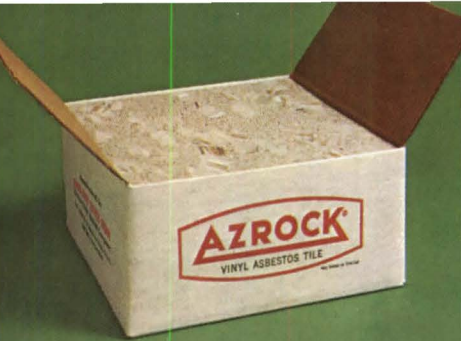


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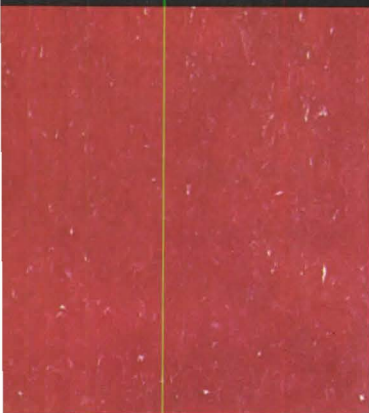
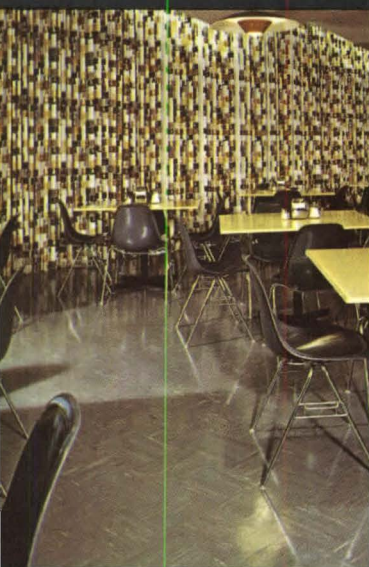
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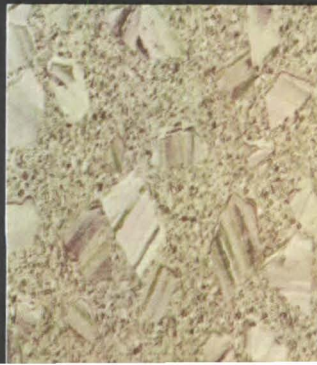


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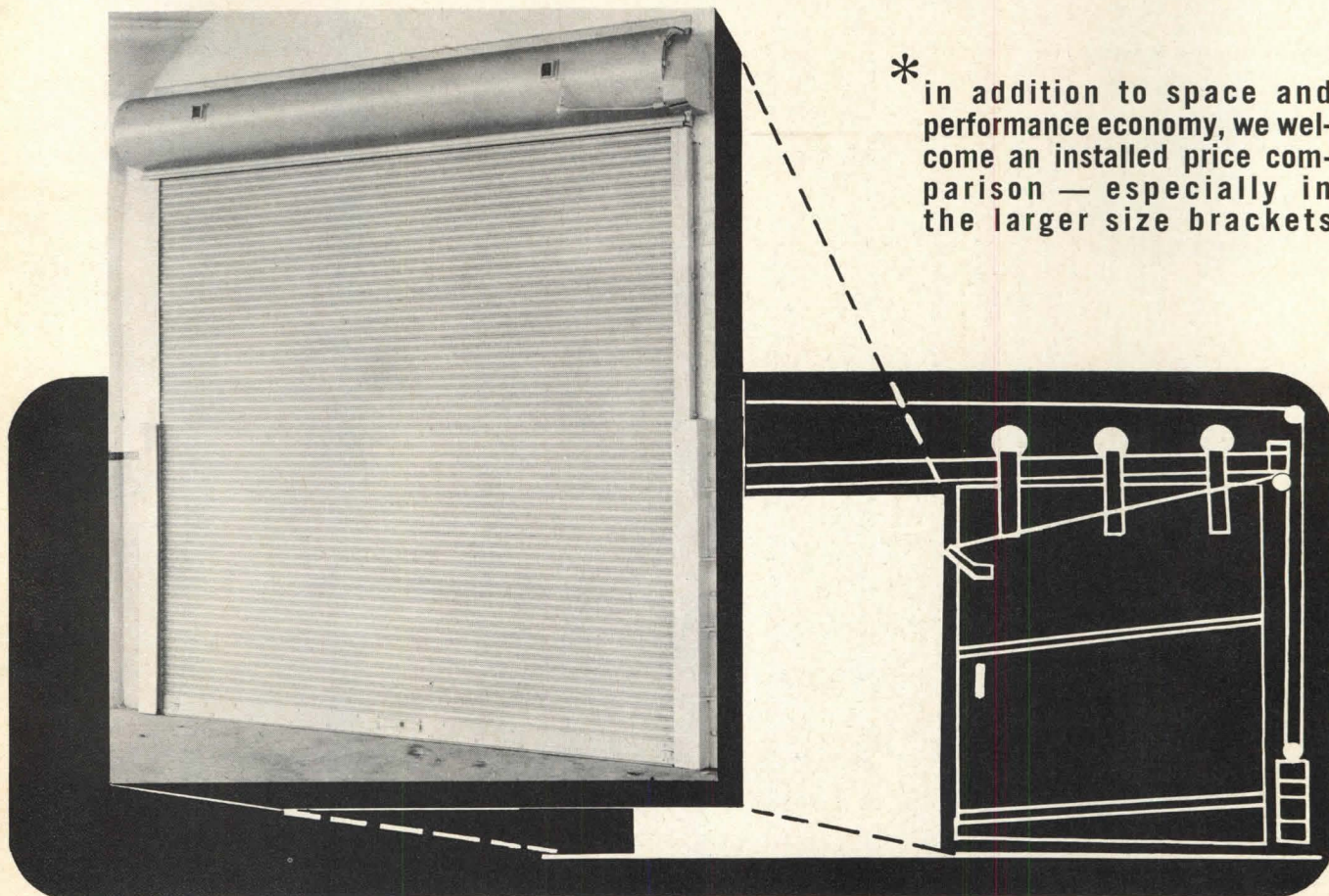
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P/A

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Progressive Architecture® November 1969

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Mies van der Rohe (1886 – 1969)

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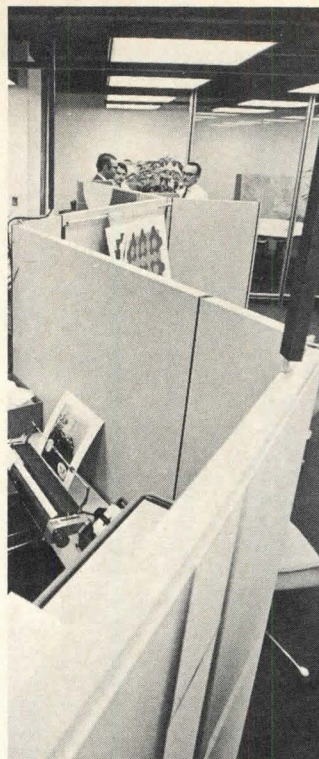
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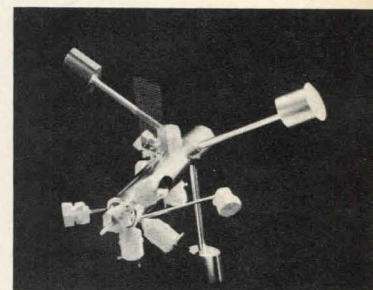
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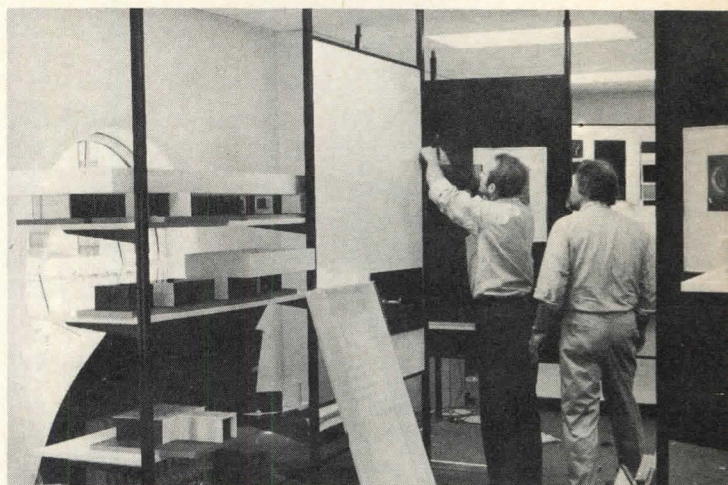
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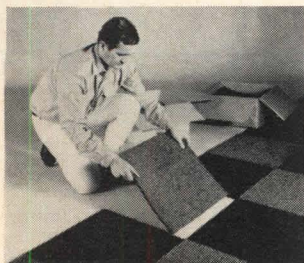
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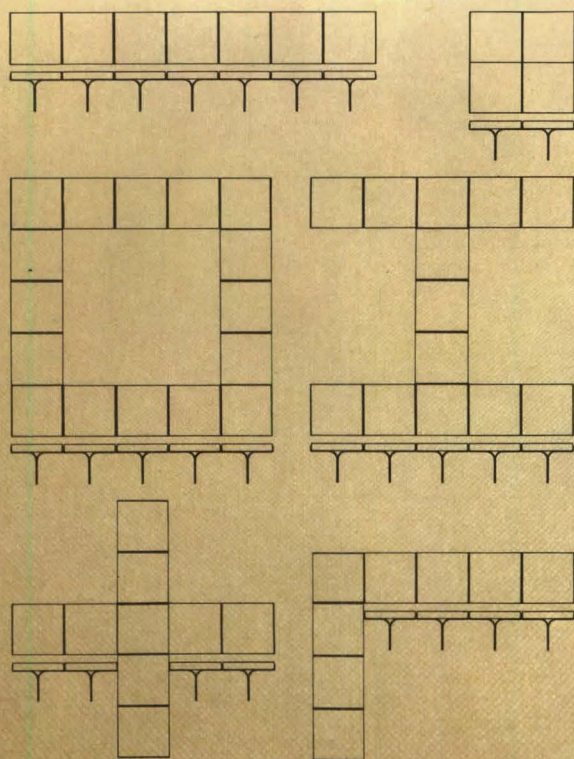
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Mies van der Rohe (1886-1969)

Before sewing one must cut. A philosopher who is in search of the nature of things is obliged to begin with sharp distinctions. These distinctions may seem brutal. They simply deal with certain essences taken in themselves: and how could we bring out otherwise the intelligibility of things from the confused flux of existence?

Jacques Maritain.

In an age obsessed with time, Mies van der Rohe was a man preoccupied with eternity. An architecture that seeks to exist outside of time, embodying absolute principles and an intellectual order, is sometimes called "classical", a term often, if loosely, applied to Mies's work. Yet Mies, who consistently refused to be his own historian, never commented on the appellation. Indeed, he would probably have denied it, at least on this ambiguous usage, so highly did he value clarity and precision in thought as in architecture. If, therefore, the concept is to have any value in clarifying his work, it must be rendered more precise, and in so doing we may pay some small tribute to his extraordinary contribution.

The concept of classicism does not apply to all buildings within the Greek and Roman tradition, and it can be used to describe an architecture outside of that tradition. Gothic Classicism, for example, refers to that point in the period's development when the most perfect harmony had been attained between form and structural technique (exemplified by the nave of Amiens Cathedral, completed 1236). Every building system permits a certain range of formal expression within which lies a very narrow band where its possibilities are neither underdeveloped nor pushed beyond the point where structure refined by art (*Baukunst*) is the sole determinant of form. It was Mies's genius to have kept his work consistently within these narrow limits.

This is the broadest sense of harmony that, as an attribute of classicism, applies to a wide range of architectural expression. But there are narrower and more purely visual meanings. Gothic architecture, even at its most classical, embodies a visual dynamism quite uncharacteristic of Mies. All the elements of his buildings, spatial or structural, are harmoniously and nondynamically interrelated. This was achieved, in terms of structure, through the repetition of a well-proportioned rectangular module with-

in an equally well-proportioned whole, and through the careful avoidance of contradictory directionality. In his tall buildings, for example, I-beams were used to break up the otherwise horizontal bays that, left alone, would contradict the essentially vertical direction of the building. It is more difficult to impose a classical quietude on a tall building than on a low, horizontal one since the visual effect of great height has dynamic connotations. But horizontality alone does not guarantee an harmonious aspect, and Mies was again careful to respect that basic axes of the building. The trusses that support the roof of Crown Hall, for example, divide the facade into five sections, each end containing two bays, with three central units of six bays each. This division was possible because the building is a rectangle, wider than it is deep. The post office projected for the new Federal Center, however, is a near square, making such a subdivision itself arbitrary, and yielding an arbitrary indication of direction. Therefore, although in the original design the roof was supported by trusses visible from the exterior, Mies omitted them from the final version.

There is another aspect of classicism — self-containment — that is present only partially in Mies's work. Mies had always been concerned that the building interact with its environment — a most unclassical preoccupation — and in the earlier works, from the Brick Country House Project through the Barcelona Pavilion, this was accomplished largely through the extension of walls past the roof plane into the surrounding landscape. In the later steel and glass buildings, which contain a purely cubiform space, it is the disappearance of the wall as such, through the use of a transparent glass infill, that accomplished the effect of interaction. Nevertheless, Mies's buildings do present an aspect of self-containment. In a traditional sense, this is most apparent in those buildings at ITT where the edges of the frame are particularly emphasized. The device can be observed even at Crown Hall, where the narrow, two-bay end sections establish full-stops in the frontal lane, as well as in the brick-filled Alumni Memorial Hall where it appears in the effort lavished on the exquisite corner details. But in the series of buildings supporting a cantilevered roof on a few slender

columns that culminated in the New Berlin National Gallery, the edge ceases to assume the function of visual containment. Through these last works, it becomes clear that the jewel-like isolation of Mies' buildings is largely the result of their precise, linear geometricity — the sense of an intellectual order visible in nature only at the highest levels of abstraction.

Linearity is another quality of Mies's work that links him with the classical tradition, especially that of the early 19th century. The indication of spatial configuration through line, rather than through shadow, characterizes Mies's own drawings as it does those of Schinkel who, through Behrens, influenced his early career. In his buildings, the linear crispness that defines each element separates one from another with a clarity and precision alien to the Baroque and Romantic traditions. These distinct elements are then unified, as they are in the classical architecture of the Greek temple and the Renaissance palazzo, entirely through repetition.

Miesian spaces are classical only in their geometricity and in their avoidance of abrupt and conflicting transitions. The extremities of his buildings are defined structurally by columns or roof lines

Photo: Hedrich-Blessing



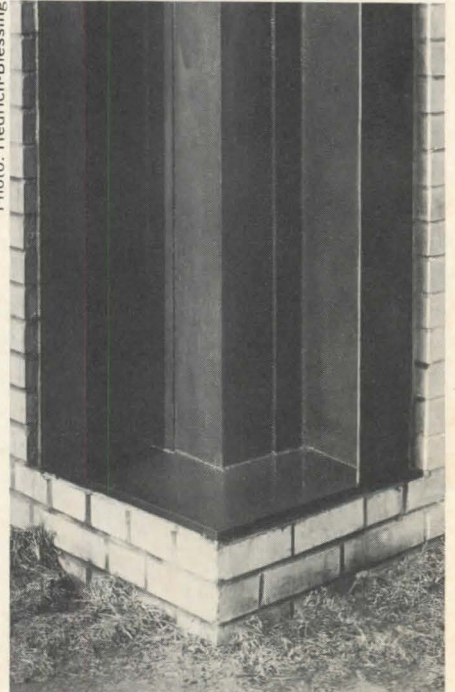
Chicago Federal Center — U.S. Courthouse and Federal Office Building. 1964.

Photo: Balthazar Korab

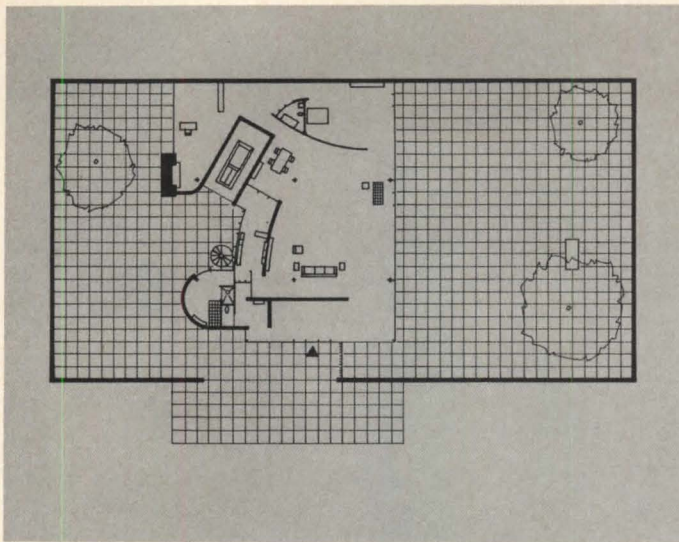


Illinois Institute of Technology — Crown Hall. 1965.

Photo: Hedrich-Blessing



Illinois Institute of Technology — Alumni Memorial Hall. 1945-46. Detail of corner pier.

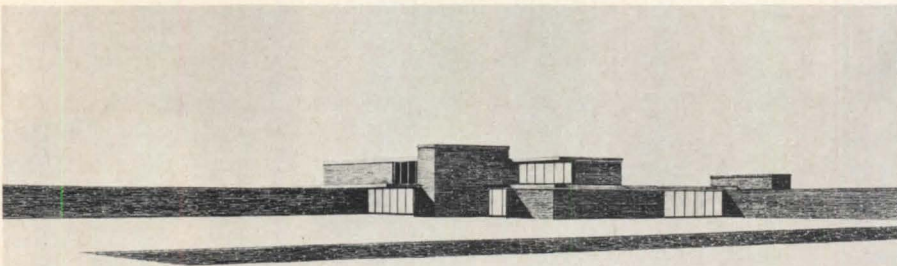


Court House with Garage. Project, 1923.

so that it is only a kind of visual *gestalt* that supplies a perimeter. Whenever possible, Mies divided interior spaces by clearly non-structural screens that, after the Court House with Garage project of 1934, avoided curved outlines. The omission of even simple curves, much less the eccentric shapes permitted by a non-load-bearing divider, is indicative of the kind of self-discipline Mies exerted, as well as of the kind of configurations he wished to establish. The spaces thus generated are free-flowing, yet geometric — exemplary of the kind of mature freedom only discipline and reason can produce.

The architectural language that Mies developed and refined is comparable to the Classical language, but all the more extraordinary for having been invented by a single man within the course of one career. Mies's legacy is a vocabulary of elements and a

Photo: Hedrich-Blessing



Brick Country House. Project, 1923.

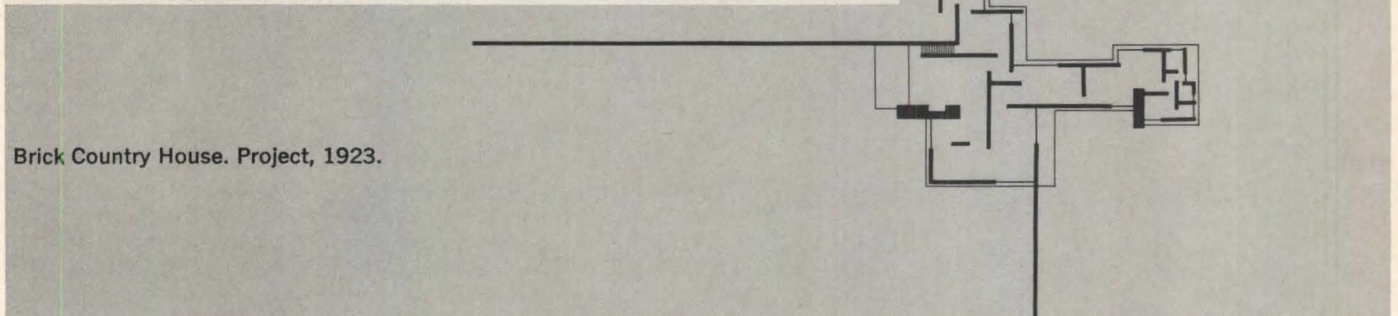
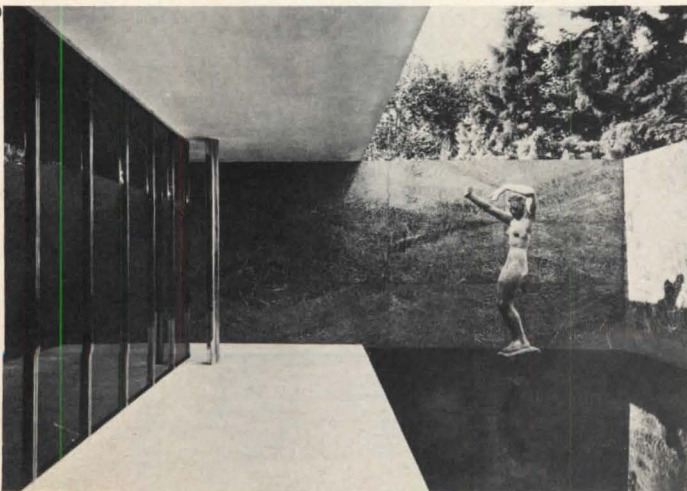
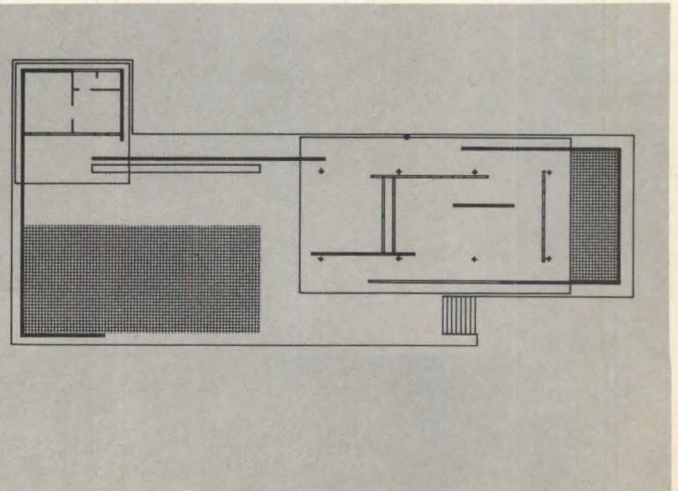


Photo: Hedrich-Blessing



Barcelona Pavilion. 1929.



syntax for composing those elements into a meaningful structure. Whether the composition would yield doggerel, prose, or poetry depends on the genius of the user, and not upon the language itself. It is for this reason that Mies was so profoundly concerned with the details — the “words” of his language — since they are the most readily communicated, concrete manifestations of a broad, abstract vision. Each element of this language — including piers, spandrels, air-conditioning vents, and roof trusses — transmits a double meaning by fulfilling functional and aesthetic objectives within the structural whole. Ironically, it was the superficial *gestalt* that lesser architects parodied, leaving Mies’s details the elements of a beautiful but private vocabulary.

Classicism is not merely a set of formal stylistic qualities but a complete metaphysical attitude. Mies’s philosophical concerns were profound and complex. With little formal education he was well grounded in the Greek classics — Plato and Aristotle — and in their Christian descendants — St. Augustine and St. Thomas. Of the moderns, he was equally familiar with Russell, Whitehead, and Wittgenstein, and he enjoyed the personal friendship of the Existentialist theologian (and aesthete), Jacques Maritain. It is difficult to separate the threads that composed his own view, although Plato and Augustine clearly figured high in his personal hierarchy. Mies thought of his own buildings as the particular embodiments of general solutions with a very broad range of application. Mies’s Platonism, therefore, lay in this notion of his role as a form-giver. Augustine’s theory of the reality of the universe, revealed with increasing clarity through the evolution of history, formed another part of Mies’s notion of the architect’s role. Every age, he felt, is dominated by a particular *leitmotiv* — its concept of reality — whose spirit is crystallized in its greatest architecture. Consequently, the themes of our own industrial era — science and technology — can provide the only meaningful basis for contemporary building. Mies’s own work was perhaps the century’s most elegant statement of these themes.

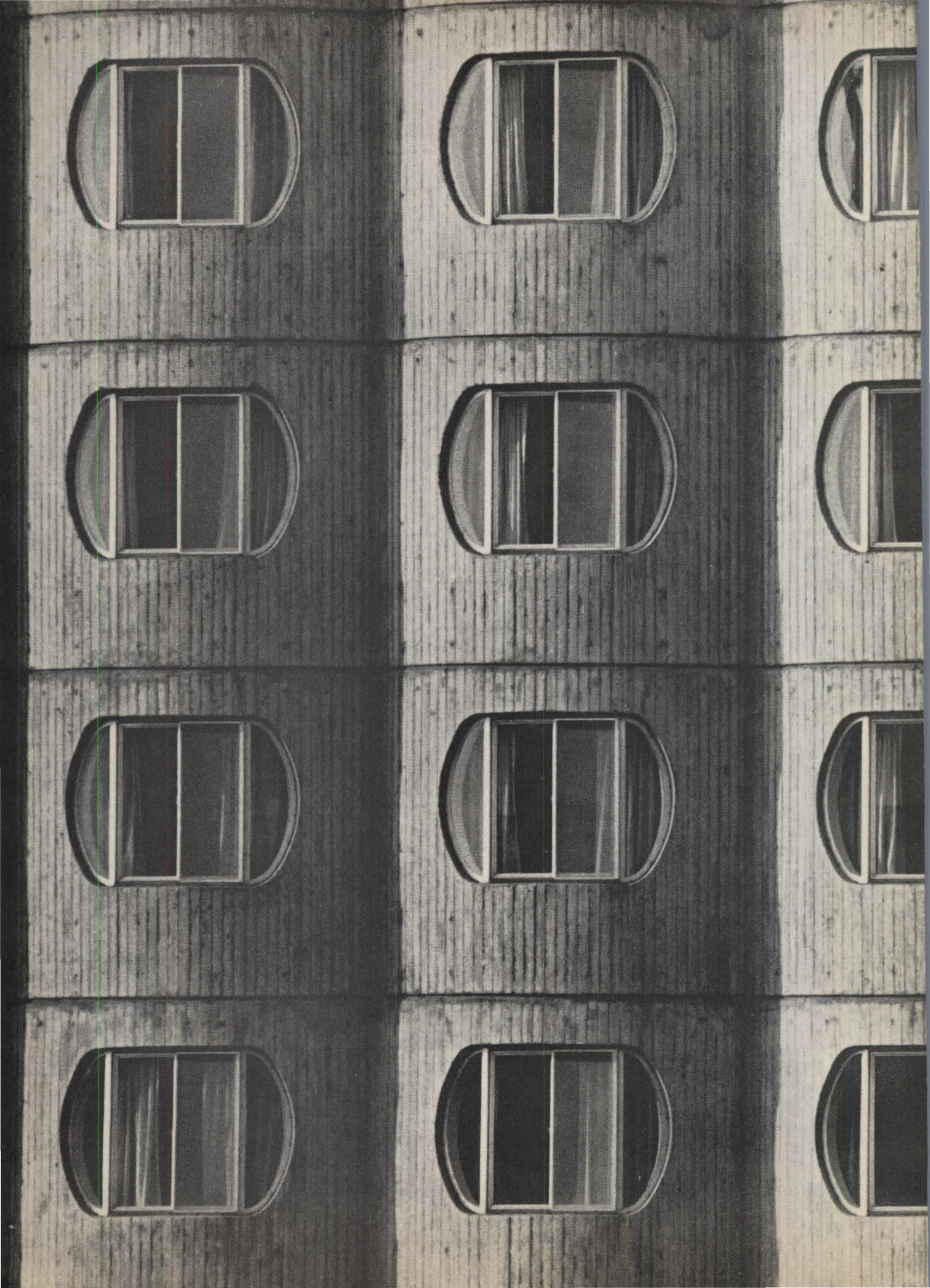
The philosophy of Wittgenstein, whose famous dictum, “What we cannot speak of, we must be silent about” has affinities with Mies’s own “Less is more,” and has significant bearing on his almost mathematical concept of elegance. Wittgenstein, concerned with the nature of language, observed that of all the possible combinations of words within a given system, only a limited number are meaningful. Although one may acknowledge the existence of a reality beyond that describable by language, its qualities are necessarily incommunicable. Similarly in architecture, technology permits a baffling range of formal choices, but only a limited number can meaningfully express the essence of that technology. Like

Wittgenstein, Mies tended to speak — and to build — in aphorisms, producing eloquent and profound statements with a modicum of means. Again like Wittgenstein, his concern to delimit an expressible reality reflected a deeper concern with the inexpressible.

In metaphysical terms, Mies’s work is an architecture of Being, rather than Becoming. The perfection of proportions, repetition of elements, and harmony of relations produces that sense of calm and timelessness associated with a special kind of unity. This striving for unity — the One — through refining and reducing the structure to its essentials, revealed a kind of quiet mysticism. “God is in the details” meant more to Mies than a mere *bon mot*.

Mies, like Plato and Shelley, tended to identify beauty with the true and the good. For a building to be at once false in the expression of its structural principles and beautiful in its appearance was a contradiction in terms Mies could not accept. In this, and in other senses, his architecture embodies a very highly developed morality. Part of his justification for designing large, open spaces for living and working lay in the freedom it gave the ultimate users of the building to develop their own mode of existence. Mies had too much respect for the individual to impose his own concept of life on the occupants of his buildings.

In many formal concerns, and in the philosophical attitude that informs them, Mies’s architecture can be identified as classical. Perhaps more than any other concept, it captures the essence of his work. Nevertheless, no single notion can account for every aspect of an artist’s career, and especially not one of Mies’s scope and depth. Classicism cannot explain, for example, the “complexities and contradictions” that mark the plan of the Court House with Garage project where Mies violated that basic grid with a complex of curves and intrusions. More importantly, it cannot be made to cover one fundamental quality of his work — transparency. Mies could justify his lavish use of glass on rational grounds since it is a cheaply produced and highly functional material. Nevertheless, one feels that he was drawn to it, and to other “non-materials” for more profound and personal reasons. Invisibility is, after all, the principal quality of the Barcelona Pavillion, filled with glass, chromed steel and polished marble. This quality is revealed with even greater clarity in the beautiful “Museum for a Small City” collages. Here the structural elements, lightly but precisely drawn, disappear into the background, leaving paintings and sculpture as the only truly visible elements. This invisibility was the creative manifestation of Mies’s own self-effacing temperament. Through it he created not monuments, but a kind of poetic environment whose appeal is to the mind and to the inner eye. — S.A.K.



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3. Arbeiterdorf Employee Apartments.
Designers: Zejdlik, Harmala, Hysell and
MacKenzie, Inc., Minneapolis, Minn.

4 and 5. Snowmass Inn. Architect: Art
Preusch, Aspen, Colo.

