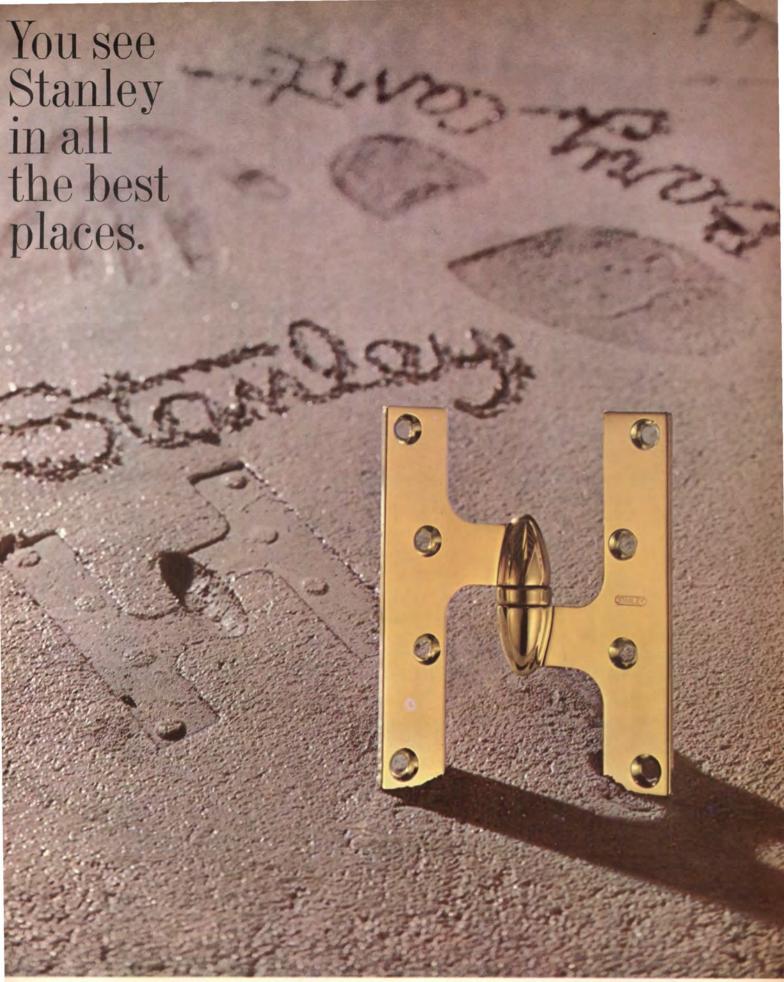
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Plant and Office
Atlanta, Georgia
Architect: Toombs-Amisano & Wells
Atlanta, Georgia
Contractor: Ira H. Hardin Co.
Atlanta, Georgia



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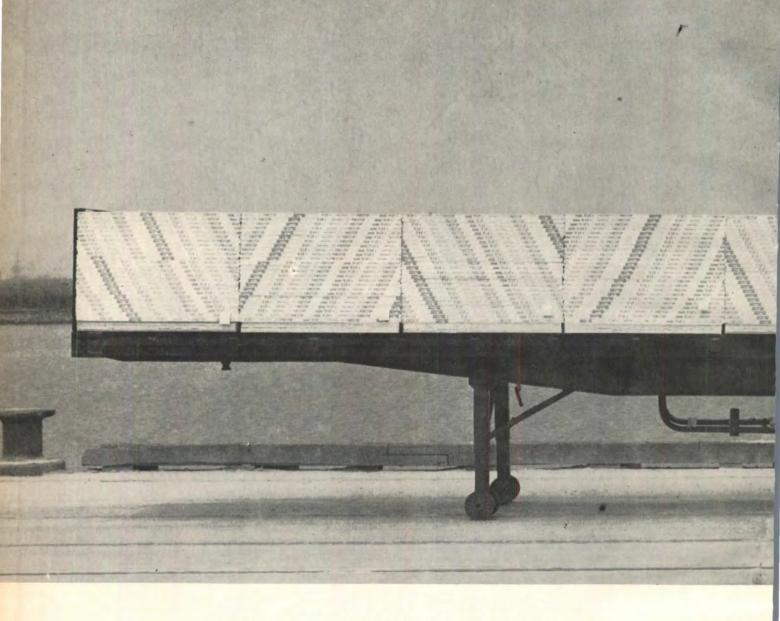
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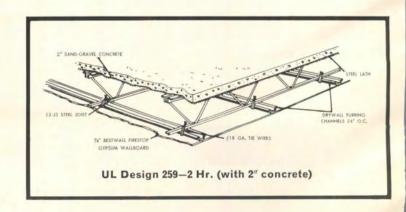
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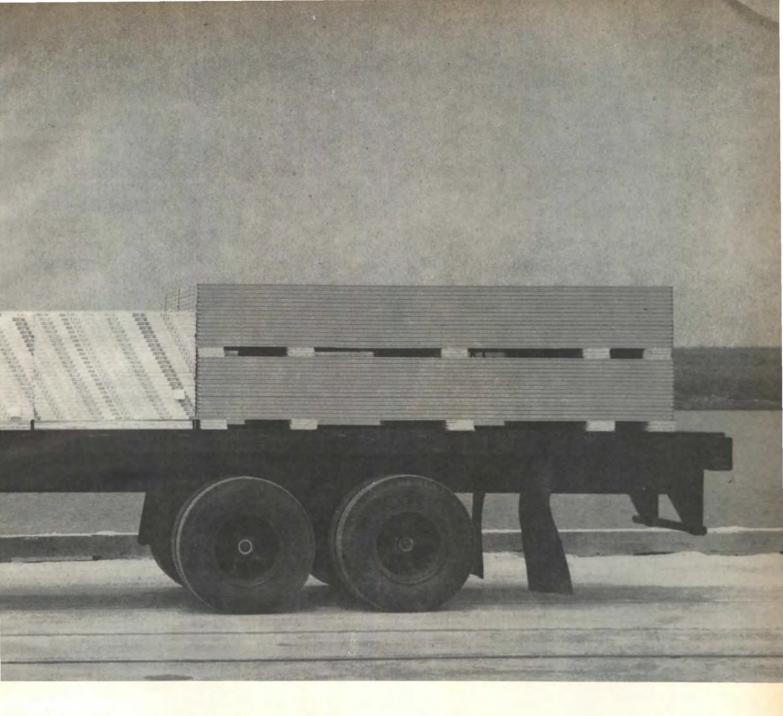
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320 Book Reviews/Notices

Continued from page 311

A Walk in Georgetown. Text and photographs by Mary Mitchell. Barre Publishing Co., Couth Street, Barre, Mass. 96 pp., illus.

A good and informative and handsome book on Georgetown and its buildings, mainly houses. Many histories of individual structures. Where the book falls down is in its failure to take a hard look at Georgetown today, i.e., the tiresome historicity of the hulking Georgetown Inn, the anonymous but sort of jolly buildings such as the Lehi Grill, the sad passing of the old powerhouse. A satisfactory guidebook to "important buildings," however.

Welding Aluminum. The American Welding Society, publisher. Copies available from The Aluminum Assoc., 420 Lexington Ave., New York, N.Y. 134 pp., \$2.50.

Willy Stäubli: Brasilia. Universe Books, Inc., 381 Park Ave. South, New York, N.Y., 1966. 197 pp., illus., \$15.00.

A thorough description in text and photographs of the architecture of the new city and University-not the social or economic aspects-with reports by Costa and Niemeyer.

With Heritage So Rich. A Report of a Special Committee on Historic Preservation, Under the auspices of the U.S. Conference of Mayors. Random House, 457 Madison Ave., New York, N.Y., 1966. 230 pp., illus., \$10.

A book written by several people, including three architects, who believe that "Land without population is a wilderness, and population without land is a mob." A rational plea for preservation of the nation's remaining natural and architectural heritage.

The Work of Frank Lloyd Wright. The Great Wendingen Edition. Introduction by Mrs. Frank Lloyd Wright: contributions by Frank Lloyd Wright and other architects and writers. Horizon Press, 156 Fifth Ave., New York, N.Y., 1965. 164 pp., illus., \$42.50.

