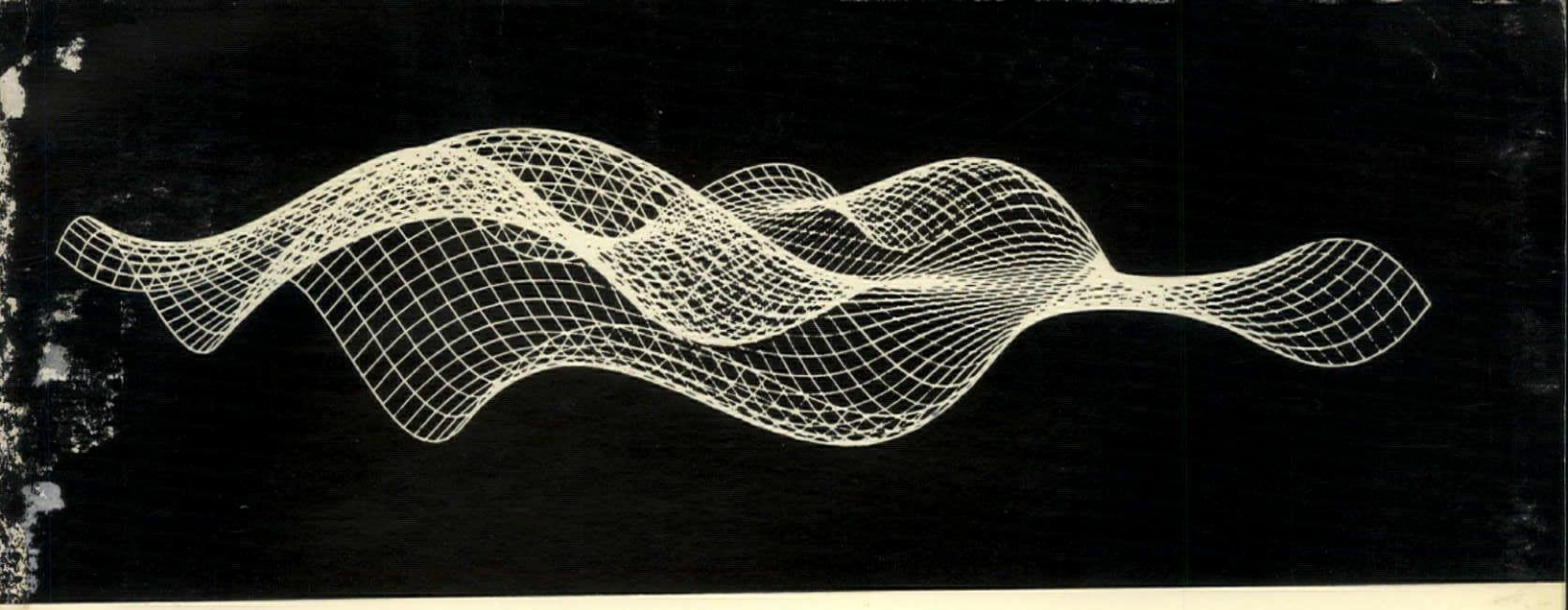

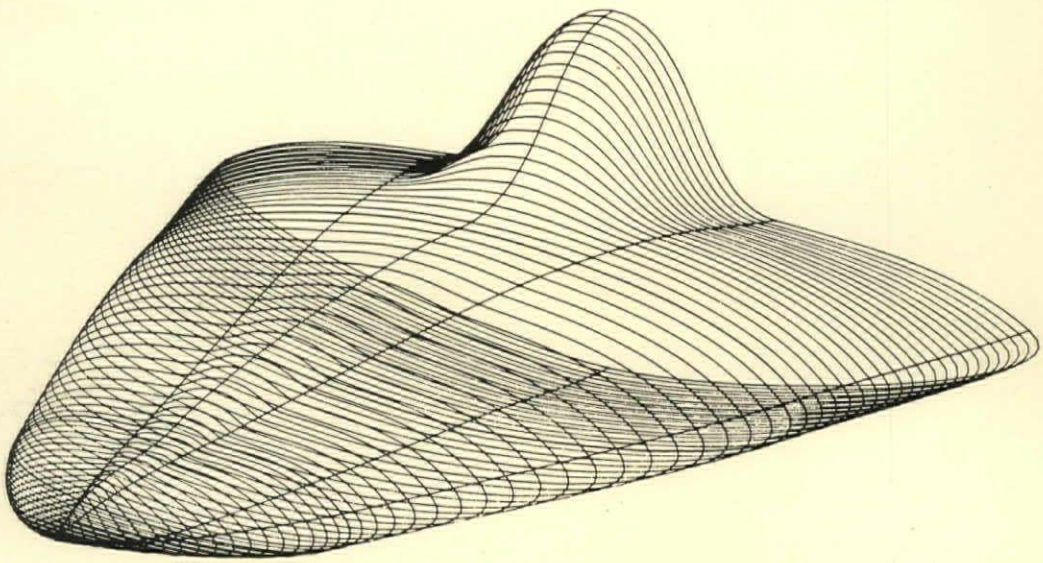

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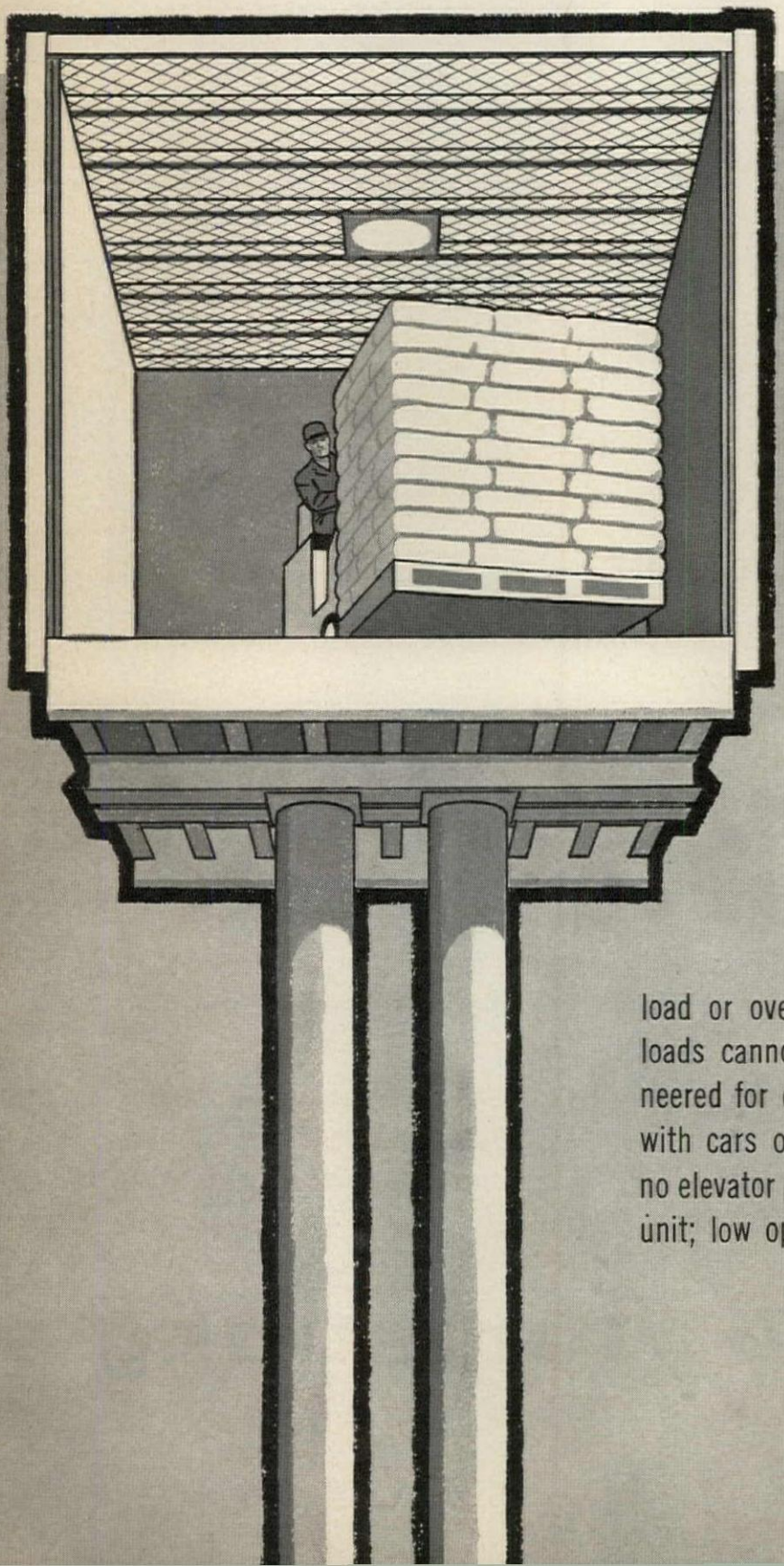

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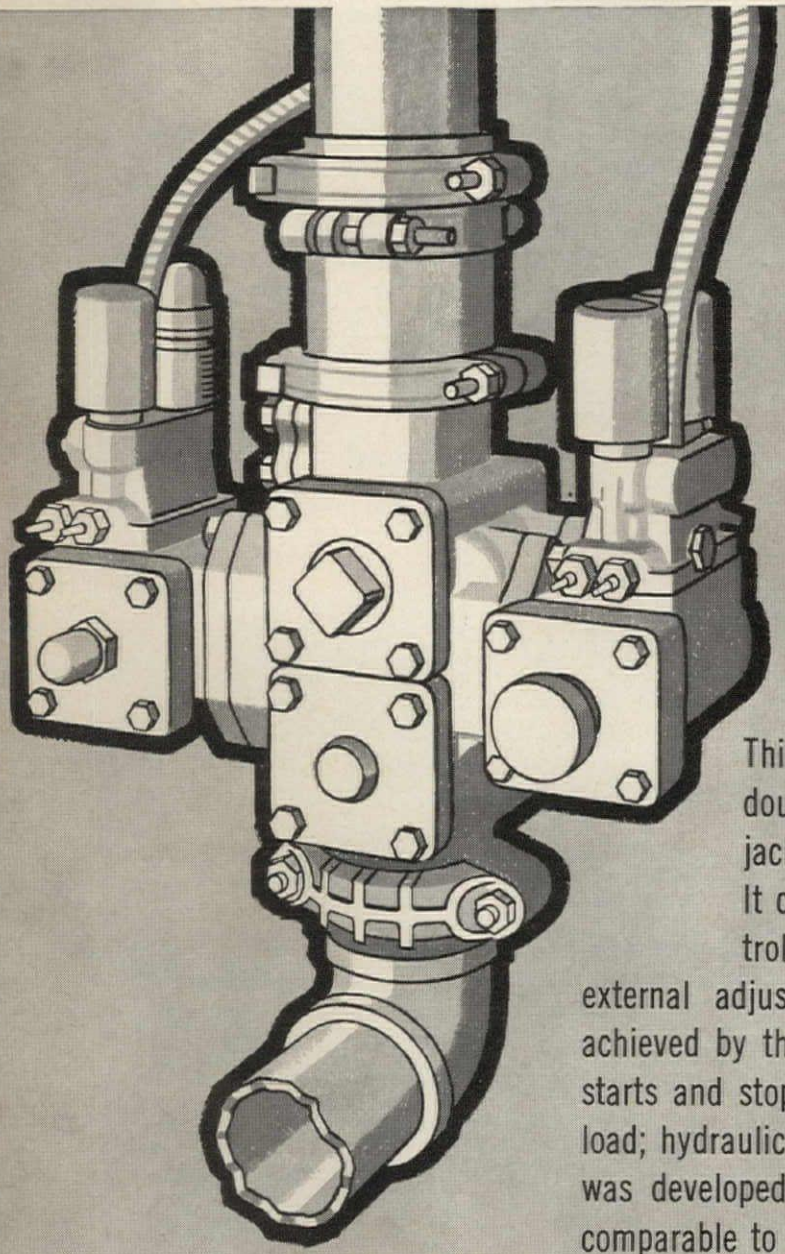

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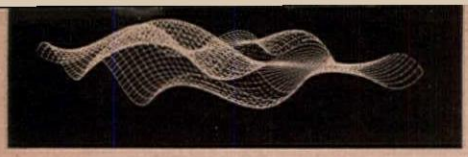

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Drawings made with a computer: a mathematically defined wave motion surface and a perspective of an aerodynamic configuration, from a book on computer graphics to be published by McGraw Hill. By permission of the Boeing Co.

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RECORD

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January 1965

Building Types Study 341: Industrial Buildings

Coming in the Record

ACHIEVEMENT IN SEATTLE

The recently completed IBM Building in Seattle, the work of Naramore, Bain, Brady and Johanson and Minoru Yamasaki, seems to reflect Yamasaki's increasing concern with structure and the architectural expression of it. The building has a unique structure composed of high-strength steel pipes covered with a precast concrete skin.

HOSPITALS OF ALL KINDS

Next month's Building Types Study on Hospitals will provide a sampling of the wide variety of current work generated by increasing availability of private and public funds, especially those authorized by the 1964 Hill-Harris amendments to the Hill-Burton Act extending coverage to replacement hospitals, nursing homes, rehabilitation and other health centers.

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Competitions and Public Relations

Focusing his jaundiced eye sharply, this iconoclast begs permission to raise a practical point about the welfare of architects: do architectural competitions improve or damage the public image of the architect? I am thinking especially of much-publicized competitions like those for the Roosevelt Memorial or the Toronto City Hall.

Various questions about competitions have been raised in recent years. Do they encourage blissful disdain for realities? Do they devote too little attention to costs, and thus lead contestants (and sponsoring clients) into unbearable extravagances? Do the juries neglect functional considerations or normal clients' needs? Do they focus too intently on intramural preoccupations, like architects' architecture? Or do the juries, as Garrett Eckbo charged recently, focus so narrowly on such preoccupations that they forget the siting of the building, the landscape architects'—and the public's—inherent interest in the cityscape? Yes, it is time for the traditional architect to protest feelingly; let me put the words in his mouth: "Damn your questions; great architectural competitions improve the quality of our architecture, and the more public debate the better." When an architect leaves the university, he goes equipped with charger, lance, banner and devoted determination. And the blessing of this writer.

Duly self-chastised, let me pick up my question again: are competitions good for the public image of the architect?

Or to put it differently: does the architect realize the negative aspects of the resulting publicity? Such competitions as mentioned above result in quite violent reactions in the public press. If, as in these cases, the public is greatly concerned in the premiated solution, one cannot expect the architects' architecture to be universally greeted with paeons of praise. Indeed, it might even be that architects' hope would be that it would not, that criticism would result in more columns of calumny, and the more the merrier. Thus do we raise the flag; thus do we speak to the masses.

Both the FDR Memorial and the Toronto City Hall competitions produced furious storms of protest. And the protests came from the professionals as well as from laymen. There was in fact as much violence within as without the profession. Did the results perhaps do damage, maybe great damage, to the public feeling about architects and their works?

A great many public servants in Washington may have decided that architects were not well attuned to the necessities of memorials. A great many architects did. Uncounted business men may have decided that a *croissant* was not a suitable model for an office building. A great many architects did. And millions and millions of private citizens were thoughtfully adding up the costs, both tangible and intangible, and charging them against the architectural profession.

Yes, the public had two great opportunities to review and understand the workings of architects' minds, and in both instances one suspects that the lessons got home. Architects themselves may have picked up some worthwhile observations.

Every interested follower of those designs was duly impressed with the architect's status as an artist, and probably noted the independent spirit in which the winning designs were selected.

Is this as happy a thought as it is frequently considered to be? I wonder if the architect's stature, his public image, improved any. I suggest that he doesn't need to keep asserting his artistic propensities; the public has given him this recognition for, say, a thousand years.

I have the feeling that the thought would be more pleasant if the public were more ready to follow happily along. The artist always thinks that he must lead the public, tantalize it, educate it, or to hell with it.

But it could be that in such competitions the public gets that last message. The citizenry are notoriously unreliable in their leadability.

Naturally in a huge competition the sponsor, the professional adviser, and the members of the jury are not to make decisions based on public relations expediency. But I insist on the question—does the competition system contain some traps for the profession?

—Emerson Goble

WESTERN REGIONS HOLD ANNUAL CONVENTIONS

Architects who attended the three annual conferences of the Western region, American Institute of Architects, heard more speakers than ever (34 speakers, 28 others who participated in various ways), rubbed elbows with more people than ever (though with fewer fellow professionals), and experienced more program innovations than ever before. All this added up, in the aggregate of Western conferences, to something for everyone; from theorists and philosophers to down-to-earth practitioners concerned with contracts, accounting, specifications and legal responsibilities.

But through the varieties of subject matter ran a familiar concern which suggested more professional unity than usual: the esthetics of cities and how to produce a more humane (and thus more esthetic) environment in the face of the increasing complexity contributed by scientific and technological developments. In fact, the California Council suggested in its theme, "Science in the Service of Humanism in Architecture," that science and technology might be subservient to architecture but left the question open to the individual architect.

Joyce Earley Lyndon, Fellow of Great Britain's Institute of Landscape Architecture, philosophy professor Dr. John Cantelon of U.S.C., and Ian McHarg head of Pennsylvania's department of landscape architecture at C.C.A.I.A. convention in Coronado

Kiyonori Kikutake, Tokyo architect, Producers' Council speaker at C.C.A.I.A. convention and Institute first vice president Morris Ketchum

California Council: Coronado

This theme was further developed through the choice of speakers, most of whom were professors: Pennsylvania's Ian McHarg, an ecological landscape architect; University of Southern California's Dr. John Cantelon and Eric Pawley of philosophy and architecture, respectively; California's Dean Martin Meyerson of Environmental Design; Washington University's Buford Pickens and visiting professors Konrad Wachsmann and Jacob Bakema. Non-professors included Joyce Earley Lyndon, Fellow, Institute of Landscape Architects, formerly of Great Britain, now of Santa Monica; architect Phil Daniel of DMJM; and computer-management specialists James Souder and Donald Malcolm; Morris Ketchum, Institute president-designate and C.C.A.I.A. president Ulysses Floyd Rible. Exhibitions included Fine Arts (for the second time), featuring California artists, and drawings of proposals for improvements to the Mexican-United States border.

Highlight of the convention was the presentation of the Council's distinguished service award to William Wilson Wurster for "dedication and achievement in architecture and education."

As it has done since 1960, the Producers' Council provided a speaker from a foreign land for one session. This year it was Kiyonori Kikutake of Tokyo who analyzed the design of his administration building for the Izumu Temple in Japan.

Northwest Region: Portland

Like previous conferences in the Northwest region, this year's meeting arranged by general chairman Joseph Rudd and program chairman Lewis Crutcher, used unusual program methods to impress its theme, "The Hand of Man," on conferees, taking them out of the hotel and through the city by bus; instituting seminars with city officials; and honoring leaders from seven northwest cities, each nominated and brought to the conference by one of the region's chapters.

Robert Geddes of Philadelphia, Paul Spreiregen of the Institute staff, Charles Blessing of Detroit and Gordon Wittenberg of Little Rock presented a session on urban design which highlighted the implementation of the conference theme. Institute President A. G. Odell stirred the 400-plus registrants with a challenge to government at all levels "to take a significant part and to display greater wisdom in the functions of government which affect community development." On the final evening Seattle businessman Langdon Simonds, stating that "we need more than stringent new laws if we are to have a better environment: we need genuine leadership to create a new kind of country, to stir up a demand for better environment," unveiled the newly established Foundation for Environmental Design which will "encourage and reward excellence of design in the interrelation of our communities and the changing landscape."

Robert Martin, president of the Oregon Council of Architects, was nominated to succeed Robert L. Durham as regional director.

Western Mountain: Las Vegas

The Western Mountain region, having chosen Las Vegas as the location for its conference, wisely did not schedule evening meetings. Days were full enough, however, with such featured speakers as Herbert Swinburne, Hugh Stubbins, Vernon DeMars, Paul Spreiregen, and Don Lutes of Springfield, Oregon, who described what had been done to revitalize "One Tenth of A Town," and a series of four "schola" on accounting, legal problems, single versus multiple contracts. Herman Light, F.A.-I.A., of Los Angeles, was a surprise hit with his first hand report on damage from the Alaska earthquake, and Arthur Hood, a management consultant from Los Altos, California, electrified his hearers with his startling figures of "what they should be earning" from the "$100 billion annual gross volume of construction." Charles Eames was the banquet speaker, pinch hitting for James Lucas of Zeeland, Michigan.

The program was organized and arranged by Howard Brandis and chapter president Jack Miller.

—Elisabeth Kendall Thompson

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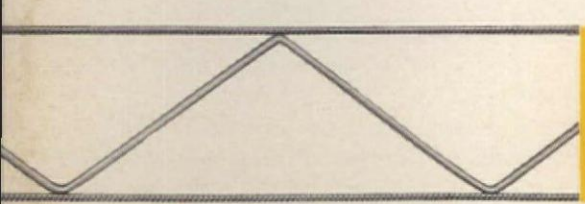

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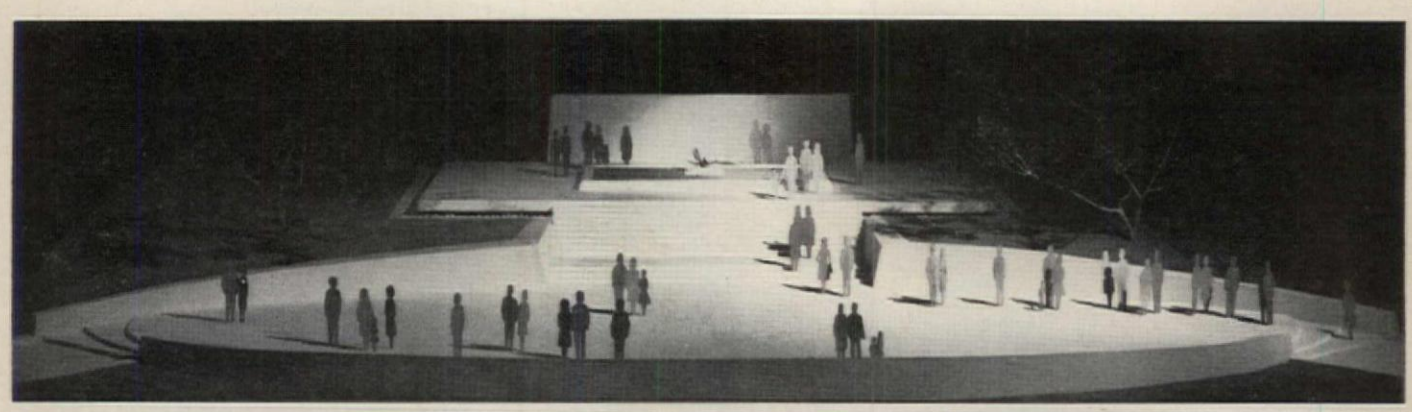
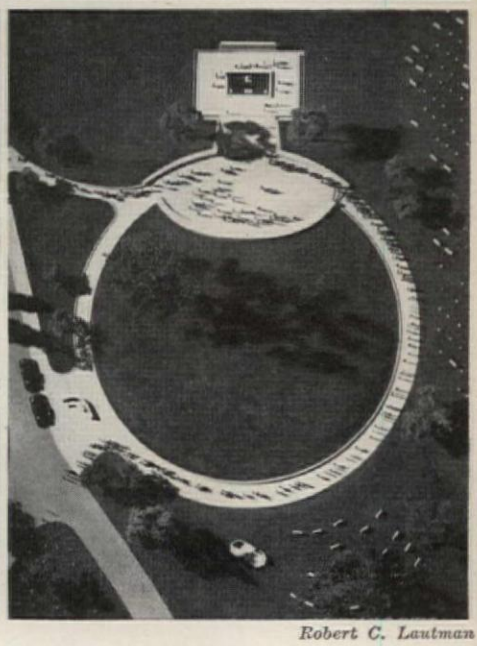




Robert C. Lautman

KENNEDY GRAVE DESIGN IS DISCLOSED

The eternal flame, lighted by Mrs. John F. Kennedy on November 25, 1963, will remain the central symbolic feature in the final design of the John F. Kennedy Memorial Grave at Arlington National Cemetery. Designed by John Carl Warnecke, architect, in consultation with the Kennedy family, the whole concept was conceived as sculpture—the hillside contours, the walks, the terraces, the walls, all leading to the central theme of the flame within a font, which is located directly along the great axis of Washington extending from the Capitol to the Lincoln Memorial across the Potomac River to the Custis-Lee Mansion.

The final design concept was influenced by the need to provide for throngs of visitors (over 7,740,000 persons have visited the grave in the past year). Other design criteria were: the grave should be a simple final resting place for the President; the grave should reflect the office of the Presidency, but should not evaluate the late President's programs; the elements of the grave should have meaning for a full range of people; the grave should complement the visual impact of the Custis-Lee Mansion; and the grave should respect the traditions of Arlington National Cemetery.

The entrance to the grave site is marked by a curved wall and a bench. A paved walk, cut into the hill, curves upward around a mounded circle of lawn with granite retaining walls. Where the walk curves in toward the grave, the visitor enters an elliptical terrace which serves as an overlook to the city.

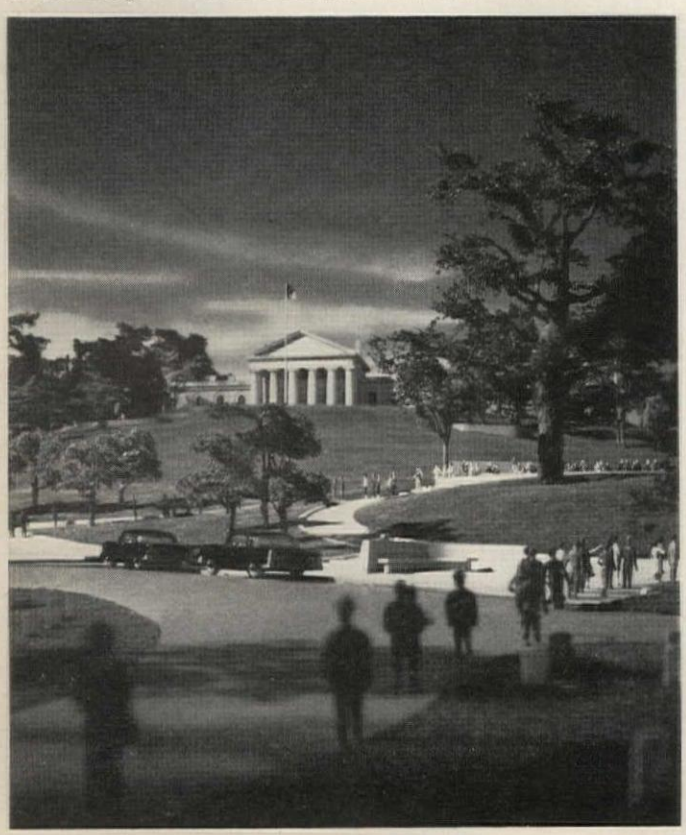
Steps from the overlook lead up to the rectangular paved grave site. The material changes here from gray granite to white marble. In the center of this space, slightly elevated, is the rectangular grass plot where the President and his two deceased children are buried. In the grass plot, emerging from a low three-pronged bronze font, is the eternal flame. The terminal point of the design is a long low wall incised with the Presidential seal, which serves as a backdrop for the flame.

Toward the city, the overlook is bounded by a granite wall which will be inscribed with quotations from President Kennedy's speeches, to be selected by the Kennedy family and friends.

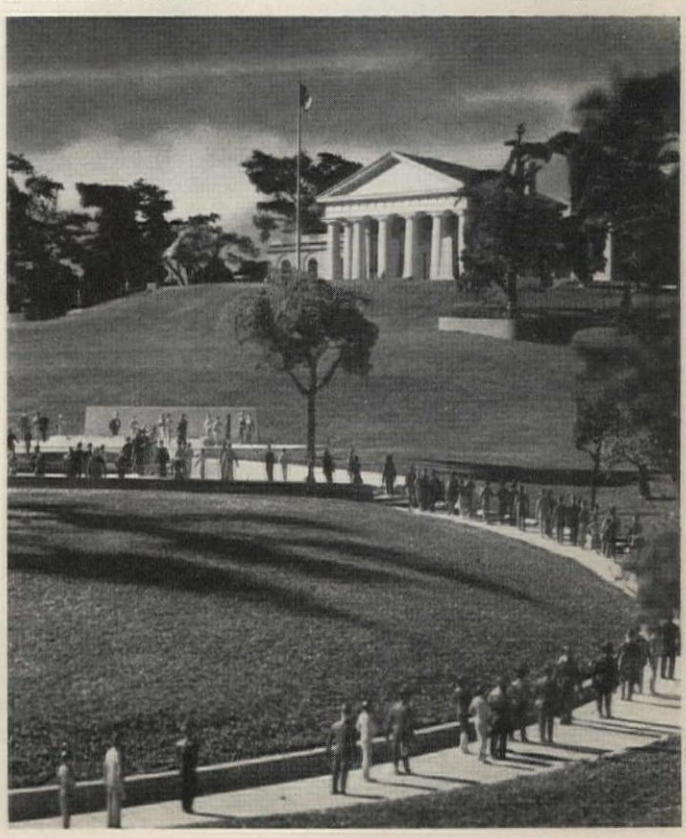
Actual construction is expected to begin in the fall of 1965 and will take about one year. Preliminary cost estimate is approximately $2 million with the Kennedy family contributing between $200,000 and $400,000 for the area immediately surrounding the grave site of the President.

View of the grave from the Custis-Lee Mansion showing its relationship to the great axis of Washington extending into the city

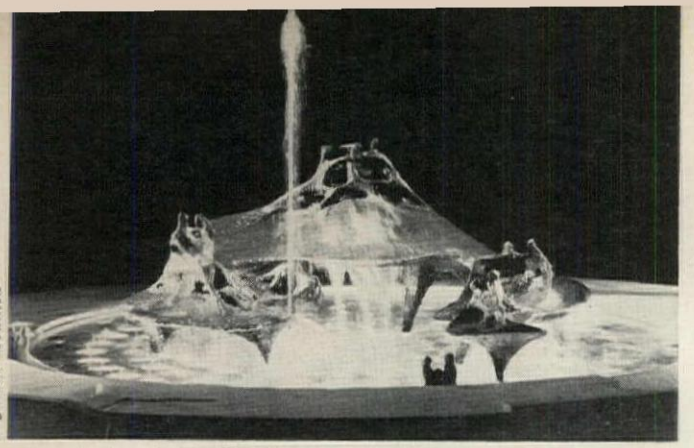
Marked by a curved wall at the entrance, the circular walk to the left provides direct access for official visitors.



The circular walk to the right of the curved bench leads around a mounded circle of lawn to the overlook and grave site



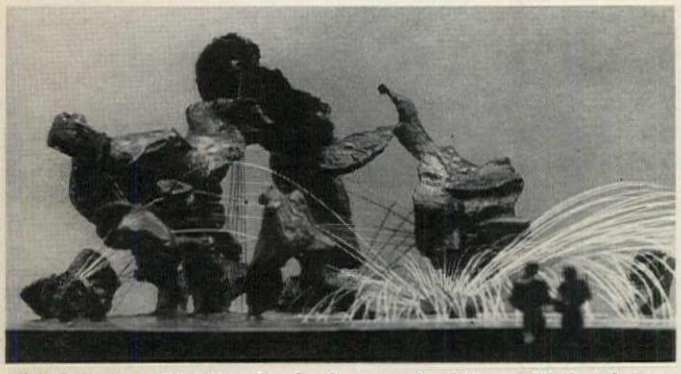
Robert C. Lautman photos



Seymour Mednick

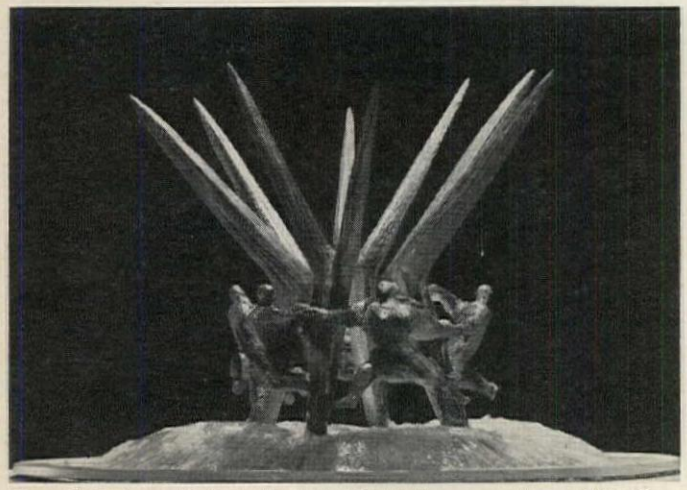
First Prize—$12,500: Stonorov & Haws, Architects, Philadelphia; Oskar Stonorov and Jorio Vivarelli, Collaborating Sculptors

Second Prize—$7,500: Abraham W. Geller and Raymond J. Abraham, Architects; Henry Gorlin, structural engineer, and Richard De Cew, fountain consultant, all of New York City



Seymour Mednick

Third Prize—$3,000: Louis Sauer, Architect, Philadelphia; Robert Ranieri, sculptor, New York City



Fourth Prize—$3,000: Jack A. Thalheimer, partner of the firm of Thalheimer & Weitz, Architects and Engineers, Philadelphia; Nathan Rappoport, sculptor, New York City

WINNERS ANNOUNCED IN FOUNTAIN COMPETITION

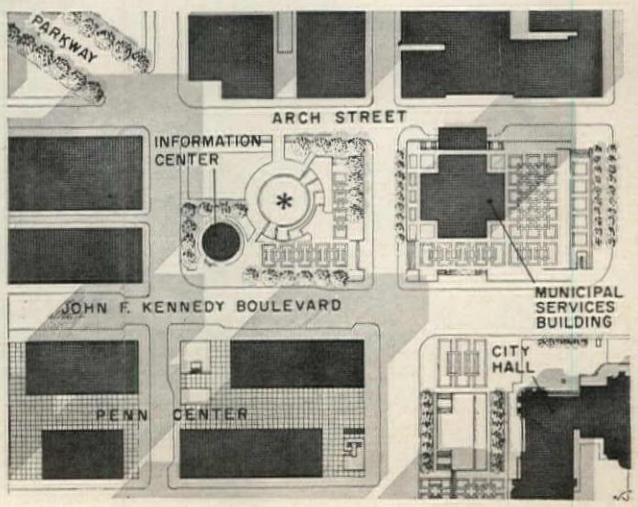
Five winners and five honorable mentions have been awarded for the design of a monumental fountain on the Benjamin Franklin Parkway in Philadelphia in a competition sponsored by the Fairmount Park Art Association. The jury consisted of Ieoh Ming Pei, F.A.I.A., architect and chairman; Charles R. Colbert, architect; Jacques Lipchitz, sculptor; Theodore Roszak, sculptor; and Philip Price, president of the Fairmount Park Art Association. The professional adviser is Norman N. Rice, F.A.I.A.

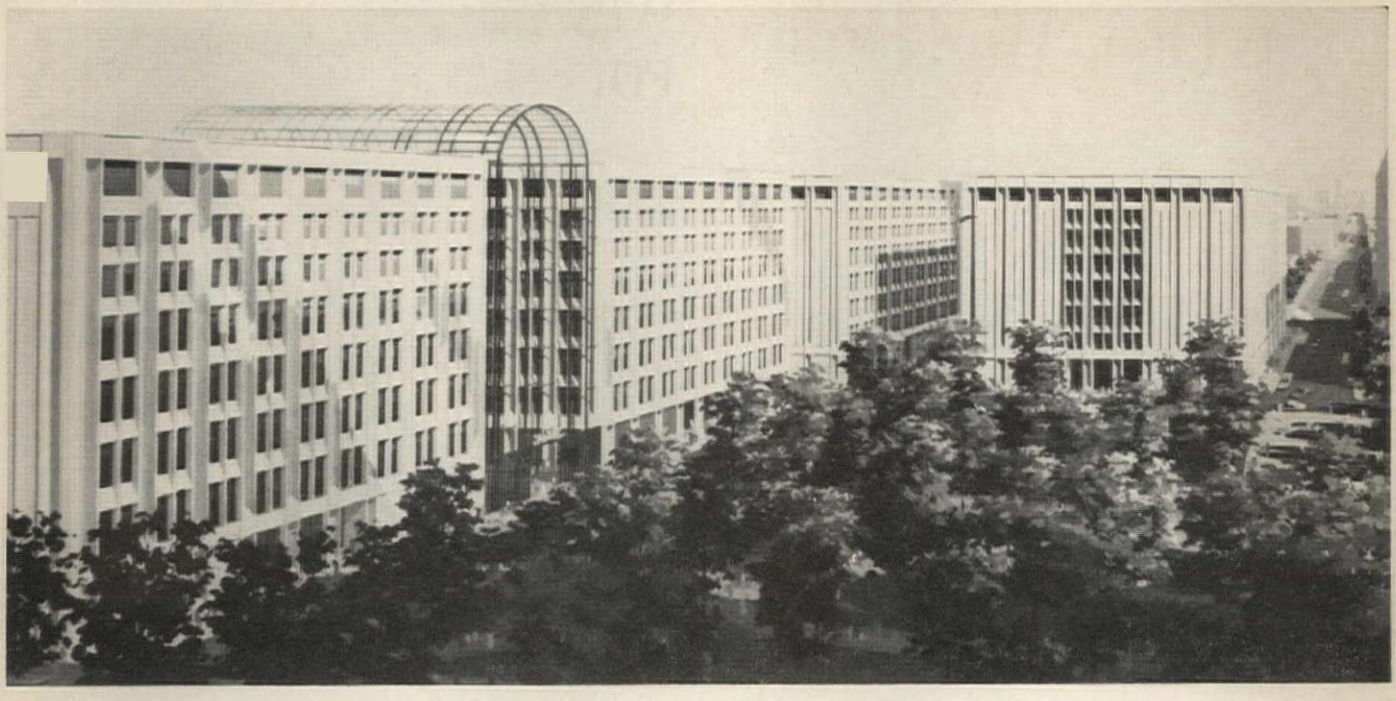
In addition to the top four winners whose entries are shown on this page, a fifth prize of $2,000 was awarded to Reuben Nakian, sculptor, of Stamford, Connecticut. Mr. Nakian's prize is being withheld since he did not comply with the mandatory eligibility requirement of associating himself with a registered architect.

Receiving honorable mentions of $1,000 each were Lundquist & Stonehill, architects of New York City; George W. Hall, sculptor, and Curtis & Barkkarie, Architects, Corona del Mar, California; Rolf Myller, architect, and David Chapin, sculptor, both of New York City; Otto Reichert-Facilides, architect, of Philadelphia and Peter Nicholson, sculptor, of New York City; and H. Lee Hirsche, sculptor, of Williamstown, Massachusetts, and Ronald R. Rucinski, architect, of Albany, New York.

The fountain site is pivotally located in a skyscraper framed plaza with long views up the parkway and, to the east, the Municipal Services Building, and to the southeast, City Hall (*site plan below*).

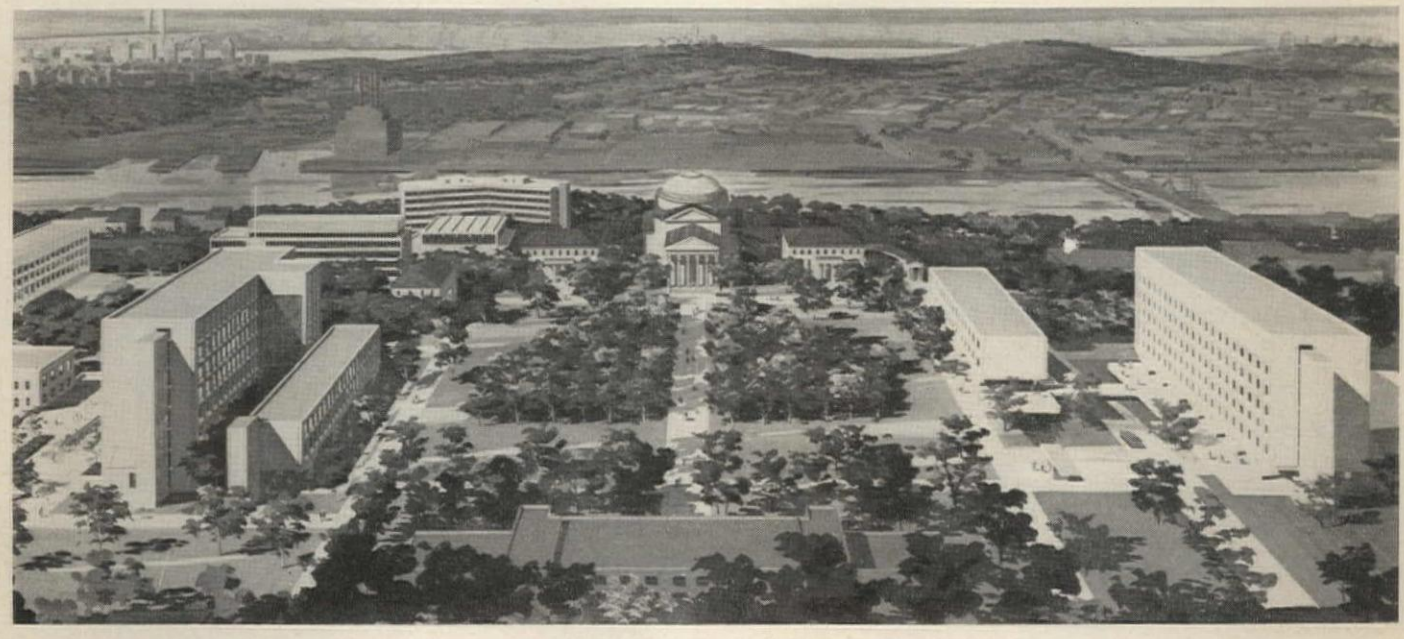
The first prize design by Stonorov & Haws was selected as "best of show" by a three to two vote of the jury. The jury majority praised the design because, as sculpture, it has the most promising possibilities of development, also noting that added water action could be incorporated. Minority comments criticized the fountain as an insufficient terminal for the parkway, and as having insufficient water action. A majority of the jury recommended the design for execution with the express proviso that the water action be made more important and voluminous, as well as visible from a substantial distance.





Design Unity for N.Y.U. at Washington Square

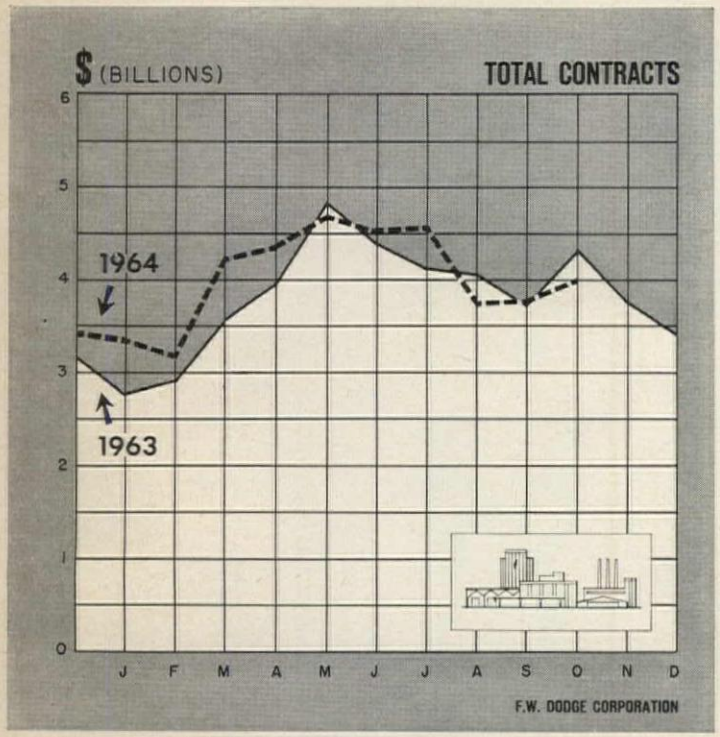
A campus arcade with an arched roof of glass and steel across Washington Place between the Main and Education Buildings is a prominent feature of architect Philip Johnson's unified design concept for New York University at Washington Square in New York City. As part of a three-year $100 million development program announced by the university, the Main Building on the left is to be remodeled, as is the Commerce Building, third from left. A new $17.5 million University Library and Study Center at the right, which will hold 2,000,000 volumes and seat more than 3,000 people, will be given highest priority because of university needs. The new $7 million Education Building, second from left, will also have a similar design. According to Dr. James M. Hester, president of the university: "Mr. Johnson has developed a concept that will preserve the traditional serenity and beauty of an important landmark in New York City."



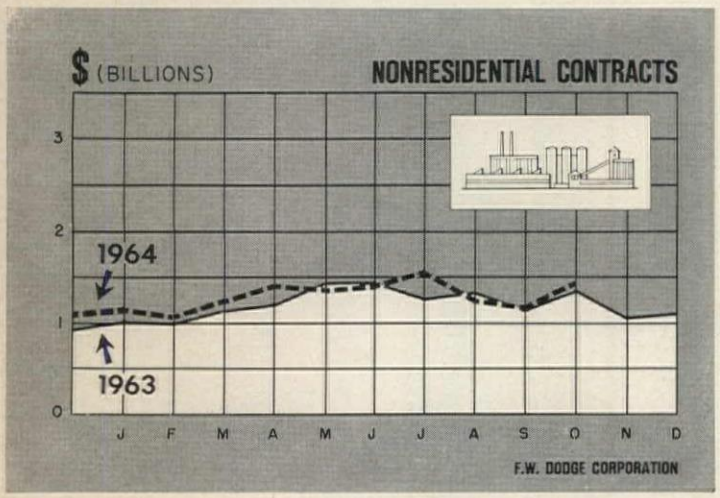
New Buildings Designed for N.Y.U. Bronx Campus

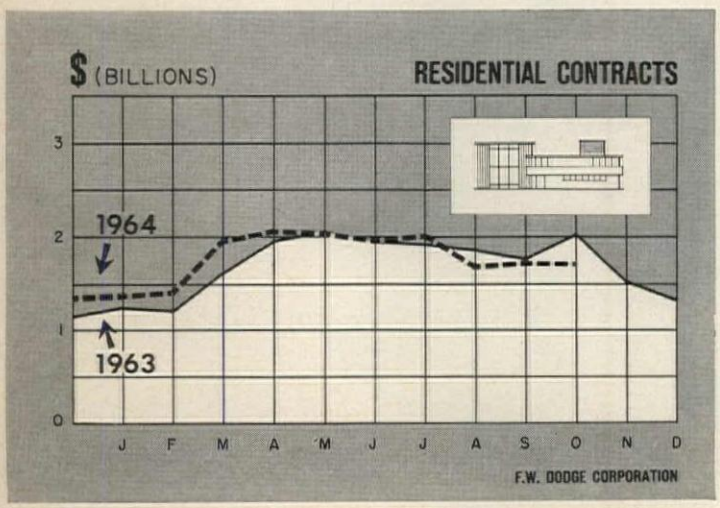
Three new buildings, designed by Marcel Breuer, architect, are proposed for New York University's Bronx Center at University Heights as part of the new development program. To be added to the Bronx campus, which already has a unified plan for development designed by Mr. Breuer, is a new technology facility, shown at left, which will house several departments of the School of Engineering and Science. The new Life Sciences Building for biology and psychology will face the right of the campus quadrangle. In this sketch, which has a view to the west and the Gould Memorial Library, is University College Hall, to be built at a later date, shown to the right of the life sciences building

REPLACEMENT DEMAND FOR HOUSING GROWING



Total contracts include residential, nonresidential and non-building contracts





In the two decades since the end of the second war, the total number of families (today about 47 million) and individuals who live alone (now about 11 million) has increased by just about 15 million. The growth, and the related gains in income, have been the basis for the strong and steady expansion in home building in the postwar years. But over this span, the grand total of all the new housing units built amounted to nearly 28 million—13 million more than the net growth in families.

It's true, of course, that because there had been little home building during the war years, there had built up during this period a delayed demand for housing to accommodate the needs of a few million families and individuals who were still living with relatives or under other temporary conditions. Filling this urgent need, and at the same time building enough extra units to permit a small but necessary part of the housing stock to stay vacant at all times, accounted for perhaps 5 million of the 13 million homes built in excess of net family growth. The remaining 8 million newly constructed homes are a pretty good measure of what it has taken to replace the housing units which were eliminated over the past two decades. In recent years, replacement housing has become a fast-growing part of the total demand for residential building, and its effect tends to be highly concentrated in the rental building markets.

During the forties and early fifties when housing was still in very short supply, any losses from the housing stock resulted mainly from fire and flood. It wasn't until well into the fifties that we began to make any real progress in removing and replacing the substantial proportion of dilapidated and otherwise substandard housing then in existence.

In the latter half of the fifties, as the pressures on the nation's housing stock began to ease a bit, deliberate demolitions (instead of natural catastrophe) became the leading cause of housing losses. Between 1950 and 1960 nearly four million units vanished from the housing stock, and better than half of them went by way of the iron ball. The vast bulk of those four million units were ones which were classified as dilapidated or substandard in 1950.

In the sixties, replacement for housing began to accelerate. Demolitions, spurred by expanding urban renewal programs and by continually growing highway construction, by 1964 have reached an annual (and increasing) rate of something like 250,000. Fire, flood and storm destruction, while small in relation to the total exposure of nearly 65 million units; nevertheless, results in an additional 10,000 losses each year, and grows along with the total stock of homes. What's more, nearly 150,000 more units vanish because they literally fall apart from old age, are converted to bigger units or to nonresidential uses, or are simply abandoned as uninhabitable. As the total housing stock is updated, these latter losses might diminish.

In total, approximately half a million housing units were torn down or otherwise removed from the total on hand at the beginning of this year. And if the pattern of the fifties still holds, something close to three-quarters of those disappearing homes were rental units. That would mean that out of the near-record 500,000 or more new apartment units built in 1964, only every fifth one counted as a net addition to the housing stock. That's part of what's behind the stable vacancy rates of the past couple of years.

George A. Christie, Chief Economist
F. W. Dodge Company
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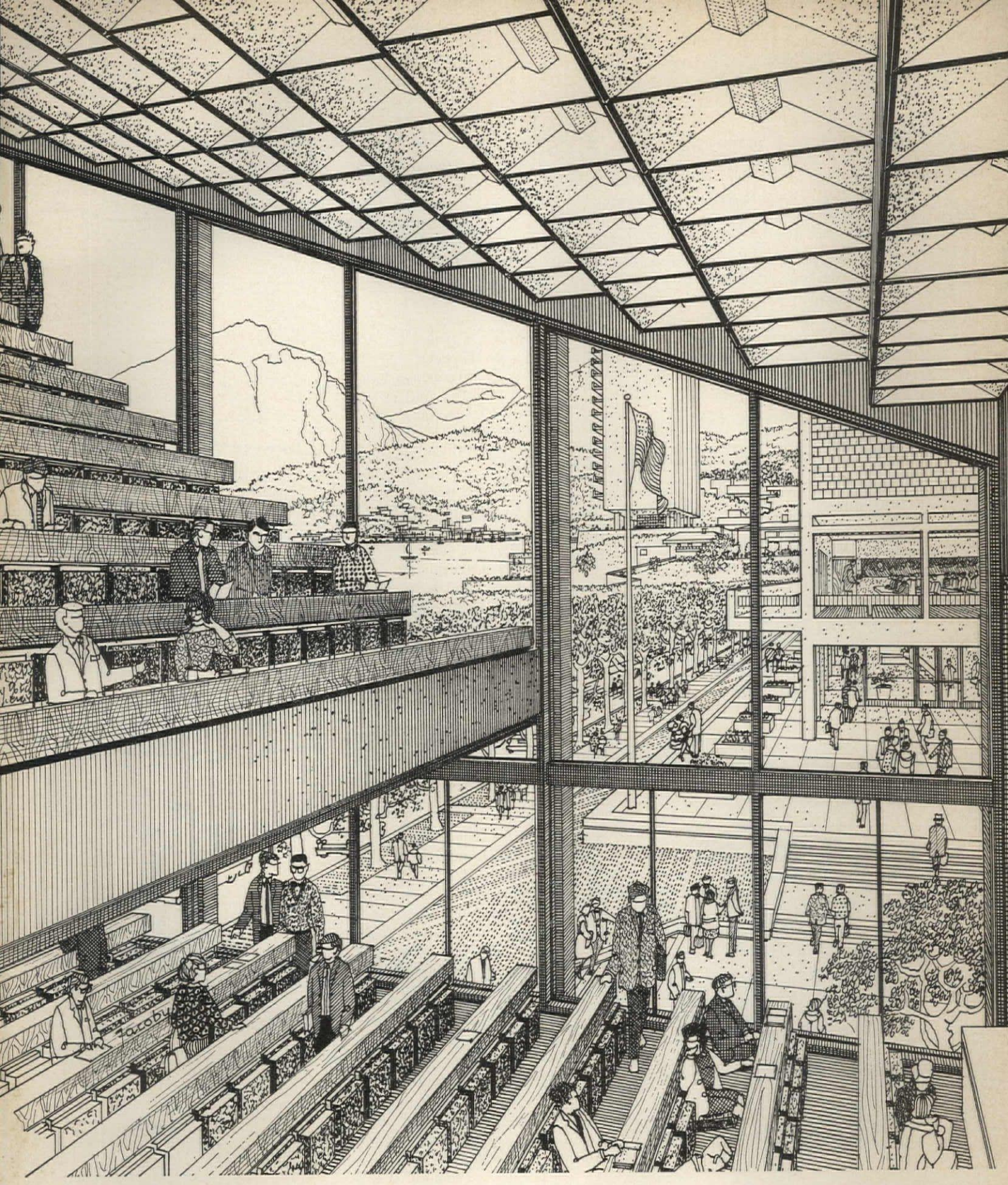

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Ceiling Systems by Armstrong

Building Construction Costs

By William H. Edgerton
Manager-Editor, Dow Building Cost Calculator, an F. W. Dodge service

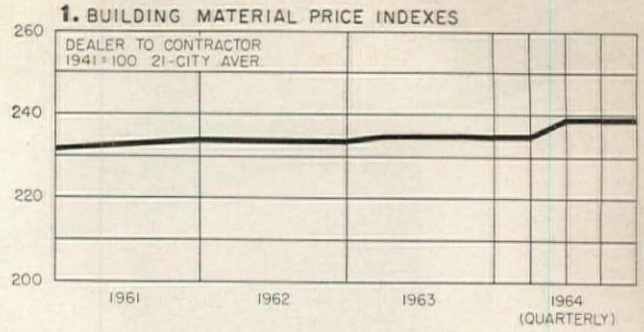
The information presented here permits quick approximations of building construction costs in 21 leading cities and their suburban areas (within a 25-mile radius). The tables and charts can be used independently, or in combination as a system of complementary cost indicators. Information is included on past and present costs, and future cost can be projected by analysis of cost trends.

A. CURRENT BUILDING COST INDEXES—DECEMBER 1964

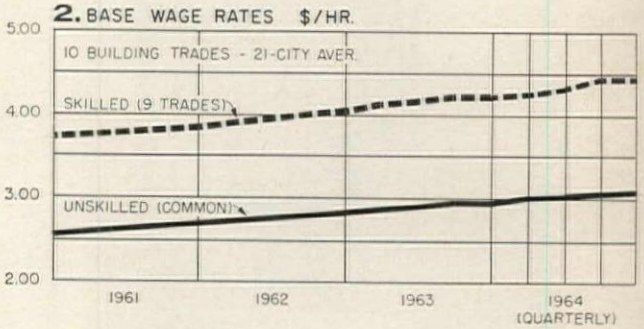
1941 Averages for each city = 100.0

Metropolitan Area	Cost Differential	Current Dow Index Residential	Current Dow Index Nonresidential	Per Cent Change Year Ago Res. & Nonres.
U.S. AVERAGE— 21 Cities	8.5	263.6	281.3	+0.72
Atlanta	7.1	299.8	318.0	+2.28
Baltimore	8.0	268.6	295.9	+1.48
Birmingham	7.4	246.3	264.9	+1.51
Boston	8.4	235.3	249.0	+0.20
Chicago	8.8	292.3	307.4	+0.23
Cincinnati	8.8	257.4	273.6	+1.81
Cleveland	9.3	265.0	281.7	+0.21
Dallas	7.8	251.2	259.5	+1.14
Denver	8.3	273.5	290.7	+1.30
Detroit	8.9	267.7	281.0	+1.60
Kansas City	8.3	238.6	252.6	+0.12
Los Angeles	8.4	265.5	290.6	+0.14
Miami	8.4	261.4	274.4	+0.18
Minneapolis	8.9	263.3	279.9	+0.07
New Orleans	7.9	239.4	253.7	+0.36
New York	10.0	270.5	290.9	+0.24
Philadelphia	8.7	262.8	275.9	+0.11
Pittsburgh	9.1	251.4	267.3	+1.89
St. Louis	8.9	253.4	268.5	+0.11
San Francisco	8.5	331.1	362.2	+0.08
Seattle	8.5	240.7	269.0	+0.11

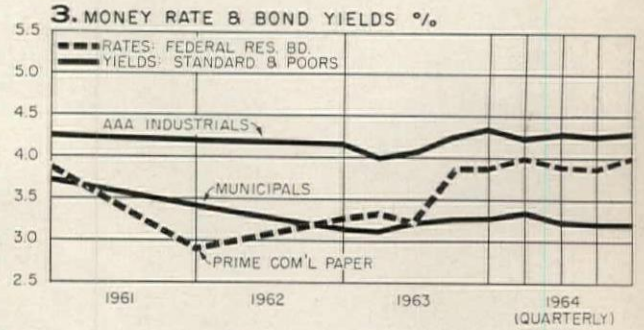
1. BUILDING MATERIAL PRICE INDEXES



2. BASE WAGE RATES $/HR.



3. MONEY RATE & BOND YIELDS %



B. HISTORICAL BUILDING COST INDEXES—AVERAGE OF ALL BUILDING TYPES, 21 CITIES

1941 average for each city = 100

Metropolitan Area	1952	1957	1958	1959	1960	1961	1962	1963 (Quarterly) 1st	1963 (Quarterly) 2nd	1963 (Quarterly) 3rd	1963 (Quarterly) 4th	1964 (Quarterly) 1st	1964 (Quarterly) 2nd	1964 (Quarterly) 3rd	1964 (Quarterly) 4th
U.S. AVERAGE 21 Cities	213.5	244.1	248.9	255.0	259.2	264.6	266.8	269.4	270.3	273.4	275.0	274.7	276.8	278.6	276.4
Atlanta	223.5	269.6	277.7	283.3	289.0	294.7	298.2	302.0	303.0	305.7	307.5	310.0	312.3	313.4	313.7
Baltimore	213.3	249.4	251.9	264.5	272.6	269.9	271.8	272.3	272.9	275.5	277.1	277.2	279.3	280.5	280.6
Birmingham	208.1	228.6	233.2	233.2	240.2	249.9	250.0	251.3	252.0	256.3	257.8	258.0	259.9	260.1	260.9
Boston	199.0	224.0	230.5	230.5	232.8	237.5	239.8	240.4	241.2	244.1	245.6	246.1	247.9	251.3	245.6
Chicago	231.2	267.8	273.2	278.6	284.2	289.9	292.0	296.4	296.4	301.0	302.8	302.2	304.5	305.1	302.9
Cincinnati	207.7	245.1	250.0	250.0	255.0	257.6	258.8	260.0	260.7	263.9	265.5	265.1	267.1	268.9	269.5
Cleveland	220.7	258.0	257.9	260.5	263.1	265.7	268.5	272.3	272.8	275.8	277.4	276.3	278.4	282.0	277.5
Dallas	221.9	228.4	230.5	237.5	239.9	244.7	246.9	251.5	252.2	253.0	254.5	253.7	255.6	255.6	256.4
Denver	211.8	245.6	252.8	257.9	257.9	270.9	274.9	275.0	275.4	282.5	284.2	282.6	284.7	287.3	287.3
Detroit	197.8	237.4	239.8	249.4	259.5	264.7	265.9	276.1	267.9	272.2	273.8	272.7	274.7	277.7	277.7
Kansas City	213.3	230.5	235.0	239.6	237.1	237.1	240.1	242.3	242.9	247.8	249.3	246.2	248.0	249.6	249.1
Los Angeles	210.3	248.4	253.4	263.5	263.6	274.3	276.3	279.1	279.7	282.5	284.2	284.0	286.1	286.1	284.0
Miami	199.4	234.6	239.3	249.0	256.5	259.1	260.3	262.4	266.7	269.3	270.9	270.1	272.1	273.1	270.9
Minneapolis	213.5	235.6	249.9	254.9	260.0	267.9	269.0	271.4	272.1	275.3	276.9	275.0	277.1	281.6	276.6
New Orleans	207.1	232.8	235.1	237.5	242.3	244.7	245.1	246.5	246.5	248.3	249.8	247.1	248.9	249.3	249.9
New York	207.4	240.4	247.6	260.2	265.4	270.8	276.0	280.9	280.9	282.3	284.0	284.8	286.9	289.7	284.1
Philadelphia	228.3	255.0	257.6	262.8	262.8	265.4	265.2	265.6	265.6	271.2	272.8	271.1	273.1	274.5	272.6
Pittsburgh	204.0	234.1	236.4	241.1	243.5	250.9	251.8	255.0	256.1	258.2	259.7	260.8	262.7	262.9	263.8
St. Louis	213.1	237.4	239.7	246.9	251.9	256.9	255.4	260.1	262.4	263.4	265.0	266.8	268.8	271.4	264.8
San Francisco	266.4	302.5	308.6	321.1	327.5	337.4	343.3	350.1	350.1	352.4	354.5	358.2	360.9	364.1	354.1
Seattle	191.8	221.4	225.8	232.7	237.4	247.0	252.5	256.5	257.8	260.6	262.2	260.1	262.0	265.7	261.9

HOW TO USE TABLES AND CHARTS: Building costs may be directly compared to costs in the 1941 base year in tables A and B: an index of 256.3 for a given city for a certain period means that costs in that city for that period are 2.563 times 1941 costs, an increase of 156.3% over 1941 costs.

TABLE A. Differences in costs between two cities may be compared by dividing the cost differential figure of one city by that of a second: if the cost differential of one city (10.0) divided by that of a second (8.0) equals 125%, then costs in first city are 25% higher than costs in second. Also, costs in second city are 80% of those in first (8.0 ÷ 10.0 = 80%) or 20% lower in the second city

TABLE B. Costs in a given city for a certain period may be compared with costs in another period by dividing one index into the other: if index for a city for one period (200.0) divided by index for a second period (150.0) equals 133%, the costs in the one period are 33% higher than those of the other. Also, second period costs are 75% of those of the other date (150.0 ÷ 200.0 = 75%) or 25% lower in the second period. CHART 1. Building materials indexes reflect prices paid by builders for quantity purchases delivered at construction sites. CHART 2. The $1.20 per hour gap between skilled and unskilled labor has remained fairly constant. CHART 3. Barometric business indicators that reflect variations in the state of the money market

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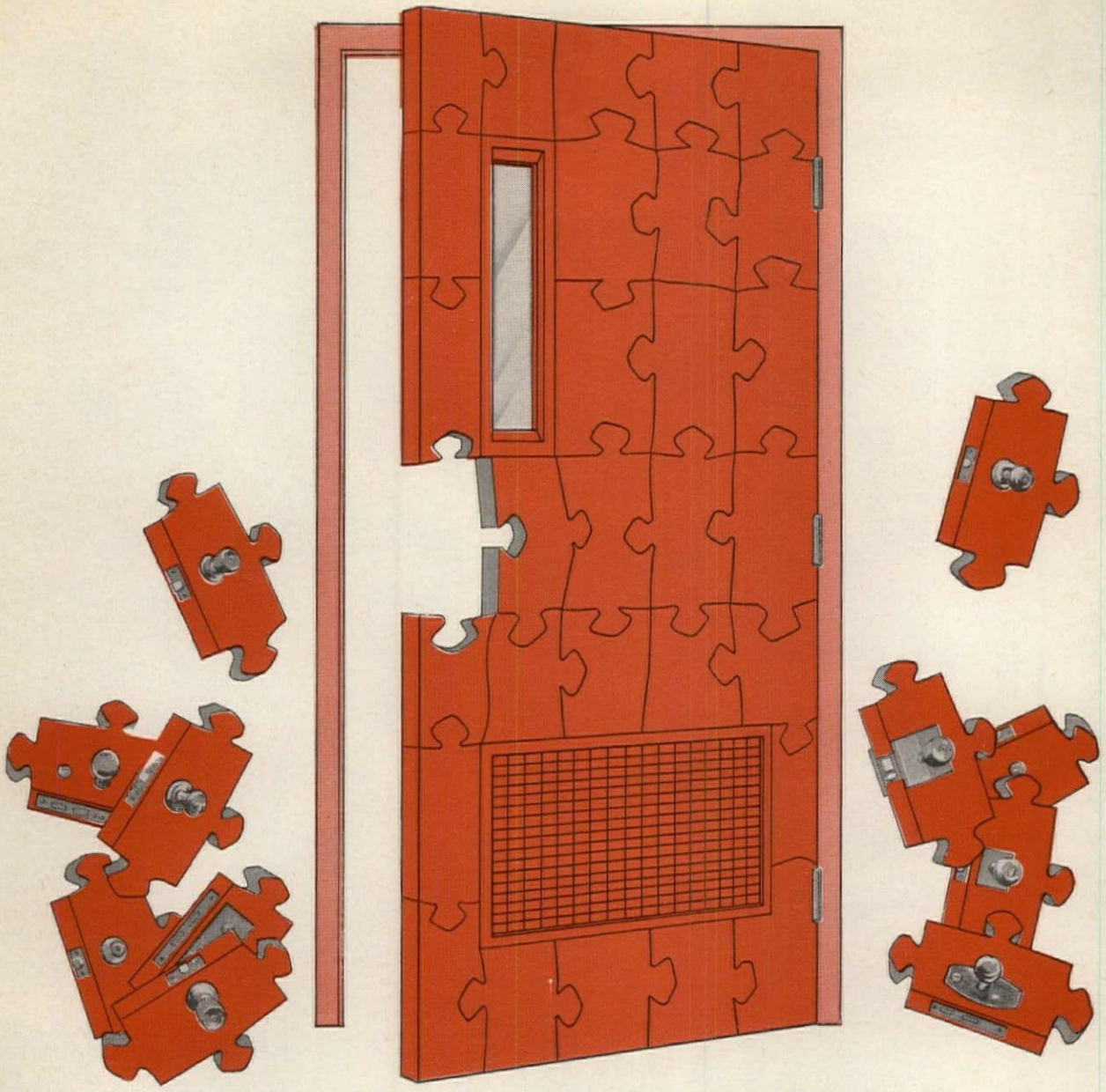

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YASKO CITES EXCELLENCE IN NEW FEDERAL BUILDINGS

Progress is being made toward the goal of architectural excellence in Federal buildings, according to Karel Yasko, assistant commissioner for design and construction of the Public Buildings Service of the General Services Administration, in a speech delivered before the Architectural League of New York on December 3. Mr. Yasko is confident that President Johnson sympathizes with that goal as an objective.

In general, Mr. Yasko seemed to feel that architects of this country have responded well to his challenge to them—in his speech at the Architectural League in March 1963—to take advantage of the new architectural era launched by President Kennedy's policy on public architecture (July 1962, pages 25 *et seq*).

". . . the government's building program, by its very nature falls into two parts—Washington and then the 50 states," Mr. Yasko said. He feels that Washington serves as a showcase or "parlor" for the rest of the country and for foreign visitors, and thus should serve as an example of excellence to these people.

"If everything outside of Washington is considered the country, we can point to the work of Mies van der Rohe in Chicago, Gropius in Boston, as two giants contributing to their environment. There are others of stature who are giving out in behalf of quality: Skidmore, Owings & Merrill in Portland, Oregon; Max Brooks in Austin, Texas; Jim Hunter in Boulder, Colorado; Heery & Heery in Atlanta, Georgia; Walker, Applegate, Oakes & Ritz in New Albany, Indiana; Austin, Field & Fry and Welton Becket Associates in Los Angeles; Finch, Alexander, Barnes, Rothchild, Paschel in Atlanta; Alonzo Harriman in Auburn, Maine; and several others."

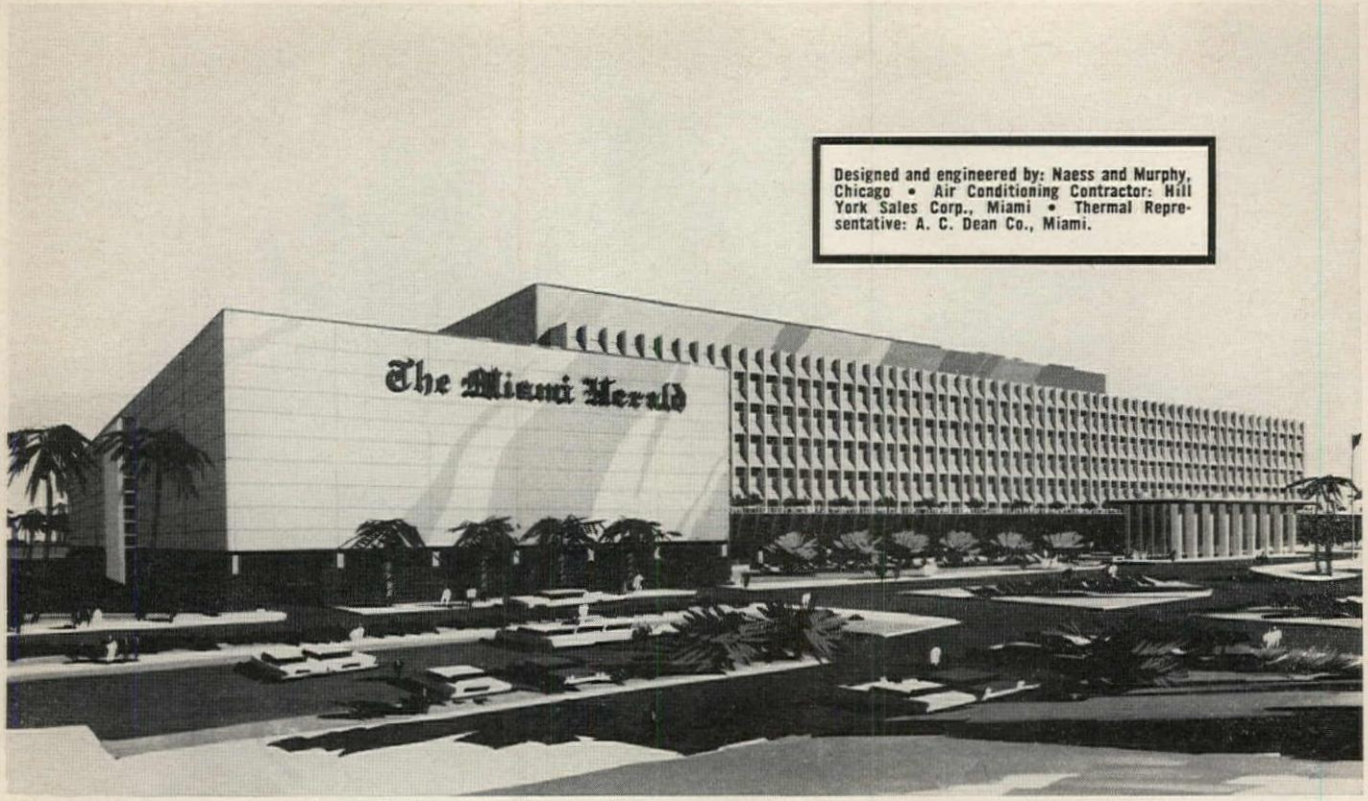
The government official cited four new buildings in Washington which he feels are indicative of the excellence of design that can be achieved in Federal buildings: an office building for the Housing and Home Finance Agency designed by Marcel Breuer, and Nolen & Swinburne; Federal Office Building 5, designed by Curtis & Davis, Fordyce and Hamby, and Frank Grad & Sons; the National Air and Space Museum, designed by Hellmuth, Obata and Kassabaum; and the Federal Bureau of Investigation Building designed by C. F. Murphy Associates and Beiswenger, Hoch, Arnold & Associates. It is in these buildings that concrete as a federal style might be emerging.

MITCHELL AND GIURGOLA WIN A.I.A. COMPETITION

As we go to press, it is announced that Mitchell/Giurgola, Associates of Philadelphia have won the final stage of the competition for the new headquarters building of the American Institute of Architects in Washington. In addition to the commission, the winner will receive a $10,000 advance on the fee.

Judging the competition were: Hugh Stubbins, F.A.I.A., chairman; Edward L. Barnes; J. Roy Carroll, F.A.I.A.; O'Neil Ford, F.A.I.A.; and John Carl Warnecke, F.A.I.A. A. Stanley McGaughan of Washington, D.C. was the professional adviser.

The other finalists were: Donald Barthelme, F.A.I.A., Houston; Jean Labatut, F.A.I.A., and Carr Bolton Abernethy, Princeton, New Jersey; C. Julian Oberwarth & Associates, Frankfort, Kentucky; I. M. Pei & Associates, New York City; the Perkins & Will Partnership, Chicago; and Charles R. Colbert, F.A.I.A., of New Orleans.



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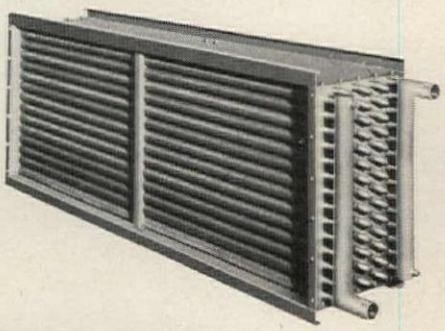

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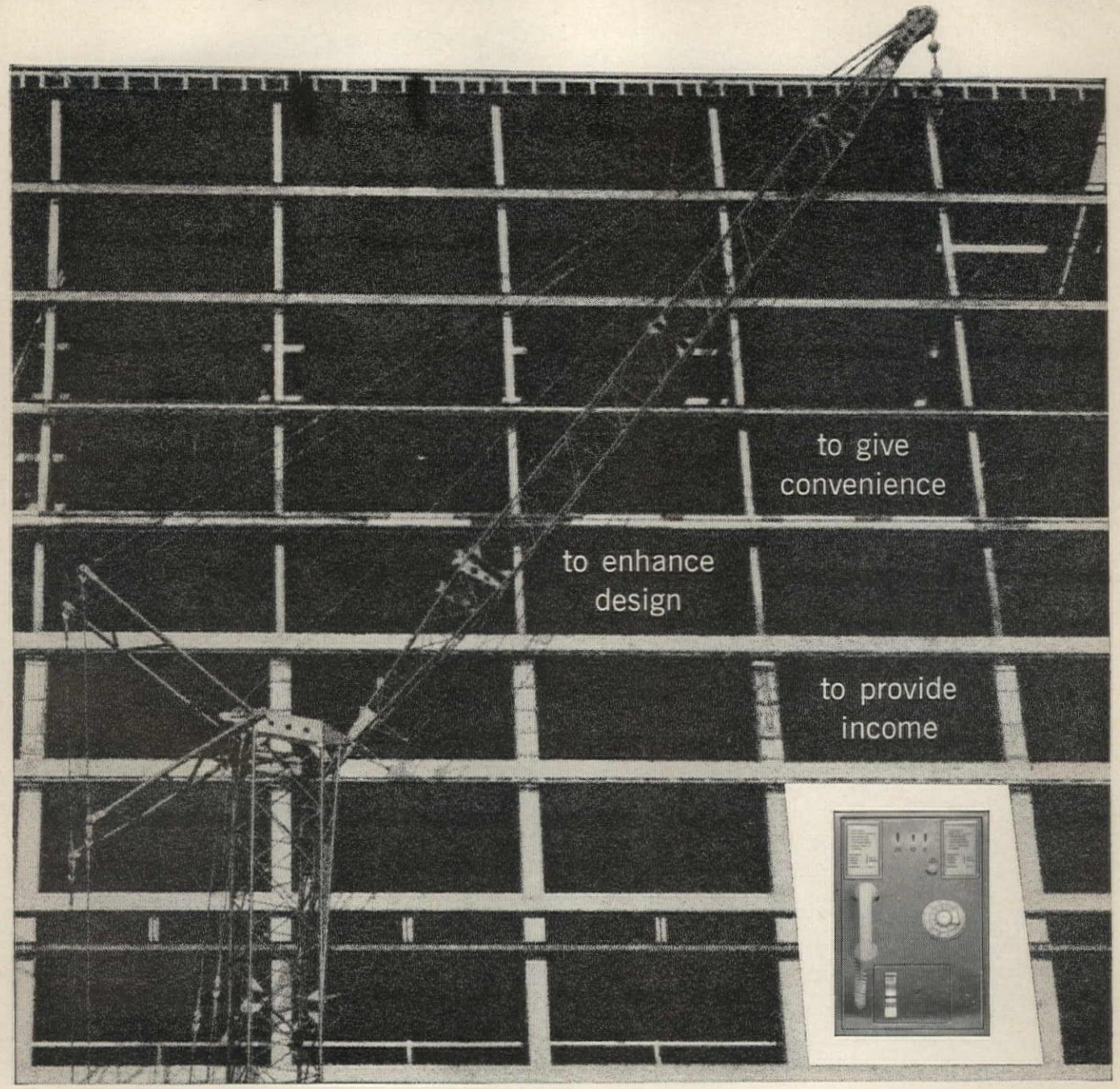

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CATHERINE BAUER WURSTER DIES AT 59

Catherine Bauer Wurster, 59, noted author and educator and associate dean of the College of Environmental Design at the University of California, Berkeley, was found dead on November 23, after apparently suffering a fall while hiking on Mount Tamalpais near San Francisco. She was the wife of William Wilson Wurster, the dean emeritus of that college and partner in the architectural firm of Wurster, Bernardi and Emmons.

An article by Mrs. Wurster, who was an Editorial Consultant of ARCHITECTURAL RECORD, appeared in the RECORD's December issue ("Can Cities Compete with Suburbia for Family Living?"—pages 149-156).

Born in Elizabeth, New Jersey, on May 11, 1905, Mrs. Wurster graduated from Vassar in 1926. Her book, "Modern Housing," published in 1934, was the pioneer American study of social policy and architecture of government-sponsored housing. Before receiving a Guggenheim Fellowship in 1936, she worked with the American Federation of Hosiery Workers in Philadelphia in starting the union's Carl Mackley Houses, the first major development of its kind in the country.

Mrs. Wurster was an adviser to President Roosevelt, having served as director of research and information for the United States Housing Administration from 1937 to 1939. She taught at Harvard University from 1945 to 1950, when she joined the faculty at the University of California at Berkeley.

Mrs. Wurster was the author of the housing and community planning chapter in "Goals for Americans," the report of President Eisenhower's Commission on National Goals, and was currently a member of President Johnson's task force on urban problems.

Mrs. Wurster's awards include those given to her by the National Association of Housing and Redevelopment Officials in 1954 and the American Institute of Planners in 1959. She was a board member of the National Housing Conference, California Tomorrow, the American Planning and Civic Association, and the Loula B. Lasker Fellowship Trust. She was consultant to the United Nations, the Ford Foundation and the Rockefeller Foundation as well as numerous housing and city planning agencies.

Memorial services were held December 6 in the courtyard of Wurster Hall, the new building for the College of Environmental Design on the Berkeley campus.

ROOSEVELT COMMISSION APPROVES MEMORIAL DESIGN

The revised design of the Franklin Delano Roosevelt Memorial, designed by Pedersen, Tilney, Hoberman, Wasserman, and Beer, was approved December 10 by the Roosevelt Memorial Commission in New York, apparently clearing the way for construction of the monument. Last June the Fine Arts Commission of Washington approved the revised design (August 1964, page 26).

According to Judge Francis Biddle, chairman of the commission, unanimous approval was reached after a great deal of discussion. Judge Biddle said Representative James Roosevelt, a son of the late President, still objected to the design, "but this is a good design and this shouldn't prevent it," Mr. Biddle added.

The commission did not pass a flat resolution approving the design, but rather chose to list a long series of "recitals" now being drafted by Mr. Biddle. These recitals, which will enumerate in detail the origins and development of the design, will be drafted to serve as a model for conducting future public competitions, according to Chairman Biddle. "We want to put the award squarely on its history and the merits of its design, showing what a solid base it really had," said Mr. Biddle.

The commission also discussed and will hold future meetings on the questions of drafting a report to Congress and ways to raise the $4.5 million needed to erect the monument.

I. M. PEI CHOSEN TO DESIGN KENNEDY LIBRARY

Ieoh Ming Pei of New York City has been selected by the Kennedy family to be the architect for the John F. Kennedy Memorial Library at Harvard University.

The program for the library has been expanded to include a projected institute for advanced political studies. Arrangements are being made between trustees of the Kennedy Library and Harvard officials to work out the form and organization of the institute and define its relationship to the university.

Robert F. Kennedy, brother of the late President, commenting on the selection of Mr. Pei, said: "We all feel that he will be able to capture the spirit and style that we wish to express in this building."

There is as yet no design for the library and institute, because the complete program has yet to be formulated. It is considered possible that the present two-acre site on the Charles River might not be sufficient for the expanded program, and a new site may be selected.

Eugene Black, former president of the World Bank and a trustee, who is in charge of fund-raising for the library, said that the original goal of $10 million had already been raised.

Here's how Deering-Milliken solved a roofing problem with RUBEROID T/NA 200® (made with Du Pont TEDLAR*)

PROBLEM: Deering-Milliken's new textile finishing plant at Blacksburgh, S. C. needed a 200,000 sq. ft. flat roof with these properties: high reflectivity, chemical resistance, a smooth surface, superior strength, flexibility, and long, trouble-free life. This was the problem facing Daniel Construction Co., the general contractor, and J. Roy Martin Roofing Co., the roofing contractor.

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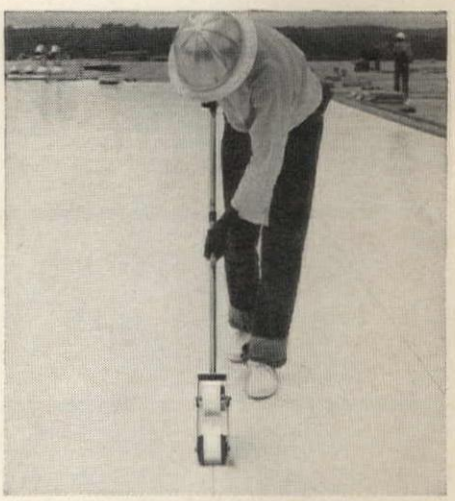

To mask the laps, and as a final seal, a pressure-sensitive tape, made of the same tough TEDLAR is used. The roof is completed!

For complete facts on Ruberoid T/NA 200 roofing for industrial, commercial, and institutional designs, write to this address:

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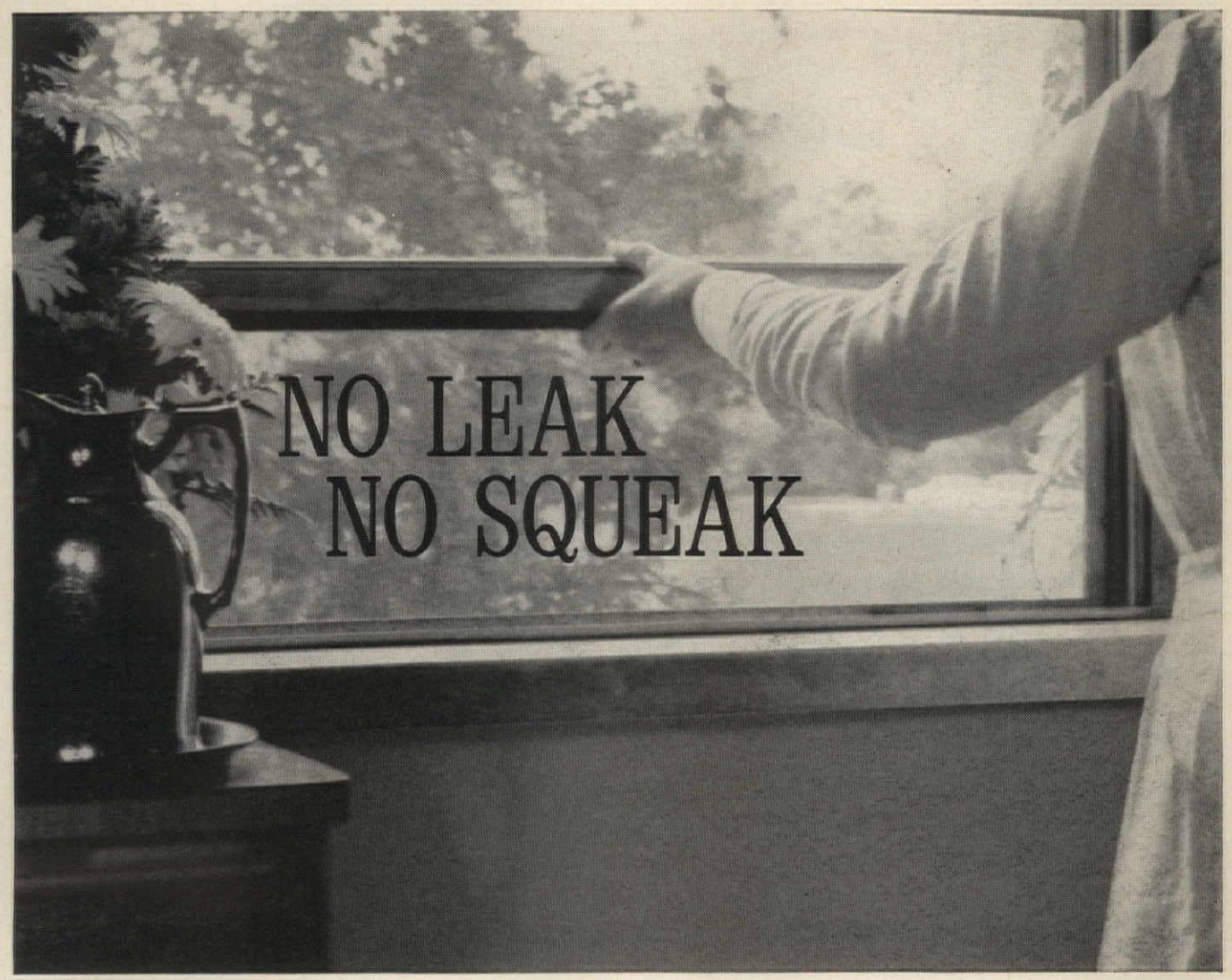

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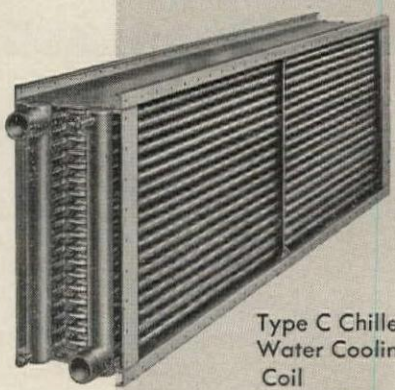

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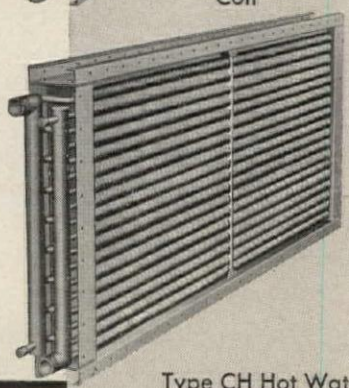

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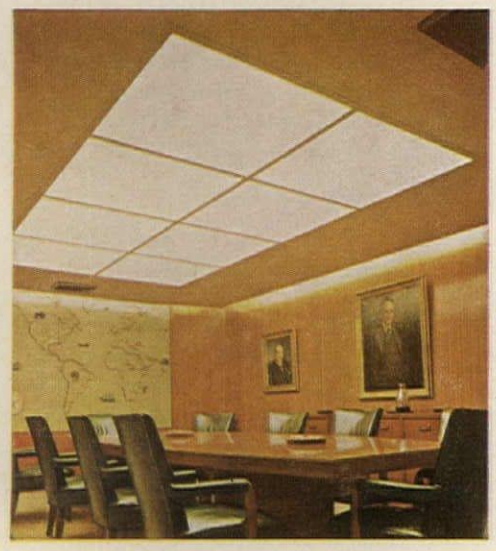

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A monthly roundup of reports on new books of special interest to architects and engineers

This Month's Books
REVIEWS

Jacobsen

ARNE JACOBSEN. *By Tobias Faber, translated into English by E. Rockwell. Frederick A. Praeger Inc., 111 Fourth Avenue, New York, N.Y., 10003. Unpaged, illus. $17.50.*

A comprehensive presentation of the work of Arne Jacobsen has long been overdue, and this book is therefore likely to be welcomed by most architects. Most of Jacobsen's important buildings are shown, as well as some of his landscaping work and a selection of his textiles and furniture. The photographs are well chosen to emphasize the essential character of Jacobsen's work—well-ordered plans, clear uncluttered architectural forms, beautiful detailing and workmanship, and quiet harmony between buildings and their surroundings.

The text (in German and English), includes an introductory article tracing the development of Jacobsen's work, as well as straightforward descriptions of individual buildings.

This book is valuable as a reference work and fills a definite gap in published material on current architecture, but Jacobsen's work is of sufficient stature to warrant a more detailed analytical study. Perhaps this will be forthcoming in the future.

Victoriana

VICTORIAN ARCHITECTURE. *Edited by Peter Ferriday, J. P. Lippincott & Company, East Washington Square, Philadelphia, Pa. 306 pp., illus. $8.95.*

The title of this book is misleading if it leads one to expect a systematic and comprehensive study of the architecture of the Victorian era. The subtitle, "An Age Revisited," is much more appropriate to this discursive collection of essays, which highlight and bring vividly to life some of the people and architectural styles which characterized this curious period from the mid-19th to the early 20th century.

Among those contributing are Pevsner, Goodhart-Rendel, E. M. Dodd, Furnaux Jordan, Paul Thompson, David Cole and a number of others. John Betjeman has contributed a brief and well-balanced introduction. Of all the essays, Furnaux Jordan's on Joseph Paxton is possibly the most charming and rekindles most vividly the spirit of the age. E. M. Dodd's study of Cockerell is an excellent appreciation of one of the most influential figures of the Victorian architectural world, and the Goodhart-Rendel lectures are always worth reading.

The most disappointing aspect of the book is the collection of illustrations. Many of these are too small and they do not seem to be presented in any understandable order.

The book has architectural, literary and historical appeal, and should command quite a wide readership.

Post Revolution Boston

BULLFINCH'S BOSTON *1787-1817. By Harold and James Kirker. Oxford University Press, 417 Fifth Ave., New York, N.Y., 10016. 305 pp., illus. $7.50.*

Books on Boston always have an appeal, and this, which tells the story of Charles Bullfinch and his designs for the Beacon Hill area in the period immediately following the revolution, gets off to a good start.

Bullfinch was not only an architect, but was also a political and social leader who did much to improve town planning, educational and social facilities within the city. By presenting Bullfinch in his social, as well as his architectural context, the

continued on page 55

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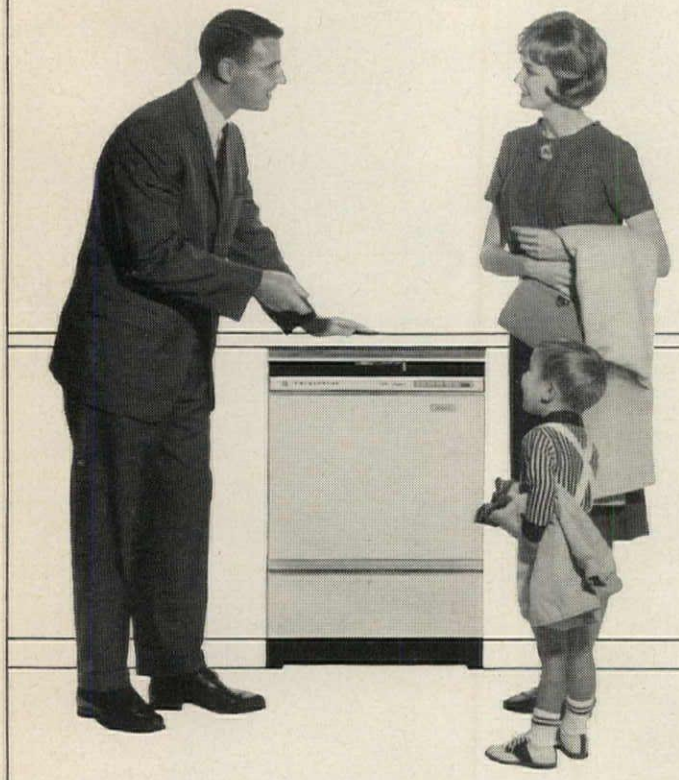

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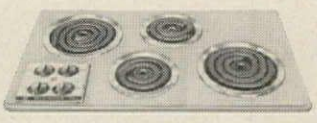

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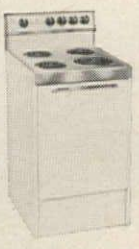

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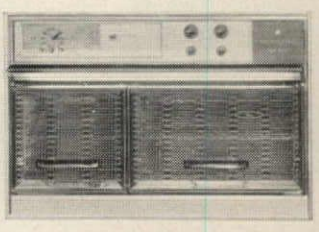

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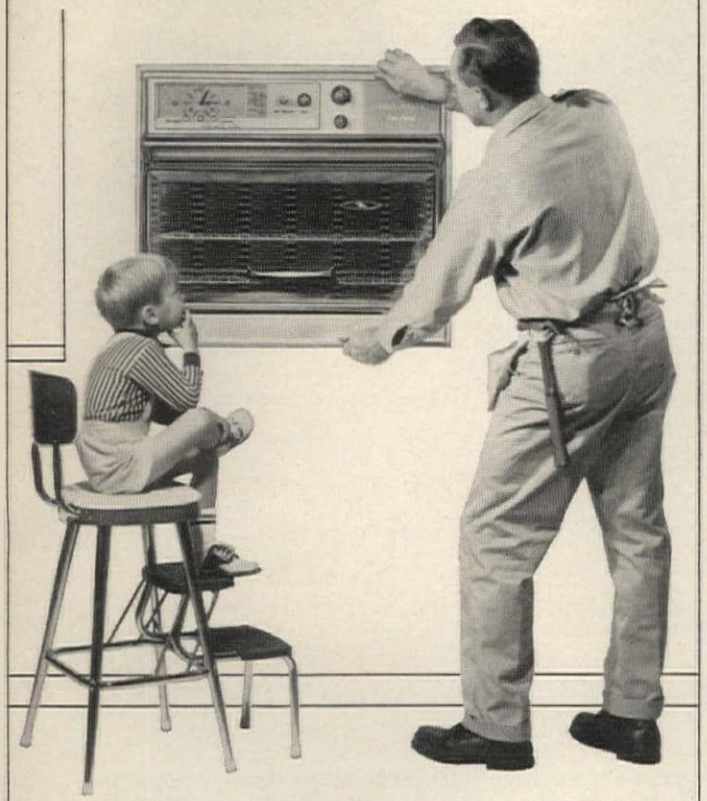

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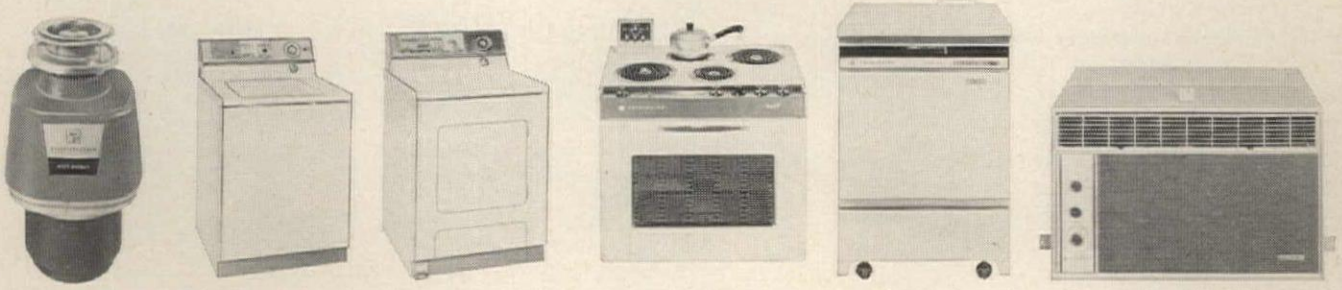

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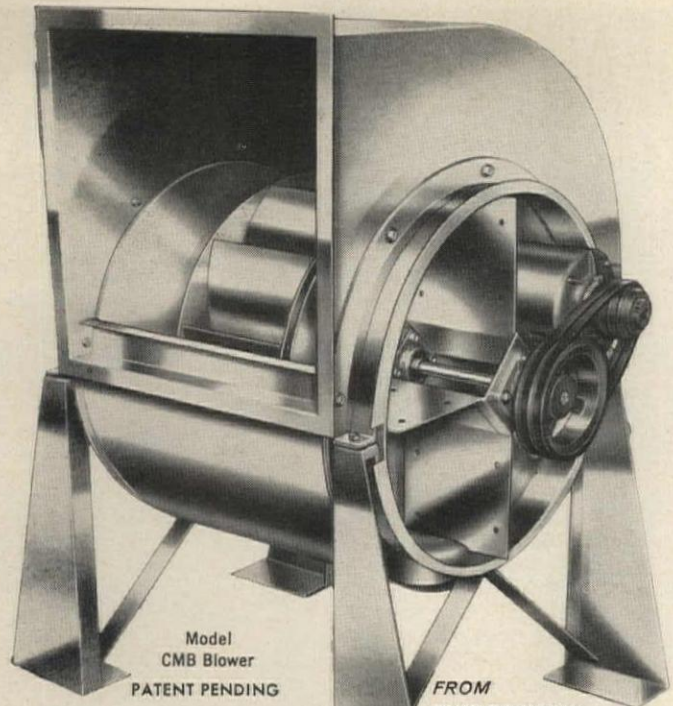

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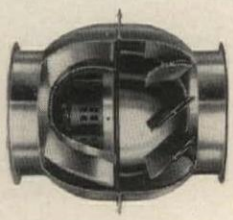

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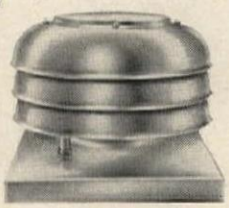

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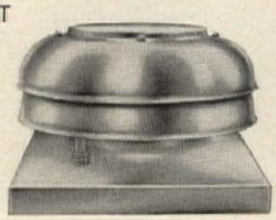

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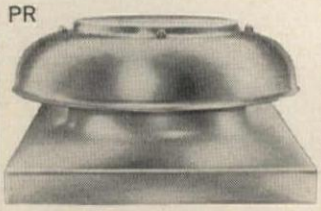

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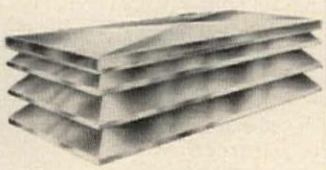

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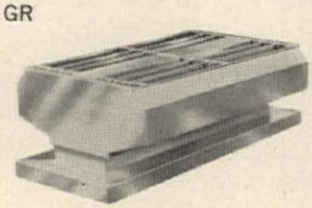

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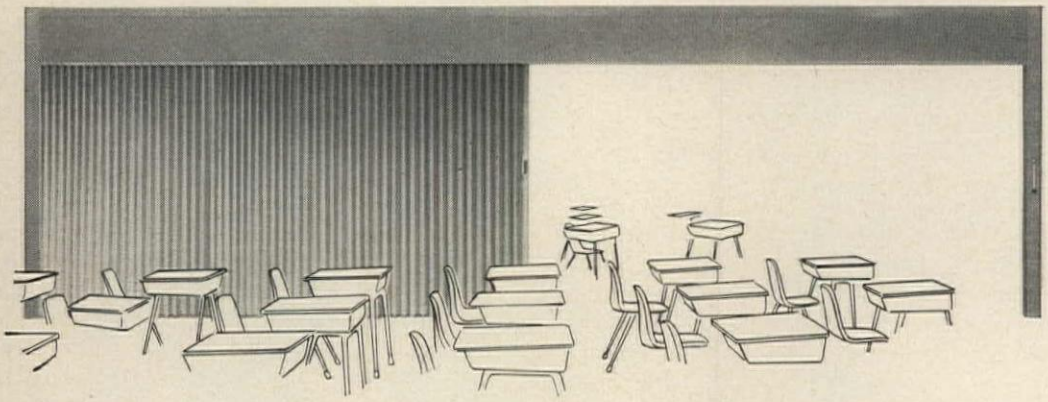

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Required Reading

continued from page 46

authors of this book have been able to show us Boston as a city whose architectural style significantly expressed the life of the times. We see all the evidence of a city in a period of transition, evolving a style of its own, but still strongly influenced by the culture it has just escaped from.