6. Shadowbrook II Condominium.
Architect: Fredric Benedict &
Associates, Aspen, Colo.

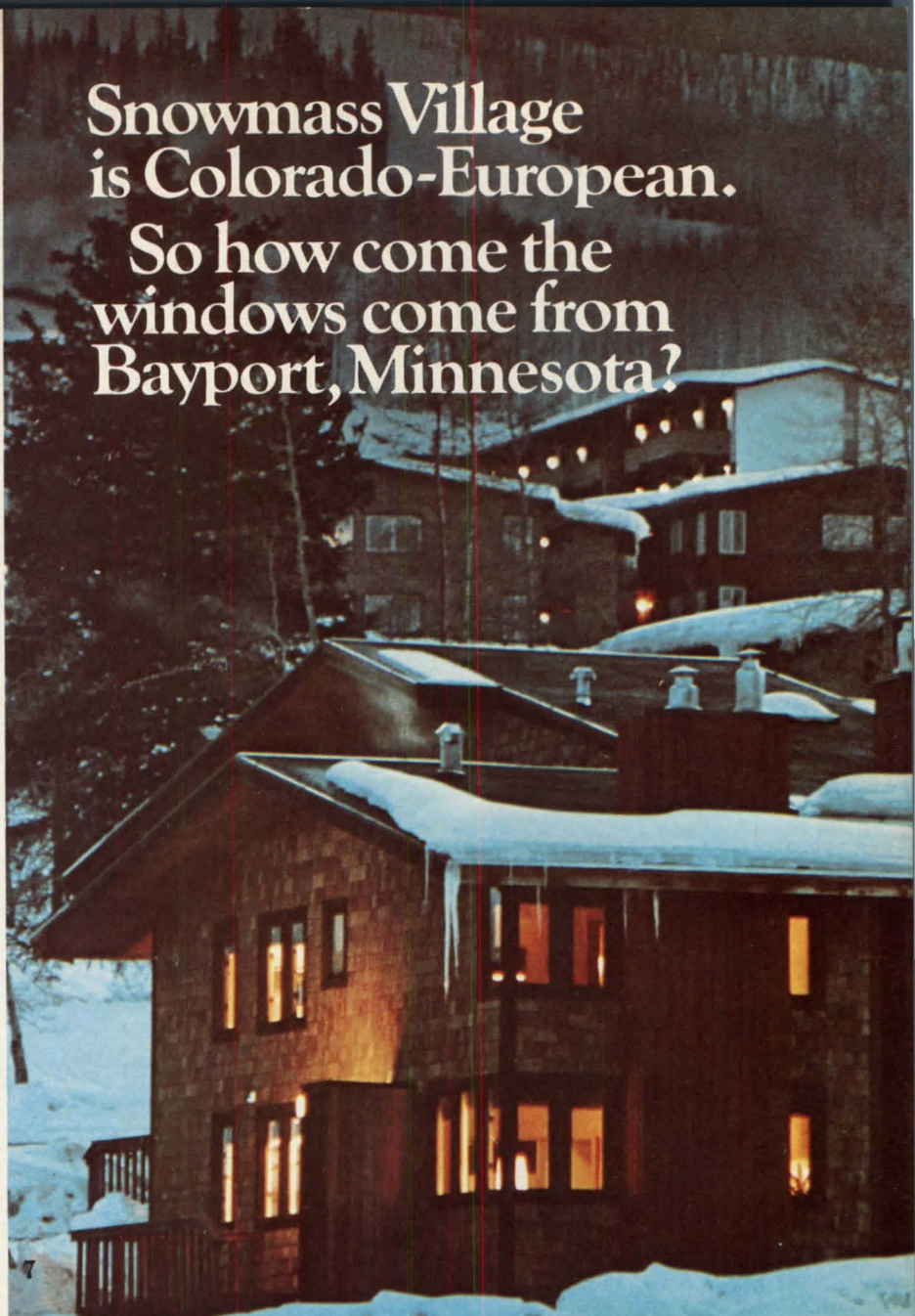
7. Tamarack Condominium. Architect:
David J. Flood & Associates, Beverly
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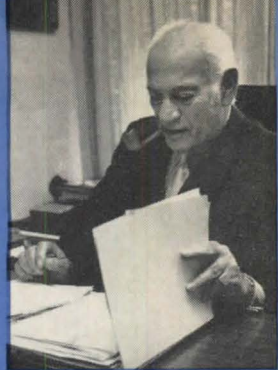
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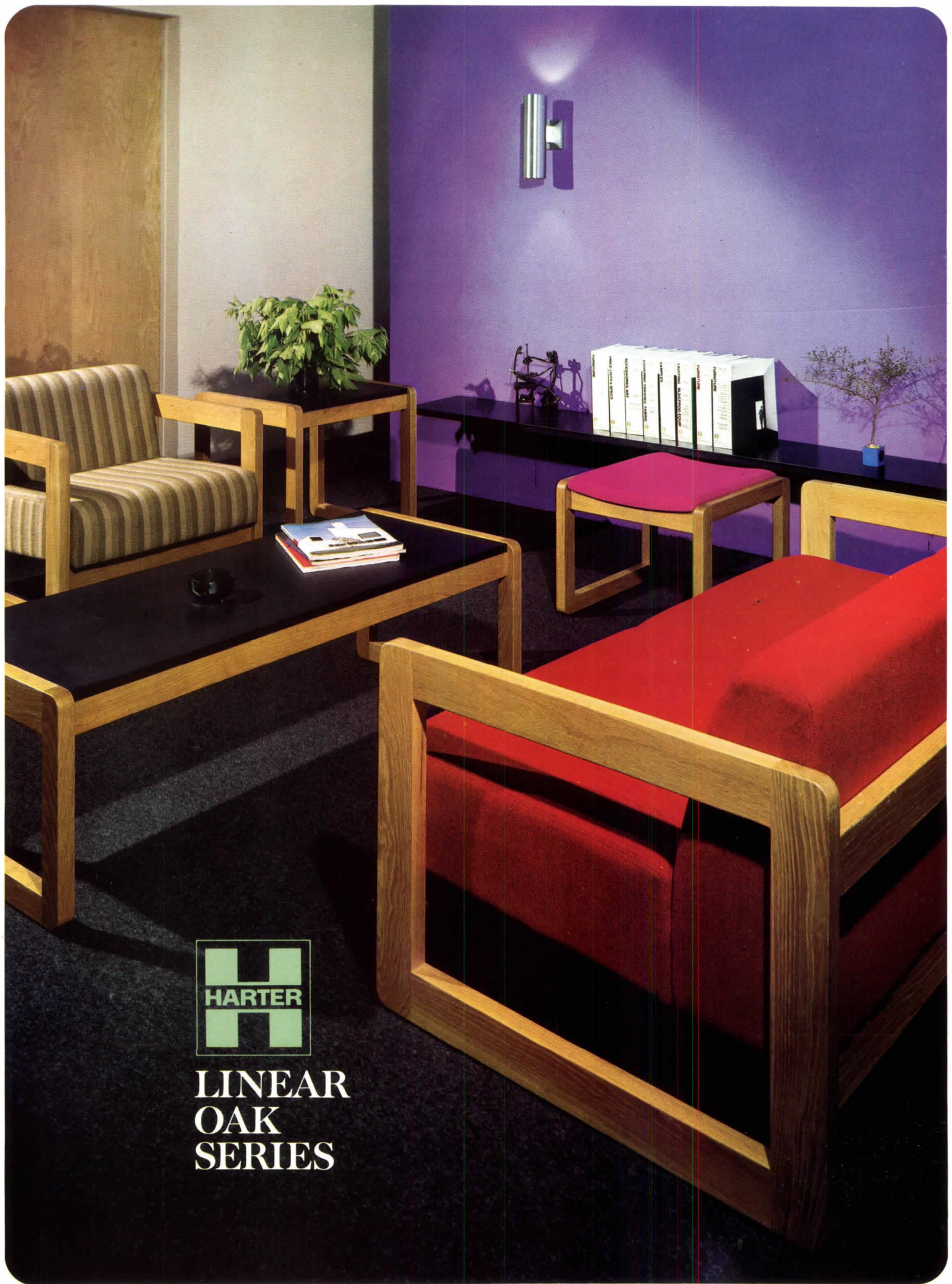
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YOUR POINT OF VIEW

Walter Gropius

Dear Editor: Yesterday I read Mr. Kurtz's article (Sept. 1969 P/A) about my husband, the "Magister." I want to thank you for it because it is one of the rare times in all the hundreds of articles which recently appeared about him that I recognize the man I know. It must be very difficult to capture the essence of someone's personality, particularly when one did not know him, but he accomplished that. I can't be sure whether they may have met sometime, but I think not.

I have just returned from a very rewarding trip to Chicago where a symposium was held on the Bauhaus by various speakers who covered the subject from many aspects and left everybody rich with experience. My husband would have been gratified by the enormous response of young people to the Bauhaus idea also in this country. It was the same in Stuttgart, London, Amsterdam & Paris. Thank you again!

*Ise Gropius
Lincoln, Mass.*

Mature Wisdom

Dear Editor: I enjoyed reading the July issue of your magazine, particularly the article "Architectural Education: The Challenge to Tradition."

The architectural student's concern with the social, political, and financial ills of the world are admirable, but to allow this concern to interfere with mastering the fundamentals of their chosen profession will ultimately be a great source of frustration to them; for without this basis, their contribution through their profession toward healing the ills that now trouble them will be limited.

*William Norman Manhoff
Richmond Manhoff Marsh, Inc.
Chicago, Illinois*

Defending the Establishment

Dear Editor: Your correspondent, Mr. D. A. Polychrone, A.I.A. (August 1969 P/A) certainly presented an excellent contemporary interpretation of the architectural profession as viewed by many of us who, however, lack the analytical tools to express ourselves philosophically as aptly as he has done.

I feel that I would be more than ungrateful if I did not come to the defense of architecture and the architect employers for whom I have worked during the past 25 years for assisting me in achieving several of the goals that I had earlier set myself. These accomplishments occurred in both the U.S. and in Canada. For the most part, these architects received their commissions from the much maligned Establishment interests, and engaged in such projects as hospitals, schools, universities, foreign missions, and U.N. assignments, in addition to run-of-the-mill commercial assignments.

Many of these offices, as long ago as 1946, were multi-racial on both sides of the border, and boasted a fine cross section of all ethnic groups in each country. As in any business or profession, there were charlatans and malpractitioners in a very few of the offices for whom I had worked but, for the most part, I recognized the majority of my former employers to be a group of highly professional, dedicated, and compassionate people.

*Creighton Aquin, P.Q.A.A., R.A.
(Penna.)
Montreal, Canada*

Getting Better

Dear Editor: With the August issue, it appears that P/A has awakened and is trying to interest your long suffering subscribers with an attractive presentation of current architecture.

Your coverage of IVB's bank in Philadelphia by Murphy, Levy and Wurman was very complete and interesting and no doubt appreciated by many architects.

Please keep up the good work.

*Walter D. Spelman
Rockville Center, N. Y.*



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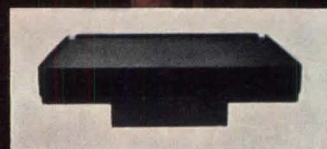
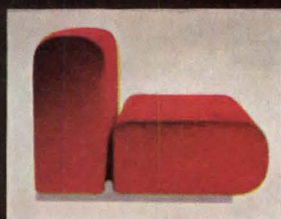
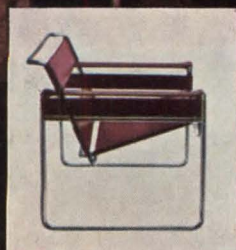
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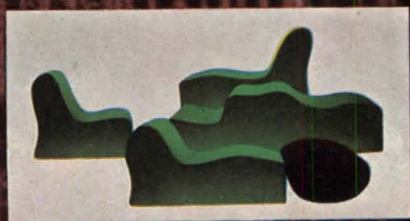
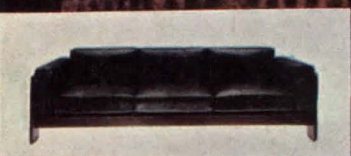
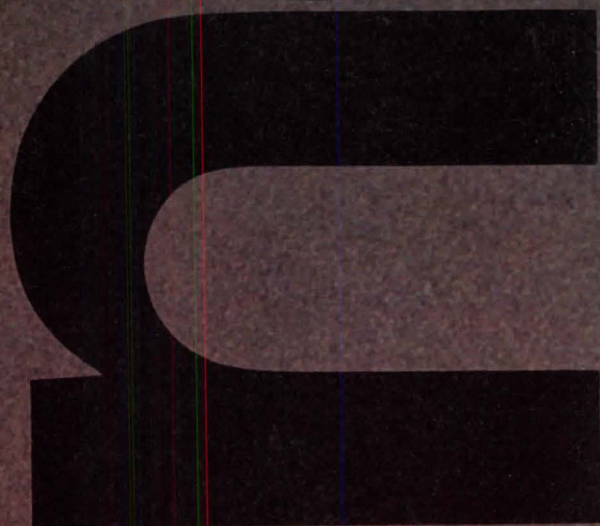
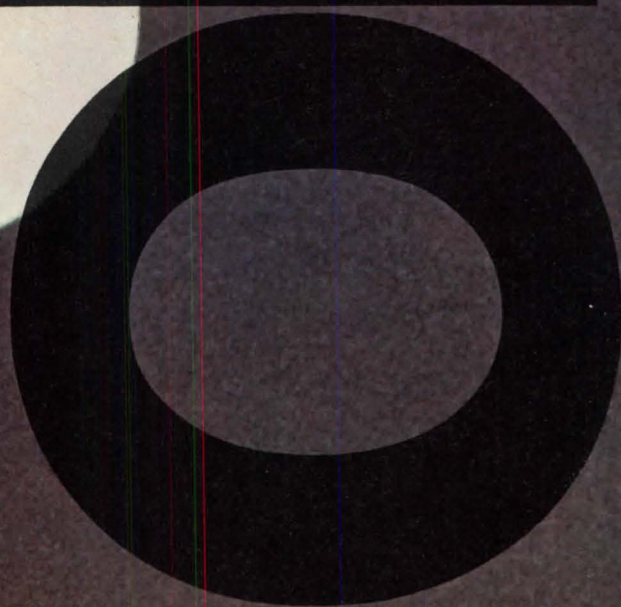
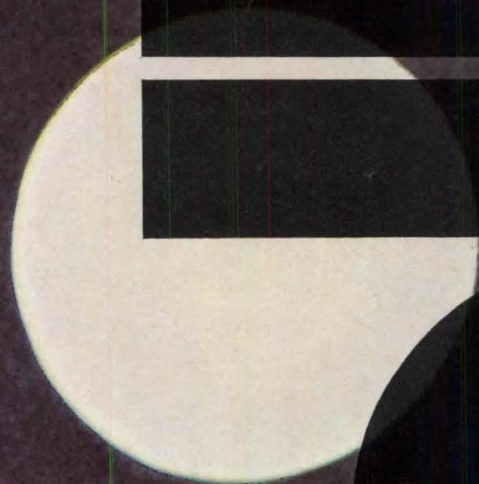
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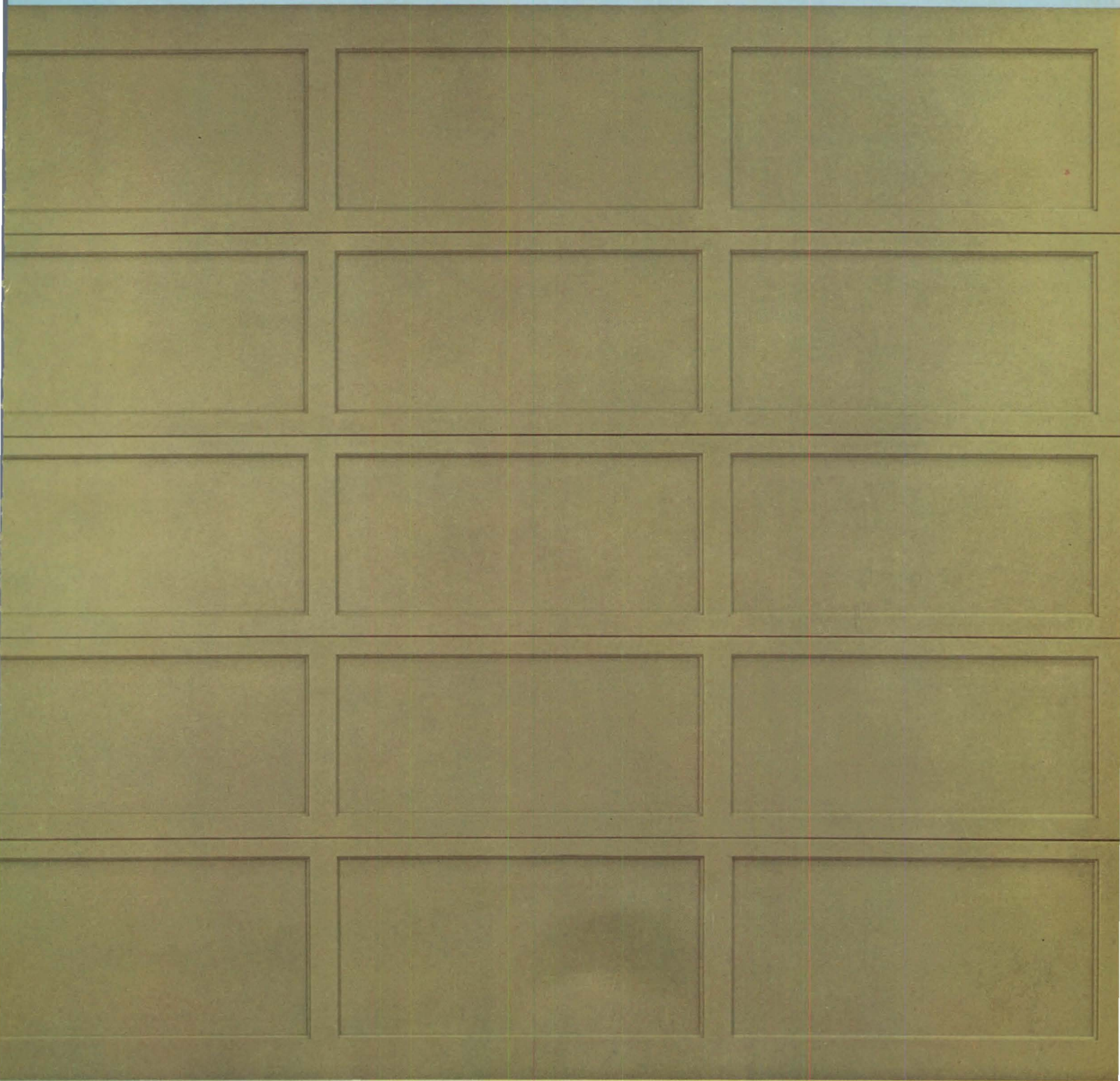
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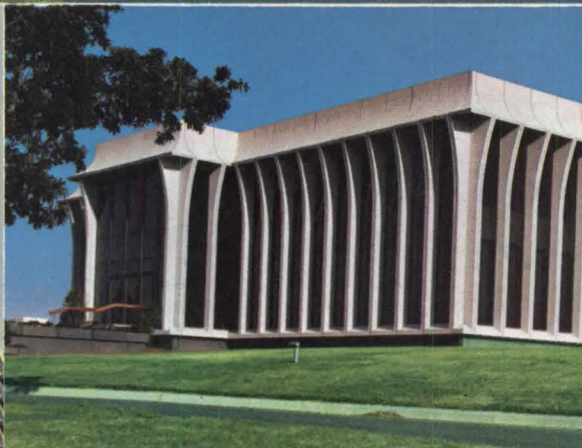
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Top: Employers Insurance of Wausau
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Architects: Childs & Smith, Inc., Architecture-Engineering

Middle left: Hartford National Bank Building
Hartford, Connecticut
Architects: Welton Becket and Associates

Middle right: National Farm Insurance Company
Fort Worth, Texas
Architects: Grayson Gill, Inc.

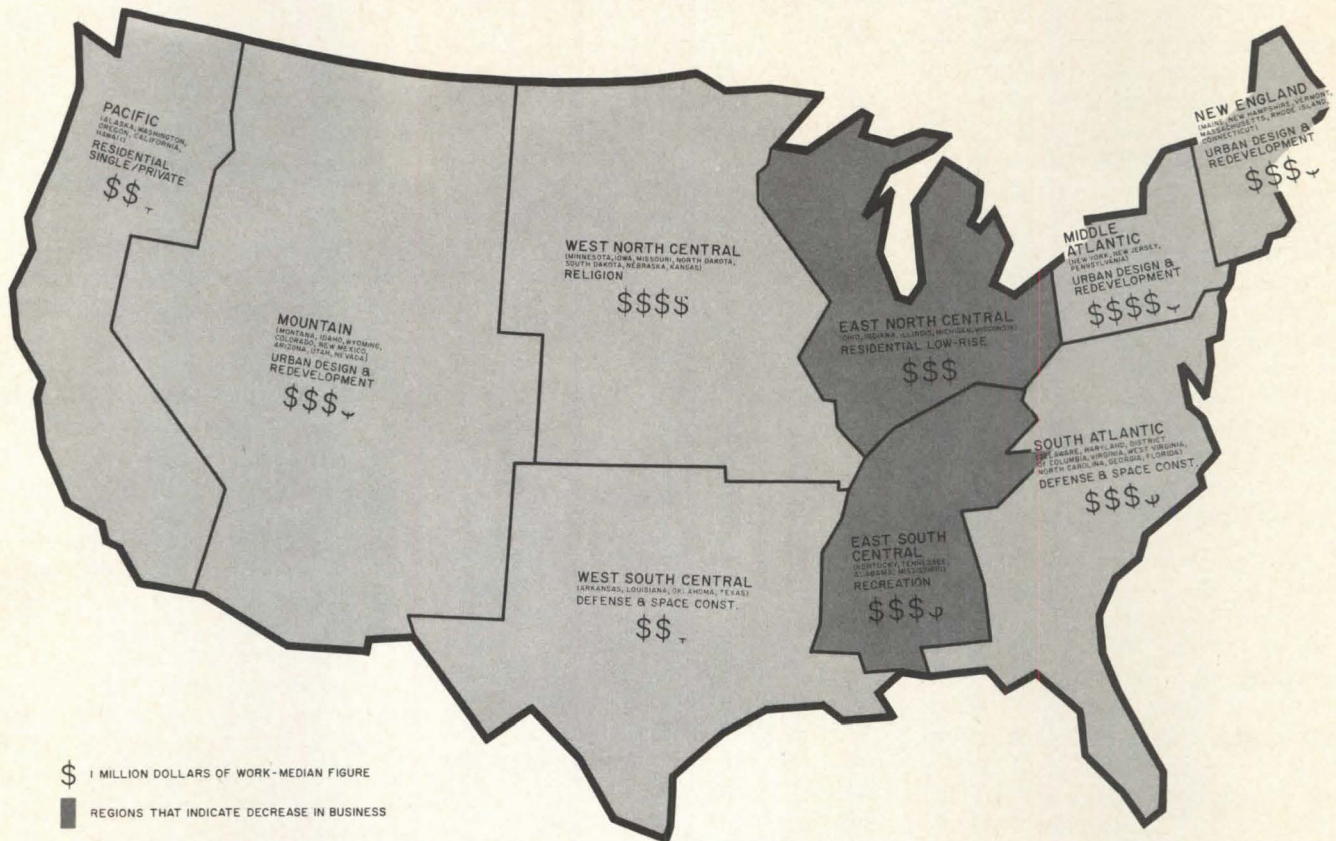
Bottom: Torrington Manufacturing Company
Torrington, Connecticut
Architects: Marcel Breuer and Herbert Bechard

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P/A

NEWS REPORT

MAP OF THE UNITED STATES SHOWING MEDIAN DOLLAR VOLUME AND LEADING BUILDING TYPES
AMONG SPECIALIZED FIRMS IN VARIOUS REGIONS.



Architectural Work Expands Despite Slump in Construction Business

The rising costs of labor and materials, high rate of inflation, and "tight-money" squeeze have caused a noticeable slowdown in the 92 billion dollar-a-year U.S. construction industry. According to leading economists, construction is well below earlier 1969 norms and can be expected to move further downward as restraints on the economy bite harder. The most severely affected area is the home-building business and, as the "credit crunch" continues, asserts *U.S. News and World Report*, "more and more cities and other governmental units are putting off much-needed building programs because they feel current costs are too high or because they are unable to sell bonds in today's market."

P/A's Survey

In compiling its annual business survey, the only one in the country that forecasts architecturally designed construction for the coming year, P/A sent a questionnaire to a random sample of its readers. Of the 618 respondents, the largest percentages of response — in ranges of 13 to 20 per cent — were from the Middle Atlantic, East North Central, South Atlantic, and Pacific regions, while the smallest percentages (ranging from 4 to 7 per cent each) were the remaining areas (see map). The typical size of the offices responding seems to be about 2 to 4 employees, excluding secretaries and clerical workers (see table 4).

Dollar Volume Trends

The present slow-down in the construction business and the various ramifications of spiraling inflation have not adversely affected the amount of work on architect's boards scheduled for 1970 construction. Rather, the figures reflect a prospering economy and architectural business. Of the architectural firms responding, 57 per cent report an increase in dollar volume of work on the boards over 1969's figures, and of these firms, over half report work increases of 50 to 100 per cent. More than a quarter (27.1 per cent) of these firms actually doubled the amount of work handled. In asking architects their dollar volume for 1970 construction, P/A

P/A NEWS REPORT

found that the median estimate was \$3,074,460, with almost two-thirds of the firms falling in the 1 to 11 million dollar construction range. Ten per cent of the respondents have work on the boards totaling \$20 million and over, and one New York office reports over a billion and a half dollar volume for 1970. While some firms, 24.4 per cent of those answering the questionnaire, report a decrease in dollar volume of business, the median decrease is 38.9 per cent, compared to the overall median increase of 51.6 per cent. The remaining 18.6 per cent of respondents state that their dollar volume has remained essentially the same.

Geographical Distribution of Work

Of the various geographical regions, the Middle Atlantic states boast the highest dollar volume with a median figure for 1970 architectural construction at \$4,296,600 (see table 1). Proportionate increase over last year's work on the boards, however, is greatest in the West. The West South Central area shows a 65.7 per cent increase in work over 1969, and the West North Central states show an increase of 63.3 per cent. The firms reporting a decrease in volume in these two areas generally have a lower percentage of decrease (approximately 20 per cent) than other regions. Of all nine geographical regions responding, only two, the East North Central states and the East South Central states do not report an overall increase in volume of work. The East North Central section of the U.S. has the unfortunate distinction of having both the smallest increase over last year's work (47.8 per cent) and the largest decrease (34.8 per cent).

Type of Buildings Represented

According to the P/A survey, (table 2) the greatest proportion of architectural firms responding are involved in commercial low-rise buildings (48.2 per cent) and education buildings

(42.7 per cent), followed by residential single/private buildings (36.6 per cent) and residential low-rise (34.5 per cent). The smallest percentage of firms is involved in defense and space construction (3.7 per cent). As table 2 illustrates, however, architects would find it more profitable to attract more commissions from commercial high-rise buildings, as well as educational buildings, since commercial high-rise yields a dollar volume median of \$3,500,000. Although some of the types of buildings yielding high dollar volumes are sponsored by government agencies, half of the firms in the sample report that 100 per cent of their work is for private clients.

Specialization

When one-third or more of the total dollar volume of a firm's work on the boards is in a specific type of building, the firm can be classified as specializing in that building type. Very few firms in the P/A survey specialize to the extent of having over half of their work in one type of building; instead most specialize in two types. Among the 603 firms who specialize, as table 3 indicates, the largest percentage are involved in educational buildings (28.2 per cent). However, in comparing the increase of 1970 work with that of 1969, more firms specializing in residential high-rise report an increase than firms specializing in the other types of buildings. The highest percentage of firms re-

1 MEDIAN DOLLAR VOLUME BY REGION

Geographical Region	Median Dollar Volume Figures
New England	\$3,300,000
Middle Atlantic	4,296,600
East North Central	2,875,000
West North Central	3,750,000
South Atlantic	3,388,880
East South Central	3,250,000
West South Central	2,300,000
Mountain	3,500,000
Pacific	2,208,330

porting decreases in total dollar volume from last year comes from those specializing in religious buildings. Geographically, the heaviest specialization is in the South Atlantic region (Cape Kennedy's location) and West South Central (NASA Control Center's location) where only a few firms (.05 per cent) are involved in space and defense construction. Other than this, the high instance of specialization is in the Middle Atlantic region, with 44.5 per cent of the firms involved heavily in urban design and redevelopment, 39.1 per cent in recreation buildings, and 38.9 per cent in industrial. The map indicates the type of building leading in specialization in the various geographical regions.

The Future as seen by the Architects

Despite the overall increase in work on the boards for 1970 con-

2 DOLLAR VOLUME MEDIANS AND PERCENTAGE OF FIRMS INVOLVED IN VARIOUS BUILDING TYPES

Type of Building	Percentage of Firms Involved	Median Dollar Volume Yield
Commercial low-rise	48.2	\$ 644,530
Commercial high-rise	12.8	3,500,000
Defense and space construction	3.7	937,500
Education	42.7	1,793,470
Health	23.9	1,637,930
Industry	23.0	725,000
Public Use	21.0	718,750
Recreation	16.0	556,250
Religion	26.2	441,950
Residential low-rise	34.5	1,141,020
Residential high-rise	18.1	1,934,000
Residential single/private	36.6	314,025
Urban design and redevelopment	7.1	968,750
Other	10.2	675,000

struction over 1969, many architects seem uncertain about the outcome for the future. When asked what they viewed as the most significant factors affecting design trends and architectural practice for the forthcoming year, the majority, not so surprisingly, replied that it was the high cost of labor, with inflation and concomitant economic restraints closely following. Also worrying architects are the high cost of materials, high salaries for architect-designers, and the paucity of both good architects and good skilled laborers.

Many architects cite the high interest rates and decreasing availability of loans as presenting the major obstacles in getting their work from the boards into construction. As one architect puts it "high interest will tend to produce cheaper structures with a resulting loss in quality . . . in an effort to 'get by' for the immediate future." Another architect complains that "government financing has become the only remaining source of financing for larger projects, and their antiquated restrictions and red-tape regulations prohibit good architecture."

Most architects feel the high cost of labor and low quality of workmanship is at least encouraging increased reliance on industrialization of construction techniques based on modular prefabricated components. As one architect states, "certain trades are pricing themselves out of the market." The advancement of systems technology in this area is generally seen as the most important single factor for future design. Either that or as one architect suggests, "we should design to make bad workmanship look as if it belongs in a building." Other architects also foresee increased use of computers benefiting both architectural design and especially office practice where it would help the operation run more efficiently and economically.

Regarding office practice, architects find one result of all of these problems is the tendency for small offices to be absorbed into corporate enterprise. There seems to be an increased demand for package deals where the contractor hires

3 SPECIALIZATION OF ARCHITECTURAL FIRMS

Type of Building	Percentage of Firms Specializing in this Type
Commercial low-rise	18.1
Commercial high-rise	6.6
Defense and space construction	0.5
Education	28.2
Health	10.7
Industry	5.8
Public Use	7.6
Recreation	3.7
Religion	5.2
Residential low-rise	17.8
Residential high-rise	10.2
Residential single/private	7.9
Urban design and redevelopment	1.5
Other	3.6

the architect (if he deems so necessary). In many cases, the client wants the complete package deal. In this way, according to one architect, "their needs are met by dealing only with one person for a predetermined fixed price for total design services," (May, 1969 P/A).