This edition retains the double-fold pages, and the printing and binding of the original. Some photographs, which show better views of buildings than in the original, were added, together with all the dates and locales for each of the buildings.

The World Cities. By Peter Hall, McGraw-Hill Book Co., 330 West 42 St., New York, N.Y., 1966. 256 pp., maps, illus., \$2.45 (paperbound).

In 1915, Patrick Geddes christened as "the world cities" London, Paris, Randstad Holland, Rhine-Ruhr, Moscow, New York, and Tokyo, because a disproportionate share of the world's business was being transacted in them. This book describes each one in statistical, geographic, economic, and urban planning terms.

The World of Contemporary Drama. By John Gassner. The American Library Assoc., 50 E. Huron St., Chicago, Ill., 1966. (pamph-

Recommended for any architect who wants a quick review of modern theater history. Excellent for anyone designing a theater.

NOTICES

New Firms

ROY W. BANWELL, JR., Architect, Musgrove Building, Hanover, N.H.

Continued on page 324

OCTOBER 1966 P/A



VALUE SYSTEM-800

highest quality lighting at lowest costs per room

Here is an inspired new product concept from Miller — a suspended luminaire room system that provides its owner with illumination of highest quality at lowest costs. A true VALUE, System-800 assures you of unsurpassed seeing comfort and economy, regardless of room lighting level desired. Balanced lighted appearance, and clean shallow lines complement functional performance.

The unique light distribution and high utilization of lamp output resulting from System-800 fixture design, make this system particularly suitable for school, office, and public areas.

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For complete, factual information on the performance, economic advantages, and convenience of installation and maintenance of VALUE SYSTEM-800—send for our illustrated 4-color brochure today.

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Why do processors of LUCITE bother with 20 different compositions and at least 3 different processing techniques?







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Century City street lighting, Los Angeles, California

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Your lighting installation might involve anything from a 24inch-diameter street-lighting globe containing a 400 watt mercury lamp...to an 8-foot-long diffuser for fluorescent tubes...to a small luminaire designed for accurate photometry, with a lens precisely shaped for optimum light distribution.

To meet such widely divergent needs, Du Pont makes available to processors a variety of formulations of LUCITE. specially adapted to different end uses. Equally important are the different processing methods. Optical, functional or aesthetic designs that can be produced only with difficulty or expense by one method may be easily produced by another.

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The extrusion process makes possible special cross sections and flat sheets in almost unlimited lengths, which can be embossed for refractive light control or pigmented for diffusion. Matte finishes can be provided (LUCITE 148),

For intricately shaped luminares or for lenses that are ribbed for mechanical strength, injection molding is ideal. This process also lends itself to the manufacture of lenses with extremely accurate contours.

And the processors of Du Pont LUCITE are rapidly developing skills in blow molding and other processing techniques, to further extend your design capability.

To find out more about the forms and formulations of LUCITE available to you, write for "LUCITE for Lighting". Address: Du Pont Co., Room 4214, Wilmington, Del., 19898.



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Address:_		

On Readers' Service Card, No. 457 324 Notices Continued from page 320

BETTS & McCulloh, Architects, 41 East 57th Street, New York, N.Y., 10022.

VAUDLINE A. CURTIS & ASSOCIATES, Architects, 3700 Upton Avenue, Toledo, Ohio. Donovan Associates, Consulting Engineers, 740 North Main St., West Hartford, Conn.

GALE A. HILL & Assoc., 11722 Studt Avenue, St. Louis, Mo. 63141.

Kennard and Silvers, Architects/Planners, 5605 West Washington Boulevard, Los Angeles, Calif.

NEVED & KIMBALL, Architectural and Hospital Consultants, 360 N. Michigan Avenue, Chicago, 911.

Edmond T. Parkin, Architect/Landscape Architect, 20 Eglinton Avenue East, Toronto, Ont.

JERRY EDWARD RYAN, Architect, 205 West Harrison Avenue, New Orleans, La. URBAN DESIGN ASSOCIATES, Architects-Planners, 3508 Fifth Avenue, Pittsburgh,

Wachsmuth & Associates, Inc., Interior Designers, 311 Alexander St., Rochester, N. Y.

Elections, Appointments

American Institute of Steel Construction, New York, N.Y., has elected J. Philip Murphy as president of the institute.

CAUDILL, ROWLETT & SCOTT, Architects, Houston/New York, have appointed JAMES FALICK associate in charge of health facilities division.

COMMONWEALTH ASSOCIATES, Inc., Engineers, Consultants, Architects, Jackson, Mich., have appointed Edwin C. Yaw director of their plant engineering division and Earl Weatherly director of the business development division.

CORCO, Inc., a firm specializing in interior planning and complete furnishing of institutions, Chicago, Ill., has elected Jack P. Solovy president.

Designs For Business, Inc., New York, N.Y., has appointed three vice-presidents: Alex J. Illich, Vidvar I. Hermanovski, Gerald Whitford.

I.S.D.. Inc., Chicago and New York, Interior Space Designers, have named (Mrs.) Leslie Kichin and John A. Dziuba senior project managers of their Chicago office.

JACOBS ENGINEERING Co., Pasadena, Calif., has appointed three new staff members: RICHARD L. BONE, process engineer; ARIES GRAMMATIKAS, structural engineer. and ALLEN J. SAVAGE, project engineer.

A. Epstein & Sons, Inc., Engineers and Architects, Chicago, Ill., have named S. Ernest Pepe senior vice-president and Marvin L. Mass and Joseph A. Vedra

Continued on page 334



Offers thin-line seat design with deep upholstered comfort.

New concept replaces bulk and obsolete spring construction. In use in furniture, automotive, aircraft, truck, boat seating.

First really new idea in seat suspension in 50 years. It's a complete seat platform, scientifically designed to cradle a person in floating comfort. Exceptionally durable.

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On Readers' Service Card, Circle No. 321



Crucible Steel Company, Hunter Research Laboratory, Pittsburgh, Pa. Engineers and Designers: Hunting, Larsen and Dunnels, Pittsburgh, Pa. General Contractor: Landau Brothers Building Co., Pittsburgh, Pa.

These Smith Walls are a stainless steel showcase

They make a beautiful building! But, better than that, they are an outstanding product display of Crucible Steel Company's own stainless steel. The Shadowall fluting of the panels demonstrates the formability of the material. And, years from now, the gleaming finish of the metal will reflect its maintenance-free durability.

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at this typical Smith installation is the single responsibility that made it possible . . . and typical. The walls were designed, custom-fabricated, delivered and erected by Smith personnel . . . to the architect's specifications . to the customer's satisfaction. With the complete responsibility on our shoulders, we make sure the job is right . . . and completed on schedule.

Would additional views of this interesting installation be helpful to you? We've made a limited number of color photos available for the asking.

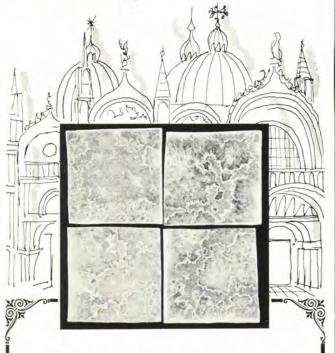
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Introducing new Georgia-Pacific Gold Crest Rosewood!

G-P Gold Crest Rosewood Paneling has one-half inch wide vertical channels every 16 inches. You decorate these channels with easy-to-apply colored tapes. You can also use metal strips, fabric or tile to match the floor covering, furnishings or draperies. There are five beautiful hardwoods in our exclusive Gold Crest line: American Walnut, Distressed Heirloom Cherry, Golden Elm and Pecan. All of them are available in 4' x 8', 9' and 10' panels with G-P's incomparable Acryglas® finish.





Now there's a popular-priced hardwood plywood paneling that looks like solid wood!

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CHATEAU KNOTTY OAK

Chateau has extra wide vertical grooves. This feature gives the paneling a *deeper*, more solid look.