The book is well written, and the illustrations fascinating but too few.

Furniture on Display

NEW FURNITURE. *Frederick A. Praeger Inc., 64 University Place, New York, N.Y., 10003. 162 pp., illus. $12.50.*

Number seven in a series on furniture, this is an attractively produced volume showing a wide variety of modern designs—some very familar and others relatively new. Chairs seem to predominate, but occasional tables and modular wall units are well represented.

Chambord

THE CHATEAU OF CHAMBORD. *Text by Pierre Gascar. Photographs by André Martin. The Macmillan Company, 60 Fifth Ave., New York, N.Y., 10011. 115 pp., illus. $9.95.*

Francois I ordered Chambord built in 1519. In many ways it is still the embodiment of a dream city.

This beautiful book pays homage to Chambord in a manner befitting its grandeur. The photography, brilliant in its detail, re-invents moods of Chambord's exquisite past and the poetic text evokes its immortal history.

Tiffany

LOUIS C. TIFFANY, REBEL IN GLASS. *By Robert Koch. Crown Publishers, 419 Park Ave. South, New York, N.Y., 10016. 246 pp., illus. $7.50.*

Louis C. Tiffany had little interest in directing the affairs of the family firm, Tiffany and Company, but instead devoted his life to the arts. This book is a definitive study of his career, and it will also provide collectors with a means of identifying and dating examples of Tiffany glass and metalware.

With the current renewed interest in Art Nouveau, architects will undoubtedly find this book of interest. Some 350 illustrations, many in color, are contained.

World Art

BYZANTINE MOSAICS. *By Heinrich Neumayer.* KOREAN PAINTING. *By Alfred Janata.* MEDIEVAL STAINED GLASS. *By Heribert Hutter. Crown Publishers, 419 Park Ave. South, New York, N.Y., 10016. Unpaged, illus. 95 cents each.*

Three new handbooks in the Movements in World Art series have been published, each devoted to subjects from differing cultural epochs.

"Byzantine Mosaics" illustrates mosaics from both Italy and Byzantium during the period from the fifth

continued on page 68

when there's a hardware selection to be made...

this man relies on past *experience*

"Look-alikes" may puzzle the novice; but the man of experience doesn't just look at hardware. He looks beyond and sees – the *tangibles* and *intangibles* of his specification.

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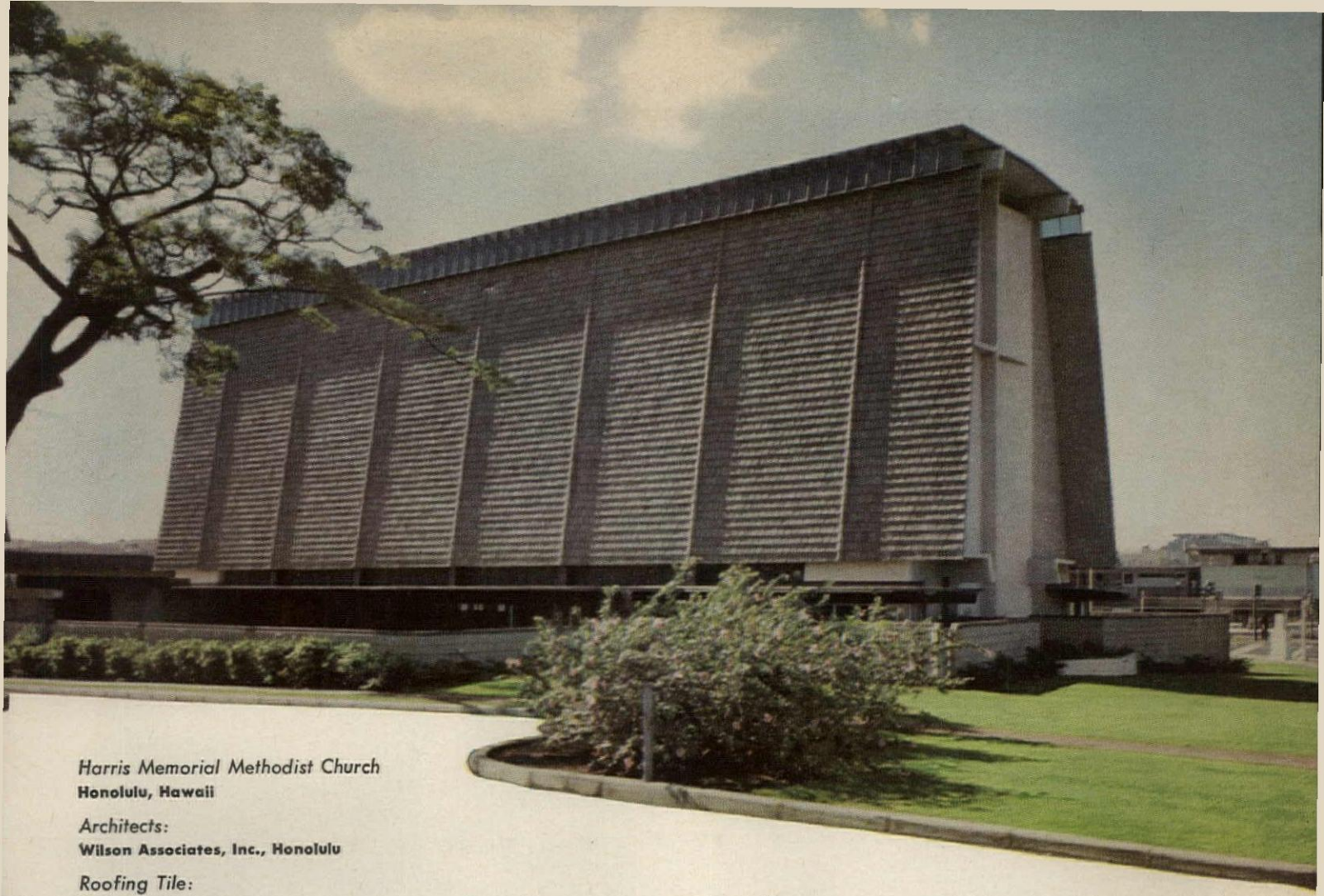
He knows the time and money that are saved when the correct hardware reaches the building site on time.

Because this man knows GJ . . . he specifies GJ . . . for the *quality that he demands*, the *service-extras he has a right to expect*, and the *scheduled delivery that he needs.*

GJ hardware is built to endure . . . and LOOKS it.

GLYNN • JOHNSON CORPORATION
4422 n. ravenswood ave. • chicago 40, illinois

For more data, circle 50 on Inquiry Card

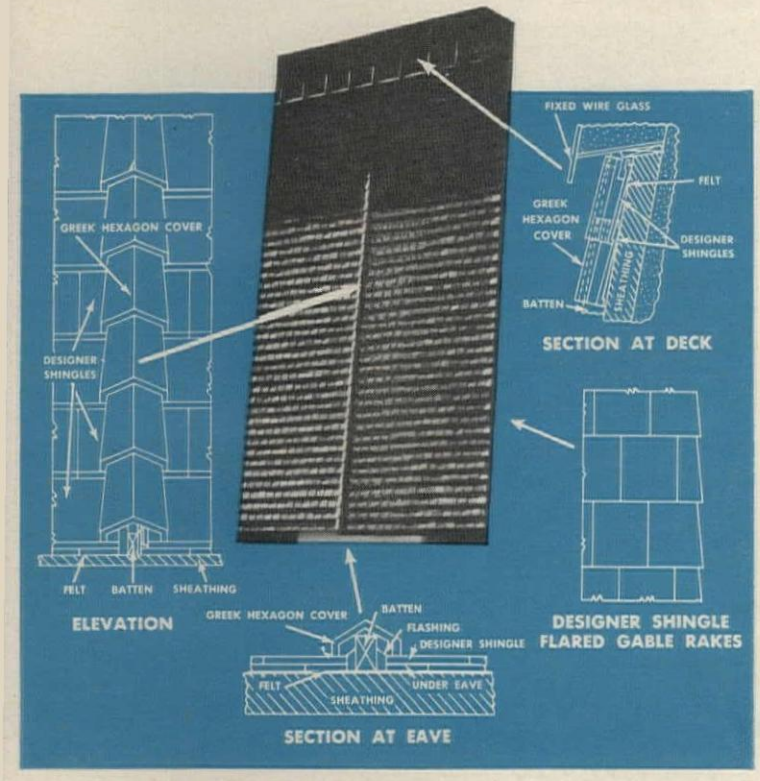


Harris Memorial Methodist Church
Honolulu, Hawaii

Architects:
Wilson Associates, Inc., Honolulu

Roofing Tile:
Ludowici-Celadon

When the Roof Becomes a Major Element in the Design...



Architects depend on Ludowici-Celadon tile roofing for versatility of texture and color . . . In this imposing edifice, modern Designer Gray is accented by the classic Greek tile motif for a pleasing effect . . . but equally important is the fact that the roof will retain its permanent beauty and enduring protectiveness for generations to come. We'd like to send you our free illustrated brochure.

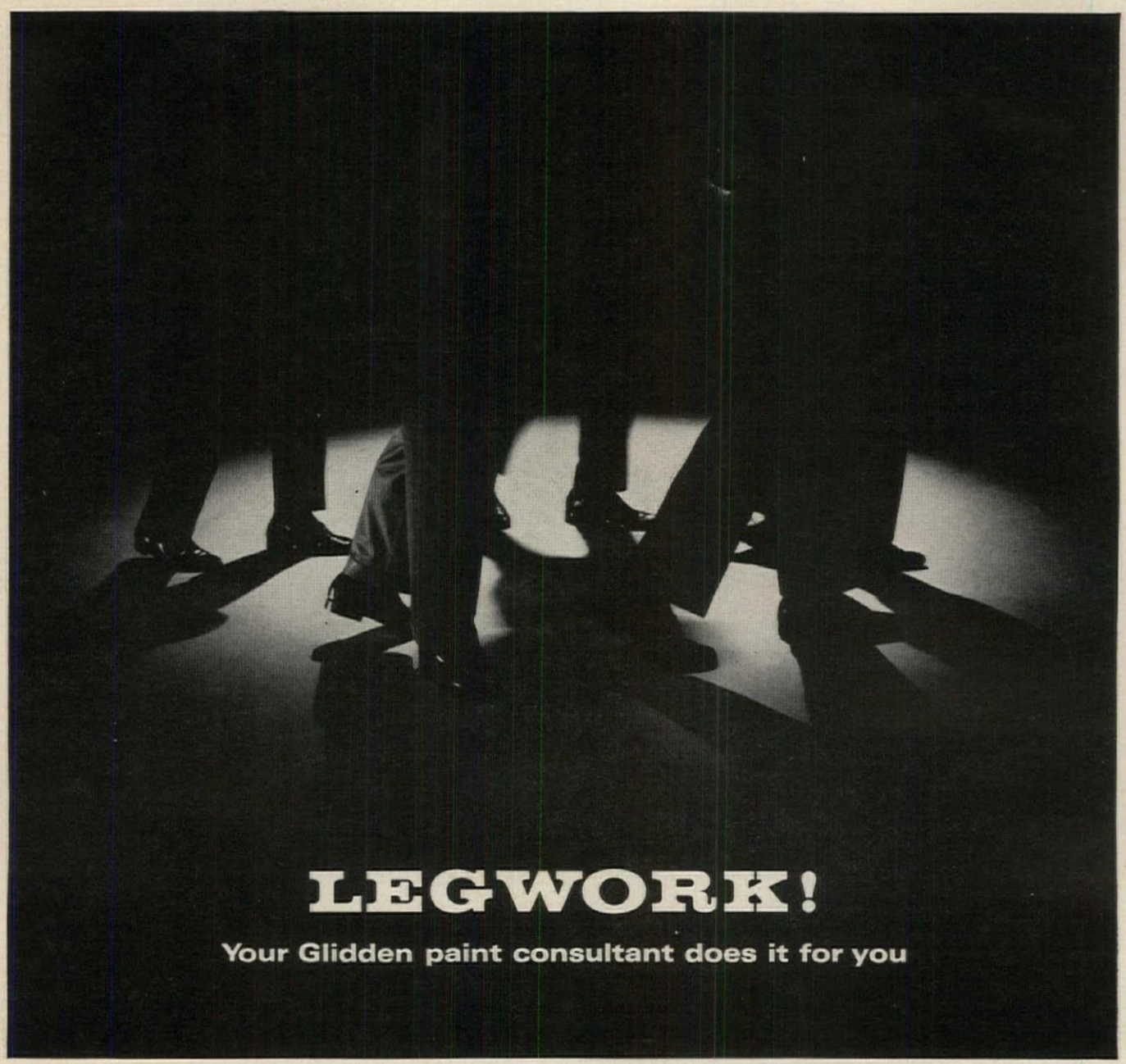
For additional information, write Dept. AR

DESIGNER tile roofing is one of the several Ludowici-Celadon patterns and colors offering wide flexibility in exterior design. Here it is combined with Greek tile over the battens.

*** LUDOWICI-CELADON CO.**
75 E. WACKER DRIVE • CHICAGO, ILL. 60601

Manufacturers of quarry tile, the nation's largest producer of roofing tile and NAILON Facing Brick

For more data, circle 51 on Inquiry Card



He visits your jobsite. Checks paint requirements. Checks paint application methods. Checks paint colors. Checks painting schedules.

All this can free your time for other work. That's the job of the professional Glidden consultant. He knows how to give your jobs "client pleasing" paint appearance and performance. He knows all paints—their advantages, their limitations.

Since Glidden makes all types of paints, this consultant has no ax to grind for any one product. You'll get frank answers, and prompt technical solutions to any problem.

Legwork is just part of this expert service. Ask for help on paperwork. Ask for "industry first" color devices. Get the help you've always wanted. Have your requirements met—not challenged. Call or write today.

Glidden

THE GLIDDEN COMPANY
Coatings and Resins Group
Cleveland, Ohio 44114

For more data, circle 52 on Inquiry Card

For more data, circle 53 on Inquiry Card ➔

Required Reading

continued on page 55

to the 14th centuries. "Korean Painting" is largely a survey of the works of Korean painters of the "Golden Age" of Korean painting, the 18th century. "Medieval Stained Glass" describes the development of the art of stained glass in Europe from the first extant examples to the masterpieces of the Gothic period.

Each contains a scholarly introductory essay and 24 color plates, one by one accompanied by explanatory notes.

New Editions

GREEK REVIVAL ARCHITECTURE IN AMERICA. *By Talbot Hamlin. Dover Publications Inc., 180 Varick St., New York, N.Y., 10014. 439 pp., illus. Paperbound, $3.00.* LOST EXAMPLES OF COLONIAL ARCHITECTURE. *By John Mead Howells. Unpaged, illus. Paperbound, $2.75.*

The republication of these vital studies of American architectural heritage in paperbound editions is most welcome. For the architect, nothing is lost from the originals; for the layman, they lend understanding to our cultural history.

THE CREATION OF THE ROCOCO. *By Fiske Kimball. The Norton Library, W. W. Norton & Company, Inc., 55 Fifth Ave., New York, N.Y., 10003. 244 pp., illus. Paperbound, $2.45.*

Devoteés of Rococo art will appreciate this paperbound reprint of the original. All the character of that art of ornament is here, from the time Rococo emerged and dominated Europe, until the advent of the classical style of the late 18th century.

Books Received

BENDINER'S PHILADELPHIA. *By Alfred Bendiner. A. S. Barnes & Company, 11 E. 36th St., New York, N.Y., 10016. 175 pp., illus. $4.95.*

DESIGN OF PRESTRESSED CONCRETE STRUCTURES. *By K. W. Bieger. Sahu Cement Service,*

continued on page 78

The beautiful way to support a roof . . .

with
exposed aggregate

Mo-Sai®

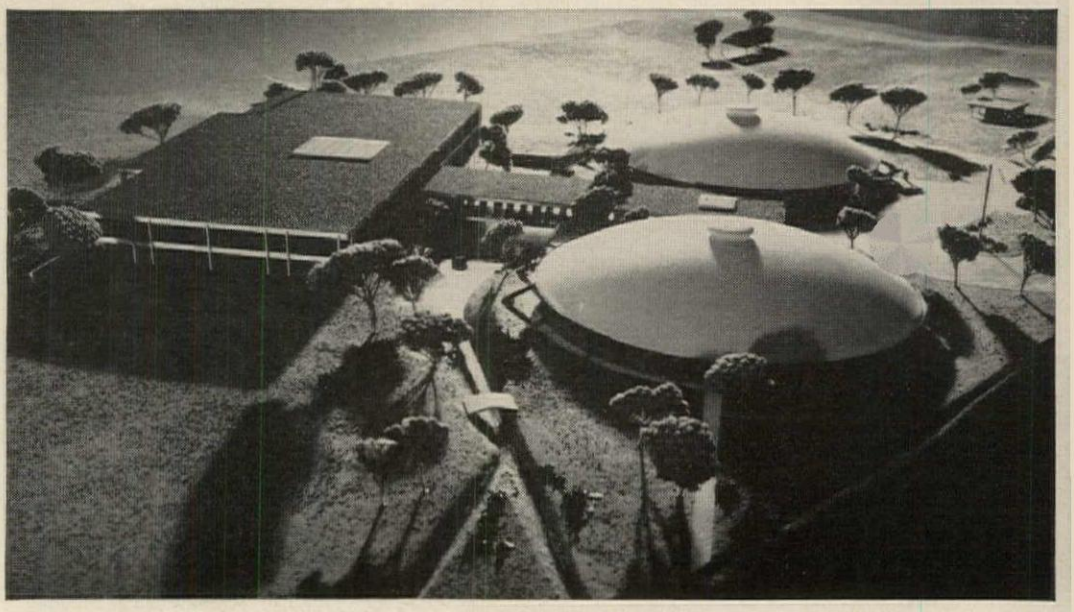
precast concrete
structural units

The beautiful, enduring finish of Mo-Sai®, originally a curtain wall or facing material, is now used extensively for structural units. For example, on the General Telephone Office Building, shown here, solid reinforced Mo-Sai precast concrete shafts with exposed quartz surface on all sides support an extended roof. Tapered Mo-Sai cross pieces complete the "star" design and form an unusual railing for the sheltered walkway. Prestressed Mo-Sai windowalls with black obsidian face the building proper, forming a striking background for the white Mo-Sai structural shafts.
Why not give your local Mo-Sai member a chance to work out your ideas in structural Mo-Sai?

General Telephone Company of Ohio, Marion, Ohio
Architects: Edwards and Burris
General Contractor: Garwick & Ross, Inc.

TWIN DOMES WITH 200-FOOT SPANS are distinctive architectural features of this Iowa school complex. One dome covers the field house; the other a fine arts building. Each is supported by 16 wooden arch segments, which meet a steel compression ring at their apex. At their base, a concrete tension ring post-tensioned by the Ryerson BBRV system efficiently and economically compensates for the horizontal thrust—thus relieving the foundation of this load.

Warren G. Harding Junior High School, Cedar Rapids, Iowa; Architects: Kohlmann-Eckman-Hukill; **Structural and Foundation Engineers:** Shive-Hall-Hattery Engineering Services; **Contractor:** Abell-Howe Company.



NEW STRUCTURES SHOW ADVANTAGES OF

PUERTO RICO'S LARGEST, MOST MODERN OFFICE BUILDING will be Banco Popular Center, a 19-story tower now being built at San Juan. The builder wanted maximum areas of unobstructed, column-free floor space, and this was achieved economically with post-tensioned one-way joist slabs—maximum spans are about 40 feet. Ryerson BBRV post-tensioning also made it possible to build each floor (slab, joists and girders) as a monolithic structure with elements combined to achieve shallowest possible structural depth.

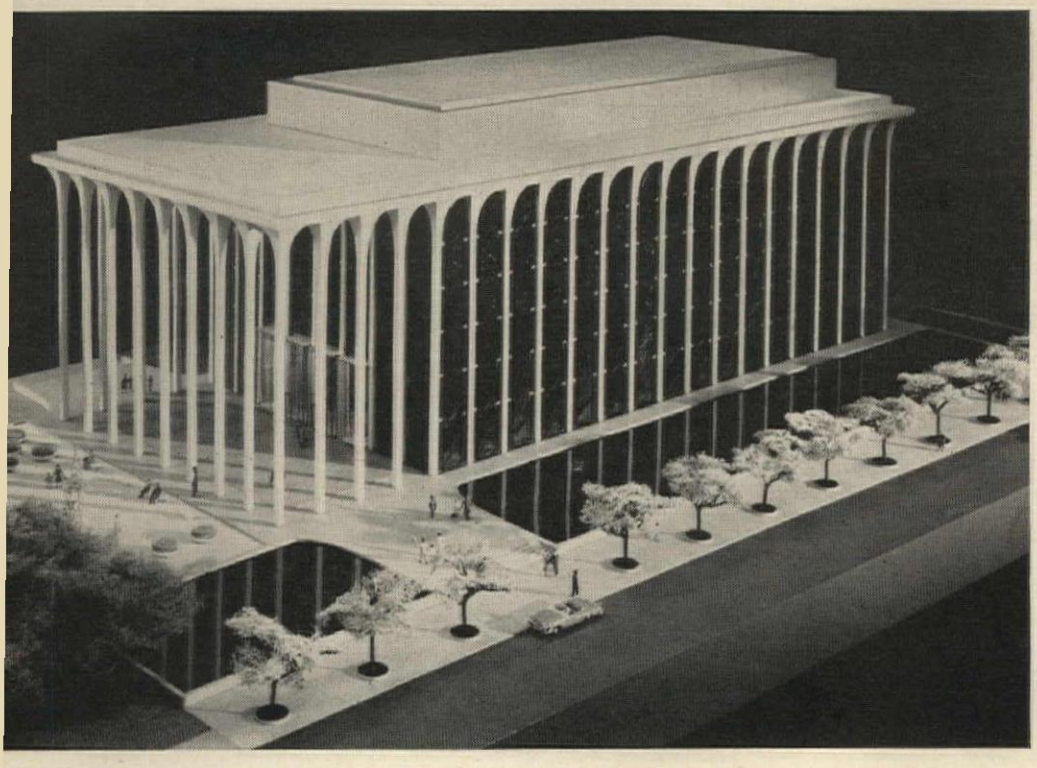
Banco Popular Center, San Juan: Project Manager and Rental Agents: Cushman & Wakefield, Inc.
Architects: Toro-Ferrer, and Kahn & Jacobs
Structural Engineers: Dinos & Vafi, and Lev Zetlin & Associates
General Contractor: George A. Fuller Company of Puerto Rico
Subcontractor for Concrete Work: Pavarini Construction Co., Inc. of Puerto Rico
Subcontractor for Rebar & Post-Tensioning: G & H Steel Service, Inc.

When you specify Ryerson post-tensioning you deal with one of the nation's largest suppliers of construction steels —a company with the resources and facilities to provide a complete service package.

For architects and engineers this package includes assistance in feasibility studies on use of post-tensioning in specific projects...preliminary cost data...sharing of experience in structural design and layout...plus specification information and detailing.

For contractors Ryerson delivers tailor-made tendons, completely assembled and ready for placement. Also provided: equipment for stressing and grouting, technical jobsite assistance, architect-approved drawings, stressing data and reliable labor estimates.

For more information or help on a current project, call the nearest of Ryerson's 20 plants or write Box 8000-A, Chicago Illinois 60680

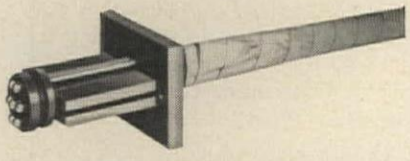


THE 63-FOOT SPAN REQUIRED BY A DEEP COLUMN-FREE PORTICO was achieved here without affecting the striking appearance of structural lightness by the use of post-tensioned concrete. Six interior beams spanning the portico at roof level each contain four 30-wire Ryerson BBRV tendons. Stressing of exterior beams is accomplished with two 40-wire units.

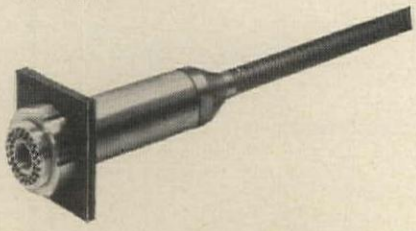
Office Building for Northwestern National Life Insurance Co., Minneapolis, Minnesota; Architects and Engineers: Minoru Yamasaki and Associates; **Structural Engineers:** Worthington, Skilling, Helle & Jackson; **Contractor:** George A. Fuller Company.

BBRV POST-TENSIONING BY RYERSON

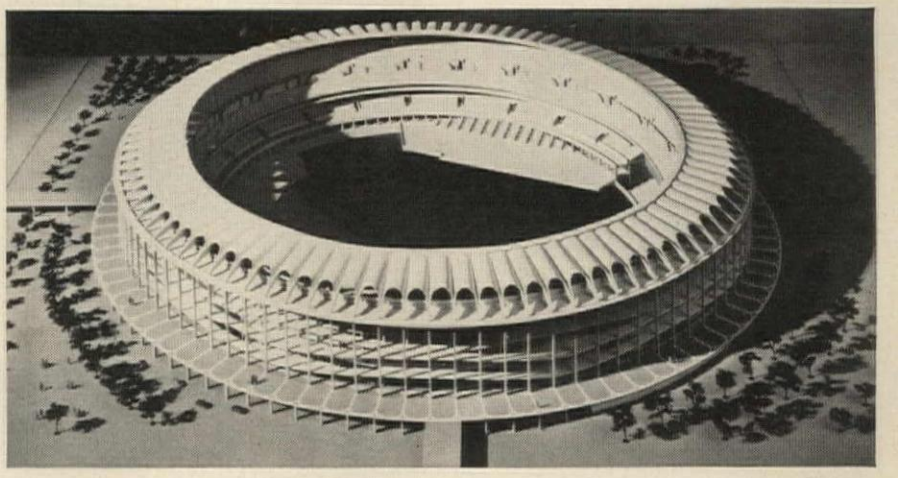
BONDED OR UNBONDED TENDONS ...LOCKNUT OR SHIM-TYPE ANCHORAGE...FOR POSITIVE END ANCHORAGE AND RELIABLE APPLICATION OF FORCES



Typical movable end anchor of Ryerson BBRV *unbonded* (greased and wrapped) tendon after stressing.



Typical movable end anchor of Ryerson BBRV *bonded* (grout type) tendon after stressing.



NO ONE ENDS UP BEHIND A POST in this handsome 50,000-seat sports stadium. Extreme cantilevers, made possible by Ryerson BBRV post-tensioning of the concrete girders, will keep columns back out of sight lines. The outer edge of the oval roof canopy extends 50′ over the upper seating deck. And the upper deck, in turn, cantilevers 40′ over the lower deck. Roof and deck each have 96 beam lines and the girders, 75′ and 67′ long respectively, are each post-tensioned by 6 tendons of 42 or 43 wires.

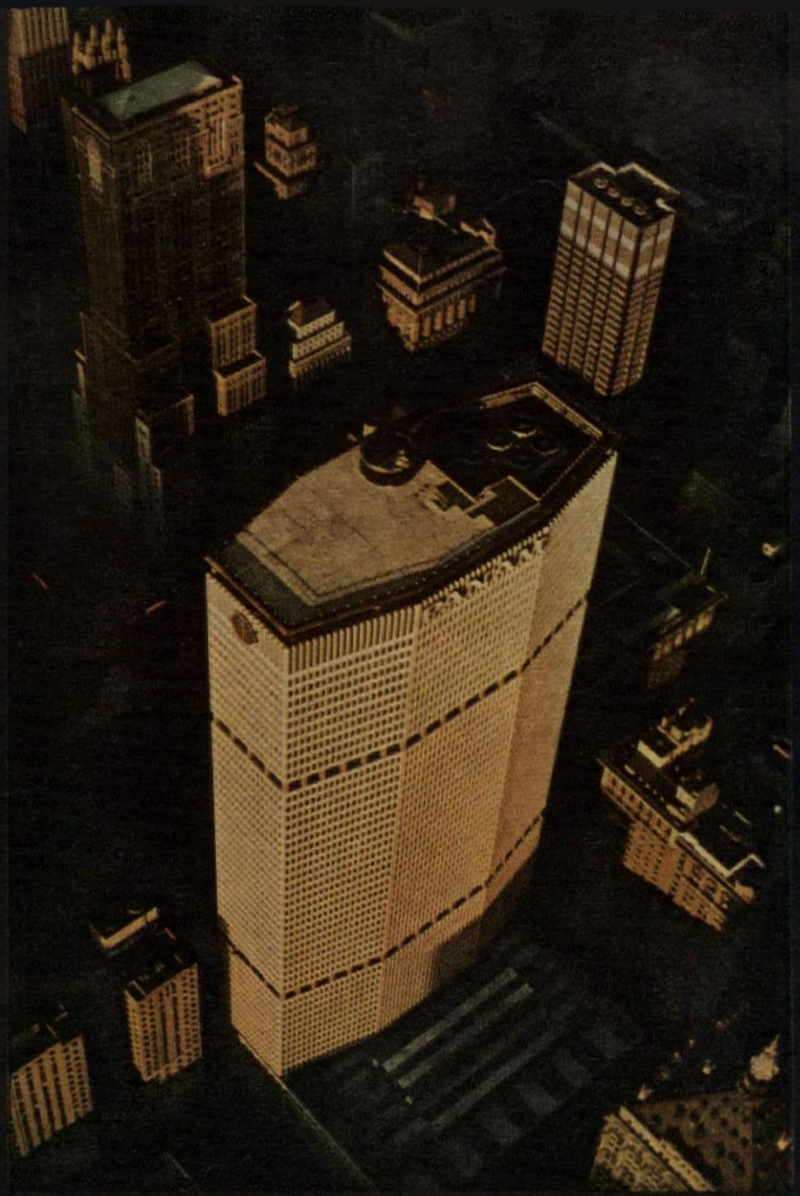
Civic Center **Busch Memorial Stadium; Engineers and Architects:** Sverdrup & Parcel and Associates, Inc.; **Architect-Designer:** Edward Durell Stone; **Associate Architects:** Schwarz & Van Hoefen; **Contractors:** Fruin Colnon Contracting Co. and Millstone Construction Co.

RYERSON

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND STEEL FAMILY

Re-Bars and Accessories • Post-Tensioning • Spirals • Wire Mesh • Open-Web Joists • Sheet Steel Piling and Bearing Piles • Structural Shapes and Tubing • Safety Plate • Stainless Steel • Aluminum Building Products • PVC Water Stops • Expanded Metal • Grating, etc.

For more data, circle 62 on Inquiry Card



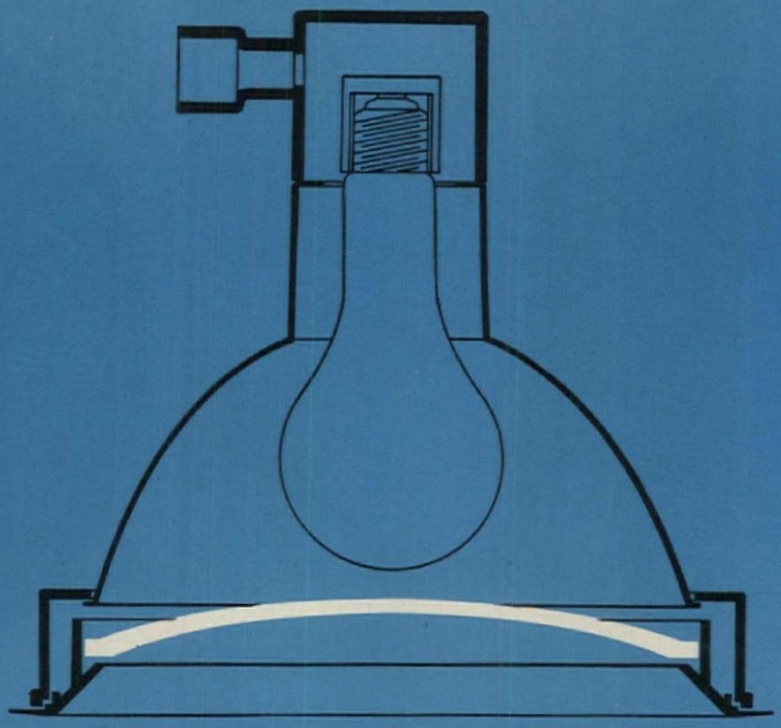
The fastest elevators in the world are in New York's Pan Am Building

They're Westinghouse Mark IV Elevators. Traveling at 1700 feet per minute, they whisk heavy traffic smoothly to the upper floors. With computerized controls, they answer calls directly. Politely, too. Doors close quickly only after the last person enters or leaves. What else would you expect in the world's largest commercial building? 71 Westinghouse Elevators and 20 Electric Stairways serve Pan Am's 20,000 tenants and 150,000 transients daily. And skilled Westinghouse Maintenance keeps elevators as efficient as the day they were installed.

You can be sure if it's Westinghouse

A NEW INCANDESCENT LIGHTING SYSTEM*

FORCAST* by Smithcraft . . .



Forcast recessed incandescent lighting fixtures make it easier for you to create with light and achieve desired lighting effects. Uniting form, function, and performance, these fixtures help you set a mood, create atmosphere, or dramatically delineate contour, color, and texture.

Paired die castings of door and mounting frame assembly enables you to specify either a precise flangeless trim, or a minimum width overlapping flange. Combining the new smaller lamp envelopes with high performance Alzak** aluminum reflectors, Forcast fixtures provide refined control with optimum efficiencies. Ideal for use with acoustical tile or plaster ceilings, recessed Forcast units are simply and quickly installed and easily maintained.

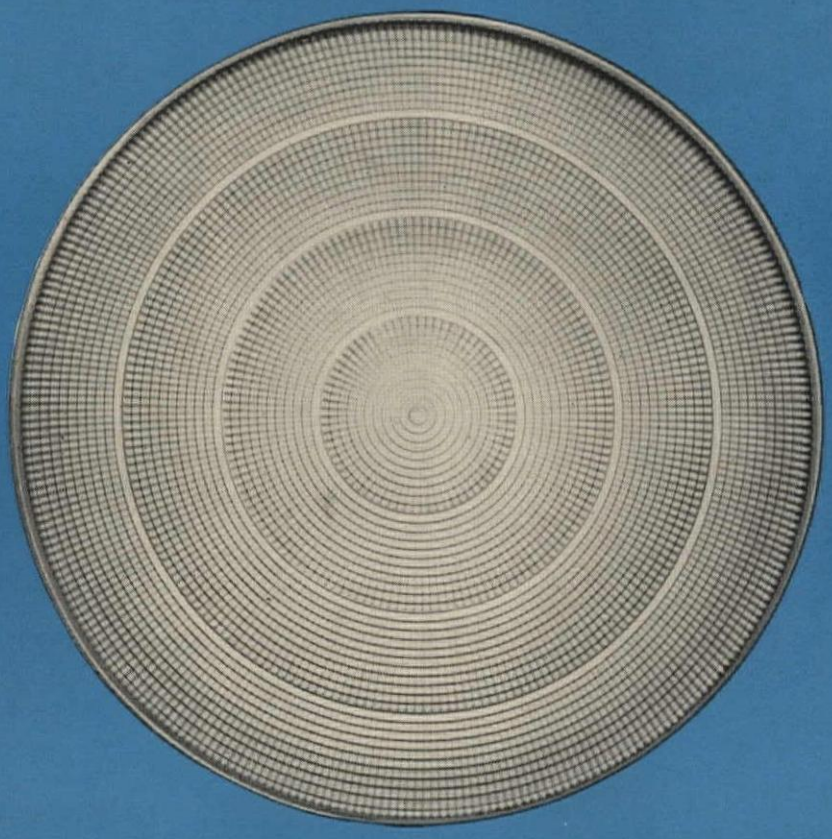
Your most demanding incandescent design requirements can be satisfied with the esthetics and construction of Forcast.

For additional information, contact your Smithcraft representative, or write . . .

SMITHCRAFT CORPORATION, CHELSEA, MASSACHUSETTS 02150

*Patents & T.M. applied for **Proprietary term of Aluminum Company of America

with new Controlens® by Holophane



Holophane has designed a new series of square and round Controlens which help to make Smithcraft's Forcast a superior incandescent lighting system.

These lenses, with sophisticated prismatic contours, distribute light evenly... reducing glare and providing complete control of light from any normal viewing angle. Controlens used in Forcast fixtures provide new beauty, too. Circular lenses have concentric radial bands providing additional definition to the prisms. Square lenses have a unique rectilinear pattern of prisms with square concentric radials. You can use both round and square Forcast units together with complete harmony.

Controlens for round Forcast fixtures are available in 6", 8", and 10" diameters... square units in 8" and 10" sizes. This new incandescent lighting system gives you additional flexibility in the lighting of stores, restaurants, lounges, banks, and other important areas. Complete information is available in your area through the Holophane Field Representative, or write...

HOLOPHANE COMPANY, INC., 1120 Avenue of the Americas, N.Y., N.Y. 10036

®Holophane

Why are Bradley Washfountains the people's choice?

Because . . . lavatories are fine at home, but in employee and public washrooms, people want wash fixtures that are truly sanitary, quick and easy to use, and require no fussing. Only one wash fixture fits that bill — a foot-operated Bradley Washfountain.

Management also insists on Bradleys. Washfountains save 25% or more on floor and wall space. And they serve up to 8 people with one set of plumbing connections, cutting installation costs as much as 80%. They also save water and reduce maintenance time.

What's more, Washfountains give you a wider choice of colors and compositions than any other type of wash fixture. So, for plants, commercial buildings, schools, institutions — *all* modern buildings — specify Bradley Washfountains!

For complete details, see your Bradley representative. And write for latest literature. Bradley Washfountain Co., 9107 Fountain Drive, Menomonee Falls, Wisconsin 53055.

Bradley

For more data, circle 67 on Inquiry Card

Required Reading

continued from page 68

P.N.B. House, 5-Parliament St., New Delhi 1. 83 pp. $2.00.

CONSTRUCTION COMPANY ORGANIZATION AND MANAGEMENT. *By George E. Deatherage. McGraw-Hill Book Company, 330 W. 42nd St., New York N.Y., 10036. 316 pp. $12.00.*

LESSONS FROM FAILURES OF CONCRETE STRUCTURES. *By Jacob Feld. American Concrete Institute, Box 4754, Redford Station, Detroit, Mich. 48219. 179 pp., illus. $6.00.*

TROPICAL ARCHITECTURE. *By Maxwell Fry and Jane Drew. Reinhold Publishing Corp., 430 Park Ave., New York, N.Y., 10022. 264 pp., illus. $17.50.*

EQUAL OPPORTUNITY IN HOUSING—A SERIES OF CASE STUDIES. *By the Office of Program Policy and Intergroup Relations Service, Housing and Home Finance Agency. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 89 pp. 35 cents.*

HOUSING STATISTICS HANDBOOK. *By the Subcommittee on Housing Statistics, Mayor's Housing Executive Committee. City Planning Commission, Department of City Planning, 2 Lafayette St., New York, N.Y., 10007. 52 pp. No charge.*

CARLOS RAUL VILLANUEVA AND THE ARCHITECTURE OF VENEZUELA. *By Sibyl Moholy-Nagy. Frederick A. Praeger, Inc., 111 Fourth Ave., New York, N.Y., 10003. 179 pp., illus. $12.50.*

ENCYCLOPEDIA OF MODERN ARCHITECTURE. *Edited by Wolfgang Pehnt. Harry N. Abrams, Inc., 6 W. 57th St., New York, N.Y., 10019. 336 pp., illus. $15.00.*

SURVEYING MANUAL. *By Louis C. Ripa. McGraw-Hill Book Company, 330 W. 42nd St., New York, N.Y., 10036. 131 pp. $5.95.*

PARKS FOR AMERICA. *By the National Park Service, U.S. Dept. of Interior. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. 485 pp., illus. Paperbound, $5.25.*

THE HOMES ASSOCIATION HANDBOOK. *By the Urban Land Institute, Urban Land Institute, 1200 18th St., N.W., Washington, D.C., 20036. 406 pp., illus. $10.00.*

BRICK AS AN ELEMENT IN DESIGN. *By Gerd Zimmerschied. Renouf Publishing Company Ltd., 2182 St. Catherine St. West, Montreal 25, Canada. 179 pp., illus. $9.50.*

GRAPHIC EFFECTS IN ARCHITECTURAL DRAWINGS. *By Gerd Zimmerschied. Renouf Publishing Company Ltd., 2182 St. Catherine St. West, Montreal 25, Canada. Unpaged, illus. $12.00.*

NATURAL STONE AS AN ELEMENT IN DESIGN. *By Gerd Zimmerschied. Renouf Publishing Company Ltd., 2182 St. Catherine St. West, Montreal 25, Canada. 321 pp., illus. $12.00.*

FINALLY a Solution to Power Load Center Problems

Kearney's NEW, REVOLUTIONARY

ISO-QUENSUR®

Interrupter-Disconnect Switch

- **SAVES SPACE**
- **SAVES MONEY**

Iso-Quensurs measure only 11¾ inches in depth — 50% less than other comparable equipment. Straight-line motion throughout the open — close cycle saves ⅔ or more of the depth needed for hinged blade disconncts.

Iso-Quensurs will save up to 50% of initial equipment costs — because they interrupt and visibly disconnect in one operation.

Group Operated, Frame Mounted NO OIL

ISO-QUENSURS SOLVE PRIMARY VOLTAGE SERVICE ENTRANCE PROBLEMS FOR:

- High Rise Office Buildings
- High Rise Apartments
- Schools
- Factories
- Supermarkets and Shopping Centers
- Hospitals & Institutions

No moving parts extend beyond frame except the operating handle.

The First Interrupter-Disconnect Switch That Offers All These Features

Interrupts and Disconnects—interrupting units are so small and compact they nest in the bores of upper terminal insulators — effecting instant interruption, independent of operators speed. When the switch is operated, the bridging sleeves engage or disengage upper contacts—middle insulators telescope into the lower ones on opening, the upper ones on closing.

Safer—all live parts, except terminals, are enclosed in bushings—enclosed always, regardless of operating position. This enclosed design provides maximum protection against phase-to-phase faults and to personnel. Operating handle is self-latching in open and closed positions—can be padlocked in either position.

Visual Gap—in the open position, there's a gap for visual inspection—but the contacts are not exposed. All live parts are always enclosed in porcelain.

No Arcing—the arc is drawn between two simplified arc resistant contacts and confined within special de-ionizing materials. No conducting residue is left behind. Means longer life—well in excess of field duty.

Flexible Mounting—can be mounted anywhere with maximum protection to personnel—on a wall, in a cabinet, inside transformer housings or with switchboards. Operating handle fits on either end with extension that can be run through a wall for remote operation.

Automatic Resetting—closing the switch resets the interrupter, ready for the next operation. Iso-Quensurs safely and dependably interrupt up to 600 amperes—have exceptionally long life.

One word more. Iso-Quensur ratings available through 13.2 KV, 600 Amps. continuous and 600 Amps. load break rating, 40 KA momentary, 95 KV BIL.

For Complete Iso-Quensur Information,
See Your Kearney Representative or Write Us for Data Sheet.

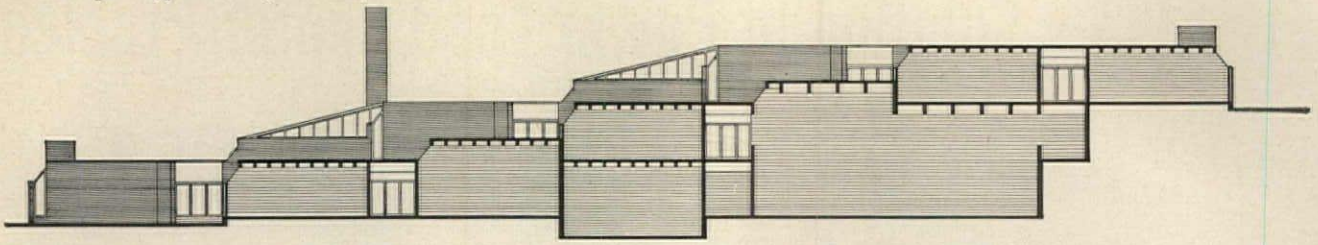
KEARNEY

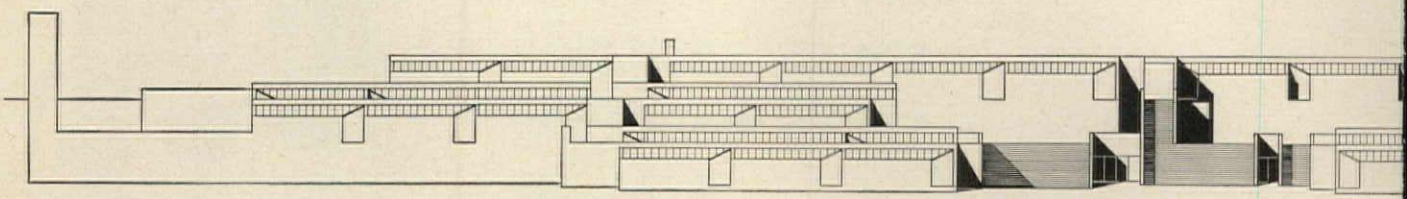
JAMES R. KEARNEY CORPORATION
4236 Clayton Avenue • St. Louis, Missouri 63110

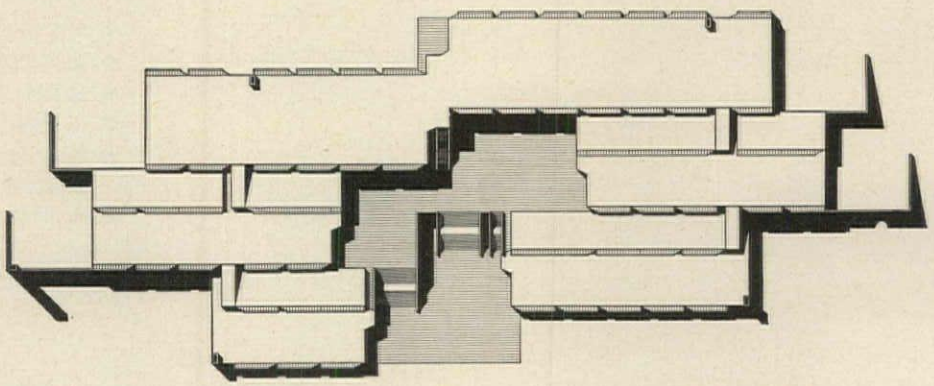
4KC-10

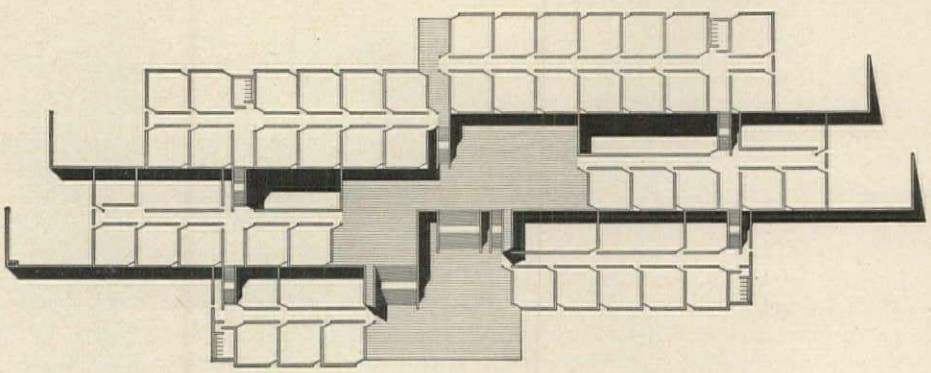
For more data, circle 69 on Inquiry Card

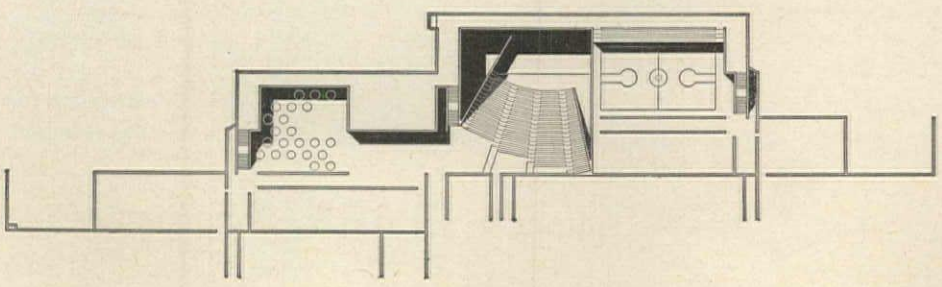
Zonolite prototype building #7: A high school

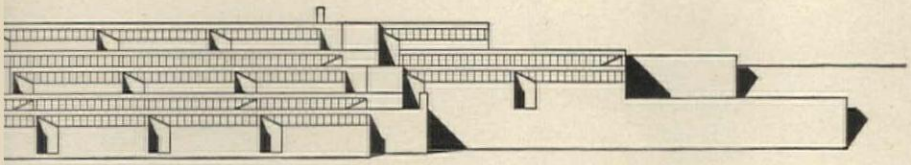












Martin Price designs a high school.

By installing Zonolite* Masonry Fill Insulation in the walls, fuel bills are cut $405 a year, returning 230% annually on the investment in insulation.

What your client actually pays for insulation is only remotely connected to the cost.

For example, Consulting Engineer Marvin M. Serot of New York City, who engineered this building, found that the installed cost of Zonolite Masonry Fill Insulation in this high school was $1,903.

But that is not what the client pays, because the insulation is financed as part of the building over a 20 year period at 6% interest.

So the true cost of the insulation to the client is about $170 annually for 20 years.

Compare this with the annual savings of $405 a year, and you will see that the client gets a 230% return on his yearly payment on Zonolite Masonry Fill Insulation.

One reason for this high return is the effectiveness of Zonolite Masonry Fill Insulation. Another is its low installed cost.

approx. installed costs per sq. ft. of wall	6" block or 2½" cavity	8" block	12" block
	10¢	13¢	21¢

Wall construction and finishing costs were also cut considerably by using Zonolite Masonry Fill Insulation. Because the insulation goes in the cavities, the interior wall surfaces were left unfinished, except for paint. Fewer materials and fewer trades were needed than with conventional wall systems.

There are other benefits, too. The cost of heating and cooling equipment is less because smaller units can be used. The building is much more comfortable. It is also quieter, because of the insulation's sound absorption characteristics.

Additional facts worth investigating are contained in our Bulletin MF-83. Write Dept. AR-15, Zonolite, 135 South LaSalle Street, Chicago 3, Illinois.

**Reg. trade mark of Zonolite Division, W. R. Grace & Co.*

ZONOLITE
GRACE ZONOLITE DIVISION
W. R. GRACE & CO.
135 SO. LA SALLE ST., CHICAGO, ILL.

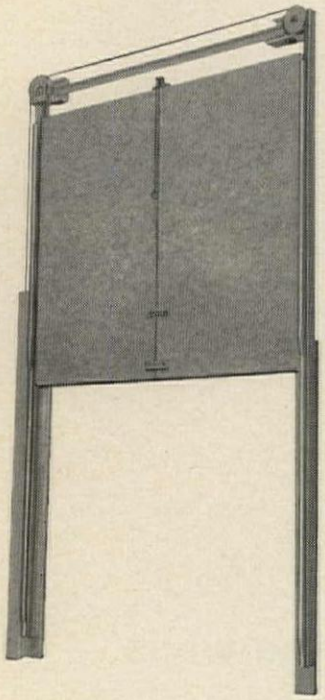
Design Conditions			Winter Heat Loss in BTU/Hr Assuming 70°F DB Indoor 0°F DB Outdoor		Summer Heat Gain in BTU/Hr Assuming 95°F DB, 75°F WB Outdoors 78°F DB, 50°RH Indoors	
	Without Masonry Fill	**With Masonry Fill**	Without Masonry Fill	**With Masonry Fill**	Without Masonry Fill	**With Masonry Fill**
Walls (above grade)	4" Face Brick Air Space 8" Concrete Block	4" Face Brick 2½" Fill 8" Concrete Block	495,000	**187,000**	120,000	**45,000**
Walls (below grade)	8" Poured Concrete		39,000	**39,000**	—	—
Roof	Roofing, 4" Concrete, 2" Insulation		600,000	**600,000**	345,000	**345,000**
Floor	4" Concrete on Grade		369,000	**369,000**	—	—
Glass: Solar & Transmission	¼" Clear, Single Plate		650,000	**650,000**	1,225,000	**1,225,000**
Ventilation	23,000 Cubic Feet per Minute		2,389,000	**2,389,000**	810,000	**810,000**
Lights	340 Kilowatt		—	—	1,150,000	**1,150,000**
People	1750		—	—	780,000	**780,000**
Totals			4,542,000	**4,234,000**	4,430,500	**4,355,000**
% Savings with Masonry Fill			$\frac{4,542,000-4,234,000}{4,542,000} \times 100 =$ **6.8%**		$\frac{4,430,500-4,355,500}{4,430,500} \times 100 =$ **1.7%**	

NOTES: FUEL: No. 6 oil @ 7.5¢ per gallon. DEGREE DAYS: 4989 per year. Total Loads Based on Maximum Simultaneous Usage.

For more data, circle 70 on Inquiry Card

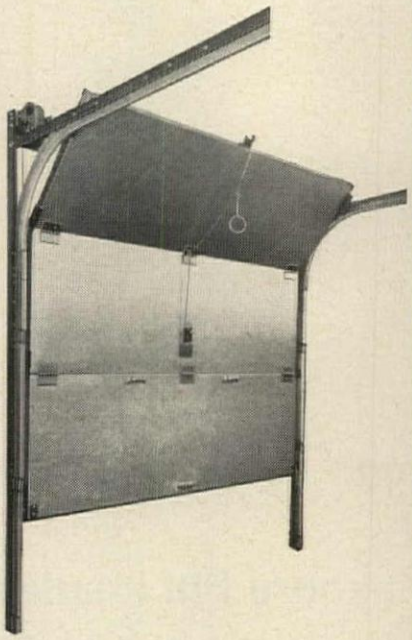
NEW FROM JAMISON

lightweight, space-saving JAMCO* doors developed for industrial use:



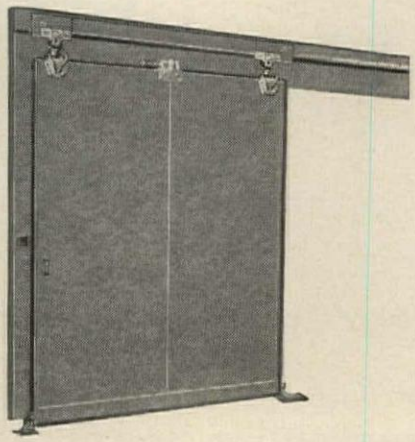
JAMCO
Vertical Sliding Door

Fully counterweighted for easy manual operation. Especially suitable for enclosed loading docks. Doorways can be positioned closer together to service more trucks.



JAMCO
Hinged Panel Overhead Door

Powerful torsion spring assures effortless operation. Ratchet adjustment maintains proper spring tension. For installation on loading docks and other areas with limited ceiling height.



JAMCO
Horizontal Sliding Door

Heavy duty lightweight door for smooth, easy operation. Spring assist opening. Saves space in vestibules, corridors, loading docks. Compact overall dimensions facilitate installation on existing openings.

JAMCO Industrial Doors have these special advantages:

- **extremely lightweight—only 2″ thick**
- **greater thermal efficiency than 12″ masonry wall**
- **fully gasketed**
- **aluminum or steel finish**
- **manual or power operation**

Write for latest bulletin describing new line of JAMCO Industrial Doors to Industrial Door Division, Jamison Door Co., Hagerstown, Maryland.

*Trademark of Jamison Cold Storage Door Co.

JAMISON
INDUSTRIAL DOORS

For more data, circle 71 on Inquiry Card

a new dimension in the store front field...

mapes SHADOPANEL

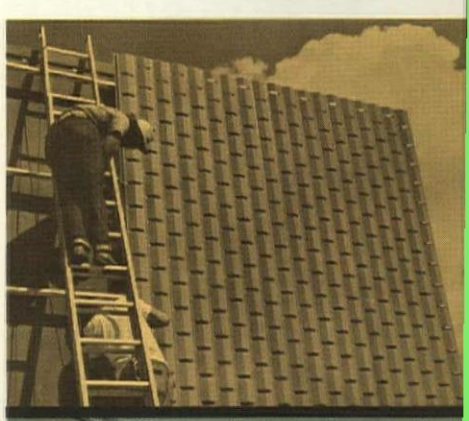
■ A TRUE DESIGNER'S MATERIAL. Mapes' new porcelain on aluminum Shadopanels create a multifaceted design which has a sculptured appearance. Changed by every shift of light and shadow, Shadopanel installations are always distinctive—never static. Use these versatile panels for • wall facing • as penthouse type enclosures to screen air conditioning and piping • to add height in creating new building lines during remodeling (see pictures at right). Choose from six standard patterns. Create your own special pattern at moderate extra cost. ■ EASILY INSTALLED. Mapes' simple aluminum framing system allows Shadopanels to be easily adapted to almost any building configuration. No heavy equipment needed. Minimum store traffic interruption. ■ COLORFUL AND DURABLE. Shadopanel's porcelain on aluminum finish won't chalk or fade. Will remain bright and fresh indefinitely. Can be drilled or cut on the job. Your choice of 18 fresh, modern colors. Your special color matched at moderate extra cost. ■ AMAZINGLY LOW-PRICED. Mapes' special system of production forming makes Shadopanels competitive with painted materials and up to 50% lower in price than other porcelain finished facing materials.

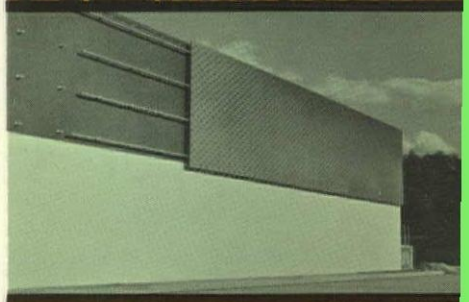
Shadopanel (patent pending) is marketed through the Glass and Store Front Industry by:

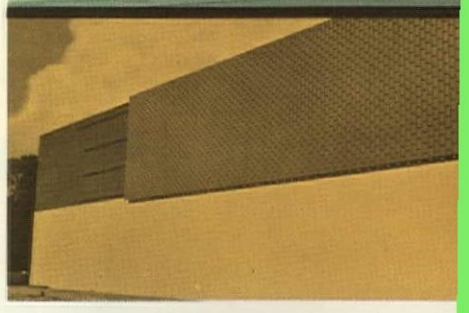
mapes & co. *Division of mapes industries, inc.*

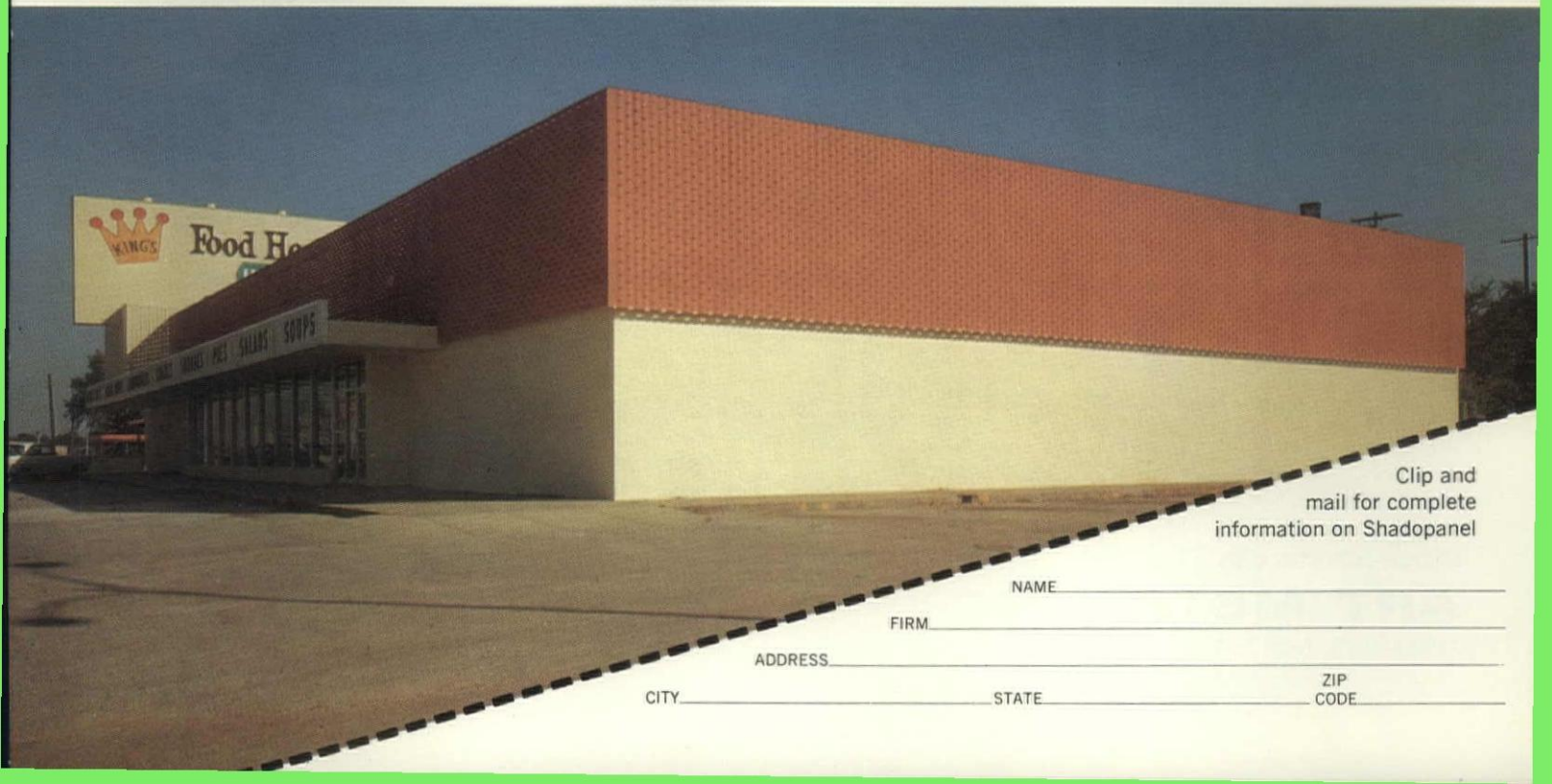
Box 2067, Lincoln, Nebraska 68501

For more data circle 40 on Inquiry Card









Clip and mail for complete information on Shadopanel

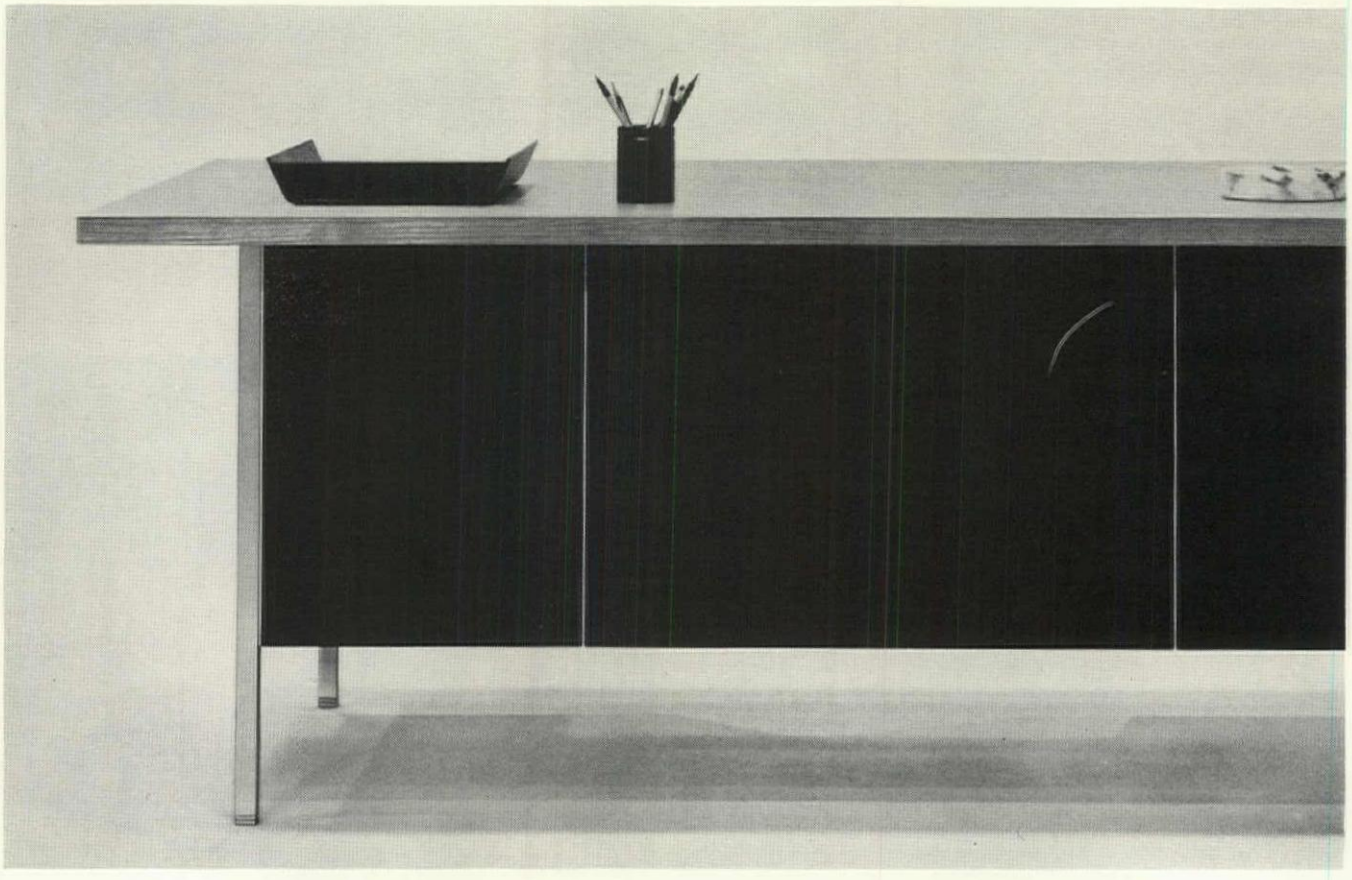
NAME _____

FIRM _____

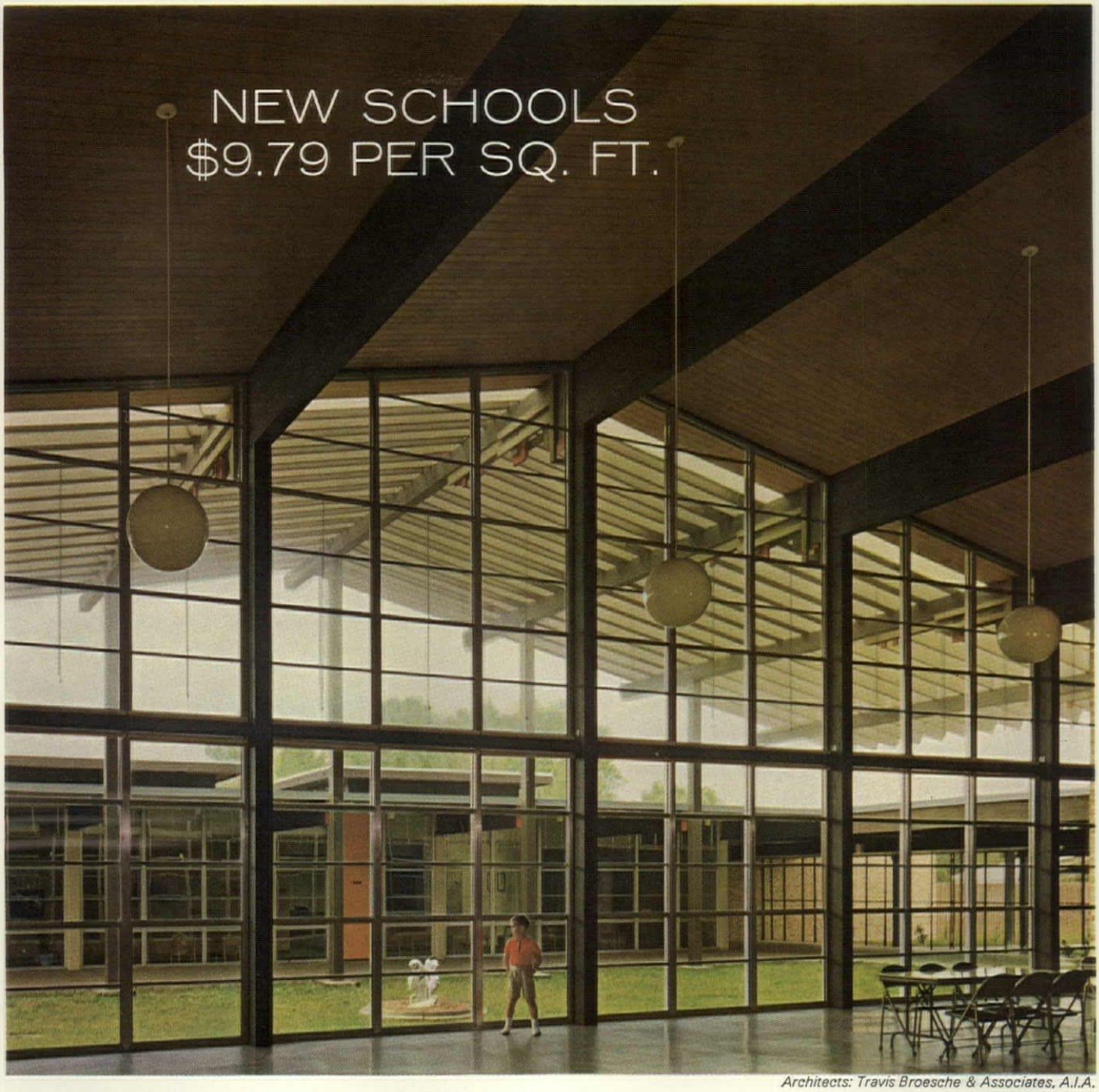
ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____

Office furniture
is an important design element.
Judge it critically.
Make sure it measures up
to your standards of functional design
and attention to detail.
Make it Art Metal's 500 Group.
Designed by Knoll.
It's crafted for enduring beauty and utility,
perfect in every respect
to support the integrity of your design.



Office furniture by
ART METAL INC
JAMESTOWN, NEW YORK



Architects: Travis Broesche & Associates, A.I.A.

Built with the strength and safety of *SPA Southern Pine

SPA

Southern Pine Association

**Trade-marked and officially grade-marked*

Wood-decking on Southern Pine laminated beams forms the roof structure of Northline Elementary School, Houston. This modern design contributed to four prime objectives of the School Board:

- **Simplicity and integrity of structure**
- **Low construction cost ($9.79 per sq. ft.)**
- **Minimum maintenance**
- **Stimulating environment for learning**

Northline is the first of five new elementary schools using pre-seasoned SPA Southern Pine among the eight newest in Houston. They are briefly described by Deputy Superintendent Glenn Fletcher as "the most forward-looking, functional and attractive elementary schools ever built in the Houston District. We feel that, on a long range basis, they give promise of efficiency and economy in operation and maintenance, and compare most favorably with buildings using any other structural materials."

SPA technical consultants are available to discuss specifications and uses. For their services write: Southern Pine Association, AR-I, P. O. Box 52468, New Orleans, Louisiana 70150

Power that moves when people do

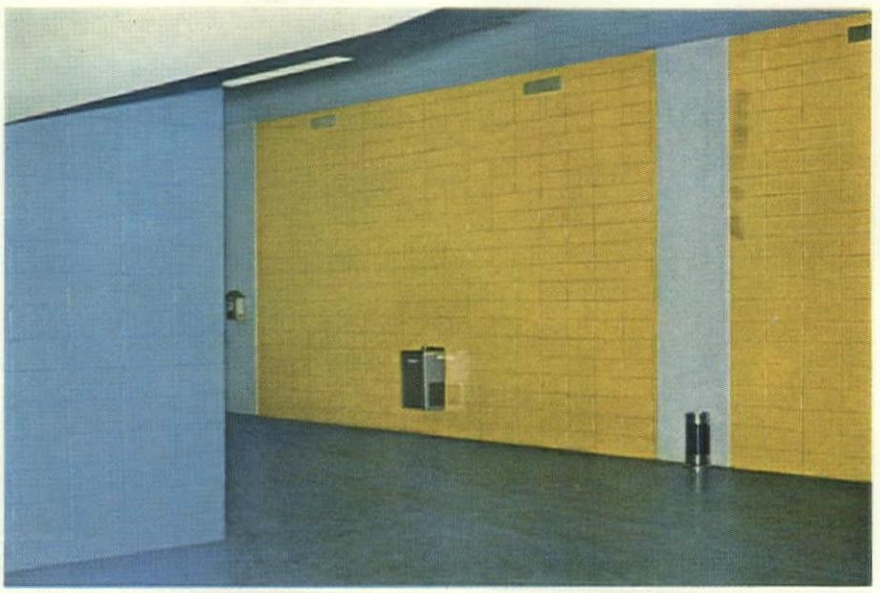
(BUILT-IN WIRING FLEXIBILITY WITH NATIONAL ELECTRIC FLUSH-TYPE HEADERDUCT)

Buildings are never "out-of-date" electrically with National Electric raceways. National Electric Flush-Type Headerduct combines with cellular steel floors to provide an integral wiring system that places electrical outlets in any square foot of floor space. Office arrangements can be easily changed. Wherever a desk is placed, electric service is immediately available. Telephone, office electrical equipment and communication outlets can be added without costly electrical alterations and inconveniences. Present and future electrical requirements are assured during the lifetime of the building.

National Electric Flush-Type Headerduct comes in various widths with unlimited compartment arrangements to provide segregated service within the raceway. An attractive, functional line of service fittings is also available. For more information write for our Headerduct Systems Catalog, No. 700. Electrical Division, Room 432, Porter Building, Pittsburgh, Pa. 15219.

PORTER ***ELECTRICAL DIVISION***
H. K. PORTER COMPANY, INC.

Durable coating based on Shell Epon® resin beautifies 250,000 square feet of Baltimore Civic Center



Smooth, easily cleaned coating based on Shell Epon resin will retain its good looks for years. Coating is Farbo-Tile, made by the Farboil Co., Baltimore. General contractor of Civic Center: Baltimore Contractors, Inc., Baltimore. Architect: A. G. Odell, Jr. & Associates, Charlotte, North Carolina.

Low maintenance coating of Epon resin selected for appearance and long service in one of nation's largest epoxy coating applications.

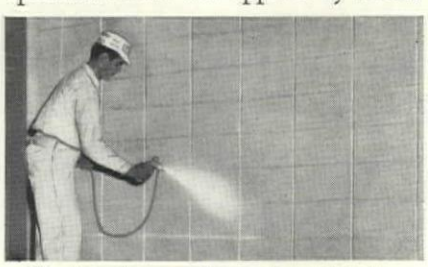
INTERIOR WALLS throughout the $13,000,000 Baltimore Civic Center are finished with Farbo-Tile*, a tile-like coating based on Shell Epon resin. The coating was applied to an average thickness of 30 mils, in six colors.

This coating gives the concrete block walls an eye-catching finish that will last for years. It can be cleaned easily and resists marring, scratching and attack from chemicals and solvents. Colors won't fade.

How coatings were applied to concrete block

The first coat was applied by brushing. Within 48 hours, following inspection and touch-up, the final coat in the specified colors was applied by airless spray. Because the coating of Epon resin is easy to clean and resists abrasion, the job was done while other construction was still in progress.

Brush-applied first coat. Initial coat, light gray in color, was brushed on concrete blocks. (Airless spray was used on poured concrete surfaces.) Leftover coating was stored overnight in dry containers at 45°F. to prevent curing.



Final coat sprayed in colors. Within 48 hours, first coats were inspected and touched up. The final coat, in six different shades, was applied with airless sprayers. Beige, light beige, blue, carrot, dusty gray, and "incense" were used.

Mail the coupon below if you would like to be referred to a supplier of tile-like coatings based on Shell Epon resin.

*Farbo-Tile is a formulation of the Farboil Co., Baltimore, Md.

Shell Chemical Co.
Plastics & Resins Div.
110 W. 51st St.
N. Y., N. Y. 10020

SHELL

Please put me in touch with a supplier of tile-like coatings based on Shell Epon resin.

Name _____

Position _____

Firm _____

Address _____

City _____ State _____

ARC-1

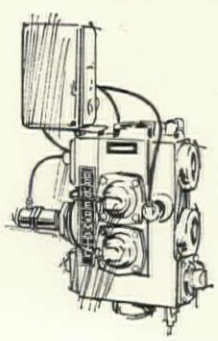
For more data, circle 44 on Inquiry Card

Met your "or equal" lately?

Neither have we!

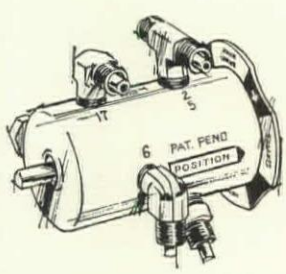
Chances are you've never met the client who selected engineering counsel on an "or equal" basis. Nor are you likely to. It's no way to choose professional advice. ■ So perhaps you understand our dismay when water softening systems are selected that way. Like you, we haven't met our "or equal" lately. If we did, it would be clear that the last 15 years were a waste of time and money. We've used our professional skills during that time to be sure Bruner equipment stayed ahead of the pack . . . to be sure we were a step ahead of the "or equal" category. ■ That's why the man who writes the water softening equipment specifications is doing himself and his client a service when he specifies Bruner. Everyone ends up happier in the long run. A few of the reasons are documented below:

BRUNER-MATIC CONTROL CENTER



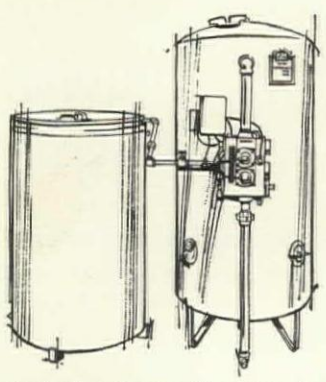
Exclusive Bruner-Matic control center assures high flow rates with unusually low pressure drop. Single control unit. No external brine injectors, butterfly controls, complicated valve systems, separate timers. Much less to go wrong.

BRUNER-MATIC PILOT



The heart of every water softening system is the pilot valve. Bruner's compact pilot is crafted like a fine watch. Gives great flexibility with "Push Button" or "Fully Automatic" options as standard. Manual regeneration possible by simply rotating dial by hand.

COMPLETE PACKAGE



Ready to install when it arrives. Every Bruner softener is shipped as a complete package. No unpleasant surprises, no complicated engineering, no puzzles to untangle.

BRUNER WATER SOFTENING SYSTEMS: UNEQUALLED FOR HOSPITALS, SCHOOLS, RESTAURANTS, LAUNDRIES...WHEREVER THERE IS A NEED FOR A DEPENDABLE SUPPLY OF SOFT WATER

B64-8

BRUNER
WATER SOFTENERS & FILTERS

Division of CALGON CORPORATION
4767 North 32nd Street
Milwaukee, Wisconsin
South El Monte, California

For more data, circle 45 on Inquiry Card

MULTI-DISCIPLINARY SPACE STRESSED FOR THE CAMPUS

The problems involved in university building expansion were discussed at a symposium held in New York City, November 2, sponsored by Walter Kidde Constructors, Inc. and attended predominantly by college administrators.

Speakers were Dr. Samuel Halperin, director of Legislative Service for the Department of Health, Education and Welfare; Dr. Howard E. Page, division director, Institutional Programs, National Science Foundation; Edwin F. Hallenbeck, director of Institutional Research and Planning at the University of Rhode Island; Robert L. Geddes, A.I.A., of Philadelphia; and Frank L. Whitney, president of Walter Kidde Constructors, Inc.; Ronald W. Haase, architectural associate, Educational Facilities Laboratories, Inc., was moderator.

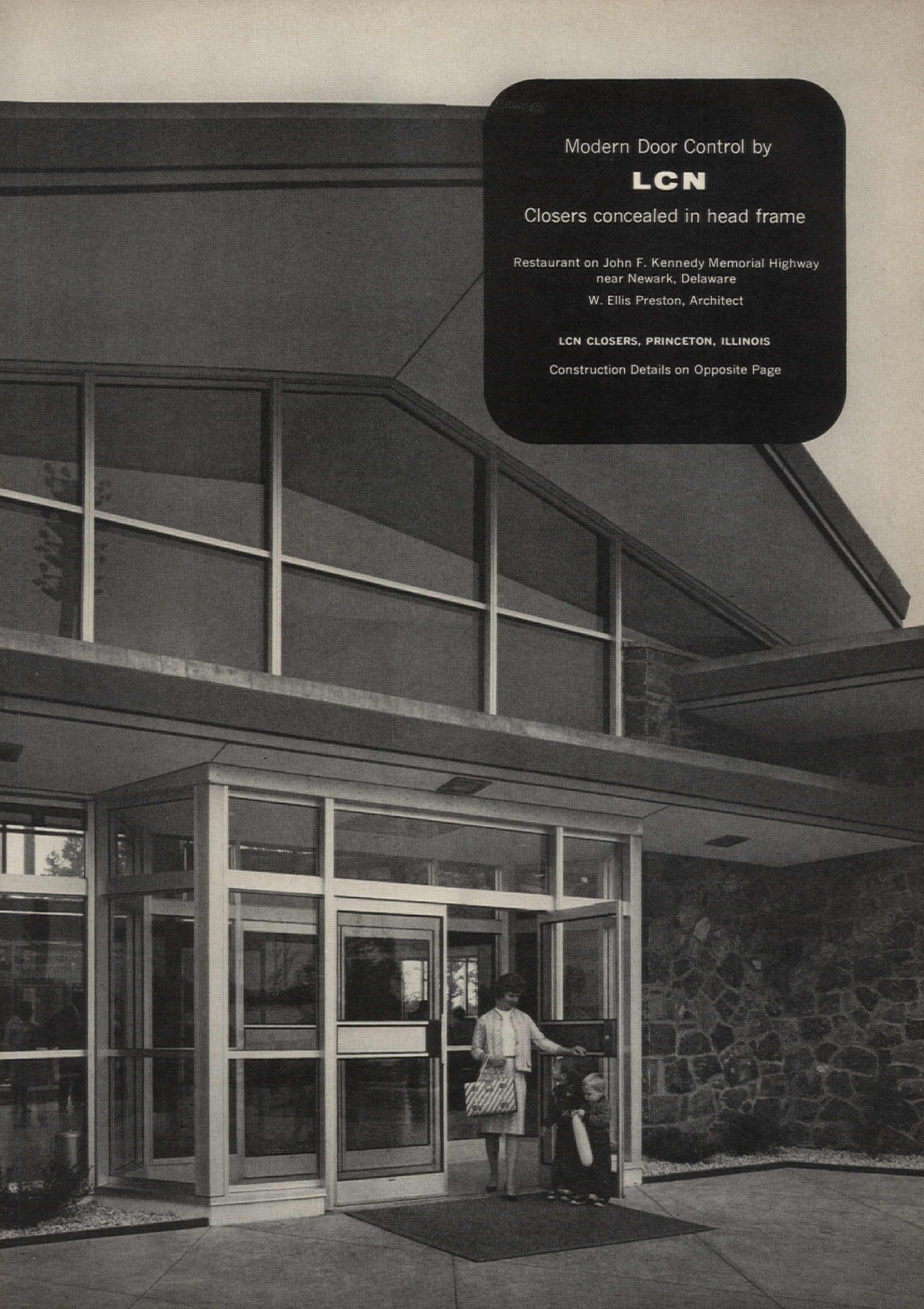
Discussion at the symposium indicated the flexibility needed in campus planning.

"There is definitely a trend," Mr. Haase said, "particularly on the part of small campuses and in the larger campuses, which is realizing that its bigness must be broken down into more comprehensible units, to multi-disciplinary space. We begin to think not in terms of the physics building, the chemistry building, the mathematics building or the geography building, but in terms of multi-disciplinary spaces. The architects of Southern Illinois University, Hellmuth, Obata & Kassabaum, are designing laboratory equipment which consists of component parts which can be put together in various combinations to serve the particular disciplines that may be using the space. Other universities are expanding this concept of multi-disciplinary space as they begin to group their facilities by function, rather than by discipline." An example given was the University of Chicago with its high-density, high-activity classroom and lecture spaces concentrated on the center of the campus and low-activity, less trafficked spaces on the perimeter. The University of Cincinnati is doing the same thing vertically.

The increased attention given to equipment which goes into buildings, from higher education to pre-school centers, with particular emphasis on electronic devices and less upon the plant in which they are housed, was also identified as a trend.

Robert L. Geddes, A.I.A., partner in the Philadelphia firm of Geddes, Brecher, Qualls, Cunningham, presented suggestions on the search for architectural compatability on the campus: the idea that it is not only the buildings themselves, but also the space between them—and their cohesion—which sets the tone of the campus.

Mr. Whitney applied the concept of "contributory planning" in his discussion of the design of university science and research buildings. He showed how some of the lessons his firm had learned as designers of research facilities for industry apply to many of the problems universities face. Among problems encountered were buildings which seem to be designed and built with a complete disregard for the research that was to be conducted in them, materials which seem to be out of economic perspective, mechanical installations planned in such a way that it would be impossible to modify or expand the building for future needs, except at prohibitive cost, and space layouts leading to inadequate work space and poor circulation patterns.



Modern Door Control by

LCN

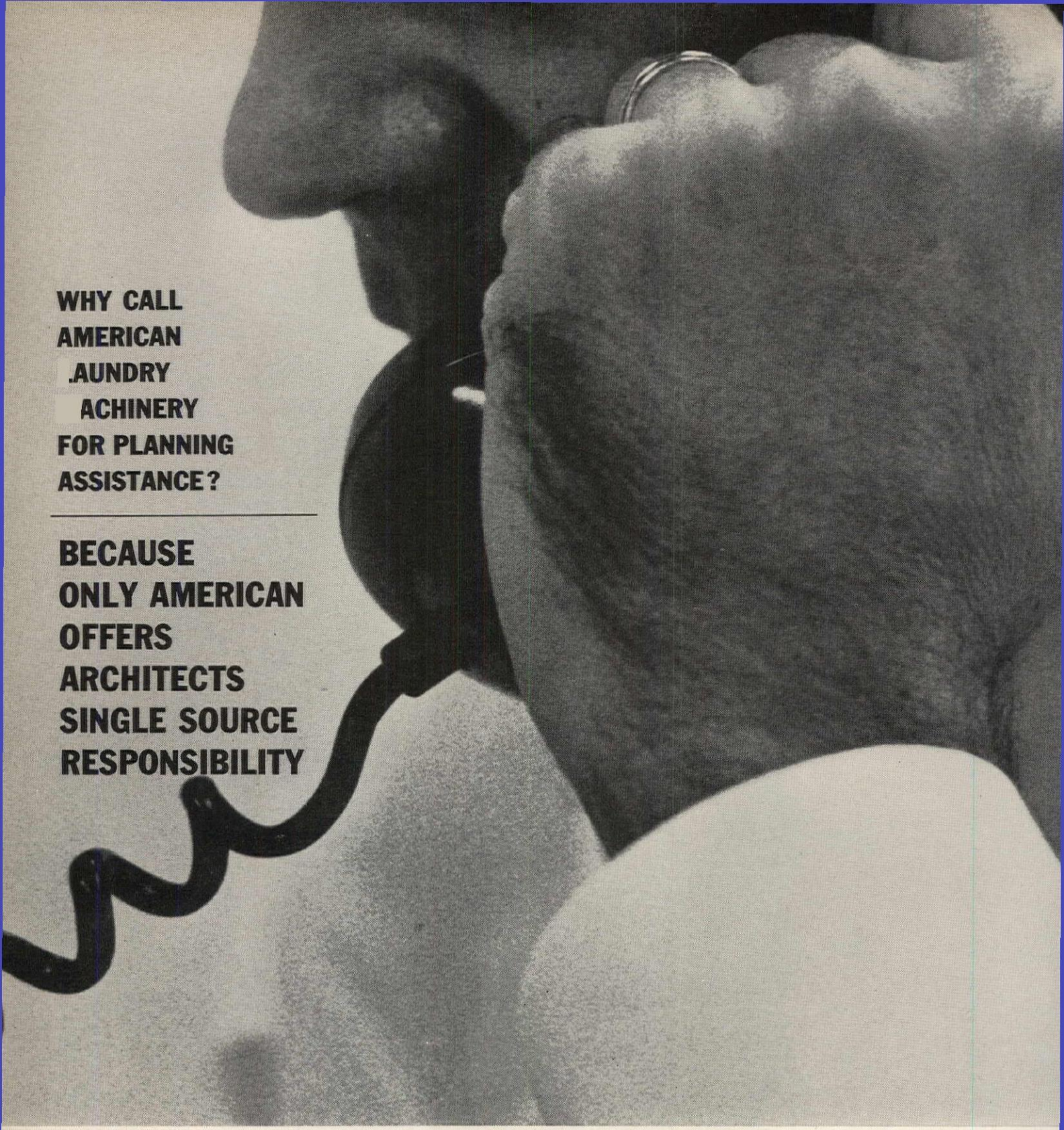
Closers concealed in head frame

Restaurant on John F. Kennedy Memorial Highway
near Newark, Delaware

W. Ellis Preston, Architect

LCN CLOSERS, PRINCETON, ILLINOIS

Construction Details on Opposite Page



WHY CALL AMERICAN .AUNDRY ACHINERY FOR PLANNING ASSISTANCE?

BECAUSE ONLY AMERICAN OFFERS ARCHITECTS SINGLE SOURCE RESPONSIBILITY

One source for laundry department survey engineering, floor plan layouts and detailed specifications.

One source for laundry equipment of every type and size. With the long life of American equipment this can be extremely important five or ten years after a job is completed.

One source for factory supervision of all equipment installation, including wiring, piping, steamfitting, etc.

One source for continuous repair parts service and field engineering service for the life of the equipment, anywhere in the country.

Architects we have worked with find this sort of laundry planning assistance invaluable. (A list of these firms is available upon request.) Why not call American today? Our offices and representatives are listed conveniently in the Yellow Pages.

McGRAW-EDISON

You get more from American

American Laundry Machinery Industries • Cincinnati 12, Ohio

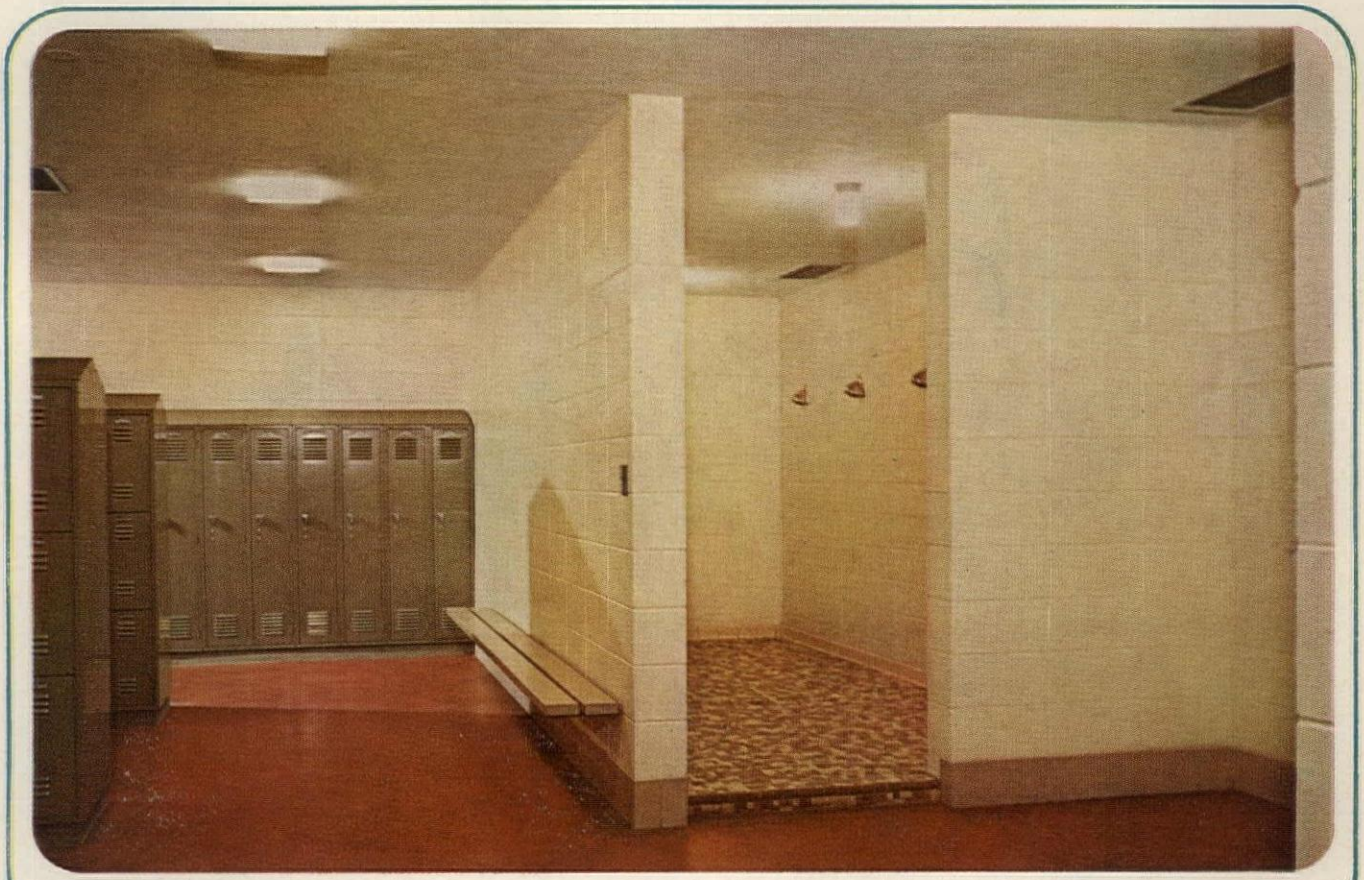
For more data, circle 78 on Inquiry Card

Devoe Tru-Glaze gets high marks for easy maintenance

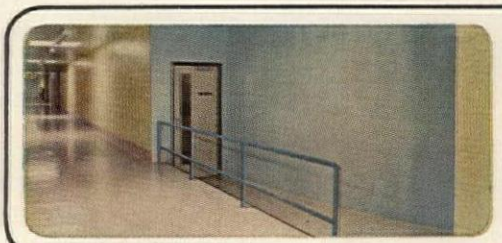
You can be sure that when Tru-Glaze is used, someone anticipates rugged living in its vicinity. Certainly a new elementary school fills that bill. Here, Tru-Glaze was used in the corridors, locker rooms, showers and gymnasium. (Can't you see those troops of six to twelve year-olders charging through?)

Tru-Glaze makes sense: it provides a tile-like surface for so much less than the cost of tile. It's a permanent, vitreous-glazed surfacing system, including a filler coat based on a patented water proofer, that makes it ideal for use on masonry. And especially great in the shower!

Once again, benefits resulted from the services of the *Man from Devoe*. He helped in many ways—supplying data on paint performance and costs, helping in color selection and with special formulae. There are many other ways the *Man from Devoe* can help—so for your next job, write or phone the nearest Devoe office to contact him.



Gertrude Scott Smith School, N. Aurora, Ill.; Architect: Robert F. Mall, Aurora, Ill.; Painting Contractor: Thacker Painting & Decorating Co., Inc., Aurora, Ill.



The "egret" white and light brown, used in the shower-locker room area, and the "Bali" blue and "mountain ice" white used in the corridor (right) are among more than 1000 colors available in Tru-Glaze.

DEVOE PAINT

DEVOE

DEVOE & RAYNOLDS COMPANY, INC.

Atlanta • Boston • Charlotte, N. C. • Chicago • Cincinnati • Cleveland • Cos Cob, Conn. • Dallas • Denver • Detroit • Honolulu • Houston • Los Angeles • Louisville • Moonachie, N. J. • New Orleans • New York • Philadelphia • Pittsburgh • Portland, Ore. • Richmond • Sacramento • St. Louis • Salt Lake City • Warehouses in all principal cities, coast to coast.

For more data, circle 79 on Inquiry Card

AMELCO WINDOWS WITH NEW

control heat · light · sight

Flexalum® INTER-PANE BLIND SYSTEM

and sound..even in an ideal environment

■ Only in office buildings like the prestige Banco Popular in San Juan, Puerto Rico is there so much control of heat and sound . . . such instantaneous control of light and sight.