This demand for expanded services has thus encouraged architects to enter into joint ventures

with architects, builders, and developers and in some cases to form corporations.

Promising Outlook for the 70's

According to *U.S. News and World Report*, any setbacks existing in the economy now are temporary. The next decade, "the spectacular seventies" will see total production of goods and services climbing 100 per cent as the "third industrial revolution" begins. This new revolution is to come about through "industrial applications of nuclear energy, the unfolding of great advances in electronics, and continued development of automatic-control systems and computers." Standard income will rise 32 per cent (adjusted for inflation), and new industrial plant growth has been forecast for the East North Central and East South Central regions of the U.S. With this growth there can be expected a sharply expanding architectural business where current problems in the construction of architectural projects and the operation of architectural offices would be almost completely solved by the advances of the "third industrial revolution."

4

BREAKDOWN OF OFFICE SIZE AND GEOGRAPHICAL DISTRIBUTION BY SIZE (Number of Employees)

Number of Employees (excluding secretarial)	Percentage of Firms in this Range
0	6.3
1-2	26.1
3-4	22.9
5-6	13.0
7-8	7.3
9-10	4.3
11-15	6.1
16-20	4.4
21-25	2.5
26-30	2.1
31-50	2.0
Over 50	3.0

Region	Number & Employees			
	Over 20	Over 10	5 - 9	Under 5
New England	13.8	9.0	2.2	6.1
Middle Atlantic	36.3	27.1	5.5	20.1
East North Central	17.2	18.9	24.1	18.9
West North Central	6.9	9.8	8.8	7.7
South Atlantic	6.9	11.5	19.8	17.8
East South Central	3.4	4.9	12.1	5.1
West South Central	5.2	4.9	5.5	5.4
Mountain	3.4	4.1	8.8	3.7
Pacific	6.9	9.8	13.2	15.2
	100.0%	100.0%	100.0%	100.0%



Aerial view of Bryant Park rally

ARCHITECTS AGAINST THE WAR

On October 15, the day of the nationwide moratorium protesting the Vietnam war, dozens of architects and planners met at rallies around New York city to proclaim their support. One group of

architects marched with artists and entertainers from the U.N. Plaza to St. Patrick's Cathedral where they joined thousands of other protesters in an evening candlelight service.

In conjunction with the moratorium, the Executive Committee of the New York Chapter of AIA sent a letter to each of its 1600 members inviting them to attend the main rally of the day in Bryant Park. Although the Executive Committee's decision had been made without an entire chapter vote, they made it clear in their letter that they as individuals, not as representatives of the chapter, were urging the architects to join the moratorium. (Nevertheless, as of the 15th, each New York Chapter Executive Committee member had already received one irate letter from an AIA architect castigating their seemingly autonomous decision.) The question perhaps is not so much one of par-

liamentary procedure as whether architects as a professional group should be politically involved. Accused by a young generation of socially and politically conscious architects as being irrelevant, the AIA at its national convention last June took a significant step in affirming such involvement. In a resolution passed at the convention, the members called upon the President and Congress of the U.S. to reexamine and reorder national priorities since "in both moral and economic terms our nation can no longer afford or pretend to intervene in the political and military affairs of the nations throughout the world, maintain a military and weapons establishment of unlimited size, explore the moon, and at the same time, rebuild our decaying cities, provide an adequate supply of housing, and finance domestic programs needed to solve pressing social problems." This resolution, printed in August in the New York Times and again on the day of the moratorium, clearly shows the growing awareness of AIA members that indeed the present political situation affects their own implicit desire for better architecture in America. As one architect explained to P/A, the AIA as a professional body has done great service to architects, much of which is felt indirectly or taken for granted. But what it needs to realize is that it can be of even greater service to the country (and to architects) by expressing a strong political consciousness.

While the Executive Committee opted for a rally sign quietly stating "Architects Against the War" rather than using the AIA's name, the sign nevertheless did attract attention from the various media and other architects at the rally — including a number of architectural students delighted that at least one small governing body of the AIA was in back of the moratorium. On the other hand, one anti-moratorium demonstrator threatened Executive Committee member Lawrence Litchfield (left center), "I'll never have you build my split level!" ... That's the price you must pay.

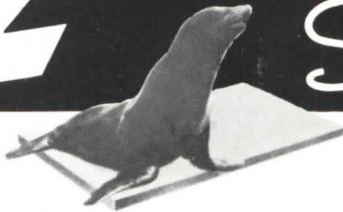


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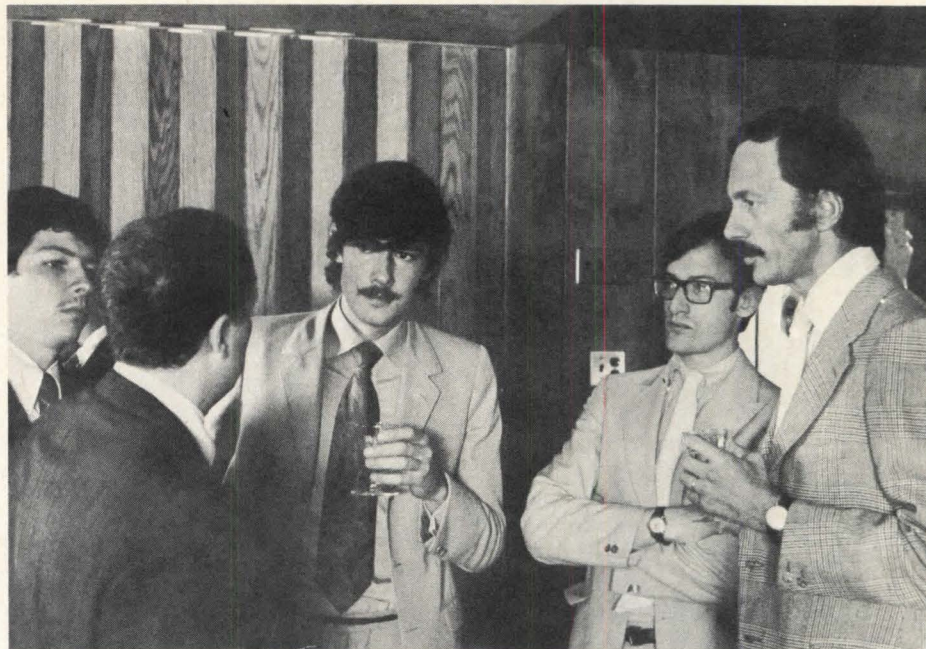
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Award Jurors' Luncheon

As preparation for the challenging task ahead, and possibly to increase the stamina of the five Design Award jurors, P/A's publisher, Phil Hubbard, treated both jurors and editorial staff to lunch. The photos above depict staff and jury in various states of lunch-time socializing.

Food eaten, ice broken, and new working relationships formed, everyone settled down to the very serious job of administering and judging the 670 Design Awards submissions.

The editorial staff is looking forward to the bestowing of the awards in the middle of January, and also to another free meal.



L. to R.: assistant editor, Chet Mantolesky; juror, Bob Venturi; associate editor, Don Raney; associate editor, Stephen A. Kurtz; juror, Tim Vreeland.



L. to R.: editor, Forrest Wilson; publisher, Phil Hubbard; administrative assistant, Charlotte Van Voorhis.



L. to R.: senior editor, C. Ray Smith; juror, Bruce Graham.



L. to R.: juror, William Brubaker; associate editor, Alis Runge.



L. to R.: juror, Bob Venturi; juror, William Mouton.



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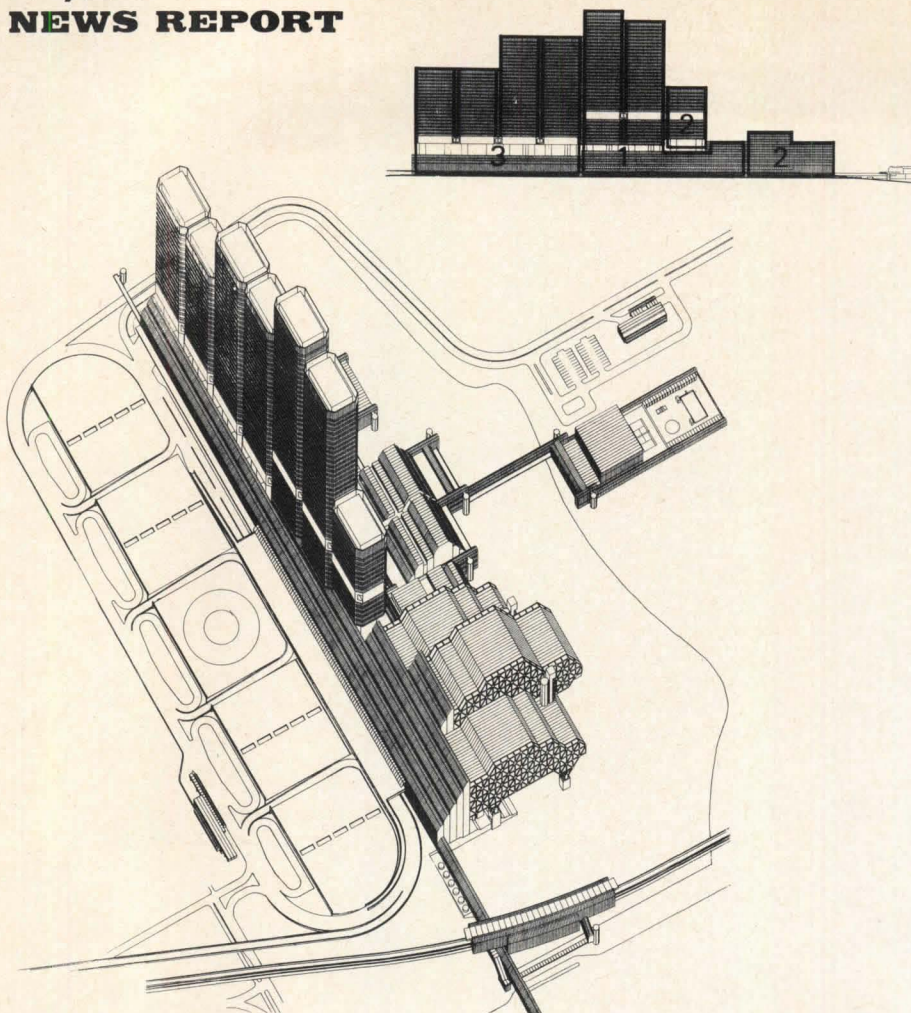
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All buildings are connected to the spine, at left of drawing. Inset shows — Phase 1: UNIDO and IAEA Headquarters. Phase 2: Offices, Conference Center, and Communications Center. Phase 3: Office Block.

Pelli Team Wins in Vienna

The winning scheme for the Competition for an International Organizations Headquarters and Conference Center in Vienna, Austria, designed by a team headed by Cesar Pelli, is a silhouette of towers of varying height and low auditoria which take the form of their space trusses.

There are two main orientations, the one toward Vienna formed by a glass-enclosed main concourse and administration buildings, and the other toward Kagran composed of smaller scale units.

The administration and office buildings are arranged in a line and raised on large piers to make them independent of the common services on lower levels. The glass wall is detailed as a membrane independent of the structure, and supporting members are on the same plane as the glass. The main concourse is supported on light

steel trusses and enclosed by the same glass membrane.

In the conference center the most important architectural elements are the space trusses formed by rectangular steel tubing. The roof and walls of the auditoria are enclosed in lightweight aluminum sandwich panels.

The main element of organization is the circulation system, a three-dimensional grid of movement; spaces are connected to and served by this circulation grid. The circulation grid is like a horizontal tree with branches spaced at 48 meters along the main trunk. The 48m increment was chosen because it lends itself to parking, high rise structures, auditoria, loft service spaces, and accommodates itself to manufactured building products.

The office functions are organized vertically to offer the small

cell-like spaces views and light. Common services are organized horizontally to provide large spaces which can be easily expanded or divided.

The parking structure is separate from the buildings in the interests of economy and efficient circulation; the separation accomplishes separation between motor and pedestrian traffic and also simplifies phasing.

The main concourse acts as a circulation axis. This 484.80m main avenue varies in height from 24 to 54m, and within it are platforms, balconies, bridges, stairs, escalators and elevators. Through the sloping glass roof are panoramic views of Vienna.

Speaking of his winning design, architect Pelli stated, . . . "Basic to the concept is design for change. The capability of change solves one of the architectural problems of our time. I am concerned with complexes, which are different from buildings, and our final answers in the Vienna Competition have much in common with the answers we found for two other projects — Comsat and Teledyne — in the sense that the solution was a central exterior spine. I don't pretend that this is the only way to organize, but it is a very good way to organize for today. I'm tremendously interested to see how far it can go and what you can or can't do with the main pedestrian spine that is connector and circulation. How large, for instance, can something grow that is not part of the urban pattern, as in the Vienna Competition? Something isolated from great urban intensity. In the Vienna Competition the spine is a separate structure in front of the other elements. You arrive there by car, bus, subway or taxi and transfer from the vehicle to the weather-proof area — the spine, the internal main street. The spine has many dimensions — wider in some places, higher in parts; there are bridges, platforms, stairs. It is movement. It is life-giving.

Now, of course, we'll begin to restudy the whole thing. We were interpreting a program in a vacuum, without the normal input from the client or user. Now the dialogue begins — cost estimates, soil borings, structural problems for that particular site. These start to make it a reality."



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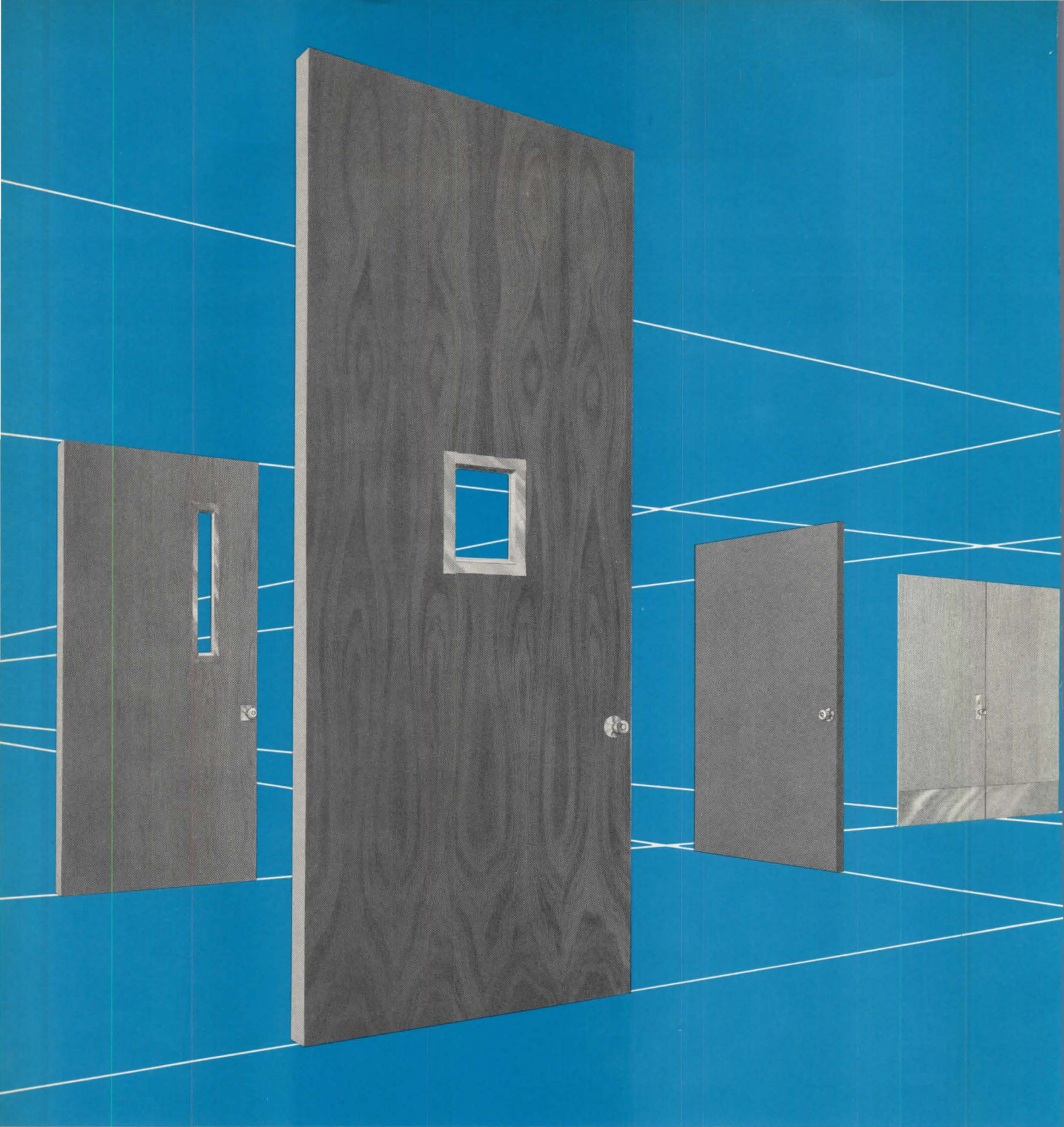
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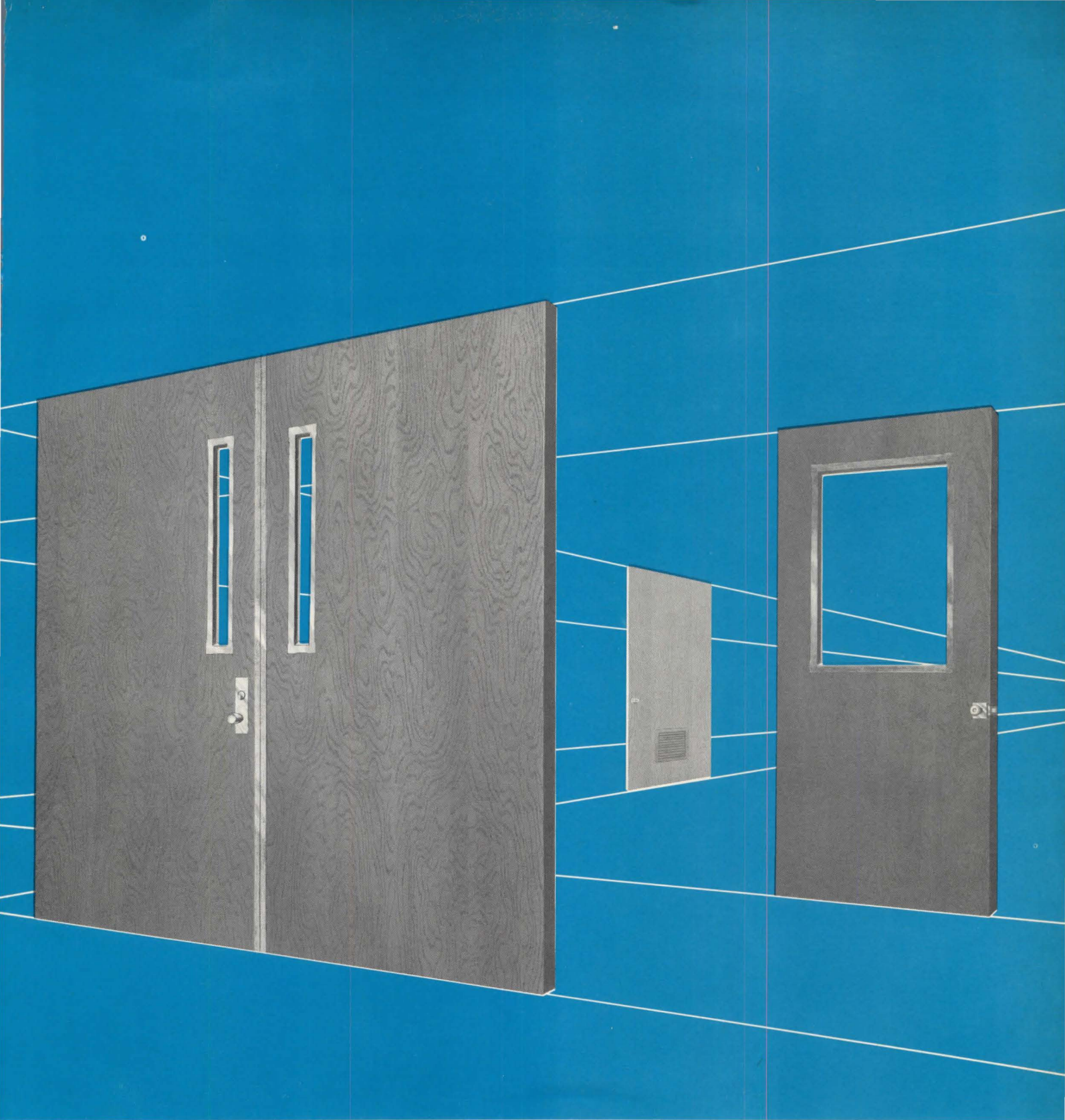
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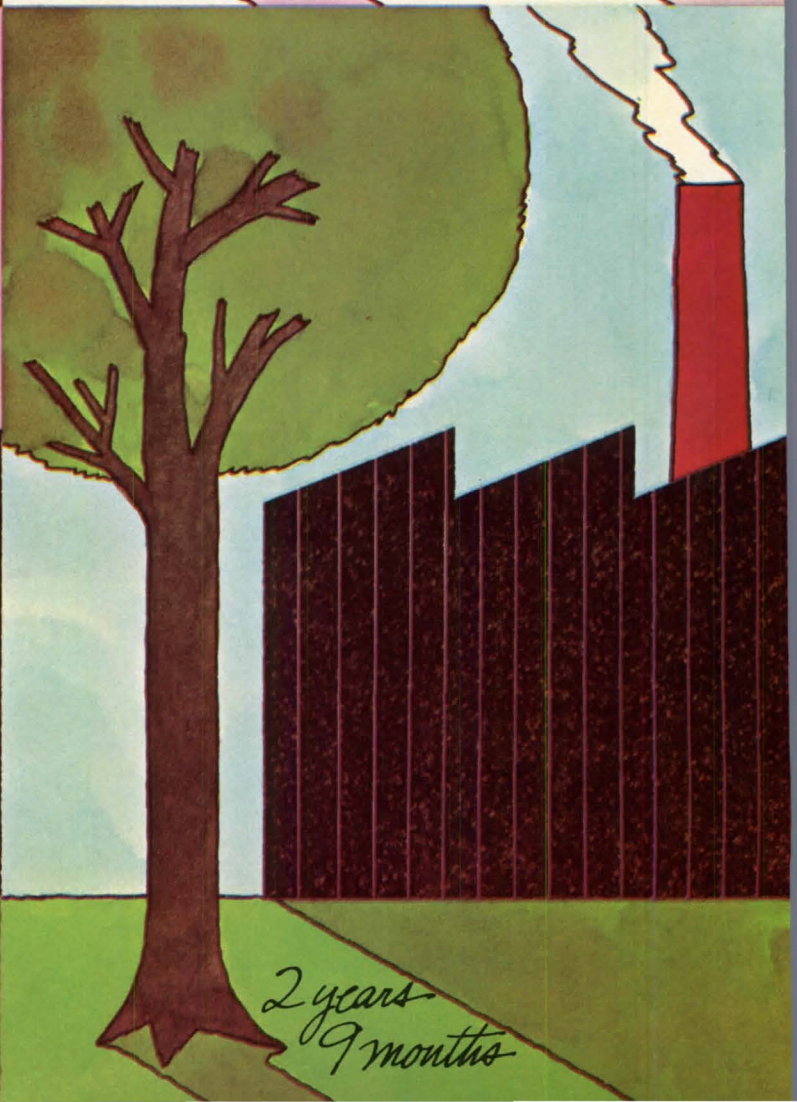
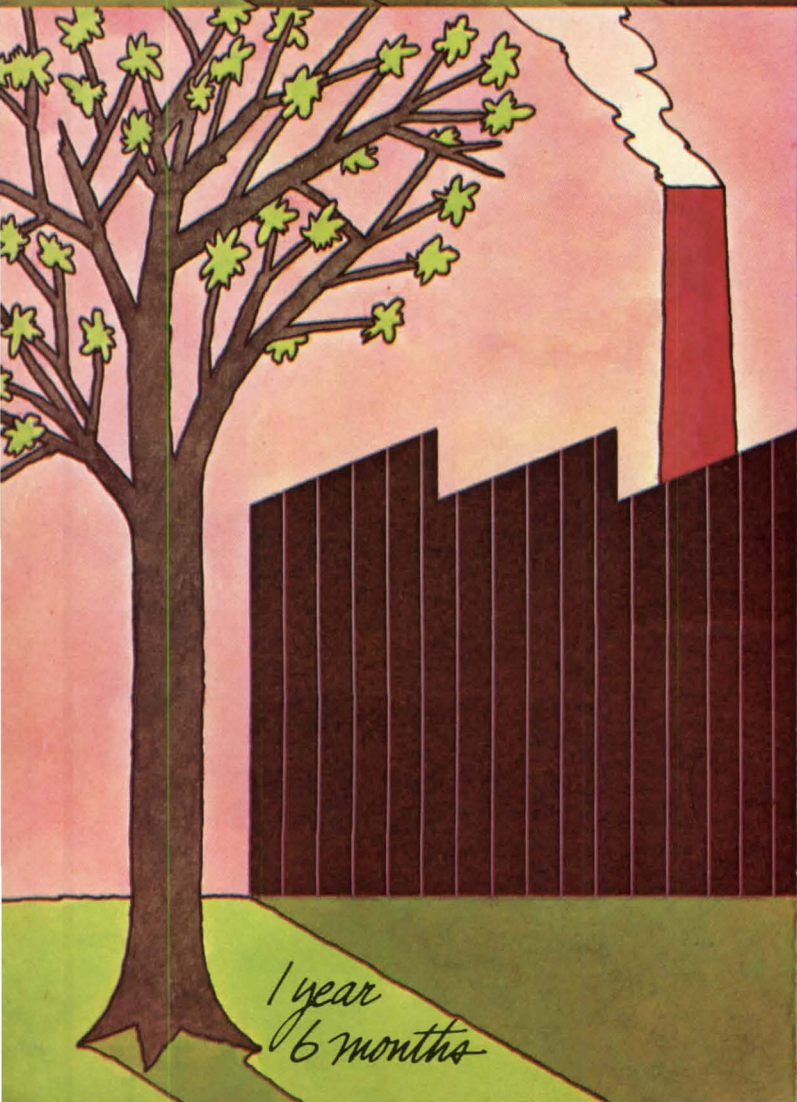
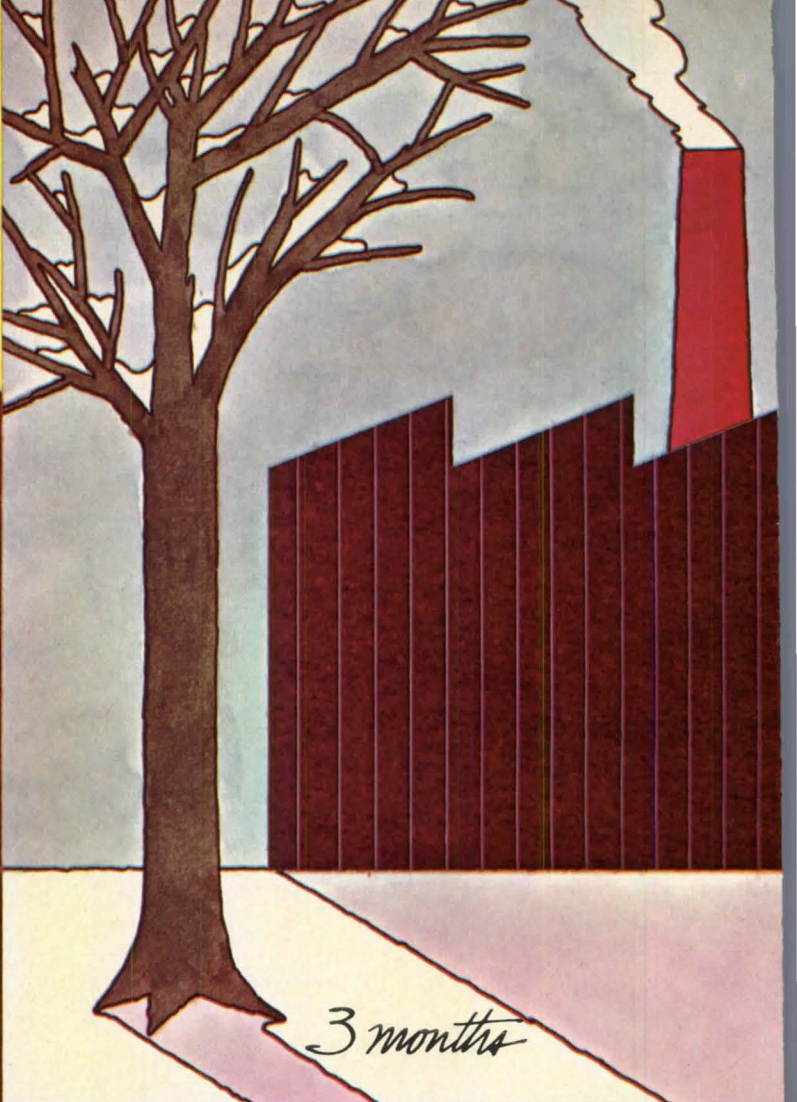
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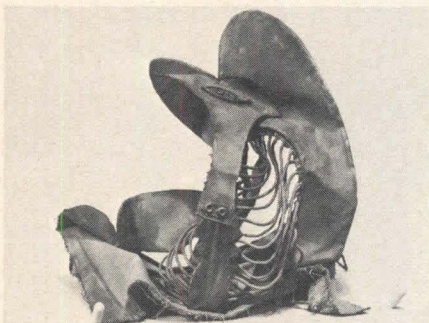
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Claes Oldenburg with Giant Lipstick.

Shunk-Kender



Soft version of Picasso's "Maquette."

Nathan Rabin

Giant Lipstick, Door Handle, and a Soft "Maquette"

The work of sculptor Claes Oldenburg, best known as the creator of "soft" and "giant" objects, has been collected in a show on view in New York's Museum of Modern Art until November 23. The show pulsates with Oldenburg's laconic whimsy. Sometimes defyingly appetizing — painted plaster: "Assorted Pies in a Case," "Restaurant Dinner: Meatballs," and "Two Cheeseburgers with everything" (which elicited the comment, "He didn't do well by the pickle, though") — always humorous, occasionally satiric as in the "soft" version of Picasso's "Maquette," the artist is always in tune with the everyday scene.

Although the "real" thing remained in the plaza outside Beinecke Library at Yale, one of Oldenburg's newest creations, the giant lipstick shown in the photo, was represented in the show by a bronze model.

When his fantasies turned toward architecture, a magnificent beach house for East Hampton, Long Island, in the form of a doorhandle, resulted. It borrows from the vocabulary of no one.

Which Is Your State's Most Interesting Building?

As part of P/A's celebration of its FIFTIETH ANNIVERSARY in June, 1970, we plan to publish the fifty most interesting buildings (one from each state) built in the United States in the last fifty years. The editors are not limiting possibilities to any particular size or type of building. Any structure that can be called a building qualifies. Your suggestions are most welcome.