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G-P Inlaid Paneling!

Here's the custom look of hand-crafted inlaid paneling in easy-to-install plywood panels. Take your pick from eight elegant hardwood combinations. Multi-coat, plastic-type Acryglas® finish looks like hand-rubbed oil finish. (Standard 4' x 8', 9' and 10' panels.)



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This paneling was specially developed to appeal to men. The grooves are 4 inches apart—this makes the paneling look like a series of 4 inch planks, installed individually. Choice of American Black Walnut or Oak, 4' x 8', 9' and 10' panels... with the Acryglas finish.



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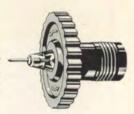
Clamp ring (instead of friction fit) allows easy, fast fitting of cartridge and guarantees airtightness. You can't spill ink on fingers or work!

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- 16 Koh-I-Noor Tungsten Carbide points, primarily for programmed automated drafting machines
- 7 Brushograph sizes for broad work, filling-in and opaquing
- 1 Koh-I-Fine Sign Pen point

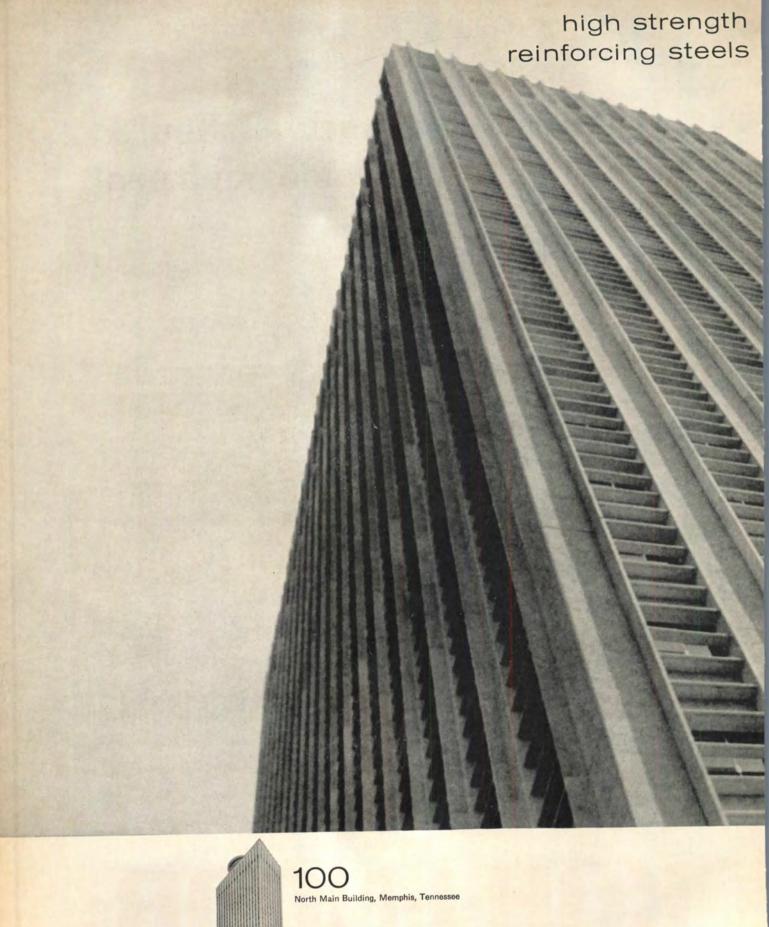
All Point Sizes including the "000"

The new super-fine "000" drawing point, providing a line only ten-thousandths of an inch in width, is now added to the point-sizes already provided. Also 7 brush sizes, and the Koh-I-Fine point. All are available either in pocket model or desk model KOH-I-NOOR technical fountain pens.

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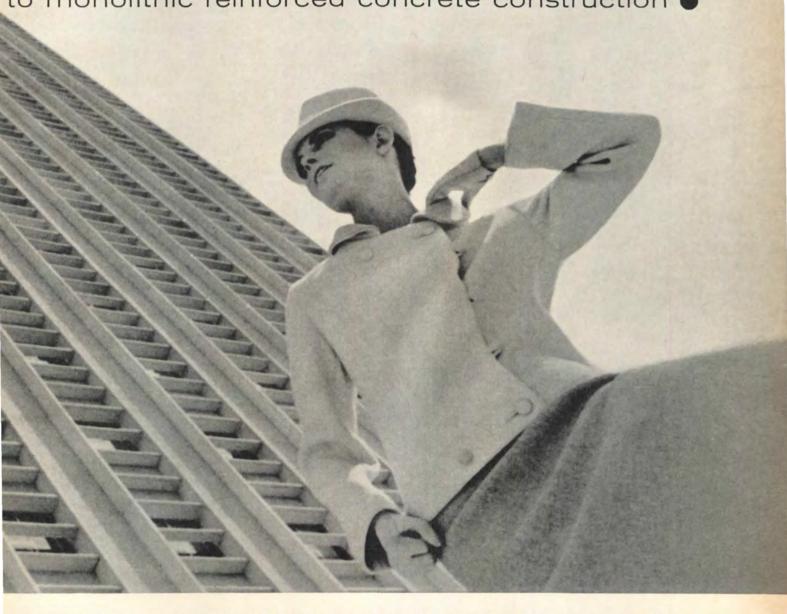
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Architects: Robert Lee Hall & Associates
General Contractor: Southern Builders, Inc. of Tenn.

Add New Dimension to monolithic reinforced concrete construction

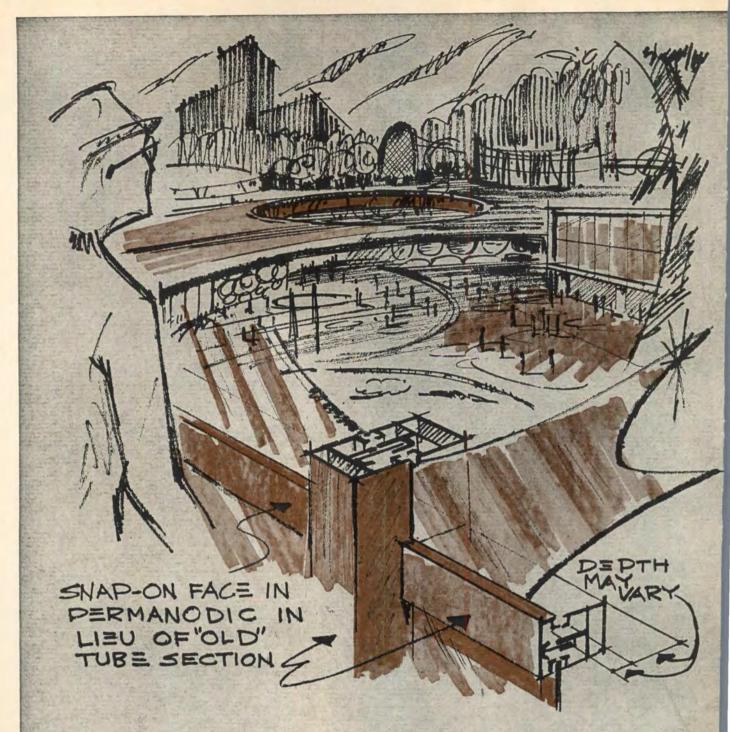


In monolithic reinforced concrete, the newest design dimension is building height. Helping architects to design for greater heights are new high strength reinforcing steels having 50% greater yield strength.

In Memphis, the 38-story 100 North Main Building set a new height record for reinforced concrete in the southeast. Soaring 440 feet over the downtown area, the designers used A432, one of the new reinforcing steels, as column reinforcement. Floor construction is flat plate with large spandrel beams. Shear walls in the centralized elevator cores, and in stair wells, aid in resisting wind loads.

On your next building, consider the advantages of monolithic reinforced concrete construction. There is nothing more economical, versatile, or creative for buildings high or low.