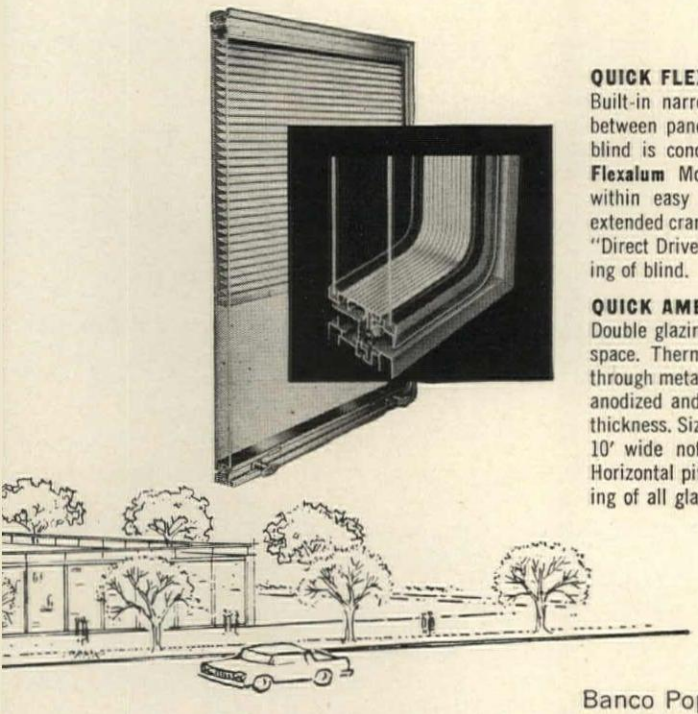
Only in Amelco windows with the new inter-pane blind system by *Flexalum* do you find a noise reduction of 50%, a solar heat gain reduction of 65%, instant control of daylight or view and a blind that's concealed when raised and without room blind cords.

Amelco windows are dual glazed with a 2" air space in between and have complete thermal breaks in vents and frames closed off by super-efficient weather seals. While Amelco windows are virtually dust free, they pivot horizontally and open for ventilation and "inside the building" cleaning of all glass surfaces.

Mounted between the 2 panes of glass is the narrow-louver *Flexalum* aluminum blind. It has a *Flexalum* Mono-Control with cable tapes that are virtually invisible from a few feet away.

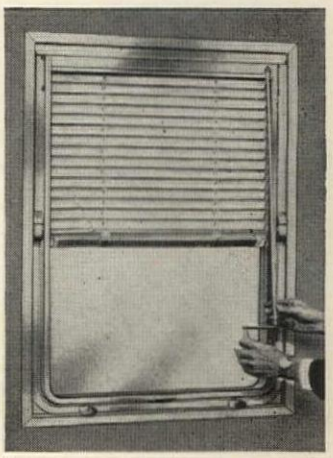
For more information on the blind system write:
FLEXALUM DIV., Alcan Aluminum Corp.
111 West 50th Street, New York, New York

For the full story on Amelco windows contact...
AMERICAN ELUMIN CO., 1676 Commerce Dr., Stow, Ohio



QUICK FLEXALUM BLIND FACTS
Built-in narrow louver aluminum venetian blind between panes of glass . . . virtually dust free . . . blind is concealed in top channel when raised. **Flexalum** Mono-Control brings control of blind within easy reach on tall windows. Control is extended crank to 'tilt' blind and to raise and lower. "Direct Drive" linkage assures fast, easy positioning of blind.

QUICK AMELCO FACTS
Double glazing . . . 2 panes of glass enclose 2" air space. Thermal breaks in vent and frame . . . no through metal. Finish and material . . . heat treated anodized and sealed aluminum alloy (.100") min. thickness. Sizes . . . available in sizes to 7' high and 10' wide not to exceed 46 sq. ft. per window. Horizontal pivoting, permits ventilation and cleaning of all glass surfaces from inside the building.



Banco Popular

Project Manager: *Cushman & Wakefield Inc., New York, New York*
Renting and Managing Agents: *Cushman & Wakefield of Puerto Rico, Inc.*
Architects: *Toro-Ferrer/Kahn & Jacobs*
Space Planning: *JFN Associates De Puerto Rico, Inc.*
Foundation Contractor: *Rexach Construction Co.*
Superstructure: *Geo. A. Fuller of Puerto Rico, Inc.*
Amelco Rep: *Lorenzo A. Cruz & Associates, Puerto Rico*
Brodsky-Norris Corp., New York

For more data, circle 81 on Inquiry Card

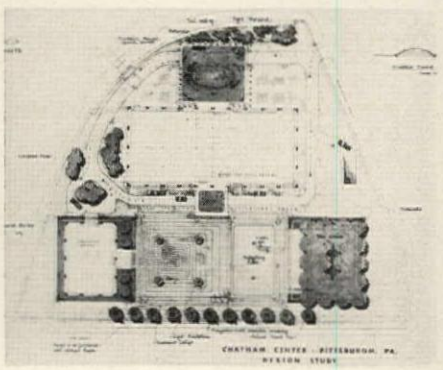
BUILDING COMPLEX HAS OFFICE-HOTEL

Chatham Center in Pittsburgh, designed by William Lescaze, architect, will include a 19-story apartment tower, a nine-floor commercial office building with a nine-floor hotel atop a glass "sky lobby," a 650-seat theater, a 2,200-car garage area, a gasoline service station and a completely landscaped plaza. Associate architect is Harry H. Lefkowitz, and the general contractor is the Diesel Construction Co., Inc. Landscape architect for the project is Robert L. Zion.

The apartment tower (*above left*), faced in pearl gray brick, will have one floor housing professional suites for doctors and others, and 18 floors of apartments.

The office building-hotel facade will have a black aluminum skin covering for the first nine floors. The first floor will house a bank, restaurant, commercial stores and showrooms. The next eight floors will be for offices.

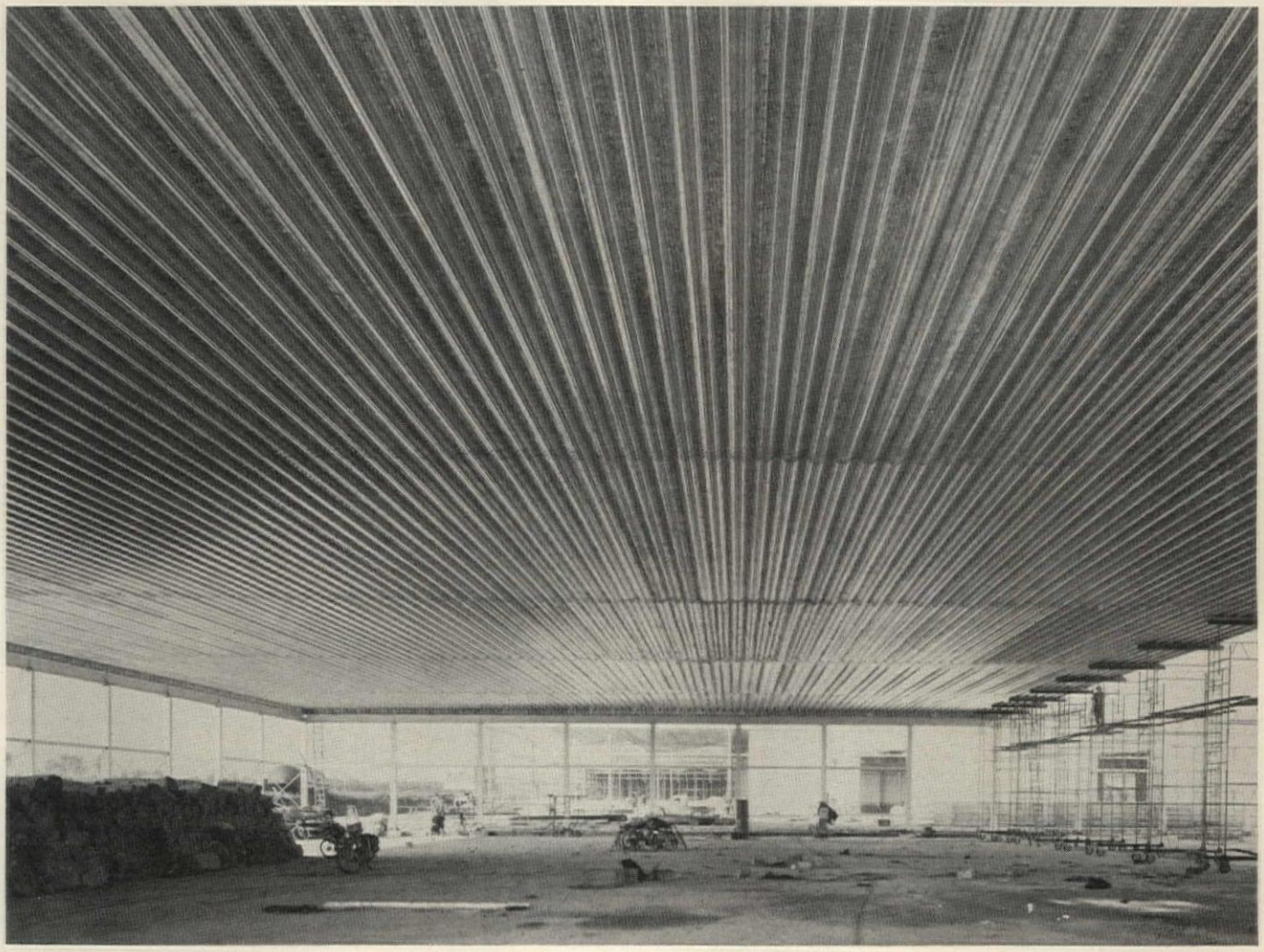
On the 10th floor will be a glass "sky lobby" for the hotel which will occupy the remaining nine floors. The facade of the hotel stories will be finished in gray brick.



The hotel will contain 330 rooms, some of which are suites, some separate rooms, with all sorts of combinations available. Patrons may park their cars in the underground garage and register electronically, receive their keys and go to their rooms without having to enter the lobby.

Both the apartment tower and the office-hotel will afford views of the plaza area which is located on top of the 2,200-car garage area. Cascading water will flow over a fountain mound of granite cobblestones.

This stressed-skin roof system clear-spans 198'...with a dead load of less than 10 lbs. per square foot *



This is Europe's largest clear span structure . . . 198′ without column, post, or beam. It's the Motta Candy Factory in Verona, Italy.

The roof, fabricated in the United States, is composed of parallel chords of steel panels, stressed to serve as load-carrying members. These panels are connected by a lightweight system of specially shaped struts. Between them, electrical conduit, mechanicals, and insulation are hidden from sight. The bottom chord, shown above, will be simply painted for an attractive, finished ceiling.

This is called the Dubl-Panl structural system . . . rapidly gaining in favor around the world because architects and engineers like its simplicity . . . like the way it makes wide column-free construction so practical . . . like the way it speeds field erection with bolt-together assembly.

Similar arched spans can reach over 1000′.

A complete technical manual, requested on your letterhead, is available from the Behlen Company. May we send it to you?

*
Roof of the Motta Factory was designed to a live-load requirement of 30 lbs. per square foot. Actual roof size is 198′10″ wide, 527′ long.

BEHLEN

Manufacturing Company Dept. AR-1
Columbus, Nebraska

Behlen Roof Systems and Load-Bearing Curtain Walls are further detailed in Sweets 2b/Be and 3a/Be, or write direct to factory.

For more data, circle 83 on Inquiry Card

Take solid, kiln-dried wood members of select fir, join them closely and securely with pre-stressed steel cables. Result—a solid wood partition that divides space beautifully — a wall engineered and built to withstand rough treatment. Coils away in its own unique coil box requiring minimum storage area. Coil-Wal may be curved or straight; small or large. (Single sizes as large as 150 ft. wide by 30 ft. high.) Turn a key and electrical operation moves Coil-Wal on or off its job of sub-dividing any large area for any purpose.

c ll l line beauty
il l flexibility

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modernfold
Coil-Wal®
ood partitions

il-Wal—newest from the
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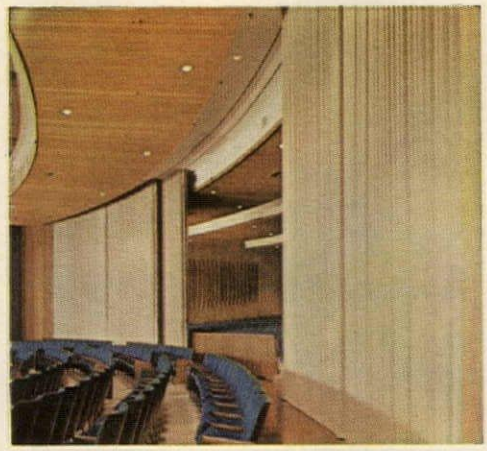
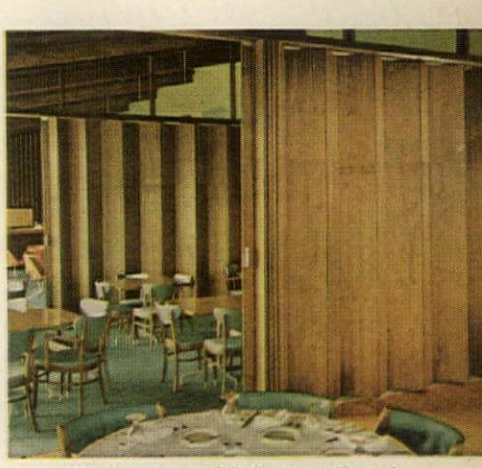
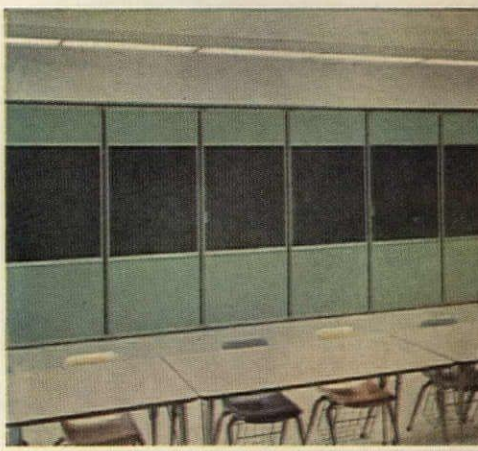


Soundmaster—in exclusive new heavy duty vinyl—a myriad of textures, colors and pattern combinations. Seals off sound as it divides space.



Woodmaster—adds the warmth and beauty of satin-smooth walnut, oak, mahogany or birch hardwood paneling to instant space division.



Acousti-Seal—carries a Sound Transmission Class of 51! (Geiger & Hamme Test NC-27 FT) Makes flat surface wall division practical for classrooms, audio-visual rooms, or other critical sound interference conditions.

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NEW CASTLE PRODUCTS, INC.
New Castle, Indiana
In Canada: Modernfold of
Canada, Ltd., St. Lambert, Quebec

Modern-Cote — By utilizing Modern-Cote vinyl wall covering with Soundmaster or Acousti-Seal, you can contrast or harmonize with any color scheme. Ends many wall maintenance problems.

NEW CASTLE PRODUCTS, INC.
Dept. A2135, New Castle, Indiana

Please send full information on the complete line of Modernfold operable walls, and the name of nearest distributor.

Name.....

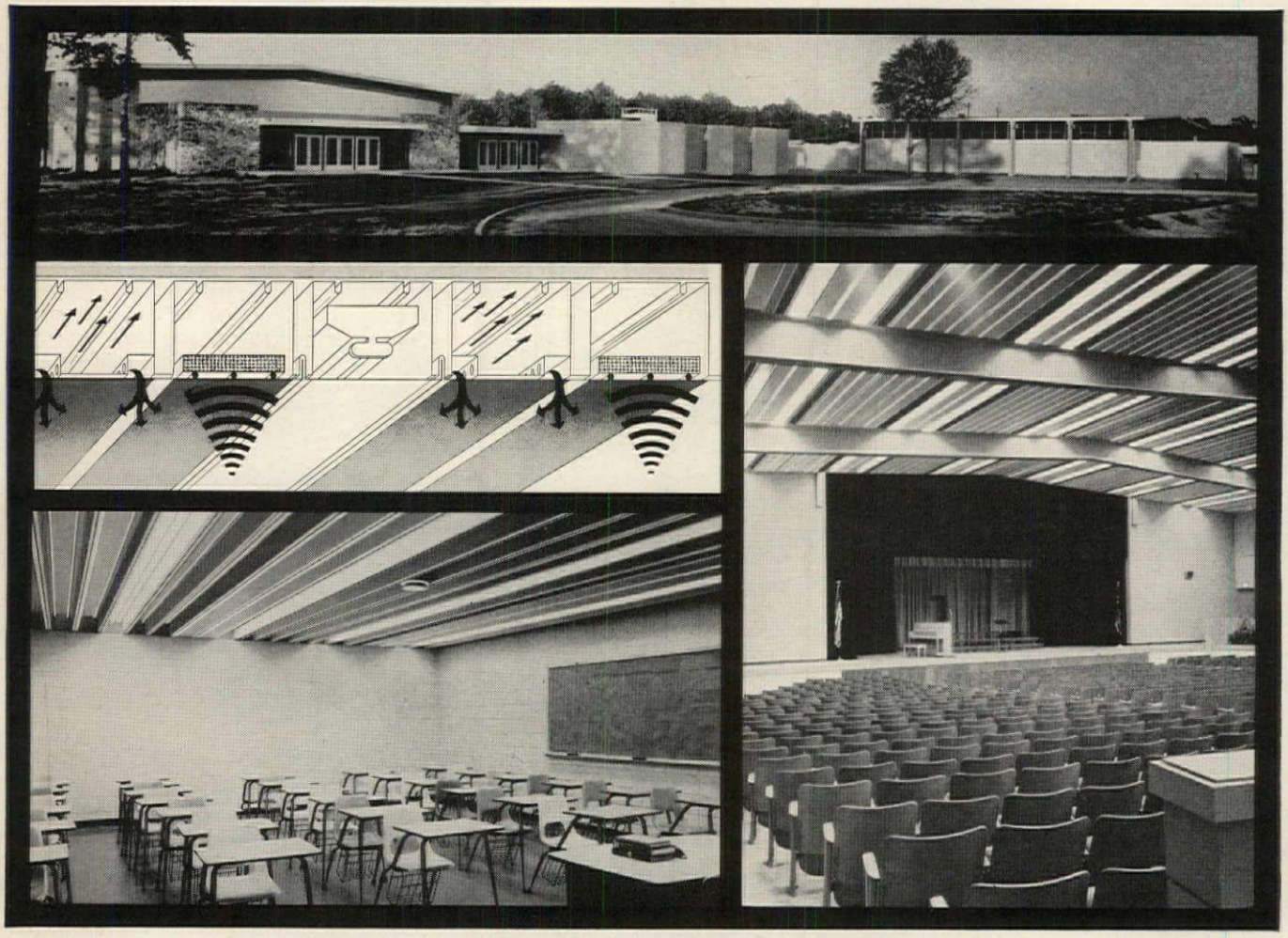
Firm.....

Address.....

City..... County..... State.....

For more data, circle 84 on Inquiry Card

MAHON
IS IDEAS
IN BUILDING PRODUCTS



SEE HOW MAHON "SQUEEZED THE AIR" OUT OF AIR-CONDITIONING COSTS

with the new and unique Mahonaire® Ceiling System

As an example of what Mahon can do for you, let's see what its Building Products Division recently did for a noted Texas architect.

He was planning a school.

The School Board wanted air conditioning. But at a cost that was out of the question with conventional air circulation systems.

The architect "bucked" the problem to Mahon. And Mahon suggested using its new and unique Mahonaire Ceiling System—a system in research since 1958.

This Mahon idea worked.

The use of a 7.5-in. deep Mahonaire cell system squeezed overall requirements down 180,000 cubic feet. It gave the architect quiet, uniform air distribution and diffusion. It saved $1.25 per square foot.

Mahon is ideas in building equipment. When you have a tough construction problem, "buck" it to Mahon for an idea that may save you space, time, money. Write . . . The R. C. Mahon Company, 6565 East Eight Mile Road, Detroit, Michigan 48234.

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Colors Above Left to Right: French Green 5552, Arctic White 5551, Smoky Beige 5555, Taffy Beige 5554, Worsted Gray 5553.

RUBEROID royal stoneglow

The chips go all the way through in Royal Stoneglow the new vinyl asbestos tile from Ruberoid that combines rugged durability with downright beautiful looks. The flowing stone pattern just can't wear off—can't wear out. It resists scuffing and denting. So tough is Ruberoid's new Royal Stoneglow, that it gives beauty that lasts and lasts no matter how heavy the traffic.

Royal Stoneglow is available in 5 glowing colors, size 12" x 12", 3/32" and 1/8" gauge. For more facts, call your Ruberoid representative or write to us.

RUBEROID FINE FLOORING ■ 733 Third Avenue, New York, N. Y. 10017

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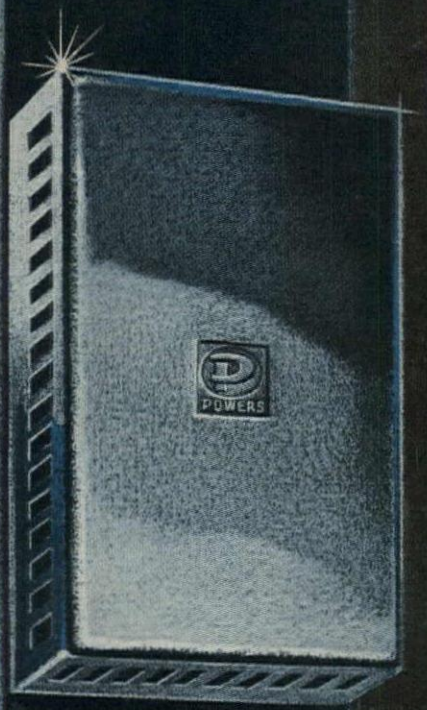
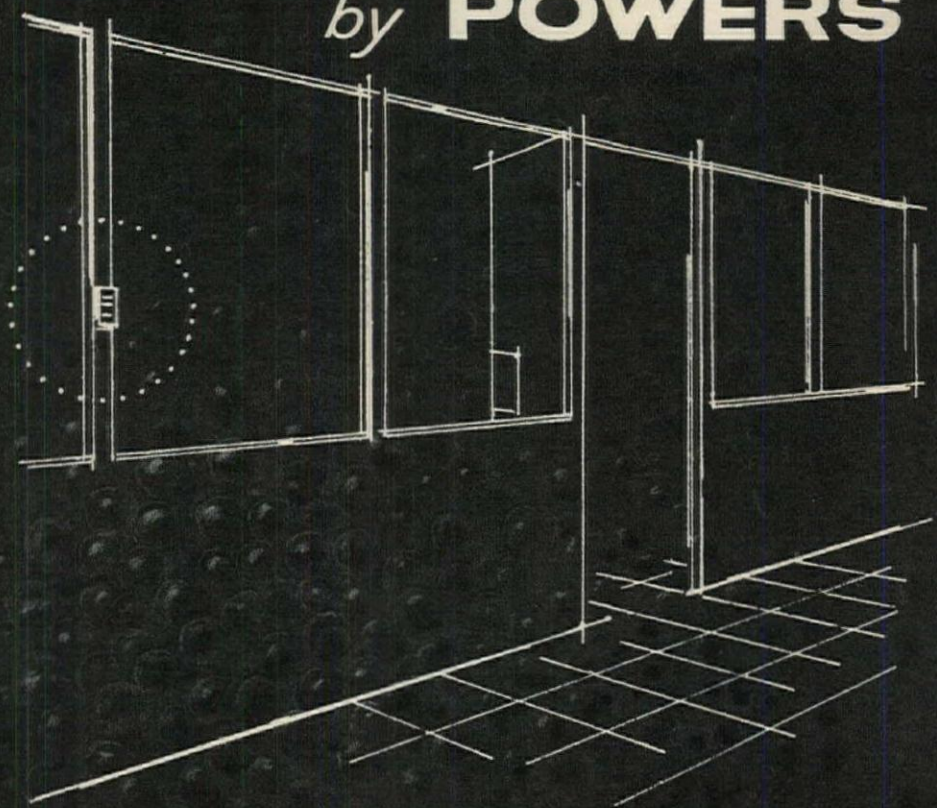
Announcing a new

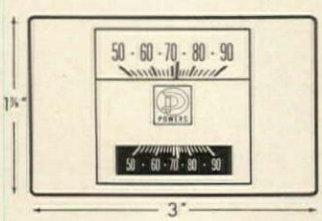
THERMOSTAT

by POWERS



(ACTUAL SIZE)





CONCEALED ADJUSTMENT
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EXPOSED THERMOMETER

Powers new thermostats have a faster response than any other pneumatic thermostat on the market.

'Decorator styled', they can be installed horizontally or mounted vertically on narrow mullions.

Cover styles available
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For more data, circle 88 on Inquiry Card

65-124

Please furnish complete data on Powers' New Thermostat Line.

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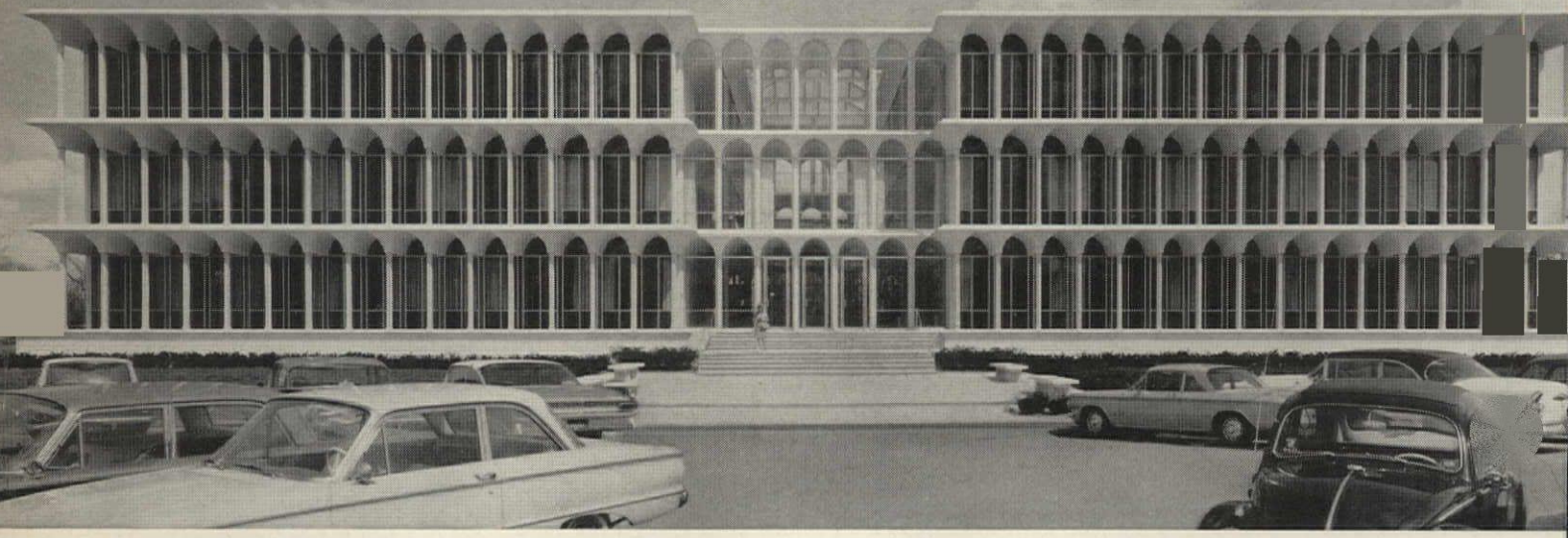
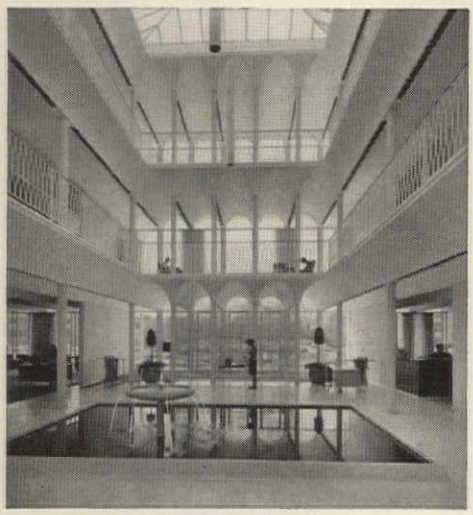
THE POWERS REGULATOR COMPANY
3400 OAKTON STREET • SKOKIE • ILLINOIS

Campus Classic in Prestressed Concrete





Trim beauty of prestressed construction is emphasized by skylight, fountain and pool in the atrium.

Rolled steel forms were used for the 228 vault units, each 5 ft. wide, 2 ft. 9 in. deep, 50 ft. long and weighing 11 tons.

BUTLER UNIVERSITY LIBRARY, Indianapolis, Indiana; Architects: MINORU YAMASAKI & ASSOCIATES, Birmingham, Michigan; Structural Engineers: WORTHINGTON, SKILLING, HELLE & JACKSON, Seattle, Washington; General Contractor: CARL M. GEUPEL CONSTRUCTION CO., Indianapolis, Indiana; Precast, Prestressed Concrete Members: SHUTE CONCRETE PRODUCTS, INC., Richmond, Indiana

Architect Minoru Yamasaki has used prestressed concrete in a highly imaginative way in this Butler University Library. The result is a graceful, almost delicate appearance, but a highly functional, durable and fire-safe structure.

Prestressed concrete was chosen, says Mr. Yamasaki, "in order to express a structural form in a pleasing and direct manner... and to keep the sizes and shapes relatively thin and in good scale."

The structural frame is composed entirely of precast, prestressed members. The vaulted beams are placed on columns so that flat surfaces on top form the floors and curved surfaces underneath form a vaulted ceiling. Extending through to the front of the building, these beams create an attractive scalloped effect. Fluorescent lights are placed in recesses in the base of the beams, keeping the vaults uncluttered.

To assure high quality and low fabrication cost of all precast and prestressed units, Lone Star's "Incor" high early strength portland cement—America's first—was used exclusively.

Lone Star Cement Corporation, New York, N. Y. 10017

INCOR® 24-HOUR CEMENT

"People Involvement," Research, Planning Teams, Economy and Regionalism Dictate the Designs of CAUDILL, ROWLETT AND SCOTT

"The most important thing that shapes our architecture is 'people involvement'." William Caudill's insistence on the involvement of a large team of people (including the clients) is thus stressed as the major continuing factor among the diverse approaches to design of Caudill, Rowlett and Scott. A significant result is probably that the differences of any given program, site or region are given preference over any consistency of personal or current style. Caudill explains:

"We believe that many people should be involved in the design process, particularly if they are the users of the building. As a matter of fact, we insist that at least some of the users of the building be a part of our planning team, not only in the programing aspects but during the period of conceptual design.

Communication as the Key

"The key to this approach is communication. But communication must have a broad meaning. It is being direct and frank with people. And when you can successfully do that, you have a good chance to produce a direct and frank architecture.

"It is neither an easy approach nor an expedient one. But we think it is the best one in the long run, and it just may lead us to an architecture which reflects the democracy in which we live. It carries with it a deep-seated belief that through architecture many people can be helped.

"The quality of ruggedness found in this approach is also reflected in our buildings—no namby-pamby architecture. From the beginning of Caudill, Rowlett and Scott, we have not been able to separate our *process* from our *architecture*. Our process of on-the-spot design—which is now an established institution in our firm—unquestionably has had its effect on our structures. For example, if we send a team to the mountainous regions of Colorado to design a building on the spot, there's a lot better chance of achieving an indigenous flavor than if we were to design the building in Houston.

"Formula" for Design

"Our 'formula' for a building is this: take a client, teach him to speak architecture and make him part of your team. Add technologists as well as designers to the team. Condition the reflexes of each of the members to absorb and accept ideas. Then go directly to the site and mix them up in a group. Of course, there must be strong leadership, plus plenty of imagination, as well as competence and skill, to pull off one of these things. And even more important, there must be the freedom of choice for using analyzed elements which seem capable of giving architecture a strong art form. Again, it is people involvement, but with strong architectural leadership. Most certainly we want no 'voting design'. Group action must be led by a strong designer with outstanding leadership, quality and creativity.

"Architecture is more than a reflective art of

civilization. It is a regenerative force—the force that is created through group dynamics. We believe that architecture must reflect the excitement of life found in our democratic society, which respects the individual. We believe in the individual over the team, and that architecture is for everybody, not just the privileged few.

"I remember doing the programing on our first school. We not only interviewed the teachers and administrators, but the children as well. We were honest in our belief that schools are for children and we like to think that we helped put the human element back in public institutions. Working with the users of the buildings has always been a habit with us.

"Do we sound like one of the Functionalists? We hope not. Nor do we want to be classified as Formalists. All we want to do is produce good buildings that make sense functionally, esthetically and economically. We believe that form and function can no more be separated than the form of a hand can be separated from its intended function, such as writing, patting discouraged but promising young architects on the back, or playing some one-finger jazz on the piano. Form and function are inseparable.

Form, Function—and Cost

"And of course there is the other inseparable factor that relates to both—the cost factor. Whether CRS is planning a city or a piece of furniture (and we do both) we consider form, function and cost simultaneously. This trilateral approach is as much a part of our firm as anything that I know, and it particularly holds true in the six buildings included here.

"We feel that if, after programing is completed, we have not educated our clients and raised their aspirations for a better physical environment, then we have not done our professional job. We have found that client education is a pretty tough job. Up to now we have had very few clients come to us whose sole purpose is to produce outstanding buildings!

"To most of our laymen-clients, architecture is akin to abstract art. They don't understand it. They just know what they think about it. They know their own private reactions to form, color, texture and space. And these usually differ from those of the last client. The sense of space is not the same for one client as another: nor of color, nor texture. Response depends on background, prevailing mood, time of day, mental or physical activity. So we have found that no set style or no preconceived environment will work in all cases. Each building has a set of factors to establish a context for the viewer. This all adds up to 'people involvement' again. But even more important, it means that Caudill, Rowlett and Scott cannot, if it wanted to (it doesn't), adopt or adapt any one current style.

The Role of the Observer

"Another thought with which all our partners agree is that architecture belongs to everybody —to the pedestrian who goes to market in one of the great shopping malls; to the tired businessman who, during his 30-minute drive from office to home, appreciates or detests the building groups along the thoroughfare; to the family which worships in the local church; and to the home owner who has to look across the street.

"Also, it cannot be crated and shipped to another site, another climate, for another function of another client. Since we are now practicing in 24 states and five foreign countries, the conditions are so diverse we must have diversity in our architecture. Every one of our clients has a different site, a different set of building problems, and different space requirements. Each building must respond to its own program.

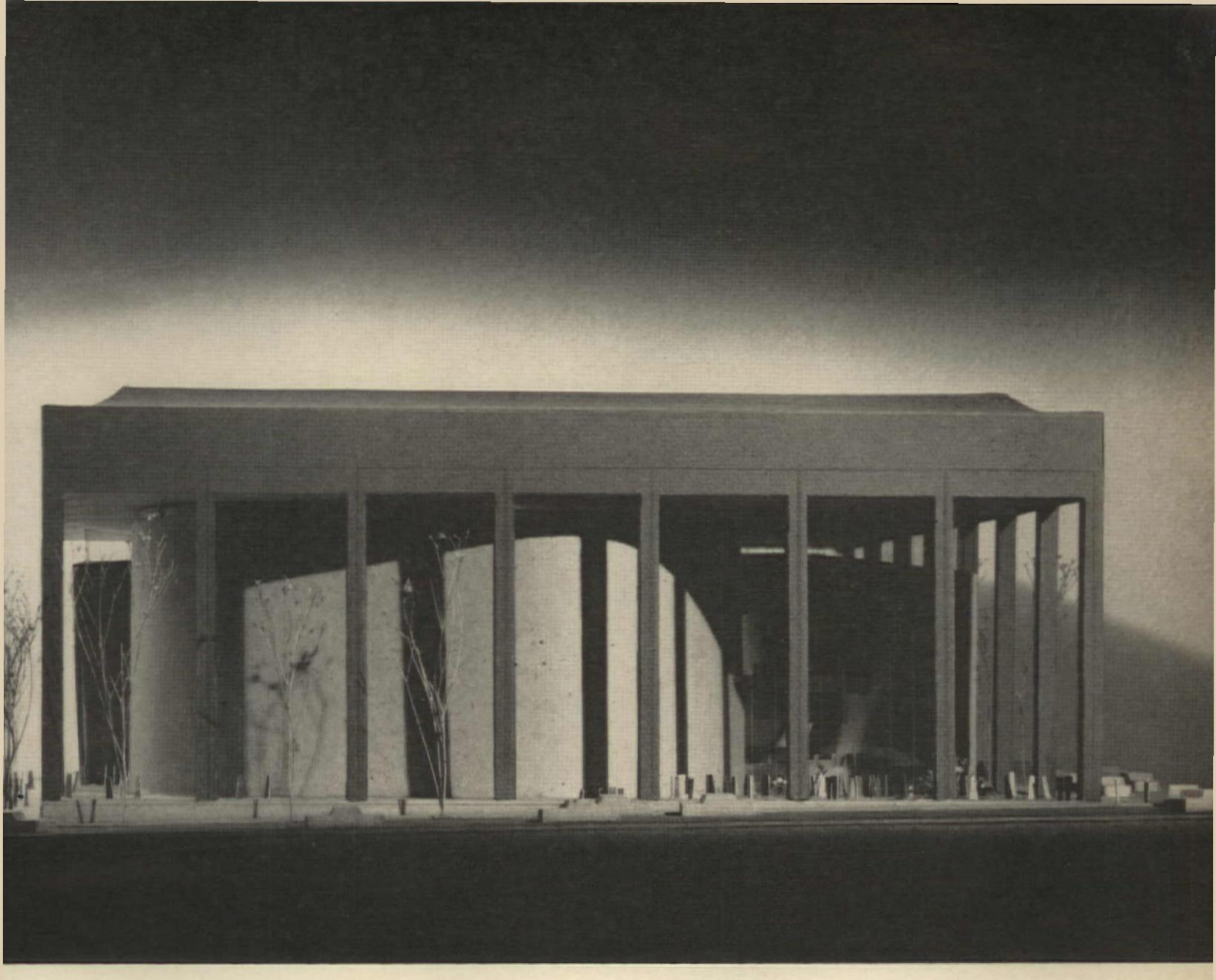
Three "Commitments"

"What are our commitments? Let me sum up with our major three:

"1. *The Problem-Solving Approach.* In some circles this is a nasty phrase. It is not with us. The practice of architecture has to do with solving problems of other people and using their money to do it. It's a big responsibility. We think a thorough architectural analysis is the prelude to better architecture. We know inspiration is derived from programing and clarification of problems. To us, programing is a creative process, and we will admit we sometimes program with a prejudice. But we know that better buildings can be designed if they are conceived in terms of thorough analysis and research.

"2. *The Team Concept.* In this day, the 'whole architect' is having a difficult time. The increasing complexity of buildings and machines is making it impossible to know everything about technology, management and design. In order to achieve depth in any of the many facets of architecture, some of us must specialize. Our firm is a team of specialists and consequently we are not geared to do small work. But we still do occasionally, just to see if we can.

"3. *Architecture is for People.* Without people, architecture is sculpture, a miniature art, in comparison to an artistic, functioning, economic, living structure for human habitation."



A DRAMATIC HALL FOR THE PERFORMING ARTS

Jesse H. Jones Hall for the Performing Arts, Houston, Texas

OWNER: *Houston Endowment, Inc.*

ARCHITECTS: *Caudill, Rowlett and Scott*

STRUCTURAL ENGINEER: *Walter P. Moore, Consulting Engineer*

MECHANICAL-ELECTRICAL ENGINEERS: *Bernard Johnson Engineers, Inc.*

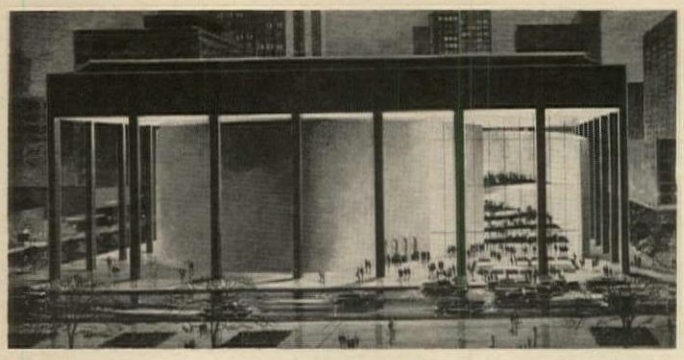
ACOUSTICAL CONSULTANTS: *Bolt, Beranek and Newman, Inc.*

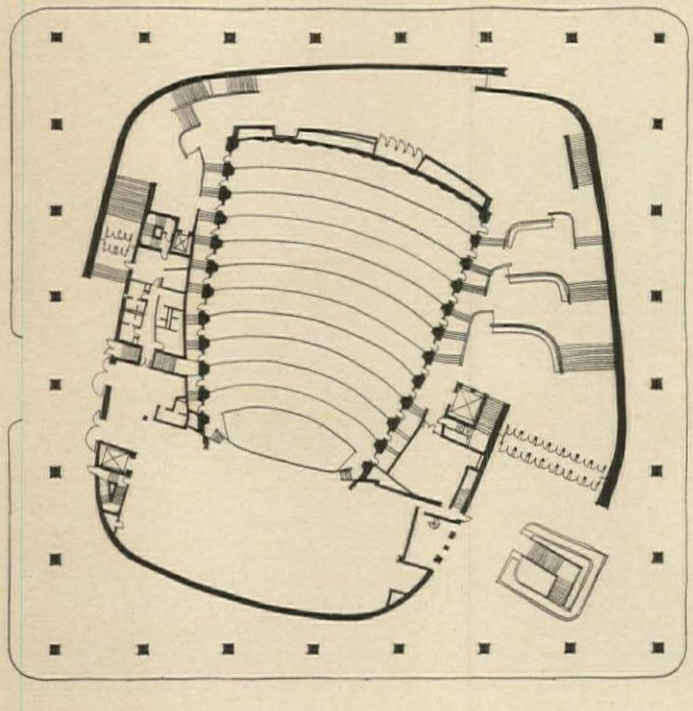
THEATER-DESIGN ENGINEERING CONSULTANT: *George C. Izenour*

CONTRACTORS: *George Fuller Construction Company*

This handsome new center for the performing arts is planned to make an "event" of going to the theater. CRS partner, Charles E. Lawrence, comments that: "In the beginning we established the belief that going to a performance means more to people than receiving and responding to the art performed. It is a total experience and includes the pageantry that takes place before curtain time, during intermission and even leaving the hall. It also had to be a multi-purpose, multi-form performing arts hall, and provide the proper theater economics, acoustics and visual character for each of the arts. As planned, the form ranges from a concert hall with 3,000 seats and a 1.9 second reverberation time to a theater with 1,800 seats and a 1.4 second reverberation time. Because of the size of the site, we created the big foyer-lobby to one side of the hall, and continental seating with side entrances made it workable. Terraced lobbies which serve the various seating levels wrap around the hall. Outside, a protective verandah is defined by a classic cage of travertine. This is mainly a night building, with lighting a major design tool."

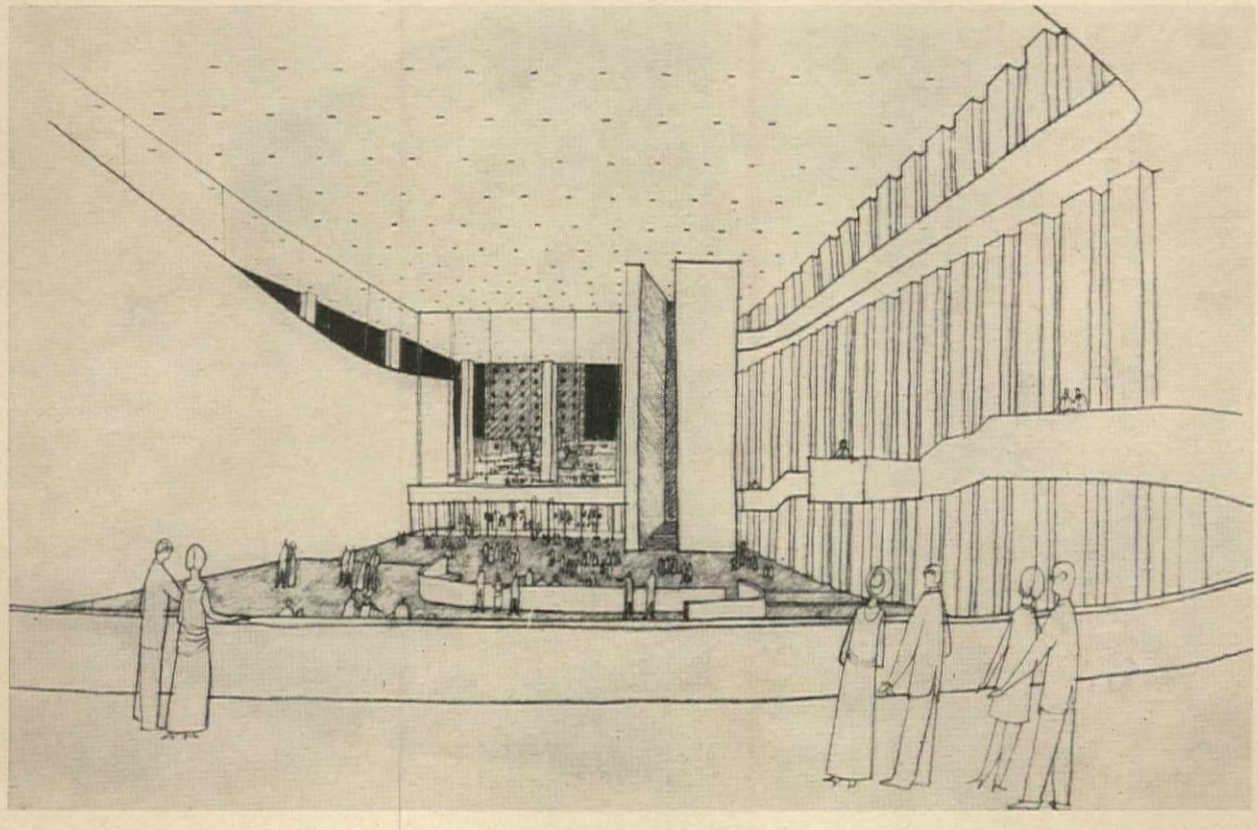
Caudill, Rowlett and Scott

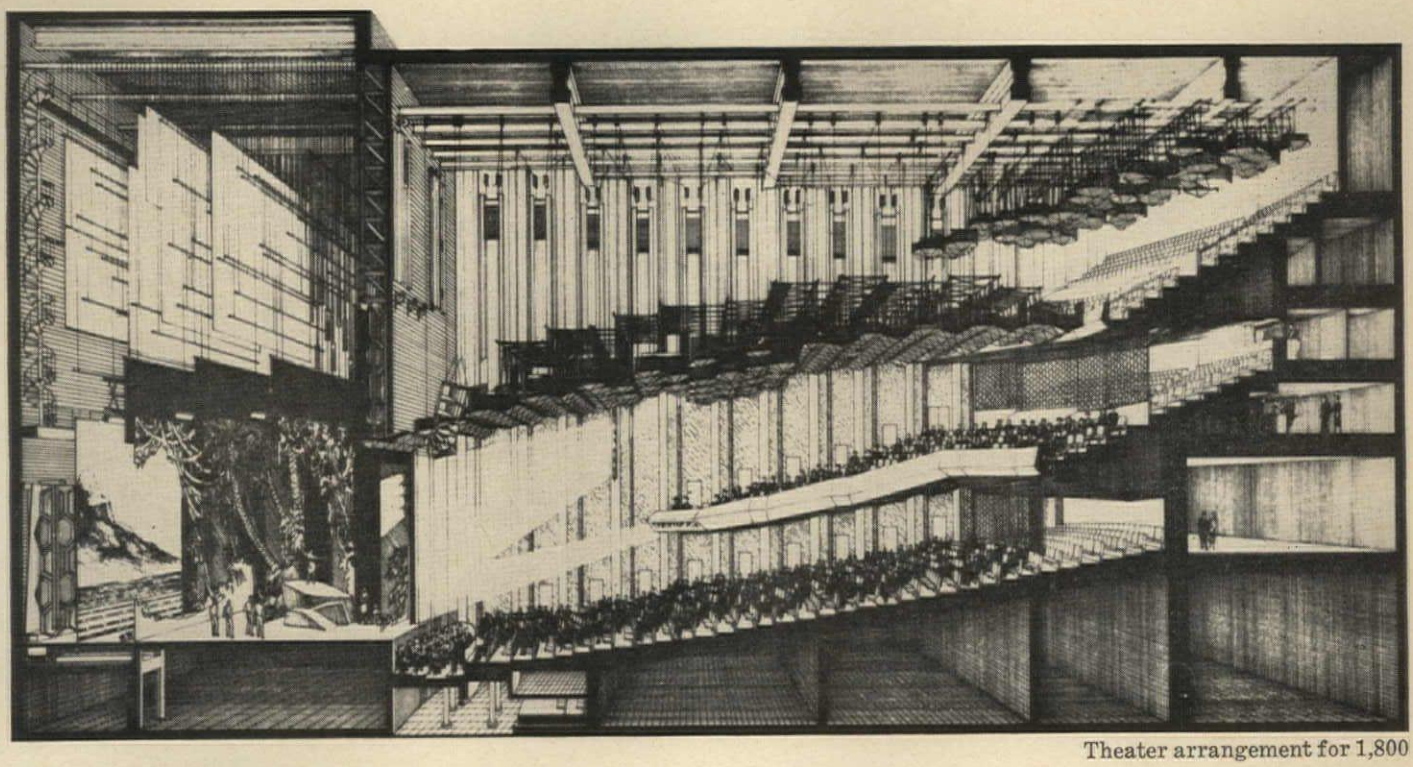




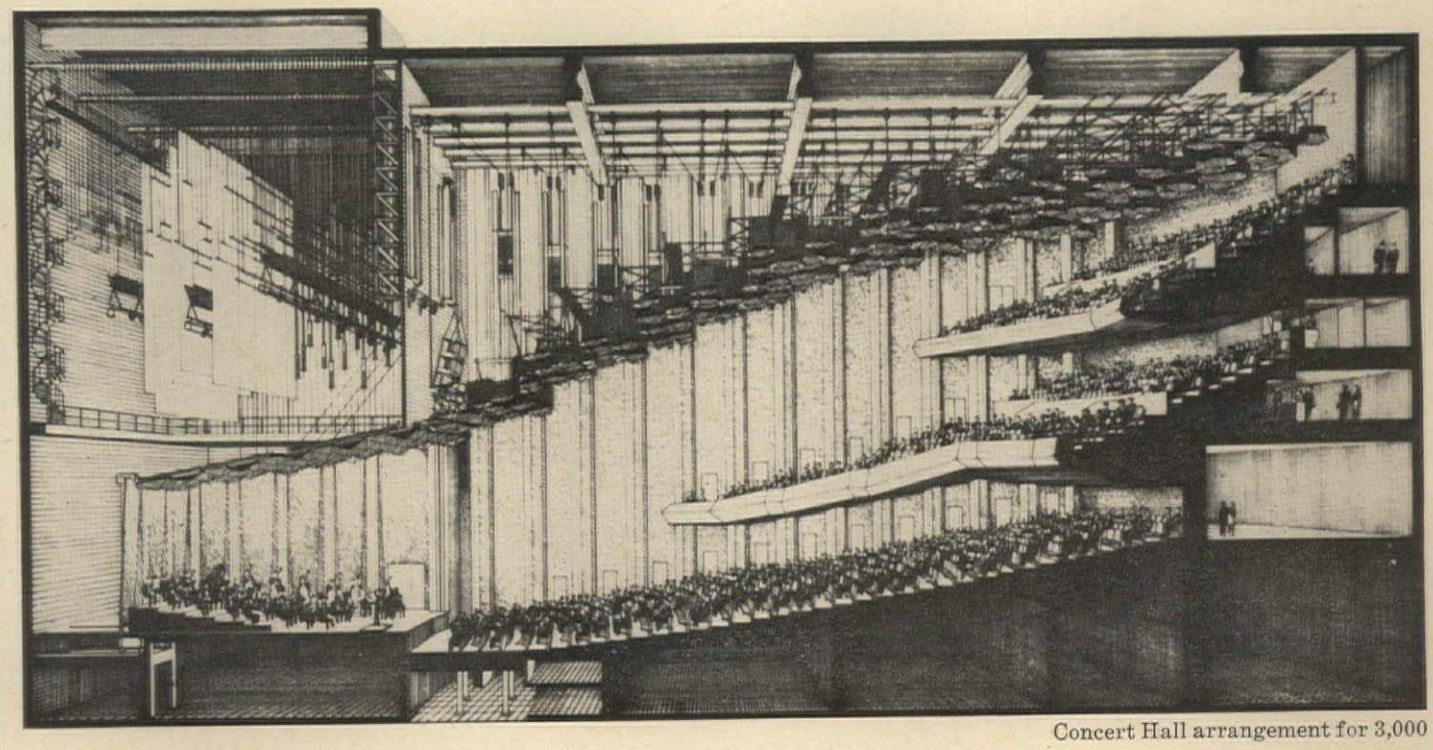
JESSE H. JONES HALL FOR THE PERFORMING ARTS

"As a concert hall, the walls and ceiling of the orchestral enclosure are visual extensions of the walls and ceiling in the hall, so that orchestra and patrons sit in 'one room.' The orchestral enclosure is segmented, hinged, and motorized to convert the space behind the proscenium to a full stage with fly loft. The reduction of seating capacity and volume of the hall (to reduce reverberation time) is accomplished in three steps: (1) lowering of the ceiling panels eliminates the top balcony; (2) operable verticle screens conceal the mezzanine; (3) similar screens blank out the last five rows of orchestra seating. With continental seating, all active rows are still accessible from the side entrances. Walls will be teak, upholstery red. Since the hall will serve many kinds of performances, a number of lighting environments will be programed on punch cards, which will put the lighting through a series of evolving changes to help set the mood before curtain time. Light will wash all outside walls."

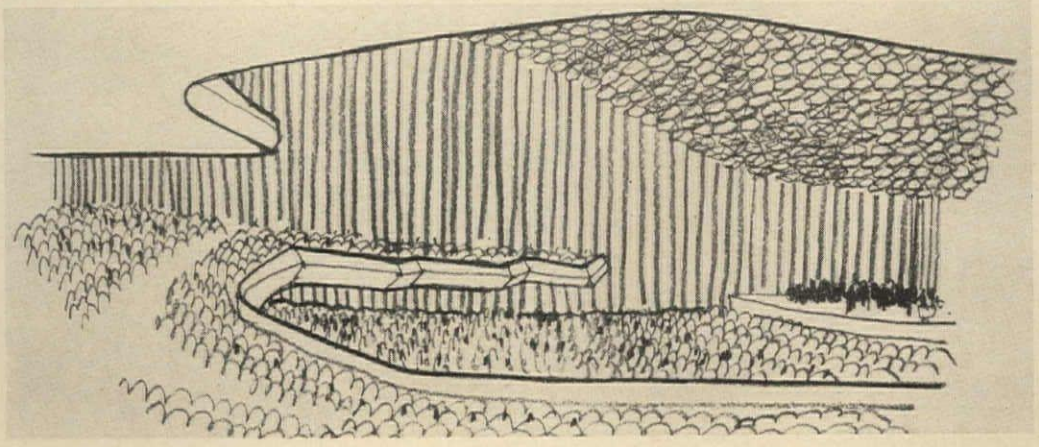


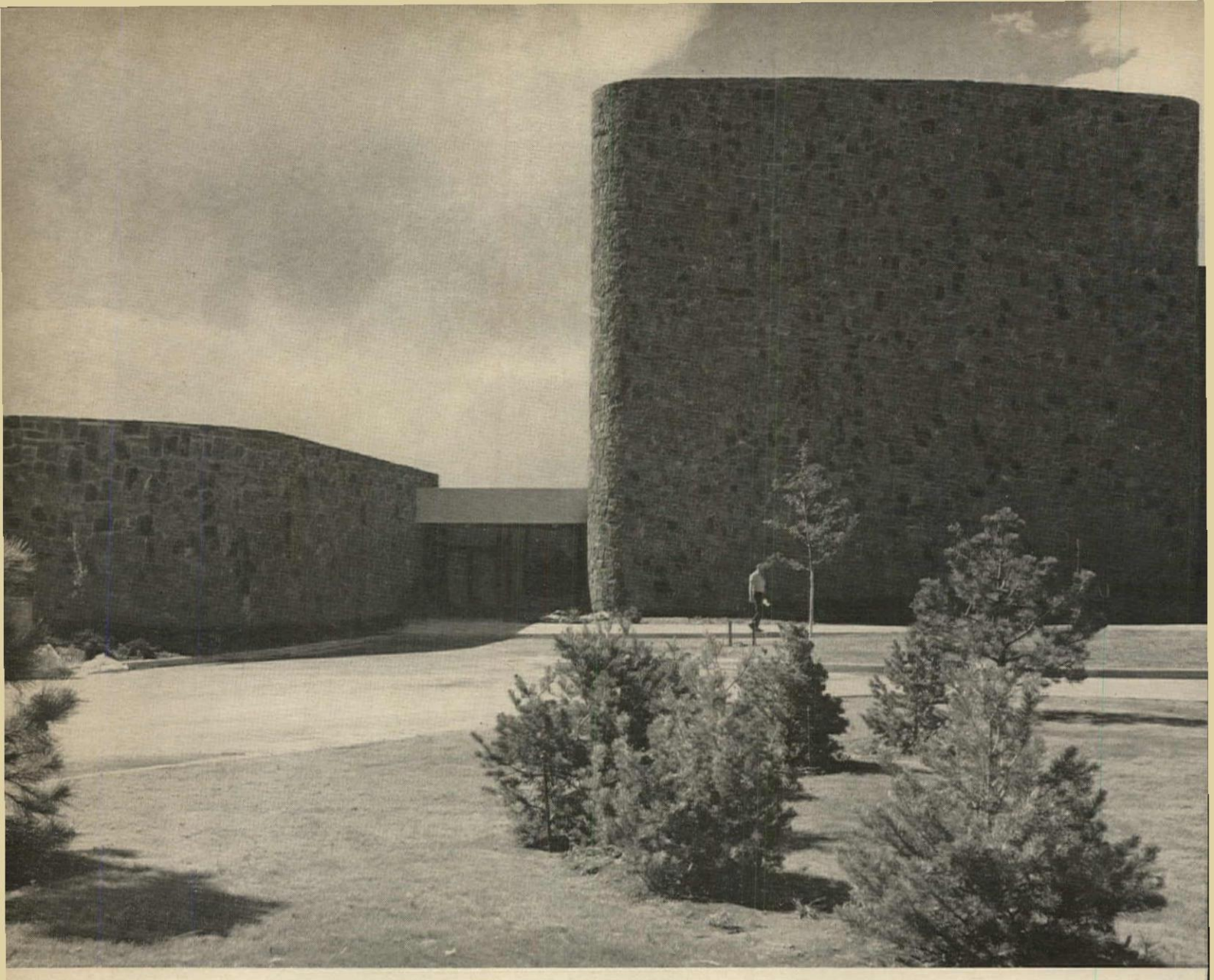


Theater arrangement for 1,800



Concert Hall arrangement for 3,000





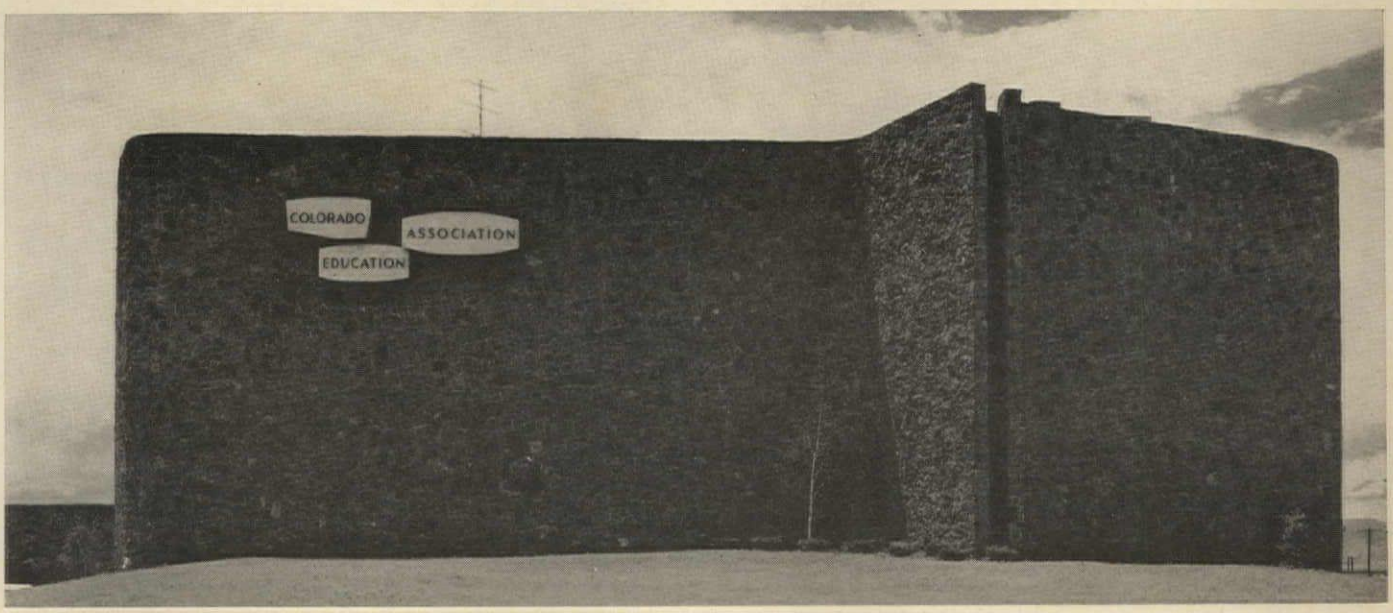
FREE-FORM OFFICE BUILDING OPENS TO VIEWS

Colorado Education Association Headquarters Building, Denver, Colorado

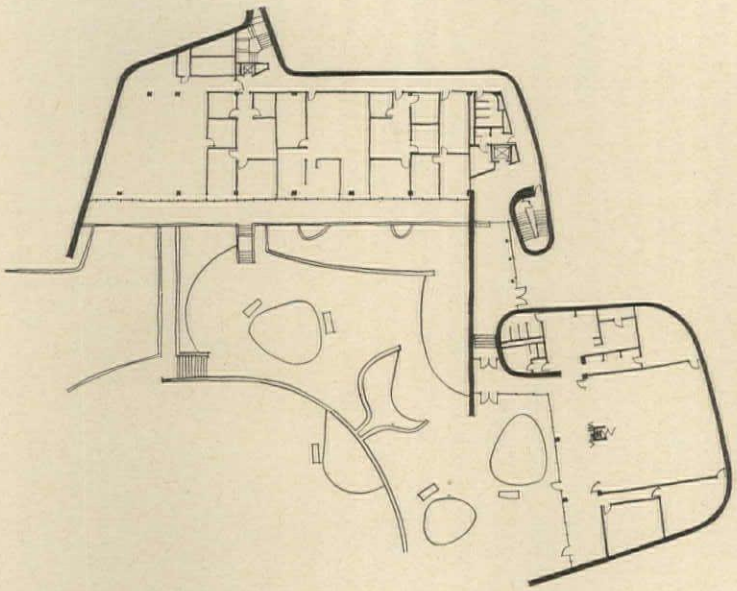
ARCHITECTS: *Caudill, Rowlett and Scott*

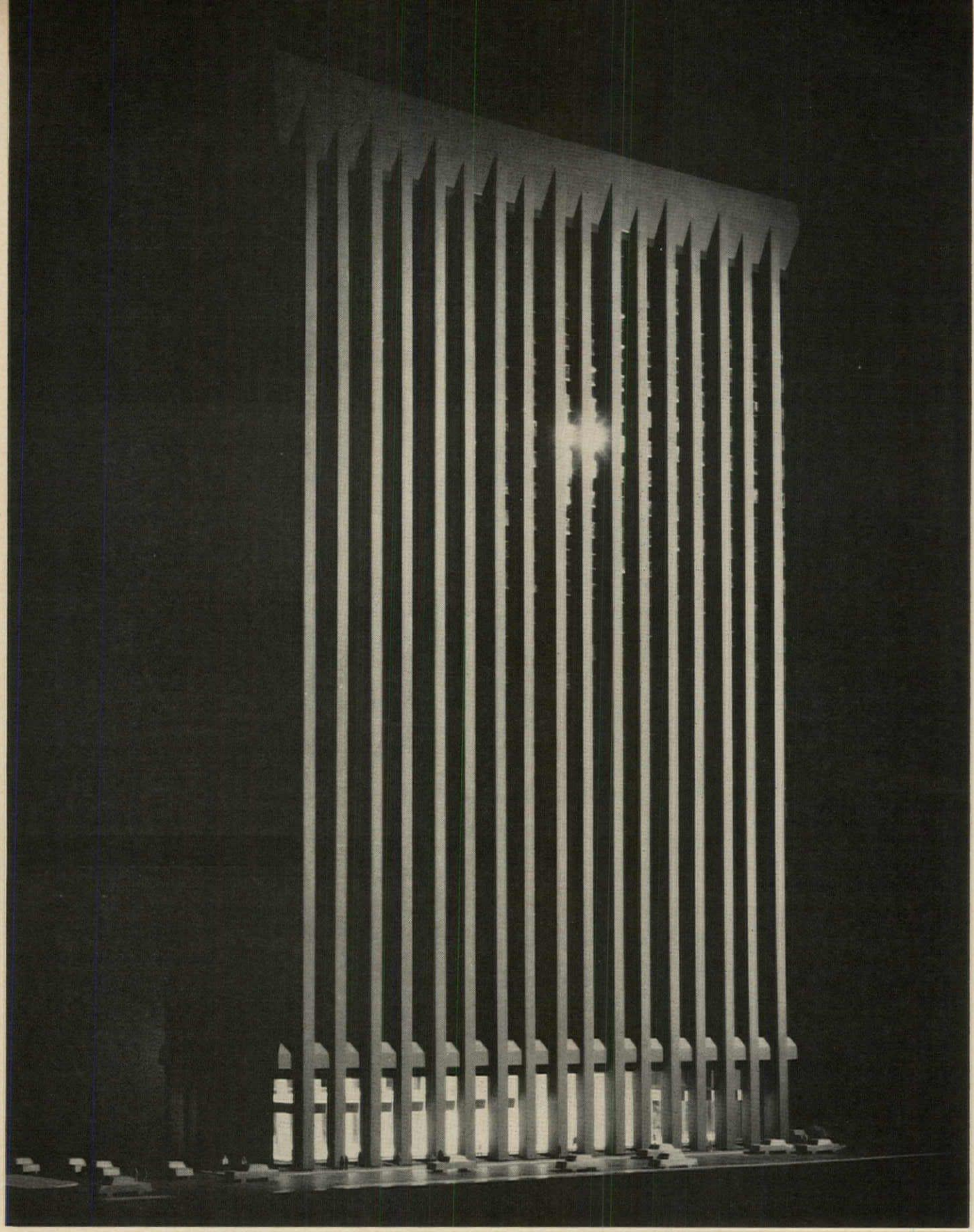
CONTRACTORS: *Lembke Construction Company*

The free-form, sculptural shapes of this building reflect a bold effort to solve the problems of a particular site and region. CRS partner, Franklin D. Lawyer, points out that: "This is a directional building which faces the Rocky Mountains, and turns its back on the noise, fumes and commercial development along an adjoining eight-lane expressway—except for one slit opening to let people know there is life behind the great wall of local stone. The building is as unique in its functions as it is in its appearance. It combines a professional building with commercial offices, an embassy, a conference center and a home office building. It houses research activities, public relations and public education services for over 19,000 persons and organizations. Facilities are divided into two elements: a four-story office building and a one-story conference center connected by a foyer. Loft spaces in the office block are readily convertible, and the conference center has nine partitions to change it from six halls into a big one for 300. Circulation balconies add sun protection for the air-conditioned interiors."



Rondal Partridge photos





BOLD OFFICE TOWER OF CELLULAR BRICK PIERS

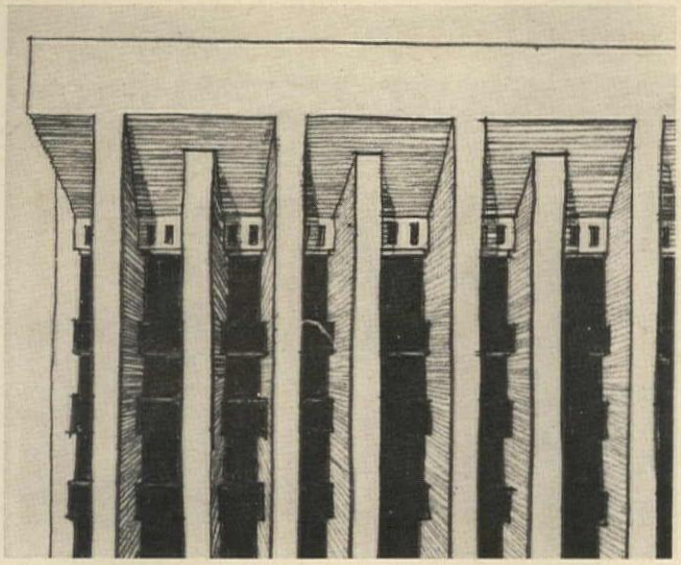
Benjamin Franklin Office Building, Houston, Texas

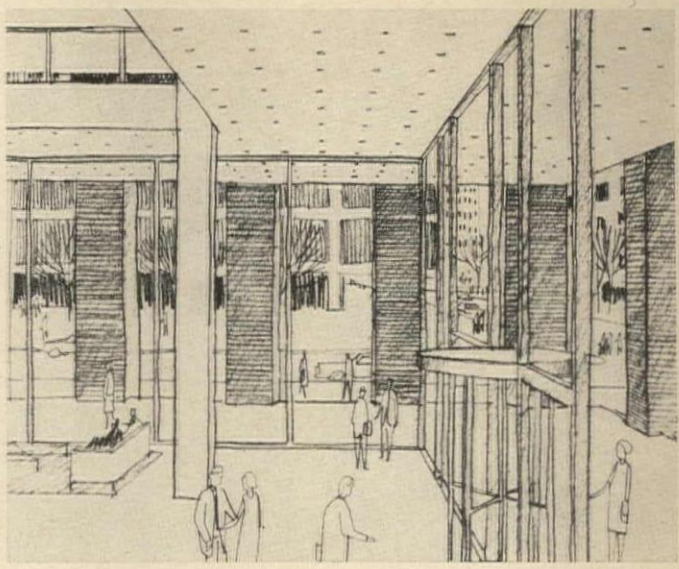
OWNERS: *Benjamin Franklin Savings & Loan Association and Cockrell-Bellows Interests*

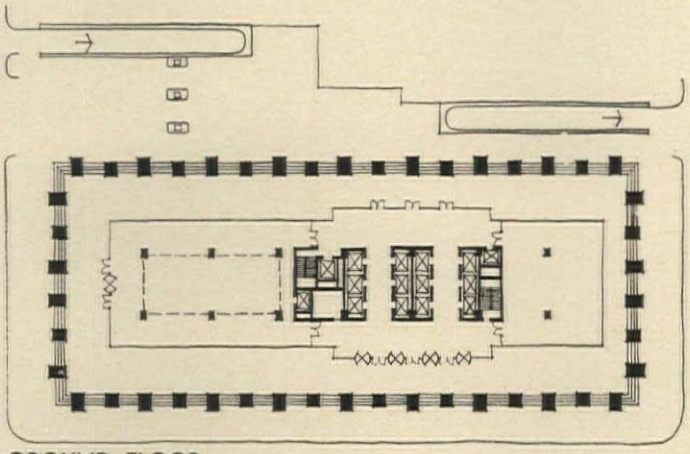
ARCHITECTS: *Caudill, Rowlett and Scott*

STRUCTURAL ENGINEER: *Walter P. Moore*

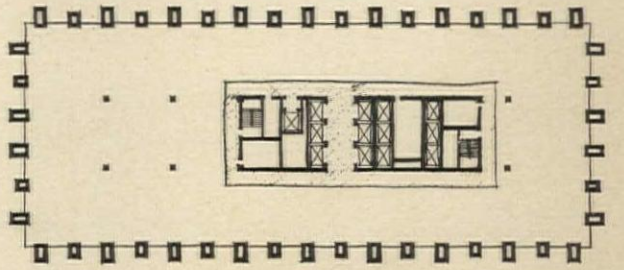
MECHANICAL-ELECTRICAL ENGINEERS: *Bernard Johnson Engineers, Inc.*



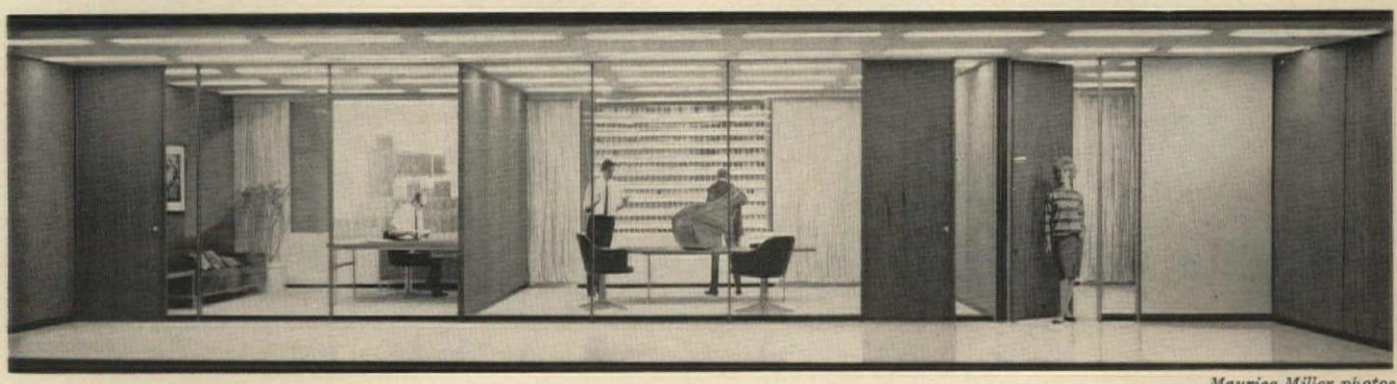




GROUND FLOOR



TYPICAL FLOOR



Maurice Miller photos

This powerful, brick-columned tower is the first urban high-rise office building to be designed by Caudill, Rowlett and Scott. CRS partner, Thomas A. Bullock, states that: "We set our objectives early: the building should be aggressive, direct, free from the superfluous. It must also have economic success as an investment tower, as well as a home office building. A computer was programed to calculate the optimum size building for the greatest investment return; this was reached in the 29- to 33-story range. The space was divided with parking underground, home office space at the base, rental areas above. By developing a cellular structure to transport the air system, we created deep vertical elements of a dark brick, which inherently provide shade from the hot Texas sun. Single horizontal sheets of glass are set in gaskets between columns. A cornice has intake and exhaust nostrils punched through the lintel. At the base, glass walls are set back to create a colonnade, and floors and walls are white marble. From an angle, the tower face will look solid; in front, it opens to show the glass."

Myron Wood

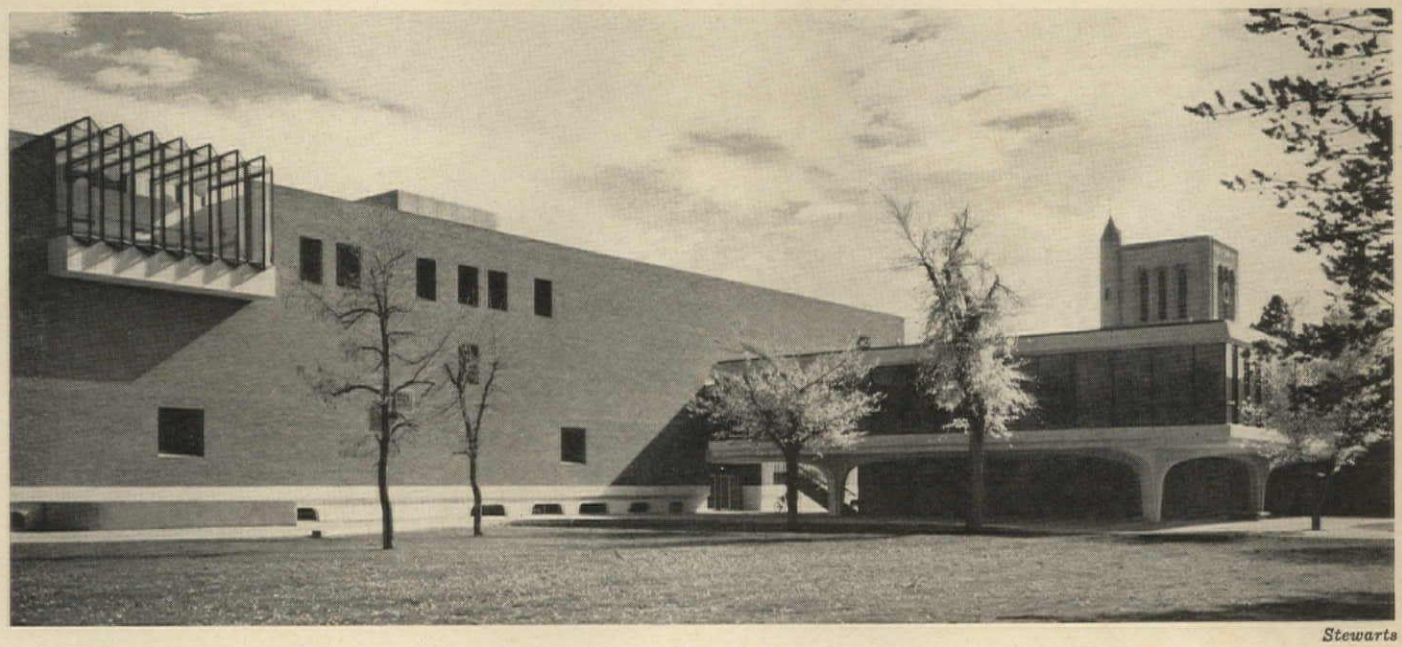
SCIENCE HALL STRESSES INNER FLEXIBILITY

Olin Hall of Science, The Colorado College, Colorado Springs, Colorado

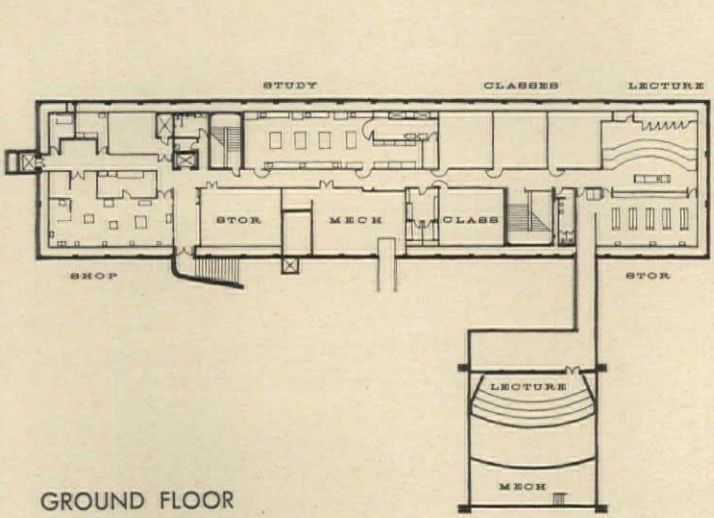
ARCHITECTS: *Caudill, Rowlett and Scott*

CONTRACTORS: *B. H. Baker, Inc.*

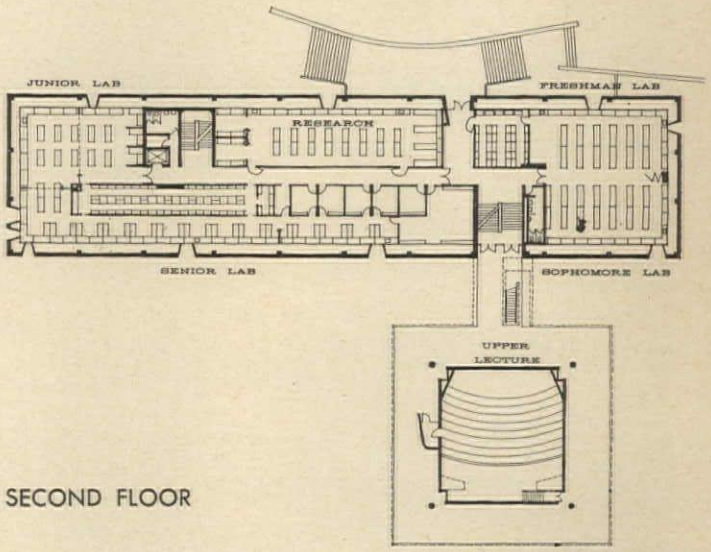
The laboratory wing of this science building achieves a high degree of flexibility by wrapping mechanical services around interior spaces. CRS partner, C. Herbert Paseur, comments that: "It is a 'grasshopper' chase wall—an exoskeleton architecture, with load-bearing brick walls and post-stressed concrete beams —providing column-free, convertible space. Like the skin of the grasshopper, a perimeter chase of the wall contains the vital functions. The dozen systems for heating, lighting, ventilation, gas, power and science utilities are available at the application of a screwdriver to the asbestos cement panels of the inner skin. At least 30 of the scientists who would use the building were brought into the research and analysis for the design. Careful but limited use of pierced windows simplified mechanical problems and helped give the building an indigenous quality both in keeping with the region (snow, glare, wind and temperature fluctuations) and with the older buildings on the campus (massive, thick walls and deep windows). While the large wing is utilitarian, the smaller one for lecture hall and lounge is carpeted and enclosed in glass. Costs came to an economical $16.26 per square foot."



Stewarts

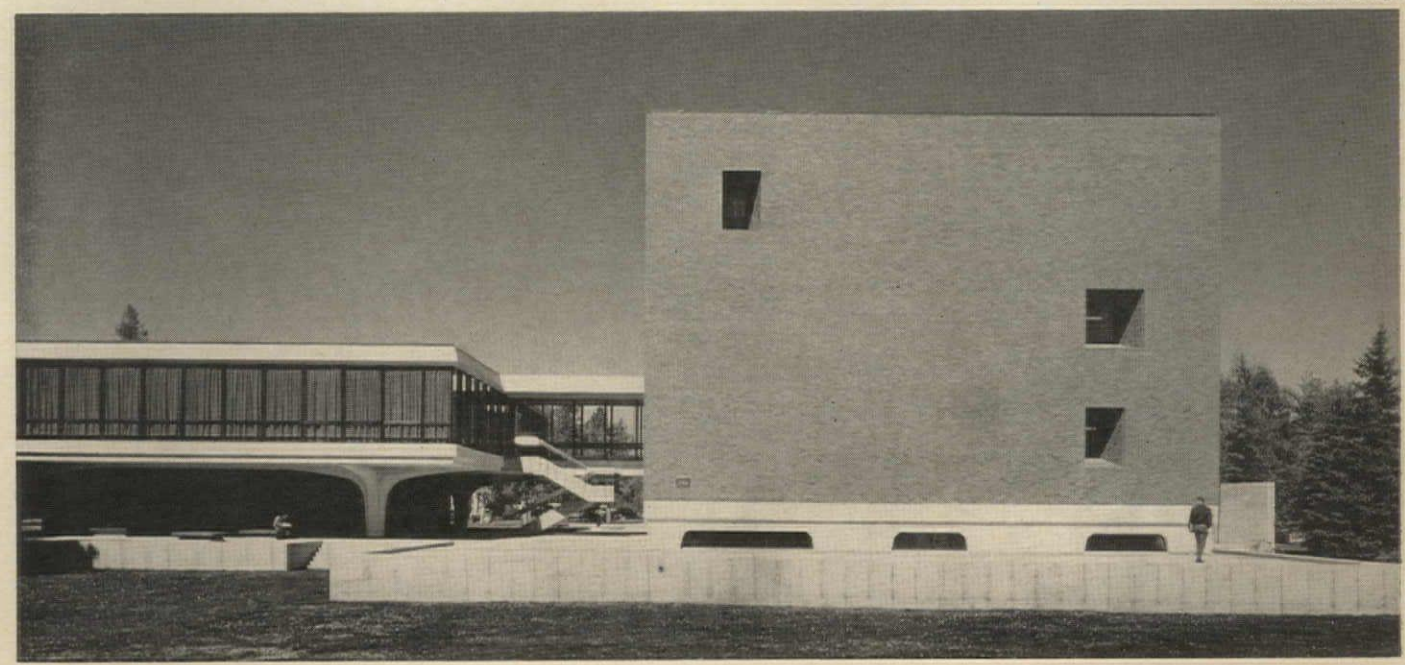


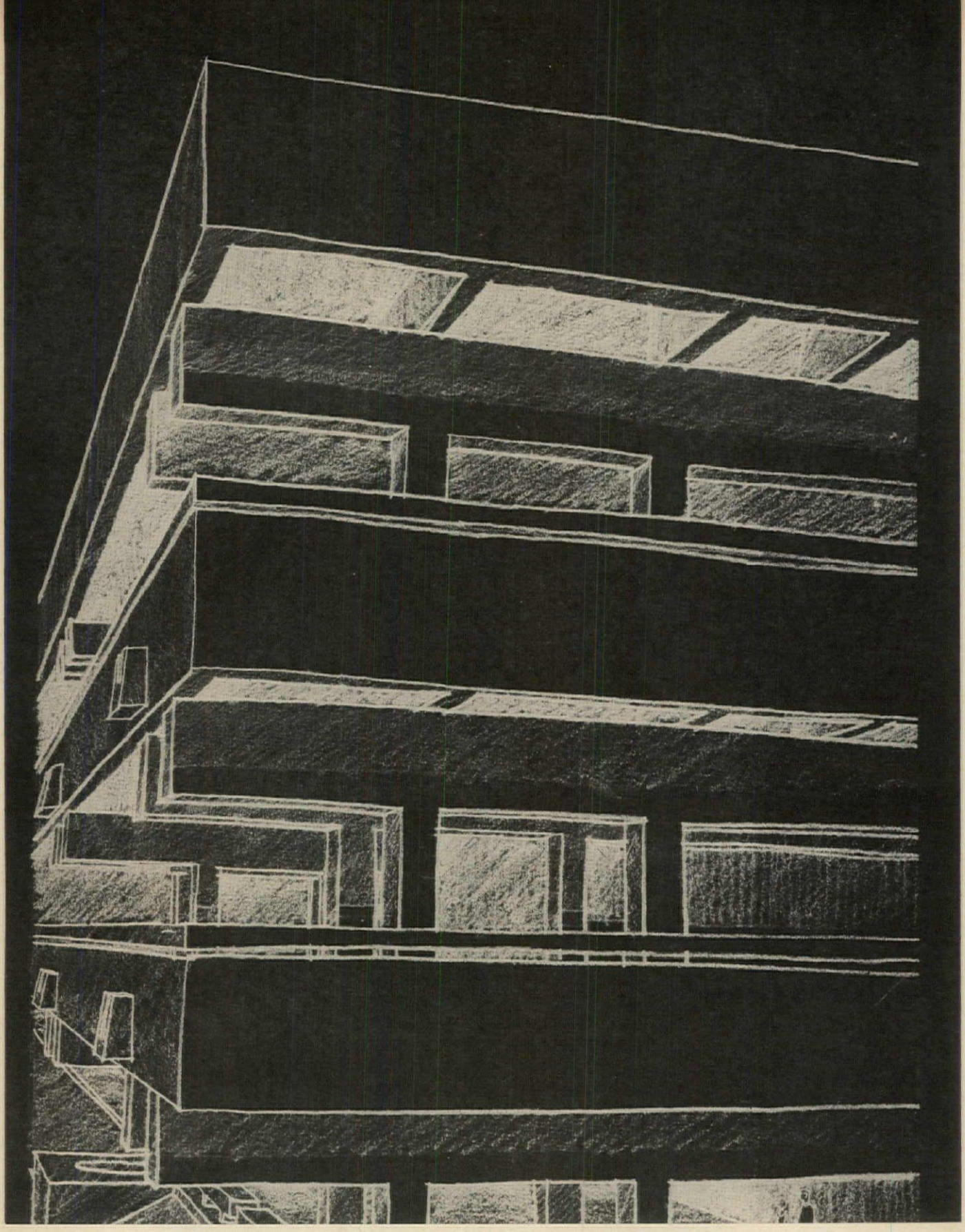
GROUND FLOOR



SECOND FLOOR

Rondal Partridge



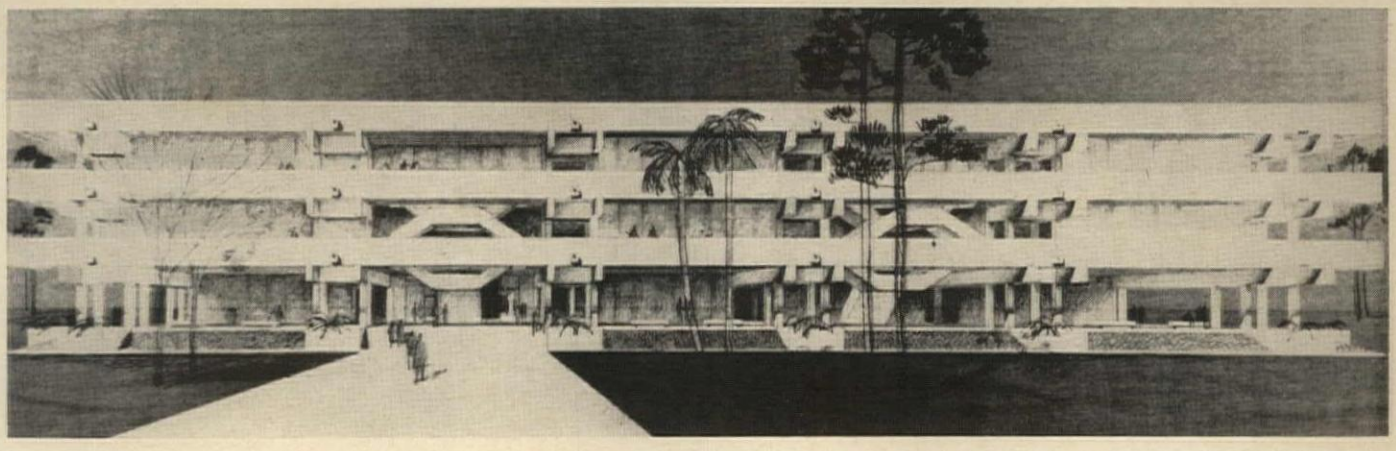


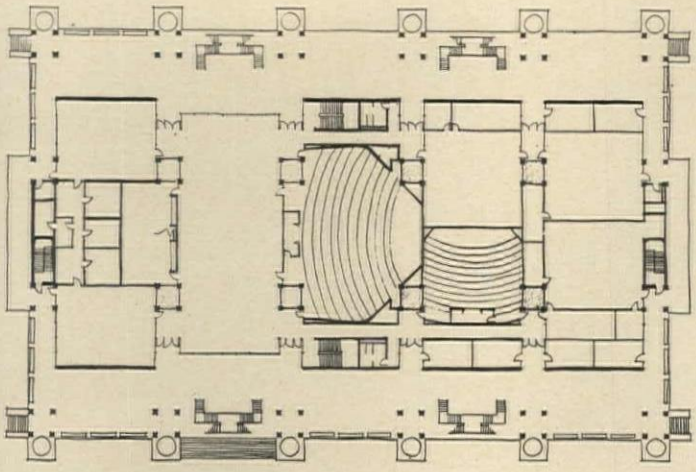
SCIENCE CENTER EMPHASIZES BOLD STRUCTURE

Science Building, University of Miami, Coral Gables, Florida

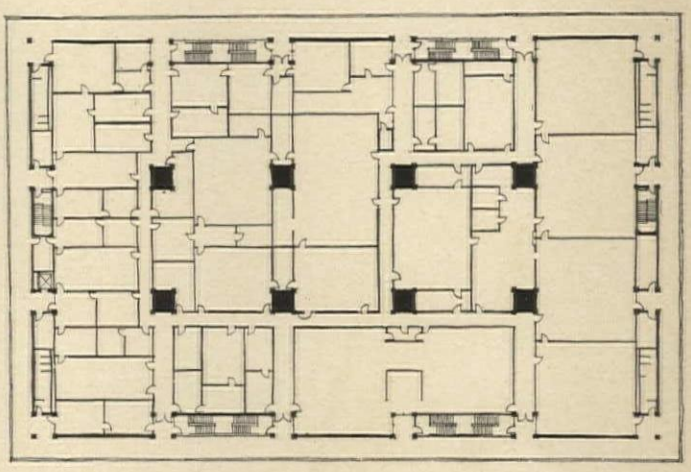
ARCHITECTS: *Caudill, Rowlett and Scott*

ENGINEERS: *Dignum Associates*

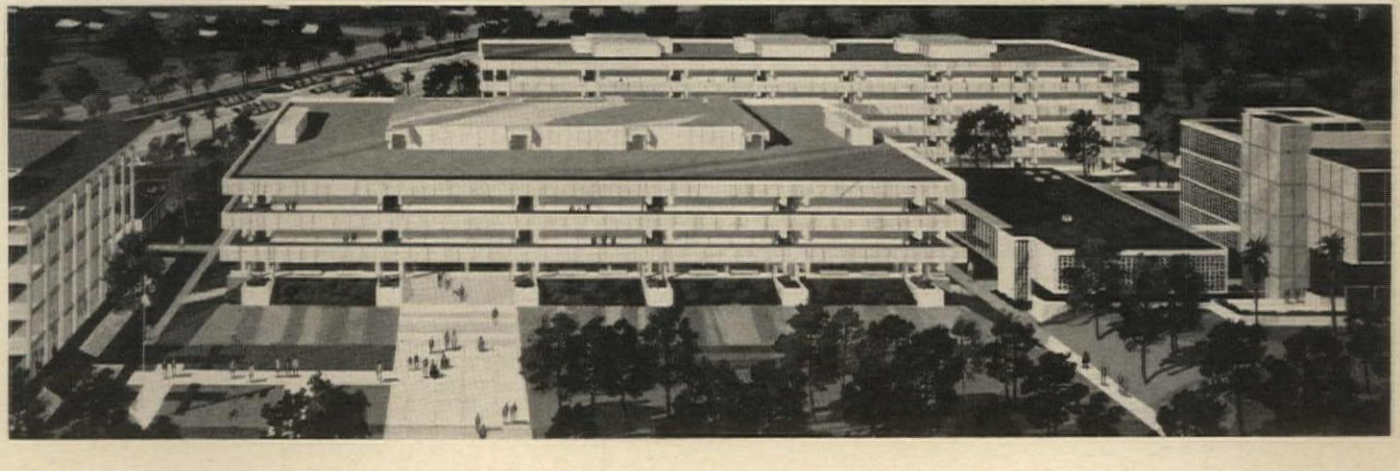




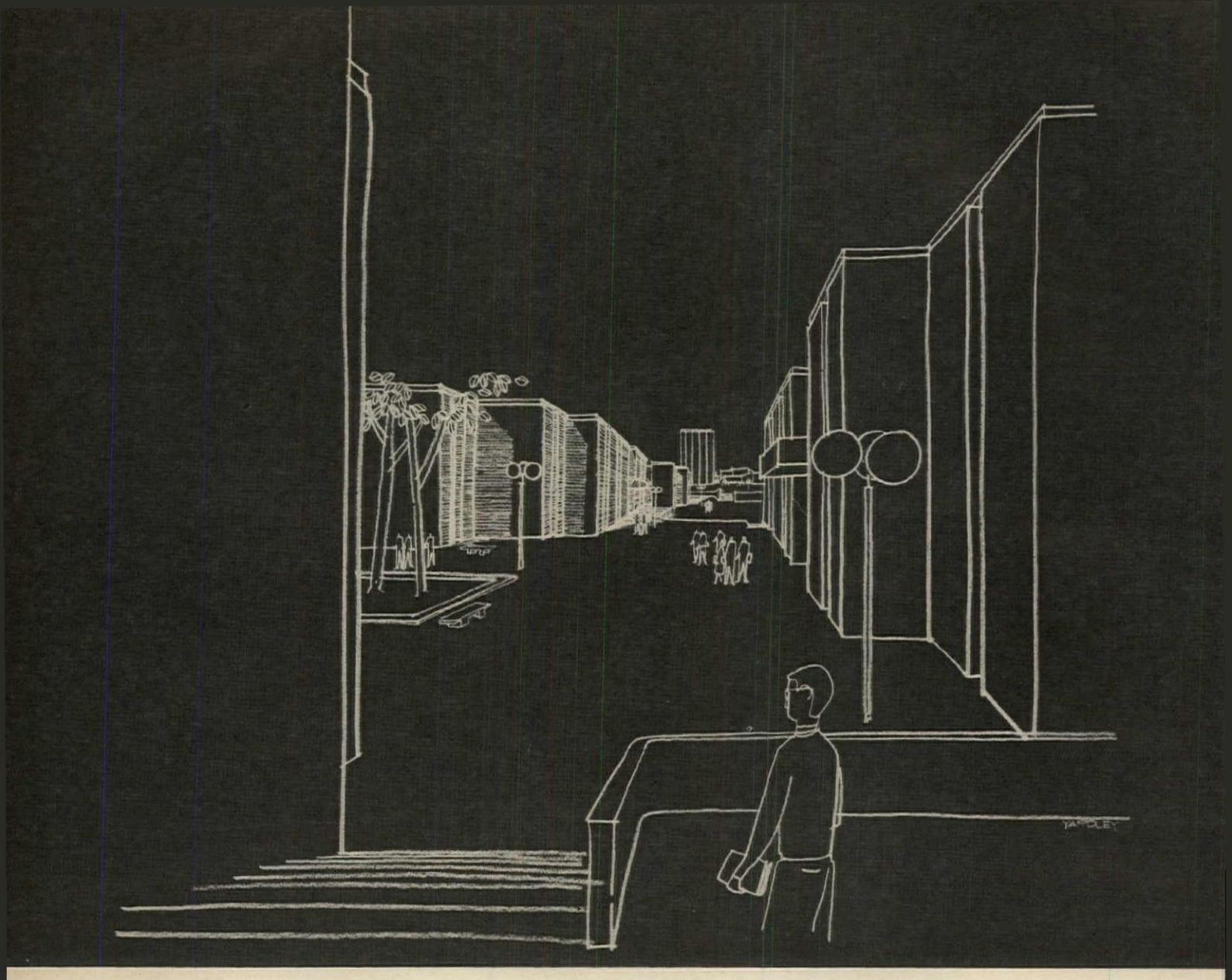
GROUND FLOOR



TYPICAL FLOOR



In this Florida science center, a forceful concrete structure integrates a flexible mechanical system, and provides protected but open circulation. Economy and expansibility in two stages were major requirements: a four-story unit for zoology, and a later addition for physics and botany. CRS partner, Wallie E. Scott, states that: "The simplicity of this science center lies in the synthesis of structural and mechanical parts into one modular system. Concrete beams run longitudinally, supported by concrete girders and columns at 42-foot intervals. Space between beams of adjoining bays creates a partially concealed distribution raceway, including a double duct, high velocity mechanical system. Eight structural piers contain the main supply ducts. Partitions are movable filler walls of 6-inch concrete block with metal inserts. The only penetrations of the solid exterior are finger corridors off balconies on each floor; new units will be linked at these upper floors. The first floor contains lounges and lecture halls. The cost per square foot is about $20.50 including equipment." The sketch (*above*) is of the final complex.