If you have a building to suggest, please send us a black and white photo, and a short statement identifying it, and explaining why you find it interesting. We will look over all suggestions, and publish the fifty we consider best along with the best explanation of its worth. Send suggestions to Associate Editor Don Raney.

A National Competition

Yale University has announced a national, two-staged competition for the design of a mathematics facility. The intent of the competition is to select an architect for a functional and economical building sensitive to the complex conditions around it.

The Yale announcement characterizes the site in this way: "Hillhouse Avenue provides a particularly challenging setting in which to integrate a new building. In the late nineteenth century it must have been one of the most elegant residential streets anywhere. Now the first of the two blocks contains a number of larger twentieth century buildings; the second block bereft of its elms, still has its fine old piles, mostly of the Tuscan villa persuasion, with frequent Egyptian overtones. These house university officials and some university offices. The mathematics building will stand between the newer larger buildings and the fine old houses."

P/A regrets that it received notification of the competition too late for the October issue. All applications must be postmarked before November 14, 1969. An ap-

plication consists of your name, signature, firm name, address, and a check for ten dollars. All architects registered and resident in the United States are eligible.

A visit to the site by December 1, 1969 will be required of each competitor in order to have entries considered. The jury consists of Edward Larabee Barnes, Kevin Roche, Romaldo Giurgola, John Christiansen, Charles Rickart, Vincent Scully, and Edward Dunn.

Send entries to: Charles W. Moore, Professional Advisor, Yale Mathematics Building Competition, 1146 Chapel Street, New Haven, Connecticut 06510.

Schools

Parsons School of Design has named Allen Tate as Chairman of the Department of Interior Design. . . . Bruce E. Erickson has been appointed head of the department of architecture at the University of Cincinnati. . . . Columbia University is introducing a degree-painting program this fall in environmental science and engineering. It will treat subjects of increasing nationwide concern and alarm: ecological imbalance, pollution, resources protection and environmental control. . . . John G. Duba, Administrator of the Municipal Services Administration, will teach a course entitled "Introduction to Urban Planning" at the Polytechnic Institute of Brooklyn. . . . In an effort to speed the construction of new homes in Canada, a group of University of Toronto engineering professors have established a Systems Building Centre that will study all aspects of the process of planning and constructing homes and other buildings. . . . The University of Wisconsin Extension has announced that 32 short courses in the engineering field including Housing and Human Needs, Building Inspection, and Formwork for Concrete Construction will be carried on in 1969-70. . . . Robert S. Harris, head of the architecture department at the University of Oregon

(Continued on page 52)



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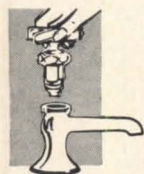
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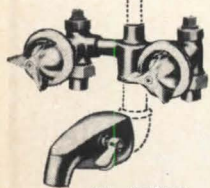
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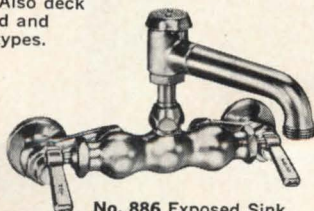
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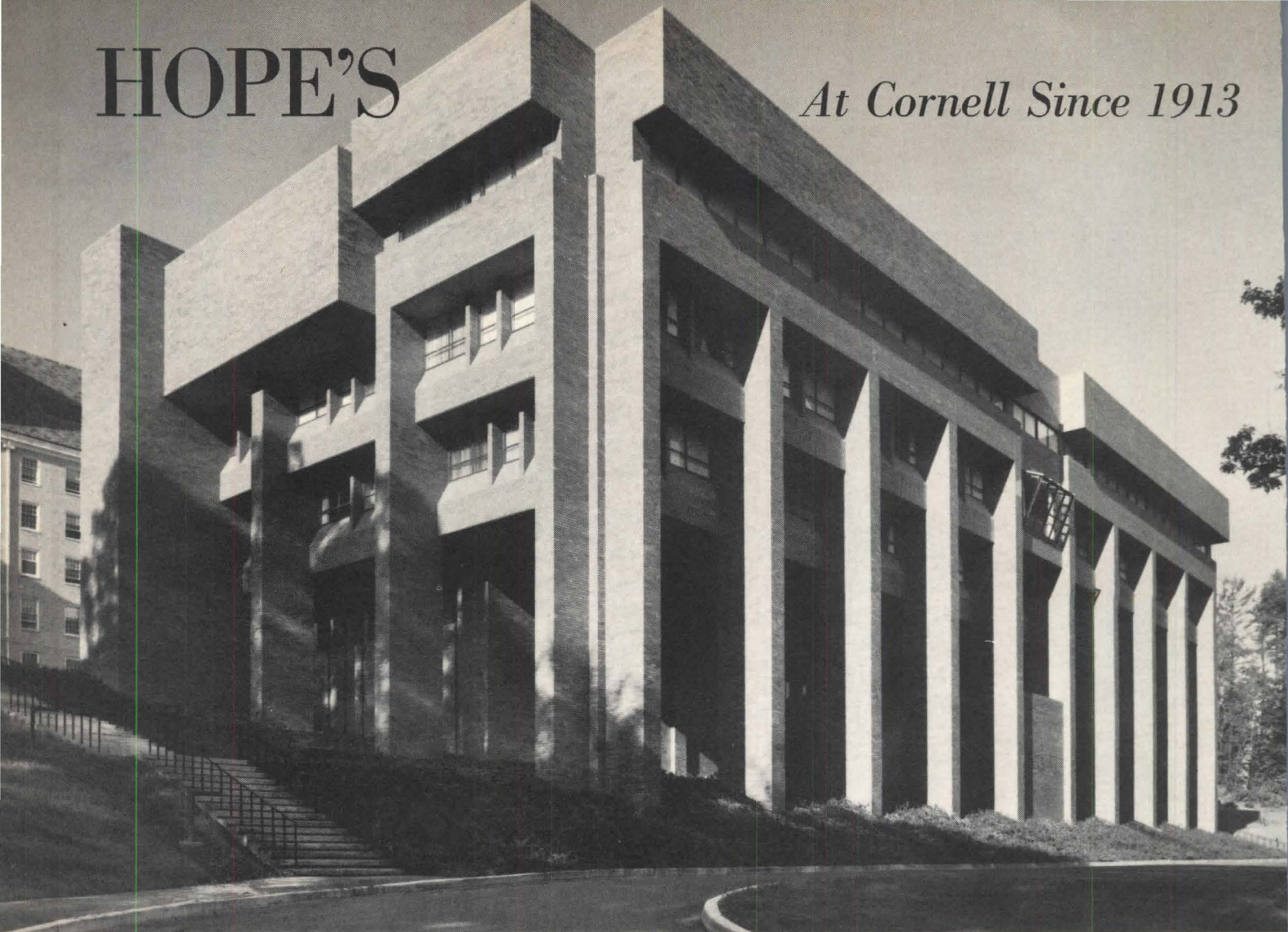


Photo by George Cserna

1966 Home Economics Building, Cornell University, Ithaca, New York

Ulrich Franzen — Architect

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<i>Architect: Searle Von Storch</i> |
| 1923 | Boldt Hall (Men's Residence)
<i>Architects: Day & Klauder</i> | 1954 | Veterinary College
<i>Architect: C. J. White, State Architect</i> |
| 1925 | Willard Straight Hall
<i>Architects: Delano & Aldrich</i> | 1954 | Aeronautical Laboratory (Buffalo, New York)
<i>Architect: Jacob Fruchtbau</i> |
| 1928 | Boldt Tower (Men's Residence)
<i>Architect: Charles Z. Klauder</i> | 1959 | Poultry Research
<i>Architect: New York State Department of Public Works</i> |
| 1929 | Balch Halls (Women's Residence)
<i>Architect: Frederick L. Ackerman</i> | 1962 | Charles Evans Hughes Hall (Law Student Residence)
<i>Architects: Eggers & Higgins</i> |
| 1946 | Savage Hall (School of Nutrition)
<i>Architects: Skidmore, Owings & Merrill</i> | 1963 | Clark Hall (Physical Sciences)
<i>Architect: Jacob Fruchtbau</i> |
| 1950 | Anabel Taylor Hall (Interfaith Center)
<i>Architects: Starrett, VanVleck & Eggers & Higgins</i> | 1966 | Martha Van Rensselaer Hall (Home Economics)
<i>Architect: Ulrich Franzen</i> |
| 1953 | Riley • Robb Hall (Agricultural Engineering)
<i>Architect: New York State Department of Public Works</i> | | |

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(Continued from page 46)

and Richard Gensert, Cleveland engineer, have been appointed visiting Andrew Mellon Professors of architecture for 1969-70 at **Carnegie-Mellon University**. . . . Six new faculty members in the School of Engineering at the **University of Miami** have been appointed: Dr. Werner Grune, William Moeller, Felipe Prestamo, Michael A. Gallis, Dr. Bert D. Nelin, and Dr. Guillermo Gonzalez. . . . A new program called Humanistic Studies in Engineering has been announced by **Princeton** to study the criticism directed at the engineering field for the lack of beauty in bridges, factories, etc. Grants have been received from the National Endowment for the Humanities, The Ford Foundation, and the Rockefeller Foundation. A major reorganization of **Yale University's School of Art and Architecture** has been announced and will go into effect immediately for the 1969-70 academic year. Under the reorganization, there will be two deans instead of one. Howard S. Weaver will serve as Dean of the Faculties in Arts, while Charles W. Moore will serve as Dean of Faculties in Design and Planning and also as Director of Studies in Architecture; Professor Christopher Tunard will serve as Director of Studies in Planning.

Calendar

Architectural License Seminars, providing study aids for The State Board and NCARB Examinations, will be offered in the form of crash courses on November 22 in Houston at The Sheraton-Lincoln Hotel, November 23 in Atlanta at The Sheraton-Biltmore Hotel, December 6 in Chicago at The Sheraton-Chicago Hotel, December 7 in New York at The Park-Sheraton Hotel, December 13 in Los Angeles at The International Hotel. For information write Architectural License Seminars, PO Box 64188, Los Angeles, Calif. 90064.

Construction will not suffer much in 1970

by E. E. HALMOS, JR.

That Presidential construction cutback order in early August, now appears to be an almost desperate threat to the construction industry. Based on the hope that costs can be brought within reason, Mr. Nixon ordered a 75 percent cutback but only in projects that are wholly financed by the federal government: public buildings, reclamation projects, forest roads, etc. And the cutback is to affect only "new starts" — not ongoing projects.

What the President was talking about cannot total more than \$300 million worth of work. Against construction's annual \$90 billion or more gross, that is very small potatoes. (Exact details to where the cuts would be made have not been spelled out, even in October.

The threat to the industry lies here: something similar could be done, the President implied, to federally-financed construction (roads and the like — wherever federal funds are involved in some manner). And that means a total of as much as \$26 billion worth of work that could be affected — to say nothing of the corollary effect on municipal and state work. A cutback in this area could be a serious blow to the industry.

The Presidential follow-up, announcing appointment of a commission to consider jurisdictional disputes and settlements and industry problems as a whole, was part of a major attack on the problem, too.

Housing Secretary Romney read the monthly figures of the Census Bureau, and warned that total housing starts for 1969 may go below 1 million for the first time since 1966 — a function both of high costs of construction and high costs of financing.

Census also noted in August, that the total rate of new construction put in place was slipping a little — down to an annual rate

of about \$90.1 billion. The rate had held steady, with little change for several months, before showing the slight downturn (which was still a bit ahead of 1968, however). Housing seemed to be leading the way — its rate has been slowing steadily for at least five months.

And costs, boosted by a national average wage rise of more than 15.2 percent for construction workers, continued to climb. In fact, the monthly Sewage Treatment Plant and Sewer Construction cost index of the Federal Water Pollution Control Administration showed its biggest jump in years at the end of September — moving upward 1.90 percentage points, to reach a new all-time high at 135.34 (with 1957-59 as 100).

State and local construction spending — though at a whopping total of \$24.8 billion for the 12 months ending in June — was indicating some slowdown, too, or at least a leveling off, the rate of gain over the previous 12-month period was down slightly.

Taxpayers, too, were showing their concern over costs. The Investment Bankers Association noted that in the second quarter of the current year, more than half of all proposals submitted to voters — 54 percent, to be exact — failed to be approved. Particularly affected, said IBA, were bonds for educational purposes, where voters approved only 25 percent of proposals in the period. "Available data," added IBA, "indicate that the very low approval ratio for the first half of 1969 is the lowest for any comparable period on record. . . ."

In all, with Congress far behind on approval of other major money bills for government operations (and with no new programs approved, for example, the Housing bill), the remainder of the year looks like a confusing and uncertain time for the construction industry.

Eljer's Ultima...today's ultimate in brass design and technology.

Ultima . . . a completely new concept in brass fittings. Brass handles that have no visible screw or index button. A concealed brass spring locks the handle in place. To remove, depress the spring and lift from the adapter. This unique attachment method discourages vandals.

Your clients will like Ultima's smart appearance and easier maintenance. Smooth tops wipe clean with a touch of a cloth. And replacement parts are front accessible for quick servicing.

Durable construction is another benefit. Ultima's Star-Fire is made of brass and finished with a triple-coating of copper, nickel and chrome. For clients wanting the gold look, specify moderately priced polished brass Sun-Glow. Sun-Glow has an exclusive new protective coating *four* times more durable than other coatings commonly used for this purpose.

For more information, contact your Eljer representative or write Eljer, Dept. PA, Three Gateway Center, Pittsburgh, Pa. 15222.



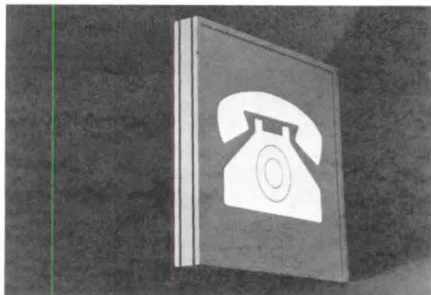
New Sun-Glow polished brass available with amber-tinted translucent handles. Clear handles available with Star-Fire.

OUR 65th YEAR

ELJER
FINE PLUMBING FIXTURES

Eljer Plumbingware Division / Wallace-Murray Corporation

PRODUCTS



Fabricated Sign Language

"UniSigns System" includes the 2000 system that offers 4" high capital letters for primary copy size and 2¼" high capital letters for secondary copy size, while the 4000 system offers large signs with 5" high capital letters for primary copy and 3" high capital for secondary copy. UniSigns are fabricated in two widths of aluminum extrusion for framing and white acrylic for the face surface. The signs which can be illuminated or non-illuminated, are available in a choice of type, style, sizes, and either suede coating in 12 colors or 3 anodized finishes. CI Designs, 136 E. 57th St., New York, N.Y. 10022.

Circle 100, Readers' Service Card

Timing Infrared Heaters

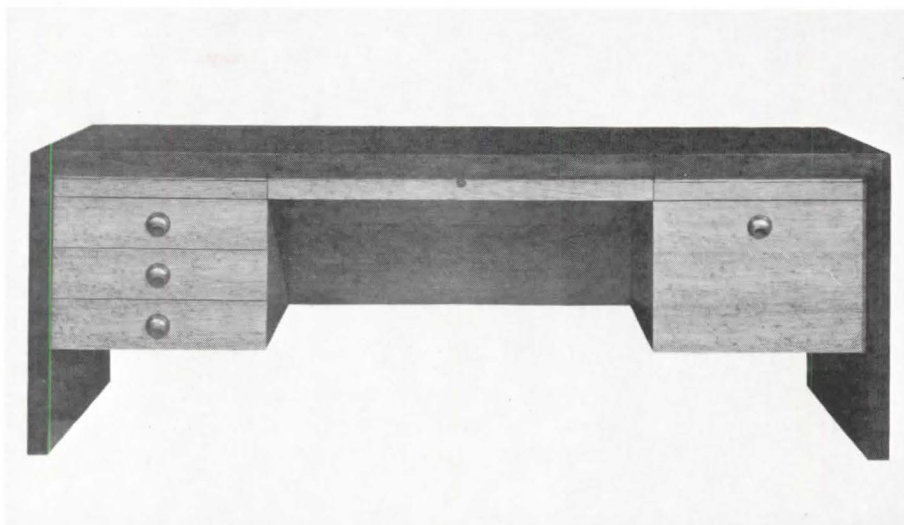
A timer for electric infrared comfort heaters provides an infinite cycling pattern from zero to continuous heat when controlling one or two heaters. Both metal sheath and michrome quartz models with a load rating of 10 KW, will operate on single or three phase. Aitkin Products, Inc., 1115 D. 152nd St., Cleveland, Ohio 44110.

Circle 102, Readers' Service Card

Refuse Compactor Eats Dirt

A refuse compactor machine designed for use in apartment buildings, hospitals, schools and restaurants, can crush more than 1800-lb of varied waste including glass, cans, thick bundles of paper and vegetable matter. With a compaction ratio of about 4 to 1, the "25K" compactor automatically produces 55- to 60-lb blocks of refuse, sprayed with insecticide and deodorizer, and inserts them into sturdy disposable sealable paper bags. The electrical logic system and hydraulic power pack are housed in a steel sound-proof casing, and all vital components are out of sight and reach of vandals. Weighs 2000-lbs and measures approx. 8' long, 18" wide and 49" high. International Dynetics Inc., 41 W. Putnam Ave., Greenwich, Conn. 06830.

Circle 103, Readers' Service Card



Versatile Office Furniture Group



The contrast of hard-rubber, lacquer-finish rosewood with bold-grained English oak distinguishes a versatile group of office furniture designed by Roger Sprunger. A basic design motif consists of straight-lined, inverted U-shapes in rosewood forming tops and sides of the desks and cabinets. End sections continue flush to the floor, eliminating legs. Desk aprons, storage pedestals, door and cabinet fronts are filled with English oak. Hardware is of softly-polished antique bronze, on black metal backs-plates. Dunbar Furniture Corp., Berne, Ind.

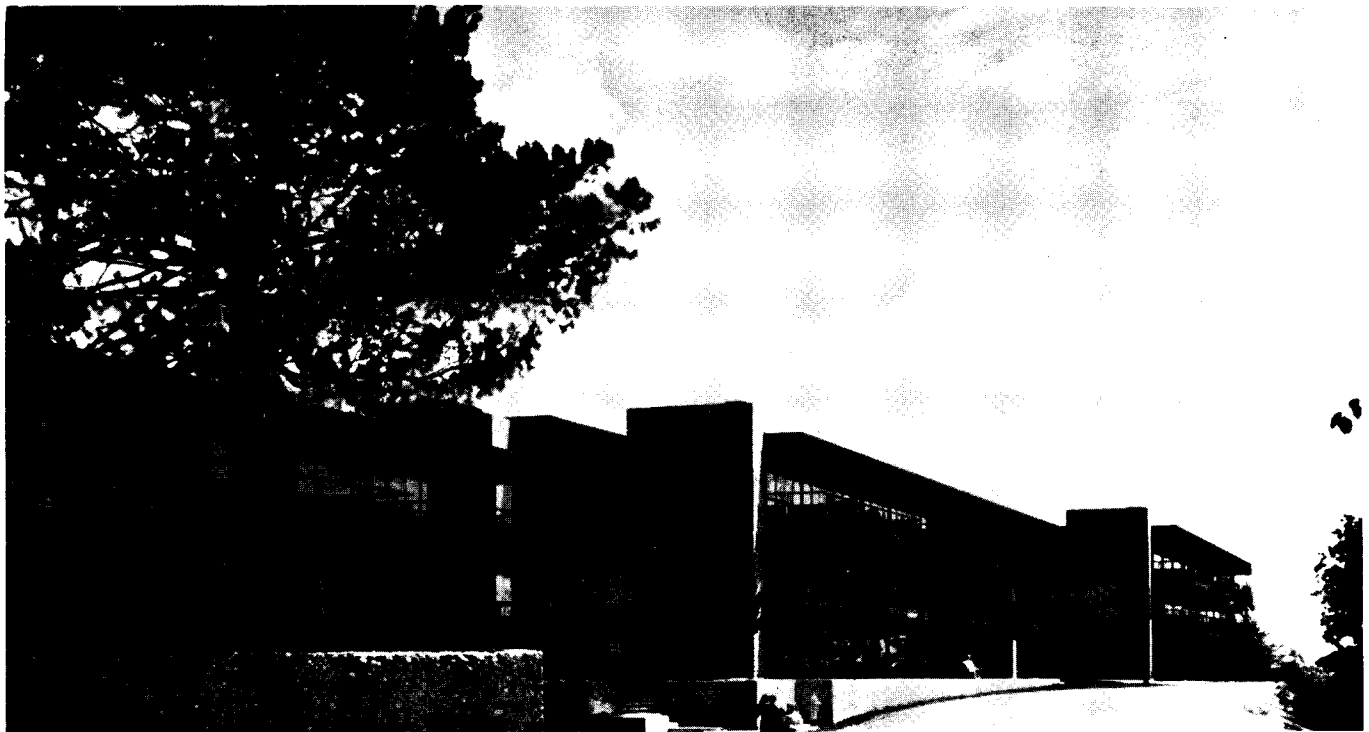
Circle 101, Readers' Service Card

Fume Scrubber Fights Air Pollution

A line of fume scrubbers designed to handle air pollution and corrosion problems includes four models ranging from 1000 to 6000 cfm. Named "Wash-Aire," the units are available in PVC, fiberglass or steel, and may be used in parallel or series to suit the application. They are said to effectively remove up to 99% of contaminants from corrosive fumes that emanate from plating, anodizing and other finishing operations. United Air Specialists Inc., 3533 Cardiff Ave., Cincinnati, Ohio 45209.

Circle 104, Readers' Service Card

(More products on page 58)



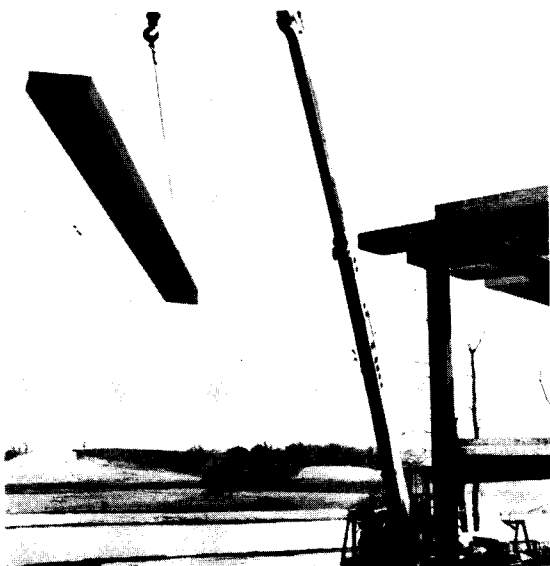
Flexicore decks cantilever for balconies; are faced with redwood. Bronze-tinted glass is used throughout.

New Playboy Club-Hotel has 200,000 sq. ft. of Flexicore deck in six guest wings

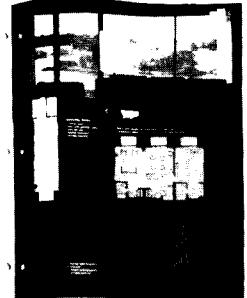
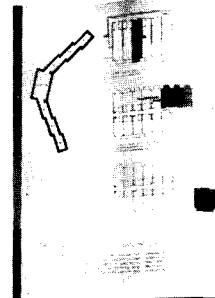
The beautiful new Playboy Club-Hotel at Lake Geneva, Wis. is a year-round resort and convention center.

Its 300 rooms include a variety of special accommodations including the Hugh M. Hefner penthouse, large enough for 250 party guests.

Flexicore concrete floors and roofs were used for fire-resistant, sound-deadening construction throughout the six residential wings. The eight-inch decks have a two-inch concrete topping, earning a 3-hour fire resistant rating from national laboratories.

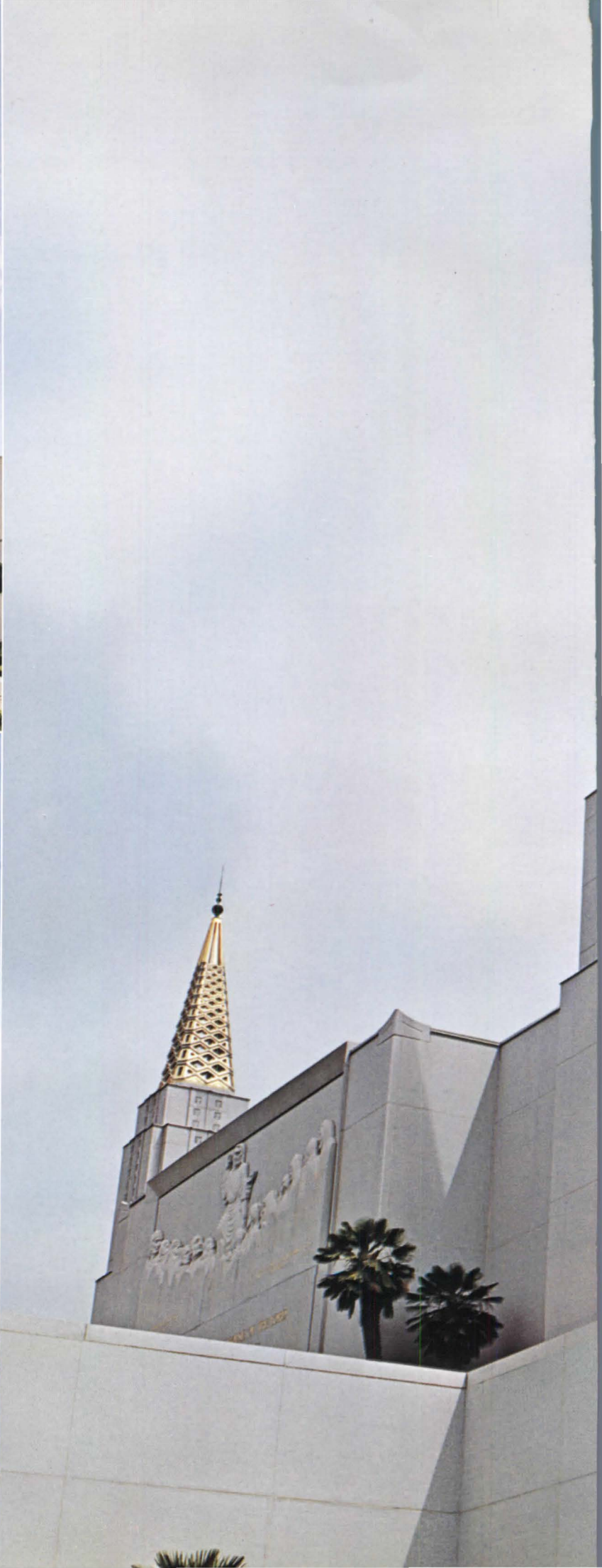
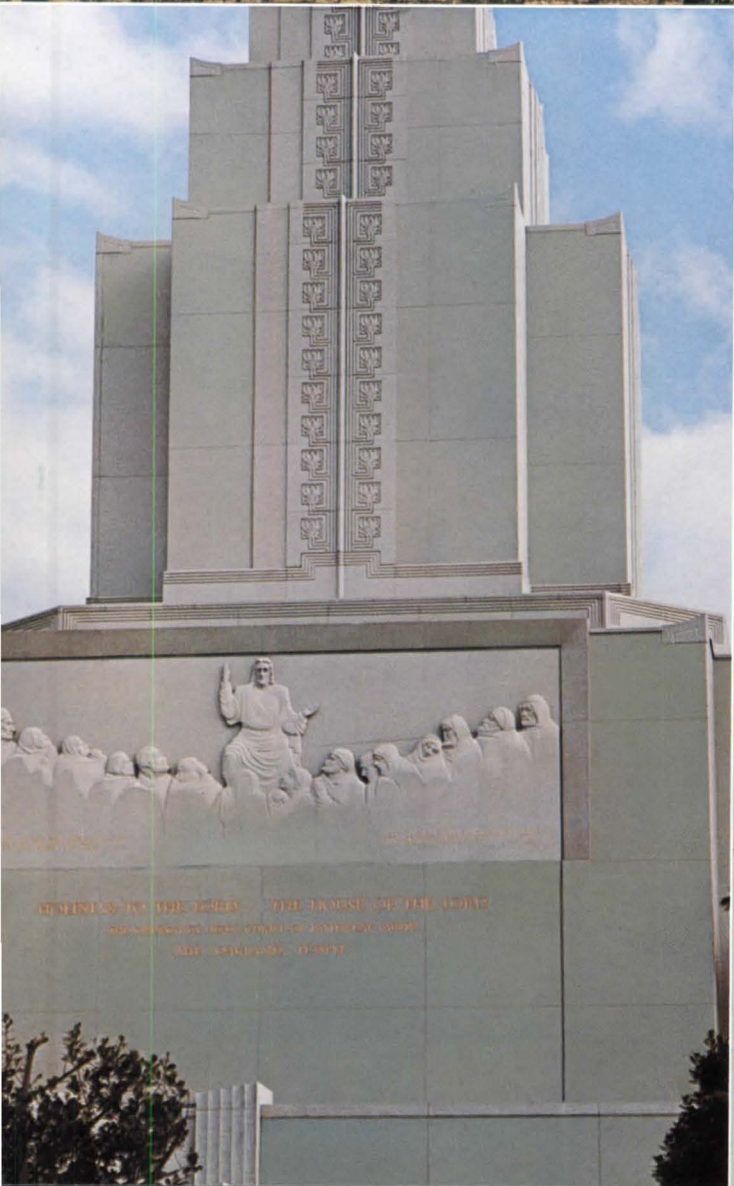



Flexicore erection went ahead during winter months in below freezing temperatures.



Send for our new booklet on the Playboy Club-Hotel. It contains photos, floor plans, structural details, and descriptions of the luxurious accommodations. Write The Flexicore Co., Inc., P. O. Box 825, Dayton, Ohio 45401.

PLAYBOY The Playboy Club Rabbithead Symbol are registered service marks of HMM Publishing Co., Inc.





Caution:
Granite
can color
your thinking.

Oakland Temple, Church of Jesus Christ of
Latter Day Saints, Oakland, California

Architect: Harold W. Burton

General Contractor: Wheatly Brothers

Sculptor: Merle Gage

Granite: Sierra White, thermal finish
and hand carved

*Cold Spring
Granite Company*

Cold Spring, Minnesota

subsidiaries:

*Lake Placid Granite Company
Jay, New York*

*Texas Granite Corporation
Marble Falls, Texas*

*Raymond Granite Company
Raymond, California*

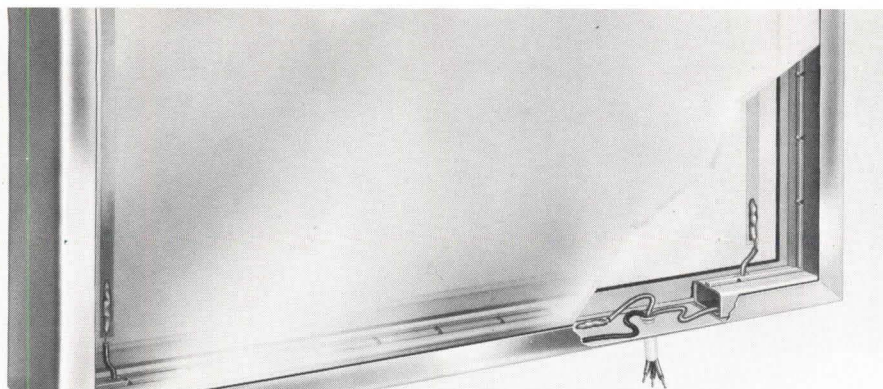
*Cold Spring Granite (Canada) Ltd.
Lac Du Bonnet, Manitoba*

over 20 producing quarries

See us in Sweets, File No. $\frac{6a}{Co}$, or write.