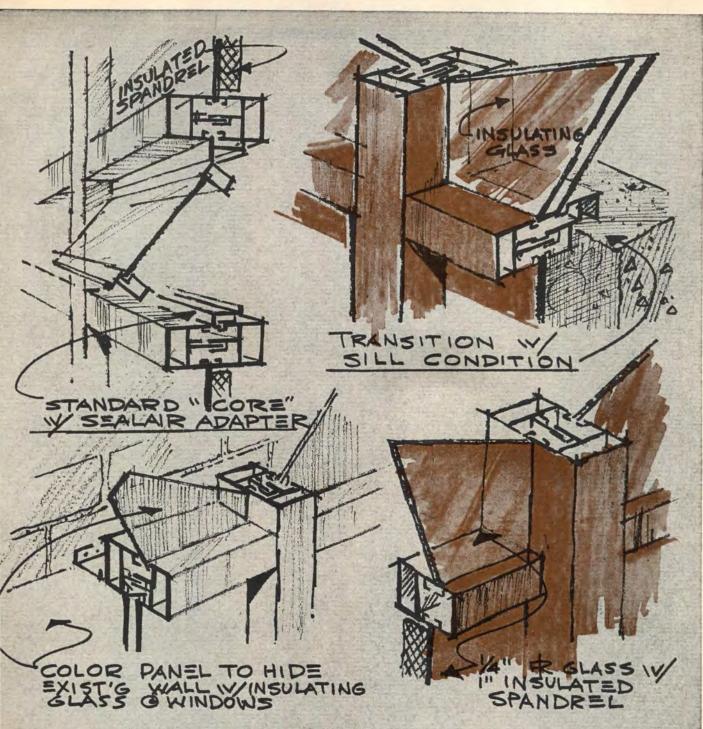


Look at what you can

This patented Aluminum Exterior Building System is a flexible design tool. Permits you to create a variety of grid fronts—each with a unified appearance—for new construction or remodeling applications. Better looking—with crisp, clean lines—and weathering advantages.

We think you'll like working with Core almost as much as a sculptor does with clay, because of the many effects it permits you to create. Where would you like the glass? Up front? Middle? Back? Does your design call for equal or varying reveals? Do you want to accent the vertical mullions or give equal prominence to the horizontals?

This versatile system also permits you to go from ¼ inch glass to 1 inch panels. It accommodates Kawneer entrances, concealed operators and closers, V-6 facings, Colorwall, Sealair windows, insulating glass and panels—all with uniformity. This is true even on tough remodeling jobs, which might otherwise look like a hodge-podge. And Core's "Snap and Lock"



do with KAWNEER CORE

face glazing eliminates the unsightly clutter of exposed screw and stops. This feature also results in speedier erection and a very favorable installed cost.

Interesting effects with Permanodic*— Kawneer Permanodic hard color finishes add warmth to your design. You can harmonize with colored lites of glass, panels, and facings. Core permits you to do this economically by combining colored Permanodic finished face members with Alumilite finished gutters.

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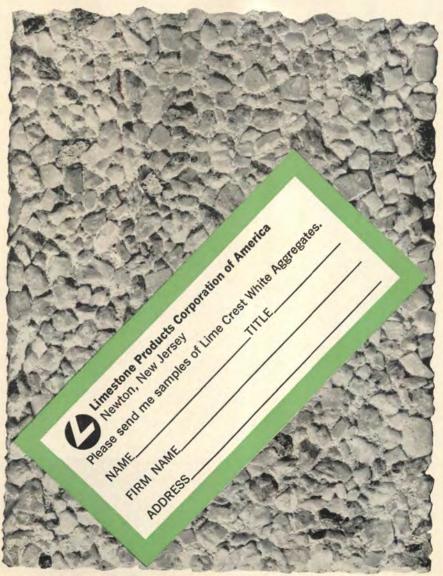
*Trademark of Kawneer Co., Inc.

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With their unusual crystalline structure Lime Crest White Aggregates add light reflectivity to pre-cast panels and color contrast to poured concrete. Their predominant, long-lasting whiteness makes possible the use of pastel shades and other light colors in a mix...almost any desired effect can be achieved—and much more economically than with cut stone.

Where appearance makes a difference Lime Crest White Aggregates look better and cost less. If our photograph doesn't convince you, let us send you some samples that will.



On Readers' Service Card, Circle No. 390

Continued from page 324

vice-presidents. Garfield S. Rawitsch has been appointed administrative vice-president.

HOWARD JOHNSON COMPANY, New York, N.Y., has elected ROBERT E. TURNER vice-president, architect and construction, of Howard Johnson's Motor Lodge Division.

ALBERT KAHN, Associated Architects and Engineers, Detroit, Mich., have appointed D. H. Shanan director of structural and civil engineering, and T. C. Halliday administrator of the department; A. Zweig has been appointed chief structural engineer and F. Kramrisch has been named chief civil engineer. A. Annala has been appointed administrative assistant to the supervisory staff of the firm's architectural department.

KNOLL ASSOCIATES, INC., New York, N. Y., have named BARRY ROSENGRANT Assistant Divisional Manager of Knoll's western division and JAMES P. NORTON as regional manager.

CHARLES LUCKMAN ASSOCIATES, INC., Architects, Planners, New York, N.Y., have elected James M. Luckman to the board of directors.

The planning department of Marin County, Calif., has appointed Albert Solnit, University of Cincinnati assistant professor of architecture, chief of advance planning.

HERMAN MILLER INC., Furniture Manufacturers, Zeeland, Mich., have named Joe Schwartz manager of national accounts and government division, Victor Pitzi, New York major market manager, and John Buglisi, showroom manager at 600 Madison Avenue.

P&W Engineers, Inc., Chicago, Ill., have named John A. Sbarounis principal structural engineer.

REYNOLDS METALS COMPANY has named Gus Straus a development project director in the architectural construction section of their company's product development division in Richmond, Va.

New Partners, Associates

BARRON, HEINBERG & BROCATO, Architects, Alexandria, La., announce that THILO STEINSCHULTE and ROBERT D. WYNNE have become partners.

GUNNAR BIRKETS & ASSOCIATES, Architects, Birmingham, Mich., have appointed JOHN D. HILBERRY and EDWARD G. ROSELLA associates.

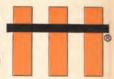
CROOKS, MICHELL, PEACOCK & STEWART, Architects-Engineers, Chatswood, Australia, have named eight new associates: N.C. Lowe, J.W. NAIRN, R.J. JACKSON, W.R. MILLAR, E.R. PATTERSON, M. LLOYD JONES, L.P. HURST, K. McDOWELL.

Daniel Comm Associates, Architects, Chicago, Ill., have named Alan H. Comm a partner.

Continued on page 338

URETHANE FOAM PROJECT REPORT

Builder News



Part of a series of product-use bulletins published by Mobay to keep architects, engineers, builders and contractors informed on new developments in urethane foam materials for the commercial and residential construction industries.

MOBAY

BN-5

DESIGN VERSATILITY OF URETHANE FOAM SIMPLIFIES CONSTRUCTION OF YAMASAKI-INSPIRED MANUFACTURERS AND TRADERS TRUST BUILDING

The high thermal value and excellent bonding feature of sprayed-on urethane foam insulation make it an ideal material for the new 21-story Manufacturers and Traders Trust Company building, now under construction in Buffalo, reports Project Architect John Urban of Minoru Yamasaki and Associates.

Among reasons given for using urethane foam are that it provides maximum insulation at minimum thickness, is easily sprayed on during construction and conforms to unusual design shapes. It gave the builder greater flexibility, especially during the early, rough design stages and was a major factor in achieving the strikingly distinctive narrow vertical lines in column covers and sash mullions.

The urethane insulation was applied in a twophase method in this project: It was sprayed onto the panels during fabrication and was sprayed in place after column covers and sash mullions were installed.

The exterior of the \$12 million building consists of alternate courses of glass and stamped anodized aluminum panels, separated vertically by precast marble aggregate-concrete column covers. The U-shaped 12'-long covers are clipped at top and bottom to the floor slabs, leaving a ¾" space between cover and column. Once in place, urethane is sprayed into the gap to fill the void and provide uninterrupted insulation with the previously sprayed panel surfaces.