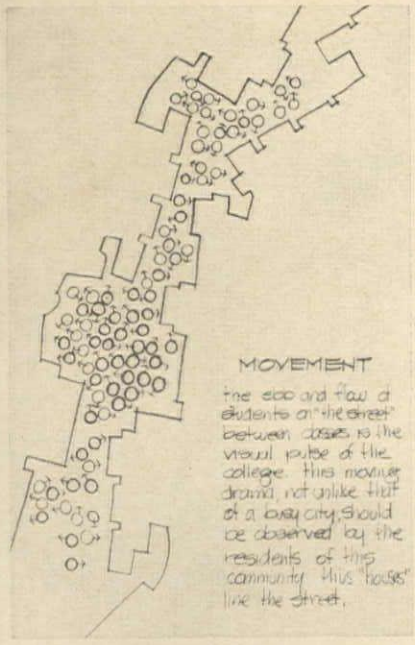
A COLLEGE CAMPUS THAT IS MAIN STREET

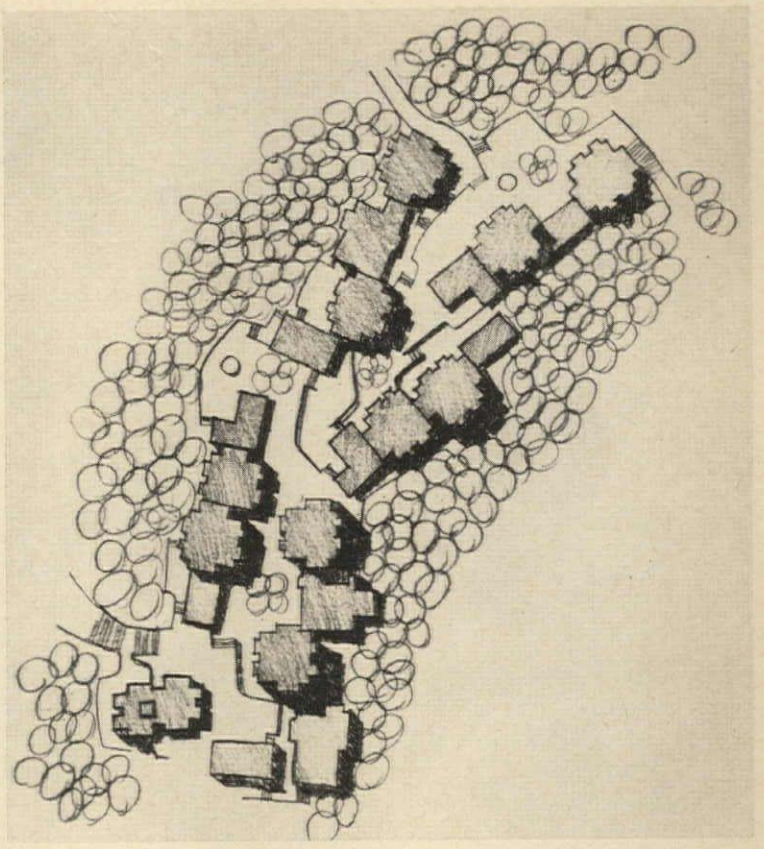
Denison College, Denison, Iowa

OWNER: *Midwestern College, Inc.*

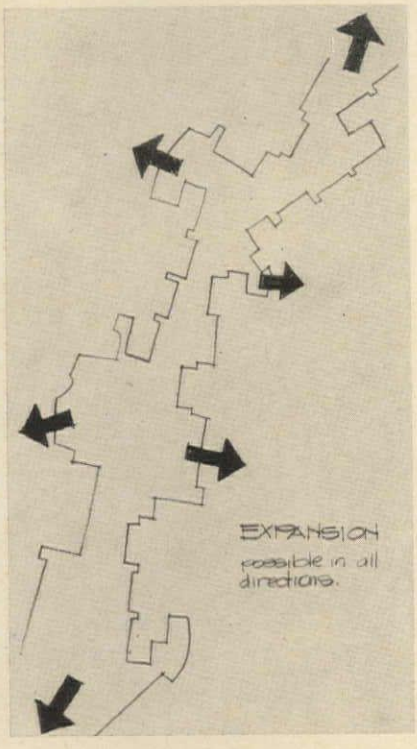
ARCHITECTS: *Caudill, Rowlett and Scott*

A somewhat different type of college community is envisioned in this plan for a new campus. CRS partner, John M. Rowlett, says that: "The contention that quality architecture and construction economy would be achieved if the complete plan for the campus were known, and the curriculum used as the core for planning, is manifest in the campus plans for Denison. The key was space planning rather than room planning. Man is a gregarious creature. He organizes himself along streets. What could be more appropriate for a Western Iowa town than a college campus that is Main Street? There is no zoning in the traditional sense—the academic avenue is an integration of residential and academic functions, with the accent on aliveness, human scale, the motion of pedestrians. The buildings ramble along each side thrusting silhouettes up from the hill crest site. The street, 2,000 feet in length, meanders, narrows down, then widens into a court. The space will expand and withdraw along the street behind enclosures against weather, into places where people sit and talk, eat or study, work in labs or wait before classes. The emphasis will not be on buildings, but on the experience derived from the total environment."

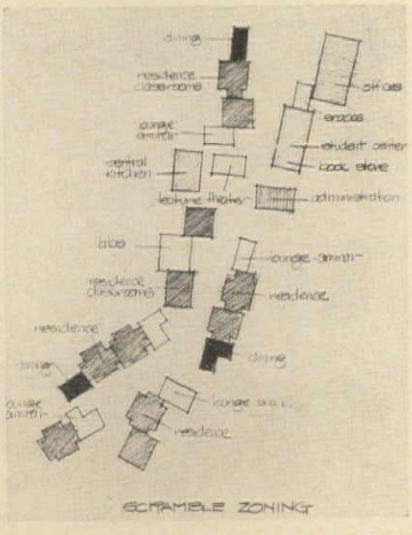


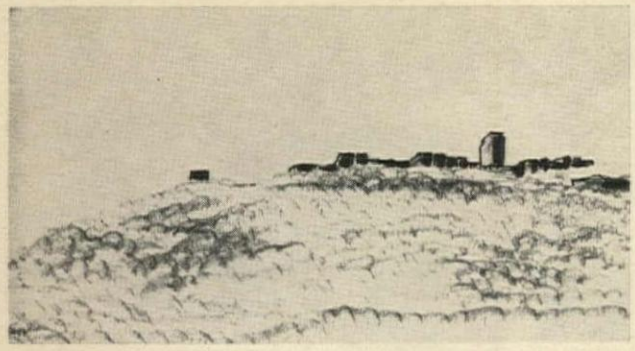


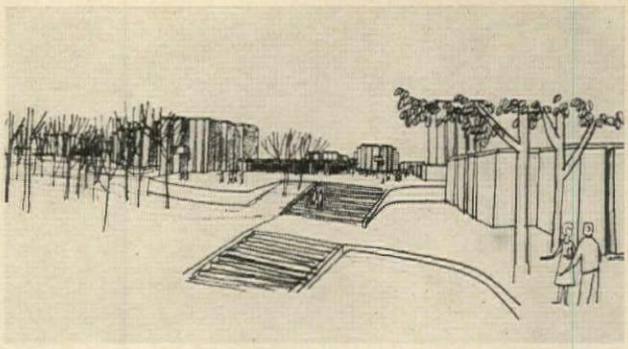
An early stage of development of the campus

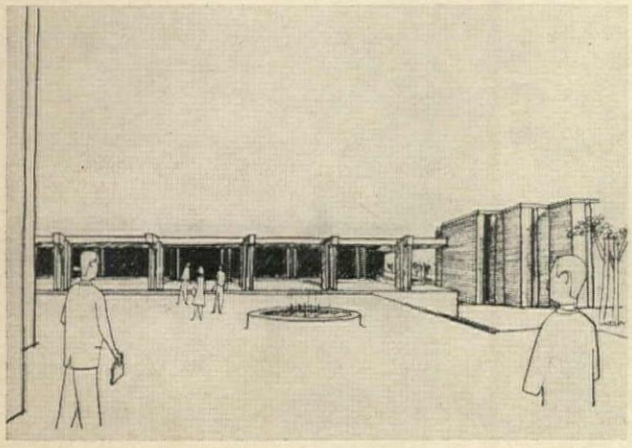


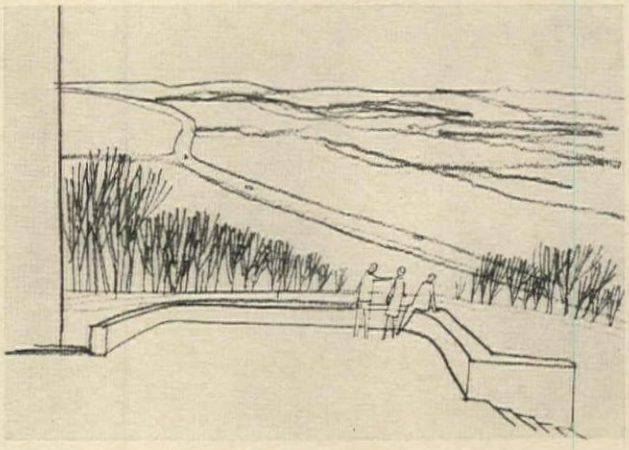
Master plan for future expansion





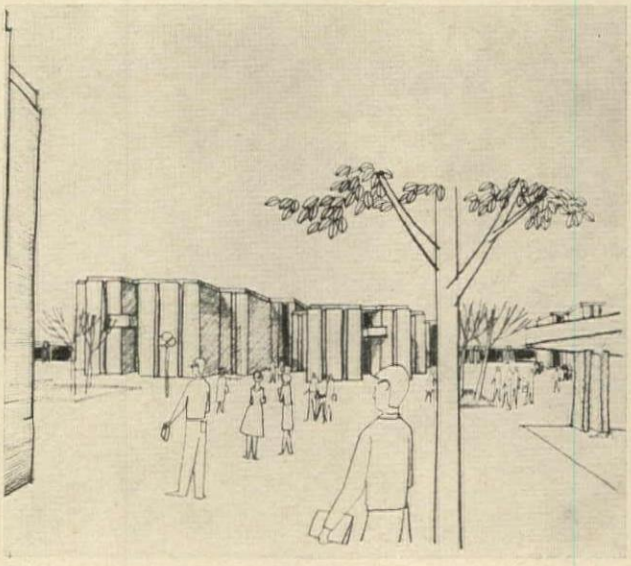


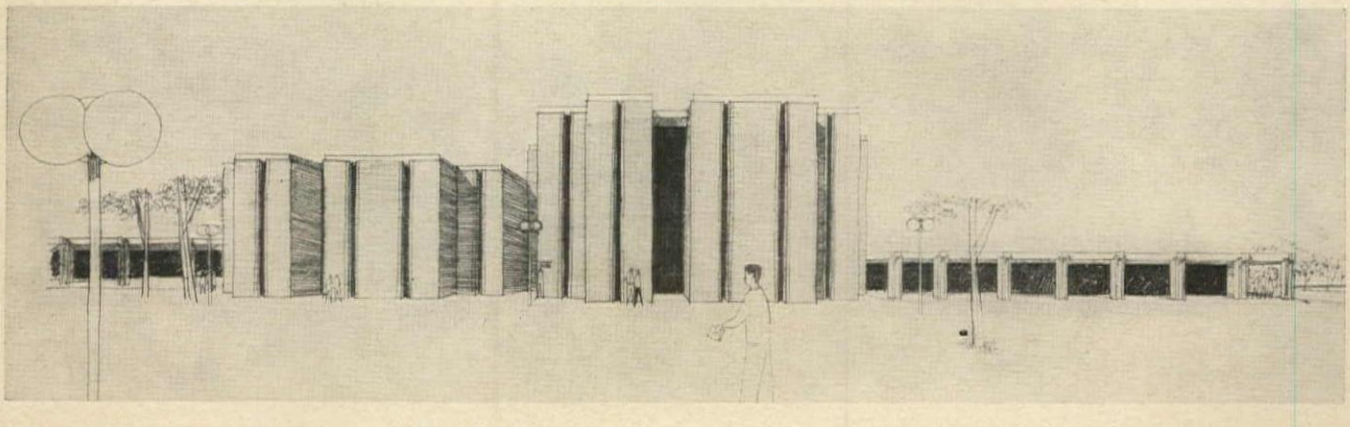




DENISON COLLEGE, IOWA

"As the college construction progresses, the street will lengthen as it expands laterally into byways for services and recreation. The first buildings will be the administration building and two dormitories. The administration unit will house an auditorium, classrooms and offices. Dormitories will have living and dining facilities for 448 students and classroom space for 600. Instead of a day college of classrooms and a night college of dormitories, the two will be combined. Social rooms will double for seminars, public lounges will serve for tutorials, dining rooms will be divisible into lecture halls. This total flexibility means reduction of required construction space and lower maintenance over the years. During the first phase, the library facilities will be decentralized with the reference library in the administrative unit."



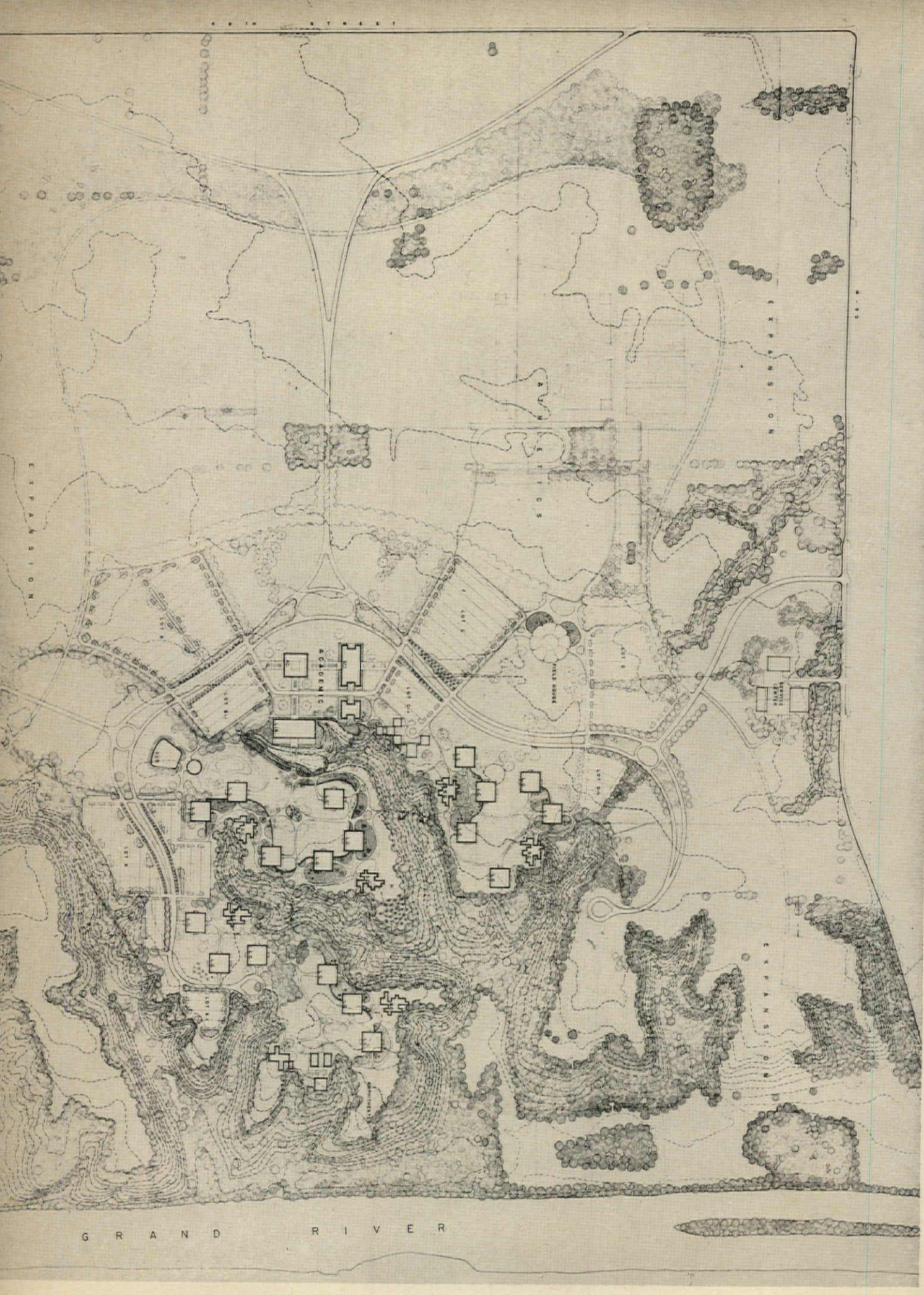


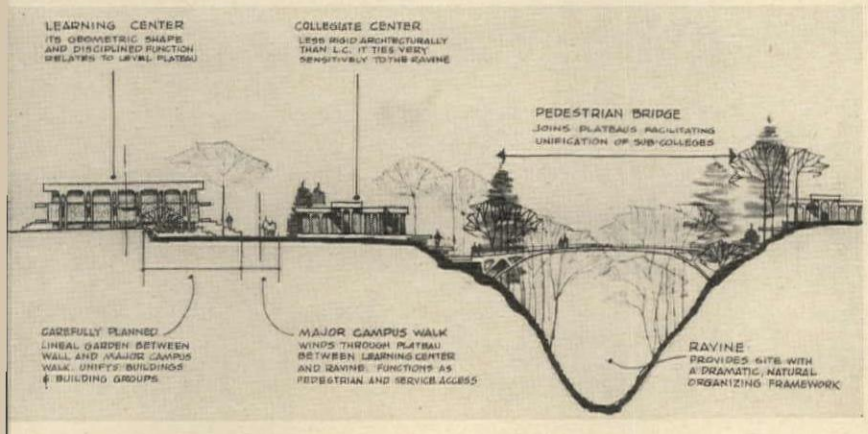
COLLEGE PLAN A CLUSTER PATTERN

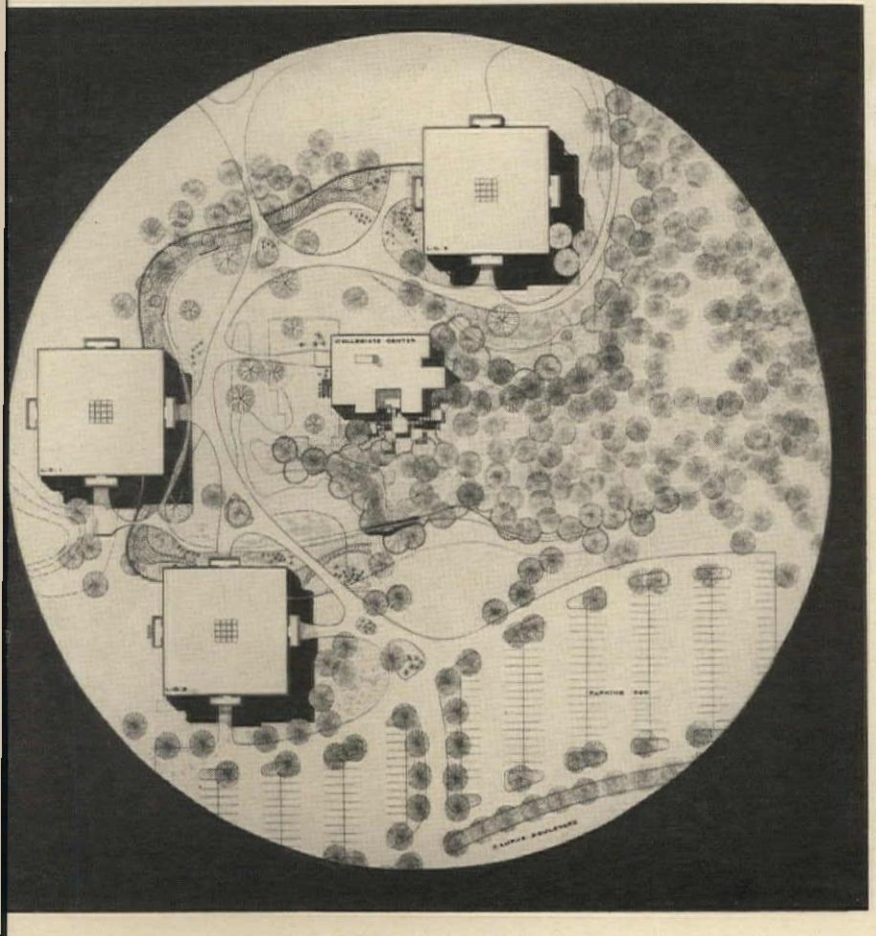
Architects Meathe & Kessler, with site planners Johnson, Johnson & Roy,
make the most of a pattern of ravines in designing
a brand-new college in western Michigan, overlooking the Grand River

The design idea for Grand Valley State College—a completely new institution near Grand Rapids—is to construct a system of satellite colleges on the finger-like plateaus surmounting the wooded ravines characteristic of the unusual site. The master plan also calls for a central administrative and academic core; and (on level ground) a service center, athletic fields and room for expansion. The first stage of construction—one satellite group—is now complete, and is pictured below. The master plan (*next page*) includes the necessary physical facilities for an eventual enrollment of 10,000 students, many living on campus.

Residents of an eight-county area sparked the development. They acquired the spectacular 770-acre site on the Grand River, and raised one million dollars—which the state then matched—and work was begun. Adrian Languis, F.A.I.A., director of the Buildings Division for the state, was helpful in conveying to the College Board of Control the importance of a definitive master plan and of good architectural design.


EXPANSION
EXPANSION
EXPANSION
ACADEMIC
FIELD HOUSE
GRAND RIVER



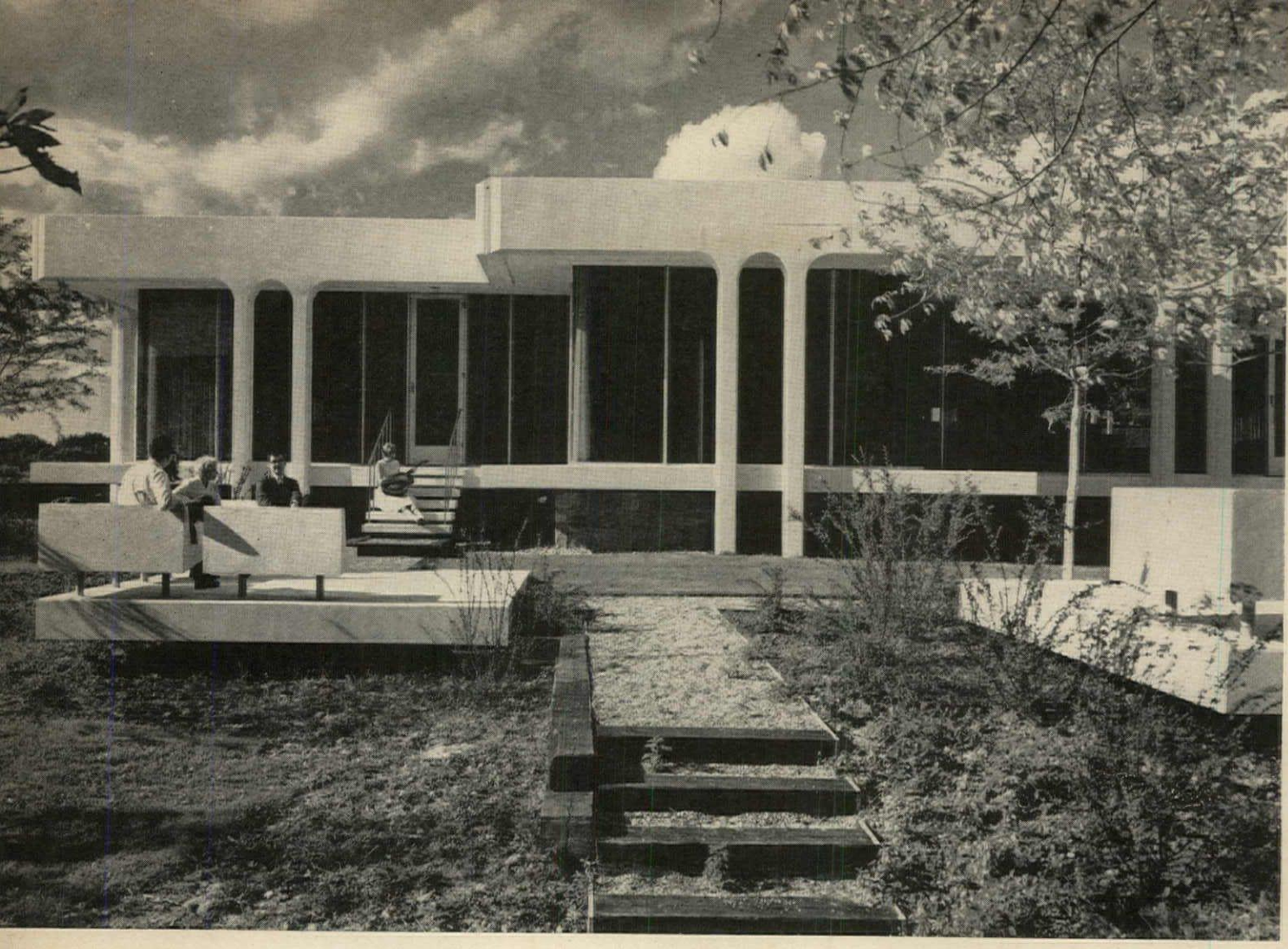


THE MASTER PLAN

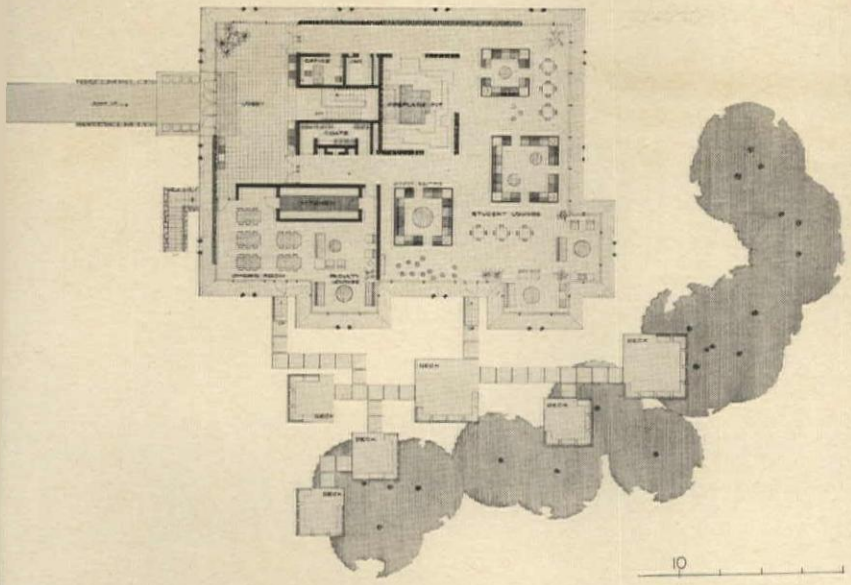
The nature of the site and some advanced ideas about the learning process weighed heavily in the development of the master plan, shown at left.

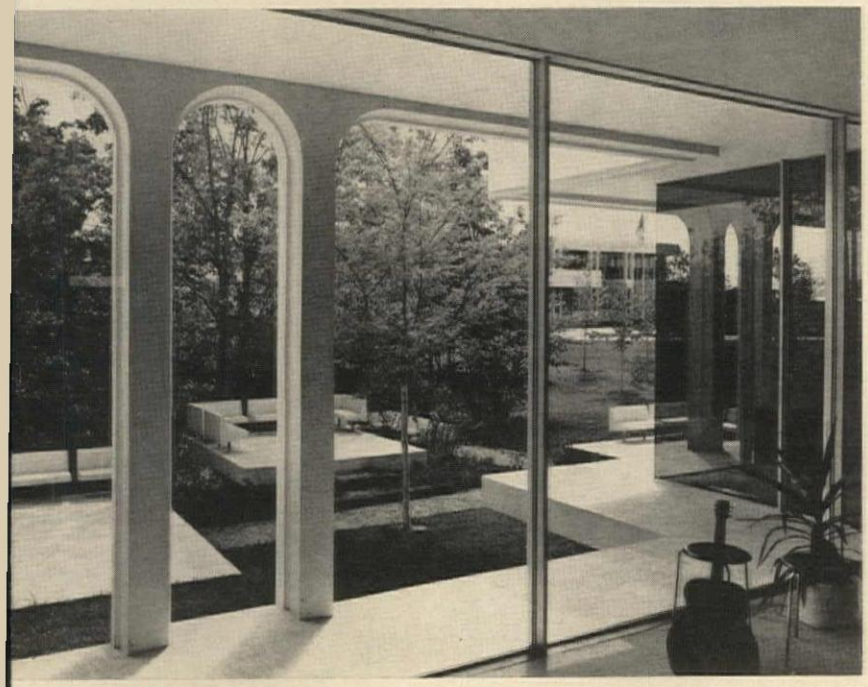
The campus lies 14 miles west of Grand Rapids, and will serve an eight-county area. Many students live within 30 minutes driving time. For the present, all students will commute; dormitories come later in the building program. The site is penetrated by a series of deep, heavily wooded ravines reaching westward from the Grand River (*bottom of plan*). The remainder of the site is level, essentially a plateau overlooking the river. The finger-shaped islands—each 20 to 40 acres in extent—that reach out between the ravines take on the character of flat open spaces ringed by trees. The satellite colleges are grouped on these land fingers; each satellite consisting of three learning centers dispersed about a collegiate center, or student union. The four buildings of the first satellite group (*circular detail plan*) are finished and shown on the following pages. Foot bridges over the ravines will join the satellites and, in turn, the core of the college and the satellites. The core—in the central area of the site—will include the library, labs for science and the arts, administration and auditorium. Athletics and field house will occupy a level area slightly to the west; the service center is on the boundary highway (*right edge of plan*).

The campus is approached from three directions, all leading to the main campus drive—a curving, boulevarded road which serves as the spine of the plan and reaches all principal building sites. Student parking lies outside this drive; faculty parking within. Pedestrian circulation follows the edges of the ravines, revealing the full drama of the site.



Balthazar photos

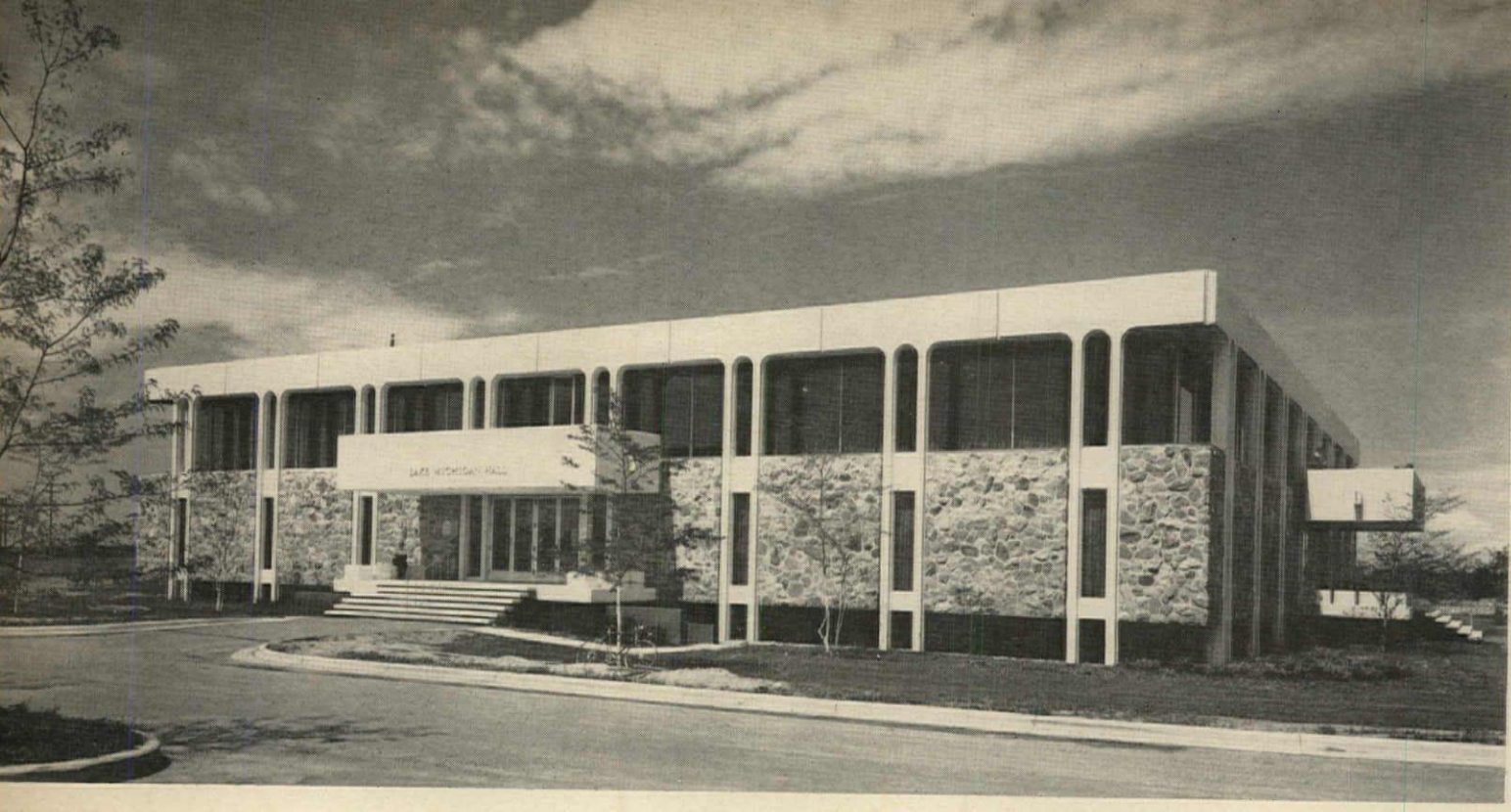


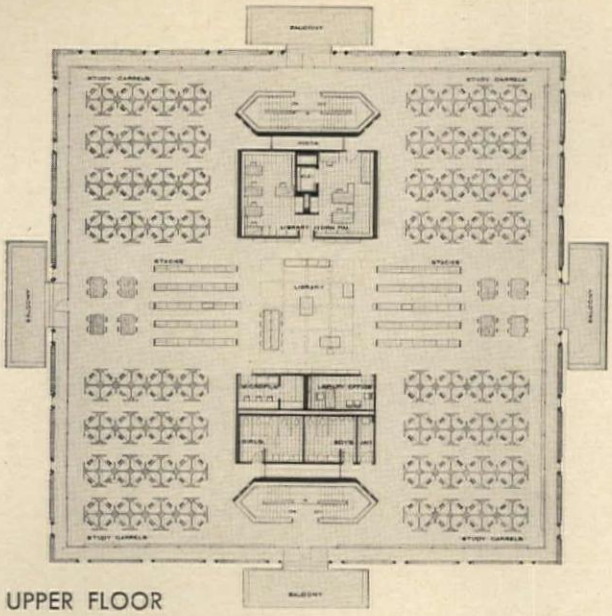


A COLLEGIATE CENTER

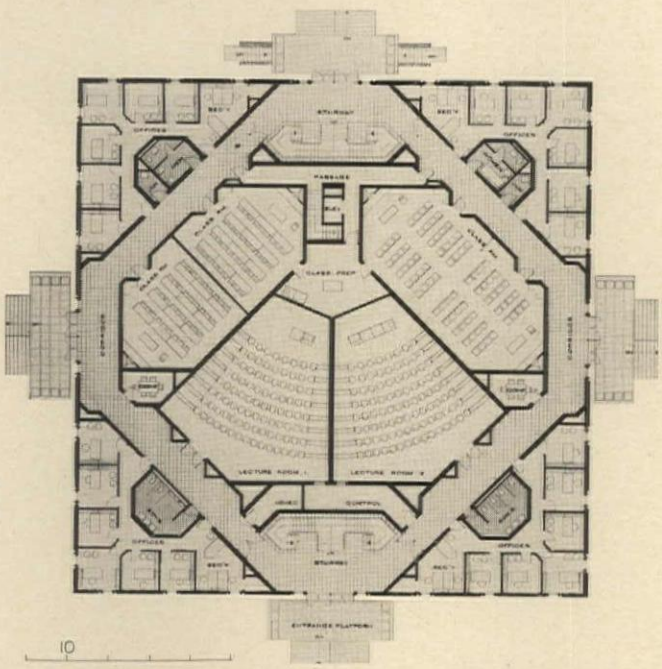
The collegiate center will serve as a gathering place for the students and faculty of each satellite, or sub-college group. The building is appropriately small in scale and informal in character, opening out nicely through glass walls and by way of a series of stepped terraces to the wooded ravine immediately below. Inside, the spaces center naturally on the huge stone fireplace as a visual and social focal point. On the ground floor, architectural components and furniture are arranged to create a variety of spaces for various uses: dining; small, quiet conversation groupings; general large lounges; areas of more intense activity. Special built-in seating for groups (*far left*) was designed by the architects, who handled all interiors for the college. Below the ground floor, additional spaces house a bookstore, a large game room, and student activities offices and work room. As a center for large and small gatherings, the building will serve the important function of providing attractive surroundings for the social development so essential in the college experience. The money required for the construction of the center—not available from state funds—was donated by the Seidman Foundation.

Materials and finishes for the collegiate center and learning centers: exterior finish is precast concrete, painted; partitions are block, plastered; floors are asphalt tile on concrete; ceilings are acoustical tile or plaster; sash and entrance doors are aluminum. The science building—now being built—will have a skin of self-sealing rusted steel; frames of stainless steel for the bronze colored glass; this treatment above a concrete structure from grade to the first floor line.





UPPER FLOOR



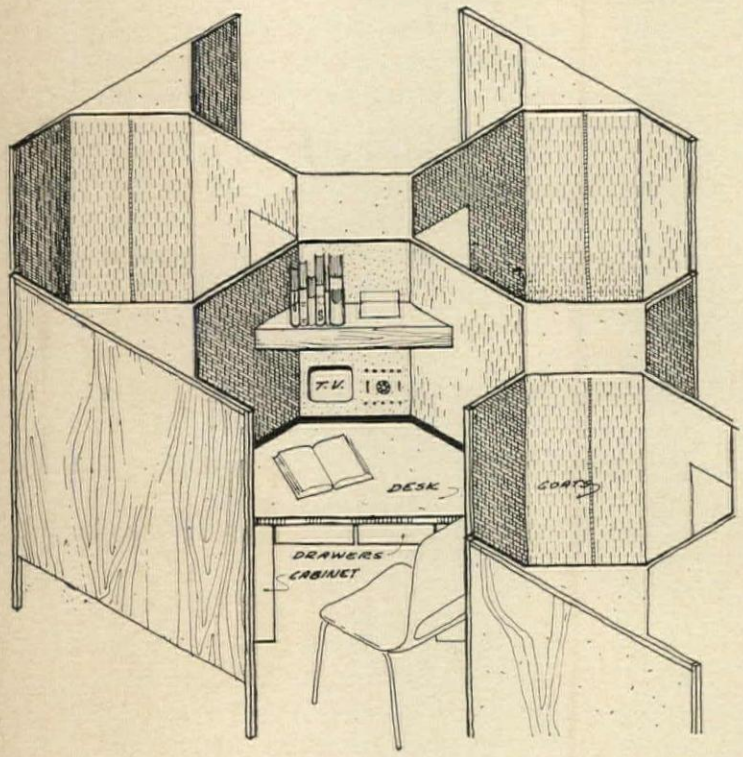
A LEARNING CENTER

Each learning center is designed to accommodate 500 students and 24 faculty members. To achieve proper character and scale for the site, a building of moderate size, two stories high, was decided upon. A natural division of educational needs into two parts made it possible to devote the first floor to classrooms, lecture halls and faculty offices; and the second floor to library and self-study areas (*plans at left*). Such an arrangement separates group movement from individual activity.

Emphasis was placed on the use of a variety of audio-visual equipment; not to minimize the role of the teacher, but in an effort to raise the quality and impact of instruction. Equal attention was paid to traditional instruction in classrooms; flexibility of classroom size is achieved by movable partitions to take care of the needs of large and small classes. A large lecture hall is pictured (*far left*); note the architect-designed ceiling. Faculty offices are located near classrooms in four groups of six each.

The second floor—for individual study—has a central portion with conventional library facilities (*plan and bottom photo*); and four groups of study desks, lockers, and certain audio-visual aids in the form of carrels, discussed in more detail on the following page.

This building thus expresses in its design two kinds of environment: the first floor introverted and disciplined; the second floor more informal and opening out to the attractive surroundings. The facades express these characteristics: the first floor of stone, with small glass openings; the second floor largely of glass, with slender columns of concrete. The use of natural stone seems proper for the site; the gracefully rounded twin columns impart good scale.



THE STUDY CARRELS

The upper floor of each learning unit houses 240 study carrels, in addition to library facilities. Designed by the architects, the carrels, or cells, are protected from outside noises. Each unit contains two lockers, a desk, drawers, overhead shelf and light, plus built-in audio-visual equipment. General lighting for the area is furnished by troffers throwing light upon the ceiling. Each carrel has a telescopic microphone, a television tube, a telephone dial, two speakers and earphones. Through the use of taped sound and televised presentations of educational material, the student has immediately available a great volume of information and knowledge not otherwise available. The basic idea of such equipment is to encourage student self-reliance; to avoid overdependency on formal instruction and conferences with faculty.

Grand Valley State College
Allendale, Michigan

ARCHITECTS:
Meathe, Kessler and Associates

STRUCTURAL ENGINEERS:
McClurg, McClurg, Paxton and Mikel

CONSULTING ENGINEERS:
Hyde & Bobbio

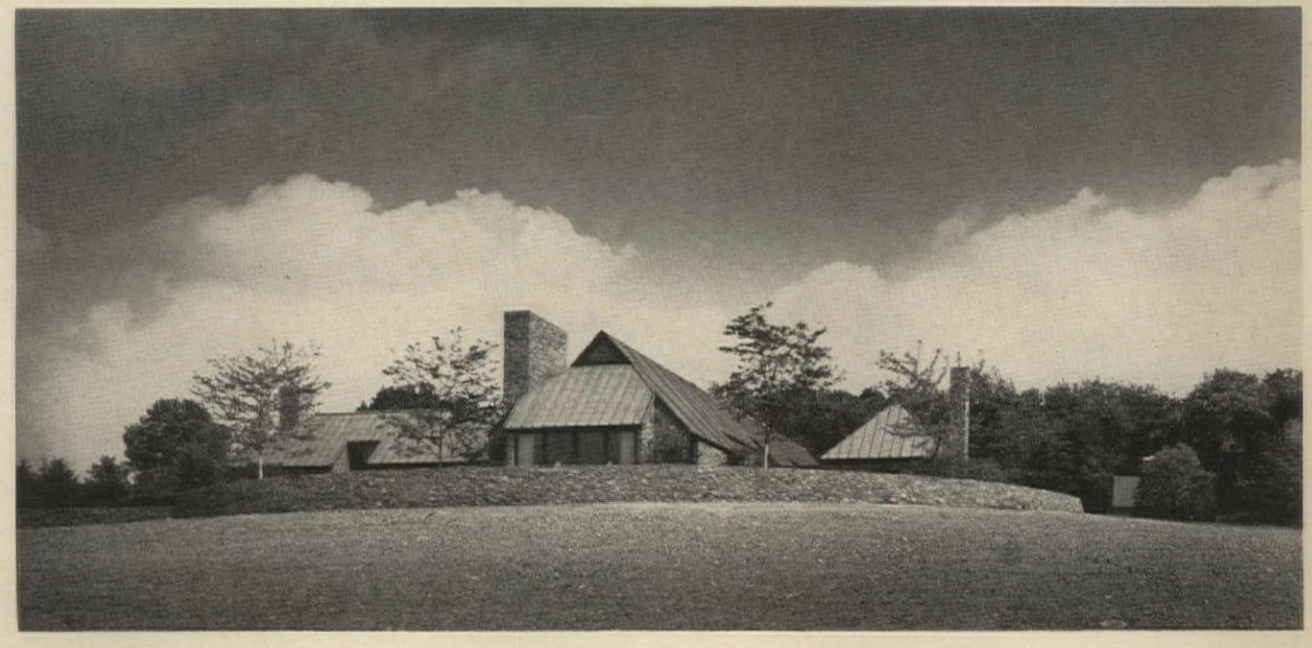
LANDSCAPE ARCHITECTS
AND SITE PLANNERS:
Johnson, Johnson & Roy

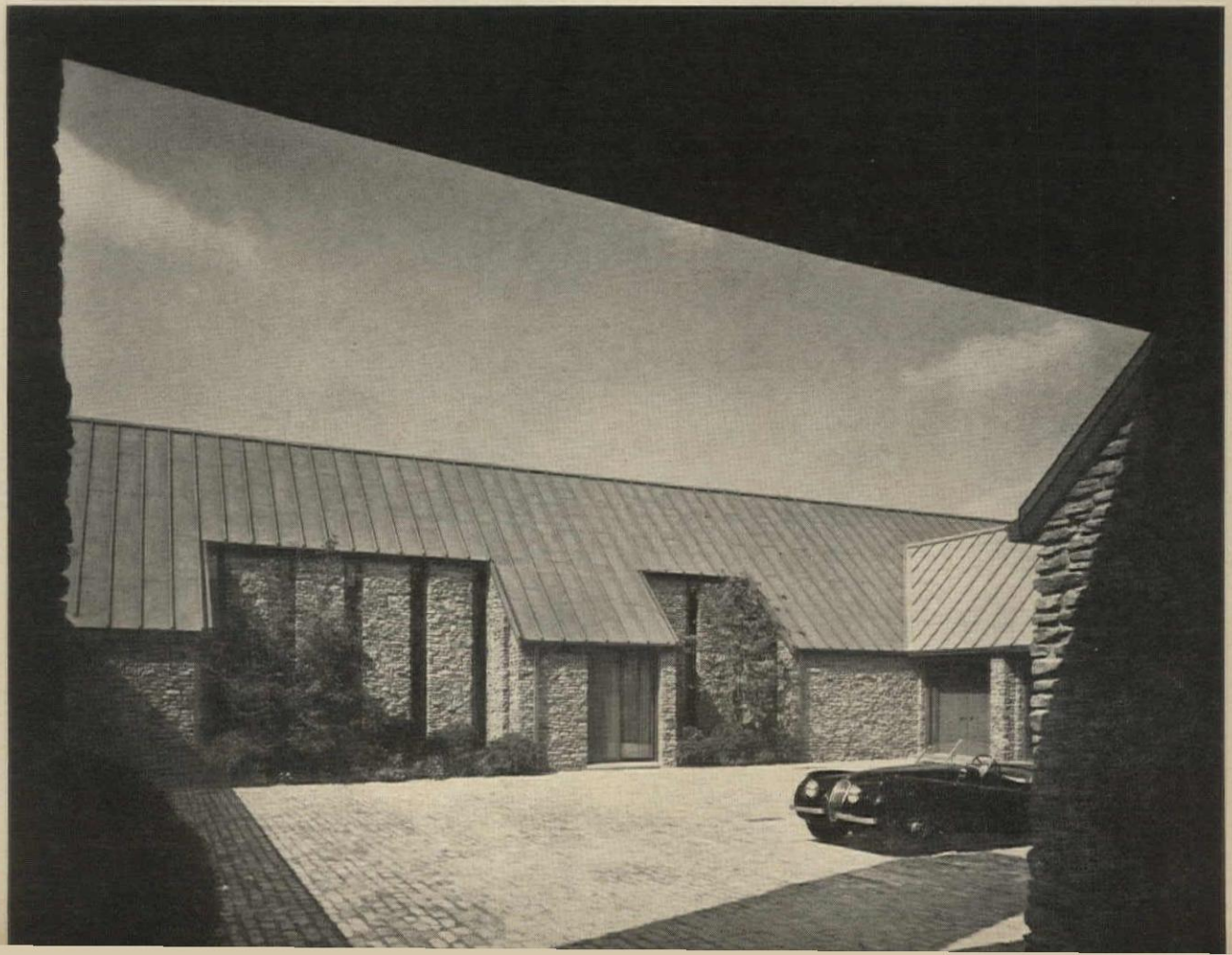
GENERAL CONTRACTORS:
Owen, Ames & Kimball
for two learning centers—
George Datema & Sons
for one learning center and
the collegiate center

PURPOSEFULLY REGIONAL ARCHITECTURE

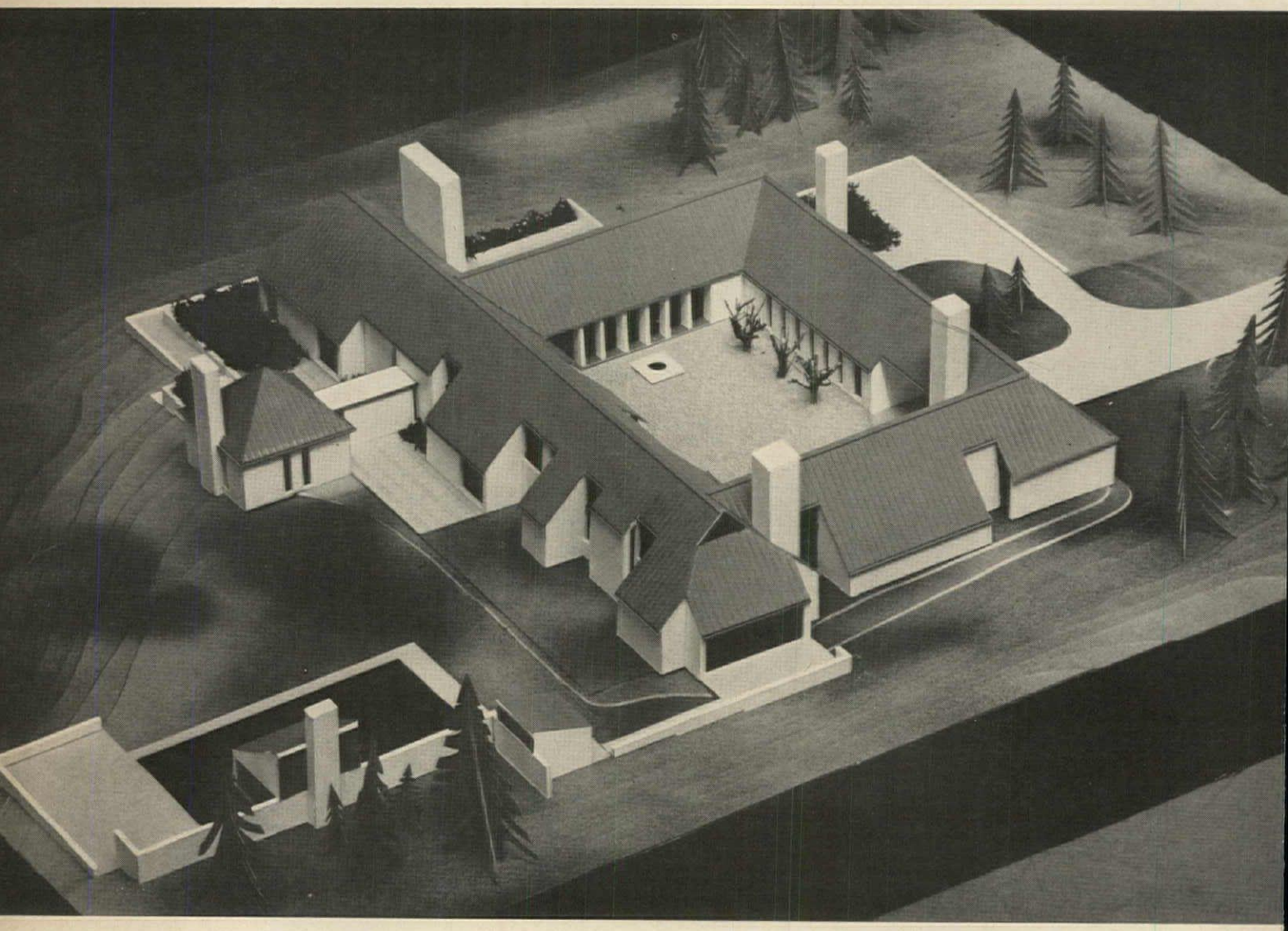
Country house by Winston Elting reflects the character of the Pennsylvania countryside

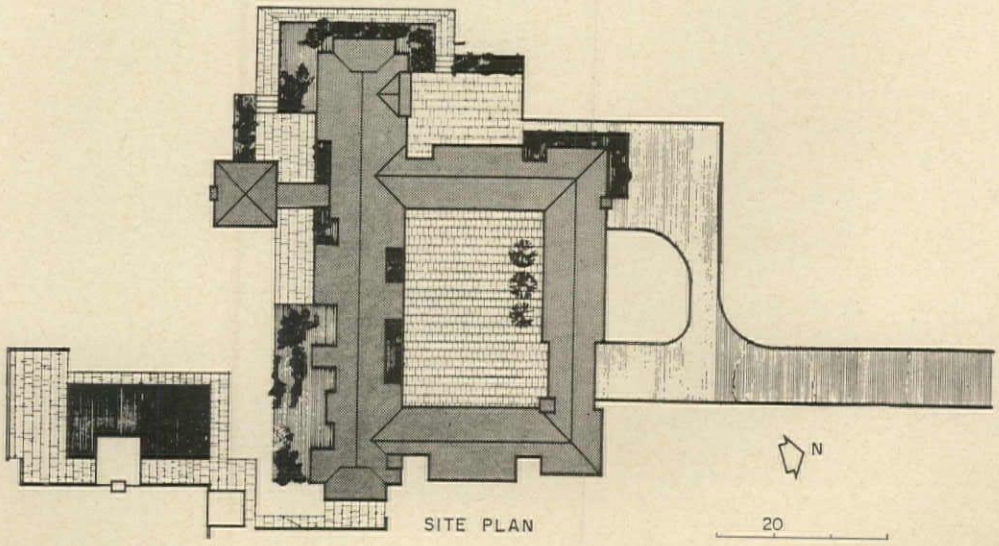
Joseph W. Molitor photos

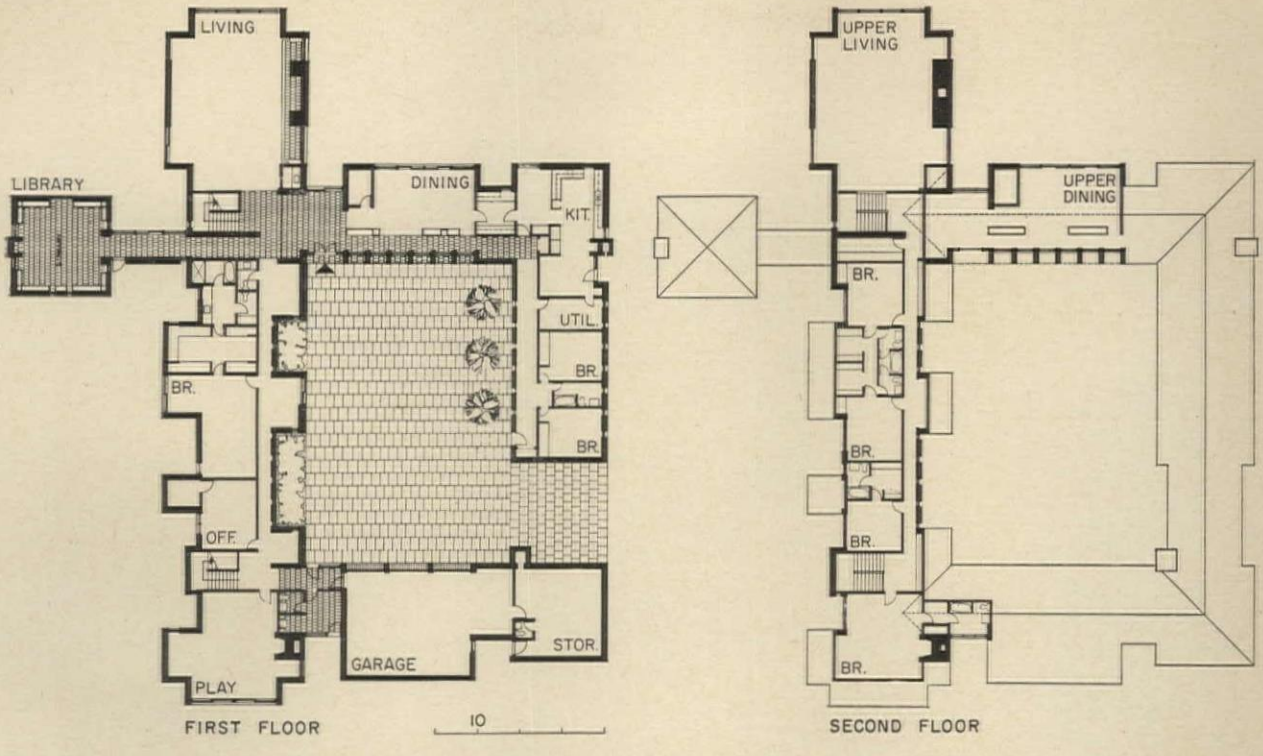




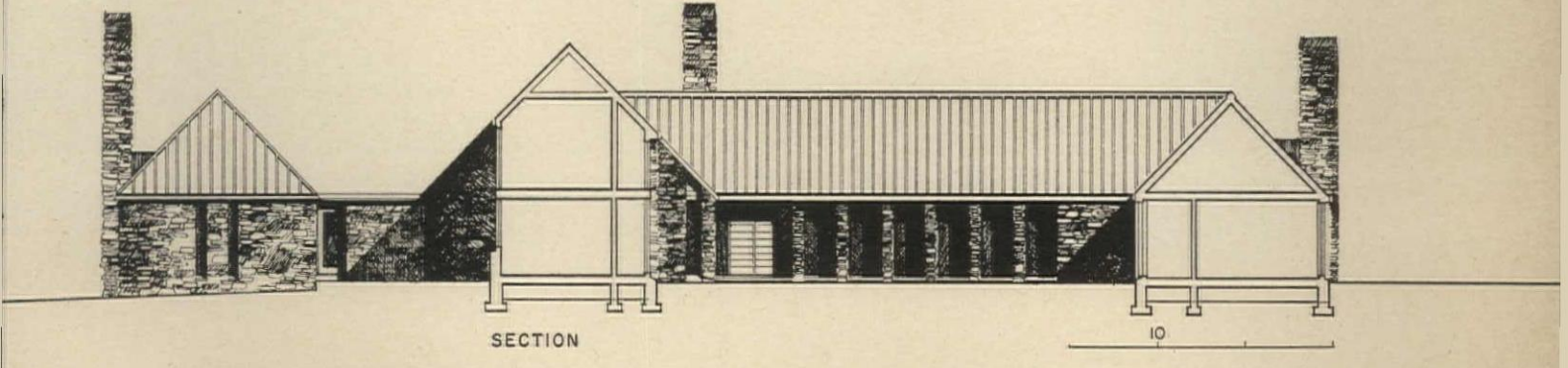
Country house by Winston Elting



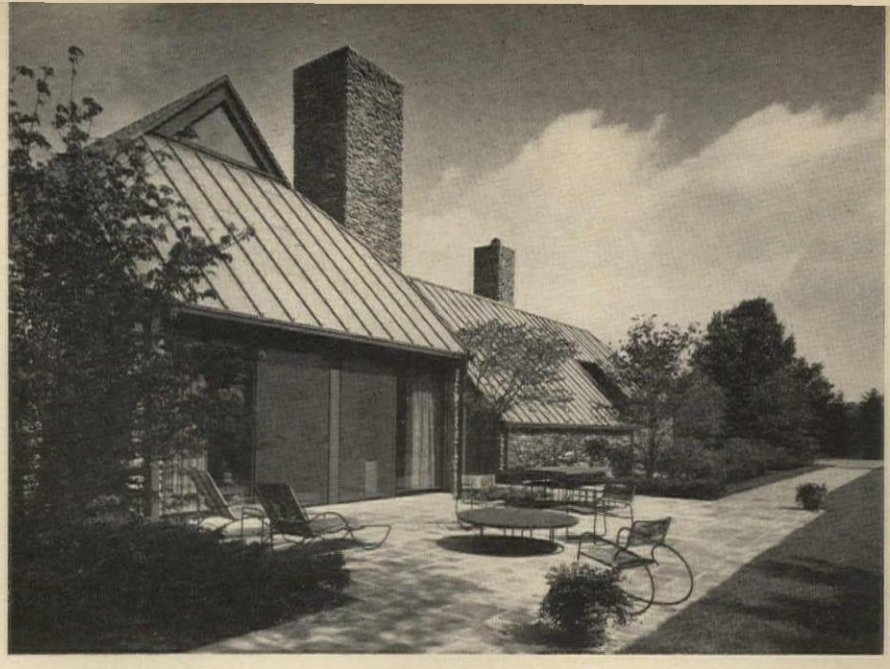


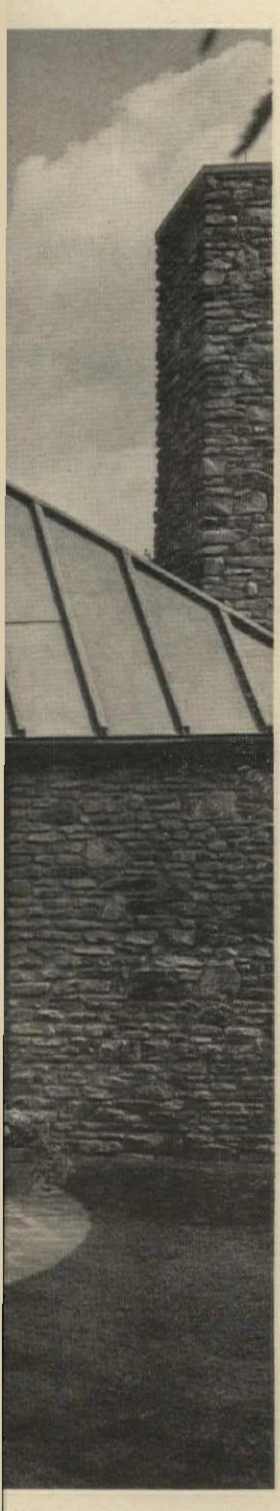


The site selected for this house was the highest point of a 60-acre property, with fine views to the north, west and southwest over rolling farmlands. In order to take advantage of these views, a central motor court scheme was adopted with circulation on the court exposures, and all living spaces on the periphery. The clients required a great deal of space, about 14,500 square feet, and the architect said: "The problem was to provide the space without spreading out all over the hillside and at the same time keep the roof line low so that the house would seem to belong to the natural landscape—just to have grown there." It was also important that the house should avoid giving the impression of a large estate. The final solution solves these problems most successfully; the house seems to be an unselfconscious and permanent feature of the countryside and because of the central court, never appears to be as large as it actually is. The relationship of the house to its surroundings is further emphasized by the use of local stone for the walls.



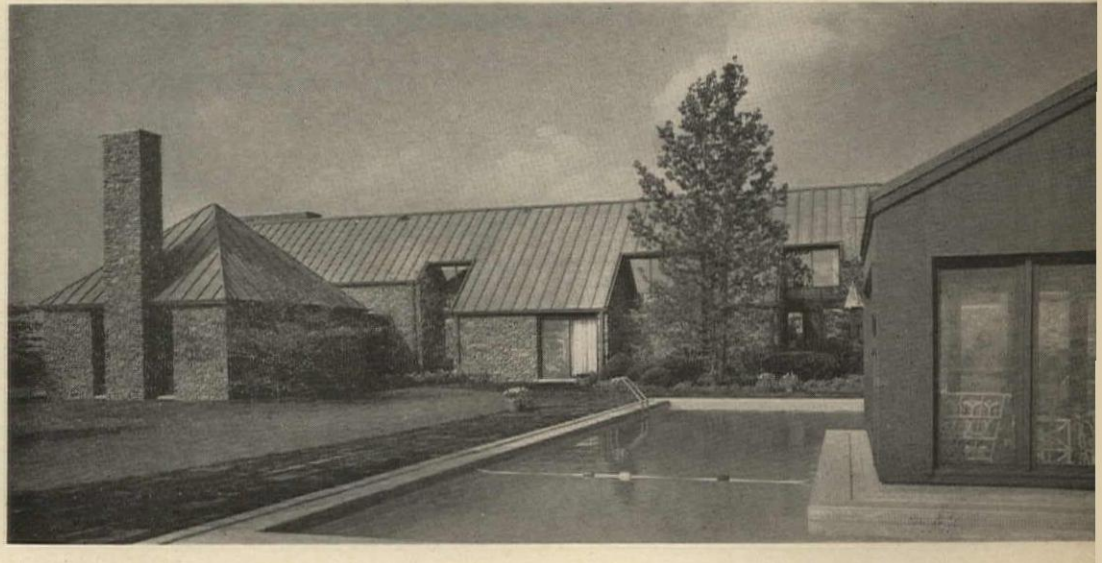
Country house by Winston Elting



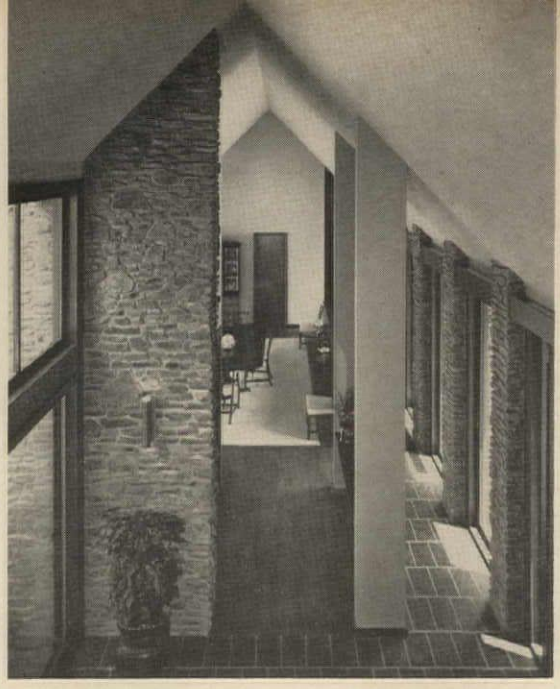


Landscaping around the house provides a number of sheltered patios, paved with bluestone, which provide pleasant extensions of the living areas and take full advantage of the different views. The area around the swimming pool is paved with 4- by 4-inch redwood blocks. The peaked roof of the pool house repeats the angle of the roof of the main building, making it appear as an integral part of the design.

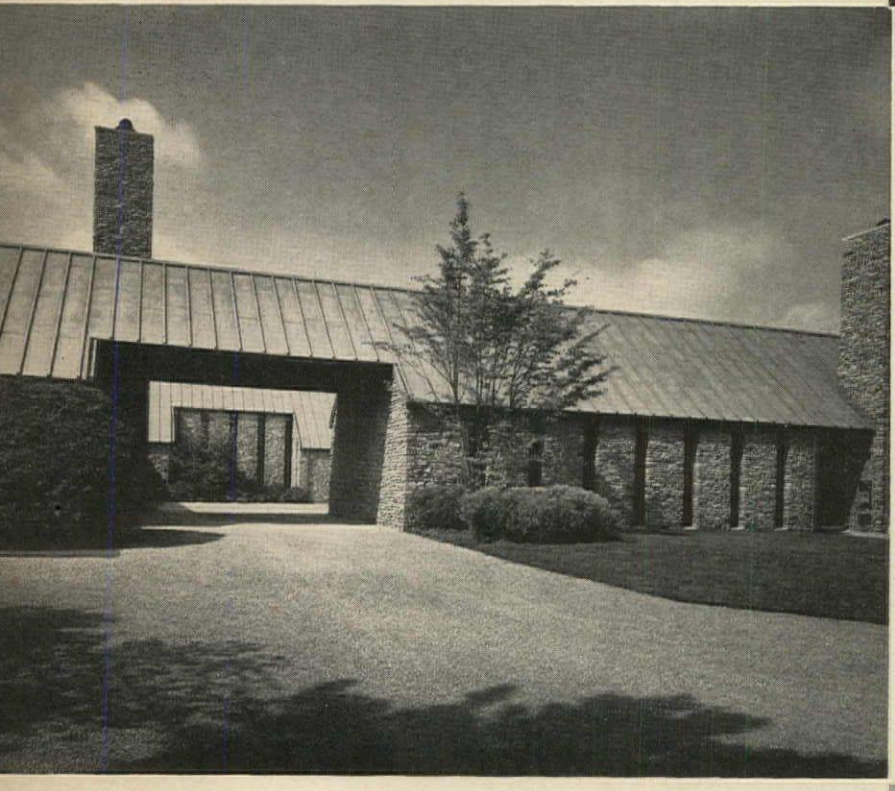
Windows for the second story are accommodated by recessing the stone walls, thus avoiding the need for dormers and the consequent projections from the roof. The exterior walls are, therefore, on two or more planes giving interesting variations of light and shadow. Construction is wood frame on reinforced concrete foundation. Exterior walls are rubble stone gathered from the local fields. The roof is dark gray terne with 2- by 2-inch battens. All sash is aluminum with a dark bronze finish; double glazing is used throughout. Exterior trim is dark stained redwood. Interior trim and doors are white oak.



Country house by Winston Elting



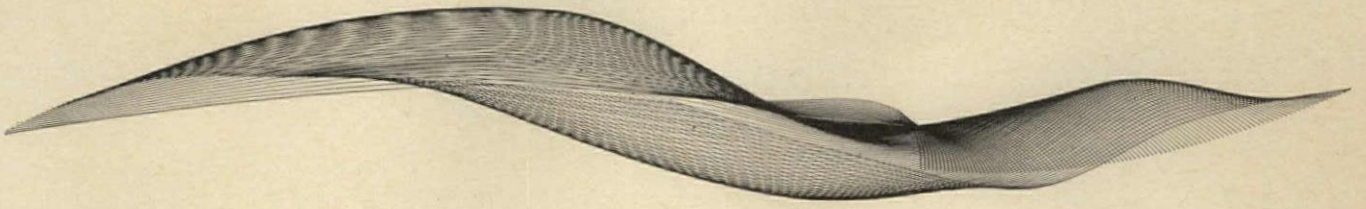
The house was planned for the client, his wife and two small children, with accommodation for two older children who visit from time to time. The master bedroom is on the lower level, but a partial second story above contains the children's and guest bedrooms. Servants rooms are provided next to the kitchen area, across the courtyard from the master suite. Although the house has a pleasant, informal, rambling quality, the plan is sufficiently compact for it to work very well as a complete unit. Sleeping areas are zoned for maximum quiet and privacy, but have easy communication with the other parts of the house. The two-story living room, large stone fireplaces and sloping roof angles all combine to make this a house which is comfortable and exciting to live in. The house is completely heated by electricity, using wire in plaster ceilings and additional drop-in units where required. Floors are oak and dark gray slate in the living areas, linoleum in the kitchen and vinyl in the bathrooms. Interior walls are stone or sand-float plaster.



The house is approached through rolling farm country, up a gravel driveway and into the motor court which is paved with granite blocks. Careful detailing and meticulous workmanship are important factors in the success of the house, and have contributed to the over-all impression of quiet elegance which it gives.

The architect says that a number of schemes were studied before the final solution was arrived at but "they were for the most part abandoned because they would have done just as well in Oklahoma, Illinois or New Canaan." The house had to be regional in character and the design philosophy developed along these lines. In the end, Winston Elting said about the scheme: "As far as I am concerned, given the site, the countryside, the character of the client and the materials—principally stone—there was no other way for me to do it."

"Stornoway," Ligonier, Pennsylvania
ARCHITECT: *Winston Elting*
ASSOCIATE ON THE JOB: *Robert H. Burdett*
ENGINEERS: *G. A. Mattern & Associates*
CONTRACTOR: *F. Hoffman Co.*
LANDSCAPE ARCHITECTS:
Franz Lipp & Associates
INTERIOR DECORATOR: *Catherine G. Rawson*



Will the Computer Change the Practice of Architecture?

Some New Uses of the Computer Are Suggested at Boston Conference

By Jonathan Barnett

A perspective of a mathematically defined surface drawn with a computer at the Aerospace Division of the Boeing Co. From a book on computer graphics to be published by McGraw-Hill

The drawing at the top of the page was made with a computer, and the ability to make such drawings is only one of the new technological developments, which, like it or not, are bound to have a significant effect upon the architectural profession.

During the past year there have been several conferences which discussed the application of these new developments to building construction; but the Boston Architectural Center, an organization which sponsors a curriculum of evening architectural courses, was the first to formally assess the possibilities that the computer will have for architecture. On December 5th, the Center held an all-day conference on Architecture and the Computer; and some 500 architects crowded into the ballroom of a Boston hotel to learn—to the accompaniment of squeals, howls, and stray wisps of music coming from a faulty sound system—what the electronic future might hold in store.

Of course, the computer is by no means unknown to architects, and many operations that require computers, such as critical path studies, have been familiar for some time. What was new to most people present, however, was the extent to which the computer is already a relevant and useful tool for ordinary, every-day problems of architectural engineering. Even more of a revelation were the possibilities of computer drafting, which seem only five or ten years away from general use, and the increased ease and flexibility with which the

". . . About a year ago at a conference, similar to this one, sponsored by M.I.T., the community of practicing engineers first learned of a new approach to the use of the computer.

"Imagine that you were told that the computer had been trained like a graduate student in civil engineering, not how to solve special individual problems, but trained in the general classical methods of solving indeterminate structures. Furthermore this graduate student could be talked to in simple English and stood ready to go to work on any problem. All that he needed was a geometrical description of the problem with some verbal requests for the analytical information required. Wouldn't you think that the millennium had arrived?

"Well, in a way, it had. This 'graduate student' is a genie called STRESS, *an acronym which stands for Structural Engineering Systems Solver; and it is well named. At that meeting a year ago, everyone present was able in one afternoon to learn the* STRESS *language and use the computer programed with* STRESS *to solve a problem of his own choice. Program writing was no longer a necessary step to solve each new problem.*

"In retrospect this occasion appears to have been a real breakthrough and its effect on our own practice has been extraordinary. A whole area of engineering activity has been permanently changed . . ."

— WILLIAM J. LEMESSURIER, BOSTON STRUCTURAL ENGINEER

". . . Just imagine the work required to analyze 100 different zones for 24 hours each day of six months. The computer will print out these loads and analyze the hour and month that the maximum coincident load occurs on the building, and the structure and magnitude of this load. This load is further analyzed to determine the contribution of walls, glass, people and solar radiation. We also print out the quantity of air for heating and the quantity of air for cooling by programing a temperature for the supply air. . . .

"The computer, as a tool, can allow the designer the flexibility of prior knowledge and hopefully free him to make significant advances in creation and control of man's living and working environment."

— LISLE G. RUSSELL, CHIEF MECHANICAL ENGINEER FOR THE SYSTEMS ENGINEERING AND DEVELOPMENT GROUPS, WESTINGHOUSE CORPORATION

computer can be used.

To the surprise of some, however, very little time was spent discussing the applicability of the computer to architectural design. In fact, the conference received a stern warning, in a paper by Christopher Alexander of the University of California, that it is possible to fatally distort the nature of design by restating design problems solely for the purpose of using a computer. He reminded the conference that the computer does not become a useful tool until the full structure of the problem is understood, and it is an extremely complex and subtle task to achieve such an understanding in any question involving design.

In an evening panel discussion there was a certain amount of talk about that classic of all computer questions: will the machine eventually outsmart and replace the men who invented and used it? But, in general, those giving presentations at the conference seemed to feel that the computer, by giving the architect closer control over such operations as engineering and drafting, should give him greater control over the design process itself. They see the computer, if properly used, as a means of increasing the architect's ability to produce meaningful design, rather than as a soulless monster that would negate his creativity.

Master Programs for Engineering

The morning session of the conference was devoted to a most important innovation that makes computers much more accessible and much easier to use: the development of programs that can be used to solve whole classes of problems. Until recently, it was necessary to write a computer program for each problem to be solved, a cumbersome process that required the services of a skilled technician. Computers require complete explanations for every step of the process they perform, and these must be stated with absolute exactitude—necessitating hundreds of step by step instructions, each coded and punched into a separate card, and a tedious "de-bugging" process to eliminate all typographical and instructional errors. (ARCHITECTURAL RECORD, August 1963, pages 158-161). The result was that a structural or mechanical engineering problem, for example, required so much preparation to solve it on a computer that it simply wasn't worth doing, except in unusual cases.

The availability of the STRESS program (Structural Engineering Systems Solver), explained Boston structural engineer William LeMessurier, has changed the situation completely. Once this program is in the computer's memory, it is possible for it to solve many different types of structural problems; and, as the program has been written so that the machine accepts simple language instructions instead of complicated numerical codes, any engineer can learn to use STRESS after a short training period.

The result, according to LeMessurier, has been to provide his office with a tool which is both subtle and widely applicable. It saves time and frees design from dependence on standard solutions, because the office's ability to analyze complex structures is increased by what LeMessurier considers to be a factor of ten.

Lisle G. Russell, the chief mechanical engineer for the Systems Engineering and Development Groups at the Westinghouse Company, described analagous developments in the field of mechanical engineering. These new programs make it possible to simulate temperature conditions affecting a building at any season, and to rapidly assess the effect of changing the building's orientation or position on the site. Mechanical engineers usually find it necessary to make extensive calculations before they will come up with even a guess about duct sizes and other requirements affecting design. These new programs, written, like STRESS, to accept commands in "problem-oriented language," can be utilized by engineers to give architects quick answers and alternative solutions at early stages in design.

Computer Graphics for Planning

The last speaker of the morning session was Howard Fisher of the Technological Institute of North-

"In my opinion the question, 'How can the computer be applied to architectural design?' is misguided, dangerous and foolish. . . .

"A digital computer is, essentially, the same as a huge army of clerks, equipped with rule books, pencil and paper, all stupid and entirely without initiative, but able to follow exactly millions of precisely defined operations. There is nothing a computer can do which such an army of clerks could not do, if given time. . . .

"In asking how the computer might be applied to architectural design, we must, therefore, ask ourselves what problems we know of in design that could be solved by such an army of clerks. . . .

"At the moment, there are very few such problems. Although we speak a great deal about the complexity of problems, the complexity of architecture, and the complexity of the environment, this talk, so far, is rarely more than hand waving. In the present state of architectural and environmental design, almost no problem has yet been made to exhibit complexity in such a well defined way that it actually requires *the use of a computer. . . ."*

"In a recent study the computer was used to compare different hospital plan arrangements, from the point of view of the total amount of walking done by patients, nurses, suppliers, and visitors. . . . There is no doubt about the technical ingenuity of the simulation. But it is not informative or relevant. First of all, the fact that the computer had to be used, forced the authors to deal with phenomena which could be measured and encoded. That is why they analyzed walking distance and volume, instead of the well-being of the patients. . . .

"Secondly, even if we take the traffic problem seriously, we find that the helpfulness of the computer is only apparent, not real.

"Any intelligent designer could look at the various hospital plans examined by the computer, and could tell roughly what relative amounts of different traffic they would generate. The key word here is 'roughly'. It is unnecessary to know the amounts of walking generated by a plan to the second decimal place, because it is irrelevant—and only has the appearance of accuracy. It is like measuring the size of a cooking apple with a micrometer. Yet it is only in the second decimal place that the computer can do better than the designer's experience."

"It is ironic that the very tool which has been invented to unravel complexities imposes such severe restrictions on the design problems which it can solve that the real source of complexities has to be eliminated before the tool can even get to it. But for the moment that is the situation."

—CHRISTOPHER ALEXANDER, ASSISTANT PROFESSOR OF ARCHITECTURE,
UNIVERSITY OF CALIFORNIA

western University. Professor Fisher is an architect and city planner, and he has been using the computer to print out complex statistical information about cities and regions in an easily readable graphic form.

Professor Fisher stressed the fact he had been a novice at computer technology and did not have an extensive mathematical background. Nevertheless, he was soon able to program the computer to make maps that show geographical distribution of various statistical quantities directly from raw data fed into the machine.

In a paper distributed to the conference participants, Walter Gropius asked two questions:

> "Will it then be necessary to educate a new profession of architectural assistants for the purpose of articulating the problems to be solved into the proper language of the computer? Furthermore, will it be feasible economically to construct individual computers in the future for ordinary office use right at hand?"

Professor Fisher's experience, and the development of master programs like STRESS, would seem to indicate that the answer to the first question is that no such special architectural programers will be necessary, and the proceedings of the afternoon session made it seem that the answer to the question of economic feasibility would very soon be yes. In fact, the talk by Professor Steven Coons of M.I.T. that led off the afternoon session indicated that the direct use of the computer will be far easier and much more economical than anyone could have predicted a few years ago.

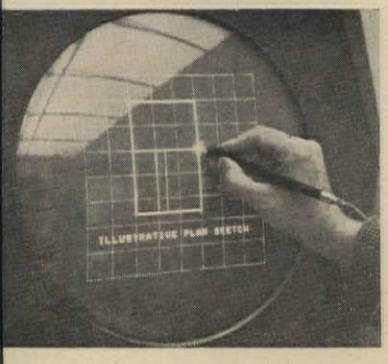
A Machine That Can Draw

Professor Coons began with a fascinating exposition of the Sketchpad process developed in the Lincoln Laboratories at M.I.T. In Sketchpad the operator uses a light-sensitive pencil containing a photo-diode to draw on the surface of a tube similar in appearance to a T.V. screen. The light pencil reacts to minute glowing dots on the surface of the screen, sending an electrical impulse back to a computer that registers the position of the dots with which the pencil made contact.

The machine is programed so that the patterns roughly traced by the light pencil can be formalized into exact images: straight lines, equilateral polygons, perfect circles. The size of the image can be increased, decreased or duplicated, and the orientation rotated. An image can also be erased and then brought back.

Another Sketchpad program, still under development, is even more spectacular. It permits the operator to draw a plan in one quadrant of the screen and simultaneously produce two elevations and a perspective in the other quadrants.

Operator drawing with a light pencil in Sketchpad computer drawing system



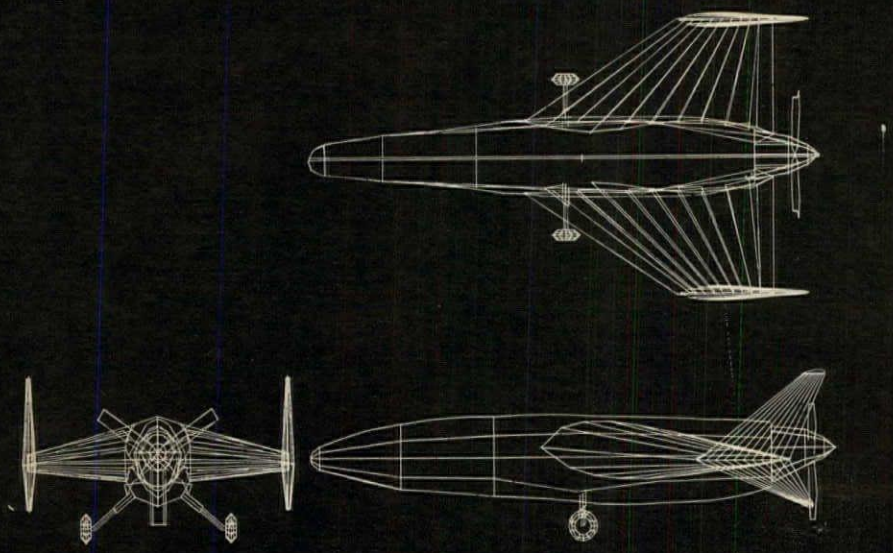
Man-Machine Collaboration

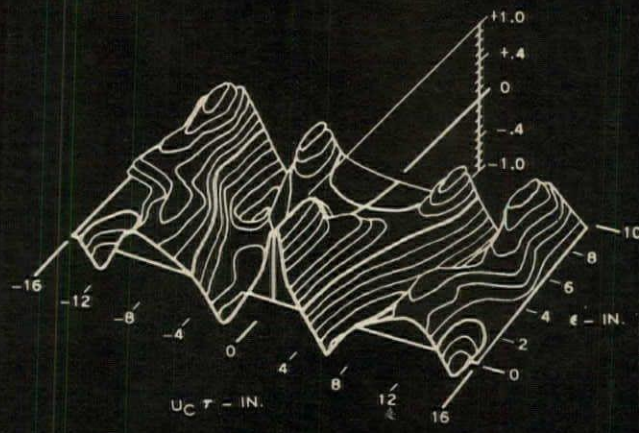
These light pencil techniques are a way of conveying information directly to the machine, without going through the elaborate procedure required to introduce information into a computer on punch cards. Furthermore, the face of the tube displays the results of an operation, which then can further be modified by the operator, with a stroke of his light pencil.

For example, imagine that the operator takes the light pencil and draws a cantilevered truss on the screen. He then feeds in the loads on the truss and instructs the machine, according to the STRESS program, to give him the stresses in the individual members. If he does not like the results, he can modify the truss and go through the whole procedure again.

The ability to perform this kind of operation is a tremendously important development, sometimes known as man-machine collaboration. It means that the man can have the tremendous resources of the machine at his disposal at any stage during his thinking process. According to Professor Coons, it will be possible to "instruct" the machine to perform new operations, giving it an ever-increasing repertoire of problem-solving capabilities without the intervention of a programer.

Putting a whole computer at the disposal of one man for an indefinite period of time would obviously be

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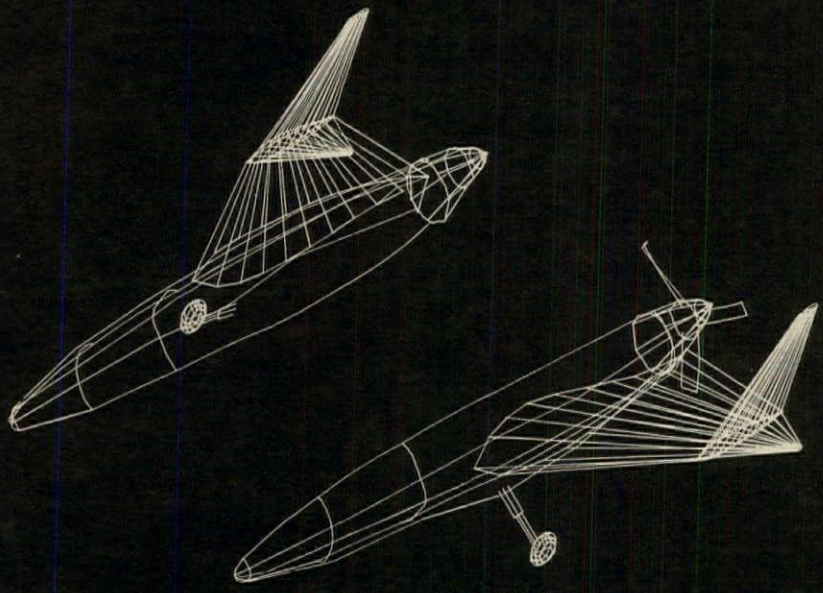
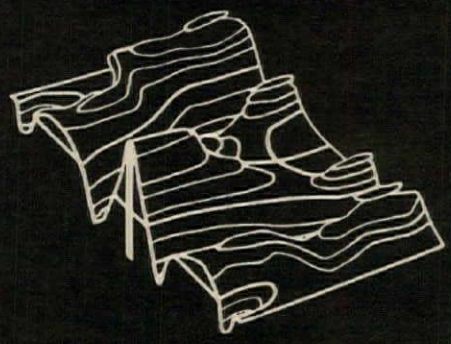
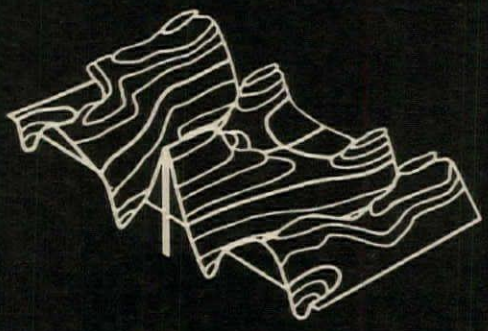
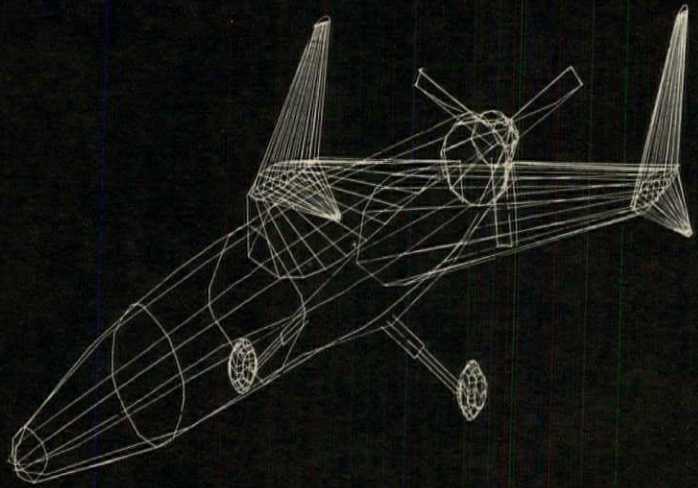
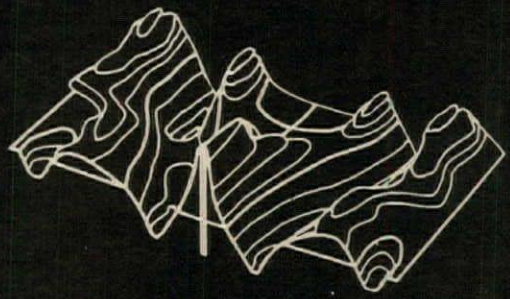










much too expensive, so Professor Coons explained a corollary development to Sketchpad, share-time techniques. A single computer can perform so rapidly that a great many subsidiary consoles, such as Sketchpad screens, can be attached to it simultaneously, with each operator receiving the impression that he is getting the machine's full attention. The principle, Professor Coons explains, is not unlike that of a master chess player playing lesser masters in round-robin fashion.

Consoles at any distance can be connected to a central computer by telephone lines, opening up fascinating prospects of information as a "public utility," vast information networks tying all sorts of installations together, and architects communicating with engineers over their office computer consoles.

Computer Graphic Simulators

Even without Sketchpad equipment, it is already possible to produce extremely sophisticated drawings on the computer, and the imagination of the conference was captured by the presentation of William Fetter, supervisor of Computer Graphics for the Boeing Company. Mr. Fetter showed sequences of projected and perspective drawings made on the computer, some of which are shown on the opposite page. He also showed animated motion pictures, made for the Navy, in which sequences of perspectives simulate what the pilot sees as he lands on an aircraft carrier. Other perspective simulations showed how much of a certain flight path could be tracked by radar; and, most complicated of all, a bombing run seen simultaneously in true perspective through the cockpit window, and in the corrected perspective of the simulator screen on the cockpit instrument panel, a simulation of a simulation.

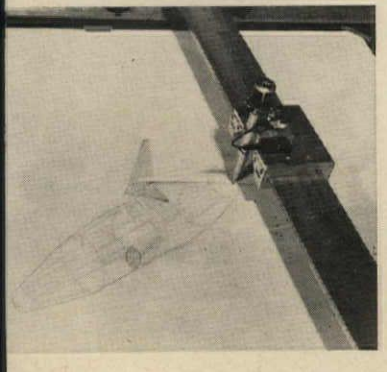
Mr. Fetter, who is a graphic artist and not a mathematician, achieved the results he desired by describing the process of perspective drawing on a chalk board, and letting others write a computer program for the mathematically equivalent operations.

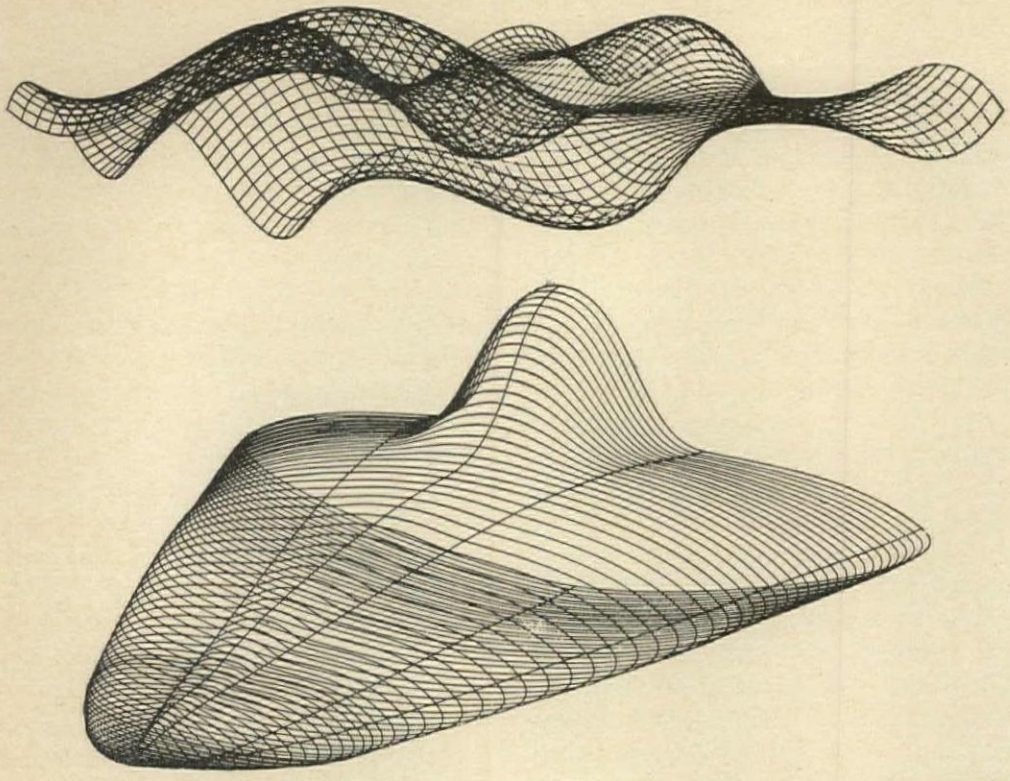
There would seem to be many possible applications of the simulation techniques to the problems of architecture and urban design. Perhaps even more important, however, are the drawings Mr. Fetter showed of complex warped surfaces, like the ones shown on the cover and on pages 143-150. In the future there should be no shape or form that man can devise that cannot be shown in minutely accurate drawings such as these. As Professor Coons said about similar drawings produced with Sketchpad, they are the net over the invisible man which enable us to see his form. A monograph by Mr. Fetter entitled, "Computer Graphics in Communication," will be brought out by McGraw-Hill later this year.

In other presentations, the moderator of the morning session, Kenneth Sargent, dean of Syracuse University's School of Architecture, commented on the A.I.A. Task Force on Information Retrieval, of which he is chairman, and which has absorbed most of the A.I.A.'s attention as far as computerized technology is concerned. Although Dean Sargent didn't mention it, information retrieval techniques are now being applied to specification writing by a number of architectural offices. James Souder and Welden Clark of Bolt, Beranek and Newman, Inc.'s Los Angeles office demonstrated their systems approach to certain aspects of hospital planning, in which they had used the Sketchpad system to correlate data. (ARCHITECTURAL RECORD, March 1964, pages 86-94.) A representative of a large manufacturer of computers discussed some improvements in critical path diagraming, and revealed a disconcertingly low opinion of the intelligence of his audience and considerable haziness about what the function of an architect might be.

The conference program stated that at luncheon Professor Serge Chermayeff of Yale would synthesize the meaning of the morning's presentation, anticipate the afternoon program, and formulate questions for the evening panel discussion. A large order, obviously, and not surprisingly Professor Chermayeff disclaimed this role. What he did instead was to give

)rawings made with a computer. *'ar left:* Series of projective drawngs made in the Airplane Division f the Boeing Co. by William Fetr, Walter Bernhardt, James Herington, Dwight Patton. *Left:* A hree dimensional graph in isometic and rotated perspective views. *elow:* Perspective being drawn on oeing graphic plotter. (Photo and rawings courtesy of Boeing Co.)





Drawings made with a computer: mathematically defined wave motion surface and a perspective of an aerodynamic configuration composed of detailed station lines and selected longitudinal lines. These drawings and the perspective of surface definition on page 143 were made by Wilfred Hoar, John Freyman, James Fergeson and Marion Rowin of the Aerospace Division of the Boeing Co. Drawings courtesy of Boeing Co.

a rather emotional speech that was very strongly critical of the architectural profession, and which was warmly received by an audience made up primarily of architects. Apparently, either architects like to be hectored, or they all feel like the lady who said to the minister after the service: "I did so enjoy your sermon; I know a great many people like that."

Professor Chermayeff feels that the existence of the electronic computer gives new impetus to rational-functional analysis, organization and synthesis. Perhaps reasoning by analogy to the computer programs for generalized classes of structural and mechanical problems, Professor Chermayeff envisages that problems of environmental design will be solved in the future at a generalized level, with programing and testing being done on the computer. The architect would then be the agent who adapted an established building type and form to a particular set of circumstances. As Professor Chermayeff put it: "We can now say good-by forever to the slow laborious process that makes a guinea pig of every client, and, as you well know, the guinea pig in these experiments usually perishes."

Leaving the conference, it was possible to envisage that not too far in the future architects would be able to receive engineering data and evaluation of functional characteristics almost instantly, at any stage in the design process; and specifications and working drawings of the finished product could be produced with great rapidity using computerized technology. These technological advantages could help deal with urban chaos by keeping planning information up to date, correlating the activities of overlapping jurisdictions and simulating results for evaluation before plans were made final.

Ideally, the architect or urban planner would then be free to give his full attention to problems of design, use and appropriateness. Unfortunately, the same technological means could permit the architect, or someone usurping his position, to multiply stupidity on a scale never before possible, and reduce design to those aspects that can be most quickly calculated and standardized. The choice, as usual, is up to the individual practitioner; but the consequences of individual action have never been so pervasive, or so inescapable.