PRODUCTS

(Continued from page 54)



Electrical Windows for Heat Regulation

An environmental control window unit produces year-round thermal regulation through a combination of electrically heated glass, double glazing and a heat-reflective coating. Designated "Heated Window," the unit features a transparent, electrically conductive coating applied to the air space surface of the interior pane, while a thermostat controls the flow of electrical current through the coating to maintain indoor glass

surface temperature within the desired range. Recommended for exterior walls of commercial structures, it is said to eliminate cold down drafts and prevents condensation and frost from forming on the interior glass surface. Available in a maximum size of 68" x 132". PPG Industries, Inc., Public Relations Dept., One Gateway Cntr., Pittsburgh, Pa. 15222.

Circle 105, Readers' Service Card

Wiring for Office Landscaping

A wiring system for office landscaping includes metal poles that provide separate channels to bring the desired electrical power and communication wiring from overhead raceways to the desired position below. Electric and telephone outlets are said to be far more accessible than floor outlets, and are easily adaptable to office rearrangement. Poles are available in a variety of sizes, finishes and wiring capacities. The Charles Brunelle Co., 37 Lewis St., Hartford, Conn. 06103.

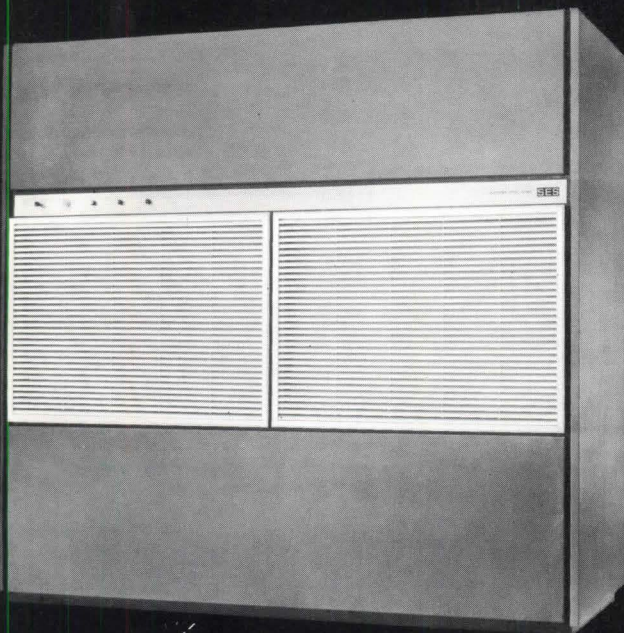
Circle 106, Readers' Service Card

Shaggy "Corn Row" Carpeting

Long, shaggy pile rugs and carpets achieve a "corn row" effect by combining up to three colors of the designers choice. Carpeting may be seamless up to 25-ft width. Pile is of Acrilan Acrylic. Philadelphia Carpet Co., 295 Fifth Ave., New York, N.Y. 10016.

Circle 107, Readers' Service Card

VERY DEPENDABLE & PRECISE ENVIRONMENTAL CONTROL FOR EXPENSIVE & SENSITIVE COMPUTERS



Computers require precise, constant control of temperature and humidity for efficient operation with minimum down time. Units for this application must handle heat loads up to 95% sensible and 5% latent heat generated by computers and maintain 40%-60% RH levels to keep tapes from becoming brittle. *Site Environment Systems perform these tasks precisely and reliably.*

Reliable—Engineered and built to operate continuously. Light and alarm bell indicate need for service. Dual circuits and dual condensers give fail-safe protection.

Precise—Automatic Controls filter, warm or cool, humidify and dehumidify room air to maintain environment within narrow tolerances.

Adaptable—Completely self-contained units in a complete range of sizes, 3, 5, 7½, 10 and 15 tons for use singly or in combination.

Flexible—Available in water or glycol cooled, air-cooled, or chilled water models. Easily altered to duct air up or down through ductwork or floating floors.

Economical—Quality engineering reduces need for maintenance. Easy access from front cuts service time.

Write for complete specification information:

FLOATING FLOORS INC

A Subsidiary of National Lead Company

5400 North Detroit Avenue

Toledo, Ohio 43612

On Readers' Service Card, Circle No. 349

Whiteprinter Uses Ammonia Vapor, Eliminates Liquid

A whiteprint machine uses ammonia vapor rather than liquid ammonia, to eliminate damage from spill. Machine is claimed to make prints up to 42" wide by any length for 1¼¢ per running ft. Rotolite Sales Corp., Sterling, N.J. 07980.

Circle 108, Readers' Service Card

Modular Accent Lights

A low voltage modular "accentlite" system, particularly suitable for adjustable accent lighting for displays, paintings and sculpture, is available in 2', 3' and 4' lengths which can be butted together and/or right-angled for continuous runs. Concealed long life sealed-beam units can be placed where desired and interspersed with blank panels where no light is needed. Lamps are available in 25 and 50w, with three distinct beam spreads. Lighting Services, Inc., 77 Park Ave., New York, N.Y. 10016.

Circle 109, Readers' Service Card

Electrically Operated Draperies

A drapery controller electrically opens and closes traverse draperies at the touch of a switch. The "Drape-Maid" Model SC1 operates from several locations, with an internal control circuit that utilizes the electrical outlets in the home. Draperies are controlled from existing light switches without auxiliary switches or wiring. Gill Electric Products Co., P.O. Box 233, Lake Oswego, Oregon 97034.

Circle 110, Readers' Service Card

Engineer Sketch Sheets

Engineer's work paper for sketching and calculation, is divided into a ¼" grid printed in nonreproducing blue ink on 20-lb No. 1 bond with a writing surface suited to pencil or pen and ink. Considered low-cost, the forms are punched for 3 ring binder and bound in pads of 50 sheets. Ross-Martin Co., P.O. Box 800, Tulsa, Okla. 74101.

Circle 111, Readers' Service Card

Carpets

Complete range of carpets in 100% virgin wool, custom-dyes, and of varying pile height, are available in any color, shape and sizes desired. Samples to your specifications sent upon request. Rugcrafters, D & D Bldg., 979 Third Ave., New York, N.Y. 10022.

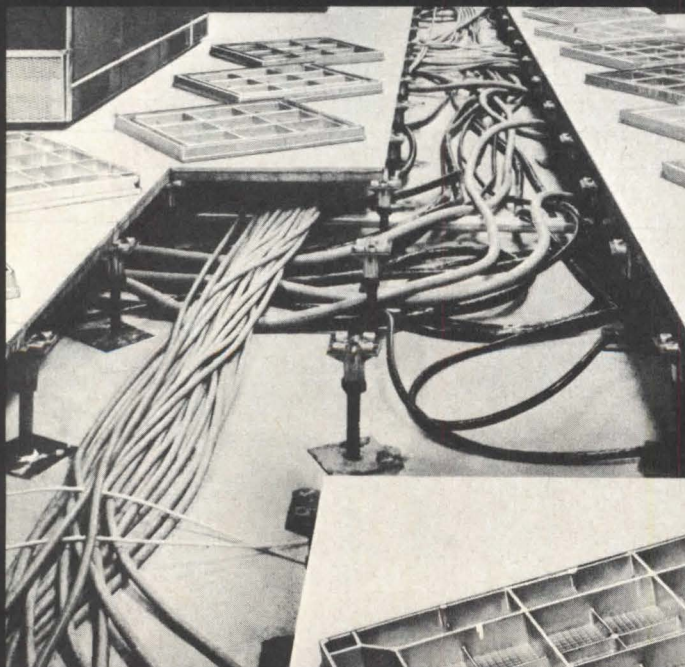
Circle 112, Readers' Service Card

Ceramic on the Roof

A new concept in residential roofing utilizes fired ceramic foam styled into 5" x 9" wedge-shaped tabs. The tabs are laminated four to a standard 12" x 36" piece of asphalt and taper upward from the leading edge, resulting in a shingle that is "durable, fireresistant, unaffected by freezing and thawing, and will not deteriorate in strong sunlight." Available in five colors, the shingle is light in weight and requires no supporting structure other than standard asphalt shingles. Building Products Dept., Corning Glass Works, Corning, N.Y. 14830.

Circle 113, Readers' Service Card

THE ULTIMATE IN ACCESS/AIR PLENUM FLOOR SYSTEMS FOR EXPENSIVE & SENSITIVE COMPUTERS



Elevated Floors provide full access to cables and ducts and a pressurized plenum for efficient, flexible, draft-free air distribution. Choose the best. A lightweight, aluminum panel, precision engineered, maintenance-free floor with all the reserve strength you'll ever need, from Floating Floors, Inc.

Precision-made—Floating Floors panels fit perfectly, with complete interchangeability.

Strong—Unique combination of die cast panels and pedestals provide all the reserve strength you'll ever need, without stringers.

Maintenance-free—Corrosion-resistant aluminum panels never need painting . . . are grounded for continuous, worry-free operation.

Cleaner environment—With aluminum panels, no iron oxide particles or paint flakes can get into the computer room environment.

Total Access—Lightweight aluminum panels simply lift out to allow complete access.

Flexible Air Distribution—The cavity beneath Floating Floors serves as plenum to deliver air. Rearrangement is by moving louvered panels.

Write for complete specification information:

FLOATING FLOORS INC

**They sell engines, generators,
heat recovery equipment, switchgear,
valves, safety devices, gauges,
controls, switches, piping and wiring.**



He sells a total energy package.

He's your Caterpillar Dealer.

His system will help you to simplify installation methods, reduce installation time and cost, and make your system cost-to-client more competitive.

The entire system — engines, generators, heat recovery equipment, switchgear and all components — is available from a single manufacturer, a single point of contact.

Capacity range? From 675 KW on up.

The entire package is Caterpillar designed, Caterpillar-tested, Caterpillar serviced, Caterpillar-warranted.

Your client benefits from a single source of responsibility. (Fewer headaches for you, too.) And he's assured of maximum reliability because the package is designed as a *system* — not as a collection of separate components.

You benefit, in addition, from purchasing simplicity. We've eliminated the time consumed previously in coordinating a maze of technical specifications and separate purchases.

Just ask your Caterpillar Dealer about the new Cat Total Energy Package.

It makes life a lot simpler.



CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.



MFRS' DATA

Vane-axial Fan Bulletin

A 44-page bulletin describes manufactured line of vane-axial fans, including an expanded line of direct drive-type with fixed and adjustable pitch propellers in sizes from 18" thru 60". All fans bear the AMCA Certified Ratings Seal. Capacities range from 1110 cfm to 148,100 cfm; static pressures to 8". Performance charts, dimensional drawings, application data and information on accessories included. Bulletin 452. Aerovent Fan Company, Inc., Piqua, Ohio 45356

Circle 200, Readers' Service Card

Air Control Equipment for Schools

A 40-page engineering brochure covering roof-mounted multizone air handling equipment for schools, describes units from 2,000 to 12,000 cfm, with electric, gas, or self-contained boiler hot water heating and direct expansion or chilled water cooling. Includes sizing tables for electric data, fans, condensers, boilers, controls, and heating and cooling coils. Hot- and chilled-water coil section curves are plotted and schematic drawings illustrate all applicable electrical controls, while sectional views show construction features. Bulletin MZRM-101. American Air Filter Company, Inc., 215 Central Ave., Louisville, Ky. 40208

Circle 201, Readers' Service Card

Ultimate Strength in Reinforcing Steel

14-page brochure describes economy and other advantages of grade 60 rebars with "ultimate strength design." Includes comparison of ACI Codes from 1951-63, as well as one-way solid slab floor construction, bond calculations, recommended typical bending details, properties of grade 60 rebars and specs. Concrete Reinforcing Steel Institute, 228 LaSalle St., Chicago, Ill. 60601

Circle 202, Readers' Service Card



Variations on the 40/4 Theme

Variations on the award winning 40/4 chair described and illustrated in a 16-page catalog, includes classroom models with a tablet arm assembly or bookrack, or both, upholstered models, groups of 4 with fixed leg mountings and outdoor models with a special coating that resists rust, wear, and corrosion. Colors, dimensions, and accessories included. The General Fireproofing Co., E. Dennick Ave., Youngstown, Ohio 44501

Circle 203, Readers' Service Card

Bronze-Tinted Glass Samples

Bronze sheet glass samples inserted as "windows" in a sturdy 5" x 10" vinyl sample case are available. The 3" x 5" samples provide comparison of tint values of four different thicknesses: 26 oz, $\frac{3}{16}$ ", $\frac{7}{32}$ ", and $\frac{1}{4}$ ". Tinted by metallic oxide, the glass significantly reduces transmitted glare from the sun and, because of its athermic property, also block transmitted heat for economy of air conditioning and temperature control. Also available in gray and green tints. Data sheets included. Glaverbel (U.S.A.), Inc., Empire State Bldg., 350 Fifth Ave., New York, N.Y. 10001

Circle 204, Readers' Service Card

New Approach to Housing Construction

Code approved panels made of rigid polyurethane foam and incorporated into a modular housing system is the subject of a 4-page brochure. The structural, insulated, sound resistant panels are said to make possible rapid construction of lowcost housing — "four men can build a two-bedroom house in six hours." Director of Marketing, Modular Concepts, Inc., 17907 S. Figueroa St., Gardena, Calif. 90247

Circle 205, Readers' Service Card

Aluminum Threaded Fasteners

Arranged in 12 chapters, this 60-page catalog includes sections on thread standards for machine screws, bolts and nuts, and recommendations for their proper use, the advantages of aluminum fasteners, and the mechanical properties of fastener alloys. 45-pages of graphs and tables present dimensional and spec data on various machine screws, while other chapters explore finishes and protective coatings, and list miscellaneous standard and special threaded fasteners. Alcoa Sales Office, Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh, Pa. 15219

Circle 206, Readers' Service Card

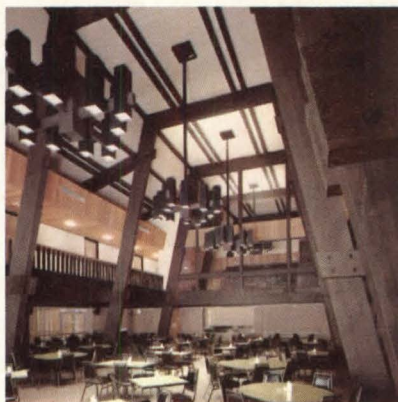
Underground Lawn Sprinkling Systems

An 8-page brochure on underground lawn sprinkler systems contains color-keyed layouts illustrating typical designs for a variety of areas, and explains application of the equipment recommended for each. A detailed schematic depicts an automatic system utilizing many varied components in typical applications. A cut-away explains construction and operation of the manufacturers valve-in-head sprinkler. Dept. MOM, Toro Manufacturing Corp., 8111 Lyndale Ave. South, Minneapolis, Minn. 55420

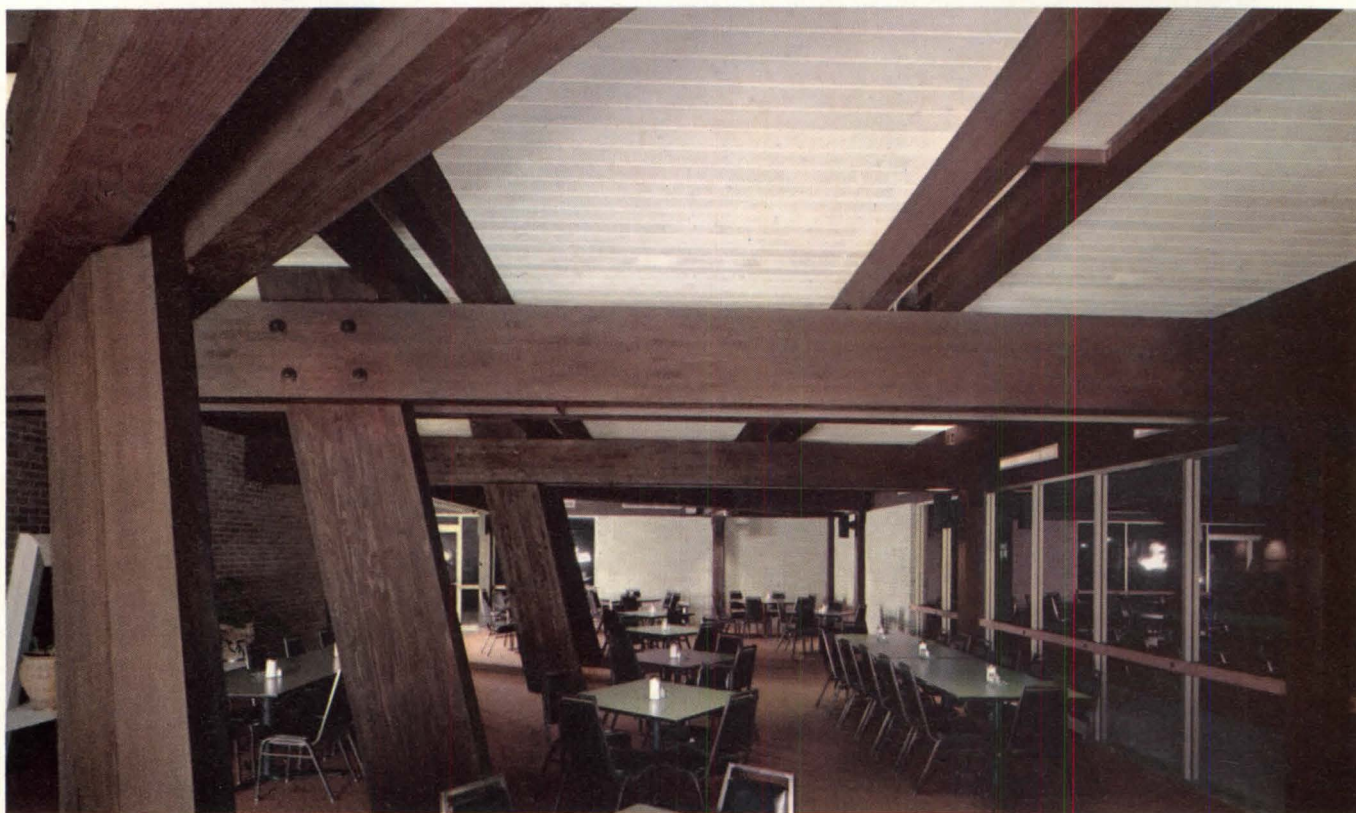
Circle 207, Readers' Service Card

(More data on page 64)

Strength
and beauty
of the
forest



...engineered Southern Pine



Architect: Hugh J. Leitch, AIA, Project Architect in association with Forrest M. Kelley, Jr., AIA, Architect to the Florida Board of Regents

The students at West Florida University study in unique surroundings which reflect the versatility, economy and strength of Southern Pine for engineered timber structures. □ In this ultra-modern food, health and study complex, laminated arches of Southern Pine and wood roof decking impart a massive air of permanence combined with a congenial environment. □ For an illustrated case history on this building, write: Southern Pine Association, P. O. Box 52468, New Orleans, La. 70150.

Specify Southern Pine

AS PRODUCED BY THE MEMBER MILLS OF THE SOUTHERN PINE ASSOCIATION
ONE OF A SERIES PRESENTED BY THE AMERICAN WOOD COUNCIL

MFRS' DATA

(Continued from page 62)

Silicone Varnishes and Resins

"Silicone Insulating Varnishes and Adhesive Resins" is the title of a 12-page technical data book that describes and evaluates the manufacturer's line of varnishes and adhesive resins, and outlines the application procedures and recommendations for general shelf maintenance and handling. S-25B. General Electric, Silicone Products Dept., Waterford, N.Y.

Circle 208, Readers' Service Card

Porcelain Enameling Sheets

Features and applications of 6 types of aluminum porcelain enameling sheet described in a 4-page brochure, points up aluminum's advantages for the fabricator in providing a base for porcelain coating. Illustrated. Howmet Corp., Aluminum Group, Mill Products Div., PO Box 1167, Lancaster, Pa. 17604

Circle 209, Readers' Service Card

Area Lighting Research Service

Manufacturer offers developmental engineering and research testing in the outdoor lighting field. Provided with architectural renderings, sketches, or specs for a particular outdoor lighting situation, the manufacturer will produce in any quantity the custom fixture required. 8-page brochure describes the service. Street Lighting Equipment Corp., 31-23-61st St., Woodside, N.Y. 11377

Circle 210, Readers' Service Card

Color TV for Patients

8-page brochure describes and illustrates a color TV system designed for hospitals and other health-care institutions. The system is adaptable to the hospital's nurse-call system, and provides music and radio entertainment as well as patient information via closed-circuit TV. Many other features. Brochure 92-109. Motorola Communications and Electronics, Inc., 4501 W. Augusta Blvd., Chicago, Ill. 60651

Circle 211, Readers' Service Card

Sliding Glass Door Hardware

Catalog of sliding glass door hardware illustrates and describes surface-mount handle and lock sets, mortise locks, mortise lock handles, outside pulls and accessories. Includes references to other products in the manufacturer's line as well as the availability of expanded detail literature. W & F Manufacturing, Inc., P. O. Box 30, Glendale, Calif. 91209

Circle 212, Readers' Service Card

Environmental Control Enclosures

Bulletin features the AAF Vapor Seal Panel System, a specially designed environmental enclosure that provides a dust-free atmosphere and constant humidity and temperature control. Bulletin includes application and technical details as well as design data. Bulletin CR-80. American Air Filter Co., Inc., 215 Central Ave., Louisville, Ky. 40208

Circle 213, Readers' Service Card

Bold new shape

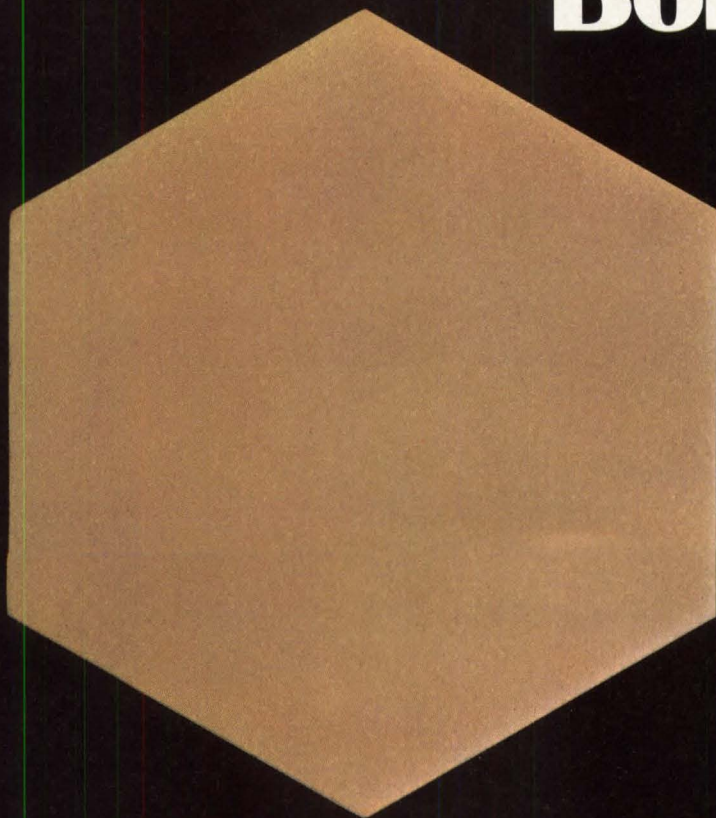
in Murray quarry tile

Now there are four Murray quarry tile shapes—traditional squares and rectangles, the gracefully curved, Spanish-accented Valencia, and the crisp geometry of new Hexagon. Hexagon tiles measure 6 inches from point to point and are available in a wide variety of Murray quarry tile colors.

Murray quarry tile by

**American
Olean**

A Division of National Gypsum Company



In-Floor Towline System

In-floor towline system described in a 6-page brochure, features powered spurs driven directly from the mainline chain, without the need for separate drive units. Compact chain drive requires less pit space than conventional in-floor systems. Form 2100. Rapis-tan Inc., 350 Rapistan Bldg., Grand Rapids, Mich.

Circle 214, Readers' Service Card

Tennis Court Standards

Brochure detailing materials, methods, and standards for construction of six types of tennis courts, includes general requirements, site inspection and preparation, storm drainage provisions, slope requirements, perimeter edging, base construction, leveling course, surface course, net and equipment, and playing lines. Describes 4 types of impervious noncushioned construction. U.S. Tennis Court and Track Builders Assoc., 7601 San Simeon Way, Citrus Hghts., Calif.

Circle 215, Readers' Service Card

Chemical-Resistant Pipes

Catalog of chemical-resistant polyethylene piping contains mechanical drawings of "Nalgene" pipe and fittings, traps, laboratory sinks, and neutralization tanks. Molded of virgin polyolefin resins, the system is designed for industrial, educational and medical laboratory drainage, distilled and deionized water systems and low-pressure piping. Nalgene Piping Systems Div., PO Box 387, Rochester, N.Y.

Circle 216, Readers' Service Card

Classroom Casework

Steel casework described and illustrated in a 20-page catalog, includes window wall cabinets, counter base cabinets, sink cabinets, tall storage cabinets, wall hung cabinets, wardrobe assemblies, and bookcases. The cabinets offer the advantage of being able to receive interchangeable interiors without additional cabinets. Grade-Aid, Div. of The Main Mfg. Co., 46 Bridge St., Nashua, N.H. 03060

Circle 217, Readers' Service Card

Airing the Fan Coils

16-page catalog of large-ceiling fan-coil air conditioners contains illustrations and descriptions of ceiling exposed and ceiling concealed models sized from 800 to 2000 cfm. Includes design performance features, selection tables and procedures, ratings and specs, cooling and heating capacities, correction factors, pressure drop tables, dimensions, and optional accessories. Modine Mfg. Co., 1500 DeKoven Ave., Racine, Wis.

Circle 218, Readers' Service Card

Gas Driven Refrigeration

Gas Engine Drive products for refrigeration applications are described in a 24-page catalog that gives design features, mechanical spec charts, diagrams, includes compressor units, condensing units and chiller units available in both water-cooled or air-cooled models. Catalog 91-721/726. Acme Industries, Inc., 600 N. Mechanic St., Jackson, Mich.

Circle 219, Readers' Service Card

Rich new color

in Murray quarry tile

Here's a deep, dark, mellow brown, the color of freshly turned earth. It adds another color to the broad Murray quarry tile spectrum. Now you can specify quarry tile in tones that range from soft golds and grays through warm reds and sands to earthy and emphatic Umber.

For full details on the Murray quarry tile line, write for a copy of our 1969 ceramic tile catalog. American Olean Tile Company, 1277 Cannon Avenue, Lansdale, Pa. 19446.

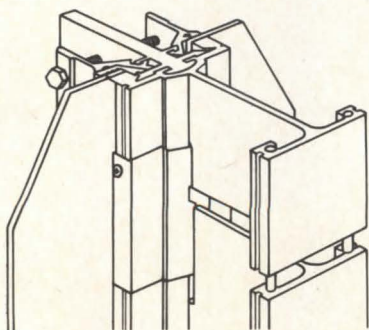
Murray quarry tile by

**American
Olean**

A Division of National Gypsum Company



About the high cost of beauty and other myths.



Pittco's new Seventy-Five Curtain Wall system has upset a lot of old rules for buildings. Like the one that says beauty should cost a lot. Nonsense.

The Seventy-Five Curtain Wall

lets you erect your building without compromising your design or budget. It's available in your choice of five anodized aluminum colors, each integrated with Pittco® entrance systems and storefront metals. And Seventy-Five Curtain Wall accommodates any standard thickness of glass or spandrel.

We've also squelched those ugly tales about curtain wall leakage with our rainscreen system, a proved method of pressure equalization. Keeps tenants dry and civil.

We've even made it clumsyproof with a controlled-pressure glazing system for secure installation without breakage. Interior glazing saves expensive days of glazing and erection. And we've subjected Seventy-Five Curtain Wall to a merciless

series of performance tests. (It's satisfied all the standards of NAAMM Tests A, B, C-1 and C-2.)

Pittco's new Seventy-Five series has erased all the old slander about curtain walls. Take advantage. Write for complete details: Pittco Architectural Metals, Box 930, Kokomo, Indiana 46901.



motiva

by Cramer



THE 5000 SERIES

DESIGNED FOR SPACE SAVING

Motiva solves space problems ordinary office furniture creates. Imaginative innovations promise efficiency at all office levels. Modular filing innovations give multiple combinations for letter and legal sizes—and all standard card sizes. Motiva has been designed for an effective, functional flow of general office or data processing programs. Motiva will complement your imagination. For full information...



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A Subsidiary of USM Oil Company, 625 Adams Street, Kansas City, Kansas 66105, 913-621-6700

Showrooms in New York / Kansas City / Dallas / Los Angeles / San Francisco

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Ah...so!

... and whether you use it in an oriental setting... modern offices... motels... hotels... colleges... restaurants... or wherever the warm, inviting, comforting look and feel of carpet is desired... you will find PATCRAFT carpet in whatever fibers you wish... every color in the spectrum... textures and styles to fit any mood... any decor.

The beauty shown here is PATCRAFT'S "PATPRIDE" made of amazing Antron® Nylon by DuPont. DuPont's Antron® Nylon is one of the most durable carpet fibers made... resistant to crushing and pilling... easy to clean... always new looking. "PATPRIDE" comes in 12' and 15' widths.

Truly, an honorable carpet by PATCRAFT!
PATCRAFT MILLS, INC., Dalton, Georgia.