Because urethane foam is an expandable voidfilling material, the builder did not have to be overly concerned with variable dimensional tolerances or the intricacies of insulating the odd configurations of the unusually shaped panels.

The panels (manufactured by Kawneer, Niles, Mich.) have a double concave surface of variable depth, which ruled out rigid slab cores because they would have had to be carved, shaped and bonded individually. Other insulating materials were also considered before selecting the urethane system (supplied by Pittsburgh Plate Glass Co., Pittsburgh, Pa.).

The major problem with other insulating materials for the on-site phase of the project was found to be their inherent inability to be applied as an



New Buffalo edifice joins growing list of high-rise buildings in which rigid urethane foam is used to gain functional benefits for the builder as well as for the eventual occupant.

integrated part of the construction sequence once the curtainwall and column covers are in place.

Specification of all materials in this project was based on the building's minimum life expectancy of 75 to 100 years.

The 21-story, air-conditioned building features a 35'-high main banking floor, a 20th floor restaurant and a 100-car garage. It is designed on the 4'-10" x 4'-6" grid module throughout and has four high-rise and three low-rise elevators. Heat absorbing bronze glazing will cut glare and help reduce heat radiation.

Owner:

Manufacturers and Traders Trust Co. Buffalo, N. Y.

Architect: Mir

Minoru Yamasaki & Associates Birmingham, Michigan

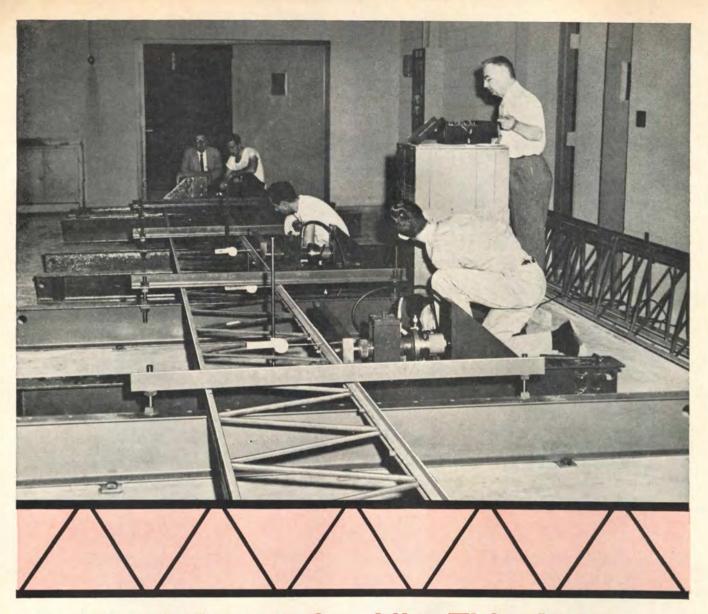
General Contractor:

The John W. Cowper Co., Inc. Buffalo, N. Y.

For additional information on the use of urethane foam for insulation and construction, write on your letterhead to:



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



Joist Laboratories Like This Assure BETTER CONSTRUCTION for You

This is a common sight in the laboratories and test centers operated by Carnegie Tech and Kansas and Washington Universities on behalf of the Steel Joist Institute. In these laboratories, new ideas in open web steel joists are performance-tested by research and development specialists. It was through such facilities that the SJI evaluated the new high-strength joist series, and conducted valuable investigation into methods of bridging.

R & D centers at selected universities are valuable tools for the SJI's Research and Engineer-

ing Practices Committees and the Institute's consulting engineer, Dr. Theodore Galambos of the Washington University School of Engineering, St. Louis. These men are responsible for research in the technical and engineering aspects of open web steel joists.

If you would like detailed information on the design, construction, performance and application of open web steel joist, send now for the latest manual. It's the Institute's complete working handbook for all

who specify and use steel joists.



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Architect's rendering of Prudential Center complex. Owner: Prudential Insurance Company of America. Planning and Architecture: Charles Luckman Associates, Inc., New York and Los Angeles. General Contractor: Perini Corp. & Walsh Construction Co., Boston. Hardware Contractor: Elmer T. Hebert Inc., New York City.



P.O.MOORE, INC.

BOX 38, GLEN RIDDLE, PENNSYLVANIA 19037 On Readers' Service Card. Circle No. 400 Continued from page 334

FRED S. DUBIN ASSOCIATES, Consulting Engineers, Hartford, Conn., have named two new partners: Selwyn Bloome and Norman D. Kurtz.

FAULKNER, STENHOUSE, FRYER & FAULK-NER, Architects, Washington, D.C., have named WYNANT D. VANDERPOOL, Jr., an associate.

RICHARD HAAG ASSOCIATES, INC., Landscape Architects and Urban Planners, Seattle, Wash., have named ROBERT M. HANNA and DONALD K. SAKUMA as associates.

E.H. & M.K. Hunter, Architects, Hanover, N.H., announce that Edgar H. Hunter has been appointed vice-president of the architectural firm of Lyles, Bissett, Carlisle & Wolff, of Columbia, S.C., Washington, D.C., and Raleigh, N.C.

KAESER & McLeop, Architects-Engineers, Madison, Wis., have named MARCUS E. WESTON an associate.

THE PERKINS & WILL PARTNERSHIP, Architects, Chicago, Ill., have elected three new partners: WILLIAM J. McCoy, DAVID L. GINSBERG, and DAVID K. PYLE. ROGERS, TALIAFERRO, KOSTRITSKY, LAMB, Architects, Baltimore, Md., have appointed George John Pillorge an associate.

RICHARDS, BAUER & MOORHEAD, Architects-Engineers, Toledo, Ohio, have named four new associates: L. EDWARD KIME, DENNIS W. QUEENAN, H. RICHARD HANSON, and JAMES B. ERHARD.

SLINGERLAND & BOOSS, Architects, Engineers, New York, N.Y., has named JOSEPH J. MANGAN an associate.

SMITH, HINCHMAN & GRYLLS ASSOCIATES, INC., Architects-Engineers-Planners, Detroit, Mich., have named WILLIAM R. JARRAT an associate.

JOHN CARL WARNECKE & ASSOCIATES, Architects, San Francisco, Calif., announce that ROBERT LAMB HART and MICHAEL PAINTER have been made partners.

WHITTLESEY, CONKLIN & ROSSANT, Architects and City Planners, New York, N.Y., have named Burton William Berger, an associate partner.

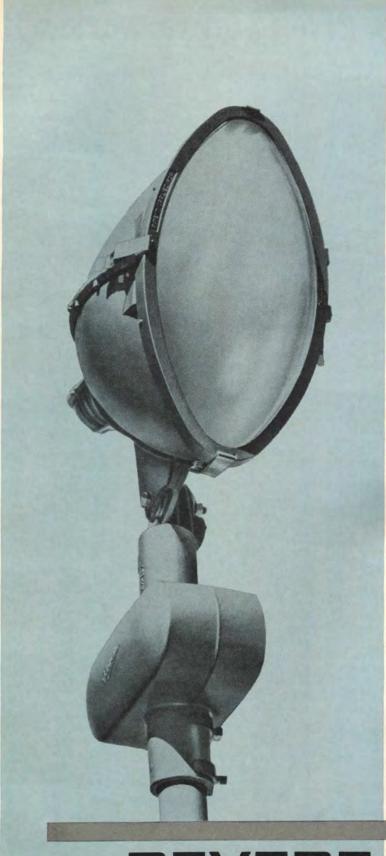
ABRAHAM WOOLF & ASSOCIATES, INC., Consulting Structural Engineers., Boston, Mass., have made C. Andrew Pretzer an associate member of the firm.

New Addresses

MARVIN I. ADLEMAN, Landscape Architect, 605 Liberty Trust Building, Broad and Arch Streets, Philadelphia, Pa. 19107.

Affleck, Desbarats, Dimakopoulos, Lebensold, Sise, Architects, 1015 Saint Alexander St., Montreal 3, Quebec.