INDUSTRIAL BUILDINGS

Factories and Warehouses

American industry seems to be increasingly aware of the value and extent of the contribution that architects can make to industrial building. At the same time, the American Institute of Architects, through its Committee on Industrial Architecture, is working to educate both architect and client to the elements of a truly comprehensive professional service in the industrial field.

The buildings on the following pages represent successful examples of the architect's capability in a number of areas; and the purpose of this study is to detail the circumstances in which these successful buildings came about.

Architects Ask Questions

"The greatest benefit that Breuer has been to us," said Rufus Stillman, vice-president of the Torrington Manufacturing Company recently, "is that he takes us outside the square. He is not hemmed in by the assumptions that we have been making all along. One of the most useful things an architect can do is to ask questions; and not give us any simple answers."

Breuer's association with Torrington Manufacturing began when he was made a design consultant for a small factory in Oakville, Ontario. The success of this first commission led to Breuer's being made the architect for Torrington factories in Van Nuys, California; Rochester, Indiana; Torrington, Connecticut; and Nivelles, Belgium; which last is shown in detail on the following pages. Breuer is presently at work upon a sixth Torrington factory, which will be built in England.

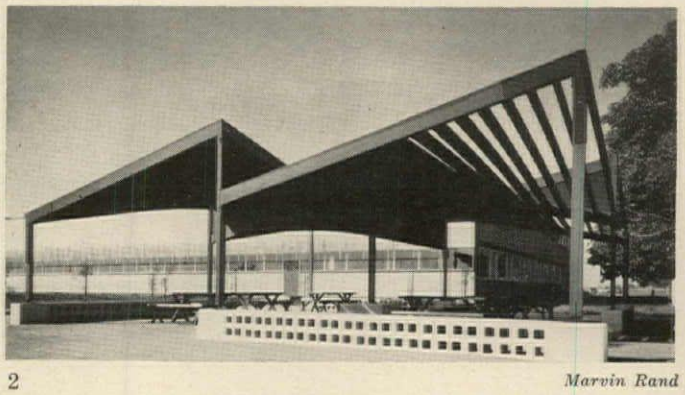
These are utilitarian buildings, whose cost is comparable to similar facilities that are not as well designed. Torrington Manufacturing does not make consumer products; it, therefore, can not justify extra expense in terms of "image" or "prestige." The important point is that lowest cost by itself is not the governing consideration. For example, the panels at Nivelles, with their strong pattern and sunshading, cost slightly more than a plain panel with a reinforced edge and a square hole punched in it. The architect estimates the extra amount at about $3,000 over the whole building; and there is a significant difference in what is obtained for the extra money expended. As Breuer says about low costs: "You do not necessarily drink your soup just as hot as you can cook it."

Packaged Costs a Misnomer

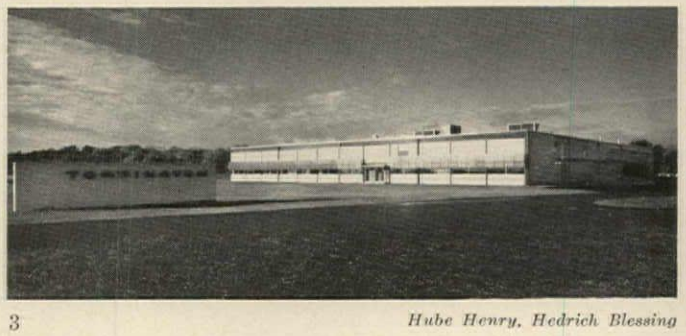
Mr. Stillman has some interesting things to say about factory costs in general: "We think the whole business about packaged costs is a misnomer: it all depends on time and place. We don't believe that going to an architect increases the cost. The intelligent architect is terribly helpful to our thinking. He can save us space over the standard-design-construction package, and he can rearrange things to make more sense.

"By keeping the same architect from project to project, we have been able to get a little bit more specific each time, so that none of the factories has been a carbon copy

1 *Ben Schnall*



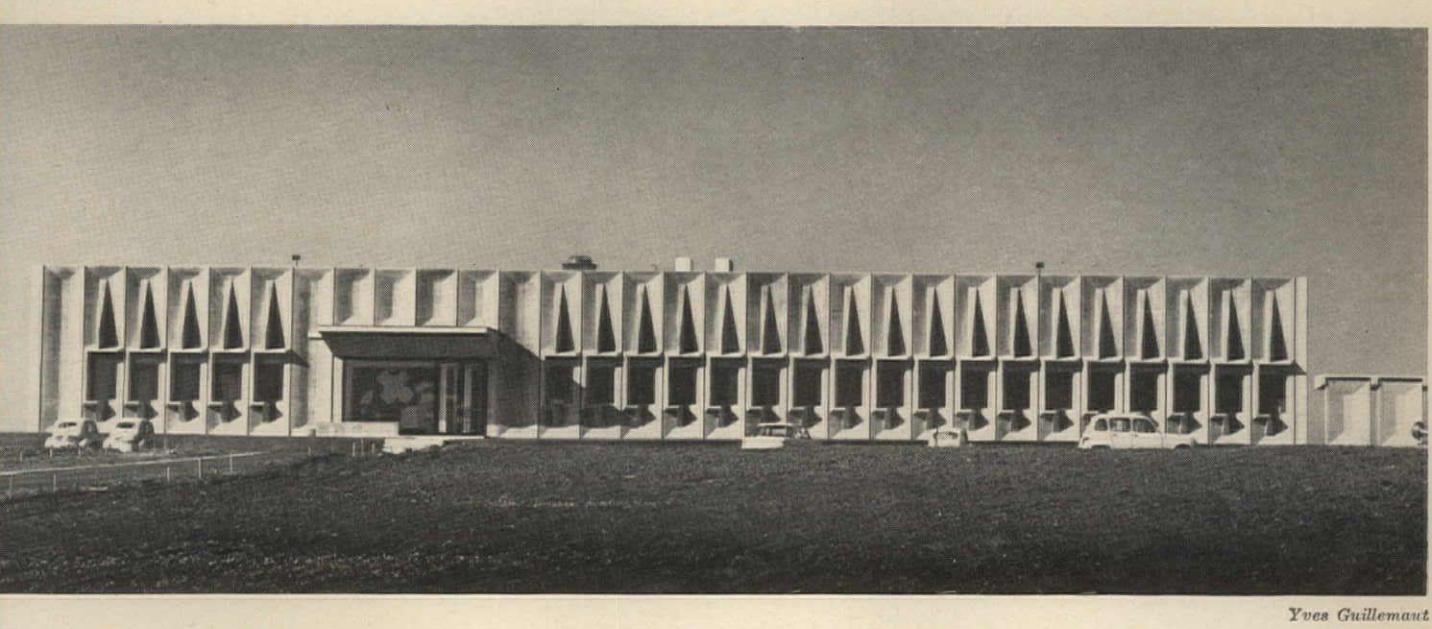
2 *Marvin Rand*



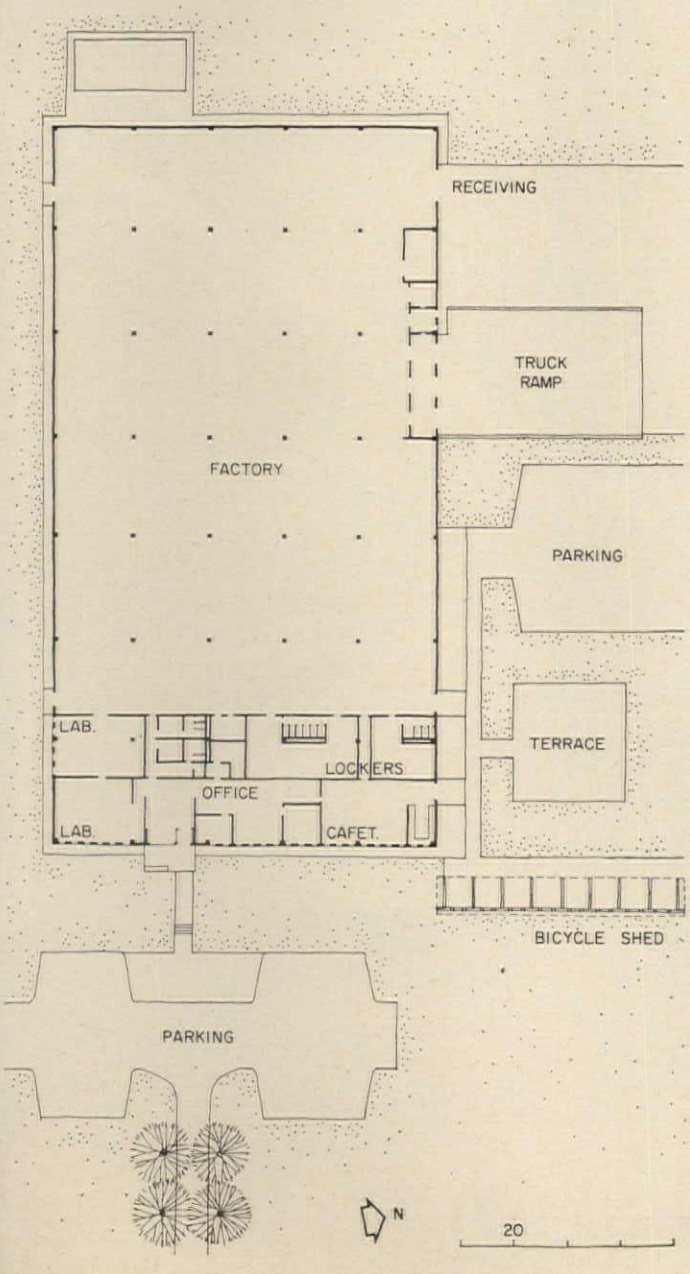
3 *Hube Henry, Hedrich Blessing*

4 *Ben Schnall*

The Breuer office has been the architect for a succession of Torrington Factories including buildings at: (1) Oakwood, Ontario; (2) Van Nuys, California; (3) Rochester, Illinois; (4) Torrington, Connecticut (ARCHITECTURAL RECORD, December 1963)



Yves Guillemaut



TORRINGTON NIVELLES

Nivelles, Belgium

ARCHITECTS: *Marcel Breuer and Hamilton Smith*

ASSOCIATED ARCHITECTS FOR SUPERVISION:

Andre and Jean Polak

The factory is enclosed in prefabricated panels made by the Shock Beton process. In addition to manufacturing, this building also houses the offices and sales force of Torrington's European Division. *Above:* Photograph of entrance elevation. *Below:* Detail of entrance

Yves Guillemaut

of the last. It is not so much that the functions have changed, but that our own thinking has developed. We try to do new things, and the architect becomes really involved in the success of our business. He is fashioning a tool for us, rather than a monument.

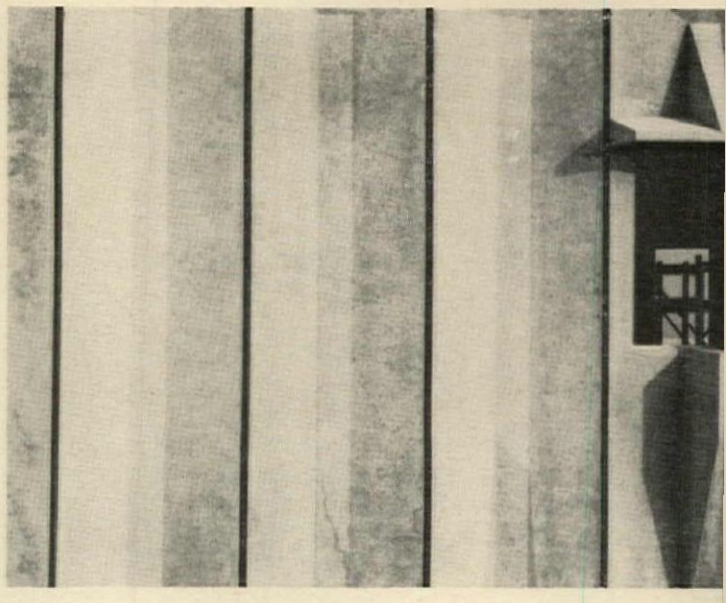
"Dividends from this process keep coming back in little ways. When you turn a corner, it's pleasant; morale is better; people take more pride in their work. When you take prospects to the factory, you realize what a fine sales tool it is. People associate the firm with progress, with working out different answers from the common cliche. It doesn't cost you anything extra to have all this; it might very well cost you less."

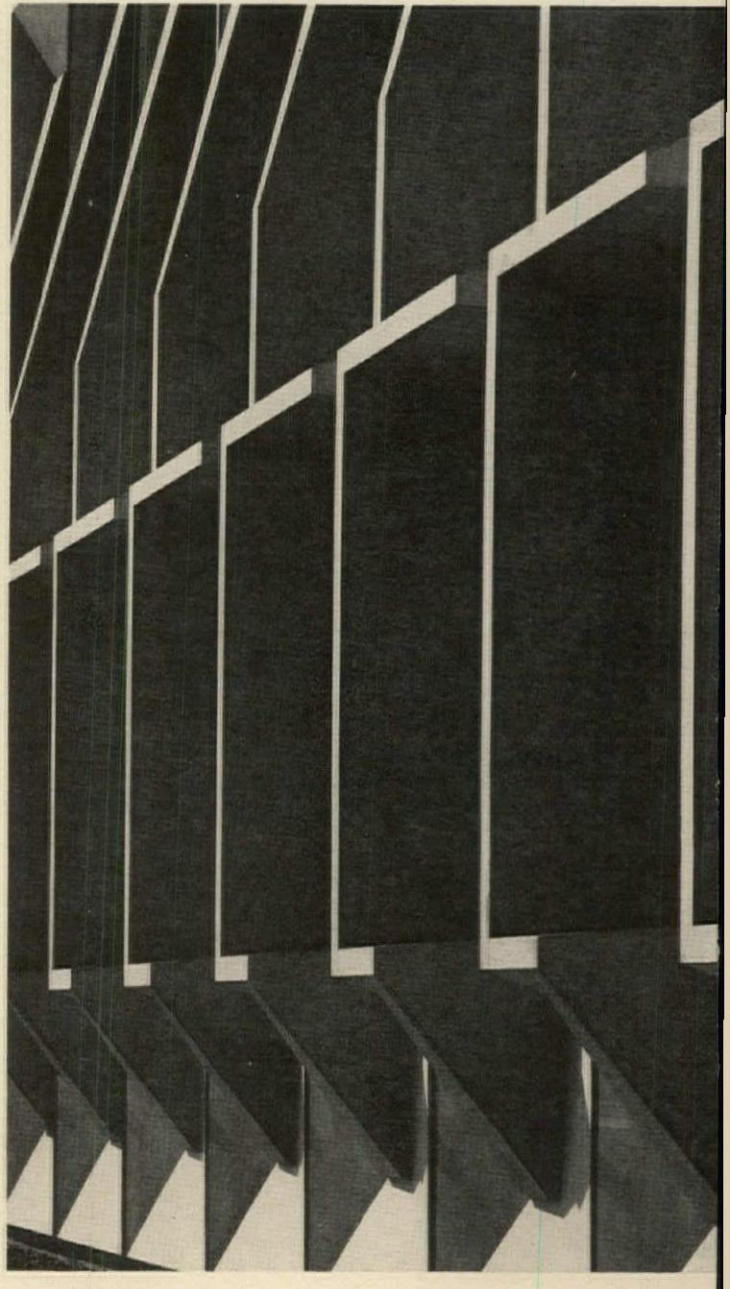
Torrington Manufacturing makes air moving devices and strip-wire forming machinery and builds a new plant only about once every two or three years. It does not maintain a corporate building department and has some of its process engineering done on a consulting basis. The role the architect plays for them must necessarily be different from what it would be for a larger company.

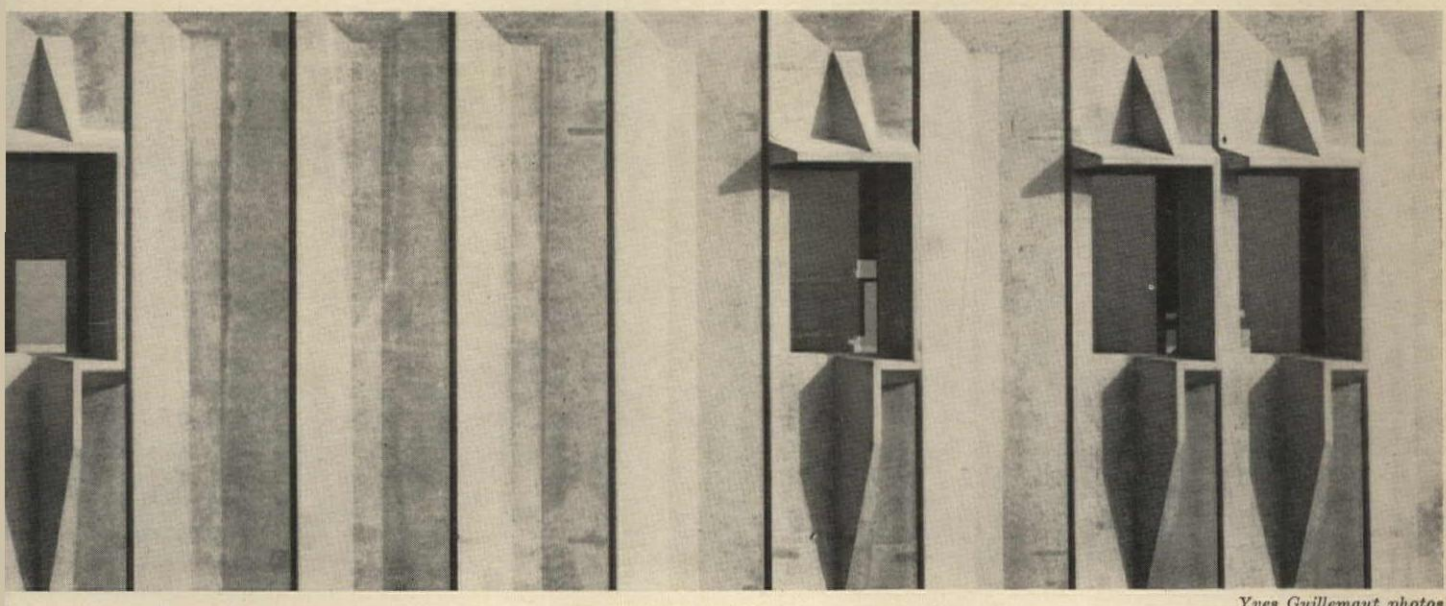
Tangible Benefits

It is significant, however, that Torrington Manufacturing puts so much emphasis on tangible benefits to be derived from the architect's independent viewpoint and creative ability. There seems to be a growing awareness, in all areas of industry, of the value of the independent professional in the design of industrial buildings. As R. H. Tatlow III of Abbot, Merkt and Co. wrote in the magazine Building Construction: "I am certain that an owner gets a great deal more for his money through the use of a professional architect-engineer, with the construction work being done by a general contractor. The package-type deal, which has been growing, may very well have application in a few limited areas, but, in general, my observations have shown that it is considerably more expensive. The owner still has to determine policy and interior requirements, and the over-all time of construction and completion is very little different. The changes made by the owner, as work progresses, are as expensive as they would be on any other construction, except that I am satisfied there are more of them with a package job."

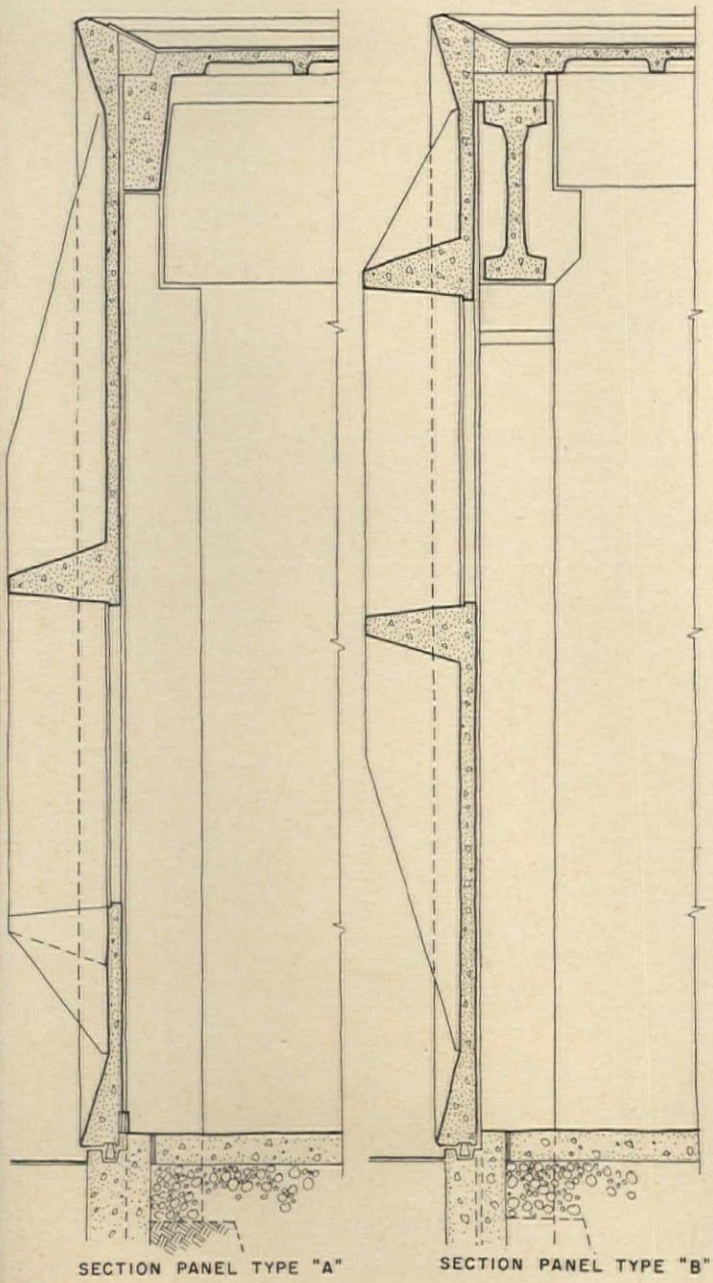
Deere and Company, Moline, Illinois, is another case in point. Their new headquarters building designed by Eero Saarinen (July 1964) is strong testimony to the company's





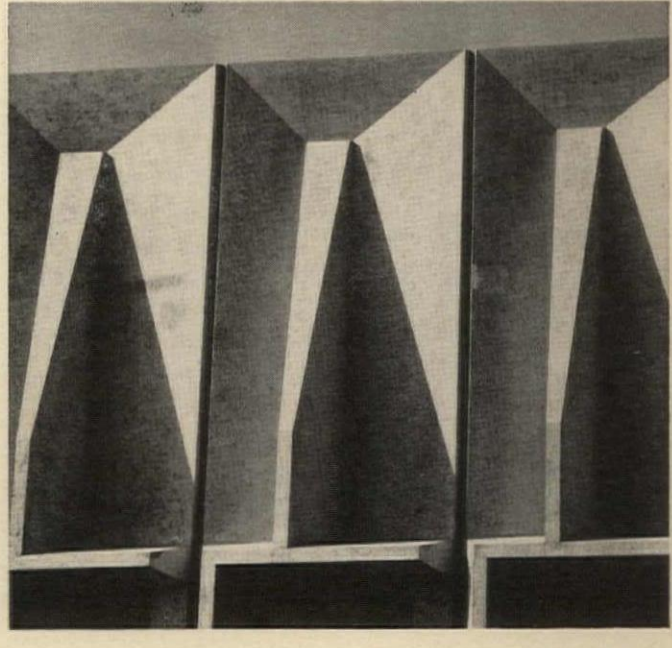


Yves Guillemaut photos



TORRINGTON NIVELLES

Breuer has used two basic types of panel at Nivelles, details of which are shown (*left*). The photograph (*above*) shows "B" panels. "A" panels are shown (*far left*) and (*below*)



concern with good design. Some businesses, however, have been known to seek good architecture for prominent buildings, and then to minimize architectural services in areas where so-called design considerations are not felt to be paramount. The new John Deere distribution center and showroom in Baltimore is important, therefore, because it will display the architect's design ability in a situation which is not always considered to be an architectural opportunity.

Rogers, Taliaferro, Kostritsky, Lamb have designed the warehouse on a curving plan which follows the shape of the site. It thus provides for expansion in a logical way which will ultimately make maximum use of the land available. It is hard to envisage such an elegant solution to a difficult site problem being obtained by commercial "pre-engineered" components.

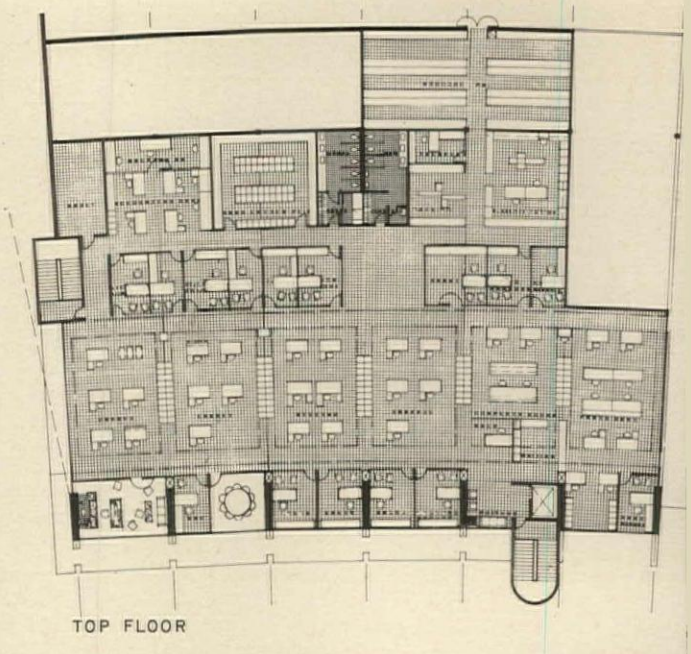
Good Buildings Attract Good People

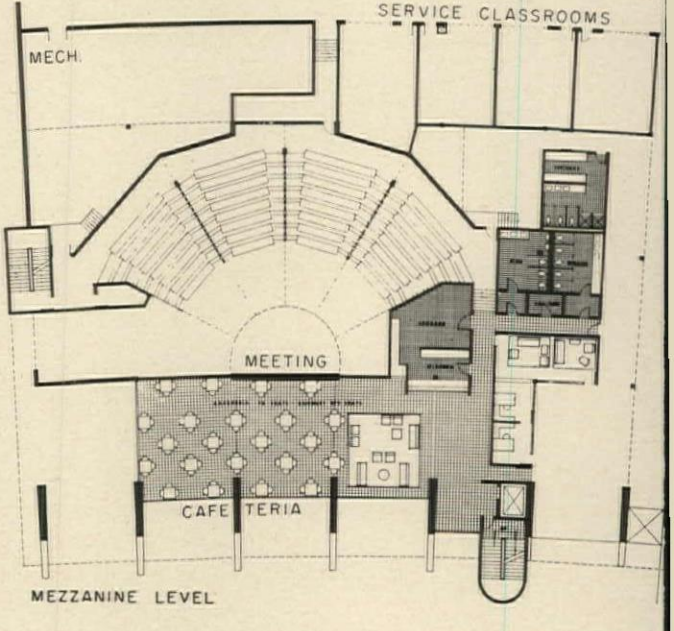
Deere and Company is also well aware of other benefits this new building can bring them. In the words of the chairman, William A. Hewitt:

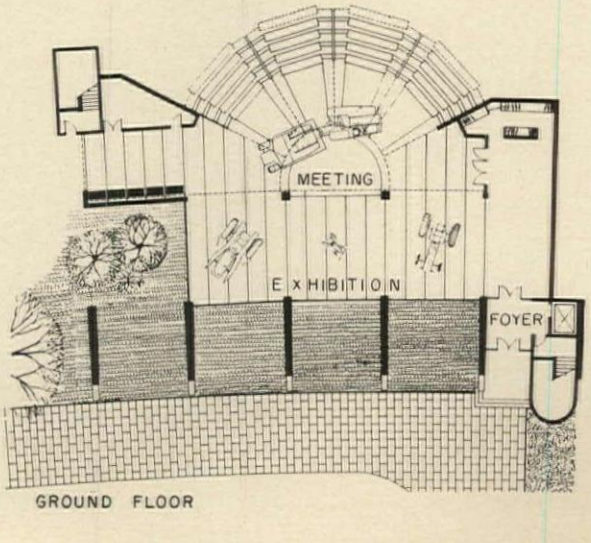
"We have a very strong interest in good buildings—good from both the esthetic and functional points of view. We feel that first-rate architectural design is important as a means of conveying to the public an impression of the John Deere organization as a top-ranking, progressive business. Equally important, we believe that quality architectural design has significant impact on the people within our organization. They think better of themselves, their work and their company when they are supplied with a superior environment. Good buildings attract good people and induce more effective performance from them.

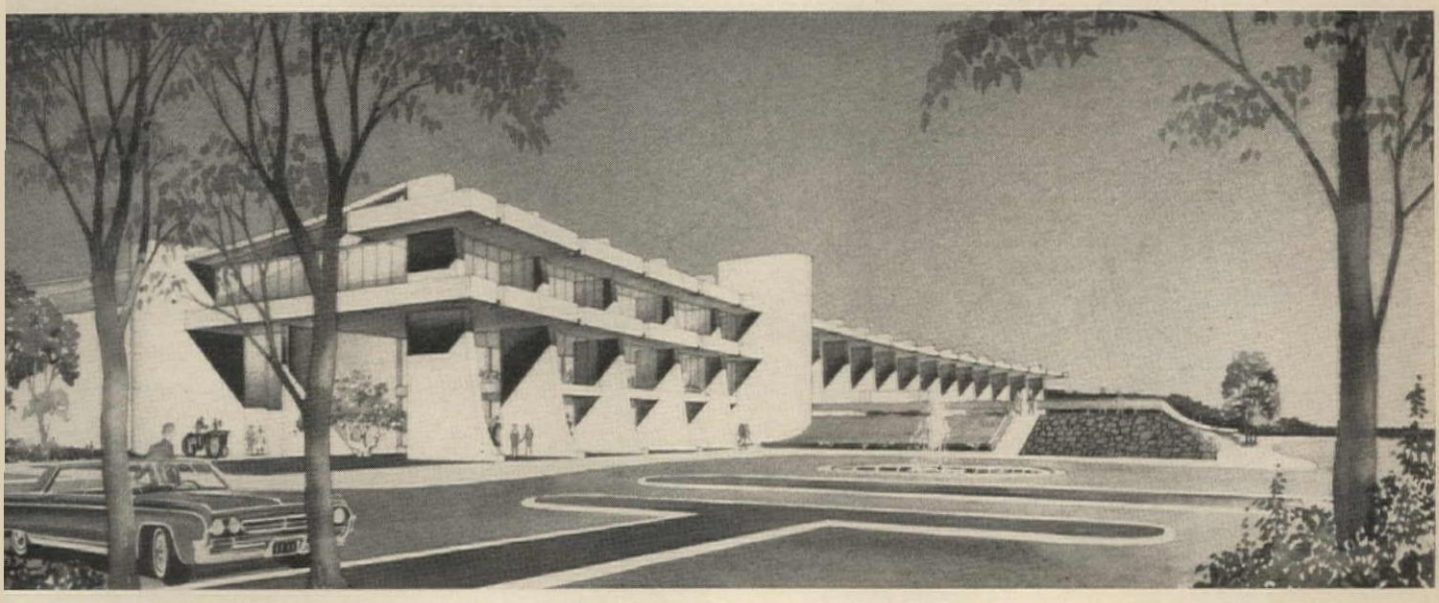
"Most of our buildings (factories, warehouses, powerhouses) are designed by our own internal architectural group. We believe that one of the best ways to set standards for their work and to stimulate their creativity is to engage a major independent architectural firm occasionally to build one of our major buildings. This we have done at Baltimore.

"Our working relationship with the Baltimore firm of Rogers, Taliaferro, Kostritsky, Lamb has been very excellent indeed, and we feel that the design they have proposed for our Baltimore sales branch will doubtless make it the most outstanding of our 14 United States buildings of this type."









JOHN DEERE COMPANY DISTRIBUTION CENTER

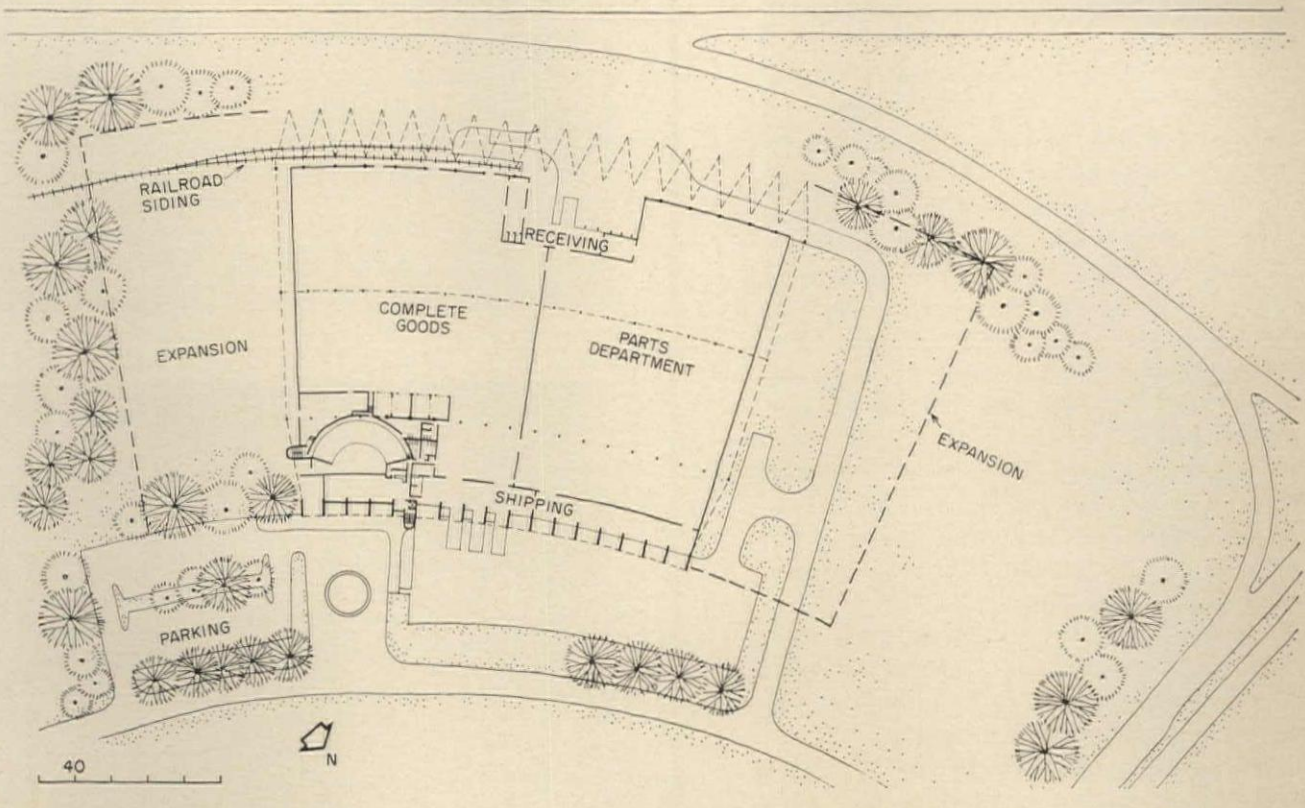
Baltimore, Maryland

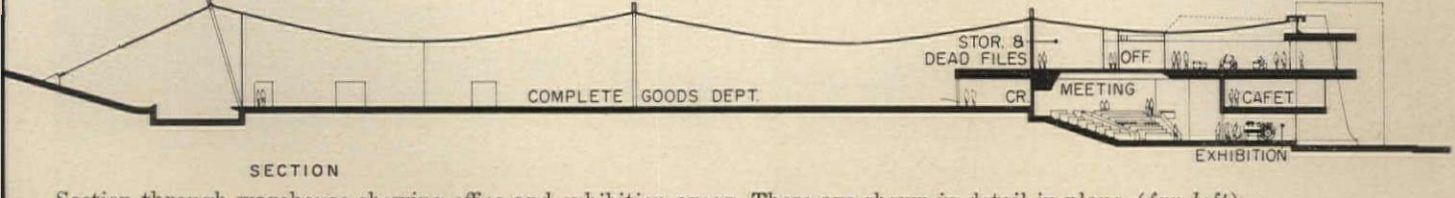
ARCHITECTS: *Rogers, Taliaferro, Kostritsky, Lamb*

Charles Lamb, partner in charge; James Grieves, associate

STRUCTURAL ENGINEERS: *Severud, Perrone, Fischer, Sturm, Conlin, Bandel*

MECHANICAL ENGINEERS: *Cosentini Associates*





SECTION

Section through warehouse showing office and exhibition areas. These are shown in detail in plans (*far left*)

Mr. Hewitt's statement brings us to an area that many an architect feels diffident about discussing: his ability to produce a better buliding by giving it an orderly and coherent design. The industrial architect may have good reason for staying away from the topic of "esthetics," a word which seems to carry connotations of frivolity and unnecessary expenditure; but the ability to design, using the word in its fullest sense, is surely one of his most important competitive advantages.

Toms Chocolate Factory

The Toms Chocolate factory in Ballerup, Denmark is a good example to bring up at this point, because, in this case, the architect was retained for the express purpose of producing an orderly and coherent set of esthetic relationships.

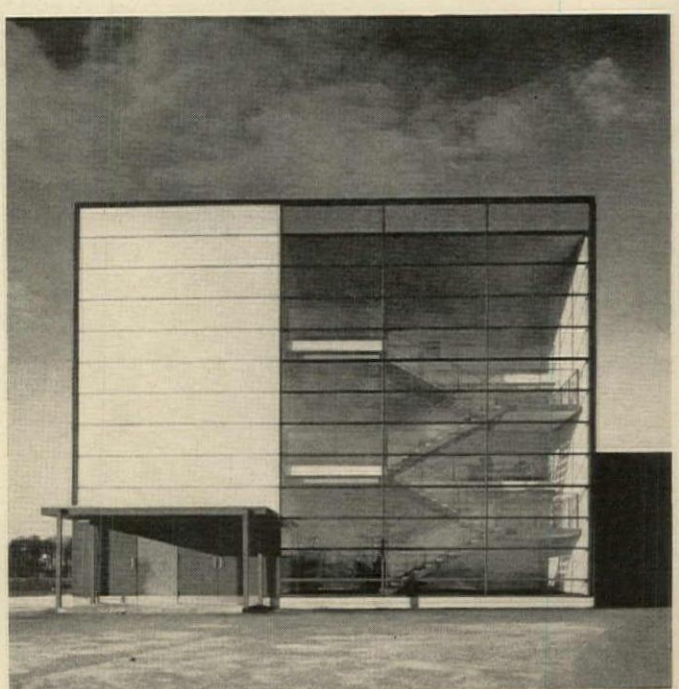
The president of Toms Chocolate, Dr. A. N. Neergaard, describes the process in these words: "Through a couple of years our own staff had been planning a factory which was to be the most ideal from the manufacturing point of view, without paying any attention to the question of whether the project in all details might be placed in successful buildings or not.

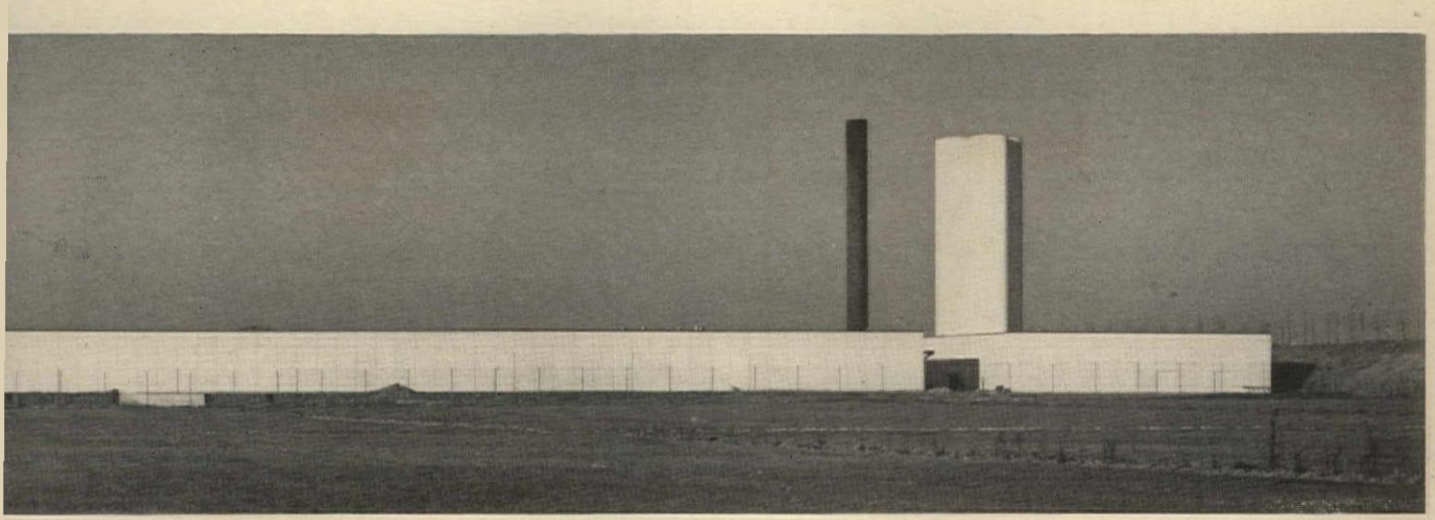
"When this work had come to an end, we approached the constructional engineer, who is one of the most prominent figures in Denmark as regards construction with prefabricated elements. We asked him to project buildings which might encircle our plants in a way which would answer its purpose, and which might be built with prefabricated elements, in order to complete the construction in a short time.

"When he had finished this work, our next problem was the choice of an architect; and, as I feel convinced that it is not more expensive to build a fine factory than a plain one, we approached the architect who in our opinion was the most artistic talent, Professor Arne Jacobsen. He accepted the task and, through the teamwork between him, the constructional engineer and our own staff, the final project was carried out.

"The result is an extraordinarily well-arranged factory; and in my opinion the buildings are a very fine architectural unity, naturally owing to the influence of Professor Jacobsen.

"I may add that the total building was no more expensive than was projected from the beginning."



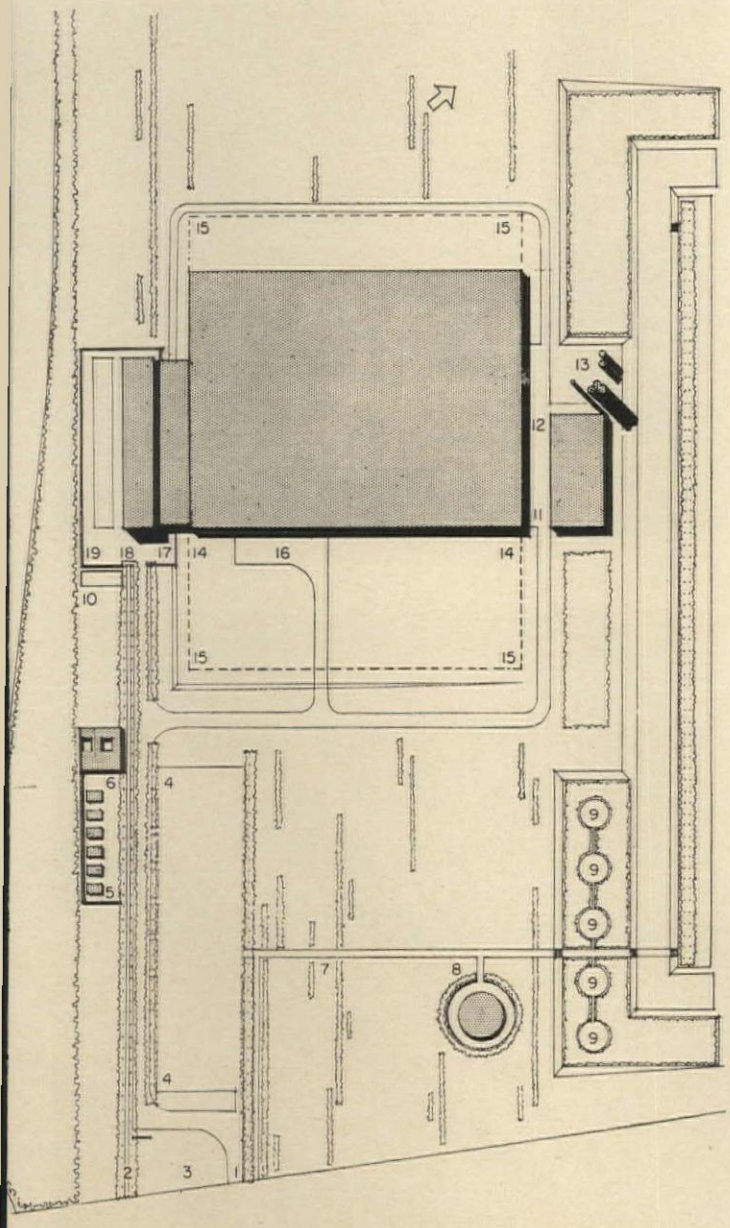


Strüwing photos

TOMS CHOCOLATE COMPANY

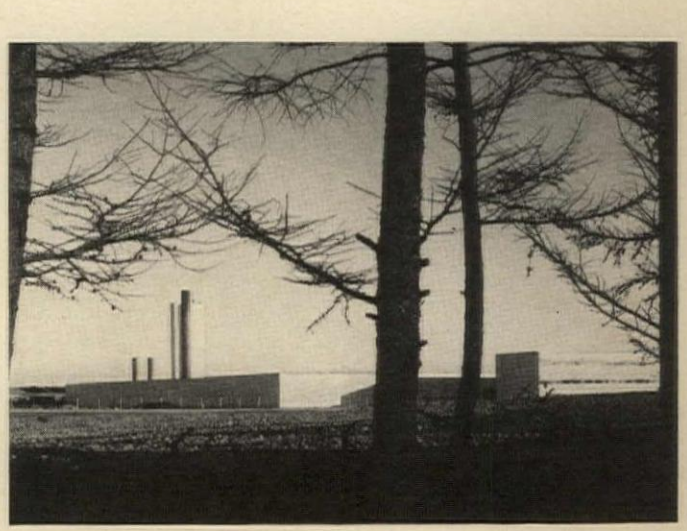
Ballerup, Denmark

ARCHITECT: *Arne Jacobsen*



1,2,3. Entrance
4. Parking
5. Bicycle parking
6. Caretakers' flats
7,9,10. Garden
8. Kindergarten
11. Raw product storage
12. Boiler plant
13. Silos
14. Production area
15. Expansion
16. Receiving
17. Shipping
18. Office building
19. Terrace

The factory has a reinforced concrete structure and is enclosed with prefabricated cladding units faced with tile. *Above:* Elevation of the factory complex from the entrance side of the property. *Far left:* Entrance elevation of office building and detail of lobby. *Below:* View of complex from back of site



The factory has a reinforced concrete structure with a regular bay system. There are two typical cladding units faced with tile; one has windows, the other is blank. Behind these cladding units and a layer of insulation is a masonry back-up wall. Similar units are used for the office building, power plant and caretaker's flat, and also for the screen walls. The panels are demountable, so that the factory can be expanded in the future.

The boiler stack, two oil tanks, and the storage silos for the cocoa beans have been grouped to form a sculptural composition. In general, however, the buildings derive their effect from the simplicity and consistency of the detailing.

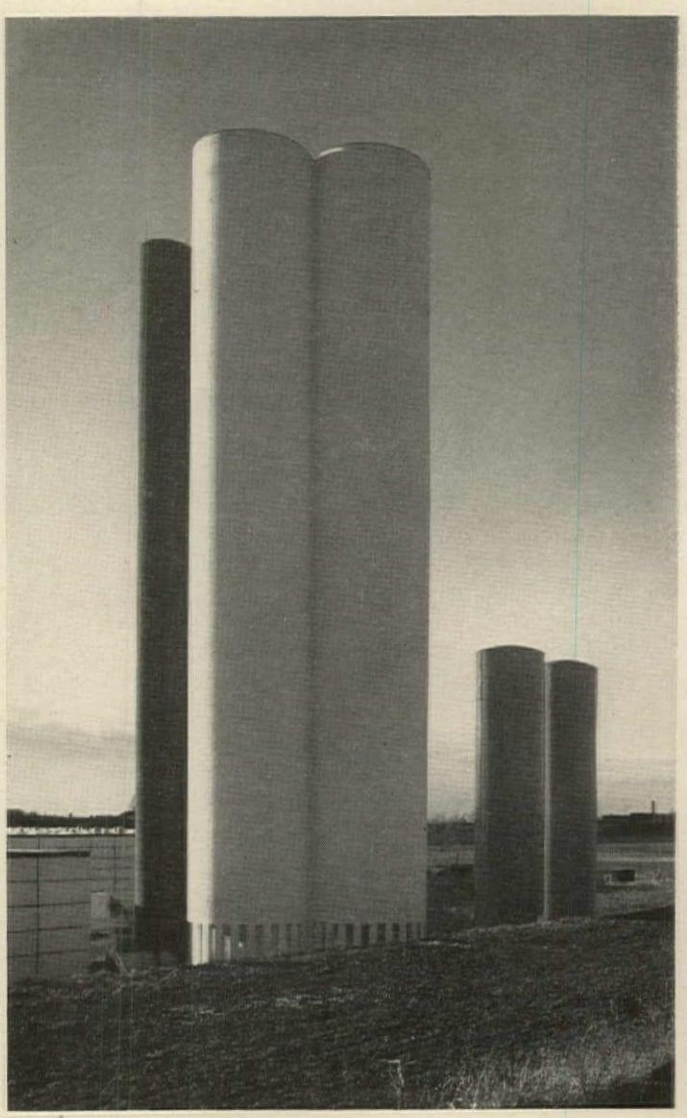
The A.I.A. Committee

In the same way that industry can be seen to possess an increasing appreciation for architectural design, the architectural profession has shown an increasing awareness of the needs of industry. The Committee on Industrial Architecture of the A.I.A. has, since its formation three years ago, embarked upon an active program of education to increase the architect's involvement with industrial architecture without forcing him into a role for which he is not qualified. On the one hand, the committee seeks to demonstrate the variety of ways in which the architect can help industry; and, on the other, the type of services the architect must offer if he is to do a truly comprehensive job.

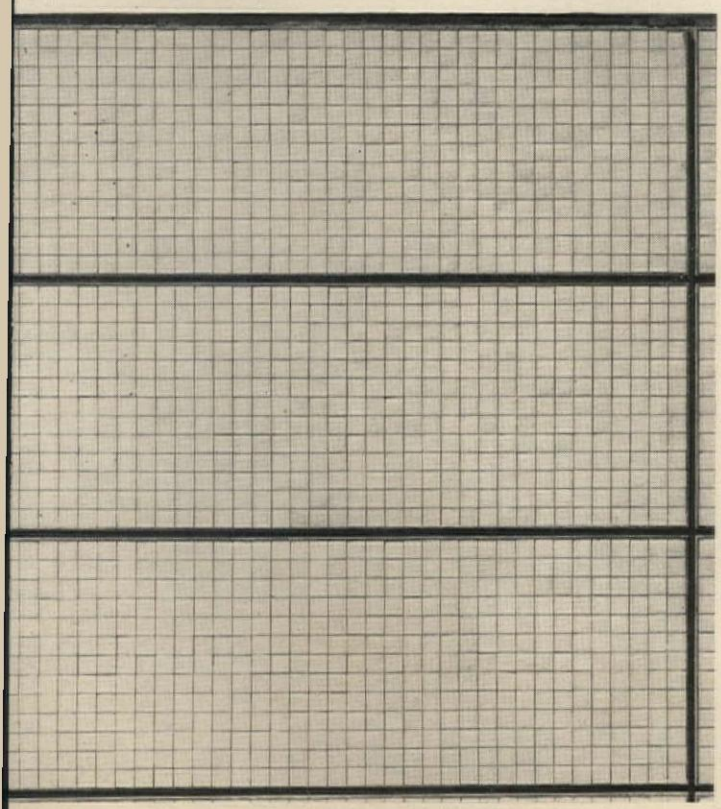
The major vehicle for this educational program is a series of publications in the A.I.A. Journal, of which two have appeared so far. The first, on industrial leasing practice, was published in August 1963 in a two-part form: one, entitled "Comprehensive Services for Industrial Lessee Clients," was directed at the profession; the other, "A Guide to Better Industrial Leasing" was directed to the client. Both were prepared by George T. Heery of Atlanta, the chairman of the Committee.

Mailings to Corporations

Twenty-two thousand five hundred copies of the "Guide" portion of the article were mailed to corporation presidents listed in Dun and Bradstreet's Million Dollar Directory. A second guide, this time to better "crash" construction, was published in No-



Strüwing photos



TOMS CHOCOLATE COMPANY

Above left: The boiler stack, oil tanks and the silos for the cocoa beans have been grouped to form a sculptural composition. *Above:* View from the office building out over the roof of the factory. *Far left:* Facade of the office building. *Left:* Detail of tile cladding material used on all solid exterior surfaces

vember, 1964. It will be mailed to 25,000 corporation presidents.

The committee plans future articles on such subjects as programing, site selection, construction cost control and flexibility of plant design.

In addition, the committee sent out a questionnaire to the presidents of 400 of the nation's largest corporations asking such questions as:

"If your company has built any facilities in the past five years, what method did you use for design and construction?

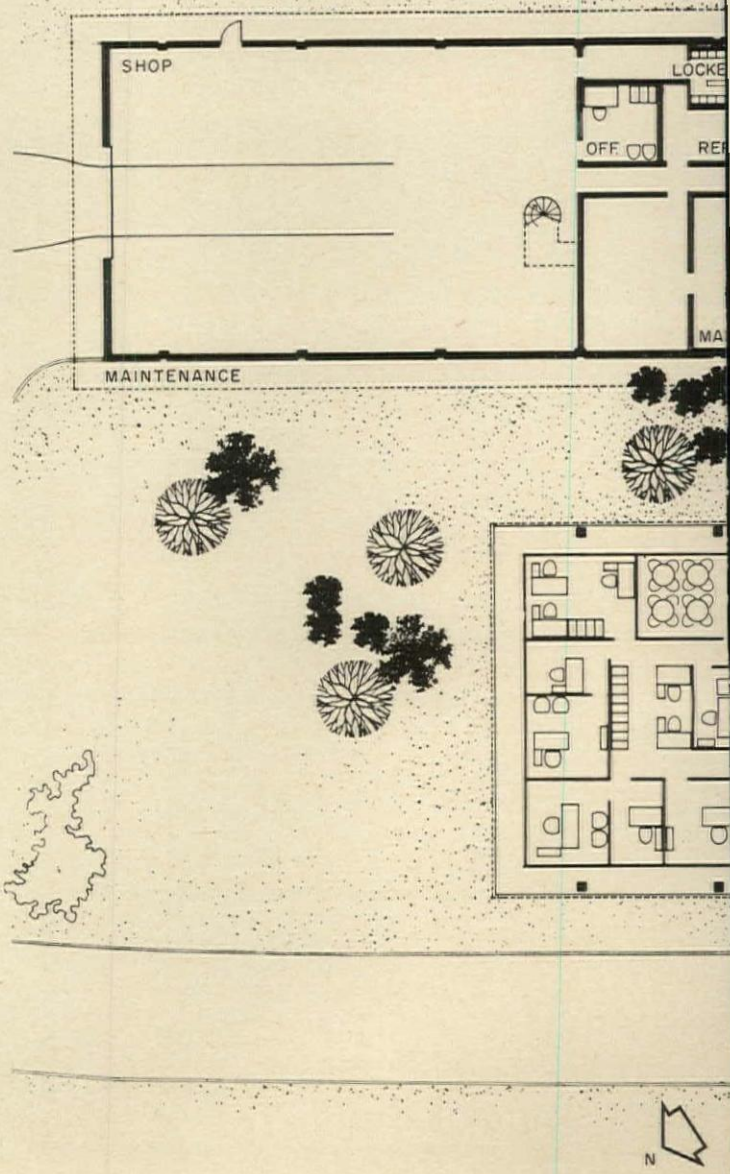
1. Designed by staff architect or engineer and constructed by your own company.
2. Designed by staff architect and engineer and constructed by independent contractor.
3. Designed by independent architect and constructed by contractor through competitive bidding.
4. Designed by independent architect and constructed by contractor through negotiation.
5. Designed and built by a single organization.

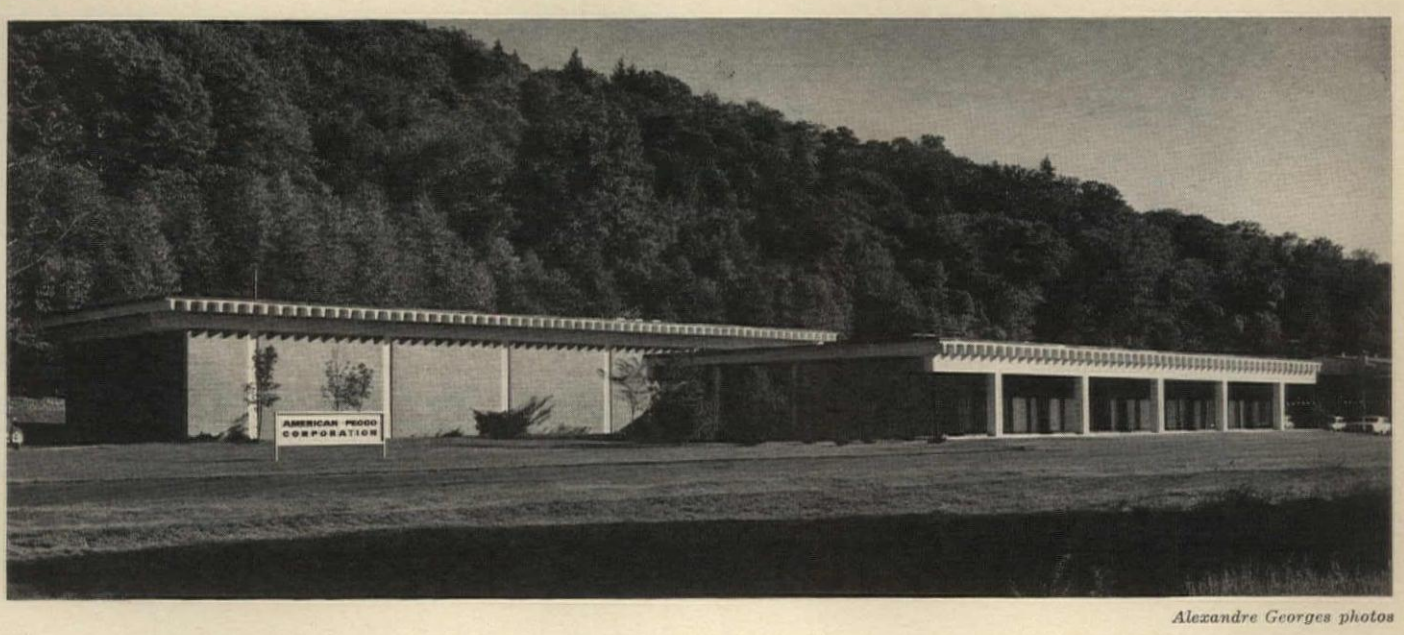
In your next building program which of the above methods would you probably use?"

One hundred fifty-four companies, approximately evenly divided between those making consumer and industrial products, answered the questionnaire. The results have not yet been fully tabulated, but seem to indicate a distinct trend among these large corporations towards the use of independent architects.

Comprehensive Services

Of course, architectural offices vary in the degree of comprehensiveness of the services they offer under one roof. A big office like that of Welton Becket and Associates can put industrial and land planners and landscape architects to work alongside their architects on investigating a site for a client; and a firm like Albert Kahn, Inc., through long association with heavy industries, has built up a group of specialists on industrial processes. At the same time, many industrial commissions, such as the building for American Pecco (illustrated on these pages), remain well within the range of a small architectural office. The message that the A.I.A. Committee is trying to put across is that the architect should recognize the various professional services required by indus-





Alexandre Georges photos

AMERICAN PECCO CORPORATION

Millwood, New York

ARCHITECT AND INTERIOR DESIGNER: *Arthur Witthoefft*

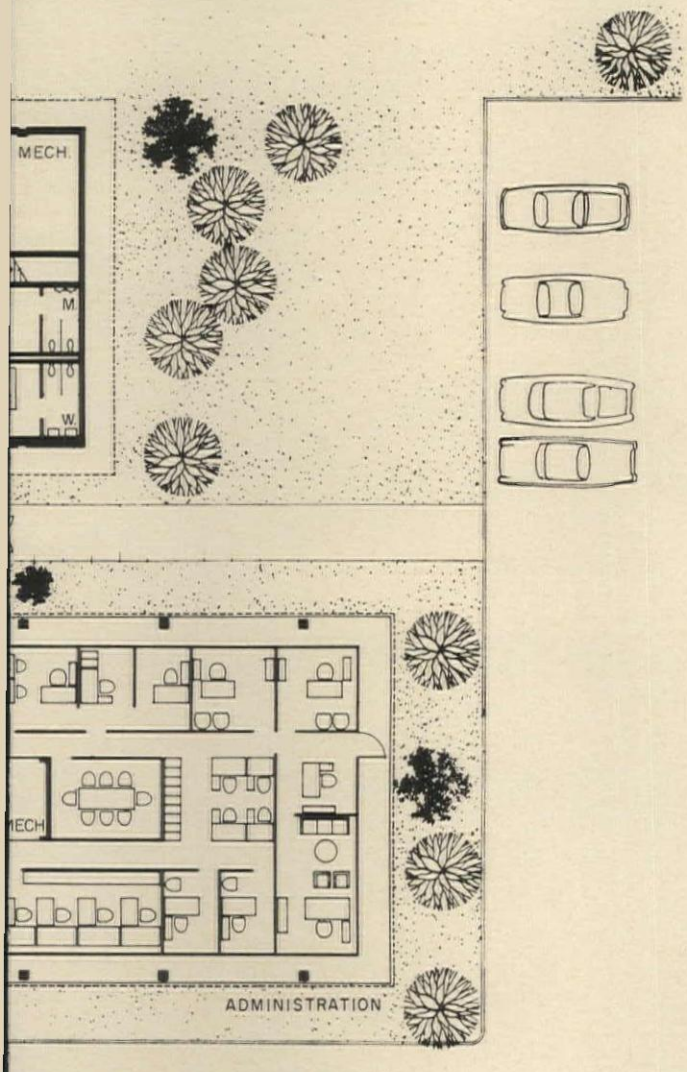
STRUCTURAL ENGINEER: *Harry Kaufman*

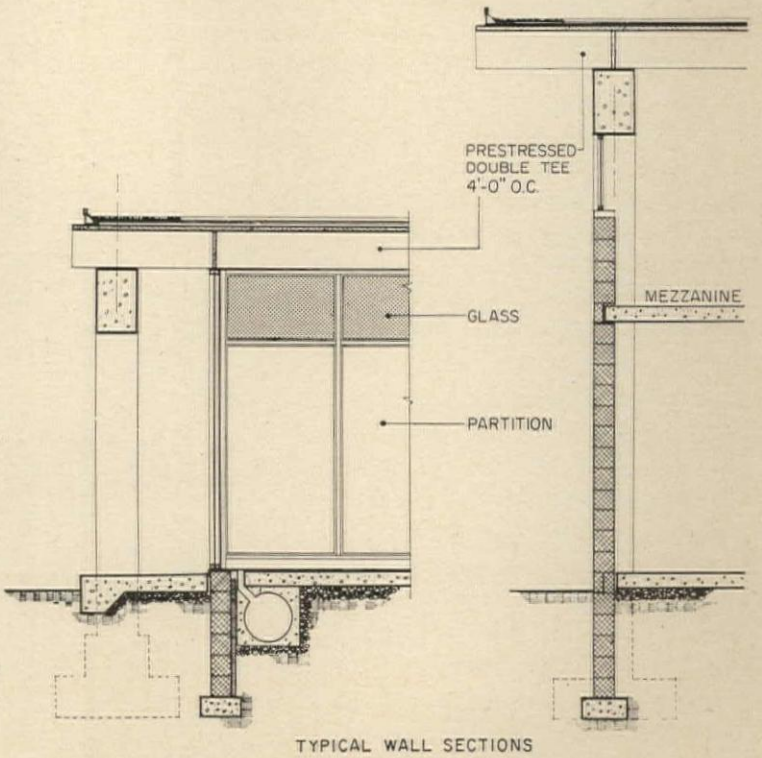
MECHANICAL ENGINEER: *George L. Smith*

LANDSCAPE ARCHITECT: *Armand Benedek*

GENERAL CONTRACTOR: *Chiappinelli — Marx Incorporated*

These buildings house the offices and repair shop of the American subsidiary of a German manufacturer of tower cranes. The basic structure is the same for both buildings: prestressed double tees supported on a poured-in-place concrete frame (*details below*)





TYPICAL WALL SECTIONS

trial clients and make sure that they are available, either by providing them within his own office, or by seeing that suitable consultants are retained.

Environmental Design

The buildings for Infrared Industries of Carpenteria, California, designed by Jones & Emmons, posed a problem of environmental design both from the point of view of requiring a controlled climate for the assembly of sensitive equipment, and in the character of the design needed to provide a suitable atmosphere for research. Businesses of this kind are in strong competition with one another to secure the best personnel, and the quality of the working environment can be an important factor of choice.

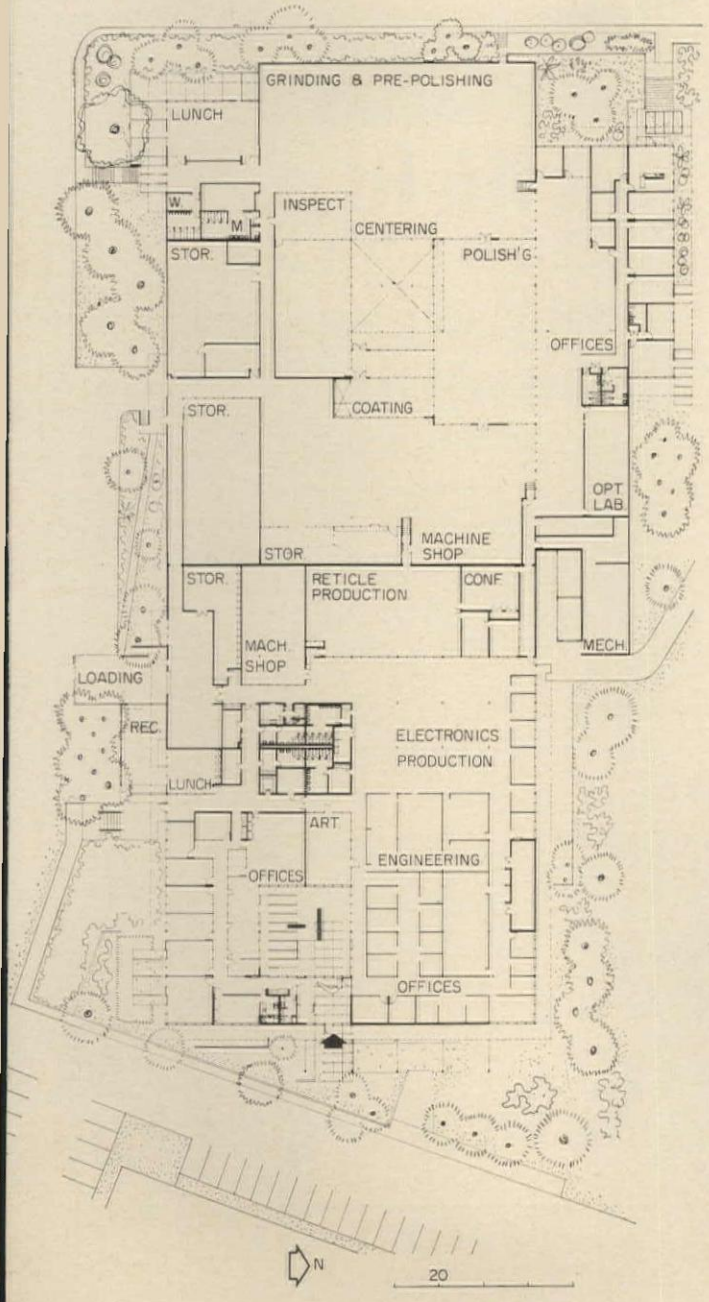
The new buildings bring together under one roof Infrared's West Coast Division, its Standards Laboratory, Controls Division, and Research and Development. The latter was transferred from the company's East Coast headquarters in Waltham, Massachusetts. In addition the company's Simpson Optical Division is now housed in an adjoining building, which was begun after the first portion of the complex was already in operation.

Advantage of Views and Climate

Carpenteria is about an hour and a half from the center of Los Angeles in an area that was once purely a resort and a haven for retired people, and has since attracted many research and development facilities. Infrared has a five and a half acre site that lies along the main coastal highway, with the ocean along one side and a view of the mountains on the other. The Infrared management wanted the new buildings to take full advantage of views and climate to create a relaxed and pleasant atmosphere. At the same time, the company was in a period of expansion and was anxious to keep costs to the minimum necessary. (The two facilities provide about 80,000 square feet at a cost of approximately $1.1 million dollars.)

The principal executive offices look out to the south, towards the ocean, with the glass protected by a wide overhang; and, on the north side of the building, the offices of department heads have views of the mountains. The parking areas have been terraced and screened with plants so that they will

Ernest Braun photos



INFRARED INDUSTRIES

Santa Barbara, California

ARCHITECTS AND SITE PLANNERS:
A. Quincy Jones and Frederick E. Emmons

MECHANICAL ENGINEERS: *Ayres and Hayakawa*

GENERAL CONTRACTOR: *MacIsaac and Menke*

Above left: Entrance to offices of Simpson Optical Division (top right hand portion of plan). *Above:* General view from coastal highway. *Far left:* Assembly areas in the electronics division. *Below:* Garden court which provides light and view for internal offices and laboratories

not obscure the view. An open garden patio provides light and a view for the secretarial pool, accounting department, drafting and some of the laboratories. The research and development personnel also have their own garden terrace, as does the cafeteria.

The assembly areas are arranged to give semi-enclosed work spaces for individual skilled workers, and there is a generally orderly atmosphere, with distracting influences kept to a minimum. Provision has been made for future expansion, both horizontally and by adding a partial second story.

Concern for Employes

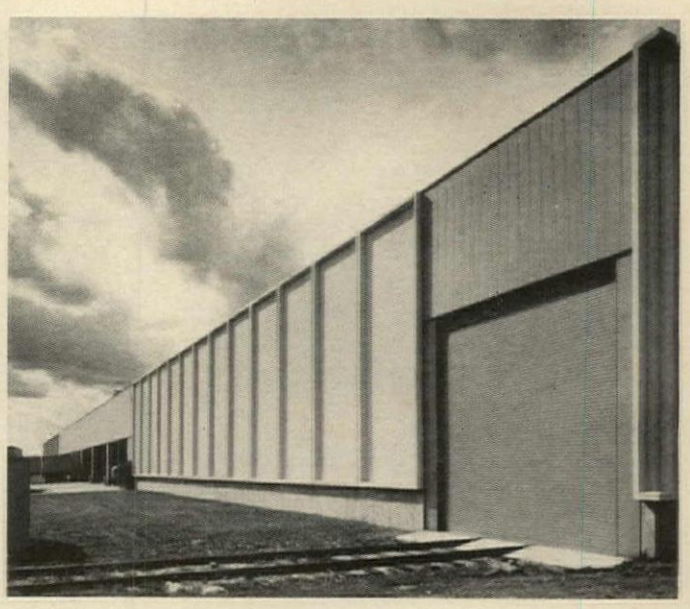
The concern shown by Infrared for the environment of its employes is part of a noticeable trend towards securing amenities for manufacturing facilities that are more directly comparable to those commonly provided in corporate offices. The Jones and Emmons office's capability as site planners was an important factor in their ability to handle this commission successfully.

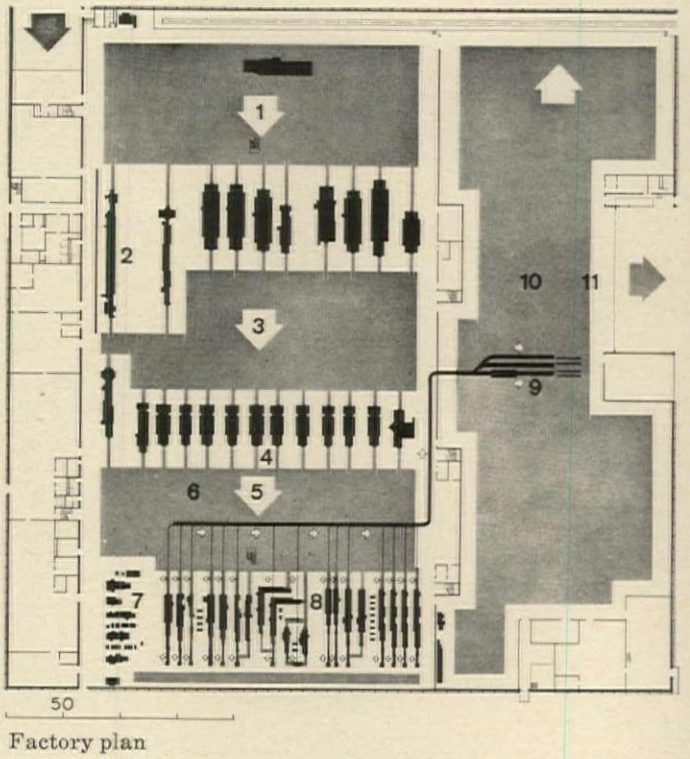
Control of Costs

Control of cost is usually a critical element in the design of industrial buildings, and the method followed by Skidmore, Owings and Merrill for the Container Corporation of America facilities at Carol Stream, Illinois provides an instructive illustration. In the early stages of discussion, the architects made diagrammatic presentations of the process flow in relation to building form, and of possible alternatives of bay size, ceiling height and wall section. The comparative costs and other characteristics were documented for each case. (Examples of these presentations are shown on pages 168 and 169.)

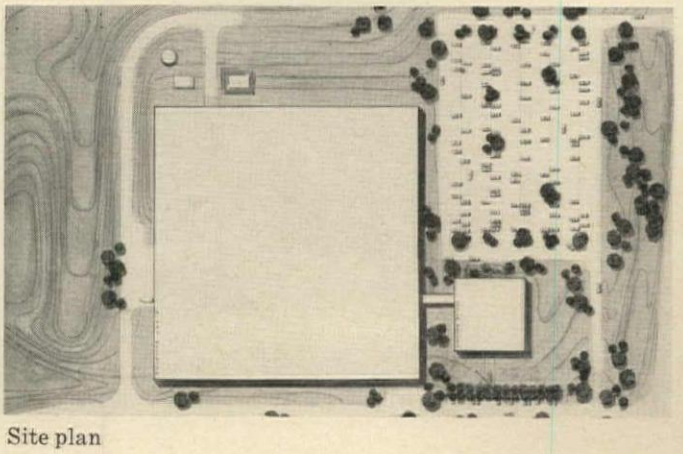
The client was able to base final decisions on clearly stated alternatives. For example, as the manufacturing conditions for cardboard cartons require a constant temperature of 72 degrees with an accompanying humidity of 45 per cent, the U factor of the wall section, rather than lowest cost, turned out to be critical, leading to the choice of wall section 4.

This wall is a pre-cast concrete panel 10 by 25 feet, with a 2-inch vapor barrier and an 8-inch concrete back-up wall. The factory area is about 385,000 square feet. A link connects the manufacturing area to a two-

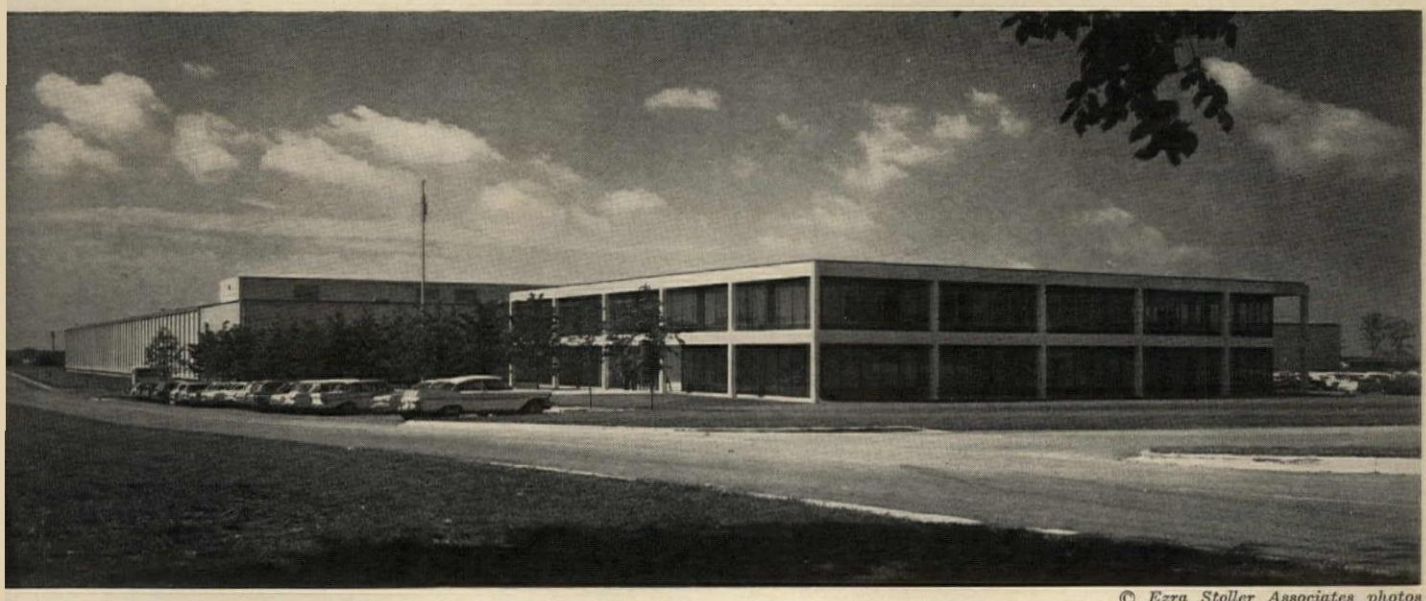




Factory plan



Site plan



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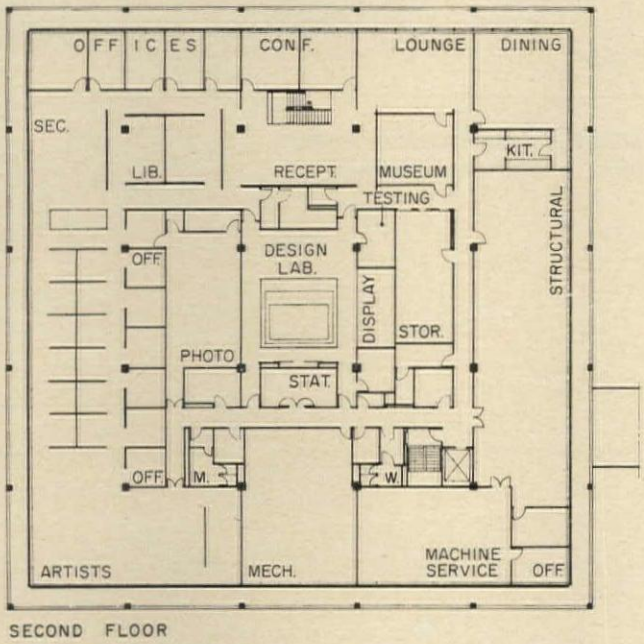
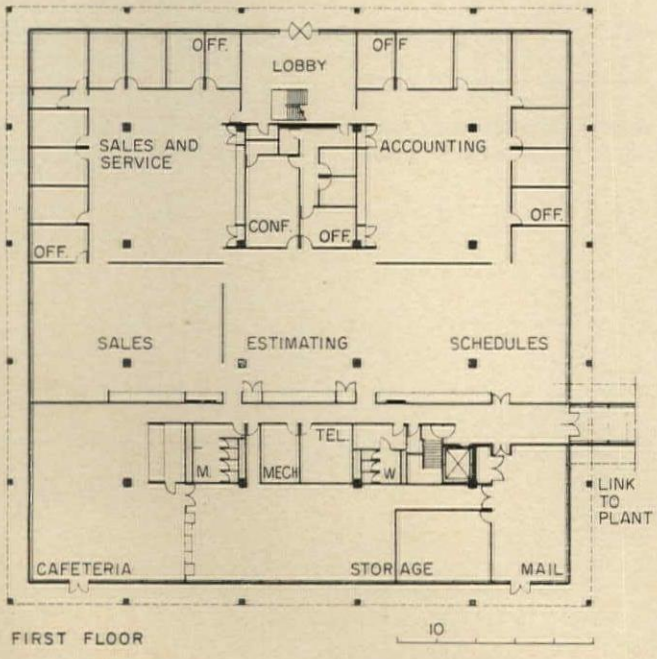


SECOND FLOOR



FIRST FLOOR

FOLDING CARTON PLANT AND OFFICE BUILDING CONTAINER CORPORATION OF AMERICA

Carol Stream, Illinois

ARCHITECTS AND ENGINEERS: *Skidmore, Owings and Merrill*

GENERAL CONTRACTOR: *Ragnar Benson, Inc.*

Top left: Entrance for railway siding (upper right hand corner of plan). Factory Plan (*far left*): (1) Paperboard Stock Receiving and Storage; (2) Printing—Gravure, Letterpress and Offset; (3) Printed Stock Storage; (4) Die-cutting and Creasing; (5) Stripping and Scrap Disposal; (6) Stripped Stock Storage; (7) Coating; (8) Folding and Gluing; (9) Automatic Tape Sealing; (10) Finished Goods Storage; (11) Shipping. *Left:* Plans of two-story office wing

story office building which houses design and market research departments and the administrative and sales offices. This arrangement provides an integrated process, from the design of the package and the testing of its acceptance, through its manufacture.

Both this plant by Skidmore, Owings and Merrill and the Infrared buildings by Jones and Emmons received awards from Factory magazine in the program in which Factory names the best 10 plants of the year.

The Architect's Contribution

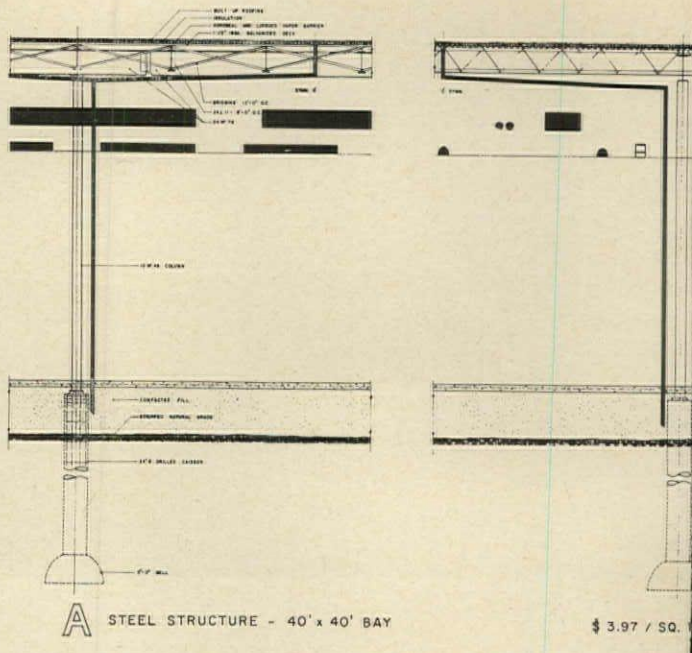
This study has touched upon a few of the contributions that the architect can make to industrial building. It has discussed the architect's ability to make a factory building a tool (and not a monument), to solve difficult and unusual problems, to give a group of buildings esthetic coherence, to shape and control environment, and to present alternatives whose advantages can be evaluated comparatively. This study also shows buildings which are successful demonstrations of the architect's ability in these areas.

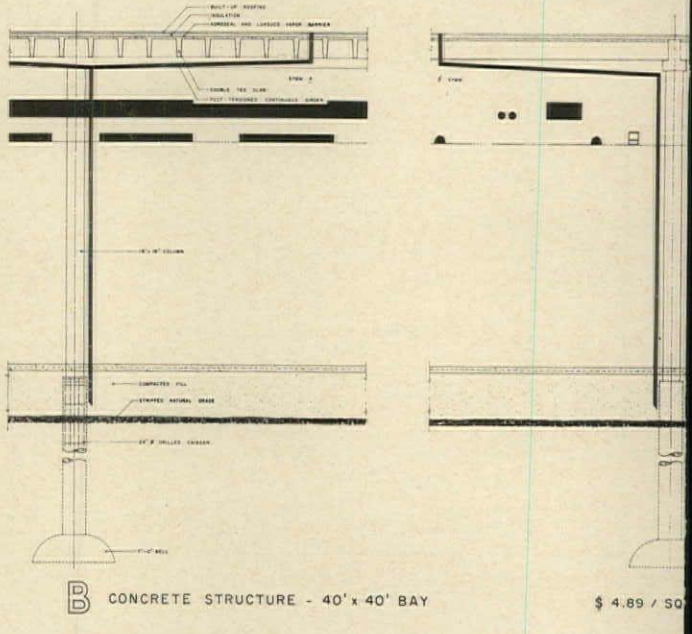
Prospects for Industrial Buildings

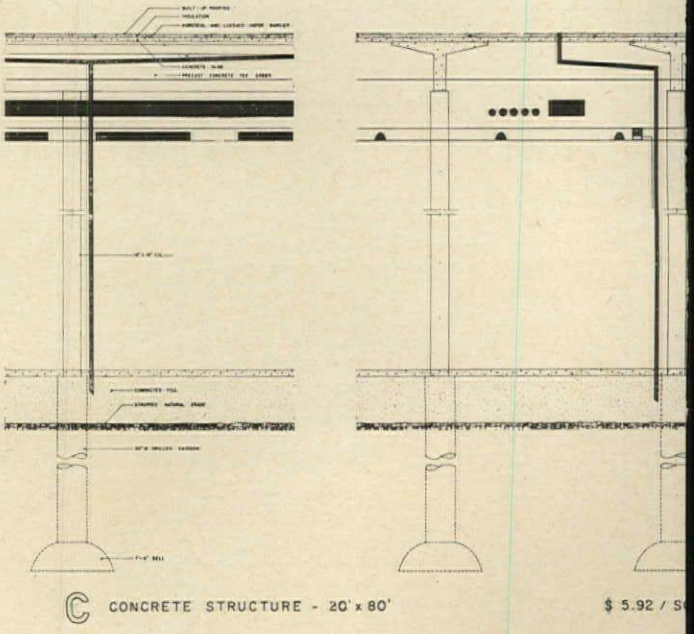
A McGraw Hill economic survey of plans for capital spending in 1965-1966 reports that American business now plans to spend 46.9 billion dollars in new plant and equipment during 1965, which is 5 per cent more than it spent in 1964. Of these figures, 20.2 billion dollars will go to the general area of manufacturing, with an additional 18.2 billion planned for 1966.

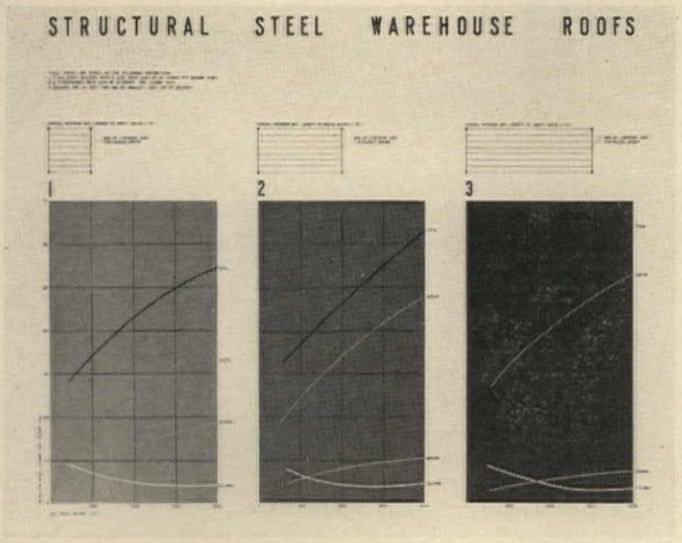
According to F. W. Dodge Company figures, about 2.5 billion dollars was expended upon buildings for manufacturing during 1964, and Dodge figures indicate that the industrial construction field has been growing at a rate of about 6 per cent a year. A Sweets Catalog Service survey of corporate building departments indicated that the total dollar value of the facilities planned over the next five years by the companies surveyed would average about 13 million dollars per company.

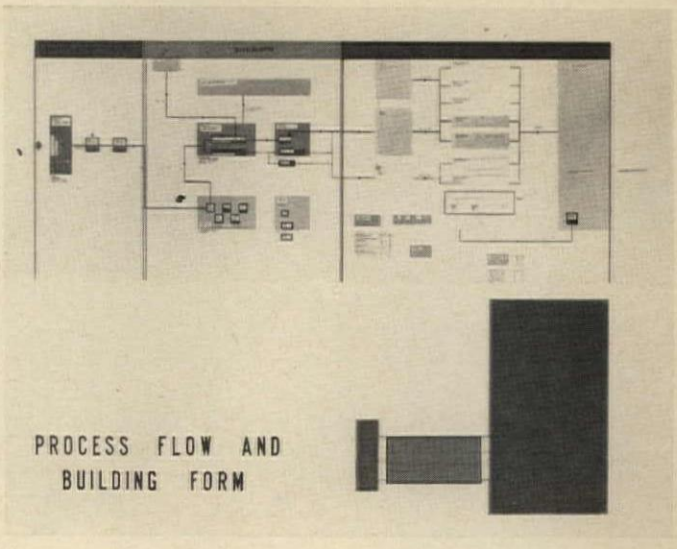
Clearly there are opportunities in the field of industrial architecture, and there seems to be an increasing likelihood that these opportunities can lead to successful buildings.





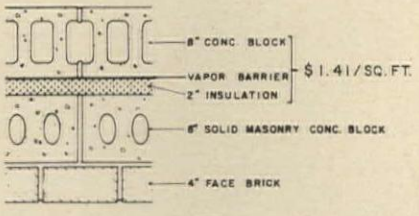






FOLDING CARTON PLANT AND OFFICE BUILDING
CONTAINER CORPORATION OF AMERICA

Drawings on these pages represent some of the comparative studies presented to the client in the early stages of design. Final choices were: a 40- by 40-foot bay, structure "A," and wall section "4," which were most appropriate for the clients particular requirements

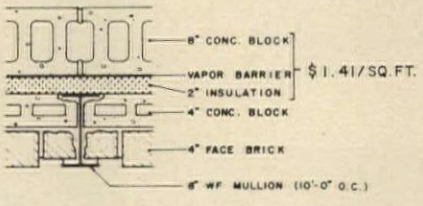


U FACTOR 0.087
COST $ 4.47/SQ. FT.

COST WITH ALTERNATE EXTERIOR MATERIALS

CONCRETE BLOCK $ 3.85/SQ. FT.
GLAZED BRICK $ 5.27/SQ. FT.

1



U FACTOR 0.09
COST $ 4.16/SQ. FT.

COST WITH ALTERNATE EXTERIOR MATERIALS

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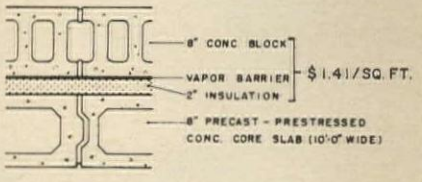
GLAZED BRICK $ 4.96/SQ. FT.

2



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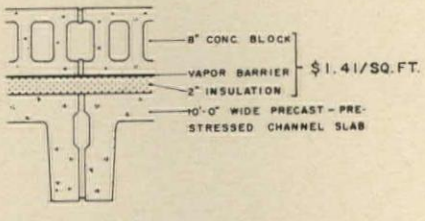
COST $ 4.21/SQ. FT.

COST WITH ALTERNATE WALL FINISH

EXPOSED AGGRT. $ 4.71/SQ. FT.

3



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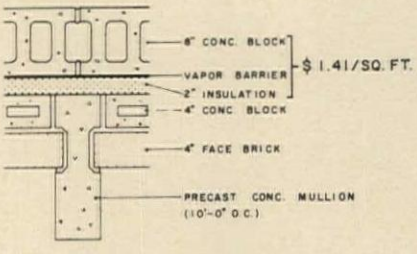
COST WITH ALTERNATE EXTERIOR FINISH

EXPOSED AGGRT. $ 4.30/SQ. FT.

4

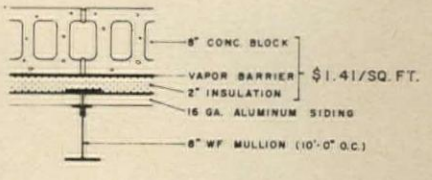


U FACTOR 0.09
COST $ 4.19/SQ. FT.

COST WITH ALTERNATE EXTERIOR MATERIALS

CONCRETE BLOCK $ 3.57/SQ.FT.
GLAZED BRICK $ 4.99/SQ.FT.

5



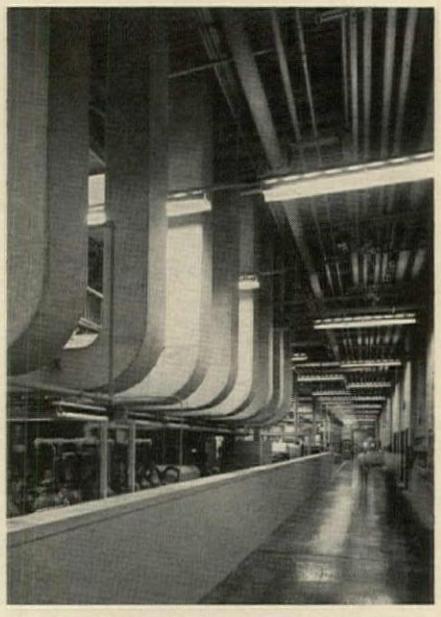
U FACTOR 0.092
COST $ 3.36/SQ. FT.

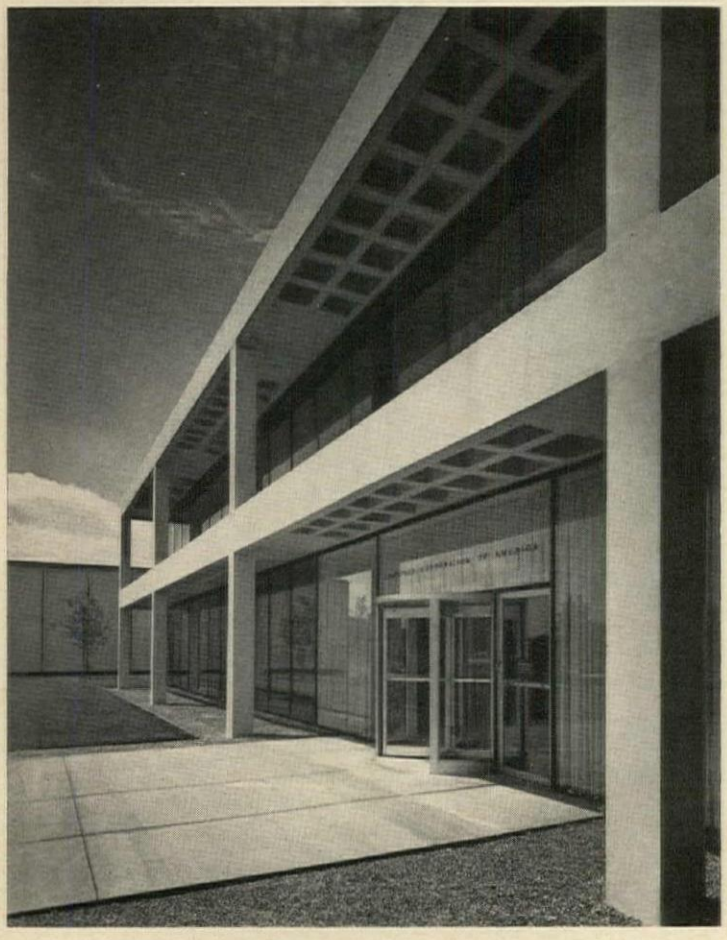
COST WITH ALTERNATE EXTERIOR MATERIALS

BAKED ENAMEL ON
STEEL PANELS $ 3.08/SQ. FT.

6

© *Ezra Stoller Associates photos*





Top left: Photograph shows link between the factory at left and the office building. Note exposed concrete waffle slab. *Left:* Main entrance to office building. *Above:* Portion of printing area on factory floor

Architectural Engineering

Plastics in Houses Assessed

A survey to assess the role of plastics in future house structures was recently conducted by the Division of Building Research of Canada's National Research Council. Over 50 major plastics producers and research groups cooperated in this survey, which was conducted by personal visits and by correspondence with European firms throughout North America.

Although primarily concerned with the potential development of plastics in house structural systems, the survey points to their success as ancillary materials in buildings for coatings, claddings and coverings.

"Plastics alone are not readily suited to house structure uses," the report says, "since, although they vary greatly in types and properties, they all have characteristics which are not acceptable for structural elements in a building. Low stiffness, softening at even sun exposure temperatures, dimensional instability, creep under load, combustibility, and generally high cost rule out the logic of an all plastic house.

"Where plastics are to be used as structural elements, the obvious solution is to use low-cost fillers to modify the basic properties of the plastics. Fillers can extend the plastics and lower their final cost. They can stabilize them against dimensional change, and they can increase both their stiffness and their strength, especially at higher temperatures."

"The Role of Plastics in House Structure" may be obtained for 50 cents from the Publications Section, Division of Building Research, National Research Council, Montreal Road, Ottawa 7, Canada. Order No. NRC 7932.

Environmental Criteria— How Quantitative?

While acoustics is a very important aspect of the total environment and one in which many criteria have been established, these still must be tempered with common sense, warns Robert B. Newman of Bolt, Beranek and Newman, Inc.

In a talk last month at the Winter Annual Meeting of the American Society of Mechanical Engineers he drew on a personal experience to reinforce this point: "The other day I walked into a large, covered mall in a new shopping center. The space was abundantly flooded with daylight from high windows on both sides. Discretely placed in this mall were a number of attractive groupings of bamboos and other plant materials. There were only a few people there at the time I walked in, but my senses were immediately confused. I seemed to be in a semi-outdoor space with shops all around, and yet my ears told me that I was in a very hard, reverberant interior and that the whole thing didn't quite hang together as a total environment. Every surface in the space was hard and sound reflecting, and it needed some modification with sound-absorbing finishes to give it the semi-outdoors feeling. I was also interested to observe a number of small children tagging along with their mothers. Each child seemed immediately to sense the reverberant character of the environment and began making delighted squeals and listening to the wonderful reverberation that followed. It was impossible for any of the mothers to make the children stop squealing. Perhaps the space should be left reverberant for the delight of these children; but, if the adult shopper is going to find the environment totally pleasing, his eyes as well as his ears must be satisfied.