Honorable
carpet
by



CARPETS OF DISTINCTION

**Builders know
that Crestline
Slidebys
are the kind
that won't
whistle
while they work**

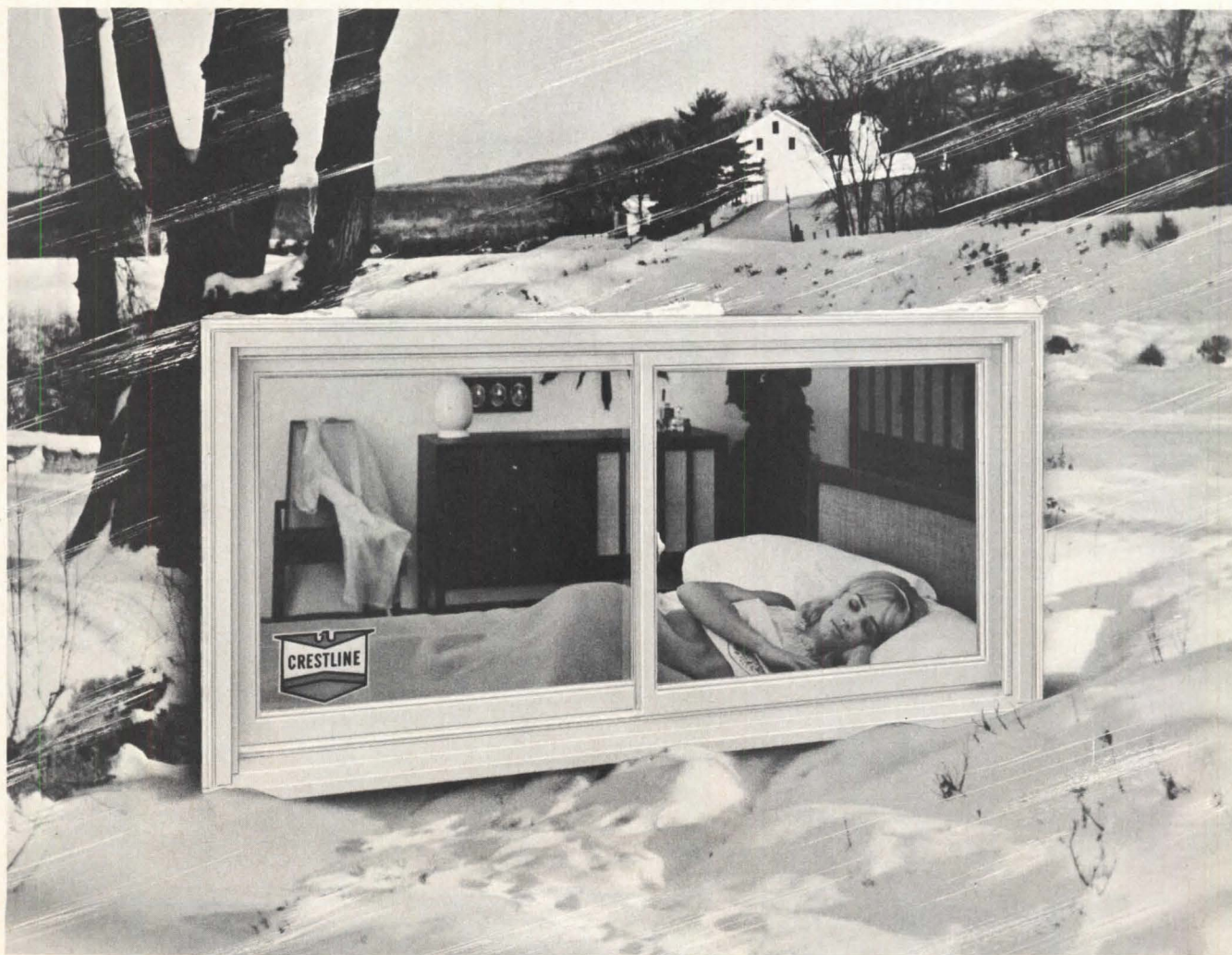
We've taken the loud screams out of the window business for keeps . . . along with all the shake, rattle and roll aspects of window selection that have been making callback-conscious builders nervous for years.

Did it with a broadscale series of design and materials improvements throughout the Crestline line that finally make windows work like they should, look as beautiful as they should, and last as long as they should.


It took thousands of engineering, production and field-test operations, to get ahead of the industry, but it was worth it, because we got way ahead.

Which is where we plan to stay. With an entirely *new* string of value-innovations that will be coming off our drawing boards for some time to come.

All calculated to make our windows easier to buy . . . and to sell. Whichever you'd like to do, write us in Wausau for the whole hush-hush Crestline story.



The wood windows that cut out the callbacks
Home office, Wausau, Wis. Plants at Wausau, Ladoga,
Indiana, Corry, Penna., and Petersburg, Va.

See us in Sweet's 

Korad[®] C

acrylic film for wood surfacing

Korad C acrylic film. It gets in the way of everything except beauty.

Protect the warmth and luxury of fine hardwood veneers with new Korad C—the durable finish.

Korad C, laminated to premium woods, provides a hard, clear, tough acrylic plastic barrier that

shields delicate veneer surfaces from the damaging effects of abrasion, moisture and household chemicals.

Because Korad C is an acrylic plastic, it retains clarity and resists yellowing through years of exposure to natural and artificial light.

Because Korad C is a pre-

fabricated film, there's no danger of thin spots or pin holes. The surface can be varied from dull to glossy, textured to smooth.

Learn more about Korad C and the new design freedom it gives you in the use of lustrous, natural woods.

Send for literature and samples.

**ROHM
AND
HAAS** 
PHILADELPHIA, PENNSYLVANIA 19105



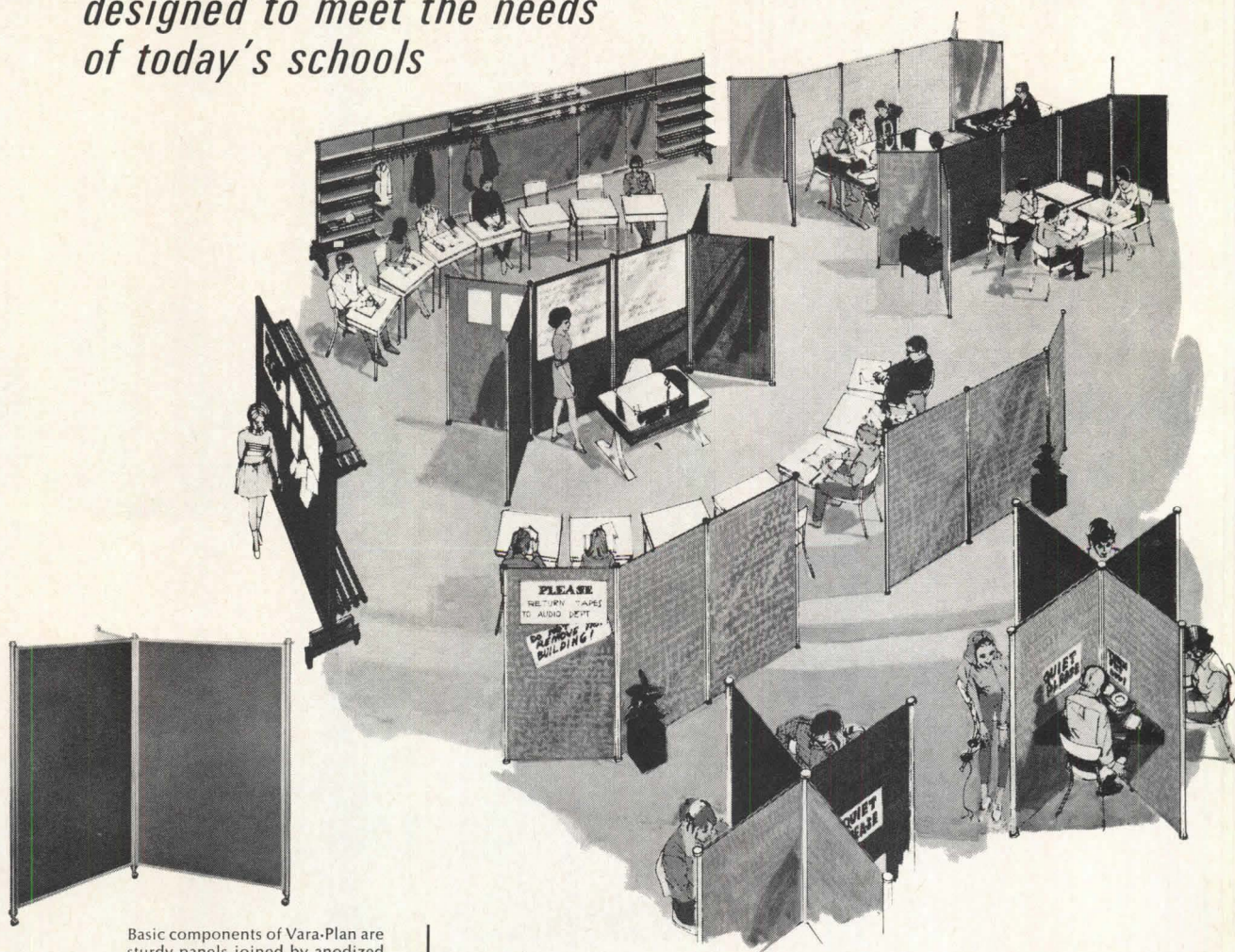
Now you see it.

Now you don't.

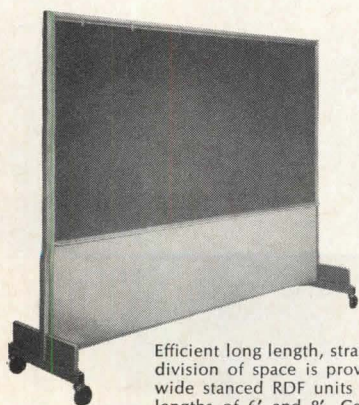
VOGEL-PETERSON

Vara-Plan^{T.M.} SPACE DIVIDERS

*designed to meet the needs
of today's schools*



Basic components of Vara-Plan are sturdy panels joined by anodized aluminum posts fitted with concentric receptacles which allow the panel to move through a variety of angles. Concave vertical edge extrusions conform to the post radius and allow no sight gaps. As many as 4 panels may radiate from a single post.



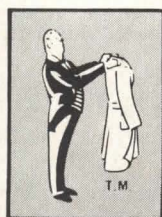
Efficient long length, straight line division of space is provided by wide stanced RDF units in basic lengths of 6' and 8'. Concealed panel to frame assembly is completely tamper proof.

Vara-Plan is at the very heart of the Open Plan concept which is revolutionizing the school field today. Designed specifically for dividing classrooms and partitioning off special projects and work areas, they offer quick and easy rearrangement into any desired configuration to suit any teaching situation.

Sturdily made, beautifully detailed and furnished in colors that complement the most modern decor . . . they are available in any combination of tackboard and chalkboard facings you may wish and can be accessorized with wardrobe racks and book or boot shelves.

School planners welcome their efficiency and durability . . . teachers appreciate their compatibility with any learning atmosphere.

Look into these versatile units—they're designed with you in mind. For complete information write for catalog VA 510.



VOGEL-PETERSON CO.

"The Coat Rack People"

ELMHURST, ILLINOIS 60126



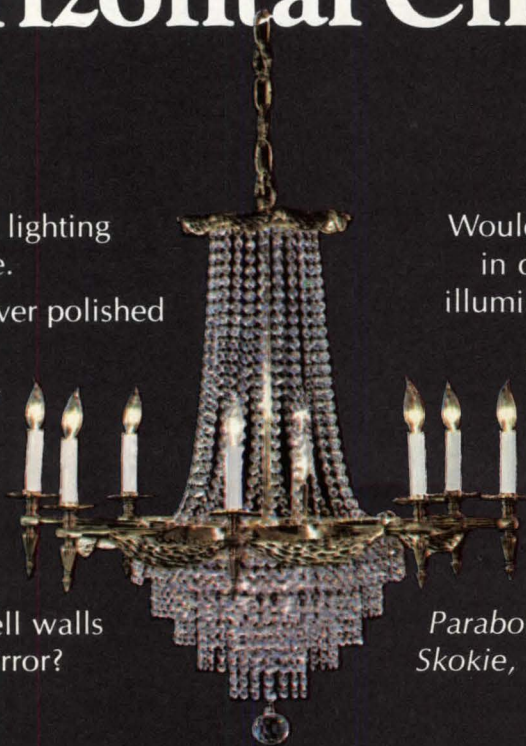
Presenting The Horizontal Chandelier.

Looks suspiciously like a lighting
louvre, you say? Can't be.

Who ever heard of a louvre polished
like Sunday silverware?

Since when will a louvre
permit you to raise foot
candle levels without
increasing glare?

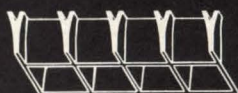
What louvre is so pre-
cisely molded that each
of its parabola-shaped cell walls
is an optically perfect mirror?



Would a louvre look as beautiful
in daylight as it does when it's
illuminated?

It's a horizontal chandelier,
that's what it is. Avail-
able with either silver
or gold metalized finish,
it's injection molded
in a single 2' x 4'
piece. Send for a sample:

*Parabolic 2020, 7700 Austin Ave.,
Skokie, Illinois 60076*



This is it in cross section.

The Parabolic 2020
by American Louver Company

On Readers' Service Card, Circle No. 323

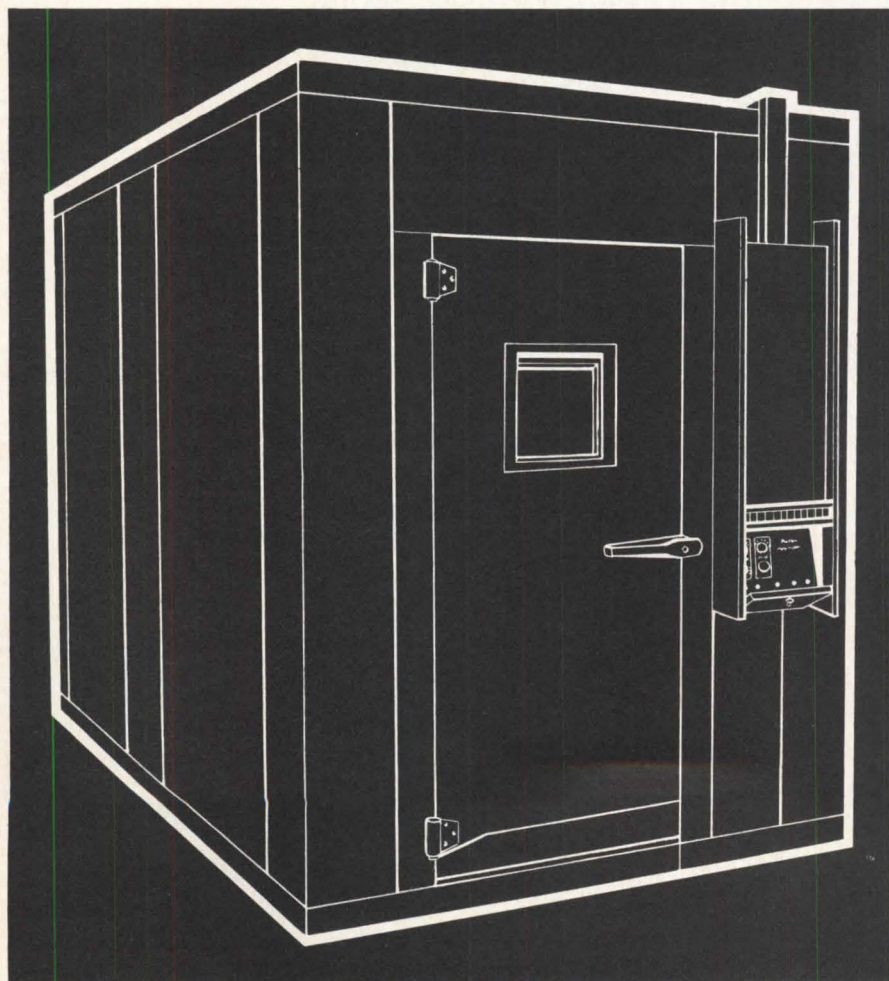
Fifty-one FORMA-ROOMS go to Ohio State... Good Buy, Columbus.

Ohio State University, Columbus, Ohio, ordered the environmental control chambers for the Microbiology, Biochemistry, Anatomy, Zoology and Botany Departments. The rooms will be used as incubators, cold rooms, freezers and day/night simulators, in addition to many other uses as dictated by special research projects. FORMA-LAB rooms were chosen for their ability to provide nearly every temperature

and relative humidity range needed for research. Temperatures range from -20° to 60°C (with $\pm 0.15^{\circ}\text{C}$ control); relative humidity ranges from 20% to 98% (with a room uniformity of $\pm 0.3^{\circ}\text{C}$).

To further insure uniformity of environmental conditions, all FORMA-LAB rooms come equipped with a 100% Solid State control system. Housed in an attractive panel, this electronic system guarantees a gentle flow of circulated air calibrated to your requirements. And there are no "clicks" to interfere with projects.

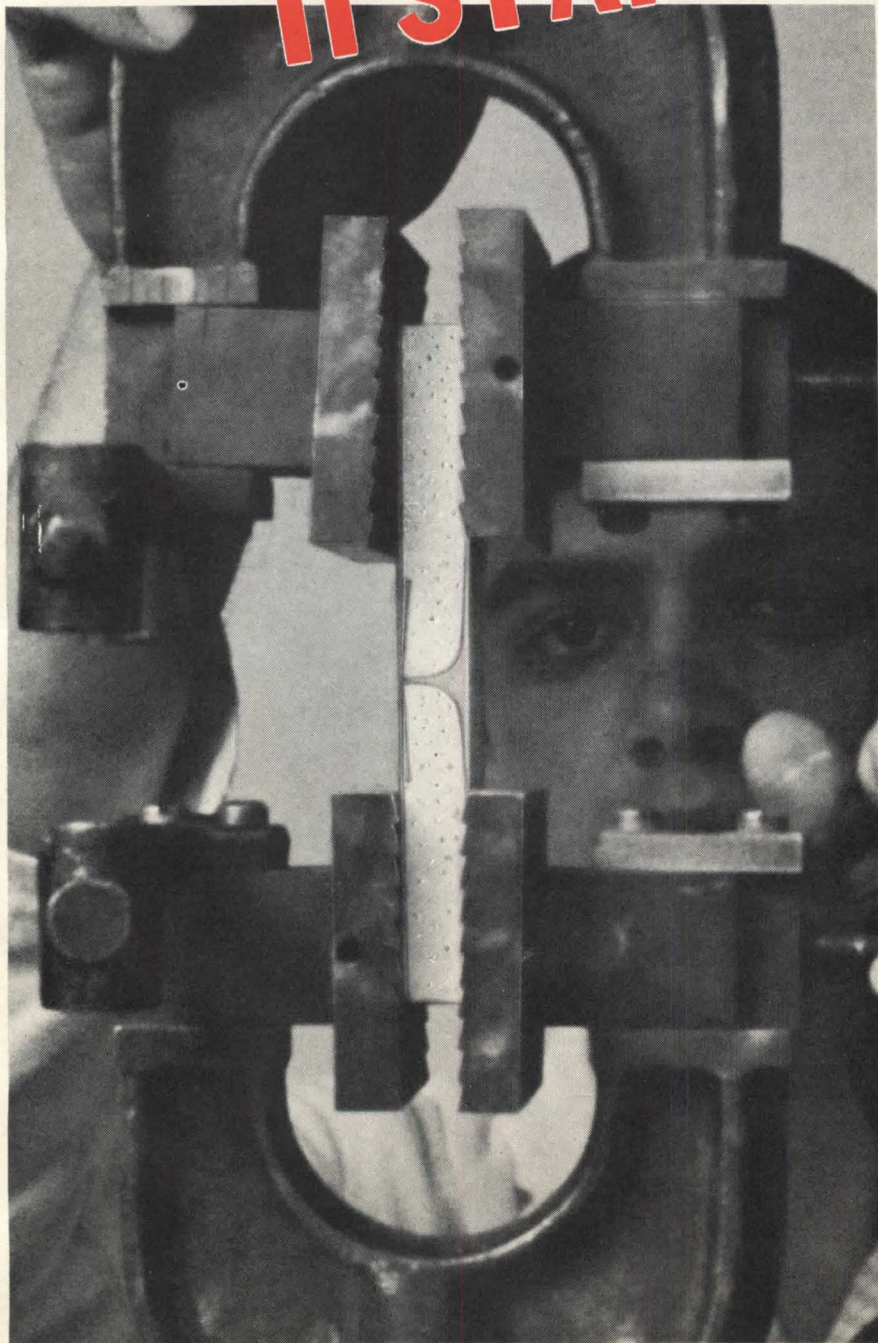
Get the complete details on the more than 200 standard models of FORMA-LAB walk-in rooms. Or for any other environmental equipment made especially for the life sciences. We make them all. Write Forma Scientific, Inc., Box 649, Marietta, Ohio 45750.



Forma Scientific

PROVED BY TESTING!

The only gypsum wallboard so effective at resisting ridging, **IT'S PATENTED!**



**SHEETROCK* SW Wallboard,
U.S. Patent #3,435,582.**

**SHEETROCK SW Wallboard, certified
ridge-resistant by Wiss, Janney,
Elstner, impartial engineering firm,
witness to 5-way tests which proved
the superior flatness and strength
of SHEETROCK SW.**

**Also proved in the field. Over 750
million sq. ft. installed and
working smoothly.**

With DURABOND*-90 Compound, exclusive SW (Smoothwall) eased edges form the strongest joints ever developed. Virtually eliminate ridging and beading; minimize other joint imperfections caused by twisted framing, offset joints, and poor framing alignment.

Use the industry's *only* patented wallboard for a certified ridge-resistant drywall system. Make sure your specs call for a written certificate of compliance with ridge-resistant construction. See your U.S.G. man; or write us at 101 S. Wacker Dr., Chicago, Ill. 60606. PA-911,

*Reg. U. S. Pat. Off.

UNITED STATES GYPSUM



Burlington WallscapingTM

A new dimension in interior design.

**Stretch your mind
around this new, pile-textured
wall surfacing of VEREL[®] ...
rich, rugged and downright affordable.**

Suddenly there are no limits.

You can afford to let your imagination wander. Up the wall.

Dream wrap-around environments of tone and texture. Interior landscaping. Spatial design you can sink into. The all-surrounding. Total living.

You've got the dream. And now we've got the reality: Burlington Wallscaping. Styled with 100% VEREL mod-acrylic.

Burlington Wallscaping is a new, pile-textured wall surfacing. It adds a luxurious dimension to previous concepts of interior design. Luxurious, but not expensive. Far from it.

As a matter of fact, Burlington Wallscaping has been totally engineered to encompass a whole range of built-in production values. For one thing, it is structured of VEREL to produce extremely low ratings for flame-spread. It's easy to maintain. And has outstanding acoustical properties. In many cases, it will justify your recommendation in terms of its sound-absorbing quality alone.

As far as installation goes, we're with you all the way: we'll provide complete instructions for any type of wall surface you have to cope with.

And last, but certainly not least important to you. The running line includes a contemporary selection of pile-textures, from tight-and-controlled to deep-and-nubby. Each will be available in up to 15 colors in inventory.

You can even order custom colors. Or stripes. Within each texture grouping, striped patterns are offered at a very low minimum.

Are you interested? Foolish question.

How do we get together? It's as easy as writing your name and address. On the coupon below. Lees Carpets, distributors of Burlington Wallscaping, will have one of their representatives get in touch with you in a matter of days.

In the meantime, let your imagination do the talking. You can afford to listen.

**Burlington Wallscaping/Lees Division
Department PA-11
Valley Forge Industrial Park
Norristown, Pennsylvania 19401**

Yes. I'd like to stretch my mind around the possibilities of Burlington Wallscaping. But I need more answers. Please have your local Territory Manager contact me.

Name

Company

Title

Address

City State Zip

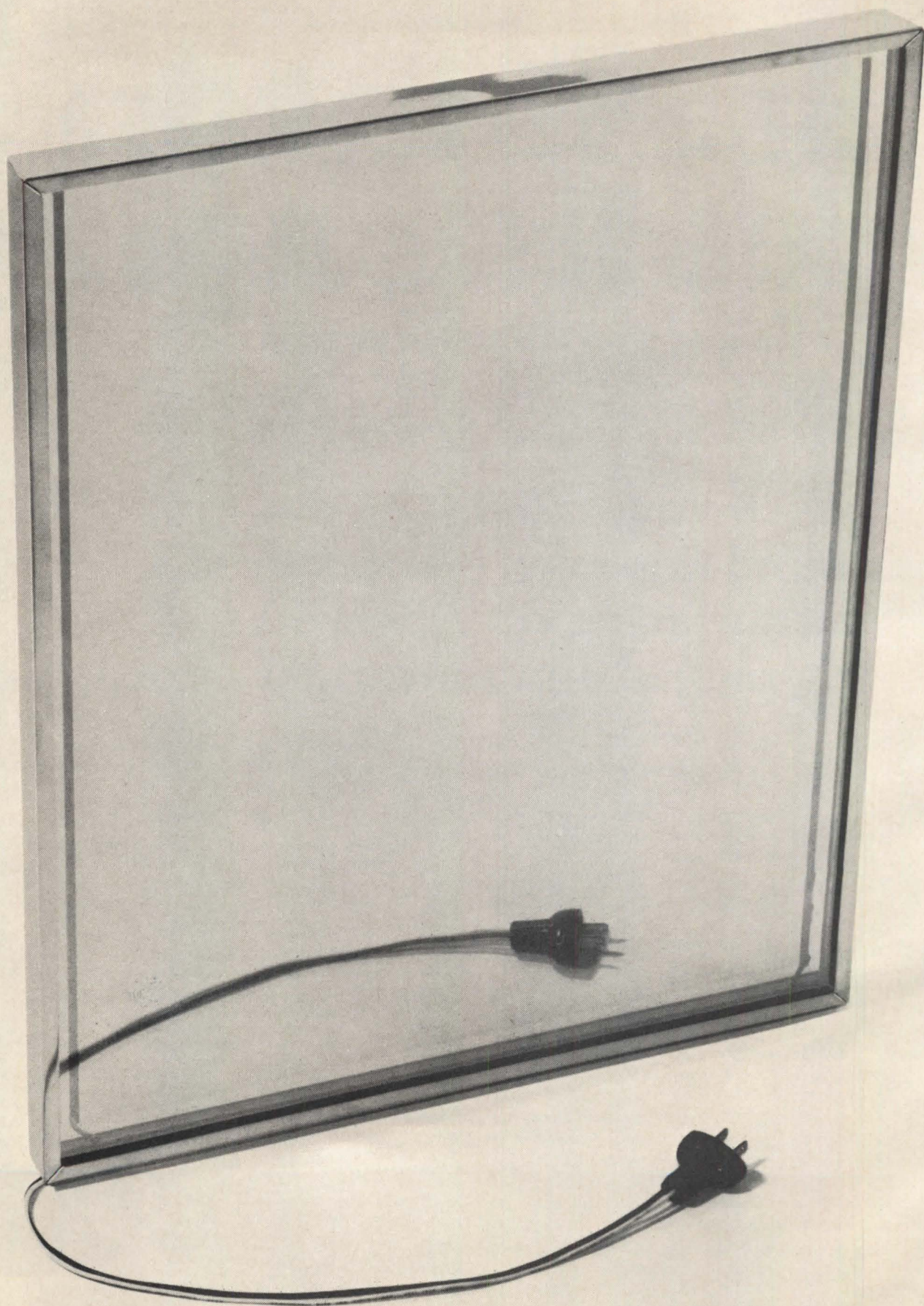
Telephone

VEREL is a trademark of the Eastman Kodak Company.

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Burlington



THE NEW PPG HEATED TWINDOW® UNIT. REMEMBER IT.

IT'S GOING TO MAKE A LOT OF BUILDINGS OBSOLETE.

It's a remarkable window that can eliminate peripheral heating systems; eliminate downdrafts, fogging, frosting and condensation; cut heating and air conditioning costs; and stay cleaner longer.

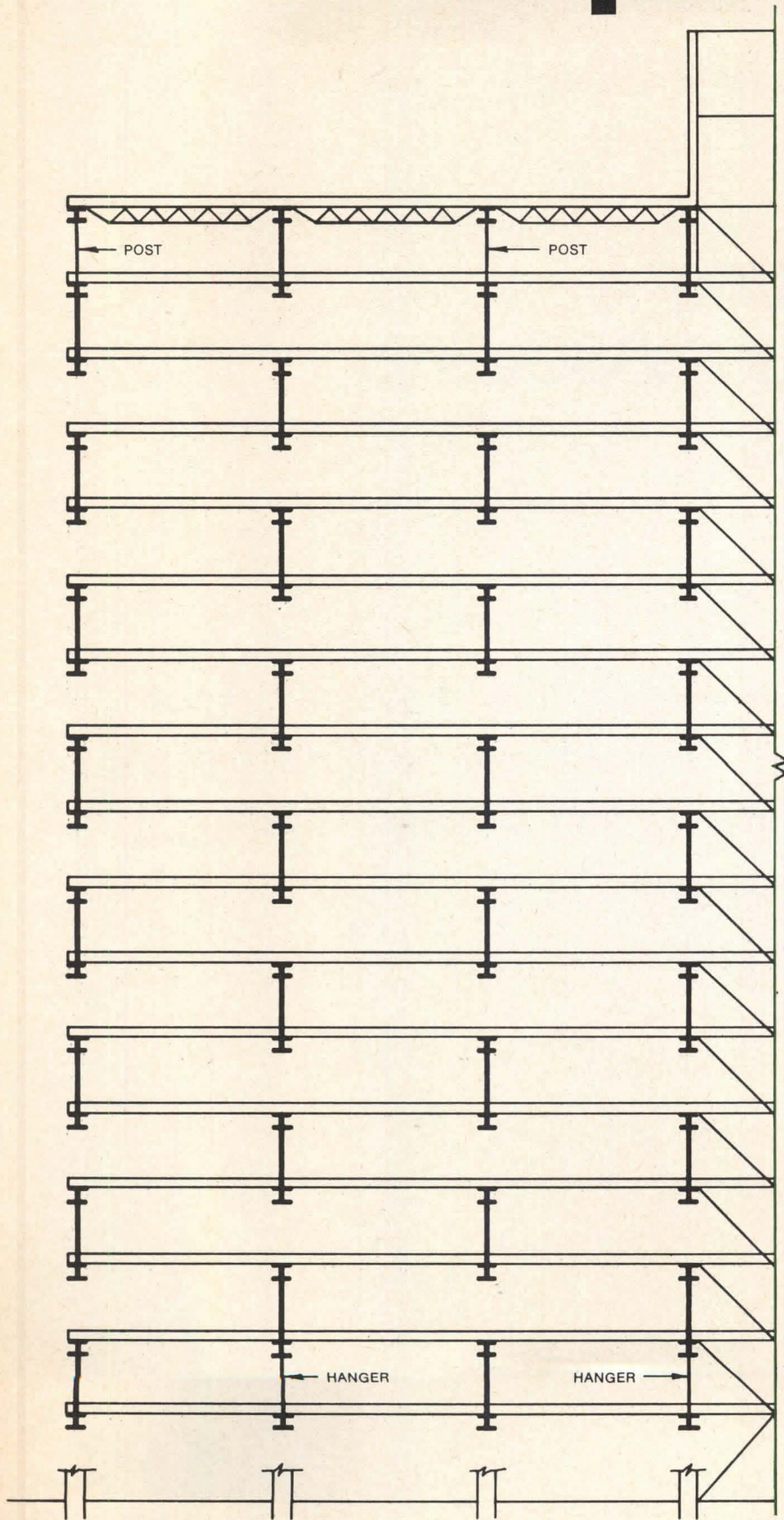
All you do is plug it in.

For information about this remarkable new window for custom installations, write for our new booklet. Mr. George Catlin, PPG Industries, Inc., One Gateway Center, Pittsburgh, Pa. 15222.