Continued on page 344



Unusual shape?

Perhaps.

It all depends on your point of view. Some people tell us that it looks like the eye of a cat from the front. And like a TV tube from the rear. Ugly? Functional? Why the shape?

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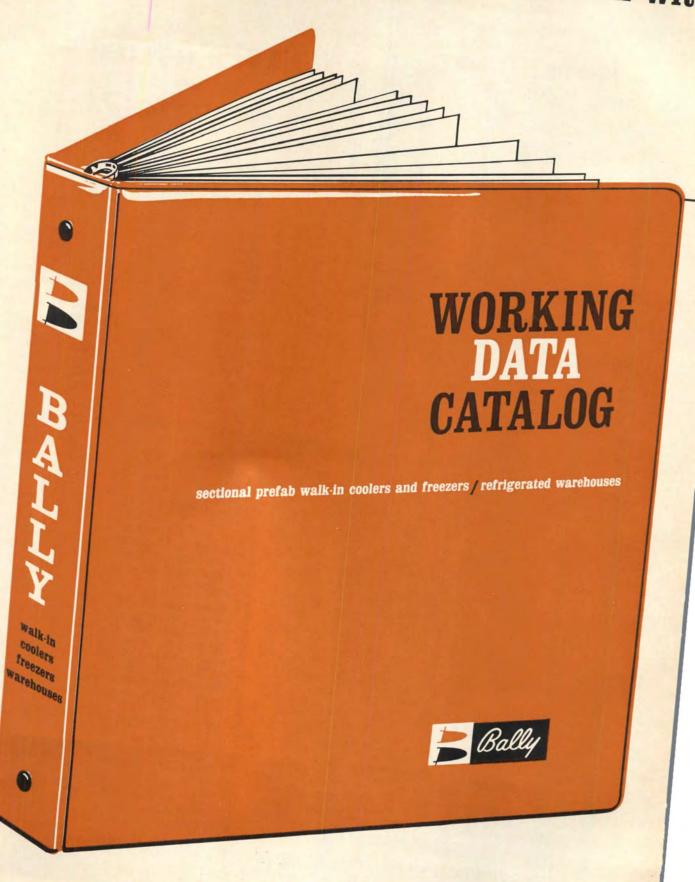


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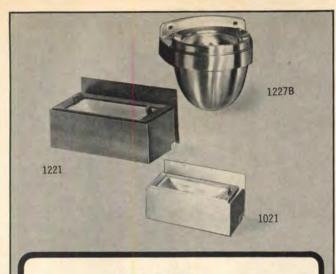
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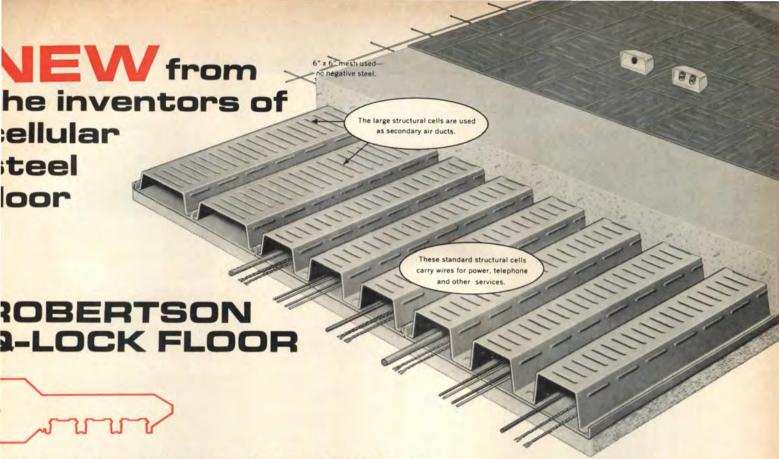
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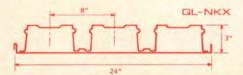
Atlanta Gas Light Tower, Atlanta, Ga. Edwards & Portman, Architects; J. A. Jones, Construction Co., general con-tractor.



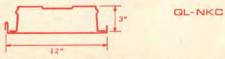
Vocational School, Springfield, Ohio. John L. Kline, architect and structural engineer; Fry, Inc., general contractor.



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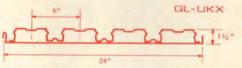


With the welded bottom plate this style provides electrical raceways.

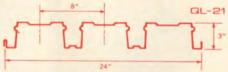


This wide structural unit (used in pairs) also functions as a secondary duct for air conditioning.

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This type is similar to QL-3 except that the flat bottom section gives it greater span capacity. It can be used electrically.

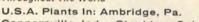


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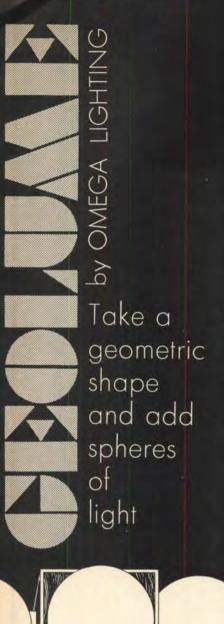
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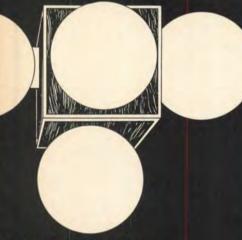
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ARMOND BARTOS & ASSOCIATES, Consulting Engineers, 86 Third St., San Francisco, Calif.

GUNNAR BIRKERTS & ASSOCIATES, Architects, 909 Haynes St., Birmingham, Mich.

DIAMOND, REDFERN & PARTNERS, 186 Derby Road, Nottingham, England.

DERTHICK & HENLEY, Architects, Gateway Professional Building, Chattanooga, Tenn.

DOBUSH, STEWART, BOURKE, LONGPRE, MARCHAND, GOUDREAU, Architects, 506 St. Catherine Street East, Montreal 24, Canada

FAIRFIELD & DUBOIS, Architects, 45 Charles St. East, Toronto 5, Ontario, Canada.

ROYAL McClure, Architect, 1502 IBM Building, Seattle, Wash.

Alfred L. Mell, Architects and Engineers, North La Salle Street, Chicago, Ill. 60602.

PROGRESSIVE DESIGN, LTD., 160 Bulkley Building, Cleveland, Ohio.

BERNARD ROTHZEID, Architect, 104 East 40th Street, New York, N.Y. 10016.

Wells M. Squier, Environmental Designer, 220 D, Commercial Boulevard, Lauderdale-by-the-Sea, Fla.

NANDOR SZILARD, Planner, 1224 Old Concord Road, Monroeville, Pa. 15146.

James L. Wadley, Architect, 970 Clark Ave., Yuba City, Calif.

Walker & McGough, Architects, North 120 Wall St., Spokane, Wash.

WERNER GANTENBEIN, Architects, Mommsenstr. 18, Zürich, Switzerland.

Name Changes

BEAUDIN & MOULTON, Architects, Burlington, Vt., upon the formation of a partnership; formerly, MARCEL BEAUDIN.

Briscoe & Berry, Architects, Eugene, Ore., upon the formation of a partner-ship; formerly, John L. Briscoe.

BUDINA, FREEMAN, & GILBERT, Architects, Richmond, Va., upon the admission of ERNEST R. GILBERT as partner; formerly, BUDINA & FREEMAN.

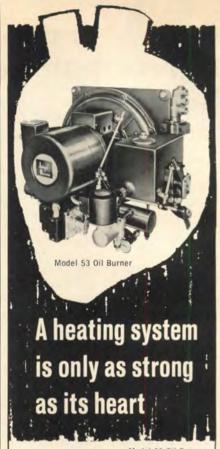
LEONARD BUSCH ASSOCIATES, Consulting Engineers, Trenton, N.J., upon the formation of a partnership with Phillip Paul.

Callins & Associates, Corpus Christi, Tex.; formerly vernor & callins.

CLARK & McCall, Architects, Hartsville, and Kingstree, S.C., upon the formation of a partnership; formerly CLARK, McCall & Leach.