"How quantitative can we be about criteria of this sort? We cannot say that the reverberation time of a shopping mall should be a certain number of seconds or that the background noise level in the mall should be so many decibels. This must be based on judgment and on experience and on the particular situation at hand. We do know that, if we pay no attention whatever to the design of the acoustical environment, it probably won't be right, but we must be very careful about applying hard and fast numerical criteria to such environmental questions."

This Month's AE Section

A LOOK AT THE FUTURE OF STRUCTURAL DESIGN

By Paul Weidlinger, Consulting Engineer, New York City*

Fifteen years ago, I gave a paper at a symposium in which I made a number of predictions regarding the future of structural engineering. These predictions seem as valid and sensible today as they did when I first made them, but what is interesting is that the terminology in which I phrased them would be very different today. This change in terminology has considerable significance which I shall discuss later. In today's terminology what I said 15 years ago was that two developments which would substantially affect the structural engineering profession were: (1) system synthesis and (2) electronic data processing. Today I could make the same predictions but more emphatically and with greater confidence.

Five years later I made a further suggestion which also remains valid today: that important developments were in the offing, not so much in new materials or new technology, but rather in new thinking and new ideas.

Slowly Developing Discipline

Re-reading what I said on these last two occasions has alerted me to the dangers inherent in predicting developments in structures. Structural engineering, which is so much tied to the building industry, is an extremely slow moving discipline, compared to other fields of technology.

First let us look briefly at the past. Let me begin with a reminder that a very large, in fact, overwhelmingly large percentage of our theoretical knowledge which is now applied to our day to day work is drawn from scientific researches which originated in the 17th and 18th centuries. I am thinking of Hooke, Mariotte, Bernoulli, Euler, Lagrange, Coulomb, and so on. This should not be regarded as derogative to the current state of the profession. In fact, these names comprise an honor roll of sciences. More significant is the fact that these names would sound equally familiar and important in numerous other fields of engineering. The structural engineering profession is, or at least has been, rather provincial—we tend to divide into specialties. But the identical laws of nature, the identical differential equations govern the design and analysis of structures in different branches of the profession. Furthermore, many of these differential equations identically describe phenomena not even remotely related to structural engineering technology.

Structural engineering originated no doubt, as a highly empirical occupation. Out of this grew a rather sceptical view regarding the place of theory in this field.

What I have said emphasizes the essential slowness of development in structures. Some of us who have had occasions to work in other fields, especially in weapons technology, know very well how amazingly short the time interval can be from development to deployment. Since the last decade it has been a fairly well recognized and common occupation to make predictions regarding anticipated weapons developments. This can be done with fair accuracy for several reasons. One of them, of course, is the unfortunate tendency, or some would say necessity, in military technology for whatever is theoretically and potentially possible to be transformed into "hardware." Obviously the work of a structural engineer, which is so aptly known as a branch of civil (i.e. nonmilitary) engineering, is not faced with the rapid technological obsolescence which confronts the weapons system designer. On the contrary, structural engineering is expected to be a conservative branch of the profession, and this implies a slow development.

I do not advocate the immediate practical application of all theoretical developments. The demand or need of society is a more valid motivation for the progress of the engineering profession than the new frontiers of feasibility created by technological advancement. In this context, Bertrand Russell noted that "Archimedes foreshadowed the modern use of mathematics by inventing engines of war for the defense of Syracuse against the Romans." He then adds: "A Roman soldier killed him and the mathematicians retired again into their ivory tower . . ." We could probably think of many morals to add to this story, but I am quoting it to show that the interlude from development to deployment in weapons technology was very short even in antiquity and that its consequences were also somewhat unexpected. In civilian technology, the rate of development and its consequences are more variable and also unpredictable. Only 100 years ago, the Victorian era created some of the wonders of engineering and also some of the spectacular and inexcusable failures.

The structural engineer of this day and age cannot afford the type of failure which was more common 100 years ago, but which is now not infrequent in other branches of engineering. In the mind of the general public and of the profession itself, there is now nothing dramatic or glamorous in the failure of a static structure; but we all recognize, although do not condone, the drama of the failure of missiles, aircrafts and other products of space technology. The attitude of today's structural engineer is both well justified and necessary, reflecting the maturity of the profession. I believe, however, that excessive empiricism and the pursuit towards reasonable safety has led to a degree of conservatism which is not always justified. More important, it has brought about a certain *state of mind* which seems to have gained an existence of its own, independent of its original objective.

If this state of mind results in a rather gradual advancement of our field, then we must also reckon with the characteristic slowness and conservatism of the building industry as another factor which retards innovation.

Need for a New Attitude

Analytical theory applicable to structural engineering and general technology applicable to the building industry is very far advanced. What is now needed is a change in the

*Based on a paper delivered at the American Society of Civil Engineers Annual Meeting and Structural Engineering Conference, October 1964

state of mind of the profession and industry in order that this knowledge may be given practical application. We see this change happening today, and I expect it to manifest itself in numerous ways. In the broadest sense, this implies that the profession and the industry will begin to apply methods which are quite common now in other fields. Perhaps one might predict that the profession will return to a state of mind which it had in earlier centuries, and will regain its earlier dynamic qualities.

That this is already happening to some extent can be seen in an interesting way in the use of a new terminology, which implies that we have begun to recognize the interdisciplinary nature of all engineering endeavors. One could really call this development a revolution (or maybe more modestly an evolution) in terminology and in semantics. What is implied in this development is the acceptance of new concepts as well as an increase in our conscious attention to old concepts. In reading current engineering literature, one runs into words such as: *systems, systems design, optimalization, value engineering, cost effectiveness study, failure-effect analysis, critical path method, and so on.*

Every one of these words defines, to some degree at least, concepts which may have been previously recognized, but they represent now a systematic and conscious approach to these and the recognition of their usefulness and effectiveness. Significantly, the list of words I have just mentioned has originated in fields other than structural engineering. I am also certain that the application of these concepts to the task of the structural engineer and the building industry will have very far reaching effects.

As I have mentioned previously, the profession and the industry also have a great deal of catching up to do in the application of available theory and technology. This does not mean, however, that further developments in theory and technology will wait until we have caught up with them in practice. On the contrary, the recognition of the concepts which I have mentioned is already generating very important analytical and technological innovations. I firmly believe that structural engineering has come to a point or at least is rapidly approaching the point where the feasibility of a structure cannot be denied either by the lack of analytical methods or technology. The reason for this is that we now have available a large backlog of analytical knowledge which is rapidly being developed, and at the same time we have access to advanced technology in related fields.

This situation is brand new and of crucial importance. It probably means that the times are gone forever when we were able to say in good conscience that a structure could not be created because of ignorance. Having lost this constraint, we must increasingly recognize the social responsibility implicit in engineering design. Decisions regarding feasibility, especially negative decisions, will henceforth have to be made in a socio-economic context instead of in a purely technical one.

I think structural engineers are now learning to use many of these new techniques and tools. In our own office we have been undertaking lately the analytical solution of problems which not so long ago would have been considered utterly impossible. We are now handling, routinely, calculations by means of data processing systems which stagger the imagination. We have become "machine oriented." But at the same time computer specialists have become increasingly conscious of the physical significance of the symbolic operation they are accustomed to perform on binary variables: *they* have become "problem oriented." Ultimately we will meet somewhere in the middle of our road at the place we today call the "man-machine interface."

Difficulties of Synthesis

And while our analytical knowledge is advancing, we are also witnessing at the present time the increasing recognition of the other side of the coin, namely that of synthesis or design. The principal task of the engineer is to design; nevertheless, structural design, in this sense and as distinct from analysis, has been an *underdeveloped area of engineering*. Many of the methods of design we are using have evolved not only in the last centuries but in the last few thousand years; and they have lead to traditional forms and shapes and elements which serve as well today, such as the arch, the post and lintel, the beam, the cable. New forms and elements and shapes have evolved with the adaptation or discovery of new materials. The use of steel and reinforced concrete introduced new elements into design. But the development of these forms and their assemblies has traditionally been a trial and error procedure. It is only in the last decade that we have begun to focus our attention on the problem of systematic design. I think here we are entering a new phase of development and are facing unknown challenges and equally unknown, and probably surprising, consequences. I am quite certain that the next concerted effort must be in this direction. We will be evolving systematic methods of synthesis, and we will be searching for techniques which are suitable for this purpose.

At this point it would be appropriate to attempt to predict some of the results which we may expect, or to at least hint at the achievements to come. Also it may be enlightening to point out the major obstacles which have to be overcome.

There are various difficulties if we try to approach structural design in a systematic way. As soon as we begin to think about this task, we recognize first of all that the problem of systematic design, or, if you wish, scientific design, is inherently more difficult than the problem of analysis. Structural design problems, paradoxically, are "not well structured." This lack of "structuredness" (which, incidentally, is also part of our new terminology) implies that the problem is not well defined, the criteria are not well defined and not quantifiable. These obstacles describe an area where at least in the past one could have said "angels fear to tread." Today we find that operations researchers and systems analysts trample all over the place. While the results are by no means proportionate either to the intensity of their activities, or to the claims of their practitioners, there is no doubt that structural engineering is one area where fruitful results are a certainty. Although we may have difficulty initially in quantifying and "structuring" our problems, we must finally recognize that engineering design is an essentially quantitative undertaking.

Let me now speculate on the reasons why synthesis does present

such great conceptual difficulties. These difficulties are especially marked when compared with the great success achieved in analysis, with the help of modern mathematical techniques and electronic data processing equipment.

I can offer at least one possible explanation to this puzzle. The use of numerical techniques which are suitable for electronic computations has shown us the power of matrix operations, or in more simple terms, we have found that we can tackle almost any analytical problem by reducing it to a number of simultaneous linear equations which we then solve by the aid of matrix operations and the computer. But if we take a closer look at our amazing success in this field, and I understand that the number of simultaneous equations which can be solved at the present time has reached five orders of magnitude, then we also must notice that the matrices we deal with are generally "sparse," that is, they have a great many zeros in them, and this, I think, is one of the major reasons for our success. But the fact that the matrices do have this form can be interpreted physically by the statement that the physical quantities we deal with in solving very complex analytical problems are to a great extent uncoupled, that is, their mutual interaction is weak. Although we may deal with a very large number of unknowns or variables, because of the sparseness of interaction, it is possible to deal with the problems essentially piecemeal through very ingenious methods developed for this purpose.

It appears, however, that if we attempt to systematize our design problems at least formally or symbolically in a matrix fashion, we find that more often than not the design variables are of a very large number and very often closely coupled and, therefore, mutually interacting. To make matters worse, the relations are often non-linear. What we then need is a technique which will permit us to deal with these problems, but at the present time, I would conjecture that this will be much more difficult to achieve than our most ambitious analytical undertakings.

Changing Role of the Engineer

The foregoing examples indicate that structural engineering is becoming a more complicated and difficult discipline. This is not intrinsically true but is true in a practical sense, in that the skills and knowledge required to practice this profession are increasing in complexity. I believe that this view will be supported by anyone who actually does engineering these days. The use of the computer has not made the work of the structural engineer easier, but has rather eliminated a legitimate excuse for not solving certain problems. There is no doubt that the minimum knowledge which is required of a structural engineer before he can be considered competent has been increasing and will continue to increase.

I find myself unable, or perhaps unwilling, to predict where this will lead, or what will happen. I think it was Clemenceau who said that warfare is too important to be left to the generals. I wonder if one of these days, unless we are very careful, somebody will not make a similar remark regarding the role of the structural engineer in the design of structures.

It is obvious that engineering education must play a very important role. The curriculum changes in the last years in civil engineering point to the recognition of this fact. The education of a new generation of engineers with this broader and deeper scientific knowledge, has, however, lead to a few interesting and somewhat unexpected side effects. As a result of a more thorough theoretical background, the distinction between some of the more specialized fields begins to disappear and a man trained as a structural engineer can readily find a place in fields other than the construction industry. And I may add that these other fields, such as space technology, transportation, etc., also seem to offer higher financial and other rewards. This, of course, represents a dilemma. But I am not sure whether it is useful to worry about it, because it seems to be inherent in our new merging technology. Having talked about the direction in which present trends seem to be leading us, I would now like to discuss certain goals which I think it would be worthwhile consciously to pursue.

I believe that the most urgent and immediate one is to catch up with ourselves both in the application of theoretical knowledge and in the application of available technology. As I have mentioned before, currently we use only a very small fraction of what is available in both of these fields. The solution to this problem, however, lies outside the traditional province of the structural engineer or that of the builder. It is a problem in communications, and in information retrieval. It is also a problem in education.

No doubt, society itself will pose new and challenging demands in terms of increased dimensions, increased spans, and unusual applications of structures. I am also convinced that a much closer attention to the development of new structural systems and to the problems of environmental control in general will lead to economies which will have very far reaching effects. In fact, I believe that in some areas the time is not far off when reduction of cost by orders of magnitude may become possible. If this should come to pass, the implications are staggering.

I believe that we have the scientific and technical means, for instance, to bring about a reduction by one order of magnitude in the cost of housing. To achieve this, we would not only have to apply the most advanced knowledge and technology but we would also have to redefine in an objective manner, free from traditional preconceptions, the requirements of environmental control which basically define the function of housing and living units. I believe that it is potentially possible to produce family living units, the cost of which would be closer to, or even less than, the cost of what we spend today on a single automobile.

I think that when this and similar developments have come to pass, we will also see the disappearance of the profession which today we call, in general, engineering. The work will be performed by some sort of a new profession, with people trained in a discipline which will concentrate on the formulation of problems, the structuring of problems, and the solution of problems. Engineering will become the equivalent of scientific decision making in the general technological field. The bulk of our present skills will become obsolete and a significant part of our knowledge and experience, trivial. The prospect is exciting. Somehow I am not worried that men of imagination and intellect will be replaced by scientific techniques or computers.

TESTS CHECK ROOFING SYSTEM FOR HUGE PLANT

By Frank Couch
Smith, Hinchman and Grylls Associates
Detroit, Michigan

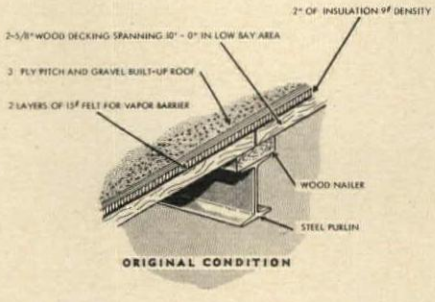
When the mammoth roof of a World War II vintage aircraft plant had deteriorated so badly that all of it had to be replaced, the reasons for failure were first thoroughly examined, and then a replacement system was carefully evaluated. This study included a test program to establish the fact that the built-up roofing system under consideration could withstand the stresses due to thermal expansion and contraction, especially since the expansion joints were originally spaced much farther apart than is now considered advisable.

The facility was built in 1942-1943 as the manufacturing and assembly building for military aircraft, and is still used for this purpose. The building is the largest aircraft factory under one roof in the world having a total area of 2,065,905 sq ft or approximately 47.5 acres. It is approximately 2,000 feet long, 1,024 feet wide, and has a clear height of 45 ft below the bottom chord of the roof trusses. War-time restrictions placed on certain strategic materials, especially steel, together with an urgent need for the facility, dictated the use of wooden roof decking which unfortunately was green and untreated.

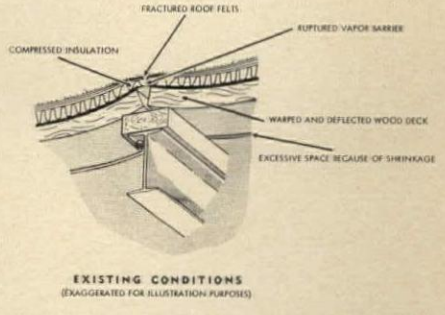
In 1951 the plant was reactivated, after five years' use for Government warehousing, by Lockheed Aircraft Corporation who assumed responsibility for the operation and maintenance of the structure. From this date progressive deterioration of the roof became evident. The gradual embrittlement and cracking of the roofing felts due to the loss of volatiles in the coal tar pitch was to be expected from extended sun and weather exposure.

However, of greater significance was the fact that, increasingly, the structural roof deck had suffered from water penetration and saturation of the insulation over relatively large areas of the roof which had produced extensive infestation of the plank decking with consequent rotting and weakening of the roof structure.

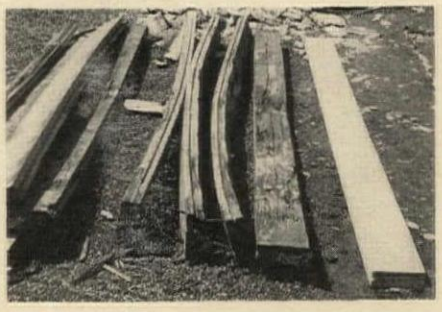
White areas are the cap sheet of the new roofing system for Lockheed-Georgia plant. Aluminum shelters protected the work and the factory interior during replacement



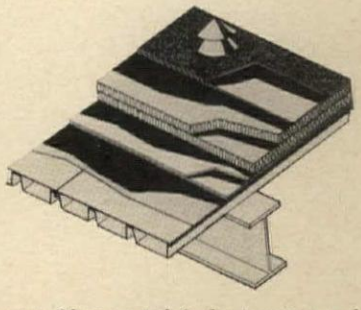
Original deck was wood with built-up roof over glass fiber insulation



The deck warped, shrank and deflected, causing fracturing of roofing



Examples of the decayed decking taken from the roof, compared with new wood



New roof has metal deck structure, glass fiber insulation and glass felts

On separate occasions, beginning in 1954, Lockheed engaged the services of engineering firms to investigate the condition of the roof structure and to provide recommendations and cost estimates for its restoration to a safe and watertight condition. These consultants universally agreed that the roofing felts and insulation would soon require replacement. They further recommended that substantial portions of the present wood deck would require replacement because of excessive warping and shrinkage and a loss of structural strength of the wood decking from rot and decay. In 1956 several proposals were considered; first for repair, then for replacement of the roof. While recognizing the existence of deficiencies in the present roof, the Air Materiel Command concluded that by continuing normal maintenance procedure, the useful life of the present roof could be extended for several additional years.

For the next three years Lockheed followed a program of continued inspection and maintenance which materially prolonged the serviceability of the roof. During this period, however, signs of advancing deterioration such as the splitting and rotting of the organic felt, gave increasing evidence of decay from fungal activity on the underside of the deck.

The progress of gradual deterioration of the roof changed abruptly in the winter of 1960-1961 following prolonged periods of sub-freezing temperatures. A marked increase in serious leaks gave clear evidence of progressive failures of the roofing membrane in general and that a complete rehabilitation of the roof could no longer be delayed.

The roofing membrane as originally applied consisted of three plies of standard 15-lb roofing felts, hot mopped with coal tar pitch and protective surfaced with natural gravel. The most serious defect noted was the splitting of the roofing felts over the top of the purlins. This was primarily due to deflection of the deck between purlins resulting in a general loss of bitumen and gravel surfacing causing a general embrittlement and rotting of the bare organic felts from weathering. The 9-lb density fibrous glass insulation was found to be soft and spongy.

The vapor barrier consistent with accepted practice of the time of construction consisted of one ply of red rosin paper nailed to the roof deck and covered with two plies of 15 lb tar-saturated felt, hot mopped with coal tar pitch. Because of the relatively poor condition of the primary roofing membrane, the vapor barrier in many instances was serving as a secondary roof. This condition had resulted in an entrapment of a large amount of water in the insulation as previously mentioned. To make matters worse the vapor barrier was not on warm side of the construction, but actually in the center between the wood deck and the insulation, contradictory to good construction practice.

Extreme sun temperatures softened the bituminous coatings, causing them to leave the purlin ridges and migrate to the deflected areas, leaving the organic felts devoid of their normal protection and which contributed to subsequent failure.

The Replacement Roof

Long-span cellular metal deck was selected as the replacement roof deck because it had a smooth surface for application of the insulation and roofing membrane; provided ample support for mechanical services; was lightweight, non-combustible, economical, readily available, and fire-resistive.

The inclusion of a vapor barrier to prevent water vapor penetration into the insulation was particularly necessary for the Lockheed plant because of high relative humidity of outside air frequently used directly for cooling.

Polyvinyl chloride sheet was chosen for this purpose. While usually .004 gauge material is normally employed, .008 gauge was selected to resist traffic and mechanical abrasion during the initial installation. Cold adhesives recommended and approved by the manufacturer and in the quantities approved by Factory Mutual were employed for adhering the vapor barrier to the metal deck, and in turn the first course of insulation to the vapor barrier.

Two basic types of built-up roofing were considered: (1) four-ply conventional coal tar pitch and gravel surfacing, over either glass fiberboard, perlite board or cellular glass insulation; (2) four-ply asphalt using glass felts and mineral surfaced cap roofing, over glass fiberboard insulation.

We concluded that both of these two basic types of roofing could produce a trouble-free installation. As our research and investigation continued, we progressively felt that there existed a marginal advantage were we to employ the asphalt and glass felt system. This roof became the base bid with alternates for four-ply coal-tar pitch and gravel roof.

In the construction of the original roof, water cut-offs had been employed at 30 ft on center in both directions. Lockheed felt that the water cut-offs had successfully limited the degree of wetting of the insulation when roof leaks developed and they requested them in the new roof.

A 15 mil polyisobutylene film reinforced with woven glass fabric was selected for the water cut-off to provide a strong flexible material which would work equally well with both hot bitumen and cold vapor barrier adhesives.

The expansion joints on the Lockheed roof were located at 360 by 400 ft, far in excess of what might normally be considered good practice. Therefore we thought it necessary to establish the forces generated in the built-up roofing membrane due to thermal contraction, and further to ascertain whether the membrane could resist such forces effectively without any indication of failure.

Test Program

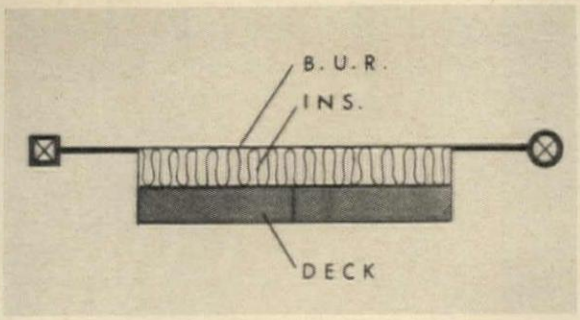
A test program was undertaken to provide data on the performance of the entire roofing system's component parts including the metal deck, vapor barrier, insulation, waterproofing membrane and flashing details when subjected to thermal shock and to thermal shock combined with movement in the supporting deck.

Thermal Shock Tests

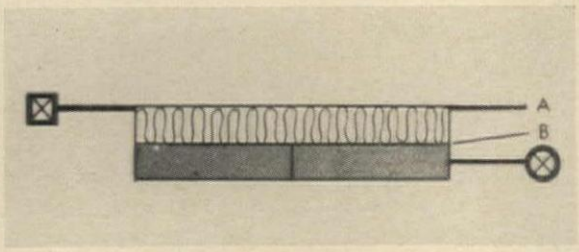
In general, each test panel was subjected for a period of one hour to the heating effects of infra-red heat lamps raising the temperature of the roof to 118 F. The heat lamps were turned off and 3 in. of dry ice were applied over the roof surface, and allowed to remain in place for one hour, resulting in a roof temperature of approximately −100 F.

The roof system was tested in four separate methods:

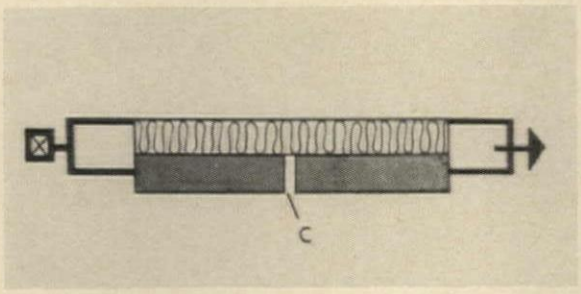
The first test applied thermal shock through a quick temperature change to represent a change in roof surface



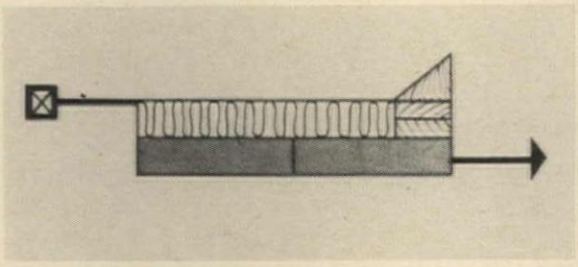
Test 1: To observe ability of roofing membrane to withstand thermal shock and to measure contraction force in membrane during rapid temperature drop



Test 2: To observe ability of roof insulation and adhesive to withstand potential shear forces resulting from contraction in membrane



Test 3: To observe ability of roofing membrane to resist potential stresses transmitted to it by movement in structural deck



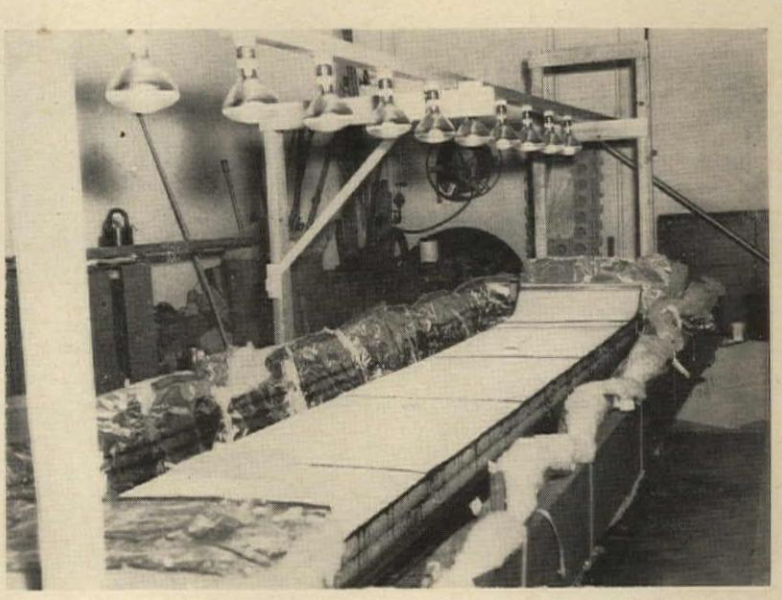
Test 4: To observe ability of flashing detail to resist contraction stress as recorded in test No. 1

⊗ Indicates component clamped in position

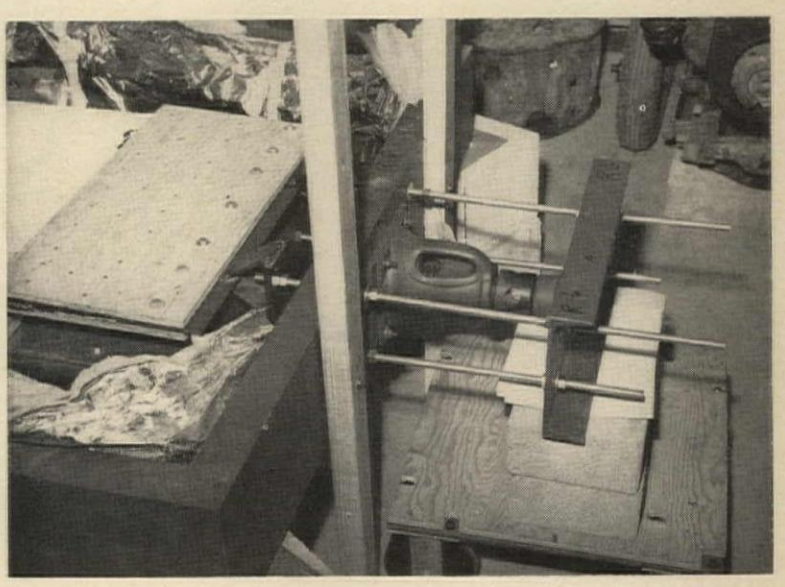
⊠ Component clamped, with transducer to record tensile loads

→ Pull exerted through jack

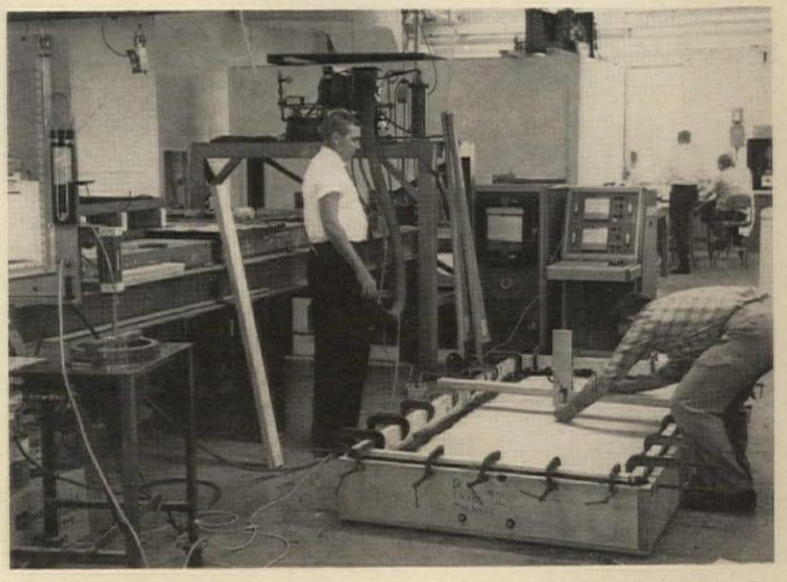
A & B Points of measurement



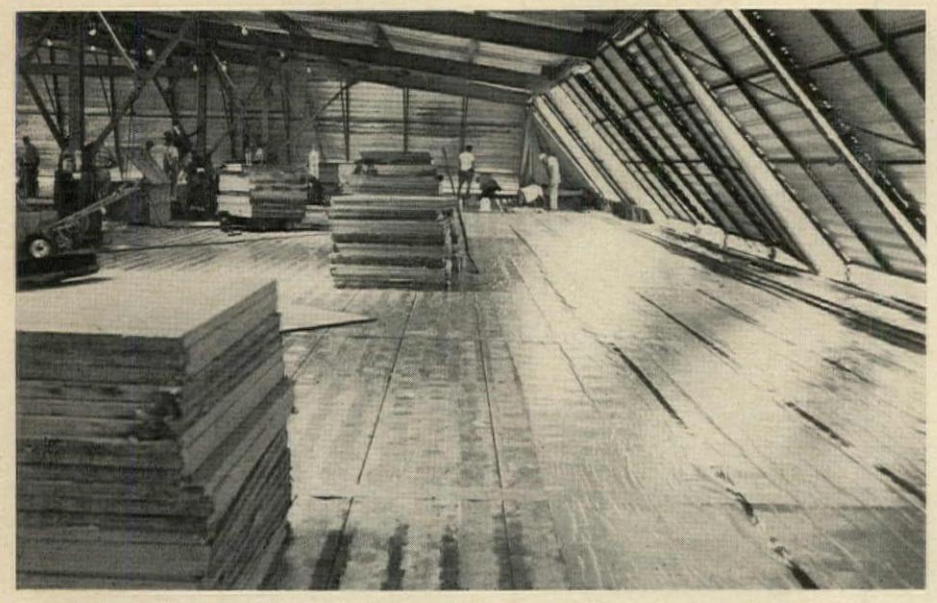
In this test 10 infrared lamps raised the temperature to 118 F, and then dry ice was dumped on top to drop it to −100 F



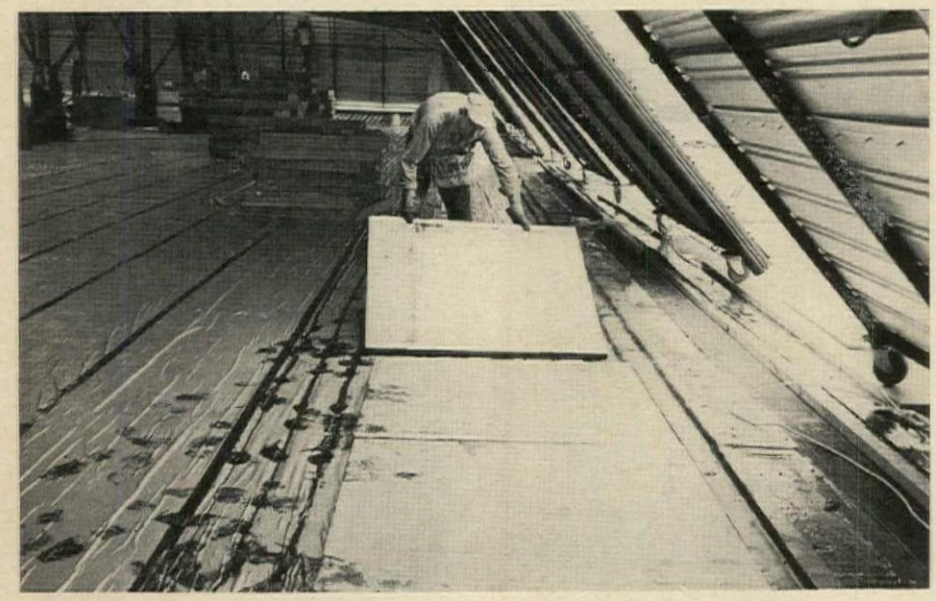
A hydraulic jack applied tension to various components of the roof system to simulate the effect of movement of the structure



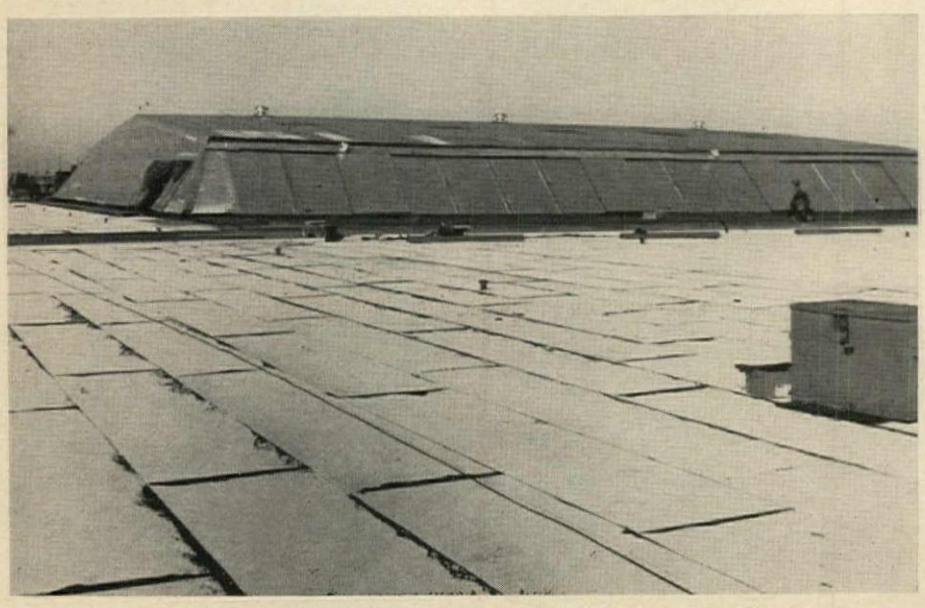
Wind pressure was applied to various test samples according to the Factory Mutual procedure to simulate the effect of uplift



Vapor barrier applied to the deck was .008 gauge polyvinyl chloride sheet



With vapor barrier down, glass fiber insulation was adhered to the deck



Final covering of the new roof system was a white mineral-surfaced cap sheet. General contractor: R & D—Lipsett Joint Venture; roofing sub-contractor: L. F. Still Roofing

temperature which might occur when an ice storm follows a clear sunny sky. The criteria were that no break should occur in the roof membrane nor the contraction force exceed 75 lb per in. of test width. The roof membrane was fixed at both ends during the 220 F temperature drop to −100 F. The maximum force recorded was less than 60 lb per in. of width. No splits or breaks occurred.

The second test was run to determine the ability of roof insulation, vapor barrier and adhesive to resist roof membrane thermal shock contraction stresses without movement and to record the amount of contraction in the membrane. Failure to meet the $\frac{1}{16}$-in. maximum contraction and a recovery to $\frac{1}{64}$-in. criteria was not cause for rejection but required a test of the flashing detail discussed in Test 4. The results of this test were a .27-in. contraction of the membrane at −100 F with a recovery to .11 in.

Test 3 introduced deck movement in conjunction with thermal shock on the membrane. Acceptable performance required that no break should occur with a deck movement of ¼ in. at the −100 F temperature.

Due to the movement observed in Test 2, Test 4 was run with the criterion that the flashing should withstand the contraction stress of Test 1 without movement or breaking.

In addition to tests on thermal contraction and deck movement, resistance to wind uplift had to be determined.

The wind-uplift tests were conducted in 15 psf load increments. At the conclusion of the first test, the panel which was loaded to 90 psf was disassembled and examined. Examination disclosed apparent failure due to separation of the insulation from the vapor barrier. No ruptures or breaks were observed in the vapor barrier or in the roofing.

At the conclusion of the second test the panel which was loaded to 75 psf was disassembled and examined. The apparent cause of failure was delamination in the second layer of insulation. Both panels were considered to have met the criteria of Factory Mutual: ". . . no separation of any bond between the metal roof deck, vapor barrier or insulation board, up to, and including 60 psf. There shall also be no delamination of the insulation board itself."

COMPUTER HELPS DESIGN MECHANICAL SYSTEMS

New program determines heating and cooling loads, predicts system performance

A new tool may save many hours of calculation in the design of heating and air-conditioning systems. The great volumes of data, calculations and charts required to evaluate all the variables and to make an optimum selection of one of the various mechanical systems available for a given building have been translated into a new computer program by the Westinghouse Electric Corporation Construction Group. Plans are to make the program available to engineers and architects on a selective basis.

In the first phase, the physical characteristics of a building, such as lighting, occupancy, orientation and glass, together with the data for a typical design day, winter or summer are fed into the computer which comes up with the heating or cooling requirements for a building. The computer program has a capability of analyzing 250 zones and will print out the total load, the sensible heat factor of this load and the time at which the load occurs in each zone. With the design data from the first phase, a mechanical system can be selected for the building. Then using weather bureau data, the performance of the mechanical system can be determined in relation to outside weather conditions.

Some of the input data necessary for the design program are: (1) the solar azimuth and altitude for each hour of the months being studied; (2) solar radiation and diffuse radiation for the building location; (3) orientation of the building zones and any projections, reveals, or shade contributing factors of the building itself or of adjacent buildings; (4) wall thickness, mass, specific heat, conductivity, absorptivity, time lag; (5) hour-by-hour outside temperature and humidity; (6) internal heat loads and their time of occurrence; (7) electrical loads; (8) ventilation and infiltration loads; (9) complete data on the many basic types of glass, including transmissitivity, reflectivity, conductivity, orientation, shading and outside air films; (10) the physical dimensions and identification of each building zone.

The computer will print-out loads and analyze the hour and month of maximum coincident load on each zone. It will determine the hour and month that the maximum coincident load occurs on the building and the contributions to this load by walls, glass, people, etc. The computer will also print-out the quantity of air for heating or cooling by programing a temperature for the supply air. Ra-

ROOM	HOUR	WALL	WIN(SOL)	WIN(CON)	ELEC(RM)	PEOP(S)	INFIL(S)	PEOP(L)	INFIL(L)	TOTAL
39	1900	13745.	0.	0.	4266.	0.	0.	0.	0.	18012.
40	1900	7914.	0.	0.	3550.	0.	0.	0.	0.	11464.
41	1900	15620.	0.	0.	4266.	0.	0.	0.	0.	19886.
42	1900	8060.	0.	0.	3311.	0.	0.	0.	0.	11370.

HOUR	WALL INFIL(S)	WIN(SOL) VENT(S)	WIN(CON) PEOP(L)	ELEC(RM) INFIL(L)	ELEC(BLD) VENT(L)	PEOP(S) TOTAL
100	-875000.	0.	-112201.	2287979.	783246.	441400.
	-0.	-157464.	551750.	0.	0.	2919709.
200	-936065.	0.	-191187.	2287979.	783246.	441400.
	-0.	-262440.	551750.	0.	0.	2674683.
300	-1046546.	0.	-191187.	2287979.	783246.	441400.
	-0.	-262440.	551750.	0.	0.	2564202.

1	6996.	2	1261.	3	1892.	4	7049.	5	10727.	6	7085.	7	4941.
8	4941.	9	8836.	10	6365.	11	0.	12	0.	13	0.	14	0.
15	0.	16	0.	17	0.	18	10534.	19	4223.	20	6334.	21	10564.
22	15072.	23	9795.	24	7462.	25	7462.	26	12140.	27	9002.	28	2266.
29	3229.	30	3229.	31	1667.	32	5626.	33	2292.	34	5521.	35	29534.

Top: Cooling loads at peak hours. *Center:* Total cooling loads during July. *Bottom:* Solar loads for each zone

tios of sensible heat to the total are also determined for the cooling cycle.

The entire computer program was developed using formulas and data described in ASHRAE papers, tests conducted over the years, and data published in the ASHRAE Guide.

Once the computer has clearly defined the nature of loads on a building, the task of arranging a mechanical system to offset these dynamic loads is exacting. Which mechanical product in which mechanical system solves the building requirements best? Which system has the lowest first cost? The lowest operating cost? The performance characteristics that best satisfy clients' needs? The practice of recording historical operating costs and system performances on other buildings and concluding that a proposed building will behave the same way may cause many financial problems.

Predicting the performance of mechanical system in a proposed building by existing manual techniques is necessarily based on a limited number of calculations operating on selected steady-state conditions. The computer can evaluate the dynamic performance of the mechanical system when actual load creating conditions are simulated over a year.

To do this, considerable extensions of standard data were programed into the computer. For example, hour-by-hour weather data must be obtained for the location of the building being studied. The values of temperature, relative humidity, absolute humidity, cloud cover, wind velocity, barometric pressure and cloud layers are needed. One of the major efforts was to make a correlation of solar radiation with a given condition of clouds, temperature, humidity and visibility.

The second important data category is the complete description of the operating characteristics of the building including heat transfer lag, the hours of occupance, both day and night, weekends, holidays, and night set-back temperatures if desired.

The third important data category is that of the specific mechanical system being studied.

It is necessary for the engineer to select components of the mechanical system and its control sequence for fans, pumps, cooling towers, compressors and boilers. The equipment performance curves at various conditions of capacity and temperatures must be translated into the program. The electrical contribution to building load and useful work is determined and programed. In essence, the complete mechanical system is described so that when the weather and building usage create a specific load and this load is handled by the mechanical system, a measure of the load and system capacity will be stored in the memory of the computer. The effect of diversity of loads is programed.

Since the computer has determined the heating or cooling load at every hour of the year, the rate at which the mechanical system handled the load, the per cent of total capacity being used, and the amount of energy required, operating costs can be determined and the new integrated system can be evaluated.

ROOM NO.	SENSIBLE LOAD (BTUH)	TOTAL LOAD (BTUH)	S/T RATIO	TIME OF DAY	SUPPLY CFM AT 56 DEG. F
1	23604.	25104.	0.94	1600 JUNE	1017.
2	11157.	12657.	0.88	1700 JUNE	481.
3	16570.	18570.	0.89	1700 JUNE	714.
4	19290.	20790.	0.93	800 AUG.	831.
5	28153.	29903.	0.94	800 AUG.	1212.

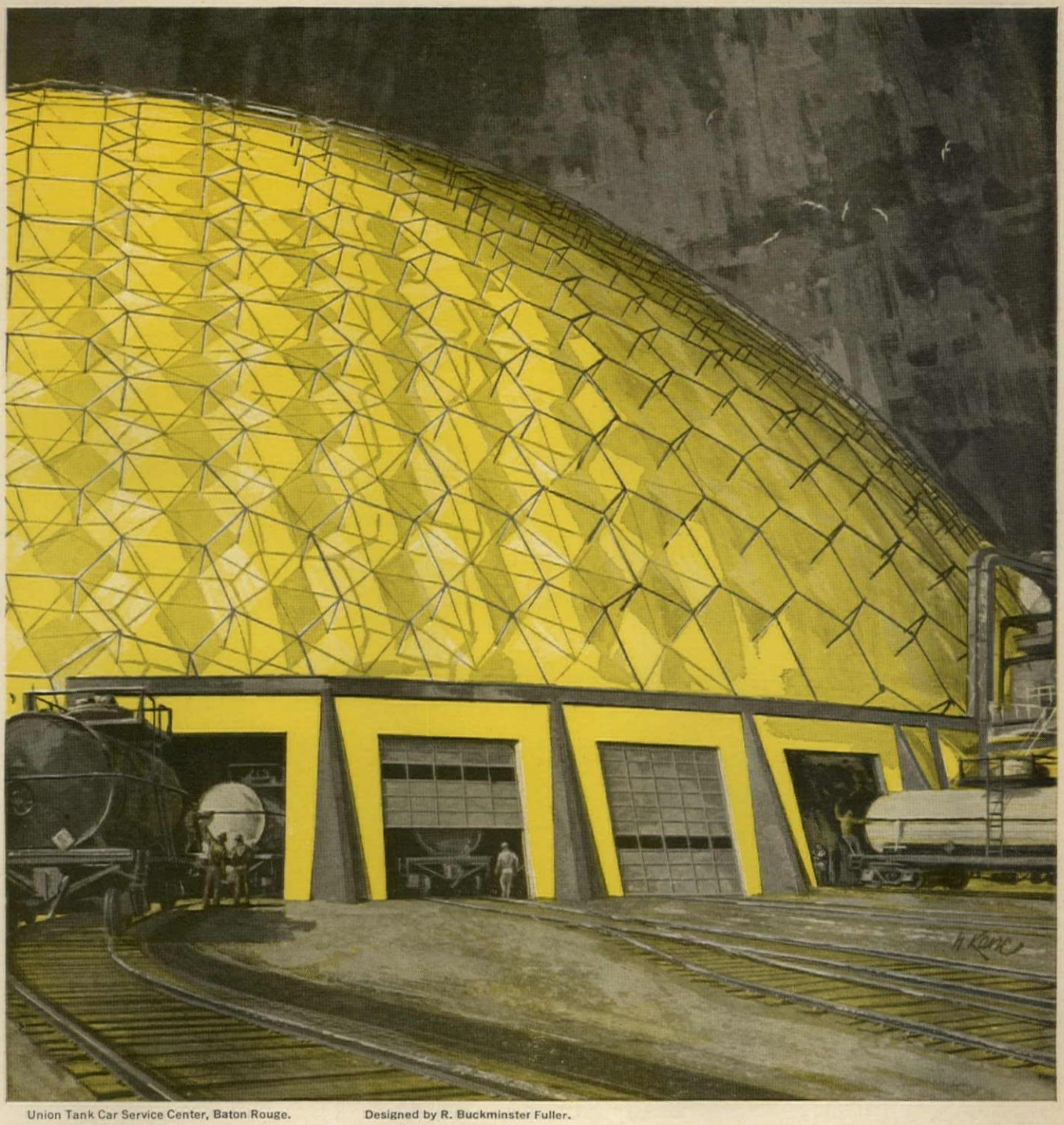
ROOM NO.	SENSIBLE LOAD (BTUH)	TOTAL LOAD (BTUH)	S/T RATIO	TIME OF DAY	REQ'D CFM AT 56 DEG. F
69	37381.	40881.	0.91	1900 JUNE	1610.

TOTAL BUILDING

MAX. HOUR 1700 JUNE TOTAL REFRIGERATION 417. TONS 0.89S/T

ROOM NO.	HEATING LOAD BTUH	REQ'D CFM AT 95 DEG. F
1	25369.	940.
2	20276.	751.
3	30415.	1126.
4	25369.	940.

Top: Peak cooling loads and required air volumes. *Center:* Peak refrigeration load. *Bottom:* Heating load analysis by zones



Union Tank Car Service Center, Baton Rouge. Designed by R. Buckminster Fuller.

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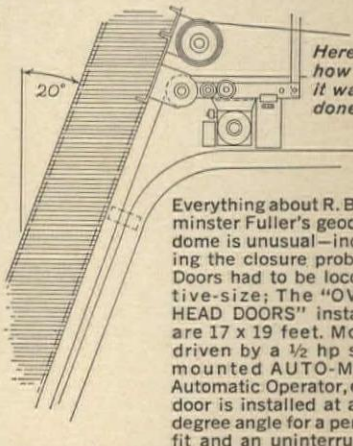

Here's how it was done . . .

Everything about R. Buckminster Fuller's geodesic dome is unusual—including the closure problem. Doors had to be locomotive-size; The "OVERHEAD DOORS" installed are 17 x 19 feet. Motor-driven by a ½ hp side-mounted AUTO-MATE Automatic Operator, each door is installed at a 20-degree angle for a perfect fit and an uninterrupted outside appearance.

For more data, circle 89 on Inquiry Card

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uneven, dirty, noisy, in the way,
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not very pretty.**

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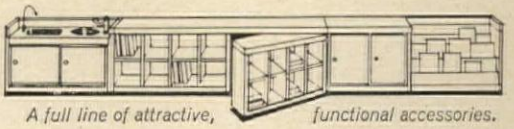
The name is Valedictorian. It's from Modine. If you'd like to know more, write for unit ventilator bulletin 1264.



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EGGERS PLYWOOD COMPANY, TWO RIVERS, WISCONSIN, SINCE 1884

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FLUID APPLIED ROOFING FOR HOUSTON STADIUM

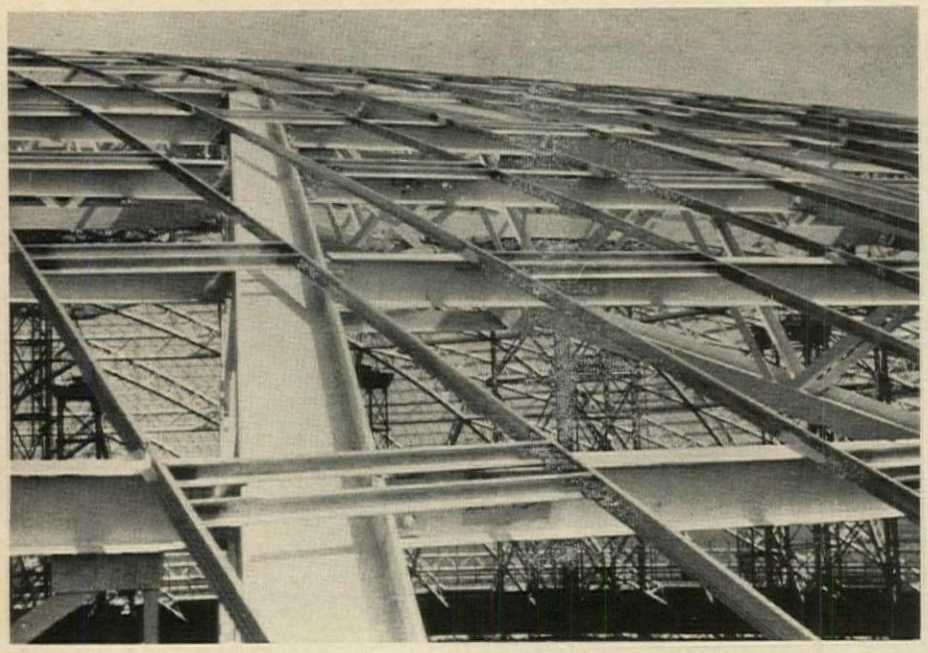
The 642-ft clear span dome, which will enclose the air-conditioned volume of Houston's nearly completed stadium, shuts out the weather via a roof of plastic skylights and elastomeric roofing.

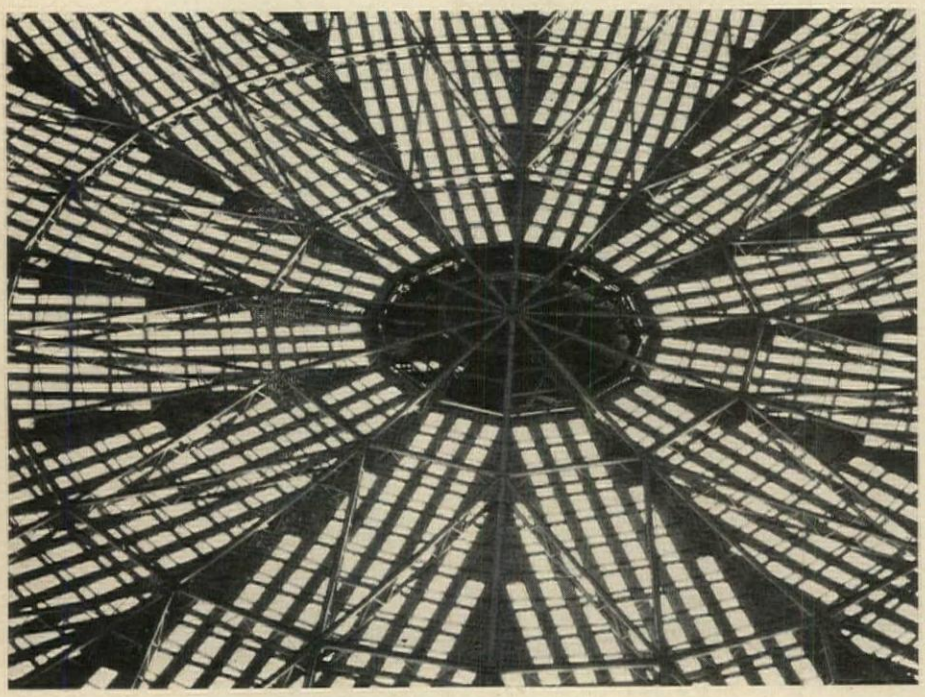
Designed to give maximum light for the 66,000 capacity building, the roof of the Harris County Domed Stadium consists of a total of 4,600 cast acrylic skylights, interspersed with sound-absorbent wood-fiber panels, covered with fluid applied neoprene/Hypalon coating.

The structure is a steel lamella framework in which large trussed beams, braced in a diamond pattern, arc upwards to the apex. Cast acrylic sheet was chosen to form a transparent plastic skin, which would admit sunlight and allow the cultivation of natural grass in the arena. This type of plastic was also chosen for its strong weather resistant qualities.

In order to reduce the sound level, it was decided that half the roof area should be made of sound absorbent material. Cement bound excelsior wood panels were chosen, and these were used to cover the complete lower third of the dome, and were fitted in between the plastic skylights in the upper two-thirds. A fluid applied neoprene/Hypalon roofing system was selected to cover the wood panels, to accommodate the movement of the

Top: Neoprene applied with pressure-fed rollers over glass roving. *Above*: Elastomeric tape seals joints. *Below*: Coating panels between skylights





roof and provide a permanent seal. The system also ensures that the membrane is completely bonded to the decking and will not lift in high winds, which are frequent in the Houston area.

The wood fiber material was pre-sealed at the factory, and re-sealed on the job as a double check against imperfection. A Portland cement base sealer was used and spread at a thickness of $\frac{1}{10}$ in. The wood fiber board is 3 in. thick, and is cut in panels 38 in. wide by 8 ft long. The panels were covered with successive coats of neoprene up to a thickness of 20 mils. A layer of continuous roving spun glass was placed between the first and second coats of neoprene, in order to give multi-directional reinforcement to the membrane. For the final coat, white Hypalon was applied.

Construction of a dome of this size presented a number of problems. It was important for the deck to be equally distributed as it was applied, to avoid unbalanced load on the structure. Flat cars with rubber wheels were used to transport the panels on the roof top. These cars were pulled by a winch and cable, and the wheels fitted in the grooves of the steel framework. The fluid roofing system was applied during the summer when the roof was at maximum expansion, in order to prevent undue stress on the elastomeric material and to eliminate any possibility of cracking through expansion. Great care had to be exercised in applying the coating to the panels between the skylights, to avoid splattering the plastic sheet. The wood fiber panels were fitted into steel bulb-T's, and the areas of cracks between panels grouted with 800 psi concrete. The grouted strips were then covered with an elastomeric tape, which had to be blocked off to protect against solvents in the coating.

In order to keep down visual glare and provide additional insulation value, the skylights are composed of double layers of acrylic sheet, the inner layer having a light-diffusing prismatic surface.

The Houston architectural firms of Lloyd and Morgan, and Wilson, Morris, Crain and Anderson have associated to design the stadium.

Coordination of the roof installation, which involved Texas Roof Decks, Jones-Blair Co. (coating) and Roof Coatings, Inc. (applicator), was handled by the Dunne Company.

For more information circle selected item numbers on Reader Service Inquiry Card, pages 253-254

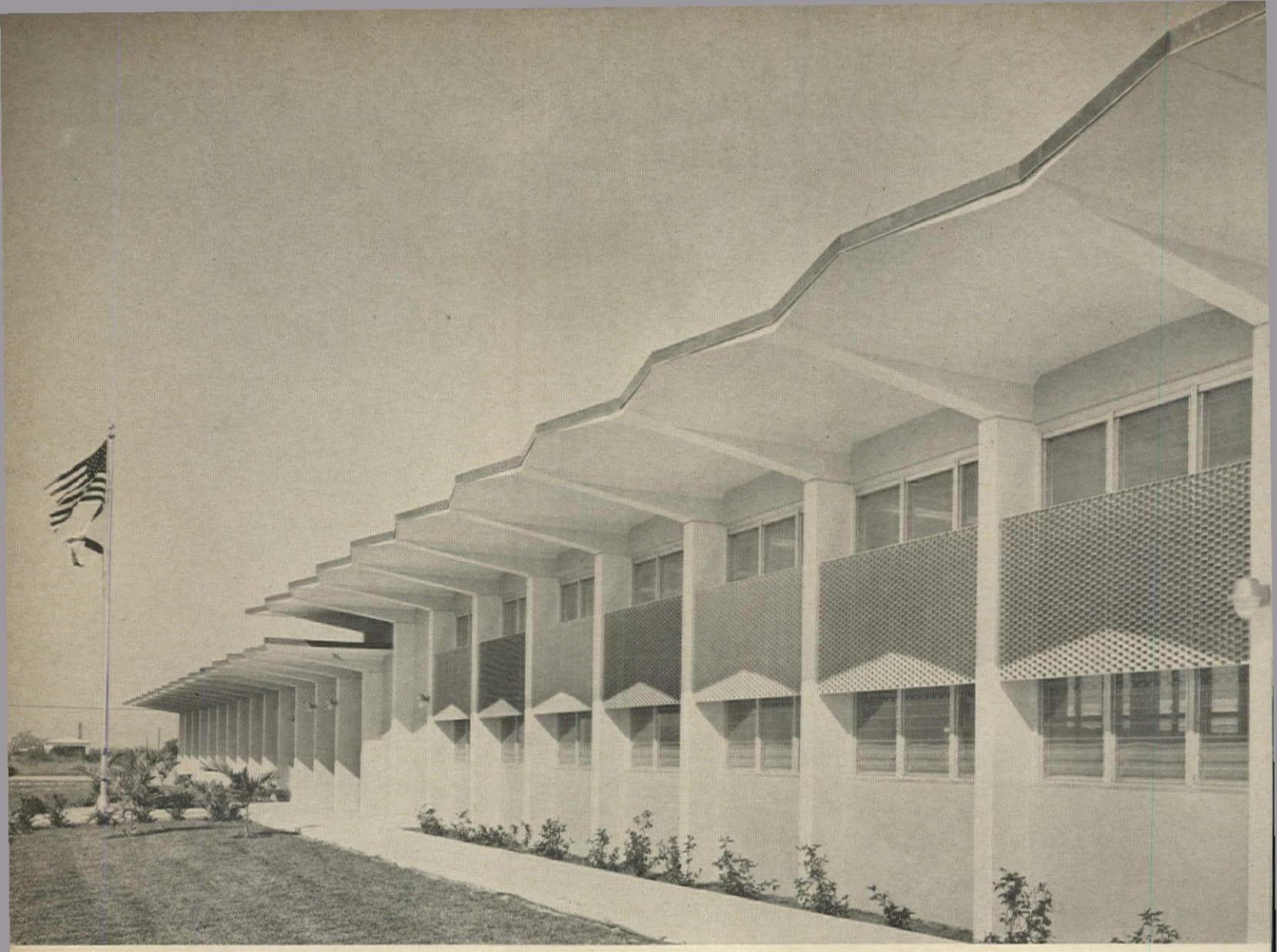
ACTION OFFICE—NEW CONCEPT IN OFFICE FURNITURE

"A working climate designed to support and stimulate the capacities of its occupants to maximum performance" is how Herman Miller describes its new system of co-ordinated office furniture and equipment. The new system is the culmination of three years intensive research into the fundamental requirements and behavior patterns of typical office workers. As a result of these researches, Herman Miller reached the conclusion that the physical limitations imposed by standard office equipment frequently have an adverse effect on the performance of workers at various levels in an organization. Moreover, considerations of status and established precedent often outweigh more important factors such as comfort, freedom of movement and ease of communication.

The Action Office system consists of a number of components, designed by George Nelson and Ronald Beckman to encourage each individual to work in the way best suited to himself. The units can be used and combined in a variety of ways to accommodate the many different facets of office life. Standing and sitting desks, acoustically treated telephone stands, small round tables for informal conferences, perching seats, shelves and storage units are all part of the system. Desks have built in storage bins for the convenient filing of relevant material; roll tops are provided to discourage vertical storage and to allow confidential papers to be left spread out overnight, ready for an immediate start in the morning. A basic 32-48-96-in. module was employed. Components anticipate specific and future machine requirements by carrying wiring conduits to the floor. *Herman Miller Inc., Zeeland, Mich.*

CIRCLE 300 ON INQUIRY CARD

more products on page 194



Architect: James E. Ferguson & Assoc., Coral Gables, Fla.

BORDEN DECOR PANELS: DECA-GRID

The aluminum sun screens on the school building above are Deca-Grid style Borden Decor Panel. The lightweight panels were furnished with tilted spacers to provide the proper degree of shading.

The tilting of the Deca-Grid spacers is known as the slant-tab variation, in which the slant-tabs (spacers) may be mounted at angles of 30°, 45°, 60° or 90°. The slant-tabs may be specified in various lengths as well, depending on the chosen angle of mounting. With the Deca-Grid style, specifications for spacings and spacer bar positions may be varied almost indefinitely.

All the Borden Decor Panel styles, including Deca-Grid, Deca-Gril, Deca-Ring and Decor-Plank, are highly versatile in design specification and in application such as facades, dividers, grilles, fencing, refacing of existing buildings, etc. Fabricated in standard or custom designs in sturdy, lightweight aluminum, Borden Decor Panels provide a handsome, flexible, maintenance-free building component.

Write for latest full-color catalog on Borden Decor Panels

BORDEN METAL PRODUCTS CO.

MAIN OFFICE: 822 GREEN LANE, ELIZABETH, NEW JERSEY • *ELizabeth 2-6410*

PLANTS AT: LEEDS, ALABAMA; UNION, NEW JERSEY; CONROE, TEXAS

When in New York City, see our exhibit at Architects Samples, 101 Park Avenue

For more data, circle 92 on Inquiry Card

Office Literature

For more information circle selected item numbers on Reader Service Inquiry Card, pages 253–254

ACRYLIC PLASTIC PANELS

An architectural design data folder contains nine bulletins which detail the use of Plexiglas acrylic plastic panels in building applications. Each of the one-page bulletins illustrates a sample project, and gives construction drawings showing the method of installation.

Some of the *Plexiglas* applications covered in the bulletin are: formed fascia panels, curtain wall panels, sunscreens and dome skylights. *Rohm & Haas Company, Plastics Dept., Philadelphia, Pa., 19105**

CIRCLE 400 ON INQUIRY CARD

MAGAZINE ON SILICONE TECHNOLOGY

The fall issue of "Silicology," Union Carbide's quarterly magazine on silicones and silicone technology, features a number of recent product developments including four new anti-foams, a new silicone rubber, and a new 60,000 cs. silicone emulsion for difficult release operations.

The use of silicone surfactants to improve the quality and insulating properties of rigid urethane foam is discussed in an illustrated article on the new CBS building in New York —the first high-rise structure in the city to employ poured-in-place foam as insulation. *Union Carbide Corp., Silicones Division, Dept. 0433, 500 Central Ave., Newark, N.J.*

CIRCLE 401 ON INQUIRY CARD

TECHNICAL BULLETIN ON FASTENINGS

"Fastenings for Lumber" is the seventh in a series of technical bulletins published by the Southern Pine Association. Illustrated in color, the bulletin provides detailed information on a variety of mechanical fastenings and includes descriptions and illustrations to enable the designer to specify the type of fastening best suited to his use. Tables shown in the bulletin are based on the "National Design Specification for Stress-Grade Lumber and its Fastenings." *Southern Pine Association, P.O. Box 52468, New Orleans, La., 70150*

CIRCLE 402 ON INQUIRY CARD

RIGIDIZED METAL FACING

A four-page catalog gives details of *Rigid-tex* metal facing, which is available in ferrous and non-ferrous metals in a number of different fiinishes. In addition to displaying the latest textures and architectural applications, the catalog has a section on the proper method of specifying and applying *Rigid-tex* to curtainwall construction. *Rigidized Metals Corp. 685 Ohio St., Buffalo, N.Y., 14203**

CIRCLE 403 ON INQUIRY CARD

CEILING SYSTEMS

A new 56-page color catalog, AD-S-65, describing the complete line of Armstrong ceiling systems, includes the new *A-50* and *B-48* luminaire systems. Entitled "Armstrong Ceiling Systems—1965," the catalog provides complete information on more than 50 different types of commercial ceiling, and includes sample specifications, performance tables and engineering data. *Armstrong Cork Company, Department P.I., Lancaster, Pa.**

CIRCLE 404 ON INQUIRY CARD

PERFORATED METAL

Twenty-four designs of *Cross* decorative and commercial perforated steel are described and pictured in a new four-page brochure. Included are actual size illustrations for all perforations listed and data on available thicknesses and per cent of open area in each pattern. Over 100 suggested applications including room dividers, furniture, display units, home appliances and guards for machinery are listed. *Department RDT, National Standard Company, Niles, Mich.*

CIRCLE 405 ON INQUIRY CARD

CABLE INSTALLATION

A completely revised and up-dated catalog has been published covering the company's line of above ground, ground level and underground equipment for the installation of electrical cables. Included are manhole and duct tools, overhead equipment, stringing sheaves, cable racks and arms. *T.J. Cope, Collegeville, Pa.*

CIRCLE 406 ON INQUIRY CARD

COMPREHENSIVE LIGHTING CATALOG

Lightolier's new catalog contains 112 pages presenting their line of over 590 designs for decorative and functional lighting. The catalog is divided into nine specific sections: chandeliers, contemporary lighting fixtures, pendant fixtures, lighting ideas, lighting for the bath, fixtures for small spaces, utility lighting, recessed lighting and outdoor illumination. *Lightolier, 346 Claremont Ave., Jersey City, N.J.**

CIRCLE 407 ON INQUIRY CARD

PROTECTIVE COATINGS

A new bulletin, T-97, describes *Bitumastic* protective industrial coatings and Koppers Pavement Sealers. The booklet gives properties, specification data, and case history information on 10 *Bitumastic* cold-applied coatings and two types of pavement sealer. The bulletin also lists recommended coating systems for more than 100 common metal, concrete and masonry installations. *Koppers Company, Inc., The Koppers Building, Pittsburgh, Pa., 15219**

CIRCLE 408 ON INQUIRY CARD

OFFICE FURNITURE

The *Series 7000 Philadelphian* collection of office furniture is displayed in a handsome fold-out catalog. The line includes single and double pedestal desks, secretarial and executive L-groups and U-groups, occasional tables, conference tables and filing cabinets. *Costa Mesa Furniture Co., 411 East Julianna St., Anaheim, Calif.*

CIRCLE 409 ON INQUIRY CARD

REVISED SPECIFICATIONS

The 11th edition of the company's "Coppermetals Specifications Index" contains an extensive updating of ASTM, SAE, AMS, Federal and Military specifications. *Anaconda American Brass Company, Waterbury, Conn., 06720*

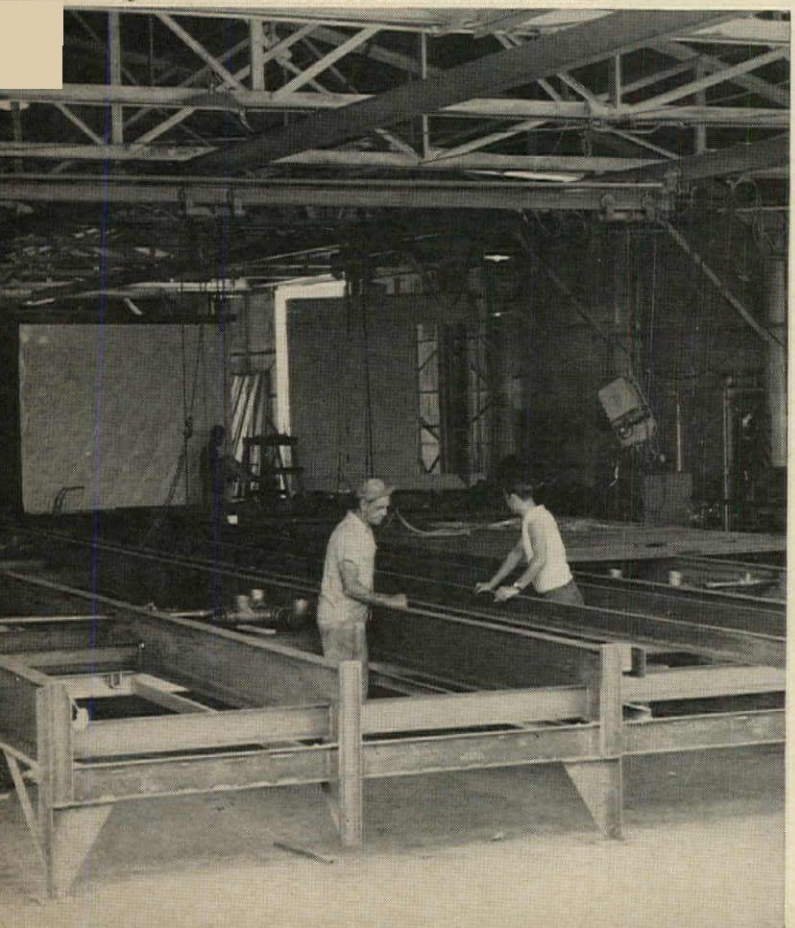
CIRCLE 410 ON INQUIRY CARD

**Additional product information in Sweet's Architectural File*

more literature on page 236

View of recently completed Holiday Inn Jr. Motel, Memphis, Tennessee, supported by two main pillars.

Frame for each section consists of 14" Light Beam longitudinal members and Junior Beam cross ties overlaid with metal deck.



A four bedroom section being swung into position by crane. Two duplicate sections, facing a corridor, provide a total of sixteen rooms.

A new Holiday Inn Jr. starts here... at 50% less cost

Steel's Symbol of Strength, Long Life and Economy

Chalk up one more wonder for this age of "instant living." Holiday Manufacturing Company, a division of Holiday Inns of America, Inc., has created complete, factory built, transportable motel units!

Four-room sections of the new Holiday Inn Jr. are transportable to the site on demountable running gear and pulled by a truck tractor. Each 56′ x 10′ compact room-unit is fully self-contained, with its own plumbing, heating, air conditioning, wiring and furniture—down to the rug on the floor!

Support for the Junior, which must resist deflection for both cantilever loading when in place and over the road haul, is fabricated from three 56′ 14″-17.2# J&L Light Beams. The floor is a steel deck welded to the Light Beams and overlaid with ¾″ plywood.

Two four-room sections, which can be arranged in multiples, are positioned at the site to face a 6′ hallway. The corridor support is prefabricated from 6″ Junior Beams and bolted to the 14″ Light Beams supporting each Junior unit.

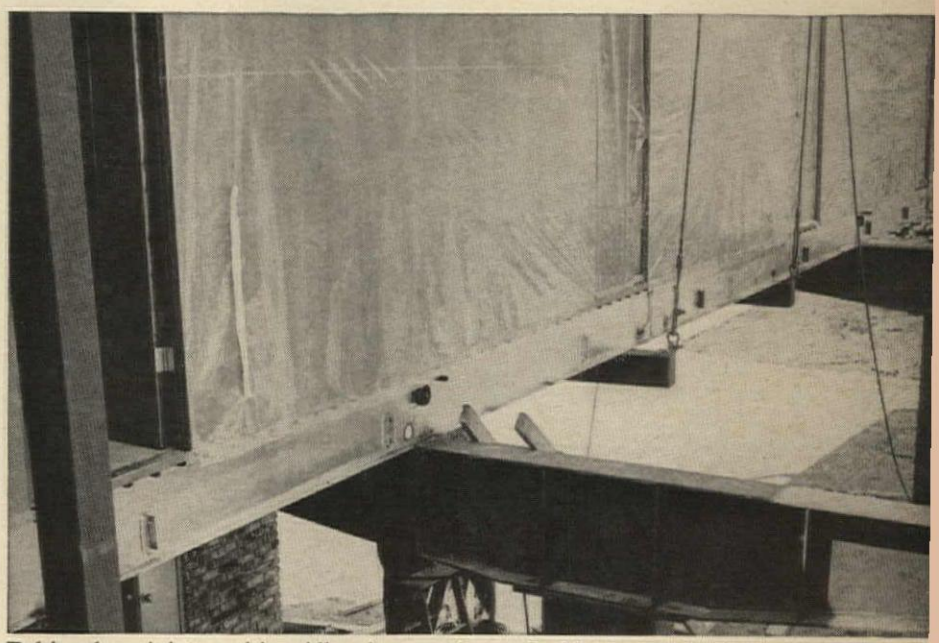
The cost of building these units, Holiday estimates, is 50% less than constructing a conventionally built motel. Savings stem from factory production methods, ease of transportation and reduced on-site construction costs. For markets, HIA looks to smaller towns, not geared to plush supermotels. Possible sites include airports, truck stops and hospitals.

The Holiday story proves again that creative ingenuity is to be found everywhere on the American scene . . . and that J&L Steel can be an important factor in giving substance to the designer's vision.

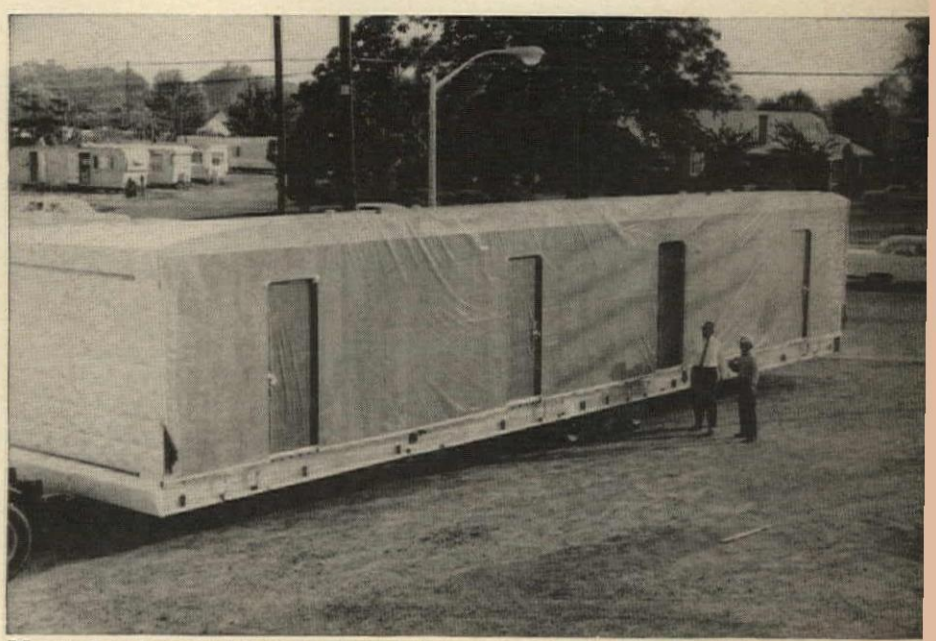
Jones & Laughlin Steel Corporation

3 Gateway Center, Pittsburgh, Pennsylvania 15230

STEEL



Bolting the unit into position. All savings are the result of factory production methods, plus ease of transportation and reduction of on-site construction costs.



Mounted on demountable running gear, a four-room section is ready to roll. Each unit is fully self-contained, with its own utility equipment and furniture.

ANDERSEN PROVIDES THE WINDOW SOLUTION
FOR ANY TYPE OF LIGHT CONSTRUCTION

How finely detailed **STOCK WINDOWS** contribute to an unusual Indiana church

Would you call Orus Eash's church a courageous design?

In some areas, it would be controversial. Yet the building has an eloquent majesty, a strength, a serenity, a feeling of welcome, that sets it apart as a center of worship.

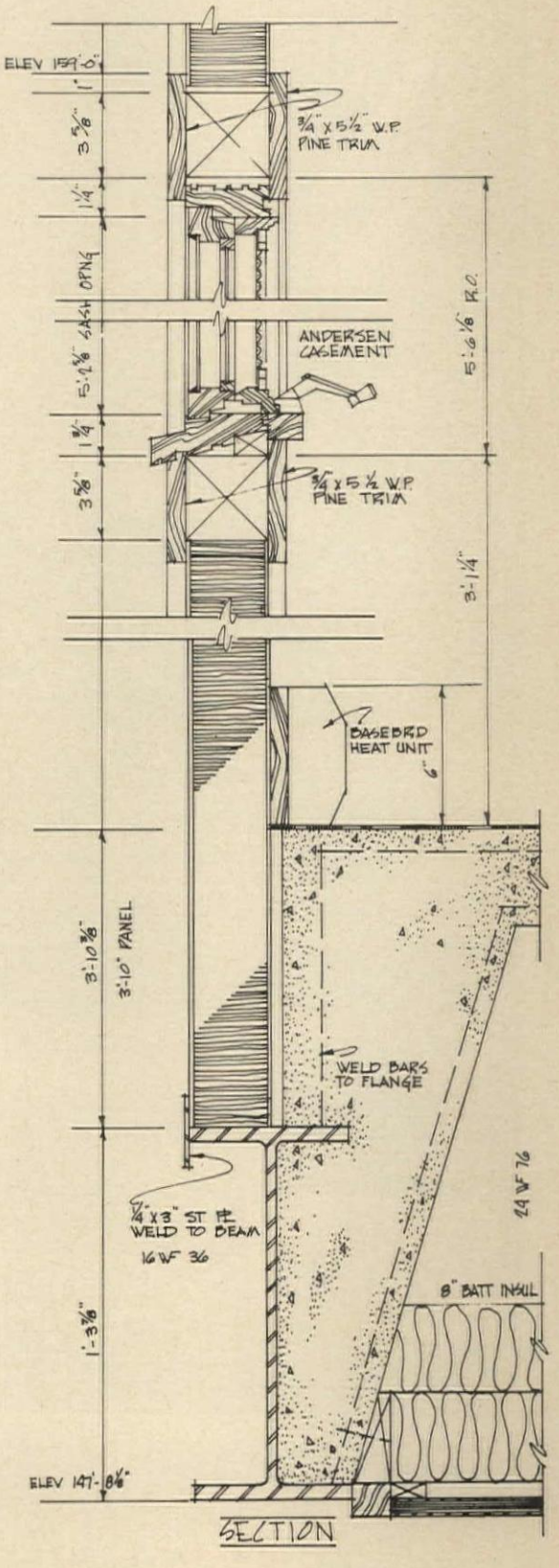
Immanuel Baptist Church is a creative, imaginative design . . . a strong achievement of an architect's goals.

That stock Andersen Casement Windows can become a part of such designs . . . not inhibiting the architect in any way . . . is a tribute to their **finely detailed lines** and the craftsmanship in their manufacture.

This is **window beauty** . . . contributing to the overall architectural scheme without becoming obtrusive.

And it comes with the assurance that Andersen Casements will **operate smoothly, silently, effortlessly** for the life of the building. They will save on heating costs. They will

Immanuel Baptist Church, Fort Wayne, Indiana
Architect: Orus O. Eash, Fort Wayne, Indiana
Windows: Andersen Casements



provide draft-free comfort . . . because they're precision built to be at least 4 times **more weathertight** than ordinary windows.

Check Sweet's File. Or contact your Andersen distributor for a Tracing Detail File. All Andersen Windows are readily available in the United States and Canada.

Andersen Windowalls

TRADEMARK OF ANDERSEN CORPORATION

America's Most Wanted Windows

ANDERSEN CORPORATION • BAYPORT, MINNESOTA

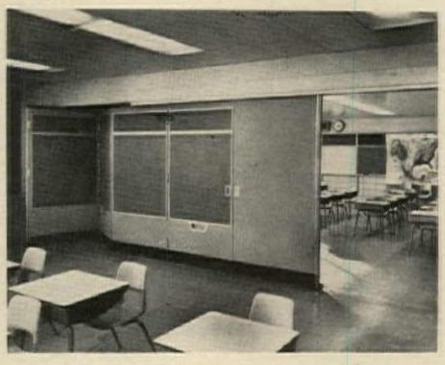
AW

Product Reports

continued from page 187

ACOUSTICAL PARTITIONS FOR SCHOOLROOM USE

A new type of folding, classroom partition is said to provide a high level of sound control, and to be easy to operate either electrically or manually. Full scale laboratory tests have shown that the new *700 Series* partition has a 38 decibel class rating under fully operable conditions. The partitions are sufficiently sturdy to



provide functional working walls which will accommodate chalkboard, tackboard and display materials. Panels can be made up to 12 ft high, in widths from 32 in. to 4 ft. The panels are 2¼ in. thick. *Brunswick Corp., School Equipment Div., 2605 East Kilgore Rd., Kalamazoo, Mich., 49003*

CIRCLE 301 ON INQUIRY CARD

RADIO PAGING SYSTEM

The new *Page-Mate* radio-paging system consists of a compact transmitter, microphone, antenna, control unit, and any number of receivers which are sufficiently compact in size and light in weight to fit comfortably into a shirt or jacket pocket. *Round Hill Associates Inc., 434 Avenue of the Americas, New York, N.Y., 10011*

CIRCLE 302 ON INQUIRY CARD

more products on page 198

HARVARD ADDS ITS 3rd SELECTOGRAPHIC

Honeywell Selectographics will control temperature and equipment for 162 buildings when the third unit is installed

Harvard is a prime example of how control of temperatures and mechanical equipment for an entire campus can be automated to increase efficiency and cut operating costs. Harvard's 3rd Honeywell Selectographic, which will be installed this year, will monitor the 2 units already in operation. From it, one man will actually be able to supervise 162 buildings.

THE STORY REALLY STARTS IN 1960, when Harvard decided to install its first Honeywell Selectographic Control Center. Before that time, operating and maintenance men were spending hours going from building to building to perform routine tasks: checking temperatures, starting, stopping and checking equipment.

A Honeywell analysis pointed out the "inordinate amount of time" required for these operations, and Selectographic Number 1 was installed.

This first unit controlled 67 buildings north of the Harvard Yard. From it, one man could:

1. view 37 schematic diagrams (projected from slides) representing systems for the 67 buildings.
2. start, stop, or listen to 42 fans up to ½ mile away.
3. operate 32 steam valves.
4. check temperatures at 100 points.
5. get warning of humidity changes in steam tunnels or library areas (which include, among other treasures, Oriental manuscripts).

Our study of estimated savings indicates that the new Honeywell equipment will pay for itself in less than 5 years.

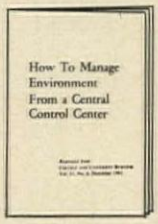
The first installation improved service. Equipment now is being operated more efficiently because it is being started and stopped in just the right sequence at the proper time. Trouble is detected quickly . . . a big assist in preventive maintenance. Selectographic Number 2 was installed in 1962. This one controls 40 buildings in Harvard's South Yard.

Now, preparations are being made to install Selectographic Number 3, which will complete the job bringing the 55 buildings in the Harvard Yard under automated control. This third unit is being integrated with the first two, and will control them.

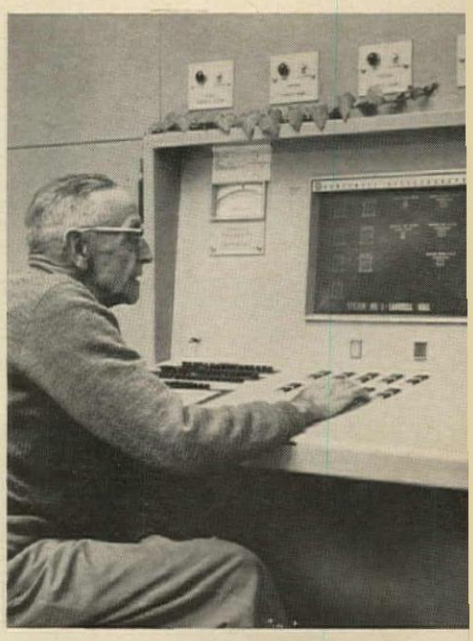
Once installed, it will be possible for one man to control all 162 buildings . . . to handle nearly anything but maintenance from his chair! Harvard will have a completely automated control system—one that can include new buildings as they're built.

THE SAME THING IS HAPPENING ON CAMPUSES ACROSS THE COUNTRY—colleges of all sizes and ages. New York University's Long Island Center, for example, has a Selectographic which now controls 8 buildings, eventually will control 40. San Antonio College has one designed to control 10 buildings.

Send for free report on Harvard



Get more operating details and information on time and manpower savings as written by Henry J. Muller, Harvard's Director of the Dept. of Buildings and Grounds. Just drop a card to: Mr. William Wray, Honeywell, Dept. AR1-104, Minneapolis, Minn. 55408.



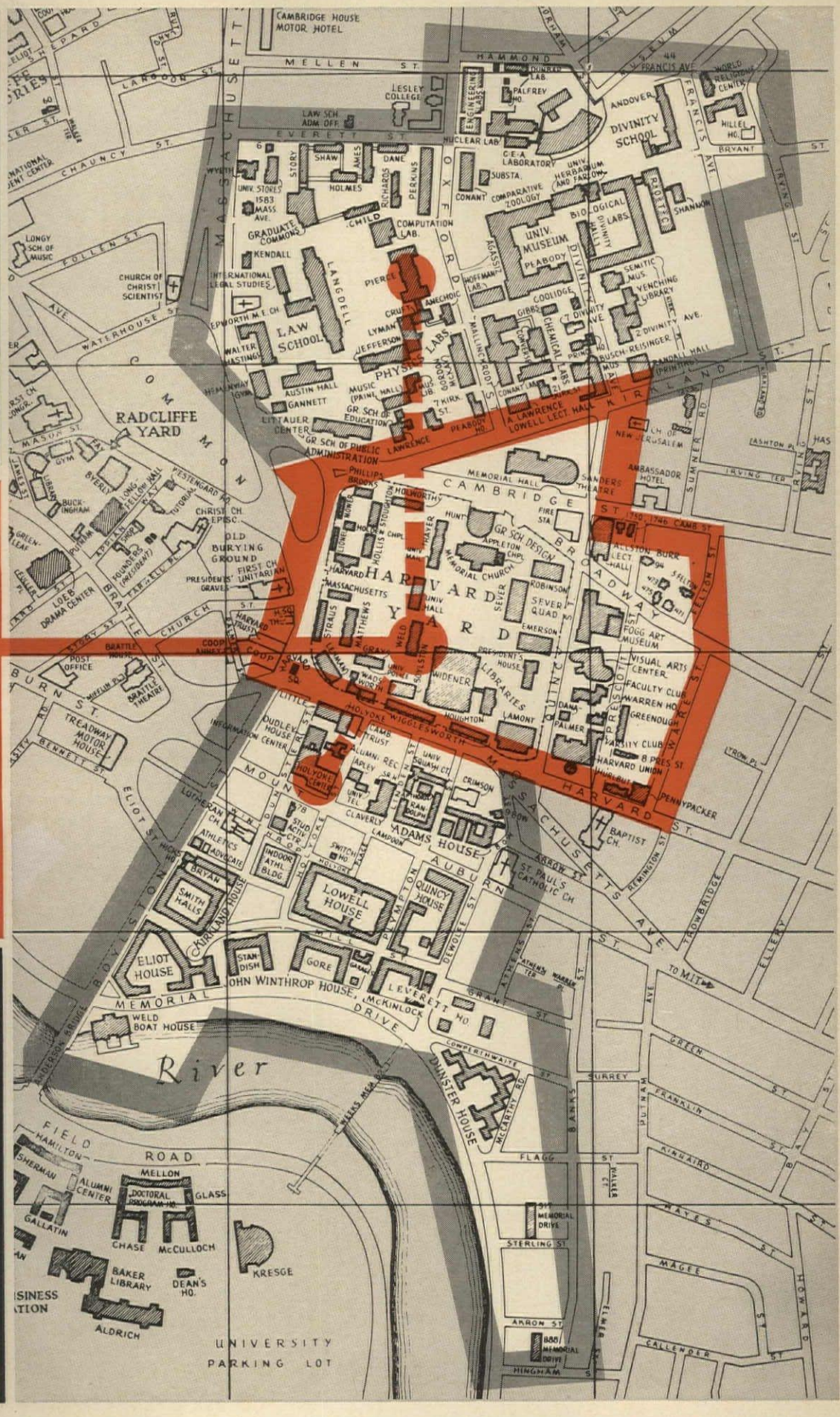
Honeywell

SIMPLIFIES BUILDING CONTROL

1960
67 buildings controlled by Selectographic Number 1

1964
162 buildings will be controlled from a new panel now being readied for installation.

1962
40 buildings controlled by Selectographic Number 2



Product Reports

continued from page 194

SNOW-MELTING SYSTEM

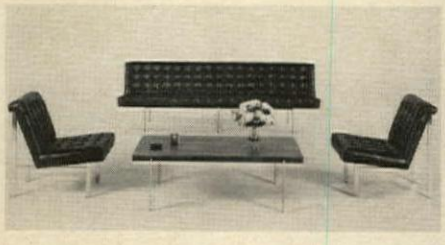
A copper-tube snow-melting system has recently been installed under the sidewalks and walkways outside a bank in New Jersey. The system utilizes approximately 17,000 feet of hard drawn copper tube. Laid on 12-in. centers under a 2-in. slab of concrete, the system covers more than 11,000 sq ft and has an output of 3 million Btu per hour. The ethylene glycol heating solution is circulated through 1-in. copper coils at a rate of

280 gallons per minute. A steam boiler provides the heat source for the solution. Once in operation, two hours are required for the system to reach maximum efficiency. Copper tube expansion joints are encased in foam rubber to allow freedom for expansion and contraction. *Copper Development Association, Inc., 405 Lexington Ave., New York, N.Y., 10017*

CIRCLE 303 ON INQUIRY CARD

RECEPTION ROOM FURNITURE

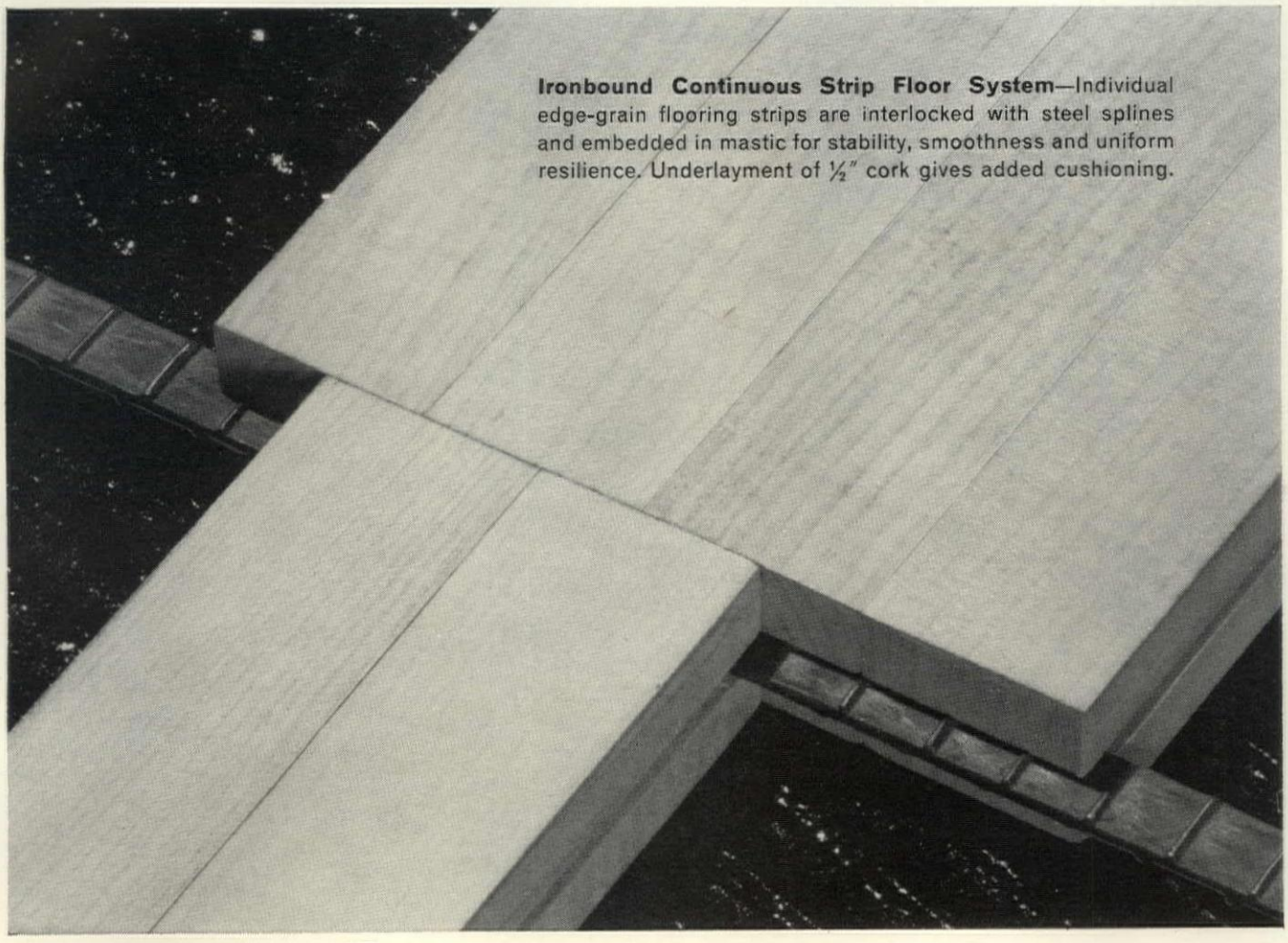
These pieces were designed by Milo Baugham for use in reception rooms or hotel lobbies. Metal supports and bases are available in chrome or



English antique finish. The table can be supplied with walnut or rosewood top. *Thayer Coggyn Institutional, High Point, N.C.*

CIRCLE 304 ON INQUIRY CARD

more products on page 216



Ironbound Continuous Strip Floor System—Individual edge-grain flooring strips are interlocked with steel splines and embedded in mastic for stability, smoothness and uniform resilience. Underlayment of ½" cork gives added cushioning.

Robbins *Ironbound*® Northern Maple Floor guarantees resilience, stability, low-cost upkeep

Cleburne County Gymnasium, Heflin, Ala.
Architects: Chas. H. McCauley and Assoc., Birmingham, Ala.
Installer: E. P. Cuthrell Flooring Co., Birmingham, Ala.

In gymnasiums, auditoriums and many other areas, the Robbins IRONBOUND floor system gives maximum satisfaction. Installation of MFMA Northern Hard Maple edge-grain flooring by this superior method (see photo above) is made and guaranteed by experienced, franchised applicators, and backed by Robbins.

From coast to coast, Robbins IRONBOUND Floors give trouble-free service and low-cost upkeep in schools, colleges and other institutions with exacting floor requirements. For detailed data on floor systems and name of nearest authorized Robbins installer, write: Robbins Flooring Company, Dept. AR-165, White Lake, Wisconsin. See our catalog in Sweets.

MAIL FOR DATA

ROBBINS FLOORING COMPANY
Dept. AR-165 White Lake, Wisconsin
☐ Send complete information
☐ Advise name of authorized installer in this area

Name_____

Firm_____

Address_____

ROBBINS flooring company
BRUCE®
Subsidiary of E. L. Bruce Co., Memphis, Tenn.

For more data, circle 97 on Inquiry Card

For more data, circle 98 on Inquiry Card ➔

KOROSEAL® IS COLOR IN VINYL WALL COVERING

But this isn't even half of the more than 300 colors and patterns available

While we are on the subject of color, we'd like you to know that Koroseal vinyl wall coverings can be ordered in virtually any shade you wish. Just give us a reasonable amount of time and our color experts can match practically anything.

In addition to our more than 300 standard colors and patterns, and custom color service, you'll find Koroseal satisfies your client's needs for durable beauty on any wall.

- Rugged Koroseal construction withstands heavy wear without cracking, chipping or scraping.
- Stains and soil marks are soap-and-water washable with Koroseal. Yet colors won't fade—even after countless scrubbings.
- Koroseal's tough fabric backing won't stretch or shrink. And Koroseal is the easiest of all heavy-duty vinyl wall coverings to apply. (Ask your contractor.)

Flame retardant Koroseal vinyl wall coverings are available for fast delivery everywhere in the U.S.A. in every one of their more than 300 colors and patterns. To obtain swatches like those shown here, write to: B.F.Goodrich Company, Consumer Products Marketing Division, Dept. KVWC, 277 Park Avenue, New York, New York 10017. Or use the handy coupon below.

B.F.Goodrich

Consumer Products Marketing Division

Household products • Furniture products • Home furnishing products • Drug sundries

Mail coupon today for Koroseal color swatches

Please send me more information on Koroseal vinyl patterns, colors and sample swatches.