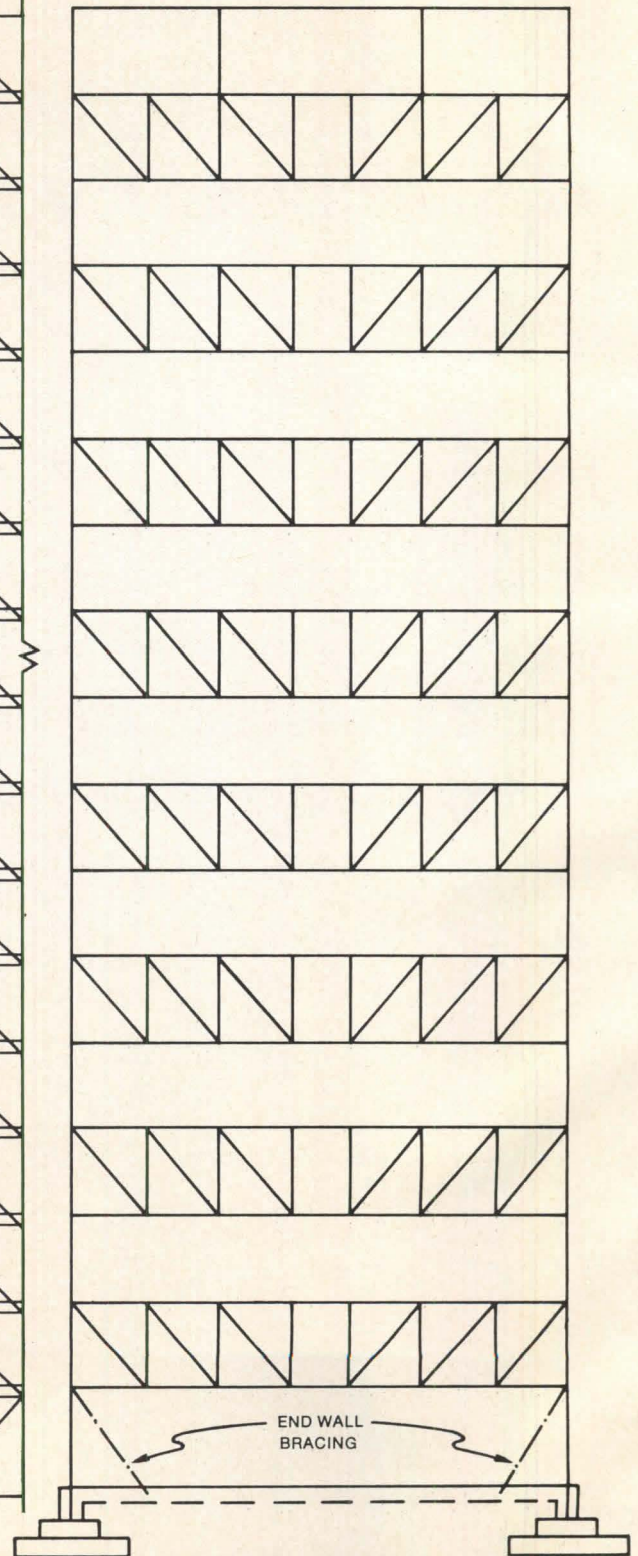
PPG is Chemicals, Minerals, Fiber Glass, Paints and Glass. So far.



Apartments:



Half longitudinal section:
staggered trusses.



Cross section:
(Note corridor space in center of truss.)

when steel goes up costs come down.

First cost is just one of the ways to save with steel. This 186-unit apartment building shows how imaginative design with steel brought a project in at \$59,580 below budget.

The building is a low rent housing project for the elderly. Two 17-story towers flank a service core. Each apartment contains 455 sq. ft. The assignment was to design a building for pleasant living within a modest budget.

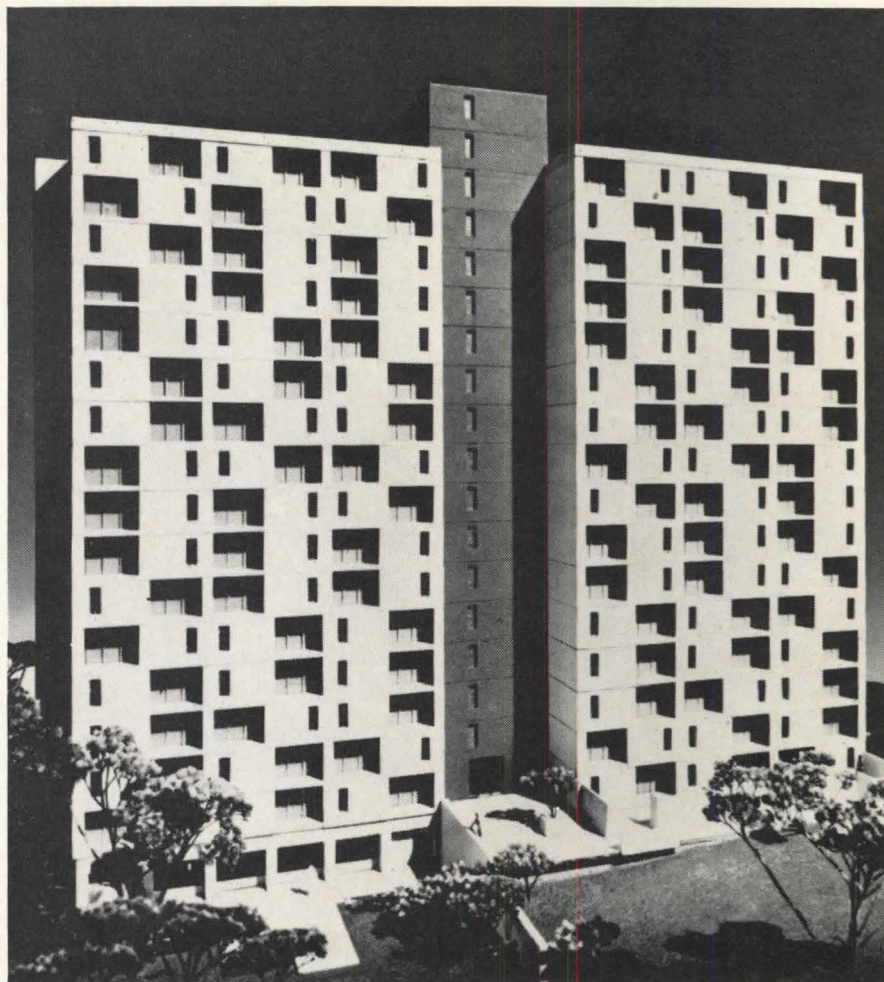
After evaluating several structural systems, the architects found their answer in a *staggered steel truss system*. This is the first use of the staggered truss system, which was developed at MIT in a research program sponsored by U. S. Steel.

Story-high trusses, spanning the building's 52'0" width, are set in a staggered pattern (see diagram). They are located within the separating walls of alternate apartment units. Precast concrete floors rest on the top chord of one truss and on the bottom chord of another truss. The floor slabs act as diaphragms together with the trusses to effectively resist wind loads.

Total steel requirement for the building was about 480 tons for an average weight of 6.8 lbs. per sq. ft. The A572 steels used in the welded trusses are USS EX-TEN 50 and 60 High-Strength Low-Alloy Steels (50,000 and 60,000 psi min. yield points respectively). Construction cost, including mechanical and electrical bids, was \$2,282,870. Sq. ft. cost: \$16.31.

Structural Report

This is one of many ways to keep costs down with steel. Used imaginatively, steel usually wins out in



HOUSING FOR THE ELDERLY, 1300 Wilson Ave., St. Paul, Minn. Owners: Housing and Redevelopment Authority of the City of St. Paul. Architects: Bergstedt, Wahlberg & Wold, Inc. Structural Designers: Bakke & Kopp. Structural Engineers: Schuett-Meier Co. General Contractor: Knutson Construction Co. Structural Fabricator: The Maxson Corporation. Structural Erector: Sandberg Erectors.

first cost compared with other building materials. In the long run, there's no question. Only steel-framed buildings can be altered at low cost when it comes time for major remodeling.

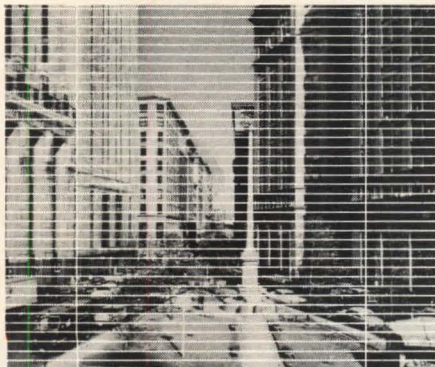
If you're planning a new building, look into the staggered truss system. Get a copy of our "Struc-

tural Report," which details its use in this building, by contacting a USS Construction Marketing Representative through the nearest USS sales office. Or write U. S. Steel, P. O. Box 86 (USS 5796), Pittsburgh, Pennsylvania 15230. USS and EX-TEN are registered trademarks.

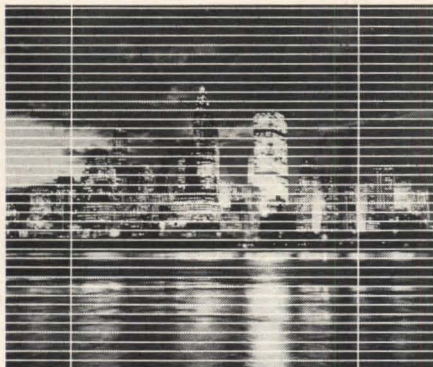


United States Steel

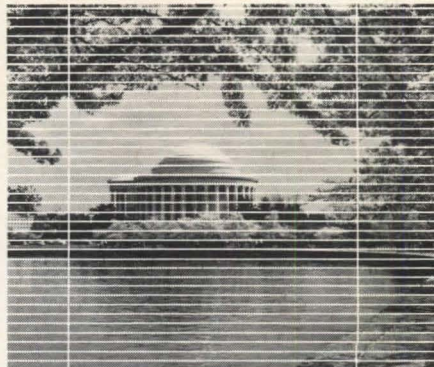
See the Venette.[®] Live.



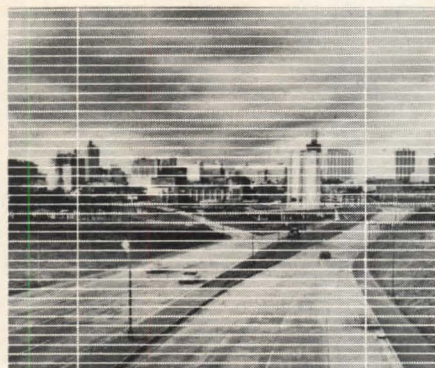
Boston



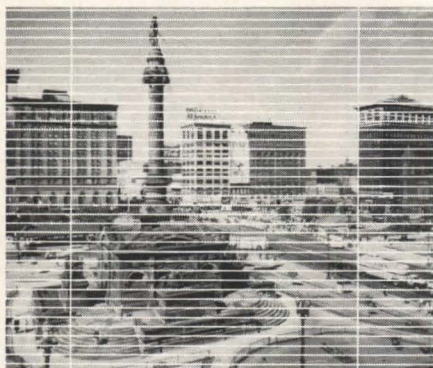
New York



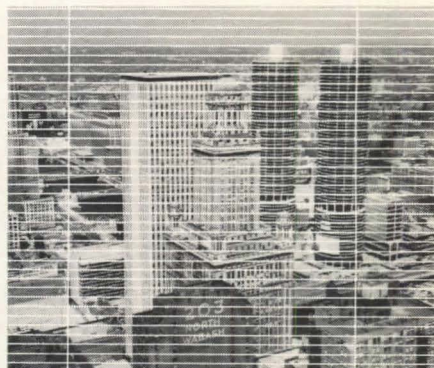
Washington



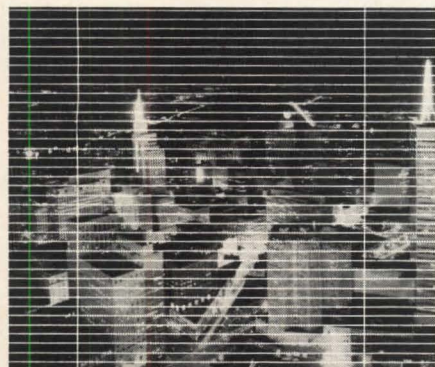
Atlanta



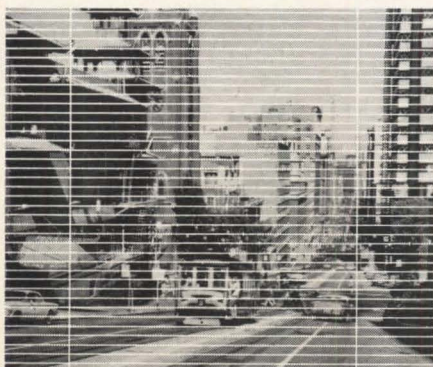
Cleveland



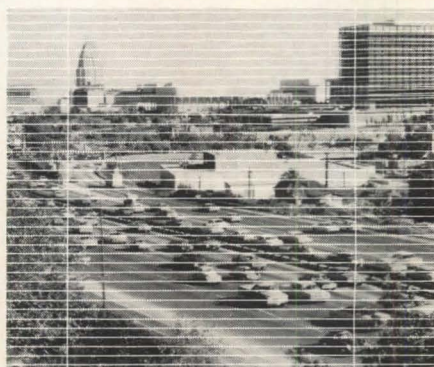
Chicago



Dallas



San Francisco



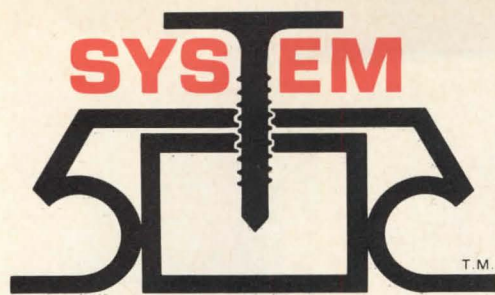
Los Angeles

You'll be seeing America. Through one-inch louvers. And for good reasons. Closed, the world disappears. Open, Venette disappears. Looks delicate . . . until you test its spring-tempered louvers, rigid torque-tube head, aluminum wand tilter, polyester cable ladders, etc. With Flexalum Venette, the more you look, the more you see. Write Alcan Building Products Division, 100 Erieview Plaza, Cleveland, Ohio 44114.

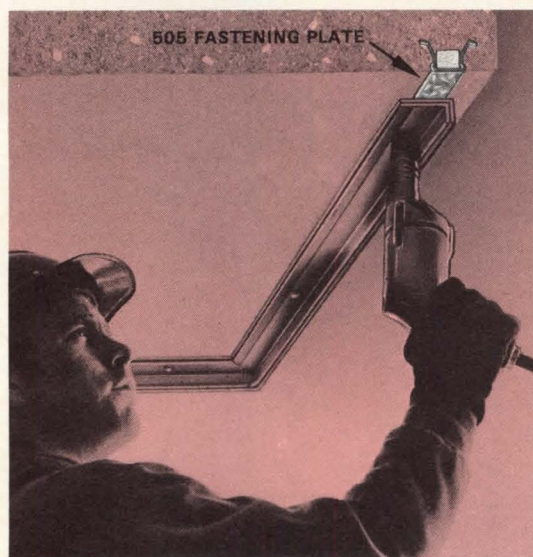
(Cataloged in Spec-Data and Sweets)

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as easy as fastening to metal or wood**



SYSTEM 505TM

With the simple driving of a screw, components can now be quickly, easily and securely fastened to concrete. SYSTEM 505 dramatically simplifies the fastening of wall and roof systems, mechanical and electrical components, door and window sections, etc.

This unique system eliminates drilling, shooting, welding, locating and placing individual inserts and other costly and time consuming operations.

SYSTEM 505 incorporates a metal fastening plate designed to accept TEKS[®] self-drilling fasteners, or if drilled, conventional fasteners. The fastening plate is a pre-pour insert that provides a fastening surface from one to four inches wide and up to 40 feet long.

This surface allows for considerable tolerance in the placement of fasteners, greatly reducing job site alignment problems. The 505 fastening plate is easily nailed to a form and can be used in on-site poured or pre-cast sections.

For more information on applications and specifications, send for literature on SYSTEM 505.

Join the fastening evolution.

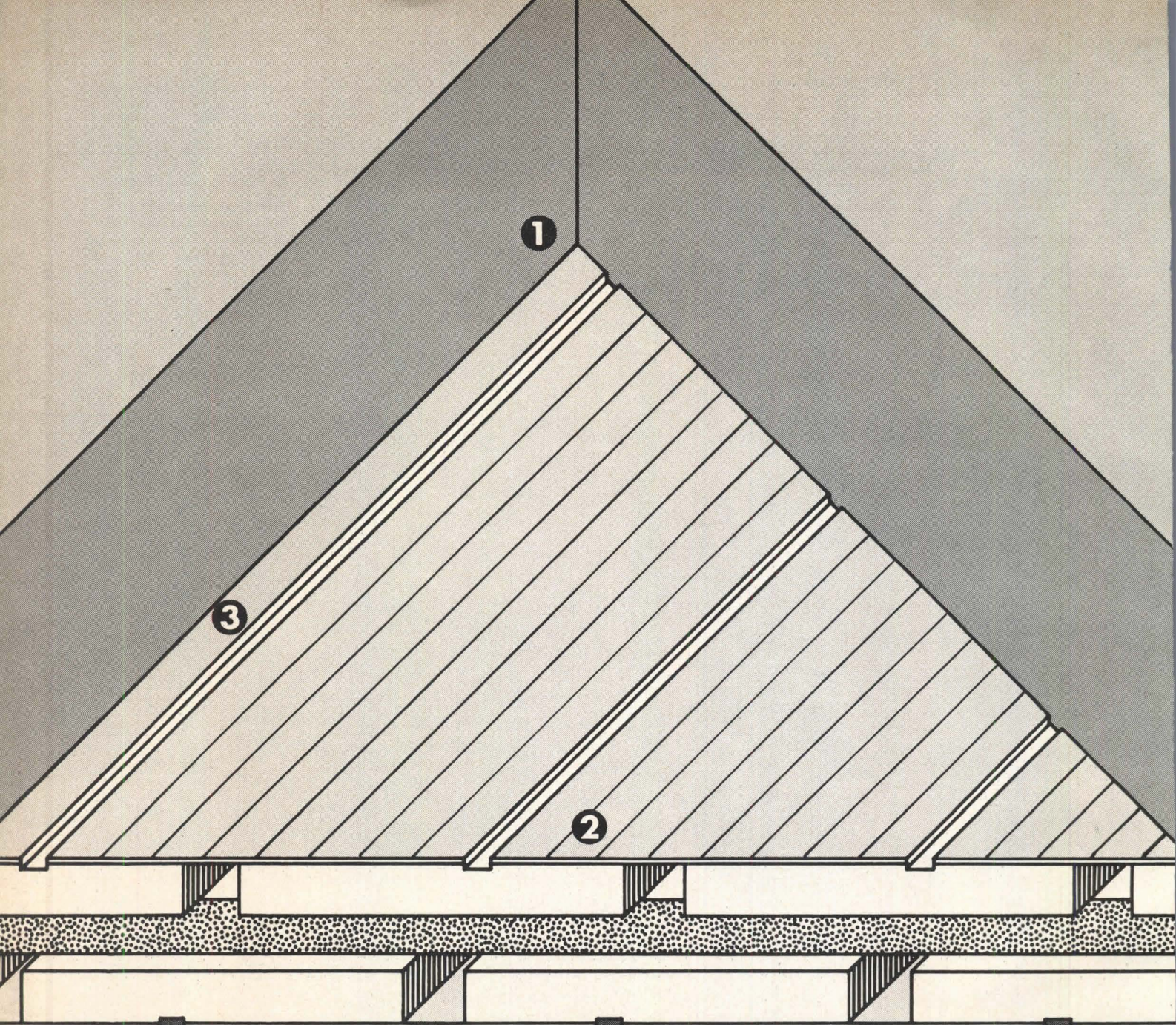
BUILDEX Division Illinois Tool Works Inc., 801 N. Hilltop Dr., Itasca Ill. 60143

i^tw BUILDEX

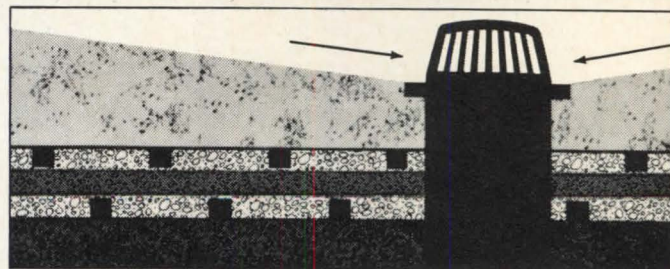
DIVISION ILLINOIS TOOL WORKS INC.

new concepts in construction fasteningTM

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***New double-insulated
Dyzone roof deck
is self-venting***



1 On top, a layer of seamless, permanent Zonolite lightweight insulating concrete that can be sloped to drain easily and economically. Leak-making ponds don't stay on the deck.

2 Below, Dyfoam Ventboard. It's composed of Dyfoam expanded polystyrene boards sandwiched between laminating material. The insulating concrete combined with Dyfoam Ventboard gives you economical U values down to .03.

3 Vents are built right into the Dyfoam Ventboard. Water vapor passes through the laminating material into the vents, and is channeled out to the edges of the roof.

No joints, no tape, no adhesives, no vapor barrier are needed. A thin slurry of Zonolite insulating concrete serves as the bonding agent between deck and structure.

Zonolite roof decks can only be applied by trained, approved applicators. Upon completion, the decks are certified to meet specifications.



Construction Products Division W. R. Grace & Co.
Dept. PA-11 Cambridge, Mass. 02140

Gentlemen: Please send me complete information and specifications on DYZONE roof decks right away.

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FIRM _____

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Baystate West
 Architect: Pietro Belluschi & Eduardo Catalano-Architects,
 early preliminary design.
 Engineer: Francis Associates, Inc.



Linkletter Natatorium, Springfield College
 Architect: Munson & Mallis
 Engineer: E. M. Sullivan



Forbes & Wallace Department Store
 Designer: 1. Strobel and Rongved, Engineers
 2. Herman Blum, Consulting Engineers



Springfield Newspapers
 Engineer: Lockwood Greene Engineers, Inc.
 Architect: Lockwood Greene Engineers, Inc.

How the architects of “new” Springfield planned for the future with All-Electric design.

A reconstructed and revitalized Springfield, Massachusetts, is rapidly taking shape. New buildings, new complexes, new developments are going up all over the city. Seven out of nine new buildings are built with All-Electric design. They're built to meet the needs of the future, and will still be modern for years to come.

All-Electric design gives architects greater design freedom. They don't have to plan around boiler rooms, flues, fuel storage and handling areas and unsightly smokestacks. All-Electric design gives tenants the ultimate in modern environmental comfort, and gives owners economical first costs and operating costs, and lower maintenance costs.

If you're planning a building to meet present and future needs, plan on All-Electric design. For more information, contact your electric utility company.

All-Electric design



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Holiday Inns of America
Architect: William Bond, Jr. & Associates, Inc.



Eastfield Mall
Architect: Daverman Associates, Inc.
Engineer: Daverman Associates, Inc.



Stephen J. Collins Elderly Housing "Twin Towers"
Architect: Caolo & Bieniek Associates
Engineer: Greenleaf Associates

CHF conference TABLES



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Charlotte Chair Company, Charlotte, Michigan 48813 ■ **Wilburn Manufacturing Div.**, Grand Rapids, Michigan 49501

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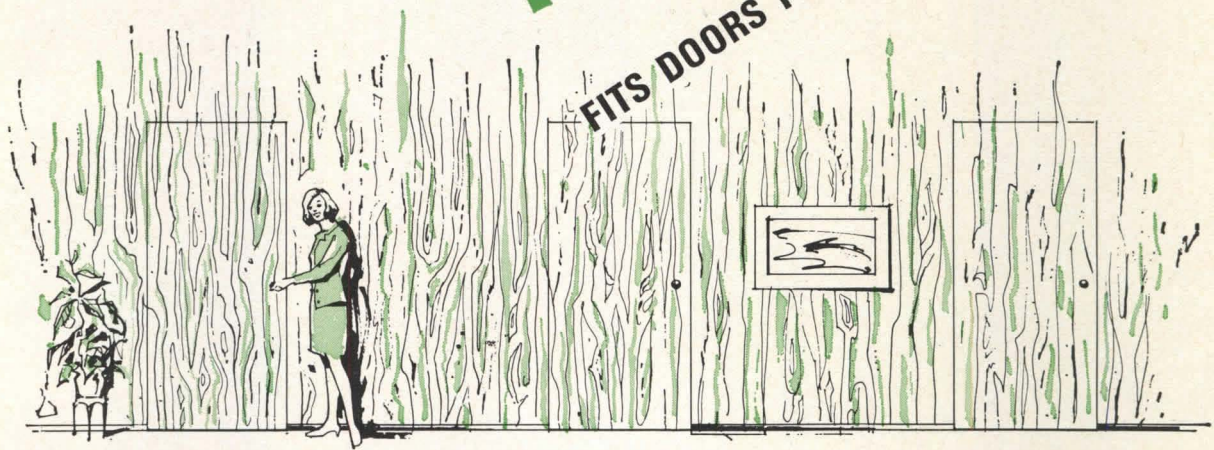
DALLAS
214/742-3564

Hager develops new type concealed hinge!

#500 Rack & Pinion

PIVOT HINGE*

FITS DOORS FLUSH WITH JAMB OR FRAME!

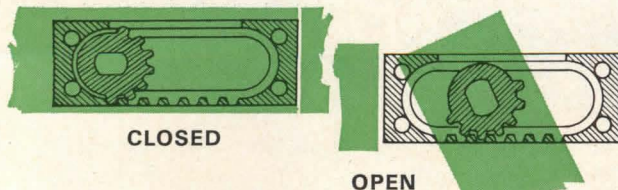


Paneled walls can now serve double duty. Vast stretches of paneling that open as doors yet close off flush so you hardly know a door's there . . . It's all possible with the new Hager pivot.

Install doors floor to ceiling without need of a single stud or jamb. It's an interesting new development that anchors doors top and bottom. No other hinges needed. Even bi-fold applications are made without hinging or large margin.

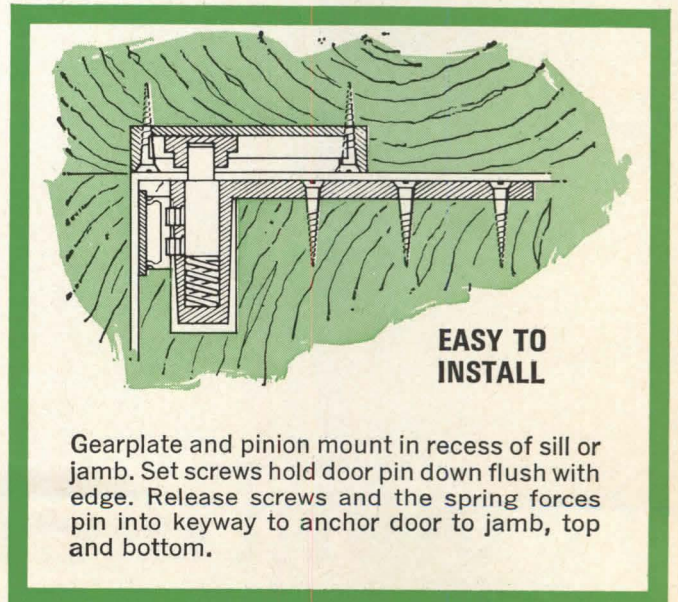
Recommended for 1 $\frac{3}{4}$ " doors. Available in chrome or brass finish.

NEW PATENTED MECHANISM !



The keyed pin rotates as door opens while the pinion moves laterally away from the door jamb. Door clears without rounding of door corners, yet fits flush with jamb when closed and opens freely without bind. Ideal for concealed installation in contemporary wood-panel interiors.

*Patent No. 3,394,428




Gearplate and pinion mount in recess of sill or jamb. Set screws hold door pin down flush with edge. Release screws and the spring forces pin into keyway to anchor door to jamb, top and bottom.

*For more details contact your
Hager representative or write:*

Hager

HAGER HINGE COMPANY
139 Victor St., St. Louis, Mo. 63104
In Canada: Hager Hinge Canada, Ltd.



Glid-Tile Epoxide Block-Filler.
Unique epoxy-ester water-reducible material applies easily, fills porous masonry with ONE labor-saving coat.

Glid-Tile Epoxide Finish.
High-solids, high-build polyester-epoxy coating. Brush, roll or spray in ONE labor-saving coat.

Around the block in 2 steps

Glid-Tile® Epoxide is thick and tough as 4-coat systems, but with low cost of 2 coats.

The GLID-TILE polyester-epoxy finish resists years of wear and tear, stains, abrasion, impact. Tile-like nonporous GLID-TILE walls require minimum maintenance. Wide range of colors, in gloss or semi-gloss. Spatter or web finish effects, too. Call your Glidden representative for fast, factual demonstration. Or write to Glidden Maintenance Coatings, 900 Union Commerce Bldg., Cleveland, Ohio 44115.

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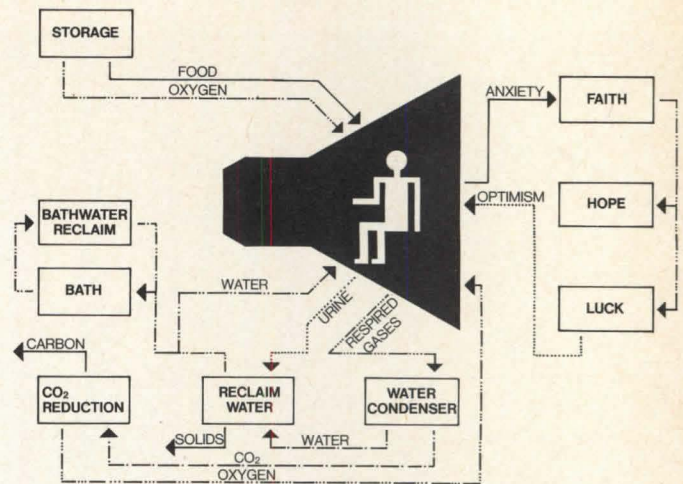
A SPACE DESIGN TECHNOLOGY has been spawned by the design of anonymous working space no less than by shooting men into outer space. This issue of P/A is devoted to that comparatively new design discipline — space planning. The design of mass working spaces is like space exploration — without precedent, a new specialty, practiced by new specialists whose objectives are not the traditional architectural “mastery of space” but are more akin to those of the rocket designer — efficiency, economy, motivation.

Space planning was born from the shortage of office space following World War II. Prior to that time the majority of workers labored submissively in grim, crowded, badly lit interiors, simply motivated by the alternative of starvation. Prosperity following the war and the inversion of white to blue collar workers created a seller's market. No longer goaded by the apparition of unemployment, office help had to be environmentally enticed. A new design profession emerged dedicated to the procurement of office help.

Twenty five years later, a market of billions of square feet of office space and billions of dollars in office furnishings and equipment can no longer depend on simple seduction to staff anonymous working spaces. A science was required. A space technology was developed. Every aspect of space, movement and psychological implication has been investigated and applied. The golden section for an office building is composed of the standardized measurements of a secretary and her desk. Yet even this new space science is not successful.

Science and design has not been able to provide personnel motivation. Part of this failure is due to the basic composition of the office itself. It is today what it was thirty years ago, a rigid codification of the social life around it, literally the “establishment.” The political composition is authoritarian, social life is strictured, decisions are arbitrary, discrimination is freely practiced, with love banished to the stock room. For the most part office workers lack even the semblance of autonomy afforded by unions. The equivalent to riot in such a rigid format, is apathy.