DEETER. RITCHEY. SIPPEL, Architects, Pittsburgh, Pa.; formerly DEETER & RITCHEY.

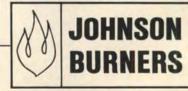
Continued on page 350



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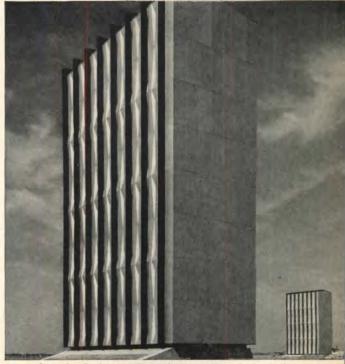
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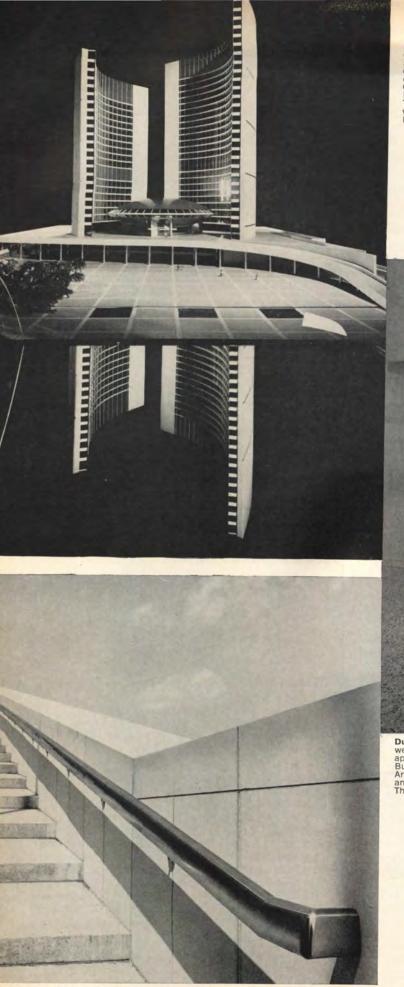
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Corrosion Resistance—These intake gate structures, each nearly 100 feet high, are clad with matte-finished stainless steel panels for strength and stability in a corrosive environment. Niagara Power Project, Niagara Falls, N.Y. Engineers and Designers: Uhl, Hall and Rich, Boston, Mass. Architectural Consultant: John B. Peterkin, New York, N.Y. Stainless steel panels: General Bronze Corp., New York, N.Y.



Economy—Over 250,000 pounds of stainless steel were specified for curtain wall mullions, window frames and louvers in this striking civic government complex at a price within 4½ per cent of the lowest bid received on any other metal. This small initial difference will be quickly offset by savings in maintenance. Toronto City Hall, Toronto, Ontario, Canada. Architects: Viljo Revell, Helsinki, Finland, in association with John B. Parkin Associates, Toronto, Ontario, Canada. Stainless steel curtain wall mullions, window frames, louvers and entrances: Canadian Rogers Eastern Ltd., Toronto, Ontario, Canada.



Durability—Lustrous stainless steel fluted panels and flush doors were specified for this public library for their contemporary appearance and their ability to resist soiling and scuffing. Buffalo and Erie County Public Library, Buffalo, N.Y. Architects: James W. Kideney and Associates and Paul Harbach and Elon B. Clark, Jr., Buffalo, N.Y. Stainless steel panels and doors: The Michaels Art Bronze Co., Covington, Ky.

Prestige—Stairway leading to a second floor terrace has handrails of polished stainless steel set into a marble balustrade. Lamps are concealed inside the rail to illuminate steps after dark. Smithsonian Institution Museum of History and Technology, Washington, D.C. Architects: McKim, Mead and White, New York, N.Y. Stainless steel stairway railing: Alexander Metal Products Corp., Falls Church, Va.

Continued from page 344

DEMARS & WELLS, Architects, Berkeley, Calif., upon the formation of a partnership; formerly, DE MARS & REAY.

THE DRAKE PARTNERSHIP, Architects, St. Louis, Mo.; formerly drake O'Meara associates.

ECKERLIN-KLEPPER-HAHN, Consulting Engineers, Syracuse, N.Y., upon the formation of a partnership; formerly, francis A. HAHN.

FITZGERALD & KAPLAN, Structural Engineers, San Francisco, Calif.

THE FREEMAN-WHITE ASSOCIATES, Charlotte, N.C.; formerly, Walter Hook Associates.

GLASS & GLASS, Architects, New York, N.Y., upon the formation of a partner-ship; formerly, M. MILTON GLASS.

HOWELL DESIGN CORPORATION, New York, N.Y., Industrial and Interior Designers; formerly, HOWELL DESIGN ASSO-CIATES.

LAWRENCE E. MATSON & ASSOC., Architects and Engineers, Idaho Falls, Idaho; upon the appointment of Donald M. TROTTER as associate; formerly, LAWRENCE E. MATSON.

MELONI & VOGEL, Architects, Morrisville, Pa., upon the formation of a partnership. MILSTEIN, WITTEK, DAVIS & HAMILTON,

Architects, Buffalo, N.Y., upon the formation of a partnership; formerly, MU-TON MILSTEIN & ASSOC.

I.M. Pei & Partners, Architects, New York City, New York; formerly I.M. Pei & Associates.

DONALD REAY, Architect and Planner, Berkeley, Calif., upon the termination of a partnership; formerly, DE MARS & REAY.

Sappenfield-Wiegman-Hall Associates, Architects, Asheville, N.C., upon the association of Charles M. Sappenfield, Jan M. Wiegman, and Joseph K. Hall for the practice of architecture.

SIEGAL-AVRIN ASSOCIATES, architects, Detroit, Mich., upon the admission of GERALD M. AVRIN as a partner; formerly LEONARD G. SIEGAL ASSOCIATES, Architects.

LINN SMITH, DEMIENE, KASPRZAK, ADAMS, Inc., Architects, Birmingham, Ala.; formerly LINN SMITH ASSOCIATES, Inc.

STEWART, NOBLE, CLASS & PARTNERS, Architects, Philadelphia, Pa.; formerly MARTIN, STEWART, NOBLE & CLASS.

TOFANI & Fox, Architects and Planners, Philadelphia and West Chester, Pa., upon the admission of Harry Robert Fox to the firm as a partner; formerly ARTHUR M. TOFANI JR. ASSOCIATES.

Walsh & Oberg, Architects, Phoenix, Ariz.; formerly, stephens, walsh, emmons & shanks.

WILLSON & WILLIAMS, Architects and Planners, Corona Del Mar, Calif.; formerly MURTON H. WILLSON.

New Branch Offices

ATCO INDUSTRIES LTD. announces the opening of a branch office in Bangkok, Thailand.

LEONARD G. GEINEN, Architect, announces the opening of a branch office at 2159 Center Ave., Fort Lee, N. J.

Miscellaneous

A. B. Benson & Company, Architects, Mobile, Ala., announces that Charles E. Rogers has joined the firm.

BOLT BERANEK & NEWMAN, INC. Acoustical Consultants and Researchers, Boston, Mass., announce that Dr. Istvan Ver, C. William Goyder, and Peter Bentivegna have joined the staff.

CROW, LEWIS & WICK, Architects, and THEODORE J. KAUFFELD, Consulting Engineers, New York, N.Y., announce their association.

RICHARD A. GOOD, Architect, former chief of the Planning Branch, Federal Aviation Agency, has joined the National

Continued on page 352

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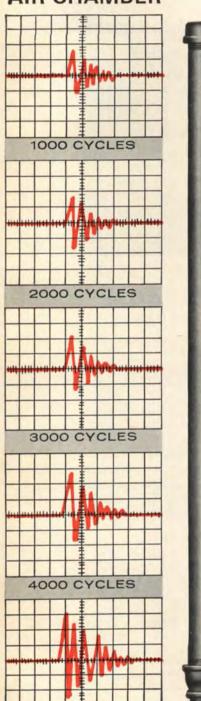
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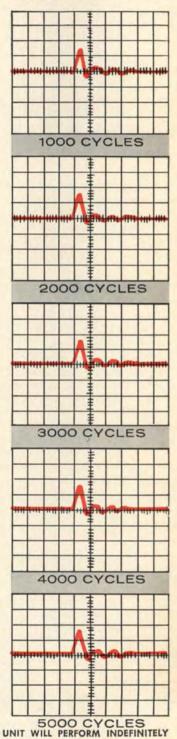
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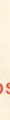
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Continued from page 350

Capital Transportation Agency, Washington, D.C. developers of rapid rail system for the Washington area.