Name_____
(Please Print)

Firm name_____

Your title_____

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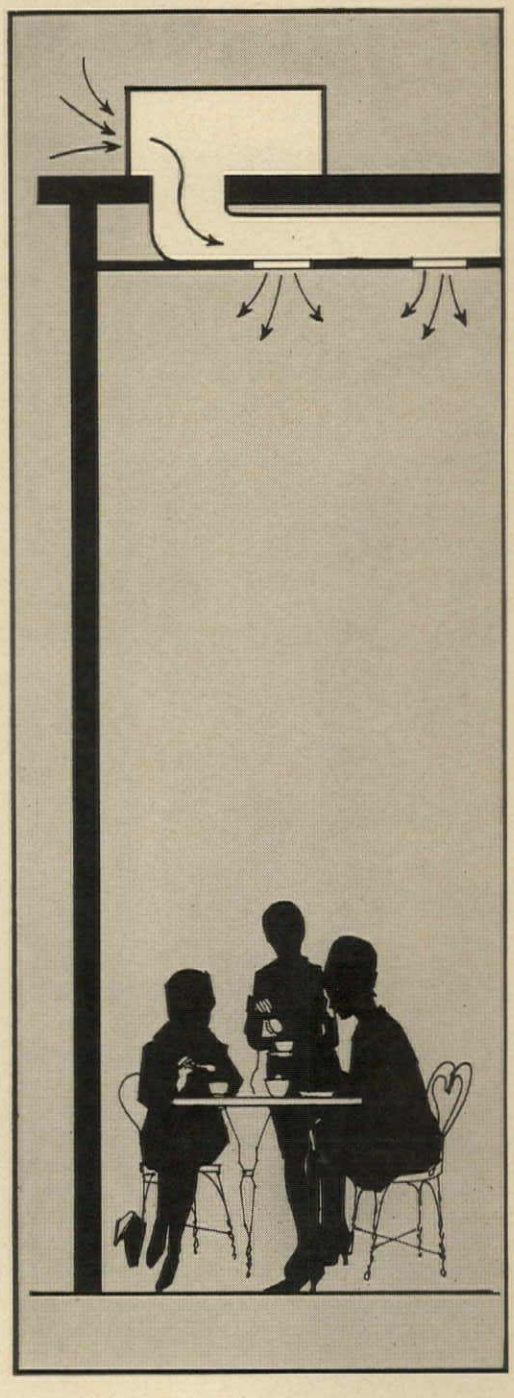
Send to B.F.Goodrich Company, Dept. KVWC, 277 Park Avenue, New York, New York 10017.

"Snow flurries and continued hot"

(Power Saver Weather)



What needs cooling inside when it's crisp and wintry outside?

Answer: Any modern building flooded with bright lights, excited people, humming motors.

And sun on the windows!

There are two ways to cool down a winter heat wave:

Run the cooling compressor, and pay the power costs. Or, air condition free, with Lennox POWER SAVER™.

POWER SAVER cools free at any temperature below 60° F., with fresh, cool outdoor air.

January or June. Without compressor wear or power cost, without low ambient problems.

How much can POWER SAVER save?

Example: In Chicago-type climate over 4,000 of the year's 8,760 hours are in POWER SAVER's free cooling range: 30° F. to 60° F.

Write for temperature/hour tables on 158 leading cities.

Lennox Industries Inc.,
463 South 12th Avenue,
Marshalltown, Iowa.
See our catalog in Sweet's.

POWER SAVER is the air control center of Lennox heat-vent-cool commercial systems, including rooftop, direct multi-zone, Landmark®, Comfort Curtain® and split systems.

LENNOX AIR CONDITIONING · HEATING

For more data, circle 111 on Inquiry Card

Product Reports

continued from page 198

GRAPHIC DATA PROCESSING SYSTEM

The IBM graphic data processing system claims to offer new capabilities in computer-aided design, development of engineering drawings and the preparation of statistical business graphs under computer control. The new system takes advantage of a computer to handle information displayed in the form of sketches, drawings, diagrams and graphs. A design engineer will be able to scan an existing microfilm

image, display it on a screen, change the image with an electronic "pen," and then record the new image on microfilm and, within seconds, review the new image projected at 19 times its actual size.

The graphic data processing system will operate under control of IBM's *System/360*. The new system includes four units, each of which can be used independently. They are: the IBM *2280* film recorder, the IBM *2281* film scanner, the IBM *2282* film recorder/scanner and the IBM *2250* display. *International Business Machines Corp., Data Processing Division, 112 East Post Road, White Plains, N.Y.*

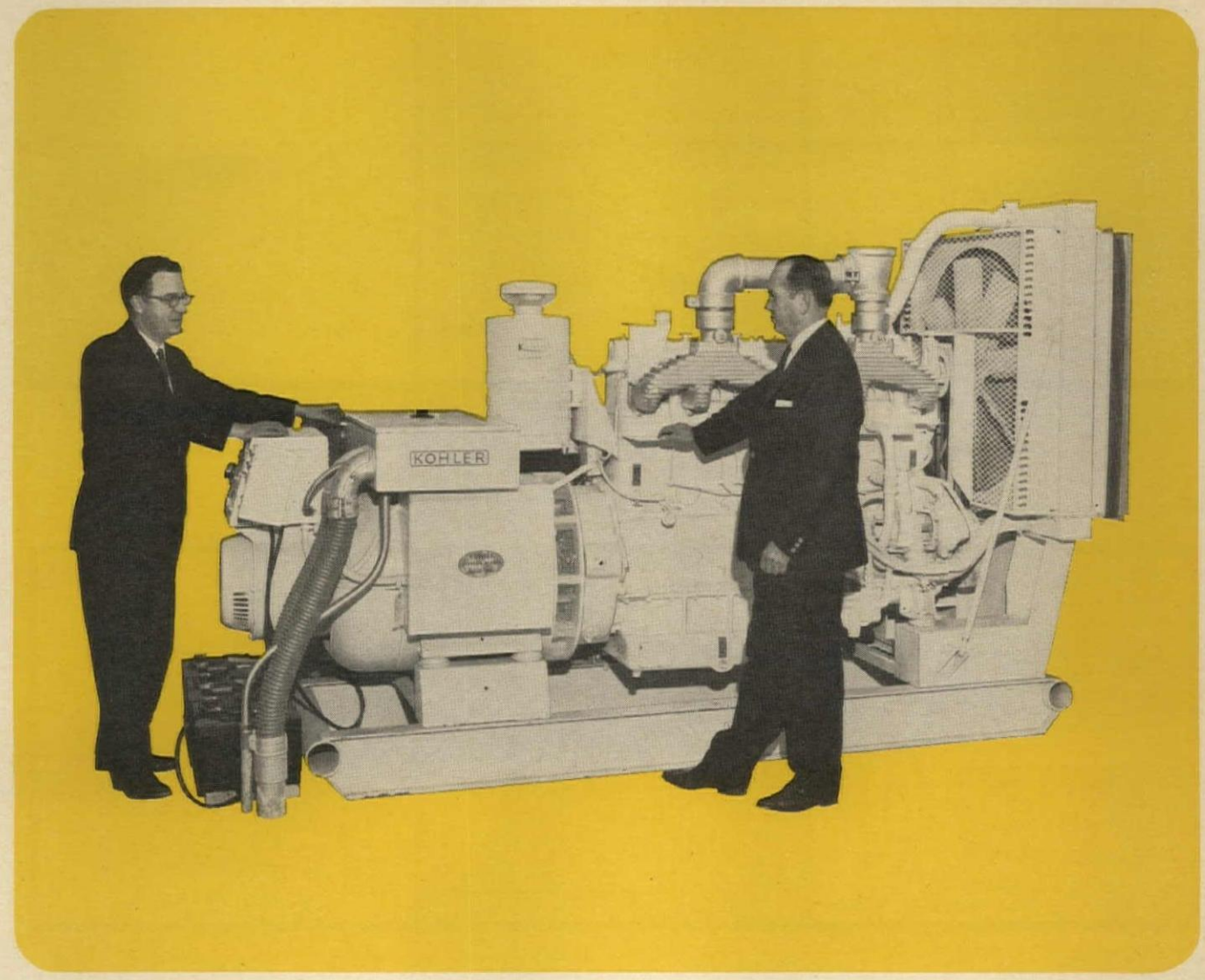
CIRCLE 305 ON INQUIRY CARD

IMPROVED REFRIGERATORS

The Koch *Certified M* series of refrigerators, freezers and hot food cabinets incorporate a number of improvements. Exterior dimensions have been reduced to save kitchen space. Vinyl-to-vinyl door seals, heavy steel door hinges, cylinder-locking, positive action door fasteners and anti-overlap door stops are supplied as standard equipment. *Koch Refrigerators, Inc., Kansas City, Kan., 66115*

CIRCLE 306 ON INQUIRY CARD

more products on page 220



A Kohler Distributor—A Kohler Technician
A Kohler Electric Plant
3 steps to stand-by power you can count on

When you're planning a stand-by power installation Kohler Distributors stand ready and able to survey your requirements—will recommend the Kohler Electric Plant or plants best suited to them.

And to make absolutely sure your needs are being met, Kohler technicians assist Kohler Distributors in estimating those needs, in supervising installation. Your Distributor and Kohler men work together to assure traditional Kohler performance for long years ahead.

As for the Kohler Electric Plant itself, the "Kohler Check Marks of Value" below give you some idea of Kohler quality. For more information see your Kohler Distributor or write Dept. EP5-501, Kohler Co., Kohler Wis.

KOHLER

MARKS OF VALUE

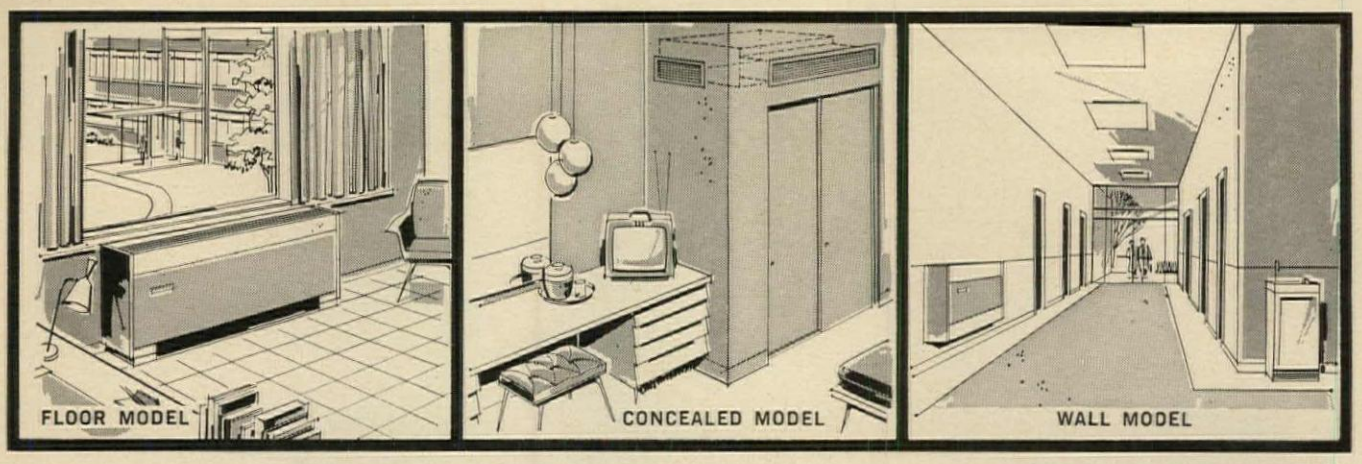
- ✓ One source responsibility—the complete plant is backed by Kohler
- ✓ Nationwide sales and service—performed by Kohler-trained mechanics
- ✓ Unitized design—plants are completely assembled and tested at the factory
- ✓ Built in vibro-mounts...for quiet smooth operation
- ✓ Heavy duty design—Kohler plants have capacity beyond their rated output—2 hp per KW.
- ✓ Automatic voltage and speed regulation—maintain power at even level
- ✓ Gas, Diesel and Gasoline fuel options
- ✓ Integral exciter, starting—quickest, simplest, most positive, trouble-free engine starting available.

KOHLER OF KOHLER

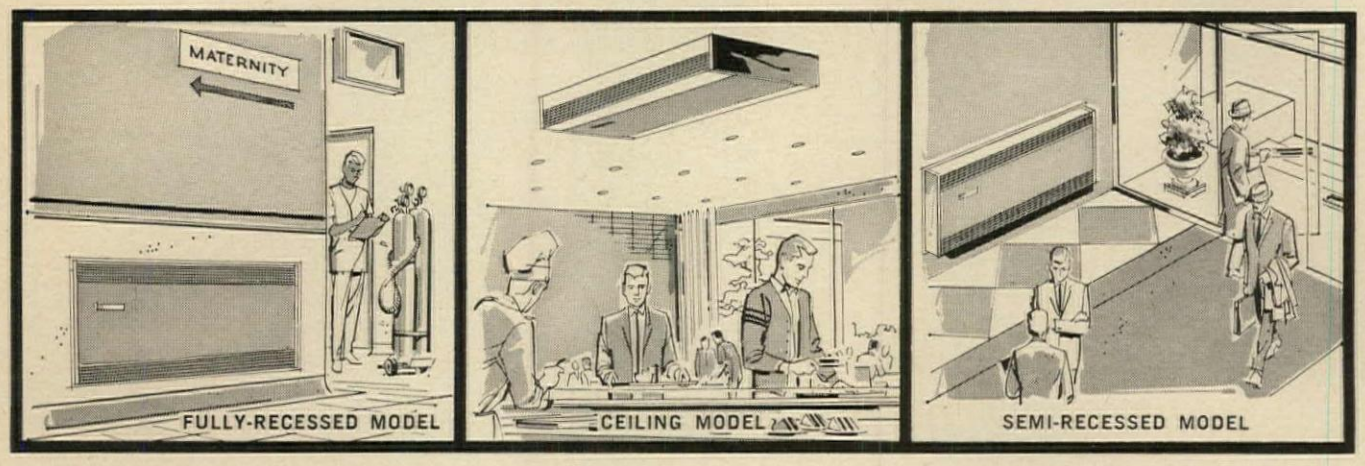
Kohler Co., Established 1873, Kohler, Wisconsin

ENAMELED IRON AND VITREOUS CHINA PLUMBING FIXTURES • ALL-BRASS FITTINGS • ELECTRIC PLANTS • AIR-COOLED ENGINES • PRECISION CONTROLS

For more data, circle 113 on Inquiry Card



NEW—with architectural styling! Goes anywhere at all!

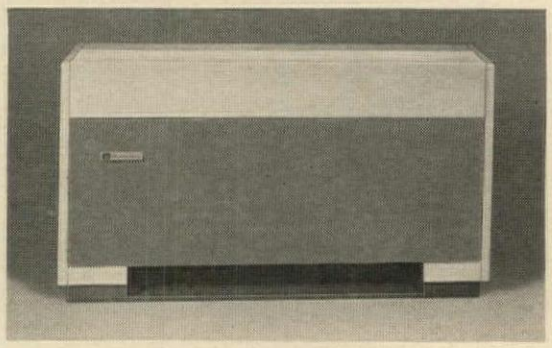


...the AAF NELSON/aire console unit

Remarkable new Mark II console unit serves wide range of heating, ventilating and air conditioning needs... offers institutional quality combined with modern architectural styling.

The AAF NELSON/aire fan coil unit provides these exclusive AAF features: modern thin design (all models only 9¾" deep); two basic cabinet styles, decorator and standard; money-saving "Damper-Guard" control; anti-blowthru ventilating damper. It stands in a class by itself for quality, styling and application versatility.

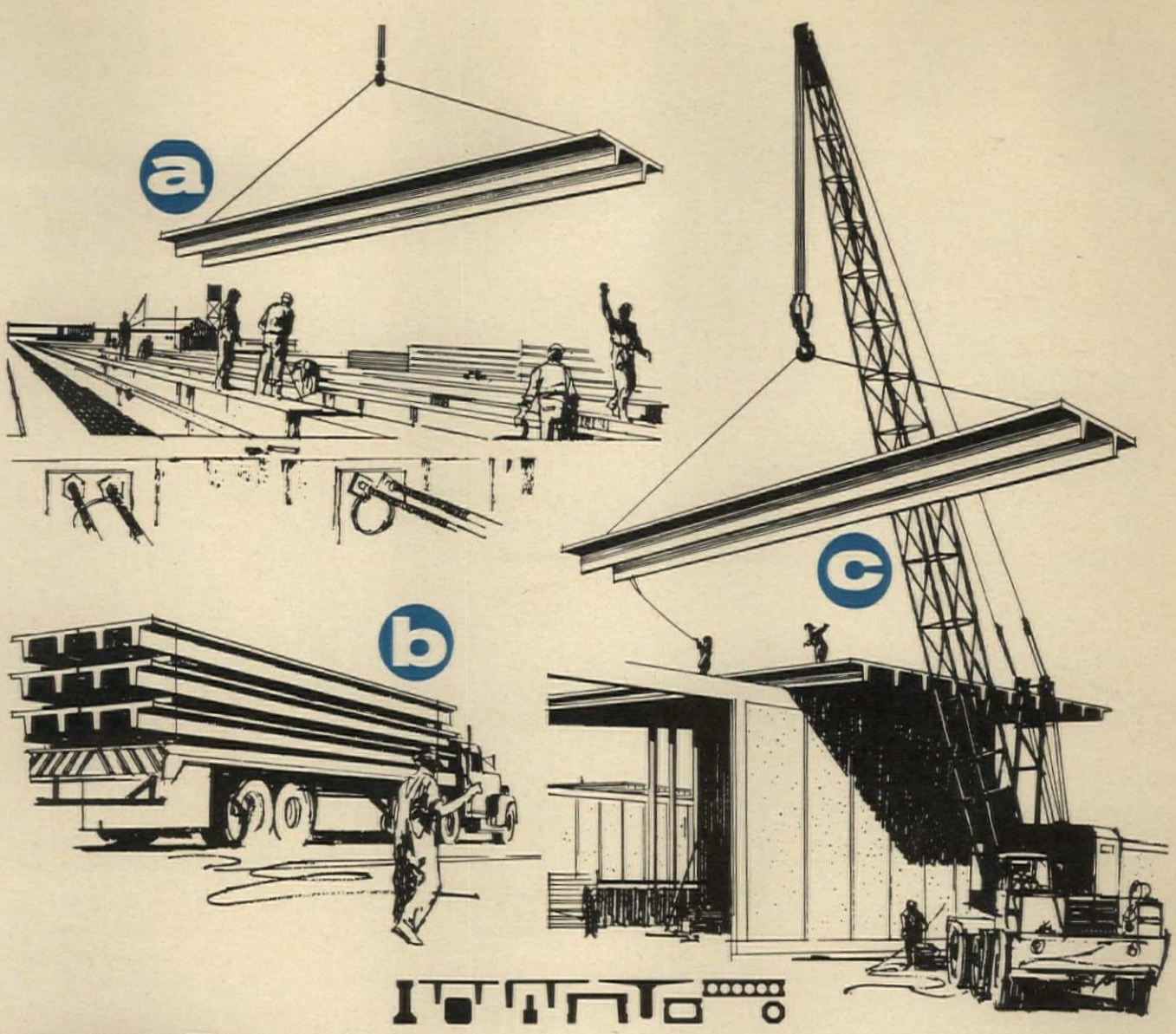
A complete line of NELSON/aire units is available for a wide variety of applications (some pictured above). Decorator units are available in all models. NELSON/aire units, designed to be compatible with the award-winning styling of famous Herman Nelson Unit Ventilators, are manufactured for use with all supply mediums. For additional information, write American Air Filter Company, Inc., 215 Central Avenue, Louisville, Ky. 40208.



AAF **American Air Filter**

BETTER AIR IS OUR BUSINESS

For more data, circle 114 on Inquiry Card



ABC's OF PRESTRESSED CONCRETE

Here's flexibility in design . . . speed and economy in construction . . . continued savings in permanent, quality structures!

a *Prestressed concrete structural units are mass produced in the plant to exact specifications while excavation and foundation work takes place at the site. Close supervision and control of materials by a specialized work force in the plant produce a high quality product at a minimum cost.*

b *Delivery is made as called for by contractors' work schedules.*

c *In almost all instances, units are erected directly from truck to structure without stockpiling or rehandling at the site. Prestressed members fit readily in place to speed erection, shorten total construction time, save labor costs.*

Long spans of gracefully proportioned prestressed concrete beams eliminate columns to provide more usable space. No painting or maintenance is required and little or no waterproofing. Durability and fire resistance mean low insurance premiums. Two-hour Underwriters' Laboratories label service is available on commonly used prestressed concrete members. Advantages like these account for the continuing growth in the use of prestressed concrete in almost every type of structure.

■ *See your local PCI member for standard shapes available and costs.*

ROOF AND FLOOR UNITS • GIRDERS • BEAMS • COLUMNS • WALL PANELS • SLABS • JOISTS • PILING

PRESTRESSED CONCRETE INSTITUTE

205 WEST WACKER DRIVE • CHICAGO, ILL. 60606

For more data, circle 115 on Inquiry Card

Product Reports

continued from page 216

FULL SIZE WHITEPRINT MACHINE

The *Cutlass* Diazo whiteprint making machine has a full size 42 in. width capacity for any length original, with automatic separation of tracing from print paper and automatic shutdown time delay. Nine models are available in four lamp wattages of 1,500, 2,000, 3,000 and 4,000, with top machine speeds of 20, 30, 40 and 60 feet per minute. The

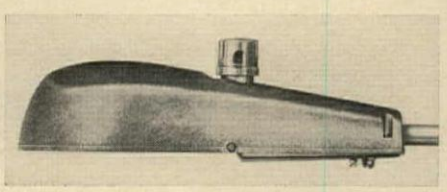
machine can be supplied as a table top model or with fully enclosed cabinet. The company claims that the *Cutlass* price range is as low as any so far achieved with this type of equipment. *Copymation Inc., 1800 Greenleaf Ave., Elk Grove Village, Ill.*

CIRCLE 307 ON INQUIRY CARD

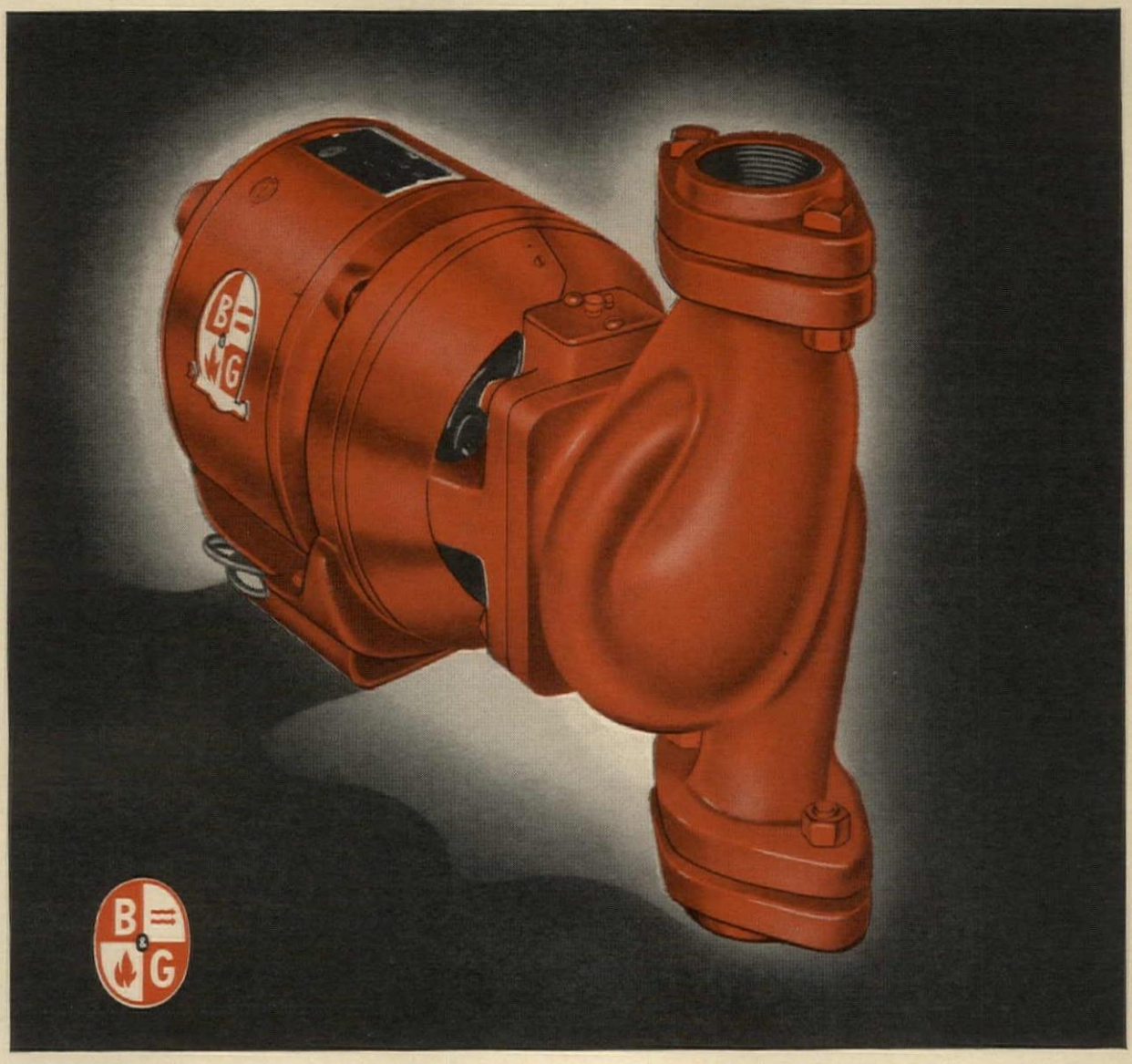
STREET LUMINAIRES

A street lighting luminaire for residential and secondary roadways is now available from Westinghouse. The end-mounting unit (Type MO-8 Silverliner) has a choice of built in ballasts to operate 100-, 175- or 250-watt phosphorcoated mercury lamps. The cast aluminum reflector and ballast housing have a hard-textured, aluminum baked enamel finish. *Westinghouse Lighting Division, Edgewater Park, Cleveland, Ohio*

CIRCLE 308 ON INQUIRY CARD



more products on page 224



In the Morton Grove, Illinois plant, Booster motors are built to exacting standards which assure quiet operation.

the only circulator with all parts designed, made and guaranteed by one manufacturer

More B&G Boosters are bought than any other pump made for the same purpose...a preference easy to explain. B&G Boosters are produced by an organization which stands back of its product—which offers help in any problem of system design or installation—and which has a nation-wide group of distributors who maintain adequate stocks and replacement parts to serve your needs.

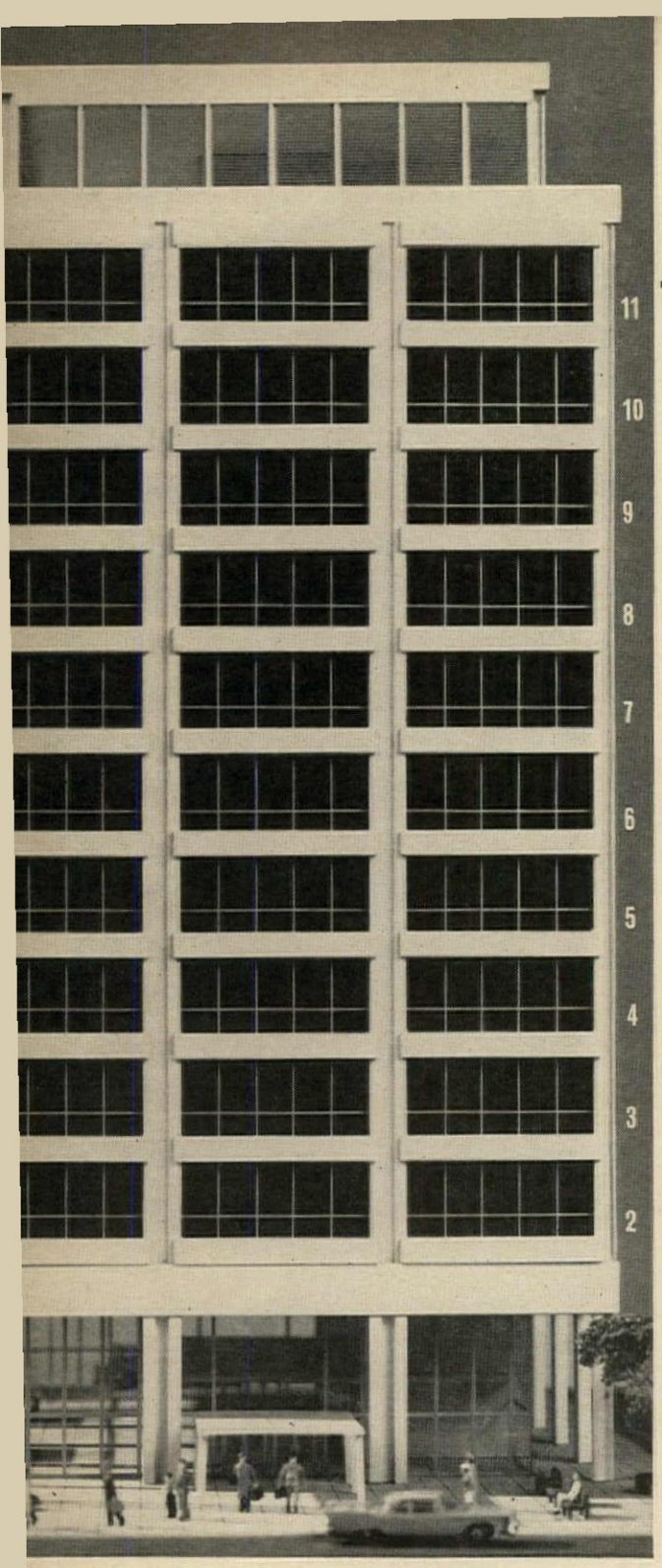
B&G Boosters are preferred because they are *quiet—vibration-less*—no noise to ruin a correctly designed and installed circulated water heating or cooling system. They are dependable and *profitable*—not a cause of endless service calls and customer dissatisfaction. Basically superior design, plus sturdy construction of best materials, assure faithful performance for years. *All parts of a Booster are made by B&G—permitting genuine quality control and a single source of responsibility!*

The sales record of the B&G Booster is clinching proof that its superior quality and performance has never been equalled!

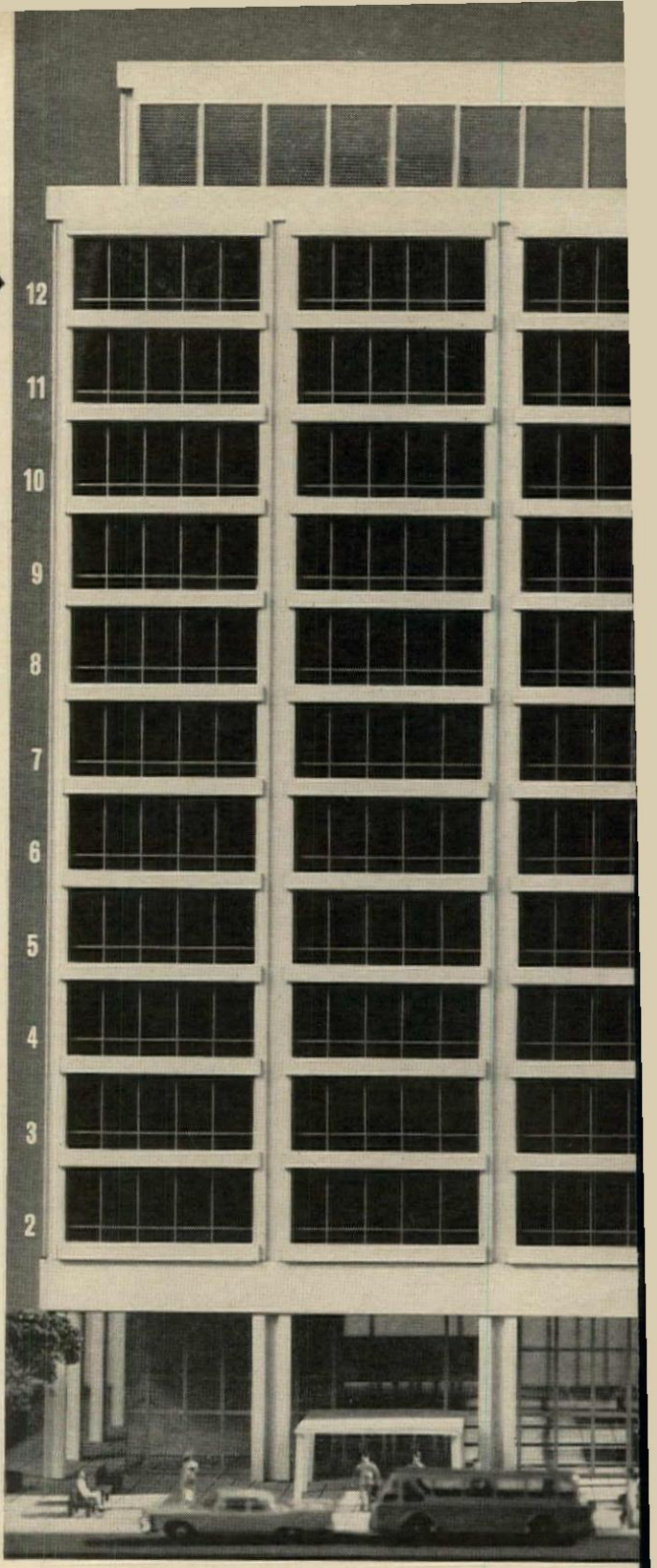
ITT Bell & Gossett Inc., *a subsidiary of International Telephone and Telegraph Corporation*, Morton Grove, Illinois, Dept. II-32.

BELL & GOSSETT
a subsidiary of ITT

For more data, circle 117 on Inquiry Card



Sneak an extra story in your next building



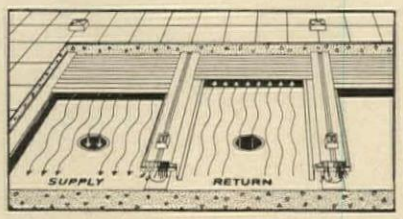
Here's how:

Save space by conducting air over, rather than under or around, obstructions.

Granco's new, compact A-E (Air-Electric) Floor system eliminates bulky ductwork. This saves space at *every* floor level and allows you to design a maximum number of stories into a given building height.

In the illustration above, the 12-story building was designed into an 11-story-building height. A-E Floor's shallow air plenum and electrical cells (see detail right) sandwiched between structural slab and finished floor reduced over-all floor depth 25% . . . saving enough space for an extra story!

Saving space is just one benefit. For more information on how the A-E Floor system permits continuous grills under floor-to-ceiling windows, luminous or exposed ceilings, full services for cantilevered floors, write for new A-E Floor catalog AE-641, Granco Steel Products Company, 6506 North Broadway, St. Louis, Missouri 63147. A subsidiary of Granite City Steel Company.



A-E FLOOR
AIR-ELECTRIC FLOOR SYSTEM
GRANCO

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Steel

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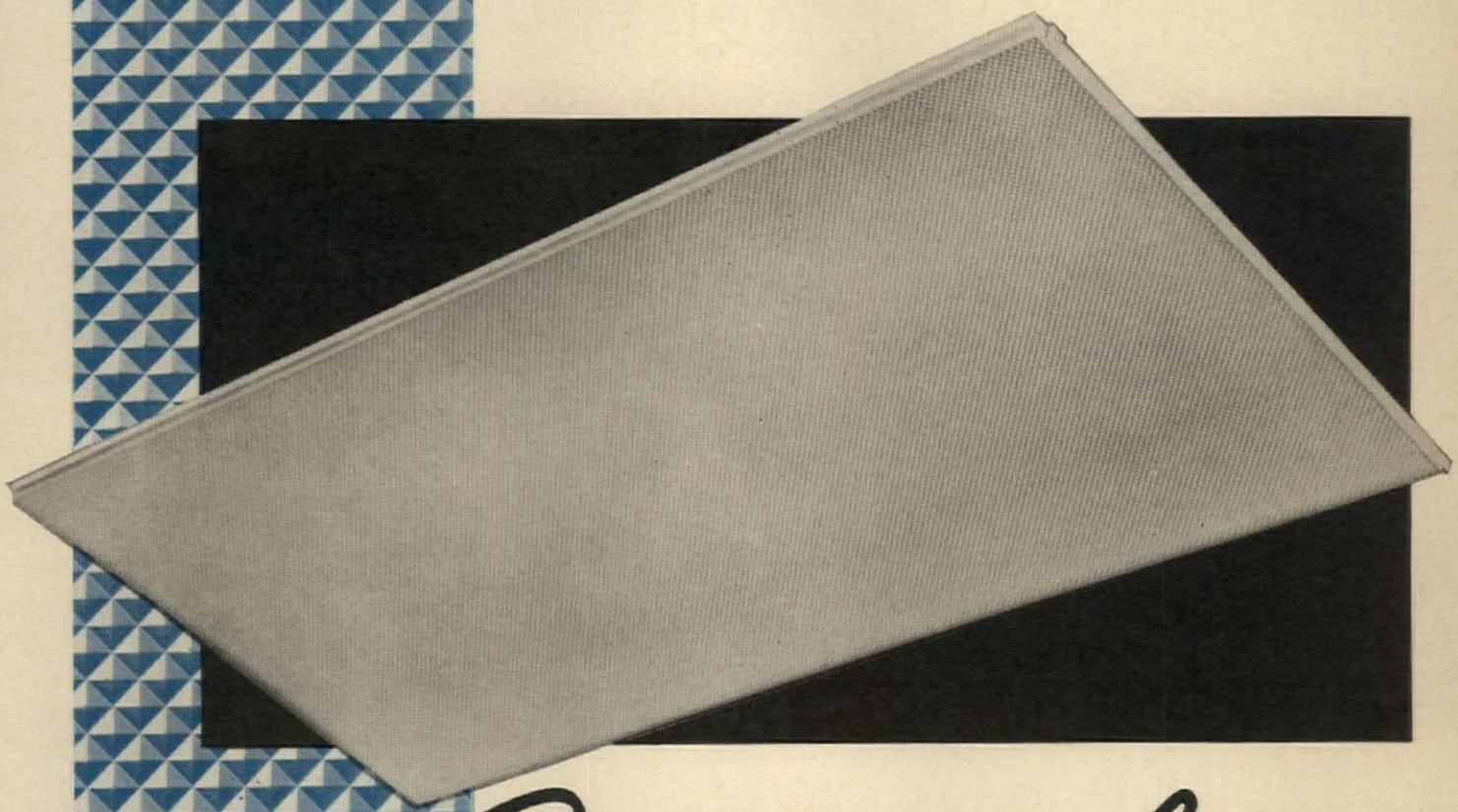
Frameless



Customlens™

NEW! FRAMELESS PRISMATIC CUSTOMLENS SETS A NEW STANDARD IN LIGHT CONTROL

CUSTOMLENS is injection molded in one piece, in either styrene or acrylic. The hinge pins are an integrally molded part of the lens, assuring permanent strength and consistency.

No metal frame as the lens is self framed and self hinging. No metal hinges or latches, provide larger "daylight" opening and thus more illumination per fixture.

CUSTOMLENS is simplest to handle and install, no tools or complicated instructions. Installed as final operation on job, saving costly clean-up time.

CUSTOMLENSES are available for all types of fixtures or ceiling constructions.

Molded in 1 ft. or 4 ft. and 2 ft. x 4 ft. sizes.

WRITE FOR BULLETIN 1400 ON COMPLETE ENGINEERING DATA TODAY

Consultants and Designers to the Lighting Industry Since 1939

american louver company

5308 NORTH ELSTON AVENUE • CHICAGO 30, ILLINOIS

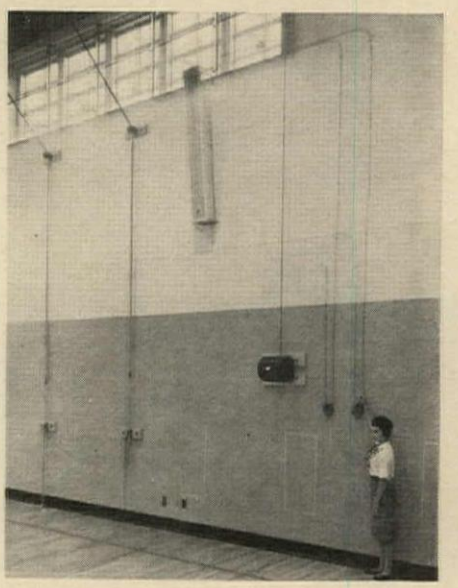
For more data, circle 119 on Inquiry Card

Product Reports

continued from page 220

REMOTE CONTROL FOR WINDOWS

Teleflex mechanical remote window controls permit the design and use of any type of projected window or louver in high or inaccessible positions. Easy to install as surface mounted units in existing buildings or concealed in new wall construction, *Teleflex* eliminates the need for poles, or unsightly ropes and chains.



The mechanical system consists of flexible cables, formed conduit and geared operating units which can be accommodated by any type of wall construction. *Teleflex Industrial Products, Inc., Church Road, North Wales, Pa.*

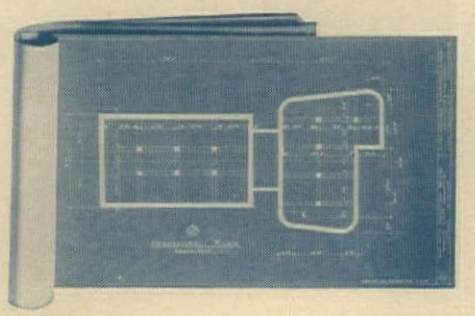
CIRCLE 309 ON INQUIRY CARD

PNEUMATIC SLIDING DOOR OPERATOR

A completely pneumatic over-center door operator for sliding doors, with up to 6½-in. door travel, can be surface mounted above the door edge, either on the wall or ceiling. The control releases compressed air into the cylinder and carries the door to the halfway point where air is automatically shut off. A large spring completes the door travel, while the exhausting air prevents a slam. Pneumatic operation does not interfere with manual operation. *Air-Lec Industries, Inc., 320 N. Third St., Madison, Wis., 53704*

CIRCLE 310 ON INQUIRY CARD

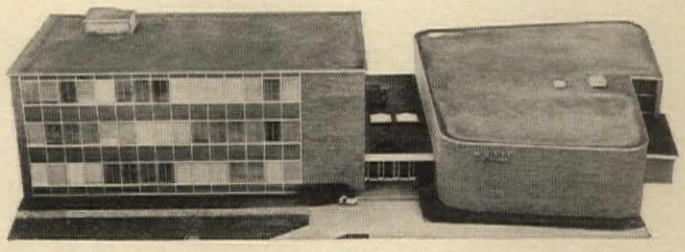
more products on page 228



Remember Styrofoam.

(If you're not using it for roof insulation now,
you probably will in a few years. So why wait?)

We've talked to architects and they've told us they think
Styrofoam® RM brand roof insulation is the material of the future,
the near future. And we believe them.
Styrofoam RM roof insulation is the new and better way to insulate
built-up roofs. It has proved itself superior to other
well-known roofing products. Matter of fact, can you name
any other insulation that matches the advantages of Styrofoam RM?
That can't absorb water? Acts as its own vapor barrier?
Won't rot? Can't collect mold? Has a low "k" factor? Won't lose
its efficiency? Is liked by roofing contractors because it's so light,
non-irritating to the touch, and easy to install?
No names come to mind? All the more reason for remembering that
Styrofoam RM is the roof insulation of today—and tomorrow.
Want to know more? You'll find it in Sweet's Architectural File
10a/Do and 8a/Dow. Or write us. The Dow Chemical Company,
Plastics Sales Department 1312N1, Midland, Michigan.
*Styrofoam is Dow's registered trademark for expanded polystyrene
produced by an exclusive manufacturing process. Accept no substitutes
. . . look for this trademark on all Styrofoam brand insulation board.*



OK. Now forget it.

(Only until your next job, that is.)

DOW

For more data, circle 121 on Inquiry Card

..for style

monolithic reinforced concrete is the architects' design material

■ Architecture has come of age in America! In this architectural evolution, monolithic reinforced concrete is the preferred construction material. It can be molded freely into any contour and shape, and eliminates the many design restrictions imposed by all other construction methods. Through the use of reinforced concrete, architects can exercise complete freedom in the achievement of style, elegance, and individuality. Decide now to utilize the great design opportunities of monolithic reinforced concrete in your next building.

CRSI
FOUNDED 1924

Edens Theater, Northbrook, Illinois
Architects: The Perkins & Will Partnership
Engineers: The Engineers Collaborative
General Contractor: Chell & Anderson

CONCRETE REINFORCING STEEL INSTITUTE
228 North La Salle Street • Chicago, Illinois 60601

5-64

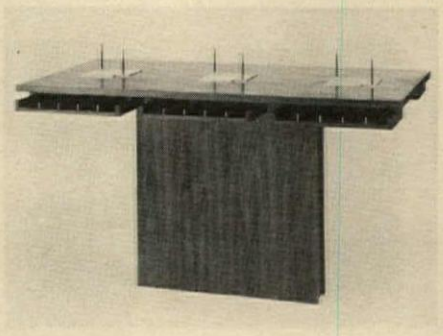
Product Reports

continued from page 224

NEW LINE OF CHECK DESKS

Lehigh Furniture Corporation has introduced a new line of desks for check writing, which can be adapted to meet the requirements of individual clients. The desk is available with from one to six writing stations and may be used as a stand-up, sit-down or wall-mounted model. Tops may be ordered in oiled walnut, rosewood, teak, marble or plastic.

A slab type base can be provided in wood, marble or clad with materials such as vinyl, leather or metal. Other



base variations are also available. Desk hardware can be ordered in satin aluminum or bronze. *Lehigh Furniture Corporation, 16 East 53rd St., New York, N.Y., 10022*

CIRCLE 311 ON INQUIRY CARD

ACOUSTICAL CEILING PRODUCTS

Armstrong have recently introduced two new acoustical ceiling products, which are said to offer substantially improved sound attenuation.

Tegular Travertone is a new 24-by-24-in. lay-in-panel designed for use in a standard 24 x 24 by 15/16 in. flange exposed grid system. The panel is specially cut around the edges so that the face extends below the supporting grid flange to create a 3/8-in. recess at all grid and wall lines.

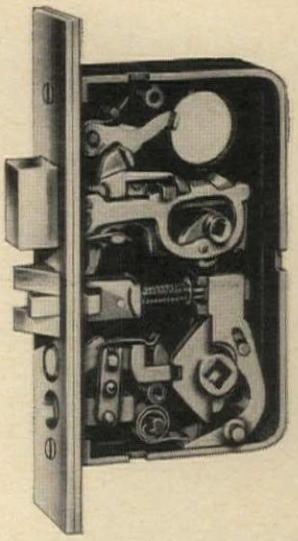
AGT Travertone is a specially treated acoustical tile designed for installation where room-to-room sound transmission is a critical factor. A newly developed backing gives the product a sound attenuation factor of 45.0 decibels, a substantial improvement over the company's regular and foil-backed *Travertone. Armstrong Cork Co., Lancaster, Pa.*

CIRCLE 312 ON INQUIRY CARD

more products on page 232

The DENVER HILTON

Not one service call on locks in four years.



The Denver Hilton hotel, like most new Hiltons, first opened with the turn of a Lockwood key. Lockwood heavy-duty mortise locks were used throughout.

Today, after four years the report comes back . . . not one service call has been required for any of the more than 2,000 locks supplied.

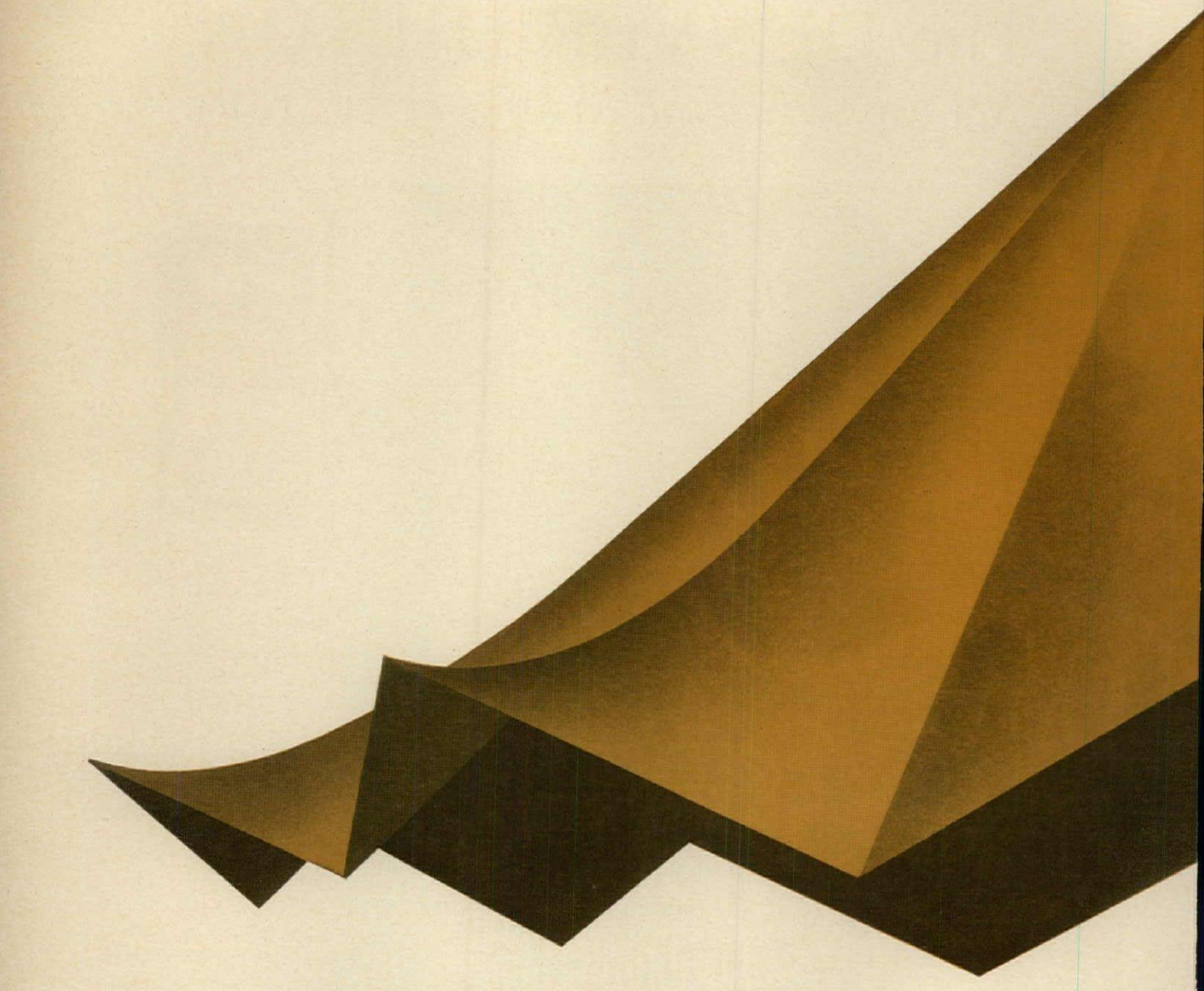
Surprising? Not to us. We know just how much quality we build into every Lockwood mortise lock. We will be glad to tell you about it too . . . just ask us.

LOCKWOOD

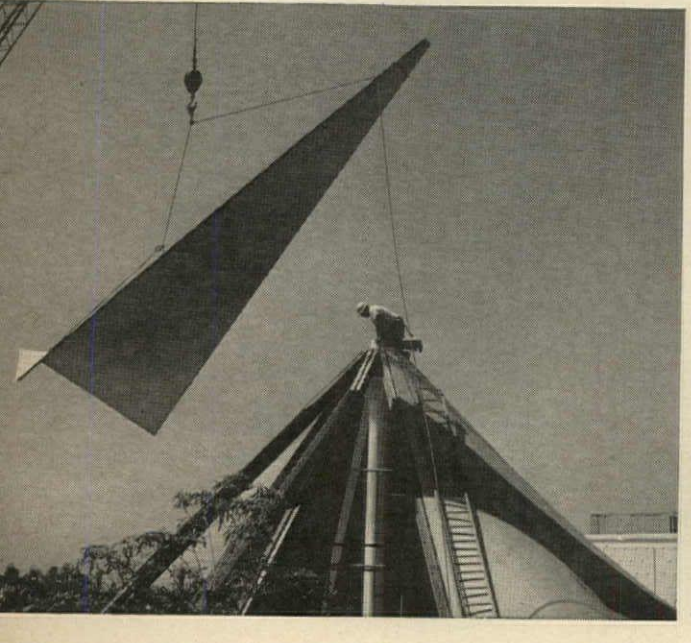
LOCKWOOD HARDWARE MFG. CO.
FITCHBURG, MASSACHUSETTS

For more data, circle 123 on Inquiry Card

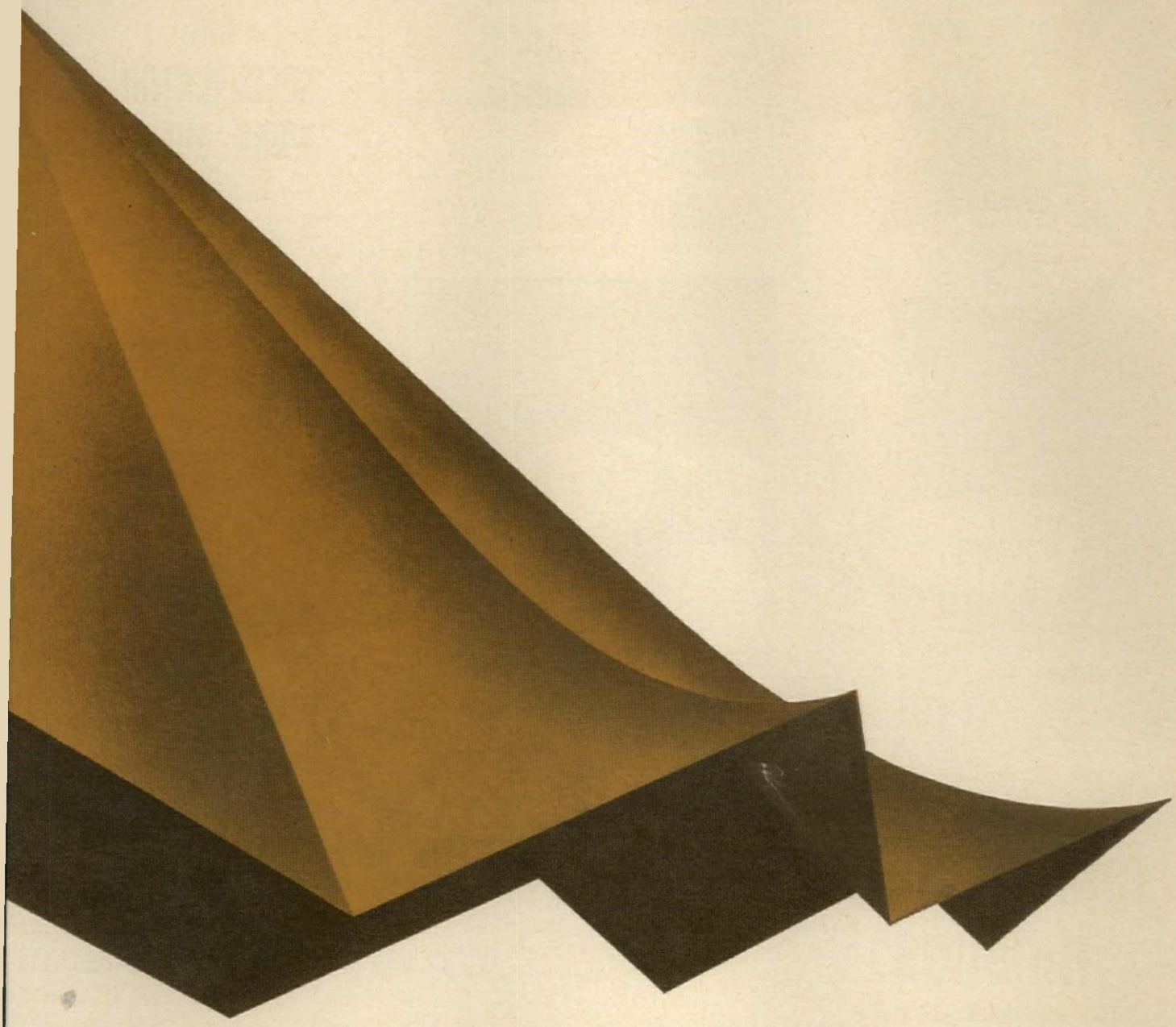
SHADE PAVILION, THE STUART COMPANY, PASADENA, CALIFORNIA

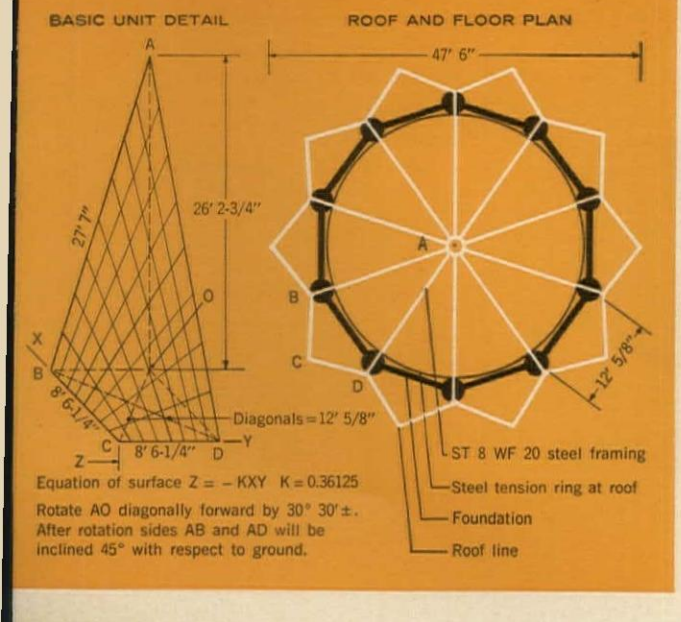


the most exciting ideas take shape in plywood



EDWARD D. STONE, ARCHITECT/HALL, PREGNOFF & MATHEU, ENGINEERS/WELDWOOD STRUCTURES DIVISION, UNITED STATES PLYWOOD, FABRICATOR





The sculptured curves of this pavilion look as though they could have been shaped only with a plastic material. Instead they were achieved with flat panels of plywood. ■ Each roof unit is a hyperbolic paraboloid, laminated from four layers of 1/4" plywood and bolted to steel "T" sections rising to 28' at the center. Despite the complex curvatures, in-place roof cost was only $3/sq. ft., one-fifth that of aluminum and well below steel or concrete. ■ For information on plywood building systems write (USA only) American Plywood Association, Tacoma, Washington 98401

AMERICAN PLYWOOD ASSOCIATION

The new name for Douglas Fir Plywood Association.
Quality-tested by the Division For Product Approval.

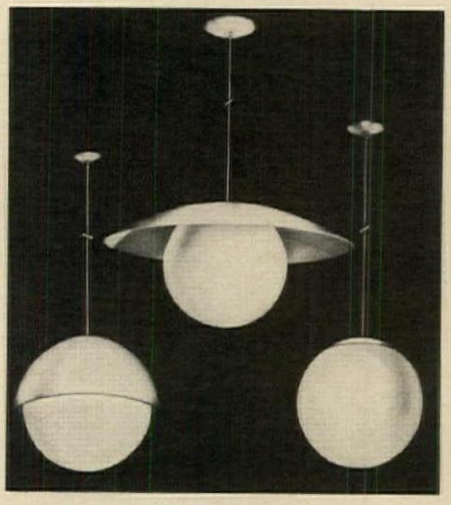
TESTED DFPA QUALITY

Product Reports

continued from page 228

NEW RANGE OF INCANDESCENT LIGHTING EQUIPMENT

A new group of surface-mounted incandescent lighting devices has just been introduced by this company. The new line includes a series of pendant opal spheres which can be



used alone or with a dome or close-hugging hood. *Department SI, Silvray-Litecraft Corp., 100 Dayton Ave., Passaic, N.J.*

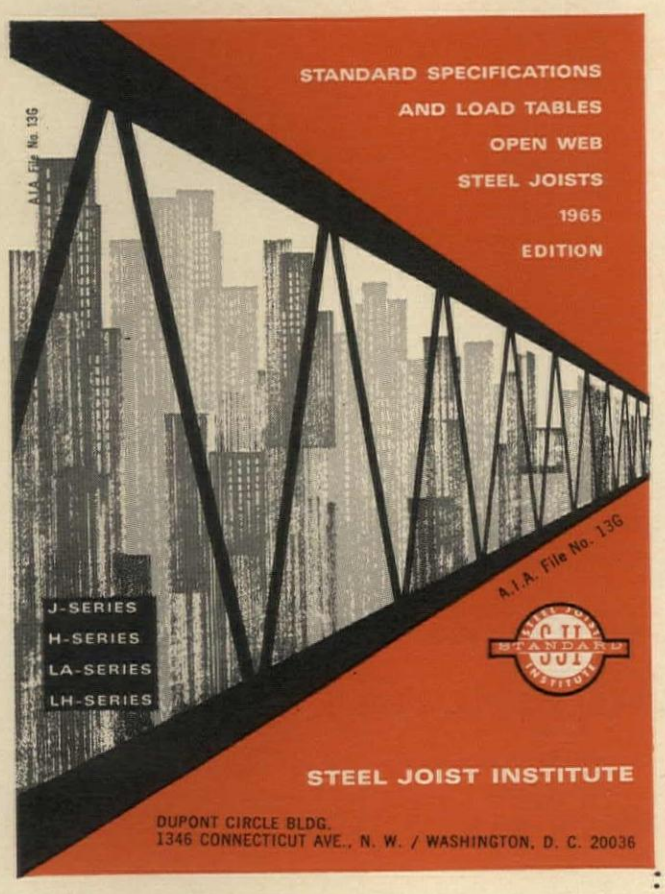
CIRCLE 313 ON INQUIRY CARD

NEW DIMMING CONTROL

Hunt Electronics Company has announced the addition of a new 600-watt, incandescent dimming control, which replaces one three-way wall switch. The unit, catalog number PC 61/3P, is easily installed in any standard 2-in.-deep single gang switch box, and can be turned on and off from either the dimmer itself or from the other three-way switch. *Hunt Electronics Company, Dallas, Tex.*

CIRCLE 314 ON INQUIRY CARD

NOW AVAILABLE!



1965 EDITION

SPECIFICATIONS AND LOAD TABLES FOR HIGH STRENGTH OPEN WEB STEEL JOISTS

including:

J-SERIES joists made from 36,000 PSI minimum yield strength steel.

LA-SERIES longspan joists compatible with the J-Series

H-SERIES high-strength joists made from 50,000 psi minimum yield strength steel.

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Here's all the information you need for fast and accurate specification of joists to carry uniform loads on spans up to 96 feet. Send coupon today for your copy of this practical, up-to-the-minute, 36-page reference manual from the Steel Joist Institute.

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For more data, circle 126 on Inquiry Card

Investment Opportunity

Thirty years from now this dreamer will be chasing the sun around the earth in a silvery bubble satellite —his eyes our eyes, his hands our hands, his heart our heart.

Whose task is it to loft him to such heights? Whose task to nurture him? Whose to take the long years to train and teach him?

It is the task of all of us. Each of us must take responsibility. Each of us has an investment in him.

You can protect that investment by joining with other leading American businessmen to promote the Treasury Department's Payroll Savings Plan for U. S. Savings Bonds. The Treasury's plan works for strength in the defense of our liberties . . . soundness in the conduct of our personal and national affairs . . . forethought and preparedness in our thinking.

When you bring the Payroll Savings Plan into your plant—*when you encourage your employees to enroll*—you are investing in the astronauts of tomorrow. In all those children who dream of skies beyond our skies and worlds beyond ours. You are investing in America's future. In freedom itself.

Don't pass this investment opportunity by. Call your State Savings Bonds Director. Or write today directly to the Treasury Department, United States Savings Bonds Division, Washington, D.C., 20226.

in your plant...promote the PAYROLL SAVINGS PLAN for U.S. SAVINGS BONDS

The U. S. Government does not pay for this advertisement. The Treasury Department thanks, for their patriotism, The Advertising Council and this magazine.

Office Literature

continued from page 189

RIGGING SYSTEMS

Sky climber electrical, manual and air-powered rigging units are described in a four-page brochure. Details of safety and operational features are given. *Western Gear Corp., Sky Climber Division, 545 Standish St., Redwood City, Calif.*

CIRCLE 411 ON INQUIRY CARD

RUBBER STAMPS FOR THE DRAWING BOARD

A remarkable collection of rubber stamps for the use of architectural draughstmen is presented in a beautifully produced new catalog. Stamp designs include tree patterns, shrubbery, tree elevations, figures, arrows and automobiles, in sizes suitable for drawings of from ⅛ in. scale to 1/100 in. *Design Specialties, Inc., 821 S. Neil, Champaign, Ill.*

CIRCLE 412 ON INQUIRY CARD

AUDIBLE SIGNAL CATALOG

A 16-page two-color catalog gives details of the company's line of Audible Signals. General data, specifications and a section defining the various types of signal in common use are included in the brochure. Products described include the new *Audibell* line of heavy duty bells for AC or DC operation; motor diven sirens, weatherproof howlers and different types of buzzer. *Benjamin Products, Thomas Industries Inc., 207 East Broadway, Louisville, Ky.**

CIRCLE 413 ON INQUIRY CARD

COMPLETE CEILING SYSTEM

Details of the *Quartette* ceiling system are given in a new illustrated brochure. The ceiling which provides lighting, acoustical control, air supply and return, and partition support in every module, is claimed to have exceptionally low maintenance and operating costs. The booklet shows a number of ways in which the ceilings can be used to give different effects. Engineering data and specifications are also included. *Luminous Ceilings Inc., 3701 N. Ravenswood Ave., Chicago, Ill.**

CIRCLE 414 ON INQUIRY CARD

CABLE LADDER SYSTEM

A new catalog gives comprehensive information about the Cope *Versi-Span* Cable Ladder System for the support of electrical power cables, control cables and instrument tubing. The system is shown alone, or with channel and tube race. The system is versatile in its range of radii—up to 36 in. for heavy conductors and large tube bundles—and permits drop outs anywhere without special fittings. *T. J. Cope, Collegeville, Pa., 19426*

CIRCLE 415 ON INQUIRY CARD

MULTI-PURPOSE HYDRONIC HEATING SYSTEM

A compact system for hydronic central heating, which also has the capacity for heating domestic hot water, indirect pool heating and snow melting, is described in an illustrated brochure. The booklet contains diagrammatic drawings, data and dimensions of the different models, and a heater capacity chart. *Raypak Company, Inc., 2430 Chicago Ave., El Monte, Calif., 91734*

CIRCLE 416 ON INQUIRY CARD

**Additional product information in Sweet's Architectural File*

more literature on page 240

Mattel, Inc. chooses shock-resistant PYROFILL* Gypsum Concrete Roof Deck

WINDS UP WITH BIG SAVINGS!

The roof deck material in the new plant of toymaker Mattel, Inc., City of Industry, California, is PYROFILL Gypsum Concrete. This system was chosen for its known durability, fire safety, and rapid installation, plus its excellent resistance to seismic shock. PYROFILL provided all that—and more! PYROFILL Gypsum Concrete allowed the engineer to use the steel joists and open truss tees to their full potential—bays are 40′ x 60′. The gypsum roof design proved so economical that it saved the company thousands of dollars. The entire plant floor area of 330,000 sq. ft. is at truck bed level and at rail siding level. There is a 26′ minimum clearance throughout. This means the company can shift the amount of floor space in use between production and storage, a vital consideration in toy manufacturing. Job in and job out, PYROFILL Gypsum Concrete Roof Decks fulfill any design concept far better, for less. When poured over a network of steel, gypsum concrete sets rock-hard—locks the roof to the building structure and actually reinforces it.

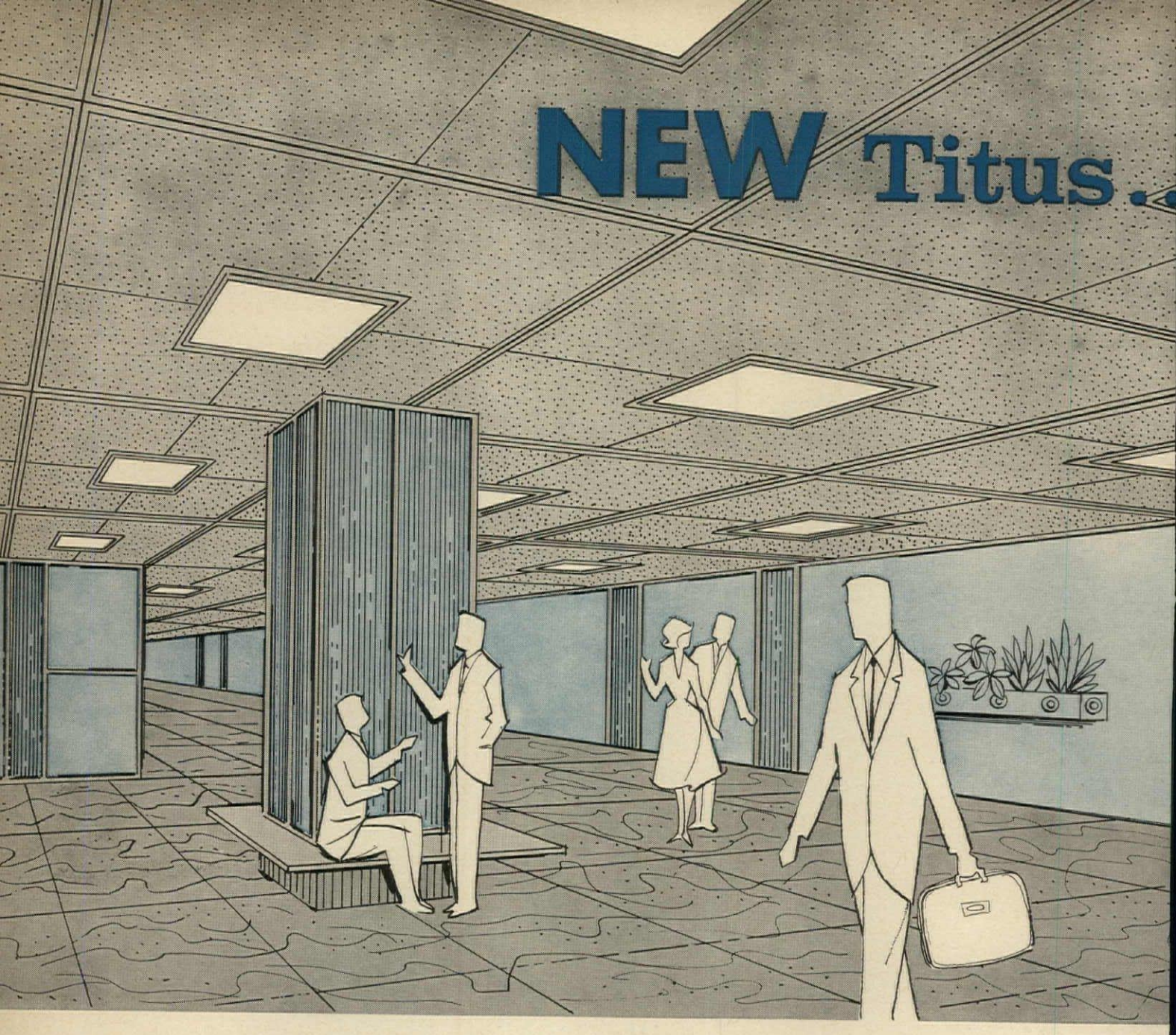
Contact your U.S.G. Sales Representative for more information. Or write us at 101 South Wacker Drive, Dept. AR-51, Chicago, Illinois 60606. *T.M. Reg. U.S. Pat. Off.

UNITED STATES GYPSUM
THE GREATEST NAME IN BUILDING

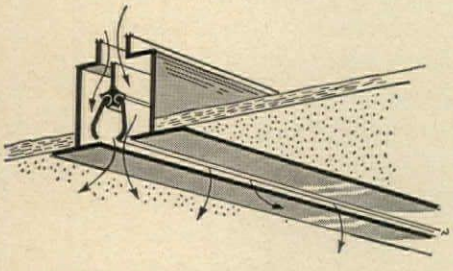
Consulting Structural Engineer: John R. Anderson, Pasadena, Calif. General Contractor: Ernest W. Hahn Inc., Hawthorne and Sacramento, Calif. PYROFILL Roof Deck Contractor: Anning Johnson Co., South Gate, Calif.

For more data, circle 130 on Inquiry Card

NEW Titus...

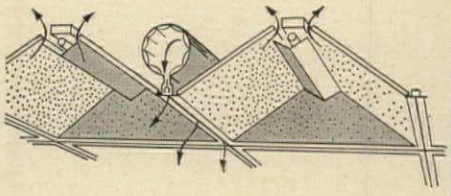


New simplicity, versatility... new design freedom for today's integrated modular ceilings! Specify a Titus ceiling air diffusion system and be sure of sound air distribution that will fully meet today's needs...as well as tomorrow's.



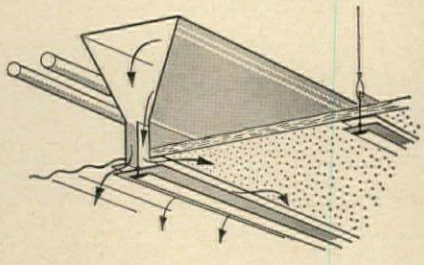
TITUS MODULinear...

Outstanding architectural design for continuous line use. 180° adjustable air pattern. 1, 2, 3 and 4-slot models. Extruded aluminum.



TITUS COV-Aire...

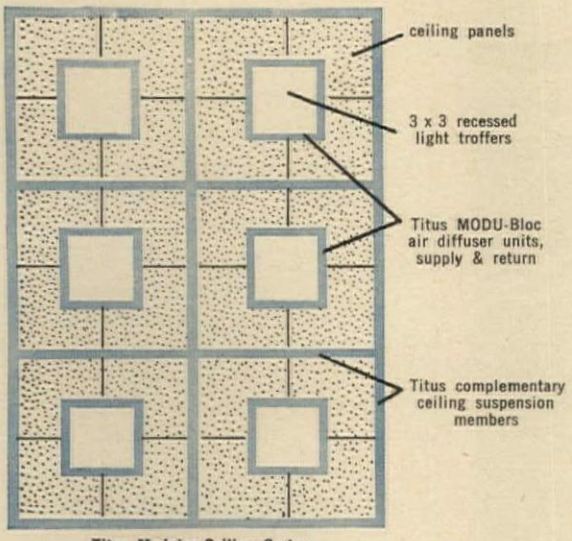
Offers the ultimate in modern architectural design and sound air diffusion for cove-type ceilings. Wide flexibility of air pattern adjustment.



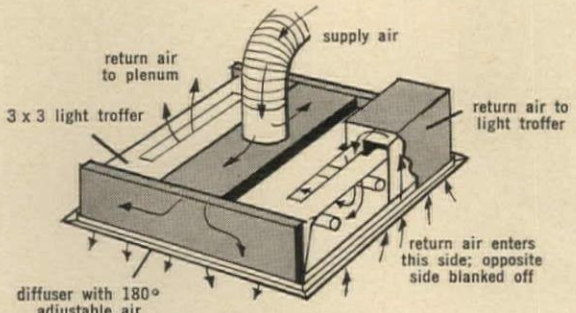
TITUS LINEAR-Tee...

Simplified, soundly engineered air distribution that integrates completely into the lighting and paneling of nearly any type modular ceiling.

air diffusion system for modular ceilings



Titus Modular Ceiling System
(Blue designates units by Titus)



Basic Titus MODU-Bloc Unit

A ceiling air diffusion system and complementary ceiling suspension system that provide the maximum in efficiency, flexibility and economy in integrating SOUND AIR DIFFUSION, good lighting and acoustical control.

MODU-Bloc diffuser units offer **tremendous versatility** in handling air -- provide the necessary air patterns and air flow rate control to satisfy the most demanding requirements. **ONE SET** of vanes controls **BOTH** air pattern (adjustable 180° to full vertical, full horizontal or any pattern in between) and air flow rate control -- including blank-off. Each MODU-Bloc unit can handle **both supply and return air.**

AND HERE IS THE MOST MODERN ARCHITECTURAL DESIGN! The extruded aluminum complementary ceiling support members fully match in appearance the smartly styled linear design of MODU-Bloc diffusers.

by TITUS®

MAIL COUPON FOR NEW, FREE LITERATURE

TITUS MANUFACTURING CORPORATION, Waterloo, Iowa

☐ Please rush literature on the new Titus Air Diffusion System for Modular Ceilings. Also send literature on: ☐ TITUS MODULinear ☐ TITUS COV-Aire ☐ TITUS LINEAR-Tee.
☐ Have Titus Representative call on me.

NAME .....

TITLE .....

COMPANY .....

ADDRESS .....

For more data, circle 131 on Inquiry Card

Office Literature

continued from page 236

MODULAR WALL FURNITURE

"Masterwall" is the title of a new catalog issued by the company to illustrate its modular wall furniture systems. Specifications, installation and construction details are given, as well as dimensions and drawings of the various components. *Tassell Industries, Inc., Grand Rapids, Mich.*

CIRCLE 417 ON INQUIRY CARD

SCULPTURED STOREFRONT PANELING

Shadopanel, a new porcelain on aluminum storefront material, is described and illustrated in a four-page brochure. Illustrations are included to show the different light and shadow effects which can be obtained by the use of this material. Specifications and installation information are also given. *Mapes & Co., Division of Mapes Industries, Inc., P.O. Box 2067, Nebraska, 68501* *

CIRCLE 418 ON INQUIRY CARD

CONCRETE COLOR GUIDE

Samples of the colors available in the Williams range of colors for concrete building products are displayed in a new brochure. The color pigments are produced from natural and synthetic iron oxides and synthetic chromium oxides, and are illustrated in full strength and pastel shades in both gray and white cements. Each page includes the correct mixing formula for obtaining the colors shown. *Williams Colors & Pigments, Chas. Pfizer & Co., Inc., 235 East 42nd St., New York, N.Y., 00017*

CIRCLE 419 ON INQUIRY CARD

STEEL DOOR AND FRAME SELECTION GUIDE

A new four-page colored selection guide of steel frames and doors is currently available from Amweld Building Products. Each of the firm's *Clean Line* doors is featured with charts detailing sizes, clearances, construction features, reinforcements and sound deadening. UL and Factory Mutual "Certified" Fire Doors are included. The last page contains charts showing steel frame profiles, types and sizes as well as anchoring information. *Amweld Building Products, 100 Plant St., Niles, Ohio.**

CIRCLE 420 ON INQUIRY CARD

INSULATING GLASS

The design flexibility of *Therm-O-Proof* insulating glass is emphasized in the new eight-page catalog. The booklet describes specifications and glazing instructions and gives illustrations of various buildings in which this glass has been used in differing ways. A section explains heating and cost reductions which have been obtained by the use of insulating glass in place of double glazing. *Thermoproof Glass Company, 4815 Cabot Ave., Detroit, Mich., 48210**

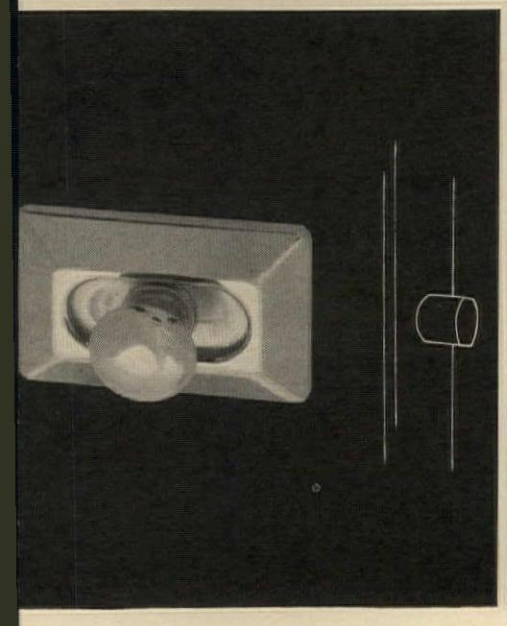
CIRCLE 421 ON INQUIRY CARD

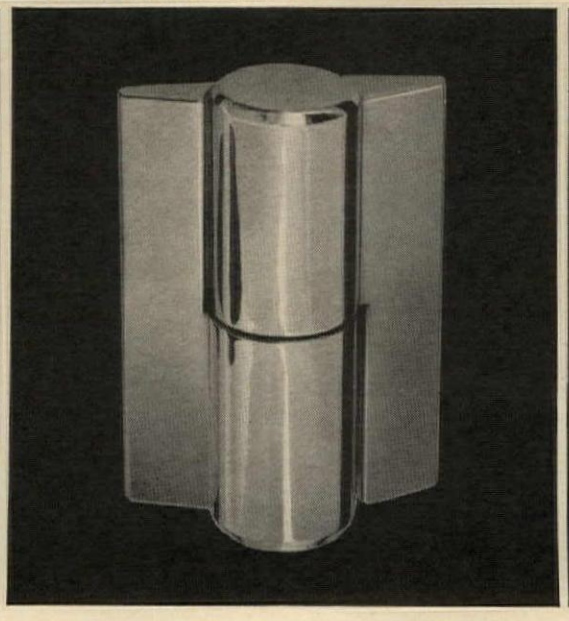
ELECTRIC THERMOSTATS

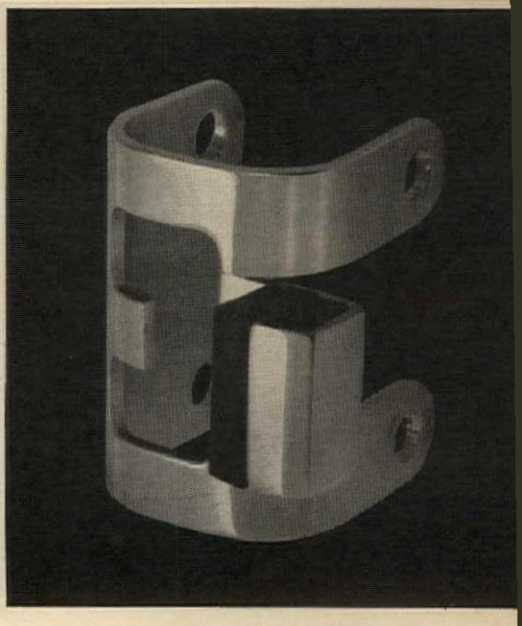
The company's line of electric heat thermostats is described in a four-page color brochure. Photographs and specifications are given for each model. The equipment described includes line voltage room thermostats, dual-duty combinations and low-voltage controls. *White-Rodgers, 9797 Reavis Rd., St. Louis 23, Mo.*

CIRCLE 422 ON INQUIRY CARD

**Additional product information in Sweet's Architectural File*







Standard equipment! Solid Brass Hardware

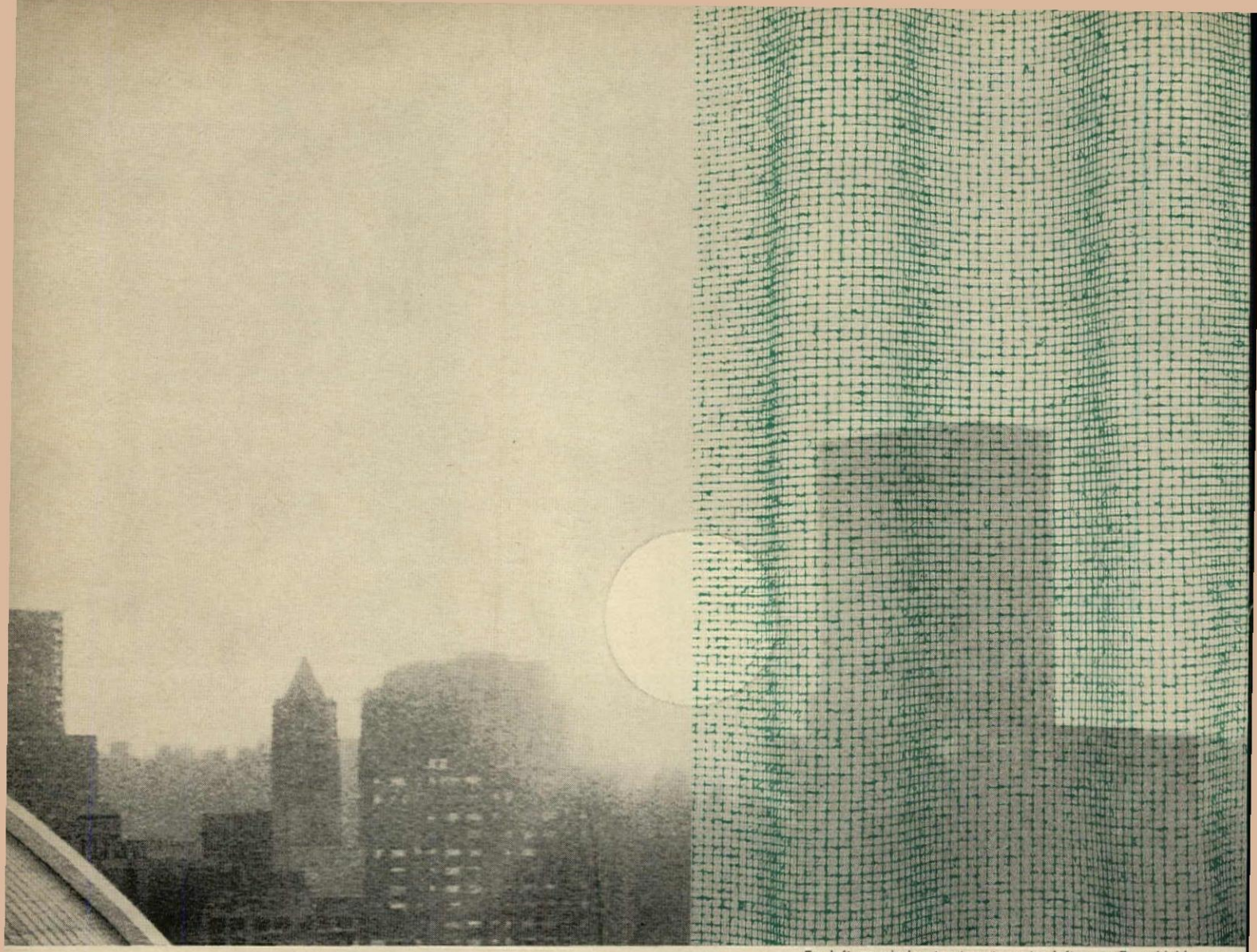
Another long-life feature for Weis Toilet Compartments: *solid brass hardware.* Solid brass plus the added protection and beauty of brilliant chromium plate. The latch, which continues to feature lift-free emergency access, is now recessed within the door. The stainless steel bolt automatically retracts if the door is slammed against the new wrap-around keeper and rubber tipped bumper. Handsome surface mounted hinges, proven through long service, give either 180° outswing or inswing action. *Solid*, these compartments by Weis with solid brass hardware.

Write for Catalog No. 36 *See Weis in Sweet's*

WEIS

HENRY WEIS MFG., ELKHART, INDIANA

For more data, circle 133 on Inquiry Card



Far left, no window treatment; center left, open Feneshield weave

Now, Feneshield® fabrics... fiber glass architectural draperies with a scientifically-oriented system of selection

Now you can choose fenestration fabrics for more than just decorative purpose. Feneshield fabrics, made from PPG Feneshield® fiber glass yarns, offer you for the first time a new, scientific approach to the control of exterior appearance and interior environment.

Research by PPG has produced a new system which provides a scientific method of selecting fiber glass draperies, based on fabric characteristics most likely to meet environment control needs.

All Feneshield fabrics are classified according to weave and color combinations, and are rated for such factors as shading coefficients, outward vision, privacy, body comfort, eye comfort, and ear comfort.

This is how Feneshield fiber glass fabrics can perform in a variety of installation situations:

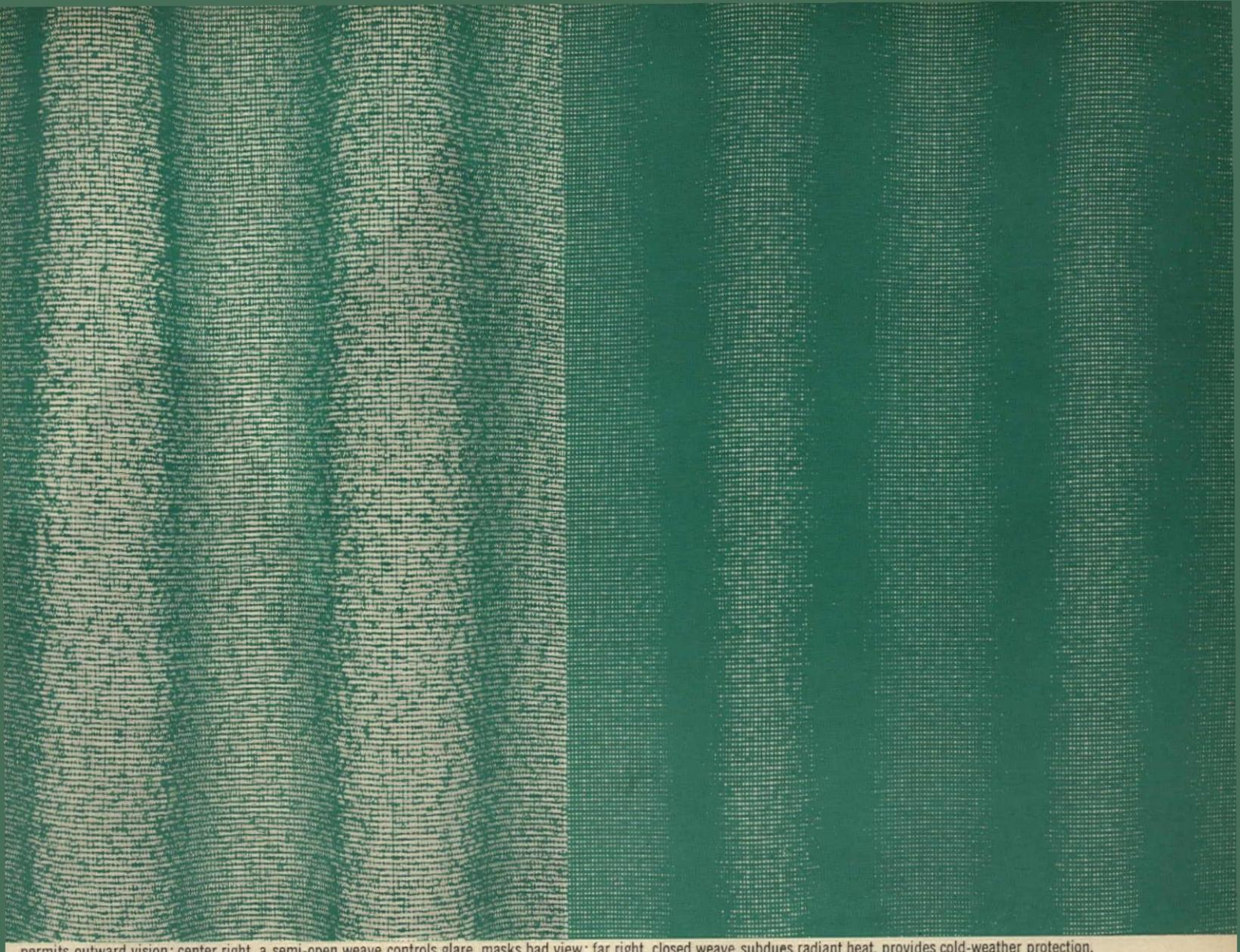
Feneshield fabrics control exterior appearance. Correct window treatment contributes greatly to a building's exterior appearance. Specification of Feneshield fabrics helps retain aesthetic control. The fabric becomes part of the over-all design.

Feneshield fabrics subdue solar radiant heat. Research shows that Feneshield fabrics reduce solar heat transfer better than other shading devices, allow much less reradiation, resulting in reduced air conditioning loads and more comfortable working conditions.

Feneshield fabrics control glare. Feneshield fabrics soften and diffuse light, but do not shut it out completely, allowing the best use of natural light and reducing eye strain and discomfort.

Feneshield fabrics improve sound control. Feneshield fabrics hung at windows, room dividers, or partitions measurably improve acoustical control by absorbing sound normally reflected by hard-surfaced walls and windows.

Feneshield fabrics enhance a pleasing view, modify a bad one. A Feneshield weave and color may be selected to emphasize a good



permits outward vision; center right, a semi-open weave controls glare, masks bad view; far right, closed weave subdues radiant heat, provides cold-weather protection.

view and still provide privacy and natural light. An identical color in a closer, more opaque weave will conceal a bad view, yet still admit a high degree of natural light.

Feneshield fabrics offer savings. Although initial cost of Feneshield fabrics may be greater than other types of shading devices, combined initial costs and maintenance costs are less for Feneshield than for other devices.

Complete information available. Participating fabric resources have authorized Feneshield presentations which show the wide range of fabric weaves and colors available. They can help you select fabrics for specific installations through use of PPG technical data. Write PPG for names of jobbers near you. (PPG makes the Feneshield fiber glass yarn only, not the finished fabric.)

You can obtain complete technical information, including means of selection of Feneshield fabrics for any type of building installation. Just mail the coupon.

Pittsburgh Plate Glass Company, Fiber Glass Division
One Gateway Center, Pittsburgh, Penna. 15222

☐ Please send me complete technical information on Feneshield fabrics.

☐ Please send me names of authorized Feneshield converters.

Name_____

Title_____

Company_____

Address_____

City_____ **State**_____ **Zip Code**_____

PPG® *fiber glass*
...the fiber glass for finer fabrics

Pittsburgh Plate Glass Company
Fiber Glass Division
One Gateway Center, Pittsburgh, Pa. 15222
579 Fifth Avenue, New York, N.Y. 10017

For more data, circle 134 on Inquiry Card

HUGE EXCAVATION OPERATION WILL RELOCATE TEMPLES AT ABU SIMBEL

Salvage operations have begun to preserve the 3,200-year-old temples at Abu Simbel in Upper Egypt. Threatened by the rapidly rising Nile River backing up behind the now closed Aswan High Dam, the temples are being prepared for dismantling and reassembly on the plateau 225 feet above their present site.

Hamilton Wright photos

Heading a team of professional engineers from Italy, Egypt, West Germany and France is resident engineer Ahmed Fahim, loaned to the project from Egypt's Ministry of Irrigation. Joint Venture Abu Simbel, a UNESCO project enlisting resources of 47 nations is involved in the effort.

The American Committee to Preserve Abu Simbel, a group of private American citizens headed by philanthropist Huntington Hartford and including Edward Durrell Stone, architect, is engaged in a nation-wide campaign to save the project.

Already nearing completion is the first phase of the rescue operation—a protective cofferdam which will temporarily keep the Nile's waters at bay while engineers and workers remove the huge temples, block by block, to higher ground. Nearly 1,200 feet long, the curved cofferdam has a core of 1,824 fitted steel shafts.

The actual excavation of the temples has begun as well as the smaller statues on the facade having been removed recently to the safe staging area (*above right*).

Inside the great temple, dug 200 feet out of the solid sandstone mountain, 280 tons of steel scaffolding have been wedged in the passageways to insure against damage from cracking or cave-ins as tons of rock are removed from above. Ultimately, 121,000 pounds of sand will completely cover the 65-foot-high colossi and the 33-foot statues of the smaller temple of Nefertari downstream. The statues will thus be protected during the excavation of 5 million cubic feet of solid sandstone from above.

Office Notes

Offices Opened

John M. Rowlett, A.I.A., is the partner in charge of the new office of **Caudill, Rowlett & Scott, Architects,** at 230 Park Avenue, Suite 626, New York City.

New Firms, Firm Changes

Lawrence H. Allen and **L. Preston Wade,** engineers, and **M. Kent Shelton,** architect, have been named associates in the Lynchburg, Va., consulting engineering firm of **Wiley & Wilson.** New associates in the firm's Richmond office are **Elwood F. Holton, John L. Kerner** and **John C. Reid.**

Frederick Baesaler has been appointed project administrator in the Detroit architectural and engineering firm of **Harley, Ellington, Cowin and Stirton, Inc.**

John R. Campbell has been named project architect in the Los Angeles office of **Charles Luckman Associates.**

Richard P. Cate has been named job captain by the architectural and engineering firm of **Jenkins, Hoff and Heimsath** of Houston.

W. R. Dickson & Associates, Architects of Huntsville, Ala., announce the change of the firm name to **Dickson, Jones & Davis, Architects, A.I.A.**

F. Andrew Foord, A.I.A., has been named an associate of **Ballard Todd Associates, Architects,** of New York City.

Harry C. Grieme has been appointed vice president of the **Heyward-Robinson Company,** architectural, engineering and construction firm of New York City.

Clovis B. Heimsath, A.I.A., is a new partner in the Houston architectural firm of Jenkins and Hoff, henceforth to be known as **Jenkins, Hoff and Heimsath.**

The San Francisco architectural firm of Roger F. Hooper & Associates has announced a change in the firm's name to **Hooper, Olmsted & Emmons.**

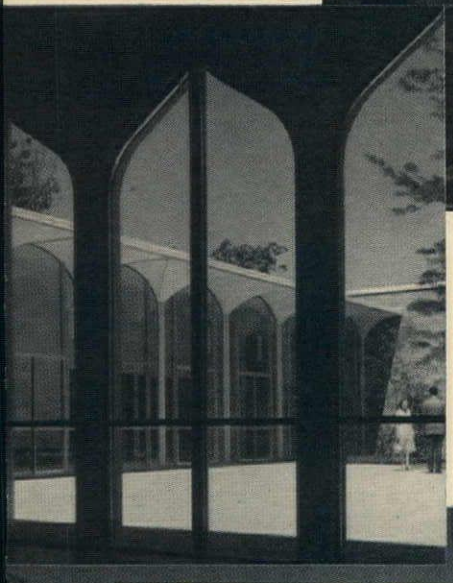
The St. Louis architectural firm of **Hellmuth, Obata and Kassabaum** has established a new landscape architecture department under the direction of **Neil H. Porterfield.**

continued on page 278

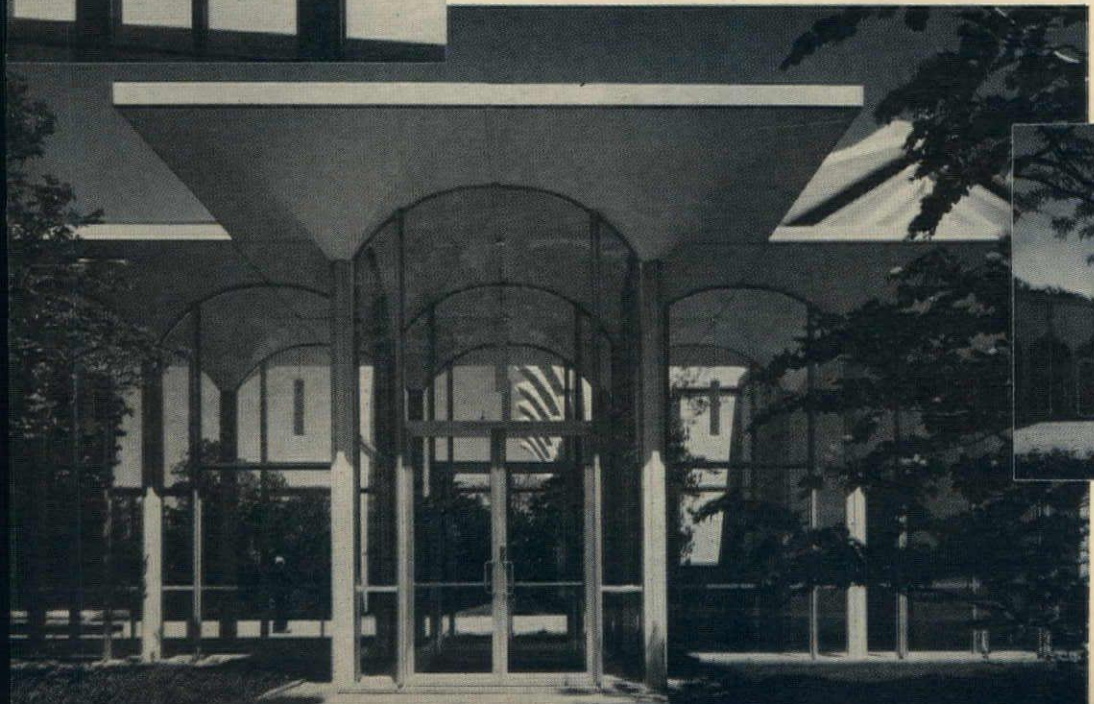
ARCHITECT:
MINORU
YAMASAKI
AND ASSOCIATES
Birmingham, Mich.