FRANK GRAD & SONS, Architects, Newark, N. J., announce that DAVID R. DIBNER has joined the firm.

HEERY & HEERY, Architects and Engineers, Atlanta, Ga., announce the acquisition of Interiors For Business.

LEVITT & SONS, INC., Builders, Lake Success, N. Y., announce that CLARENCE MONROE is retiring and that RUSSELL S. BODWELL will replace him as chief engineer.

MARCOU, O'LEARY & ASSOCIATES, Architects, Washington, D.C., announce that CHARLES TURNER has joined the firm. Roy C. NEUMANN, Architect, has joined STANLEY ASSOCIATES, an affiliate of the

Stanley Engineering Co., Muscatine, Iowa.

PARSONS, BRINCKERHOFF, QUADE & DOUG-LAS, Consulting Engineers, New York, N.Y., and LORD & DEN HARTOG, Architects, Boston, Mass., announce their affiliation.

Perry, Dean, Hepburn & Stewart, Architects, Boston, Mass., announce the formation of a Department of Preservation and Restoration.

SCHAFER, FLYNN, VAN DIJK & ASSOCIATES, Architects, Cleveland, Ohio, announce that MAUNO BACKLOND has joined the firm.

EBERLE M. SMITH ASSOCIATES, INC., Architects and Engineers, Detroit, Mich., announce that Joseph C. Watts and EDWARD HAMMARSKJOLD have rejoined the firm.

THE STANLEY WORKS, New Britain, Conn., announces the appointment of JACK E. KEOWN as Marketing Manager, Contract Hardware.

THE UNIVERSITY OF COLORADO COLLEGE OF ENGINEERING, Boulder, Colo., has appointed George J. Maler Associate Dean

VOICT & FOURRE, Inc., Architects, have a new branch office at The Minnesota Federal Savings, Knollwood Plaza, St. Paul 1, Minn.

CORRECTION: MOREHOUSE, CHESLEY & THOMAS, Architects, have their sole office at 114 Waltham St., Lexington, Mass.

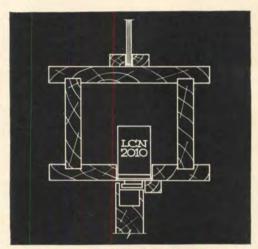
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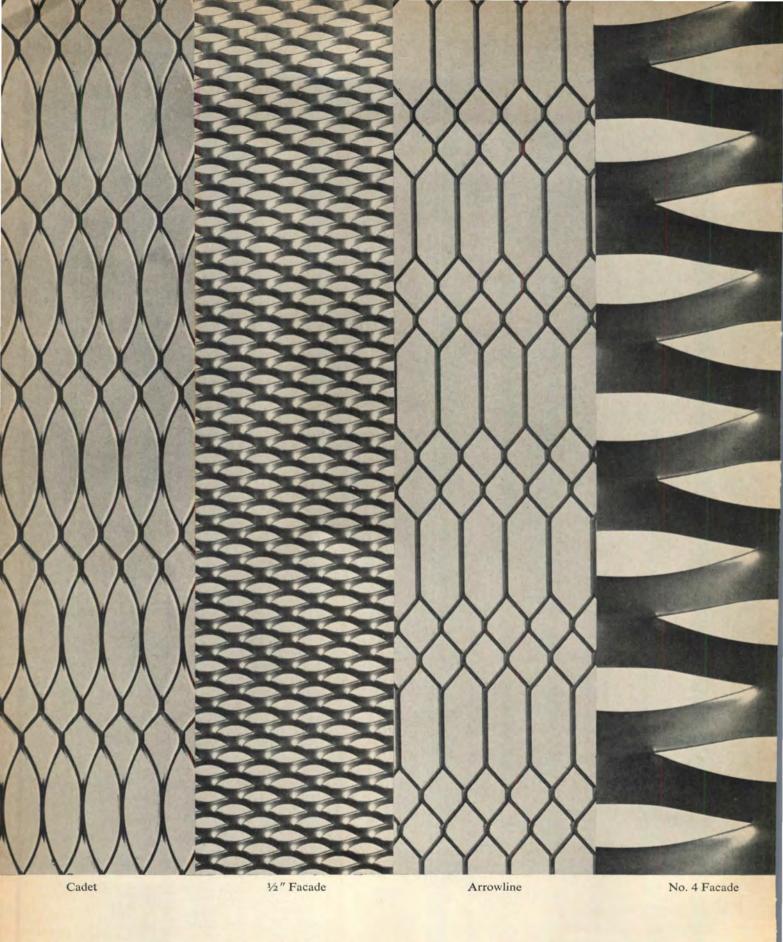
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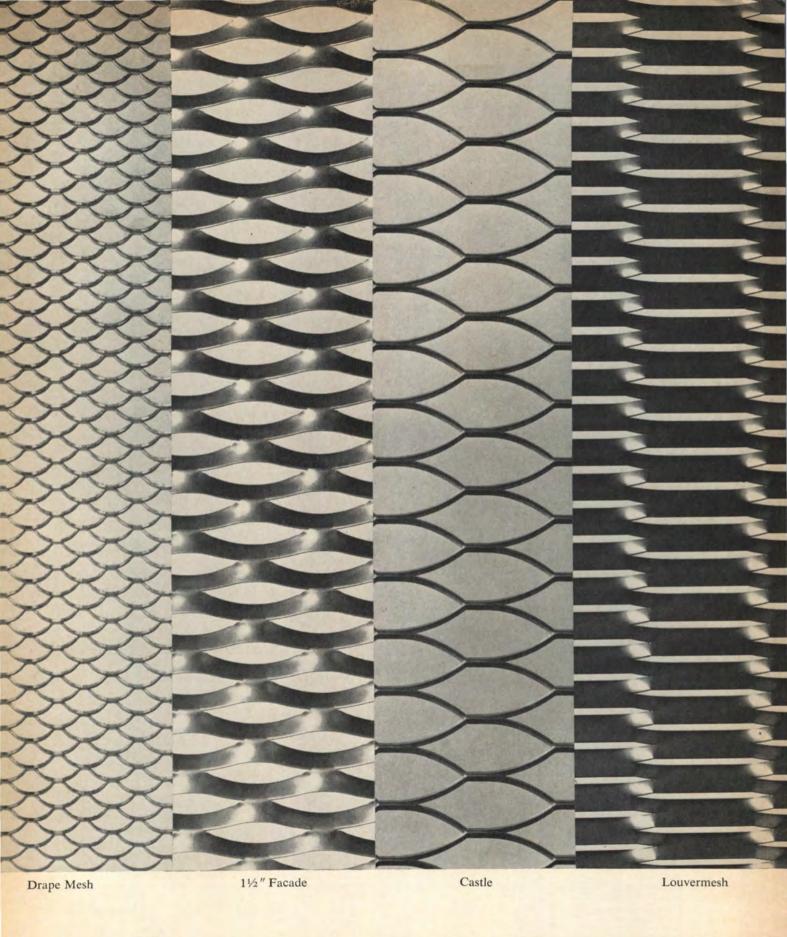
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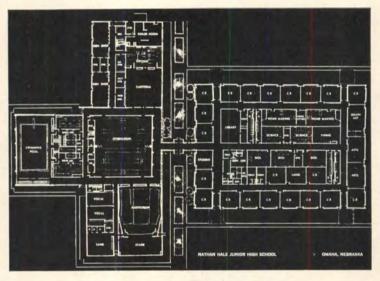
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