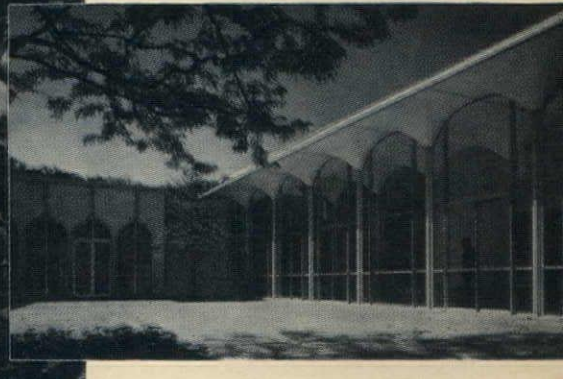
Contractor
GEO. A. FULLER
Chicago, Ill.

Fenestration
by
MARMET CORPORATION



An inspiration in structure
to lift the spirit of the worshiper





photographs by Hedrich-Blessing

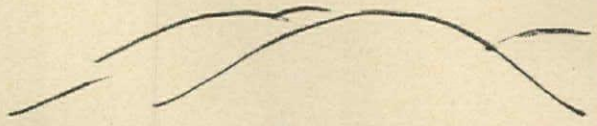
Owner's Guidance:

Provide a variety of pleasant dining rooms for 1,000 college men.

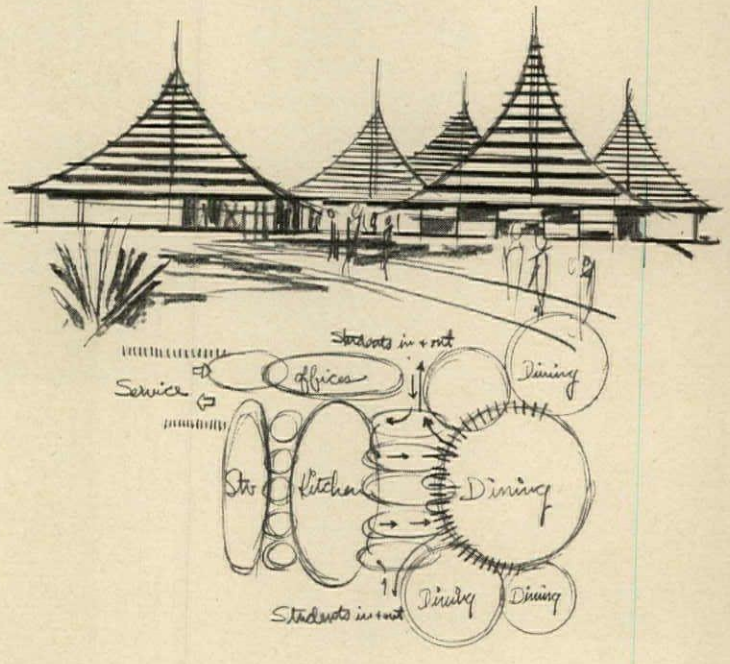
Provide an extremely functional kitchen to minimize operational costs.

"We encourage orginality and freshness."

Architectural Concept:



A design which is nondirectional, sculptural in quality - pyramidal shapes which contrast with the neighboring Palouse Hills.



Rogers-Orton Dining Hall Washington State University

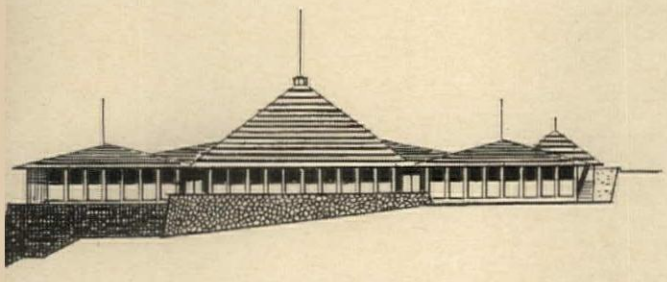
"The building had to be related to two 12-story buildings on either side. We wanted it to stand and speak for itself."

"Steel answered our design needs better than any other material."

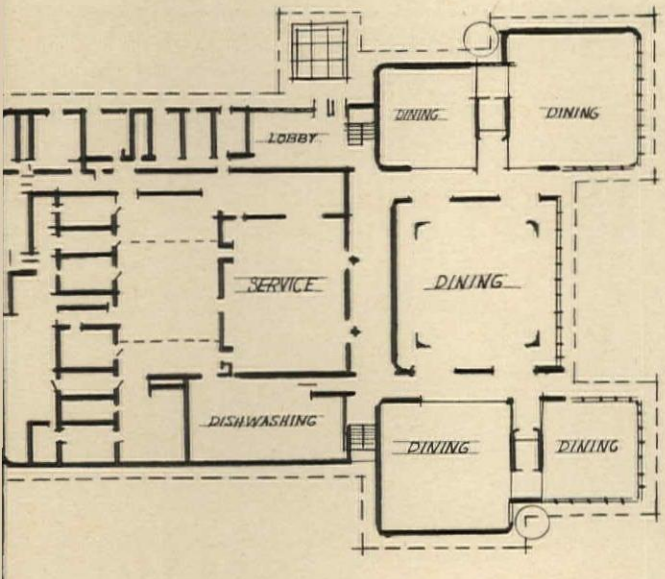
Kenneth W. Brooks, A.I.A., Architects, Spokane

Structural Engineer: Lyerla & Peden, Spokane. General Contractor: H. Halvorson, Inc., Spokane. Steel Fabricator: Pybus Steel Company, Wenatchee, Washington.

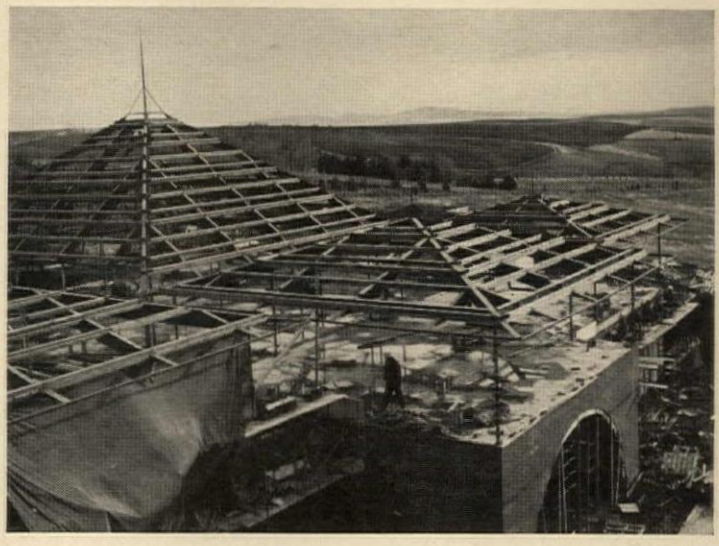
Architectural Plan:



The five dining rooms are of several sizes and degrees of openness to provide a variety of dining atmospheres.



Structure:



Steel rafters and purlins fireproofed for Class "A" construction. Columns are 3-in. through 5-in. pipe.

All steelwork was assembled in the shop and checked for alignment and fit before shipment to the site.

Steel channels of varying depths, and wooden blocking, support the steps in the roofs made up of steel purlins with shingle roofing.

Bethlehem supplied 136 tons of structurals for this building. Bethlehem Steel Corporation, Bethlehem, Pa. Export Sales: Bethlehem Steel Export Corporation.

Steel

Steel for Strength

BETHLEHEM STEEL

BETHLEHEM STEEL

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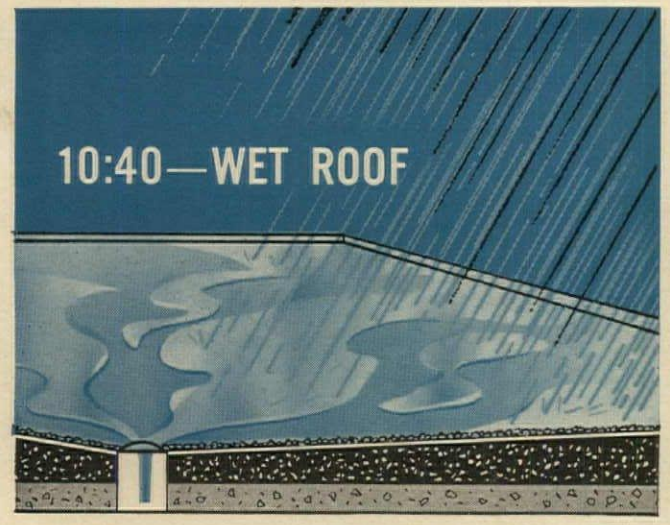

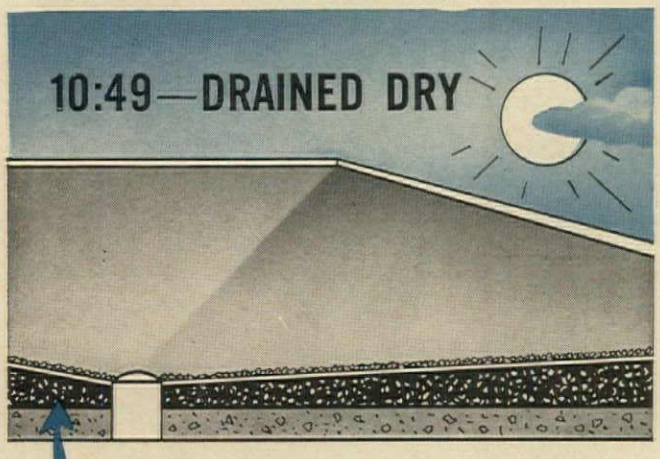

the only dry applied roof deck insulation that can be contour sloped to drains!

All-weather Crete®

ROOF DECK INSULATION

The unique ability of All-weather Crete roof deck insulation to be pitched to drains, evenly and smoothly, allows for rapid water run-off. Its uncommon but precise combination of volcanic glass rock and thermoplastic binder, mixed on the job and applied hot and DRY, produce a jointless roof deck fill with a K-factor, .40, better than any other poured roof deck insulation.

And winter does not stop the All-weather Crete franchised installer . . . since it is completely workable and can be applied in below freezing temperatures.

Use All-weather Crete for all flat roofs, parking decks, re-roofing, and ice rink bases. No expansion . . . cannot damage surrounding walls. Eliminates any possibility of vapor pressure build-up. Contains no water . . . cannot freeze out or be rained out. Underwriters approved . . . for metal deck construction.

Write today, for a complete 12-page brochure.

SILBRICO CORPORATION

5901 WEST 66th STREET • CHICAGO, ILLINOIS 60638 • RE 5-3322

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The **OFFICE VALET®**

wood and metal

HAT and COAT RACKS

- ★ Mounts on any wall (off-the-floor)
- ★ Saves floor space
- ★ Rich, attractive—modern
- ★ Keeps wraps aired, dry, "in-press"

Combines the advantages of a modern coat rack and a built-in wardrobe. Holds hats, coats, overshoes apart, open to air, still out of sight. Permits utter flexibility of office layout. Brushed cast aluminum brackets support hat and utility shelves and hanger rail of solid walnut rods; 4 solid walnut coat hangers and a 30" x 72" oil finished walnut panel screen.

MODEL WA 500

This is just one of the new "luxury" units created by Vogel-Peterson — shown in full color and described in Bulletin OV-52.

Write for it today.

VOGEL-PETERSON CO.

ELMHURST • ILLINOIS

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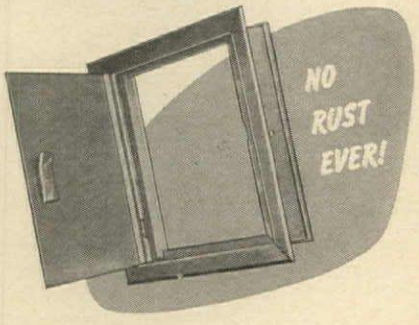
newman aluminum ACCESS DOORS



- Provide easy access through walls and to service points, valves and controls.
- Furnished complete—ready to install.
- Rigid aluminum construction.
- Caustic etched and lacquered natural finish, can be field painted if desired.
- No assembling.

WRITE FOR NEW 1965 BULLETIN

For distributors, see Sweets Catalog 16K/NE

NEWMAN BROTHERS INC.
5611 CENTER HILL AVE.
CINCINNATI, OHIO 45216

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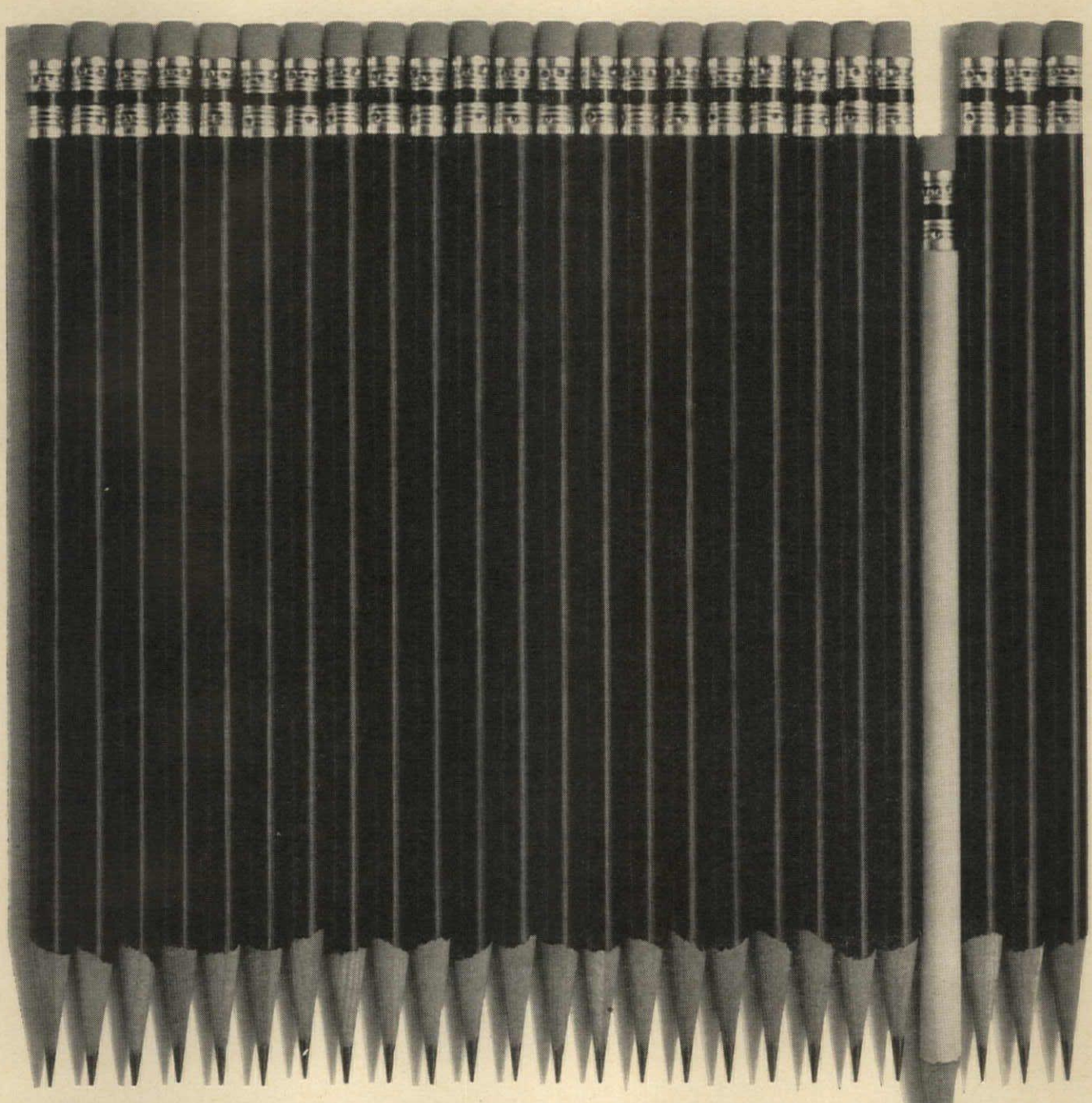

You have added design flexibility when air ducts are out of the picture.

An in-slab heating/cooling system with J-M TRANSITE® air ducts lets you flex your design muscles. With ducts below grade, buildings can be lower. Ceilings higher. Glass areas more extensive. Furred ceilings and beam construction can be forgotten.

Your client gets a more efficient, more economical system. TRANSITE ducts radiate heat, put warmth into the slab, eliminate cold spots. Smaller ducts or smaller blowers can be used, because long TRANSITE* air duct lengths and smooth bore allow air conveyance with 30% less pressure drop than sheet metal.

TRANSITE ducts install easily. Available in a wide range (4" to 36") with all needed fittings. For full details, write Johns-Manville, Box 362, AR-1, New York, New York 10016. Canada: Port Credit, Ontario. Cable address: Johnmanvil.

*TRANSITE IS JOHNS-MANVILLE'S REGISTERED TRADEMARK FOR ITS BRAND OF ASBESTOS-CEMENT PRODUCTS.

JOHNS-MANVILLE

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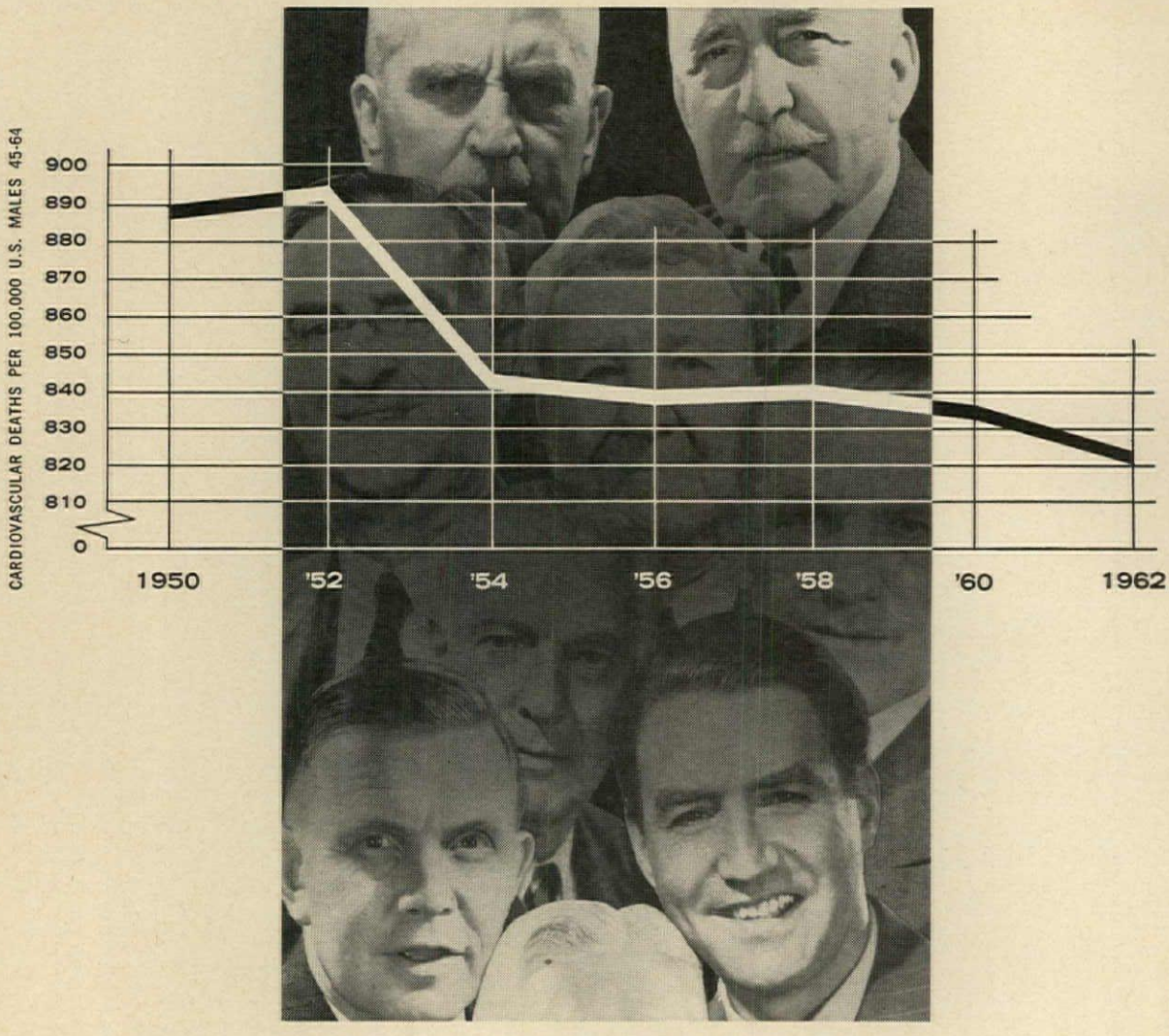
Your Heart Association Reports:

HEART RESEARCH PAYS OFF FOR MEN 45 TO 64



Here's good news for all men in the U.S., aged 45 to 64. The death rate from the cardiovascular diseases in their age group dropped 7½% since 1950, the year following the first Heart Fund campaign.

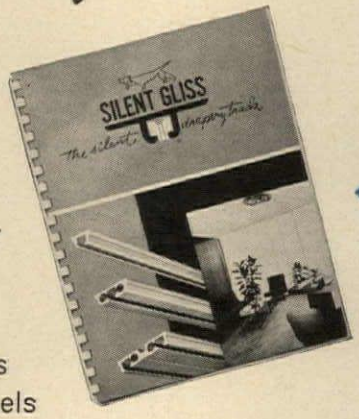
This dramatic trend is making medical history. For the first time, deaths from high blood pressure and the heart disease it causes are down 50% among men in their most productive years. Deaths from strokes are down 26%.

Score it as another triumph for heart research in its quest for new ways to control and prevent the heart and blood vessel diseases. But remember—these diseases are still the nation's Number 1 killer, claiming more than 950,000 lives a year. More Heart Fund dollars will assure more gains.

GIVE ...SO MORE WILL LIVE **HEART FUND**®

SILENT GLISS

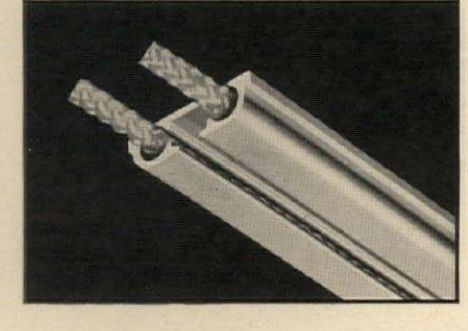
the silent drapery track®



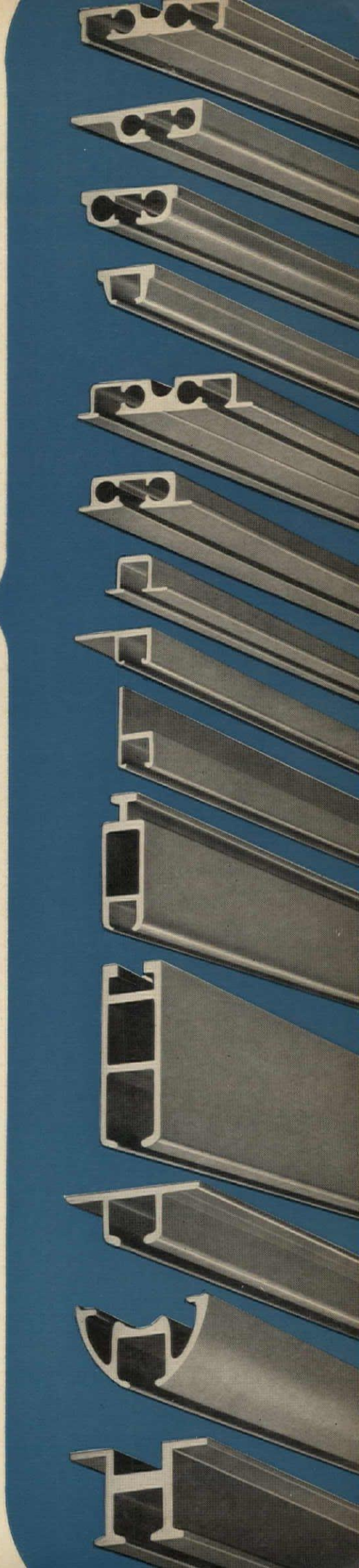
Whatever you may read, hear, or be told — one thing is sure: *there is no other track to equal Silent Gliss.*

The reasons are clear: ■ No other track has the patented system of cords traveling in separated, semi-enclosed channels (to prevent drooping, tangling, and other problems of tension systems). ■ No other track features the silence of satin-smooth rounded nylon carriers traveling in precisely fitted channels (no annoying "echo chamber" roller noise.) ■ No other track has the slim, trim lines of Silent Gliss (with the gracious contours of the thoroughbred).

Silent Gliss offers *fourteen* track styles to choose from: tracks for surface mounting, bracket mounting, or recessing . . . tracks for cord traversing or hand operation . . . tracks for cubicle, extra-duty or specialty use. All are shown and described in the complete illustrated catalog shown above. Write for full details today; address Dept. AR-1.



☐ Here is the *secret of Silent Gliss* . . . with its all-nylon cord, traveling in patented, *separated* channels. This means minimum maintenance, because there's no drooping, no tangling *ever*. It's one of the reasons why Silent Gliss is the *prestige* track, chosen for quality installations the world over.



SILENT GLISS, INC.

Distributing Companies

Angevine Co., Freeport, Illinois

Drapery Hardware Mfg. Co., Monrovia, California

THREE OF THE Newell COMPANIES

Manufacturers of Quality Drapery Hardware Since 1903

For more data, circle 160 on Inquiry Card

For more data, circle 161 on Inquiry Card

Office Notes

continued from page 270

Vincent G. Kling, F.A.I.A., of Philadelphia has announced a change in the name of his firm to **Vincent G. Kling and Associates,** and the appointment of **Frederick George Roth, F.A.I.A., Albert John Huber, A.I.A., Joseph Charles Tighe, A.I.A., Joseph Victor Marzella, R.A., John Rutkowski, R.A., Shirley Jane Vernon, R.A.** and **David Glenn Margolf, R.A.** as associates in the firm.

Victor H. Kusch has been named a partner in the Philadelphia architectural and planning firm of **Nolen-Swinburne and Associates.**

Carleton W. Lockwood and Associates, Civil Engineer, of Rialto, Calif., has been renamed **Lockwood Engineering & Surveying Company, Inc.**

Dirk J. Luykx has been named an associate in the Boston architectural firm of **Pierce & Pierce.**

Robert B. Malcolm has been named an associate of **The Perkins & Will Partnership** in the Washington, D.C., office.

Robert A. Odermatt, Architect, is a new associate in the San Francisco firm of **Rockrise and Watson, Architects.**

The Los Angeles architectural firm of **William L. Pereira & Associates** has appointed **Joseph W. Rakocy,** C.P.A., as treasurer-controller.

Giffels & Rossetti, Inc., Detroit-based architectural and engineering firm, has appointed **L. A. (Gino) Rossetti,** chief architectural designer.

The firm of Sasaki, Walker and Associates, Inc., of Watertown, Mass., has been re-named **Sasaki, Dawson, DeMay Associates, Inc.,** Landscape Architecture, Site Planning, Architecture, Planning.

New Addresses

Wendell B. Hallett, Architect, 2412 Minnesota Ave., S.E., Washington, D.C.

Tallie Maule, A.I.A., Architect and Planner, 2770 Jackson St., San Francisco.

Gerald M. McCue & Associates, Inc., 631 Clay St., San Francisco.

Alfred Easton Poor, Architects, 277 Park Ave., New York City.

Frank Schneider, A.I.A., and Associates, Sunset Center Building, 6725 Sunset Blvd., Los Angeles.

it takes the best to withstand 30 or more graduating classes *and still perform like new*

Send today for these two "Eye Opener" Bulletins on Classroom Unit Ventilators. Prepared especially for School Architects, Heating Engineers, School Administrators and School Board Members.

When you order a Schemenauer Classroom Unit Ventilator—*Heating* or *Cooling*, you *may* pay a little more but you get *much more.*

The tastefully designed Schemenauer unit is engineered to last longer, perform better and cost less to operate and maintain. Not just for 30 graduating classes or years—but for the life of the classroom.

And it *does* because no other make has the 7 vital extras. The difference between ordinary and *extraordinary* performance. The difference between bargain or *bargain in value.*

However, if you're buying on price alone and don't much care about appearance, performance, maintenance upkeep, etc., 3, 10 or 30 years from now, you can find some tremendous "deals."

But if you know better than to be fooled by an *inconsequential price differential* on an investment involving *thousands* of dollars, try checking out Schemenauer. Going first-class is much more than a matter of money!

"Guaranteed the finest Unit Ventilator any amount of money can buy."

SCHEMENAUER
manufacturing company
HOLLAND, OHIO

For more data, circle 162 on Inquiry Card

Think thin with Barrett Urethane.

Twice as thin because it's twice as efficient as any other roof insulation.

Compare Barrett Urethane to any other roof insulation. You'll find others have to be at least twice as thick to equal Barrett Urethane in insulation efficiency. Trim, thin Urethane has a C factor of 0.15. That makes it ideal insulation for buildings with modern heating and air conditioning systems.

Here's the thickness needed in various materials to obtain this same low C factor:

Urethane	**1.0"**
Glass fiber	**1.8"**
Polystyrene	**2.0"**
Fiberboard	**2.4"**
Cellular glass	**2.7"**

Easy-to-handle Barrett Urethane saves on application costs, too. Compare what a roofer would handle on a 500-square job: only 43,500 lbs. of Urethane against 210,000 lbs. of fiberboard insulation. At an average handling cost of $5 per ton, this is a saving of over $400 or nearly $1 per square. Barrett Urethane comes in large, thin, lightweight panels. You get a tough walk-on, work-on surface that won't bend, buckle or melt when mopped on with hot pitch or asphalt. There's only one way to get all the advantages of Barrett Urethane. Specify it by name. Merely to call for "1 inch of insulation" is inadequate with today's wide variations in insulating efficiency. For a detailed booklet, write to Barrett Division, Allied Chemical Corporation, Dept. ARC-1, 40 Rector Street, New York, N. Y. 10006.

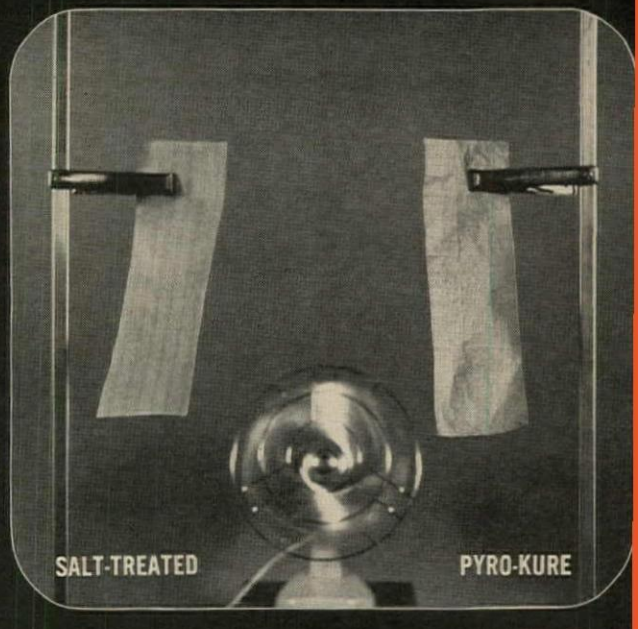
BARRETT®
BUILDING MATERIALS

Allied Chemical

For more data, circle 164 on Inquiry Card

Specify a U/L Rated Vapor Barrier that meets the National Building Code...

(1) Barriers are exposed to moisture.



(2) Barriers are then dried out.

SPECIFY THESE OTHER CONSTRUCTION PAPERS AND VAPOR BARRIERS FOR MAXIMUM PROTECTION IN CRITICAL BUILDING AREAS

Copper Armored Sisalkraft®

For concealed flashing with pure copper at 1/5th the cost of heavy copper:
COPPER ARMORED SISALKRAFT. A combination of electro-deposit copper and reinforced Sisalkraft that provides lifelong protection against moisture penetration at vulnerable points in the structure.

Moistop®

To prevent moisture migration through concrete slabs:
MOISTOP. A six-ply barrier of reinforced Sisalkraft extrusion-coated with black polyethylene film. Moistop will not rip and tear like plain polyethylene film. Applied under concrete, Moistop helps keep floors dry.

Curing Papers

For maximum protection and curing of concrete:
SISALKRAFT® CURING PAPERS. Reinforced, waterproof papers prevent damage and soiling of newly placed concrete slabs. Retards hydration, provides a maximum cure for harder, denser concrete floors.

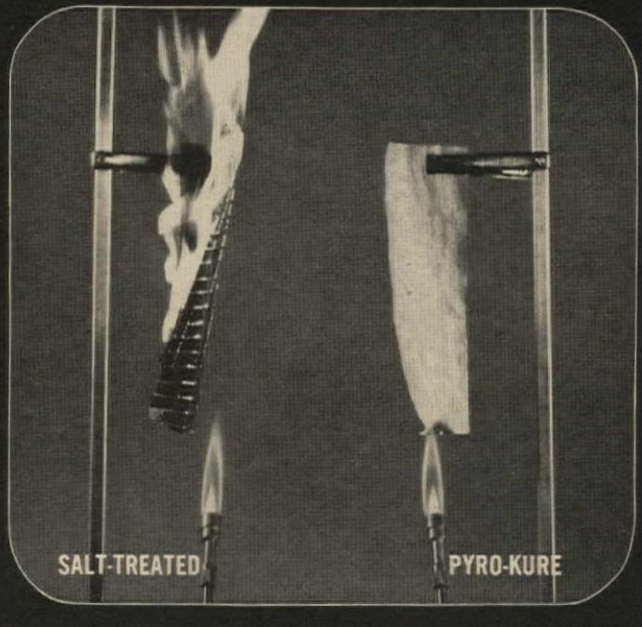
Pyro-Kure® 600

Flame resistant, abrasion resistant vapor barrier for Class I roofs:
PYRO KURE 600. More than twice the moisture resistance of vinyl film. Will not burn when hit with hot asphalt. Approved by Factory Mutual for use with asphalt and Fiberglas® insulation on metal decks.

PYRO-KURE®: PERMANENTLY NONCOMBUSTIBLE

for pipe jacketing, and facing for duct and industrial insulation

(3) Flame is applied, treated barrier starts to burn.



(4) Treated barrier engulfed by flames. Pyro-Kure snuffs out flame, won't burn ever!

This demonstration shows that Pyro-Kure will always resist flames, even after subjection to a moisture environment. Its U/L Flame Spread rating of "25 or less" will not be altered because the flame-extinguishing adhesive used in the laminating process is **permanent.**

This is not the case with other "rated" barriers where moisture conditions can cause salts, used to impart flame resistance, to leach out. These salts can also corrode aluminum.

As a result of this permanent flame resistance, Pyro-Kure complies with the National Building Code standard for NONCOMBUSTIBILITY as defined by the National Board of Fire Underwriters.

Specify Pyro-Kure Vapor Barriers. Give your clients maximum protection against fire hazard, and against condensation. Various grades are available, including aluminum foil to kraft, vinyl film to foil, and kraft to kraft, from leading insulation manufacturers under their own brand names, or through insulation contractors for local application. All grades are reinforced with glass fibers for strength. Complete specifications are in Sweets' Catalogs.

Send for Samples and Technical Data Kit which includes perm ratings and other physical property information. Write: Sisalkraft, 71 Starkey Avenue, Attleboro, Mass. 02703.

PYRO-KURE PERMANENTLY NONCOMBUSTIBLE VAPOR BARRIERS

SISALKRAFT DIVISION ST REGIS

For more data, circle 166 on Inquiry Card

PHYSICAL DATA

C (Conductance Value) 1″ Nominal Thickness: 0.36 ☐ Water Absorption (% by Volume): 1.5 @ 2 Hrs. Total Immersion (No Capillarity) ☐ Vapor Permeability: 15 Perms @ 73° F. and 51% Relative Humidity ☐ Concentration Load Indentation: 1/16″ @ 77 lbs. ☐ Compression Resistance: 185 PSI (50% Consolidation) ☐ Fungus Resistance: Complete ☐ Flame Spread: 25 (Non-combustible) ☐ Smoke Developed: 0—5 ☐ Wt./Sq. Ft./1″ Thick: 0.8 lbs. Approx.

Photomicrograph of cross section of a grain of flame-exploded perlite.

designed explosion

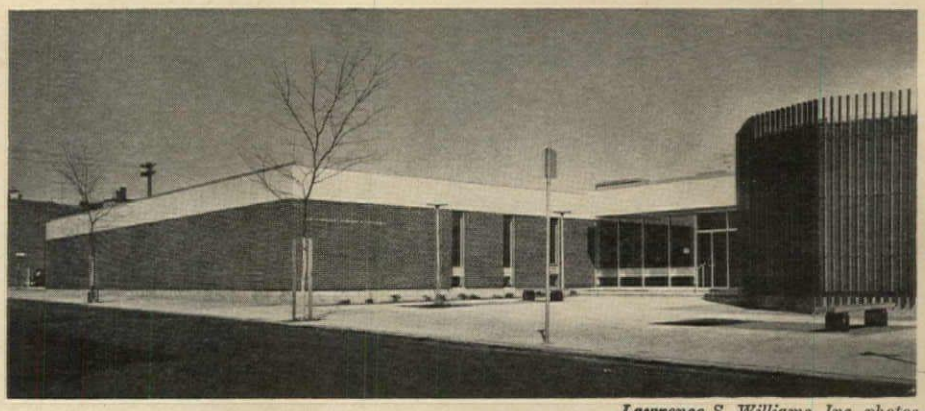
Born within
the intricate architecture
of a grain of
flame-exploded perlite
is the lightness,
the non-combustibility,
the moisture-resistance,
the thermal efficiency,
the compression resistance,
the permanence,
the strength,
that characterizes
what is today,
totally, the ideal
rigid roof
insulation board.

RIGID
Permalite®
ROOF INSULATION GLC

Building Products Department, Great Lakes Carbon Corporation,
333 North Michigan Avenue, Chicago, Illinois

For more data, circle 168 on Inquiry Card

HEALTH CENTER CREATED TO BE "VANDAL-PROOF"



Lawrence S. Williams, Inc. photos

Philadelphia's new District Health Center Number 5 was conceived and designed as a "vandal-proof" structure because of its location in a depressed area. "The health center was designed to provide a peaceful, garden-like inner view, rather than an outside view," according to Louis de Moll, partner in charge for the Ballinger Company, Philadelphia, architects and engineers of the project.

The 25,900-square-foot rectangular one-story building, with a connecting circular auditorium, has few exterior windows opening to the street. These few, made of wiremesh glass, are narrow and recessed, unlike the larger windows opening on the buildings two interior courts.

Besides extensive administrative accommodations, the center houses diagnostic and health-control examination rooms for maternity, pediatric and adult health, dentistry, tuberculosis and venereal disease. A

complete X-ray room is sheathed in lead walls.

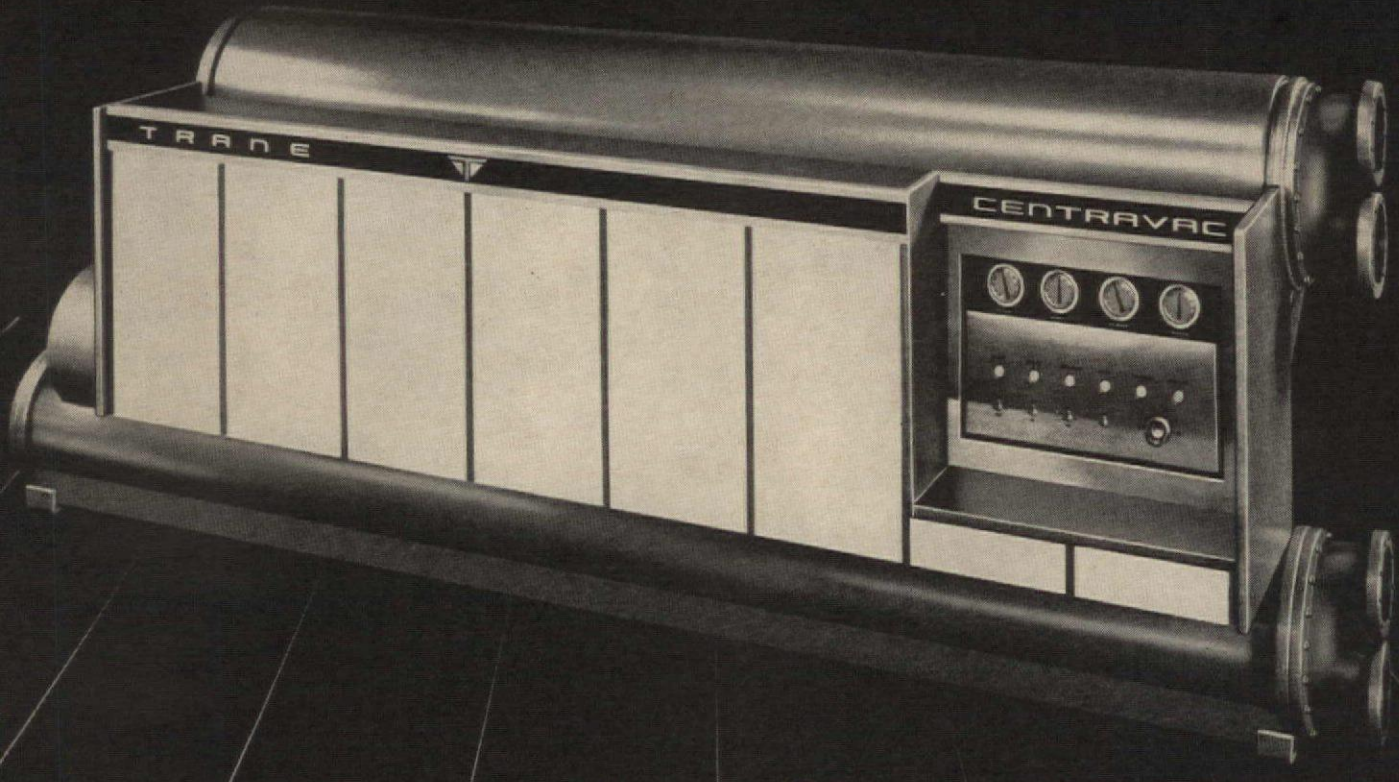
A local Philadelphia ordinance provides that 1 per cent of its cost in any building constructed with public funds must be devoted to art. Consequently, the architects commissioned a Philadelphia artist, Frances Serber, to create a ceramic mural based on Greek myth and the conquest of space.

Construction of the $592,520 center was carried out in two stages in order not to interfere with the work of the existing center. When two-thirds of the structure had been finished, the center's work was transferred there and the remainder completed.

FROM TRANE...

DIRECT-DRIVE, COMPACT

CENTRAVAC



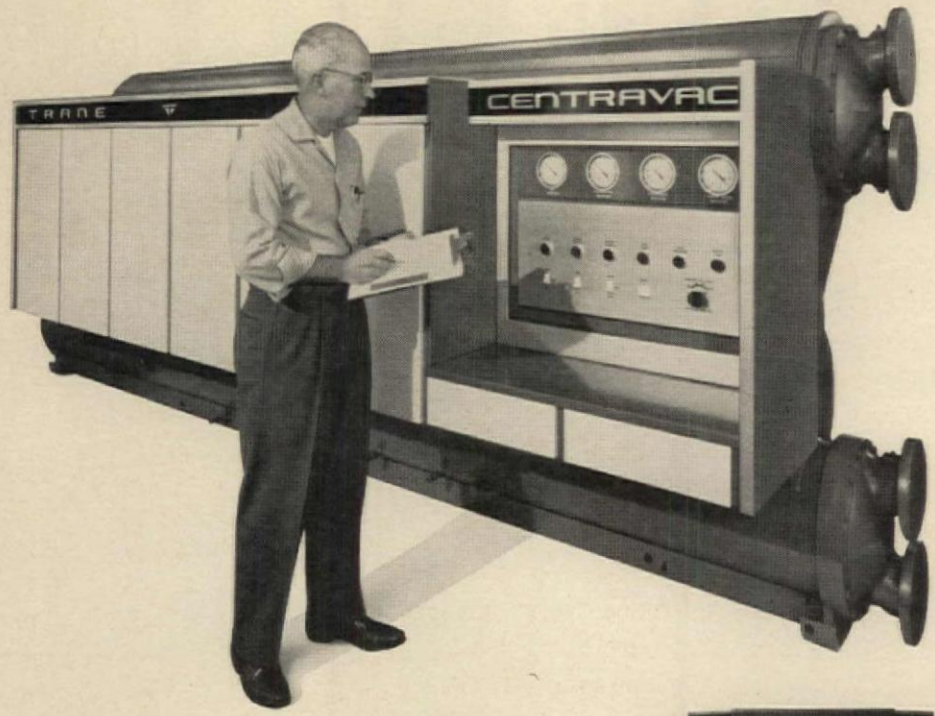
...a major advance in centrifugal water chillers

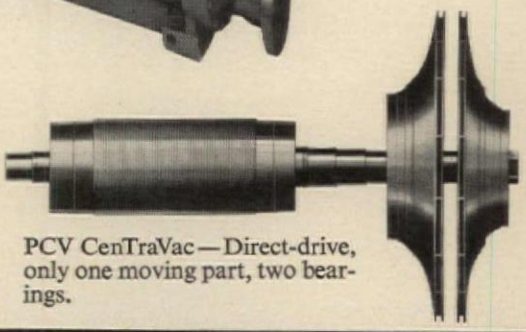
TRANE®

ANOTHER INDUSTRY FIRST FROM TRANE

Direct-Drive, Compact

3600 r.p.m. Hermetic





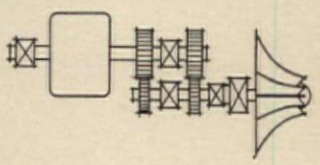
PCV CenTraVac — Direct-drive, only one moving part, two bearings.

Trane announces a second generation CenTraVac — sizes 225 to 555 tons. Eliminates need for gears, achieves compactness without high speed compressor.

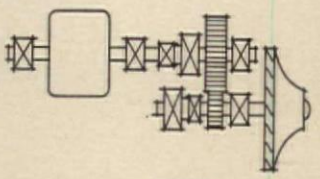
The original Trane CenTraVac, introduced in 1951, was a major breakthrough in centrifugal water chiller design. It brought to the industry a hermetic, direct-drive design concept that eliminated the need for shaft seals and speed increasing gears—prime sources of failure in open type centrifugal water chillers. More than a decade of reliable operation of over 5,000 CenTraVac installations is testimony to the dependability of the direct-drive hermetic design.

Now comes another breakthrough in centrifugal design—a second generation CenTraVac (Model PCV) with all the proven features of its predecessor . . . and more.

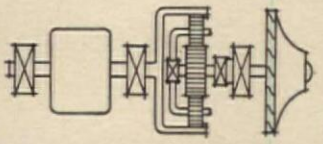
Make "A" — Gear-drive, including four gears, three bearings, plus a high-load thrust bearing.



Make "B" — Gear-drive, including two gears, four bearings, plus two high-load thrust bearings.

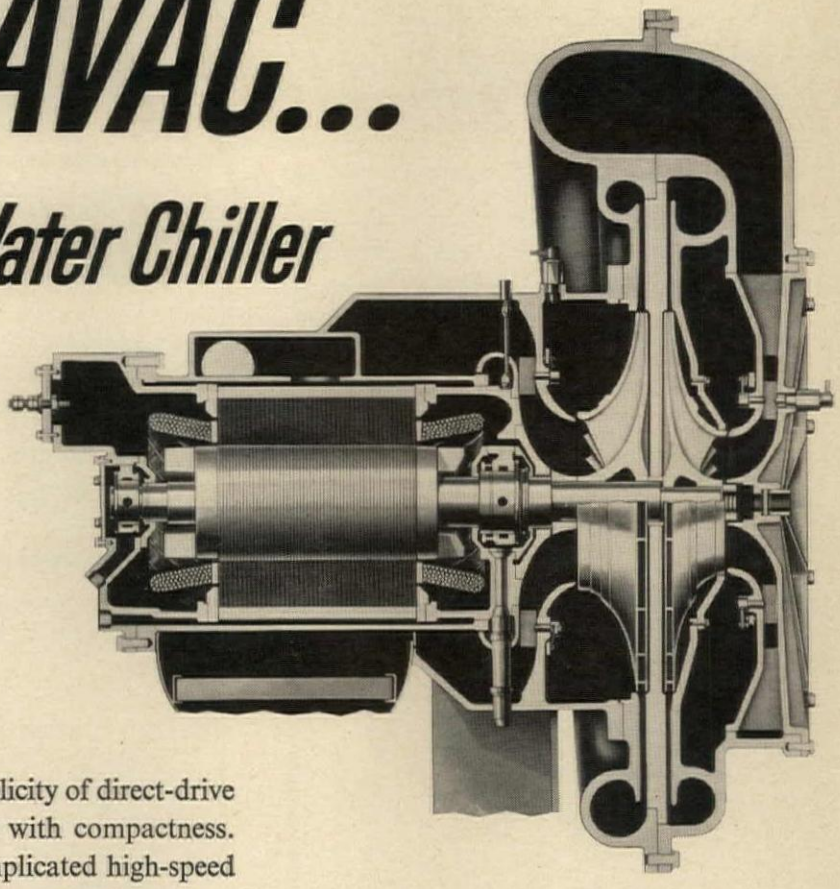


Make "C" — Gear-drive, including five gears (three planet gears), seven bearings, plus a high-load thrust bearing.



CENTRAVAC...

Centrifugal Water Chiller



Direct-drive—no gears

The dependability and design simplicity of direct-drive have been successfully combined with compactness. Competitive makes use more complicated high-speed gear-driven compressors to achieve compactness.

But, the Model PCV CenTraVac—designed for maximum reliability—has only *one* rotating part, two simple journal bearings, no gears and no high-load thrust bearings. Compare this with a high-speed, gear-driven centrifugal machine (with gears operating in a refrigerant atmosphere), dependent upon the reliability of 2 to 5 gears, up to 7 journal bearings, plus a high-load thrust bearing.

Between motor and compressor there is nothing to fail. Two-stage, back-to-back impellers are directly connected to the motor shaft. A balanced thrust arrangement—only one rotating part.

As a result, the Trane direct-drive, compact PCV CenTraVac provides the unmatched dependability inherent in a machine of fewer moving parts to insure longer life and a minimum of maintenance.

Power saving two-stage compressor design

Two-stage compressor design with inlet vanes controlling the flow of refrigerant gas to each compression stage is another important CenTraVac feature. Provides lower power consumption, smoother operation at part-load than single-stage high-speed machines for three reasons:

1. Better compressor efficiency at part-load with dual inlet vane control—regardless of number of compression stages. Inlet vanes ahead of each stage make modulation of each impeller's performance possible.
2. Wider range of stable compressor operation with two-stage control. At same entering condenser water temperature, single-stage compressor encounters surge at substantially higher part-load point. Requires intentional gas bypass with artificial loading of compressor at part-load to avoid surge.

   Means single-stage machine less efficient at part-load, does more work to compress recirculated gas.
3. Power loss, inherent in gear trains, typically amounts to at least 3% of full-load power input. Loss does not decrease with load. At 10% of full-load, gear loss alone represents at least 15% of total power required.

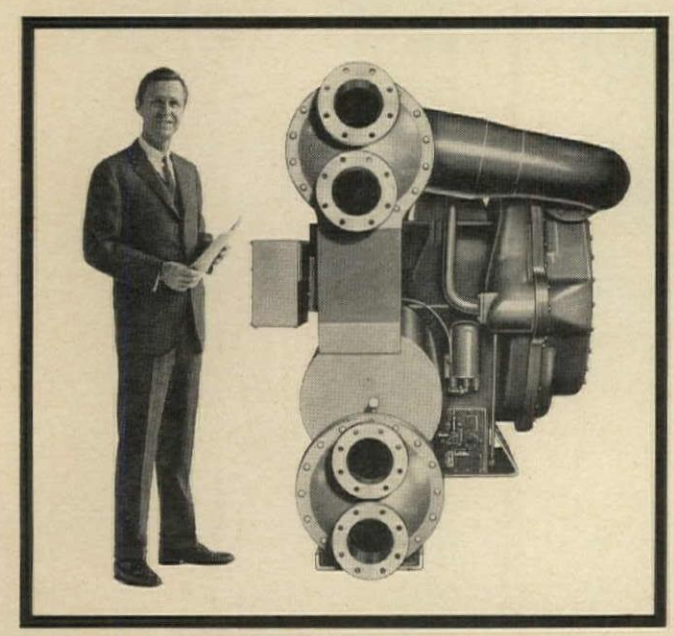
So, *any* single-stage gear-drive compressor requires at least 50% more power input at 10% of full-load to produce same refrigeration effect as two-stage compressor with dual inlet vanes.

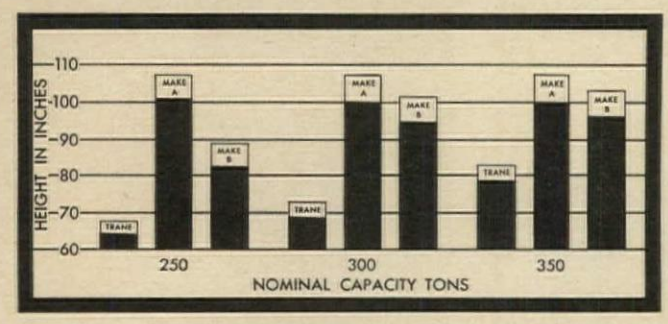
Space and weight-saving compactness

The compact PCV CenTraVac is substantially lower than competitive makes in the critical height dimension. It weighs significantly less than most other centrifugals and occupies little floor space.

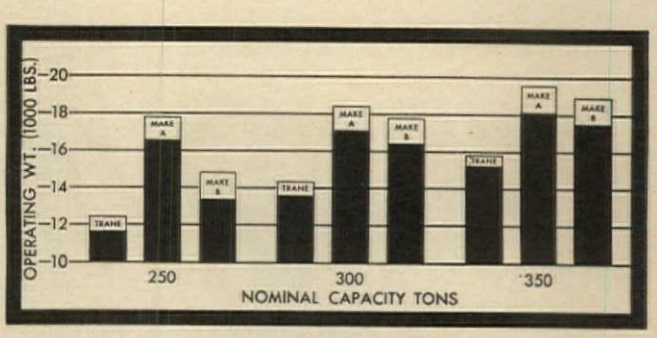
Being lower, the advanced PCV CenTraVac may be installed in equipment rooms having low ceilings, or on intermediate floors of new or existing buildings where headroom is restricted.

With less weight, this CenTraVac may be installed on upper floors and penthouses, often with appreciable savings in building structural steel.

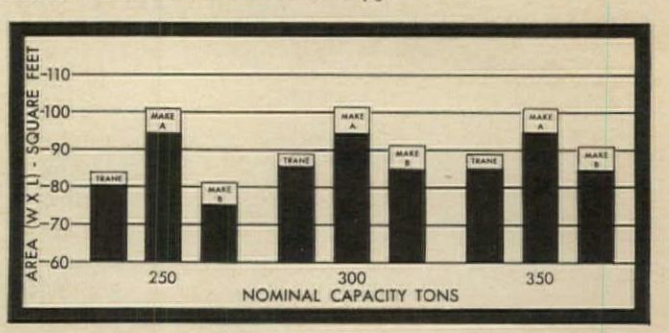




Here, height of PCV CenTraVac is compared to two major competitive gear-drive makes. Competitive makes range from 25 to 60% higher.



Note weight advantage of CenTraVac over other two makes which are from 18 to 45% heavier.



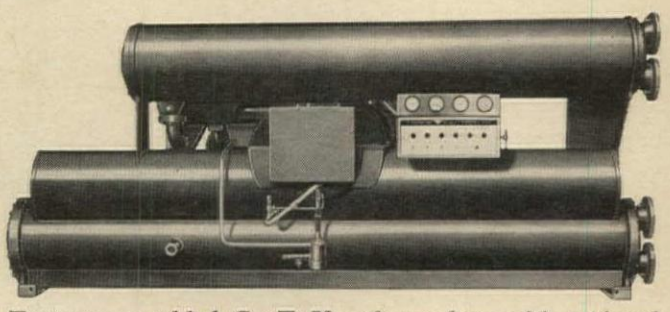
Rectangular floor space area required by compact CenTraVac is compared to floor space area required by competitive makes.

Factory-assembled, ready to run

The CenTraVac is a complete factory-assembled water chiller. Only external and auxiliary water piping connections and main electrical connections are necessary.

Nine models . . . ready now

Sizes range from 225 to 555 tons. For complete information, call your nearest TRANE Sales Office. Or, write for the new Model PCV CenTraVac Catalog.



Factory-assembled CenTraVac shown here with optional decorative front panel removed.

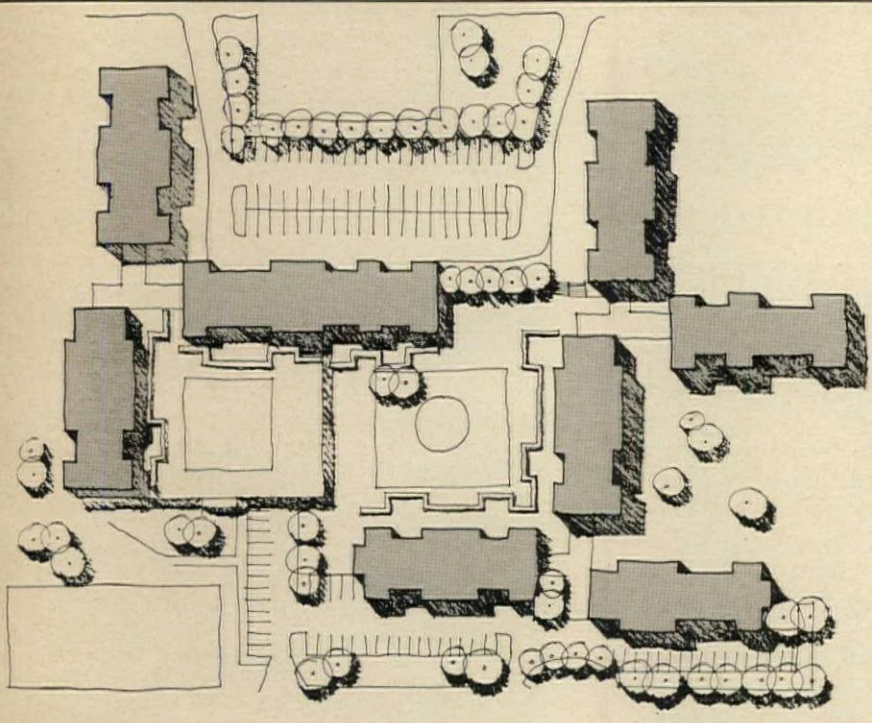
MANCHESTER GIVES AWARD OF MERIT

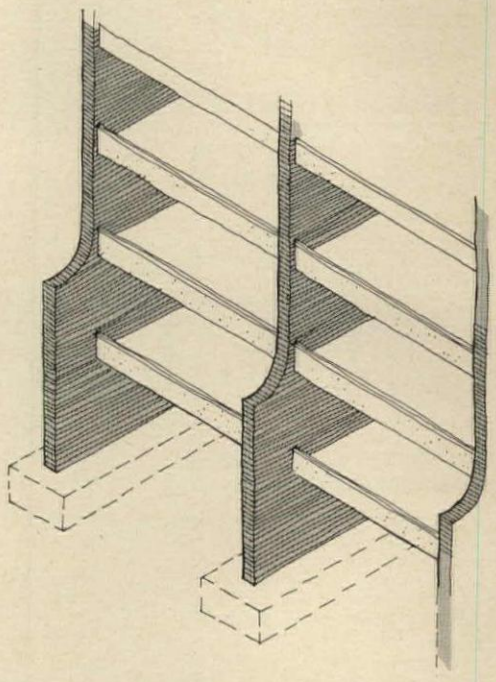
The City Planning Board of Manchester, New Hampshire, has initiated a semi-annual "Award of Merit" to stimulate and recognize outstanding contributions in the broad area of urban design in their community. Receiving the first award was the architectural firm of Koehler and Isaak of Manchester, for their Diocesan Administration Building in Manchester, for its excellence of design, site planning, and contribution to the neighborhood and community in which it is located.

EDWARD STONE RECEIVES AWARD

Architect Edward Durell Stone (*right*) was given the Architect of The Year Award of the Building Stone Institute by Arland R. Krueger, outgoing president, during the institute's 45th annual convention in New York. Mr. Stone was honored for his "inspiring contributions to the field of architecture" as well as for his "imaginative creativity in utilizing natural stone in distinguished buildings of enduring beauty throughout the world." The Building Stone Institute represents all phases of the natural stone industry.

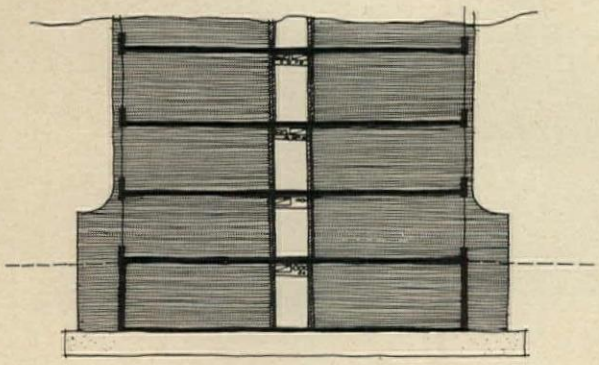
THE CONTEMPORARY BRICK BEARING WALL as designed by Tasso Katselas



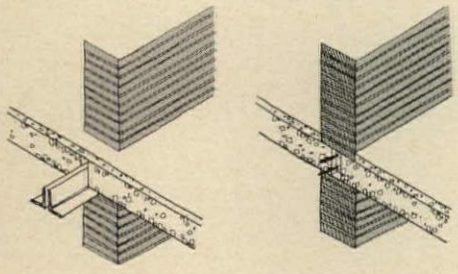


"The first phase of the Pennley Park urban renewal project in Pittsburgh involves 8 apartment structures ranging from 4 to 10 stories. Several factors influenced the choice of structural systems and materials. The program called for repetitive spaces with 20 to 24-foot spans. Subsoil was soft. We wanted a markedly residential character with pleasing scale, pattern, and texture. We wanted superior resistance to fire and sound transmission. We wanted economy."

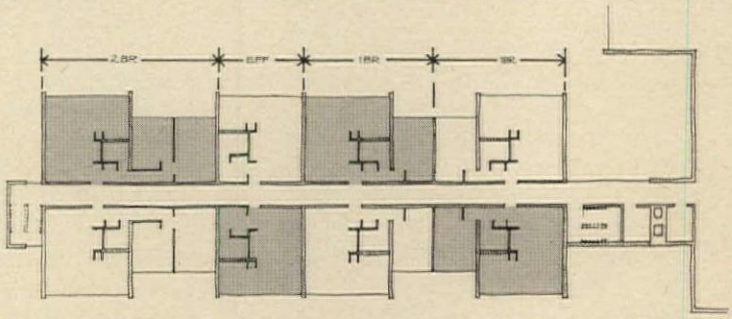
"Solution: Transverse walls of exposed brick bear the building loads. The walls interact with 8-inch precast concrete floor planks to create stiff diaphragms. Brick walls are 12 inches thick. Structurally, they could be thinner in the upper floors, but 12 inches provides a substantial sound barrier. The spread footings solve the soil problem and, sweeping inward and upward to form the cross bearing walls, express the structural concept clearly."



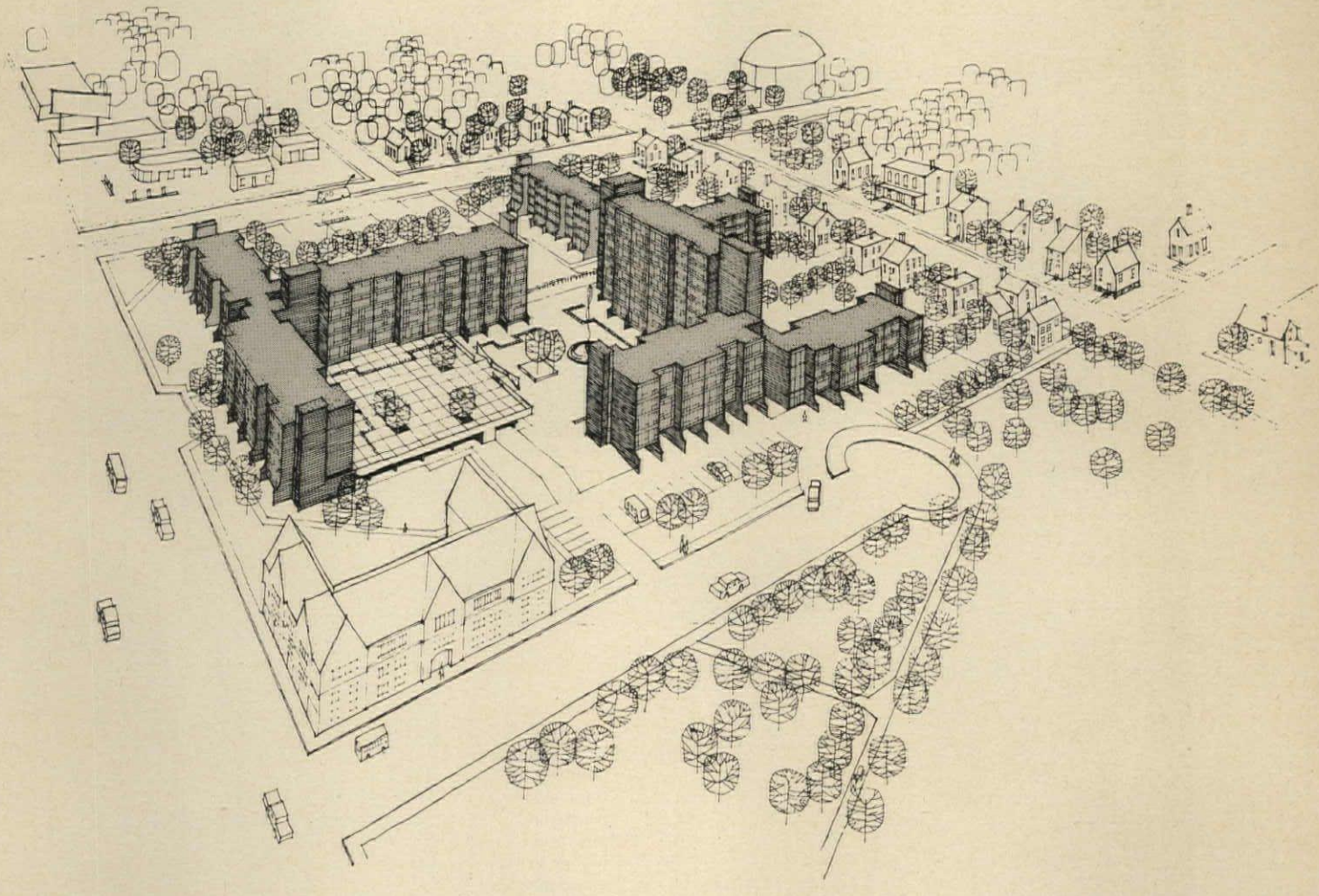
"This transverse cross-section shows relationship of walls and floors. The precast floor beams turn upward; the utilities are run through the corridors. On-site labor and materials handling are reduced. Total building structure is accomplished by a mason and precast concrete floor system. FHA requested a comparison of this system with steel frame and bar joist. The steel system, including necessary fireproofing, additional partitions, and painting, came in nearly 20 per cent higher in cost than the brick bearing wall. Concrete might have provided many of the same advantages, but it would have required finishing. The exposed brick bearing wall gave us six elements: structure, separation, economy, acoustics, fire protection, and finish."



"The section at left is through floor and corridor. At right, it is through floor and cross bearing wall. The precast floor system bears four inches on bearing walls; precast spandrels frame into bearing walls to carry corridor walls and exterior curtain wall."



"Typical floor plan shows how flexibility of plan and cross bearing wall structure can coexist. Reading from left to right at top are a 2-bedroom, efficiency, and two 1-bedroom units. The 12-inch brick walls create superior sound barriers, not only between apartments, but between rooms in many apartments. We have 296 apartment units and 22 commercial units in the 8 buildings which constitute the first phase. A similar number of units will exist in the second phase, involving seven buildings. The brick bearing wall concept solved our problems very nicely. Faced with the same kinds of needs and problems, we will undoubtedly use this system again."



Architect: Tasso Katselas; Engineer: Richard M. Gensert; Owner: Vernon C. Neal, Inc.

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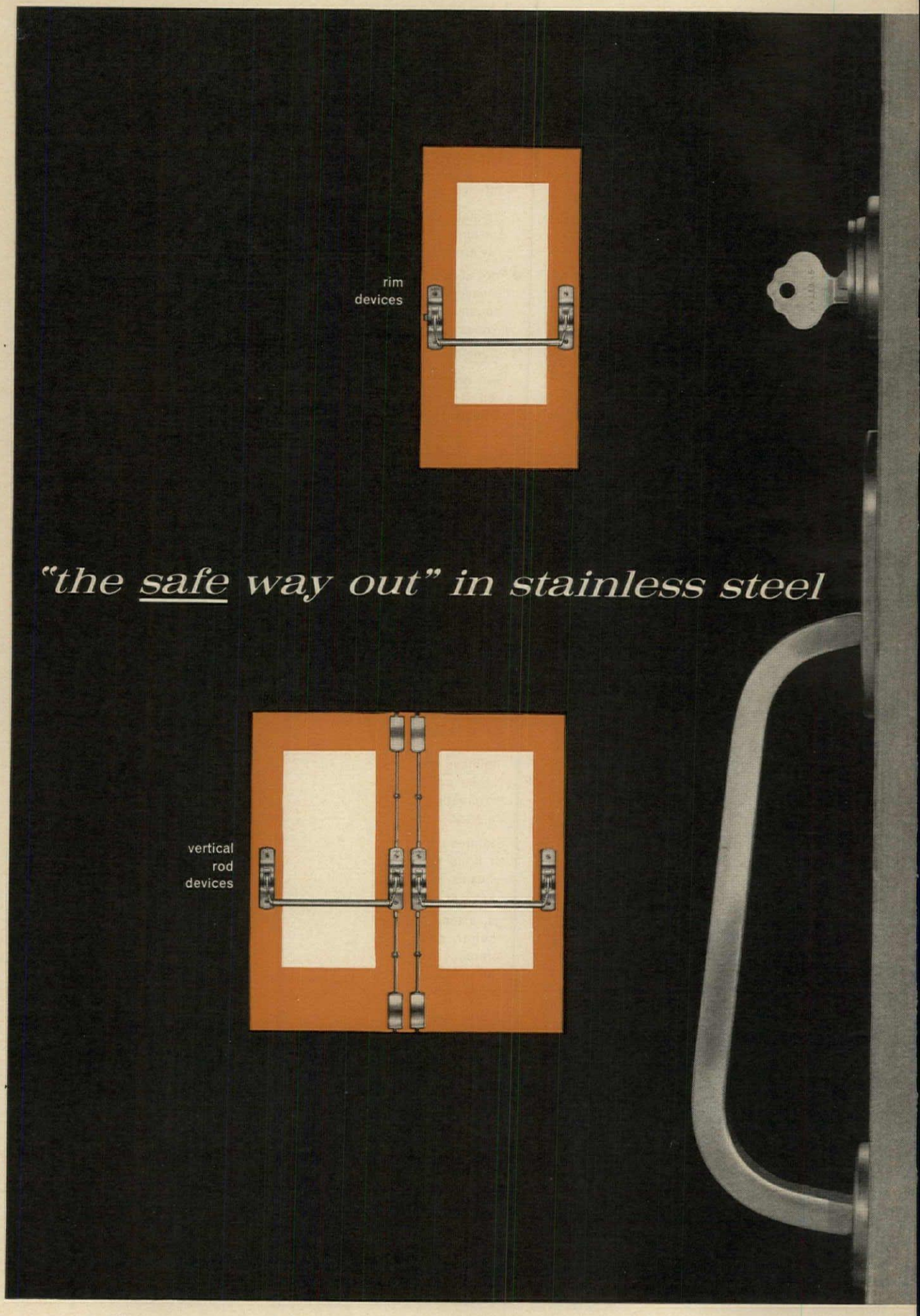
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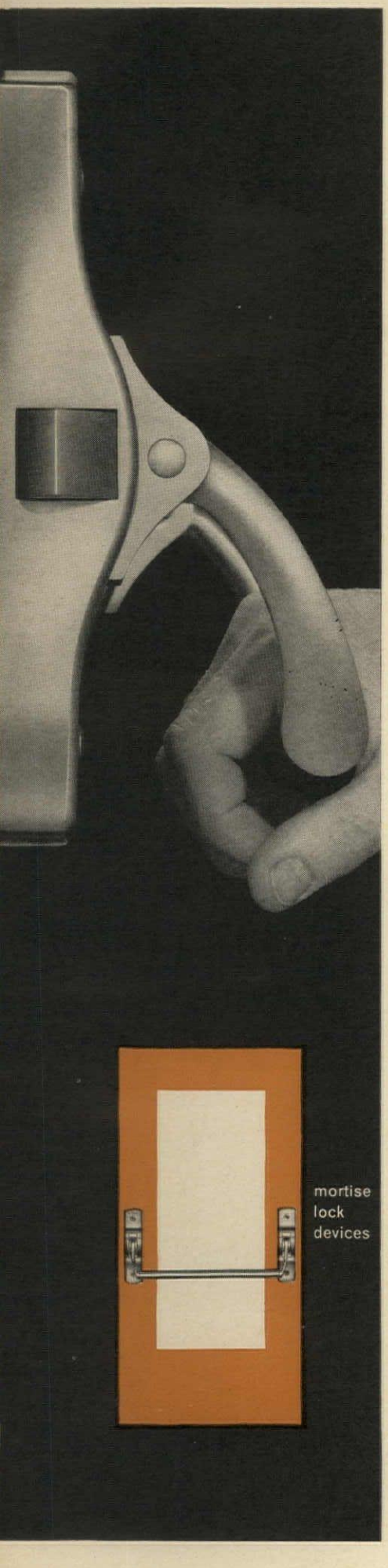

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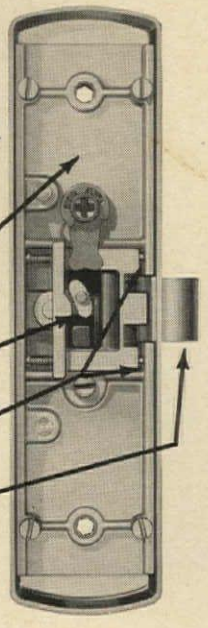

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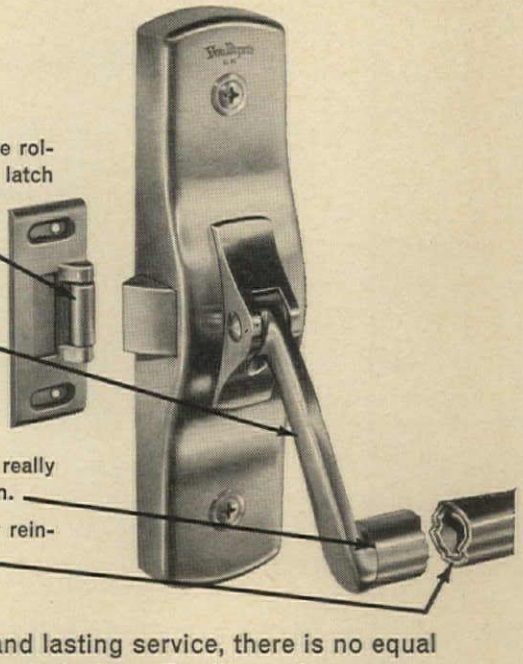

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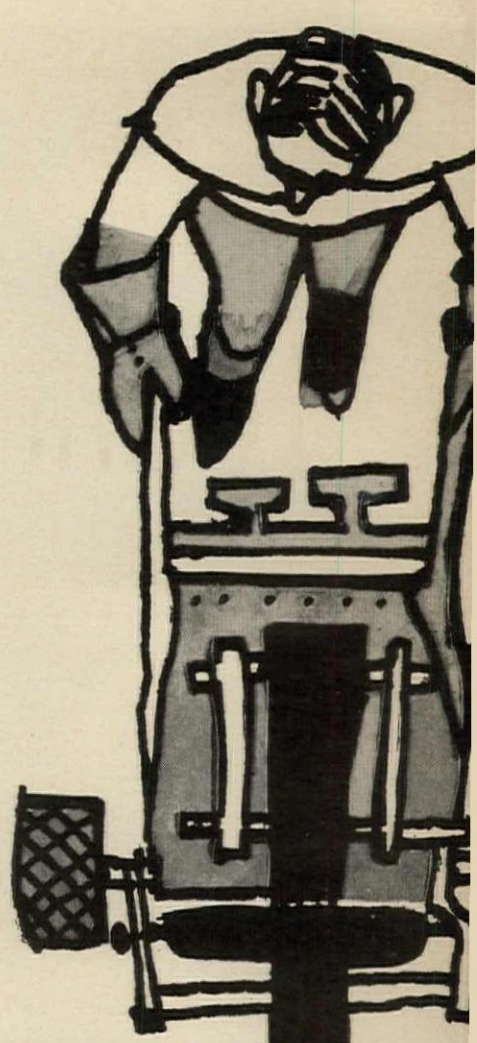

Forty-seven acres of roof were involved. Two million square feet over the Lockheed Georgia Co. plant (division of Lockheed Aircraft Corp.) had to be replaced—without shutting down.

It was a job that called for taking down some 127 tons of old roofing every day (without impeding aircraft production below). And taking up 70 tons of new raw material—via tractor-pulled wagons and a unique 750-foot ramp.

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And it was a job that called for the best base in roofing: the Fiberglas* Taped Joint System, topped with the inorganic Fiberglas Built-Up Roofing System.

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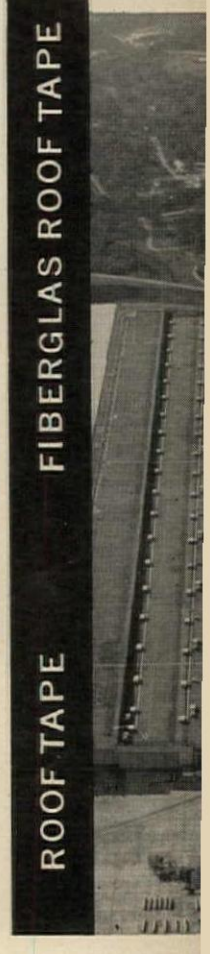

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This all-glass roofing system was topped with Fiberglas Perma Ply and Perma Cap roofing felts.

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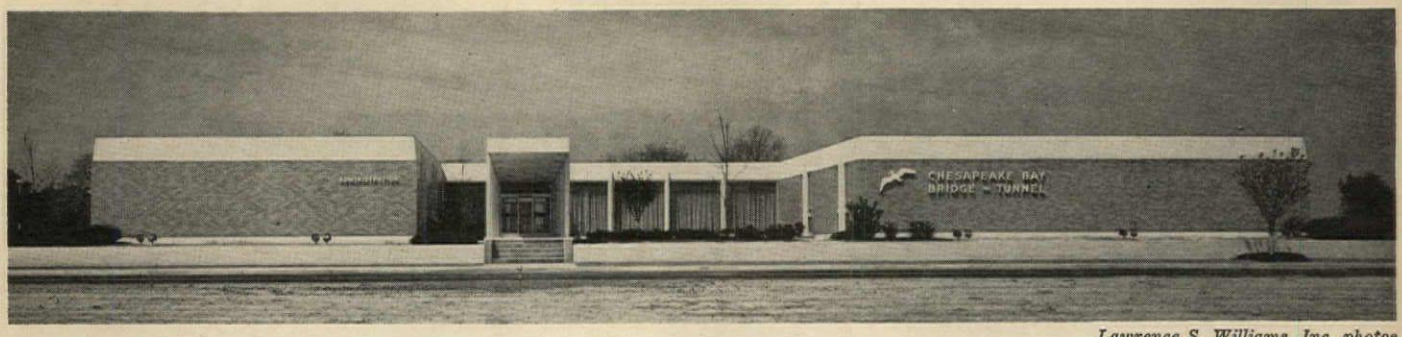
ADMINISTRATION BUILDING IS FOCUS FOR TUNNEL PROJECT



Lawrence S. Williams, Inc. photos

The entire Administration Building for the Chesapeake Bay Bridge Tunnel, located on the Eastern Shore of Virginia at Wise Point, has been situated on a raised podium which visually separates it from the essentially flat surroundings of the local country. Designed by Williams and Taxewell & Associates of Norfolk with Sverdrup and Parcel of St. Louis, engineers for the entire bridge-tunnel project, the building is intended to provide an esthetic focus for the vast project; to serve as an information center for tourists; and to house the executive, administrative and clerical staffs of the administration.

The building itself is of blue glazed brick with white precast quartz columns, pilasters and frieze features. It is arranged in a "U" shape around an extensively landscaped court planted with indigenous trees and flowering shrubs. Access to the building is across a reflecting pool and through the court.

The interior will feature an extensive collection of oils and watercolors by local Tidewater Virginia artists.

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There's a new and luxurious apartment residence in the heart of Pittsburgh—Gateway Towers—and it is the fulfillment of a dream to create a residential area with a beautiful park-like setting in a modern downtown area. It gives Pittsburgh, for the first time, an open and landscaped residential environment with all the conveniences of urban living.

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THE PROBLEM OF "OR EQUAL" HAS LONG BEEN THE CONCERN OF MANY ARCHITECTS AND ENGINEERS

Unfortunately, as everyone knows, the use of "or equal" in specifications encourages the attempt to establish non-equals as equals . . . even invites outright substitutions.

However, when it comes to Walk-In Coolers and Freezers, there is no "or equal" to a Bally.

In some ways, Bally Walk-Ins may be resembled in appearance and design. But no other Walk-In made today offers all of the important construction techniques and unusual features developed for exclusive use in Bally Walk-Ins.

If you are conscientiously seeking the best products for your client, the following features in Bally Walk-Ins will be important to you:

Urethane insulation 4" thick is foamed in place (not frothed). Has efficiency of 8½" fibreglass. Is suitable for minus 40° temperature, fire retardant and self-extinguishing.

Standard modular sections make it easy to assemble Walk-Ins in any size or shape. Since urethane is 97% closed cells, Bally Walk-Ins are ideal for outdoor as well as indoor use.

Superior section strength results from urethane foamed against metal skins. Wood structural members are eliminated entirely. Therefore, 100% of each section is hospital-clean insulation (harbors no vermin or rodents).

Bally Speed-Lok fasteners lock sections together quickly and accurately. Unlock easily for enlargement or re-location of the Walk-Ins.

Foamed lightweight door has automatic self-closing hinges, modern hand lock (inside safety release) and convenient foot treadle. Opens and closes with feather touch. Magnetic gasket provides tight seal.

Metal interior and exterior for maximum sanitation requirements. Your choice of hammered aluminum, galvanized steel or stainless steel.

Hermetically sealed refrigeration systems, factory-tested, self-contained, are available for all size normal and low-temperature Walk-Ins. Easy to install . . . reduce service problems.

Mass-produced to be substantially lower in cost than "built-ins" constructed by building trades. Cubic foot cost is less than half that of "reach-ins".

When you specify a Bally there is no need to ever accept an "or equal" or a substitute. Bally Walk-Ins are available to all dealers everywhere at uniform established prices. *Write for our Architects Fact File which includes a 12-page brochure, specification guide and sample of urethane wall construction.*

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Bally Case & Cooler, Inc.
Bally, Pennsylvania

Look For This Hall Mark On The Bally Walk-In You Specify

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incombustible ROOF INSULATION
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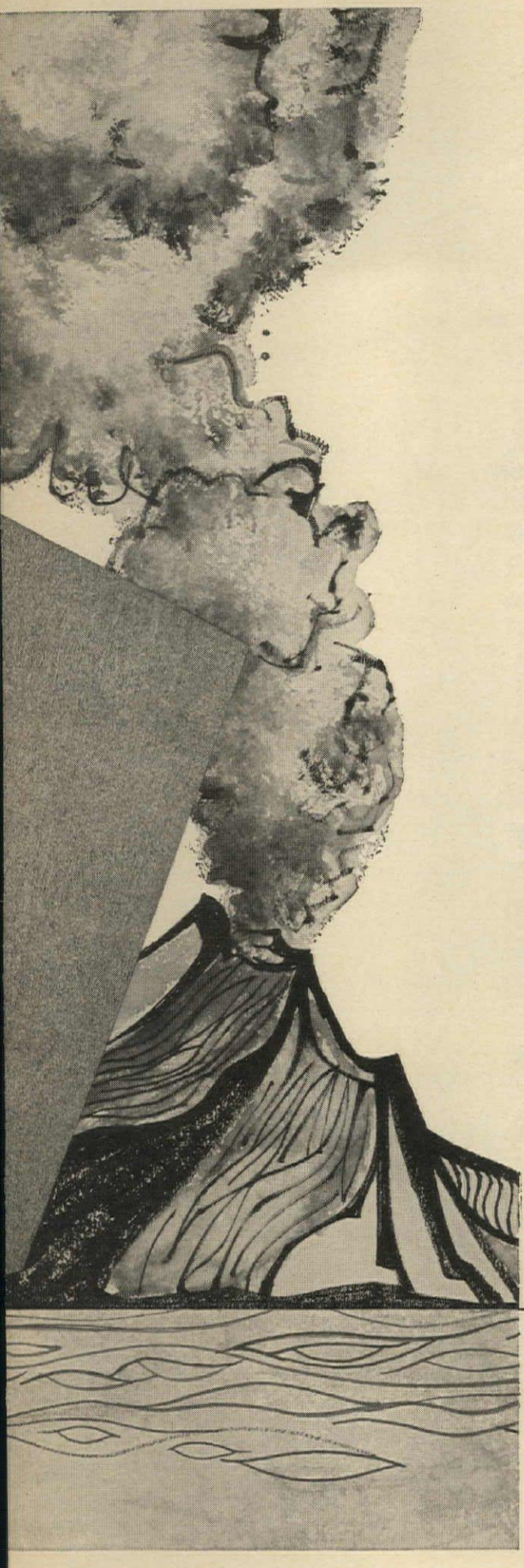

Celo-Therm Roof Insulation's remarkable properties result from what it is and where it comes from. It's incombustible* because its basic ingredient, Perlite, is processed from volcanic ore.

Roofing crews like to handle Celo-Therm panels. They're lightweight, rugged, easily cut with a knife—can be applied on any type deck. Panels are 2′ x 4′.

Celo-Therm Roof Insulation is highly moisture-resistant. It won't decay or deteriorate. It has excellent thermal insulating value and is dimensionally stable.

Celo-Therm Roof Insulation has a UL flame spread classification of 25, and is listed and labeled by Underwriters' Laboratories. Qualifies for metal deck assemblies UL Constructions No. 1 and No. 2. Acceptable for Factory Mutual Class I metal deck construction with approved adhesive. Permits reduction generally equivalent to 40% of the basis insurance rate.

*In accordance with the definition of noncombustibility in NFPA No. 220.

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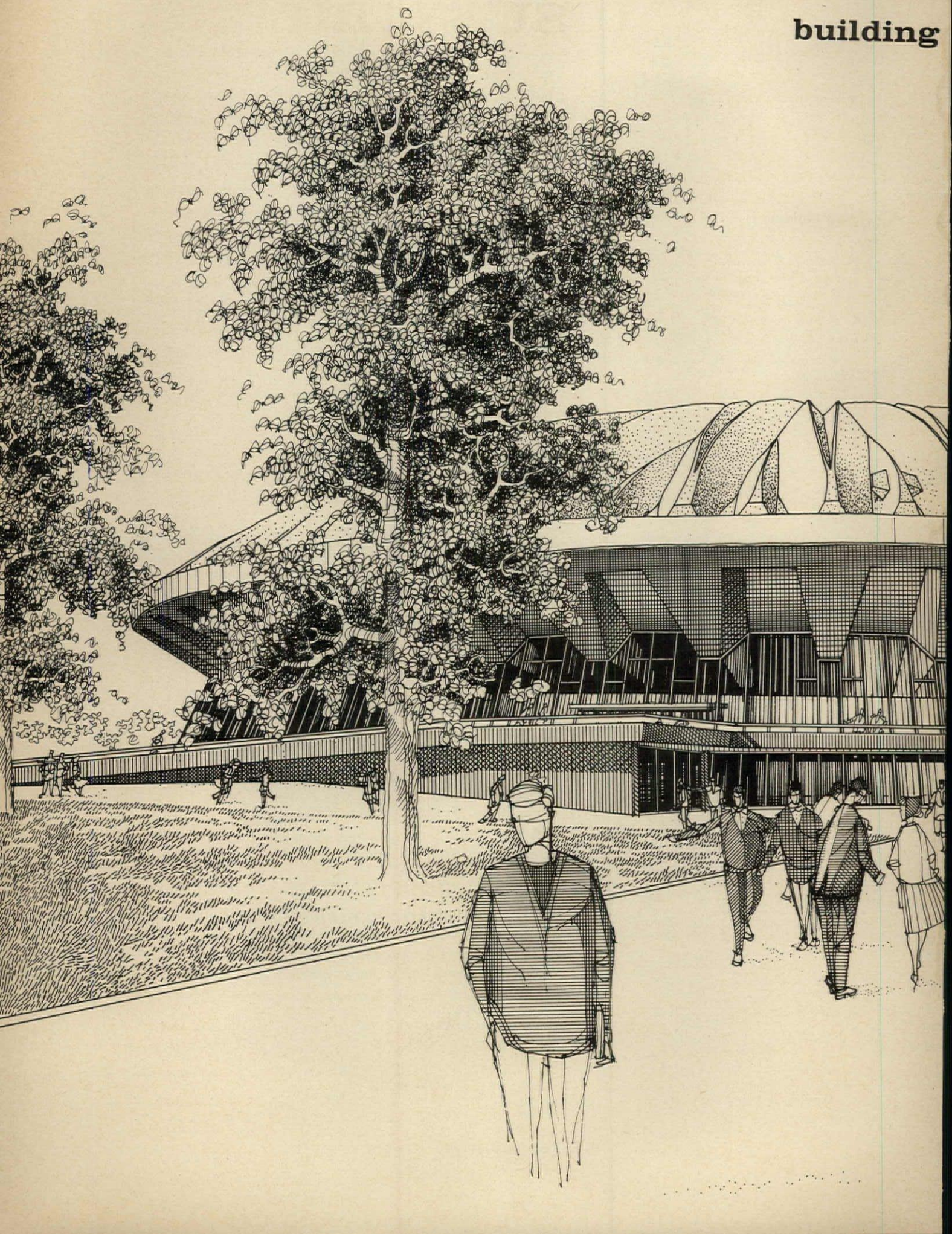

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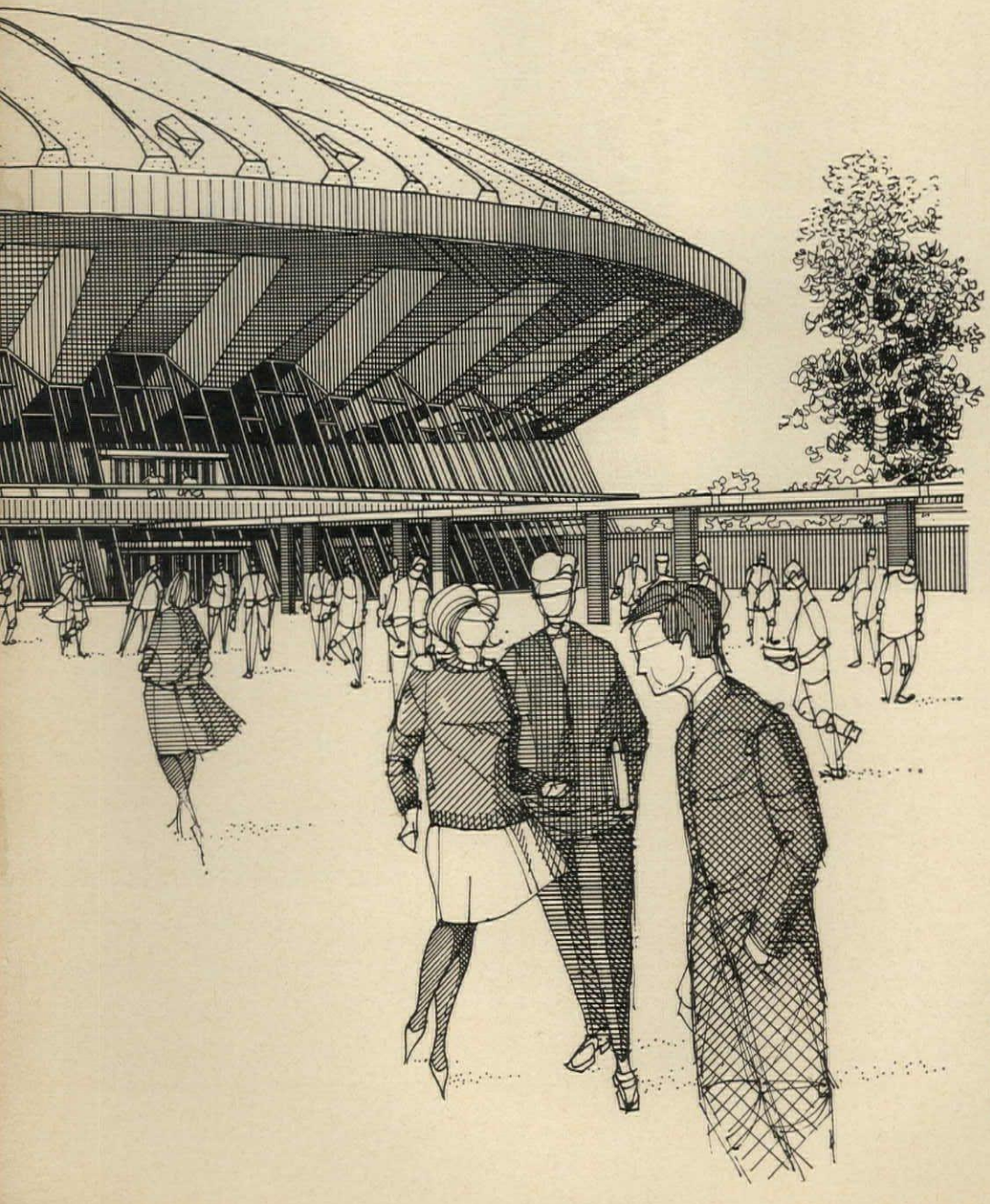

Assembly Hall, University of Illinois, Champaign-Urbana, Illinois

Architects: Harrison & Abramovitz

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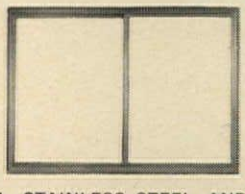

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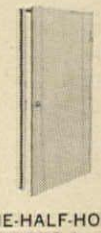

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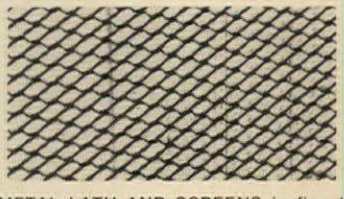

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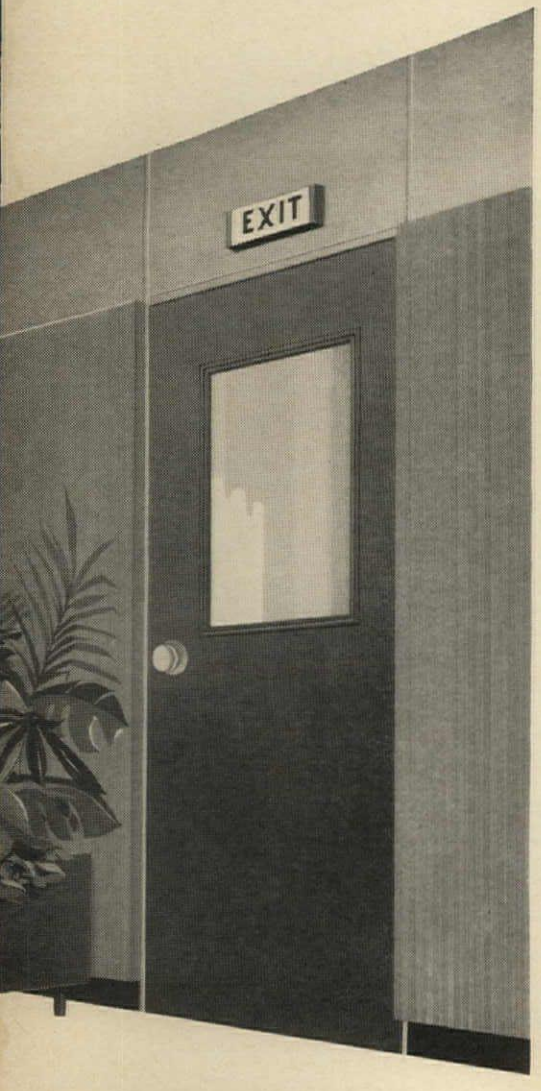

New Imperial Doors are available now in two models — the "Windsor" Series 638, 1⅜" thick, and the "Barclay" Series 634, 1¾" thick. Both feature full flush design, easily adaptable to any glass or louver treatment, integral hinge reinforcement, integral lock reinforcement, and integral fully welded perimeter channel.

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