The most likely to labor in anonymous



office spaces have the least stimulating jobs. Anonymous space is not occupied by anonymous people; at least no one that works in it considers himself anonymous. The workers in the core office pools are letting us know something is wrong through a masterful display of disinterest.

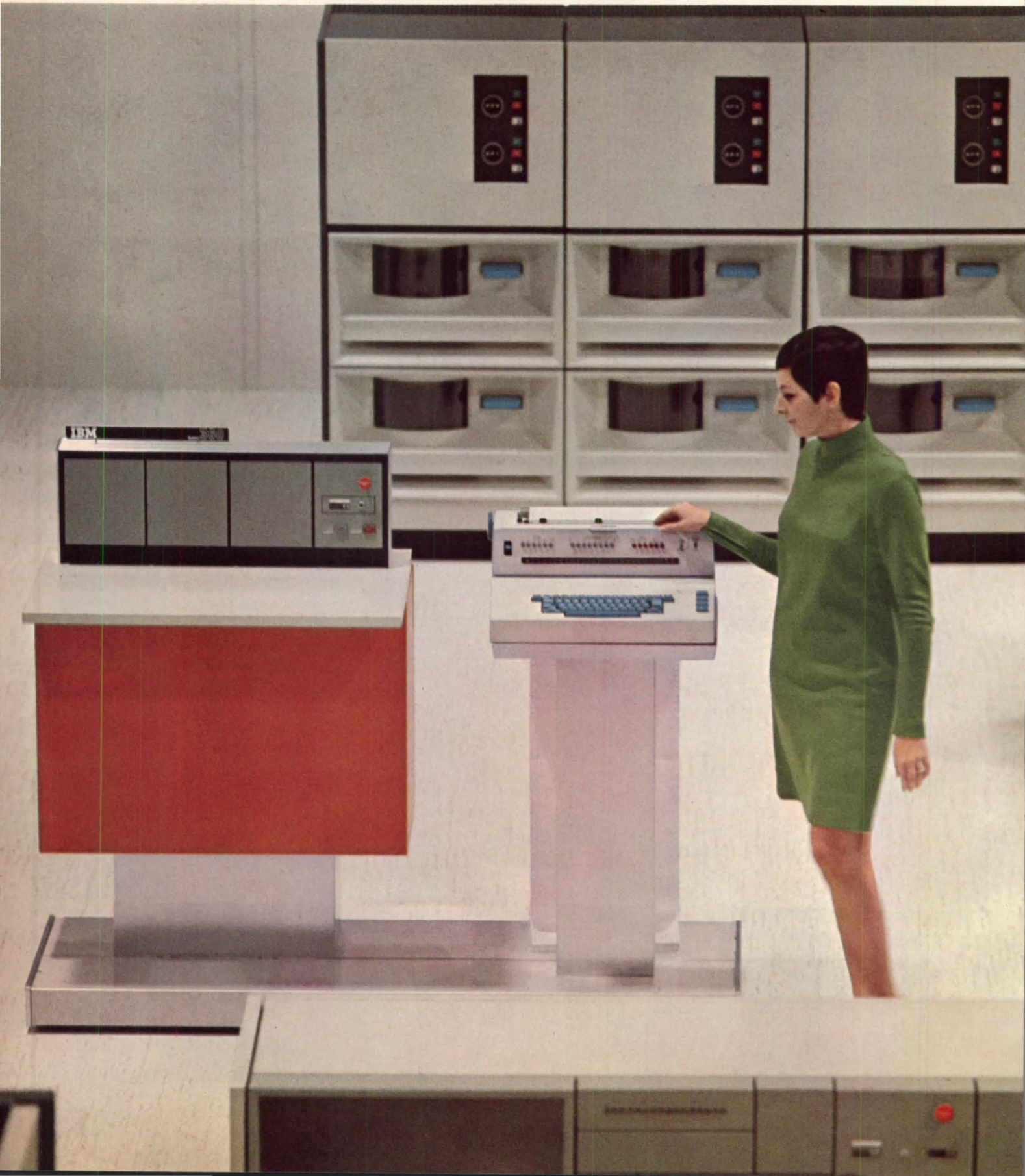
The office is besieged from two directions. The lower-salaried want to move upward out of the insecurity of menial jobs; the “other-culture” advocates who, although persecution has forced them to cut their hair and retreat into office, are delighted to see the Protestant work ethic go to pot.

The problems that converge on office design and tug at our conscience as we concentrate our most sophisticated space design technology in outer space are those that converge on the remainder of society — economic exploitation, political domination, and depersonalization engendered by institutional bureaucracy. Rather difficult problems for the space designer to tune into and design out. Dissatisfaction with the office runs more than design deep.

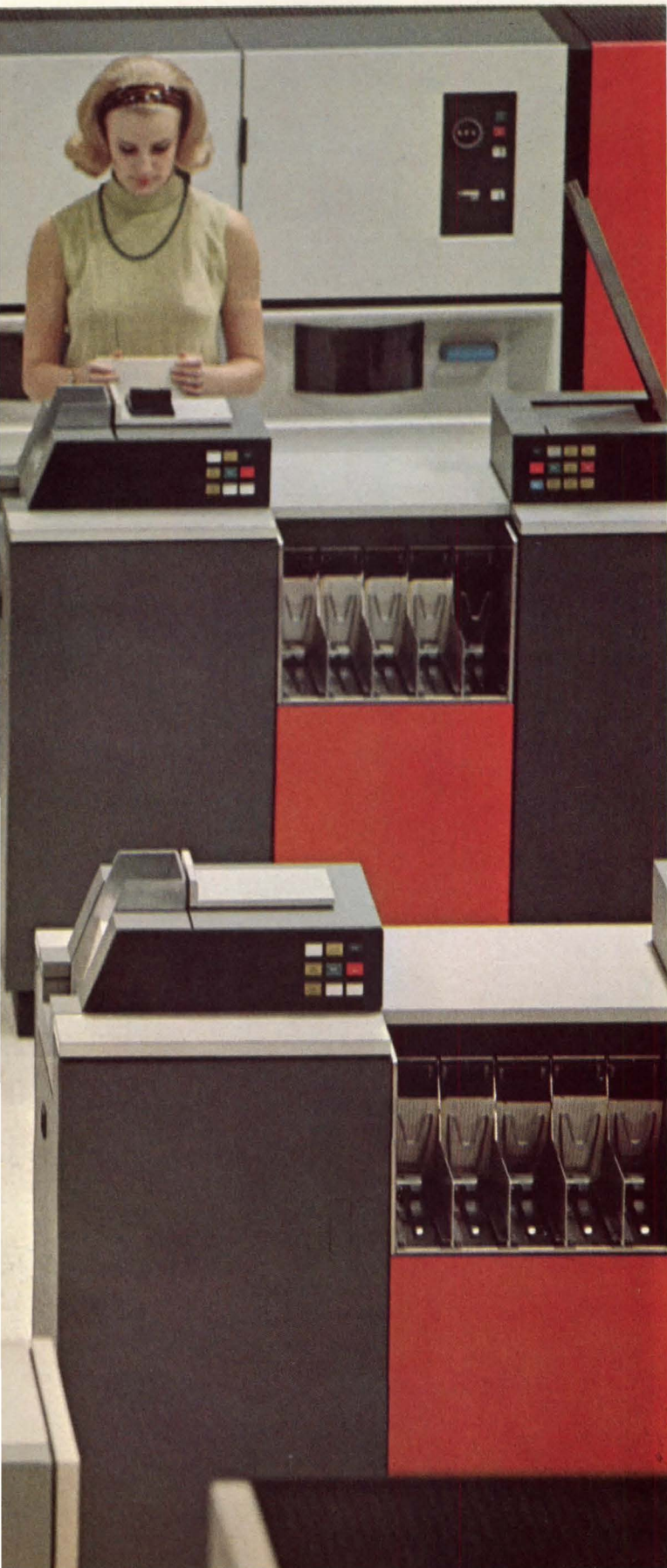
It is little wonder that space planners find it impossible or nearly so to design motivation into the office. This issue of P/A is devoted to a “space technology” far more complex and difficult than that of solving the problems of outer space.

Forrest Wilson

Anonymous Space



**As a science, how scientific,
as an art how artistic is the design
of anonymous working space?**



The disposition of space has always been one of the architect's special skills. Recently this skill has been singled out by a group of designers whose major effort is concentrated on the merchandizing of space. In this issue we feature those designers of space specializing in office interiors.

What we are asking is, as space planning becomes a science how scientific is it? As an art, how artistic is it? When large spaces are handled commercially what are the objectives or the criteria of their design?

The individual architecturally designed space, or the prestige office has certain criteria. It must usually be a corner office, have all the amenities, and all the mechanical gadgets; it must function but, most of all, it must be a showplace for the corporation that commissioned it. The design of the single space for a single man is the result of a design team ascertaining every need of one man. He becomes the design objective of their skill and most times his individual requirements are admirably satisfied. If all space could be handled as crafted space rather than merchandised space, everyone would be satisfied.

But what happens when we think of interiors in terms of millions of square feet? What criteria govern them and what is the basis used for their design? What actually happens in the great spaces designed for the majority of workers inside of mammoth buildings?

To better understand the problems today's designers must and do ask themselves, we have viewed office design over the last century. We discuss the recent emergence of the new profession specializing in interior design-space planning. We talk about the effect real estate entrepreneurs, furniture manufacturers and dealers, and others have on the offices that most people work in — that is the clerks, stenographers, bookkeepers, and the like — the occupants of anonymous computed space.

Contrasting to our major focus, the merchandising of space, we talk about the ultimate in space planning — the design of space in outer space. We describe the space station designed by the New York architectural firm, Warner Burns Toan and Lunde, which will house anywhere from six to twelve men for periods of three to twelve months in outer space.

Whether inner or outer space, we know from history that the design of office space has usually consisted of the minimum amenities the worker would accept. Precious little design effort was expended in his behalf at the turn of the century where two foot-candles of illumination and one toilet per floor were made to suffice. The office today has sound and light control, it has been tested and researched, given systems and counter systems. Does it work? And how is the special expertise of the architect being used in what should be total planning?

Photo: courtesy of IBM Corp.

OLD TIME OFFICES

For nearly a century—up to 1960—the design of general office space has remained fairly static. Improvements in lighting, office machines and equipment, were the obvious changes to that time.

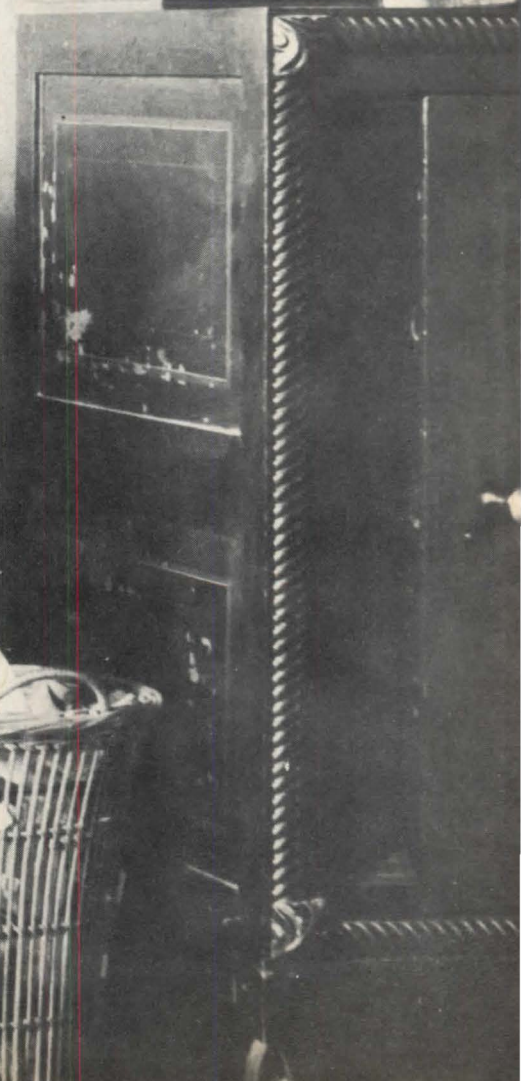
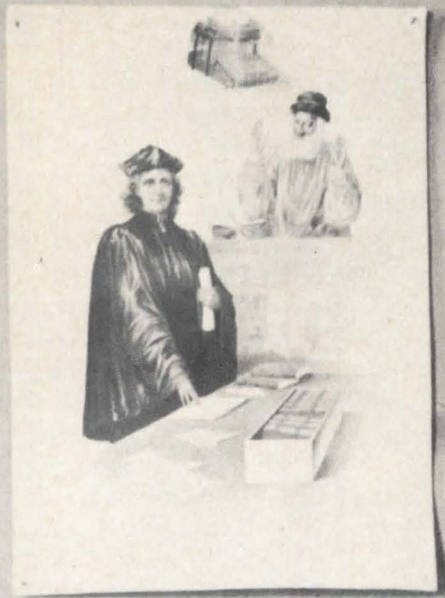
The modern concept of an office, like that of so many modern institutions, has its roots in the late 19th century. Before that time, most bureaucratic functions in Europe and America were handled by small groups of people, each carrying multiple functions, and working with simple tools. The configuration of the *small* office has evolved least since its dim beginnings, simply because a high degree of specialization is only possible with large numbers of workers. Where a small group is sufficient to sustain a business operation, the typical ensemble of owner, bookkeeper, and stenographer is still to be found. The introduction of sophisticated machinery has not changed this basic unit. To a large extent, in fact, machines and equipment have permitted its continuance, since the output of each member is greatly increased by the use of typewriters, adding machines, and telephones.

Qualitative changes in the office were produced by enormous quantitative changes, the result of industrial expansion during and after the Civil War. The vast increase in production yielded a concomitant growth in paperwork, handled by huge armies of clerks organized into increasingly specialized departments. The office became, in effect, a kind of factory. For sociological reasons, the office worker did not identify himself with the factory hand, and indeed there was, and continues to be, a lag between the mechanization of the factory and that of the office. Mechanical office tools existed long before their general use. It is startling to learn, for example, that the

Zimmerman Law Office, Madison, Wisconsin. c. 1905. Albert G. Zimmerman.



Photo: courtesy, State Historical Society of Wisconsin





An accounting department in 18th-century Philadelphia.

first typewriters were patented in England in 1714 and in America in 1829. Although a more practical device was invented in the 1860's and manufactured by Remington in 1873, its general use was not common until the last years of the century. The growth of the office, therefore, did not parallel its mechanization. The functions to be assumed by machines had already evolved before their introduction, and the rate of employment rose considerably faster than their use. As late as 1951, the amount of machine investment varied between \$2,659 and \$19,375 per industrial worker, while for his clerical counterpart, the maximum figure did not exceed \$1,000.

Nevertheless, the factory did ultimately become the model for the office. In the earliest instances, this consisted of the superficial imposition of visual order through identical furniture and the precise alignment of desks. "The appearance presented by uniform desk equipment throughout the office suggests the existence of well-ordered methods," observed one early writer on the subject. If we substitute the boss's office for the governor's palace, the first large offices parallel the grid plans of colonial towns, structured for the appearance of order, rather than for the coordination of processes.

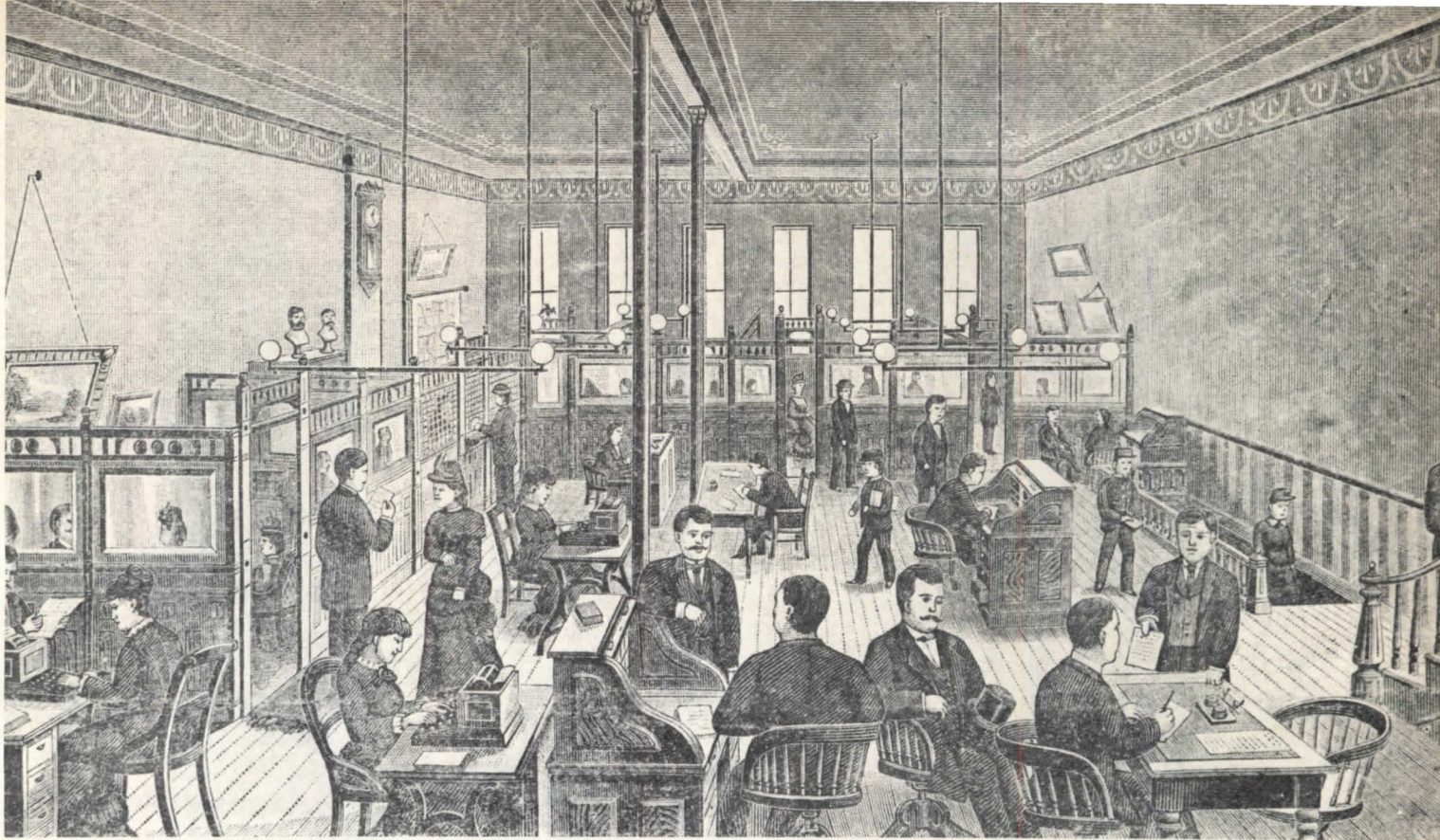
But within a surprisingly short time, this static, hierarchical concept was superseded by the notion of the office as process; not, however, without leaving certain feudal, vestigial remains. Chief among these latter was the private office whose *raison d'être* remained, in the last analysis, the status hunger of executives. But even in 1913, J. William Schulze in *The American Office* was able to note its root in "the vanity of many officials who believe the importance of their positions entitles them to some such distinction." He thought this element, however, "unworthy of serious thought."

The concept of the office evolved most during World War I, attaining, in most respects, the forms we are familiar with today. Mechanization was instituted at a fantastic pace, with over 100 new machines introduced every year between 1915 and 1921. The rate of employment of office personnel grew at an even greater pace. While in the 1890's only one in thirteen of those employed in manufacturing were clerical workers, the figure rose to one in seven by 1924. The greatest growth was evident in such operations as advertising agencies, banks, insurance companies, and mail-order houses. By 1913, all the principles on which the organization of office space and personnel are now based had been clearly articulated and put into practice. The move was toward the abolition of private offices and the institution of a rectilinear flow of work, on the paradigm of assembly-line production. This was made possible by the pooling of clerical workers — especially typists and stenographers — to increase output and lower unit costs, as well as to provide better lighting and supervision. Further advantages included:

- * the prevention of holdover in the absence of a secretary.
- * consistent salaries.
- * uniform standards and the possibility of measurement.
- * the saving of equipment and the institution of a uniform record-keeping system.

Although female personnel were employed as early as 1850, the modern concept of an office had not yet evolved.





Office of a furniture manufacturer, c. 1880. After the Civil War, increase in production yielded a concomitant growth in paperwork.

* increased speed and volume through competition.

* the isolation of executives from the noise of machines.

This last was indicative of an important sociological consequence of the centralized system, since it prevented more than the most superficial interpersonal contact between various levels of the office hierarchy. It spelled the death of the Horatio Alger myth as a realizable dream.

During these years, women increasingly replaced men in clerical positions, and for excellent reasons. First, their salary requirements were lower, and second, their temporary relation to the job made it easier to accept the virtual impossibility of advancement. Women replaced men, and younger women replaced older women with remarkable continuity from 1913 to 1969.

But office planning had become more sophisticated than the mere pooling of typists and stenographers. Schulze noted that work-flow studies had already been done and that, in designing the physical layout of an office, it was first necessary to determine the nature and amount of work done by each department, and then to position the various departments so that those most closely related should be adjacent, permitting a one-way flow of work.

Schulze also stipulated that the space for each unit should be determined by the nature and quantity of its work, with respect to the amount of equipment and personnel involved. He cited New York's Metropolitan Life Insurance Company as an example of a

highly organized large office that had already determined modular units for its many departments. A typical planning unit there involved 5 ft. of desk space with 3-foot aisles and 42 in. between desks for a total of 100–115 square feet per employee — severe crowding by contemporary standards.

At the same time, the argument against private offices and for partitionless, open spaces had already been well advanced. Principles of functional efficiency in furniture design replaced the commodious (and clutter-filled) roll-top desk with a flat-topped one lacking a carpetbag center drawer. Chairs were designed for the maximum comfort compatible with minimum extraneous movement.

But the visual image remained rigidly geometric, expressing in long rows of identical equipment the insidious monotony of standardized, repetitive tasks. For the assimilation of the office to the factory model brought, with a huge increase in efficiency, the inevitable decrease in demand for skill and intelligence. The contemporary office tries to compensate for the inherent monotony of its work through better pay, shorter hours, fringe benefits, and agreeable surroundings. But in 1890, the clerical worker averaged \$880 per year, expanding to \$1,029 in 1900, \$1,189 in 1910, and \$2,159 by 1920. And for these salaries she worked 10 hours a day and 60 hours a week in 1890. This was reduced to about 50 hours spread through a 5–5½ day week by the 1920's so that an approximate reduction of one eight-hour day was effected in the 40-year period 1890–1930. The gain in salary and fringe benefits, and reduction of hours notwithstanding



The factory ultimately became the model for the office, but in the earliest instances, this consisted of the superficial imposition of visual order through identical furniture and the precise alignment of desks.

ing, the clerical worker assumed a net loss in terms of meaningful involvement with her work and contact with her employer.

During these formative years, architects rarely concerned themselves with office layout. The work of the Chicago school, for example, produced innovations in the total space by reducing supports and opening the wall to greater natural light. Only Frank Lloyd Wright in his Larkin Building of 1904 treated the office as a total environment. The galleried, light-filled well remains, at least in photographs, an architectural marvel, and the furniture is the first serious attempt to improve the quality of design in this area. Yet, although the openness of his house plans might have yielded a different system, the arrangement remains linear and static, without even avoiding the blunder of having workers face one another directly

across their desks.

With the exception of recent experiments with *Bürolandschaft*, (P. 102) the basic pattern of office layout has not altered since 1913. Executives of varying ranks still occupy the partitioned, windowed perimeters, while row upon row of specialized, machine-operating clerks occupy the central office space, working under banks of cold fluorescent light. Desk equipment, lighting, and clerical techniques have changed — the arrangement remains the same, and it is fundamentally inhumane. To take one's place in these anonymous ranks is to assume an invisible cloak from 9 to 5, with a frantic, sometimes impossible attempt to reassume one's humanity after hours.

In this way, the development of the American office parallels American industrial development in

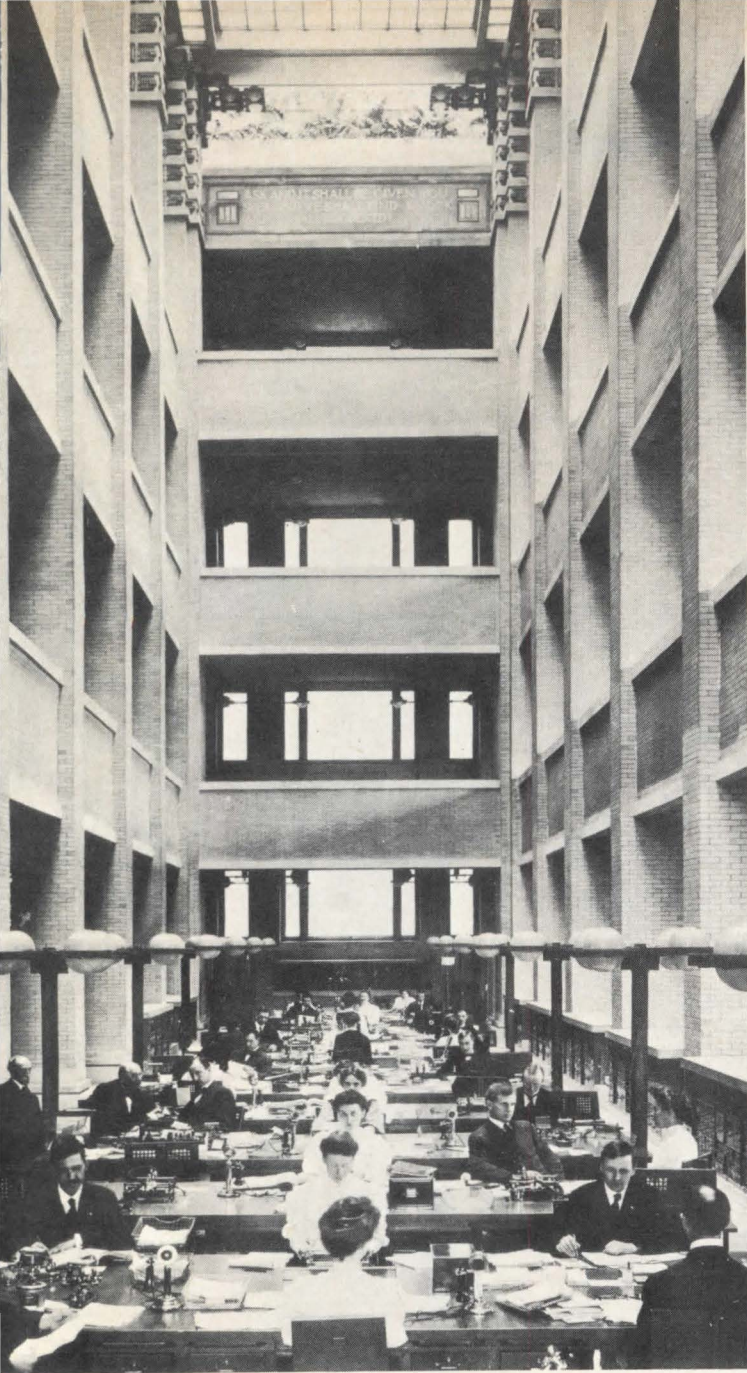


Photo: courtesy, the Museum of Modern Art, N.Y.

Photo: Culver Pictures



Open-space office, c. 1925. Principles of functional efficiency in furniture design replaced the clutter-filled roll-top desk with a flat one lacking a carpet-bag center drawer.

Frank Lloyd Wright, in his Larkin Building of 1904, was one of the few architects to treat the office as a total environment. His furniture is the first serious attempt to improve the quality of design in this area.

Office, c. 1936. Crowded rows of desks at the height of the depression.



general, with an extraordinary success in the application of rational principles of efficiency, and an equal failure to embody human principles of meaningful involvement.

By designing the office on the model of a factory, the clerk has been assimilated to the machine.

The development of industrial psychology in the 1940's introduced some improvements in the office environment through greater understanding of noise toleration levels (the executives had been isolated from the typists, but the typists remained with one another), as well as psychological responses to color and lighting. It is to be hoped that the new and complex techniques of office design developed during this past decade will not merely continue the tradition of increasing efficiency, but also will contribute more to the well-being of clerical personnel. — S.A.K.

Photo: Brown Brothers



Photo: courtesy Connecticut General

Connecticut General Life Insurance Co., Hartford, SOM, 1952. The epitome of the classical office in which a logical order unites the smallest part with the whole.

FROM GRID TO GROWTH

The classic pattern, epitomized in SOM's Connecticut General offices, set the pace until Quickborner introduced America to the office landscape. The rigid pattern, once broken, begins to develop more interesting configurations and the needs of plain people begin to surface.



The rigid grid patterns of office layout that had become standard during World War I, assumed the character of a time-worn tradition by 1960. The simple, geometric clarity of the system as a means of organizing the open "bullpen" seemed a logical consequence of the perfect modularity of office buildings. The executive cubicles that fringed the perimeters were themselves scaled to the window bays, while in the interior, precise mathematical relations governed the placement of desks, lighting, and equipment. In effect, a kind of classical harmony had been achieved so that, as in a Palladian facade, a logical order reigned that united the smallest part with the whole. But it failed precisely for that reason. Classical systems are inherently inflexible. Since they embody intellectual-aesthetic ideals of harmony and order, to disrupt any one element is to destroy the whole. Change is inadmissible. When a classical order is imposed upon an organic system — one whose parts are related by functions and processes that are themselves in flux — the result is apparent order and actual chaos. An office is such an organic system. Its organicism, however, is not revealed in those hierarchical charts that bear so curious a relation to feudal concepts of the social orders on earth and in heaven. But, since the actual relations between office

personnel defy the caste system codified in charts and embodied in layouts, attitudinal and physical barriers were created that seriously blocked lines of communication.

The paradigm for the office in the classic manner was SOM's Connecticut General Insurance Company headquarters in Hartford, commissioned in 1952. Largely the work of Gordon Bunshaft and Florence Knoll (Bassett), the offices were the most elegantly designed and carefully crafted of the post-war period. The Miesian aesthetic was everywhere apparent in the exquisite proportions, detailing, and plans, which involved no less than four courtyards. A six-foot module was used throughout with a ceiling grid that integrated fluorescent fixtures with a newly designed movable partition system. Although the open-space offices followed a rectilinear plan, they were broken by brightly colored partitions within a framework that assured each employee some access to the well-landscaped exterior. While an art-for-art's-sake aesthetic supplied some of the company's motivation, to attract and keep personnel in a highly competitive job market was an equally important factor. At the time, Connecticut General expected to save over \$500,000 in hiring and turnover costs. It was noted that the museumlike perfection of their

Aeck Associates designed the Citizens & Southern Bank in Atlanta, one of the largest American landscaped offices.



Benton & Bowles Advertising Agency, New York. Marvin Affrime, 1969. The open bull-pen was avoided and incandescent lighting used to establish a sense of individuality.



Photo: Bernard Liebman

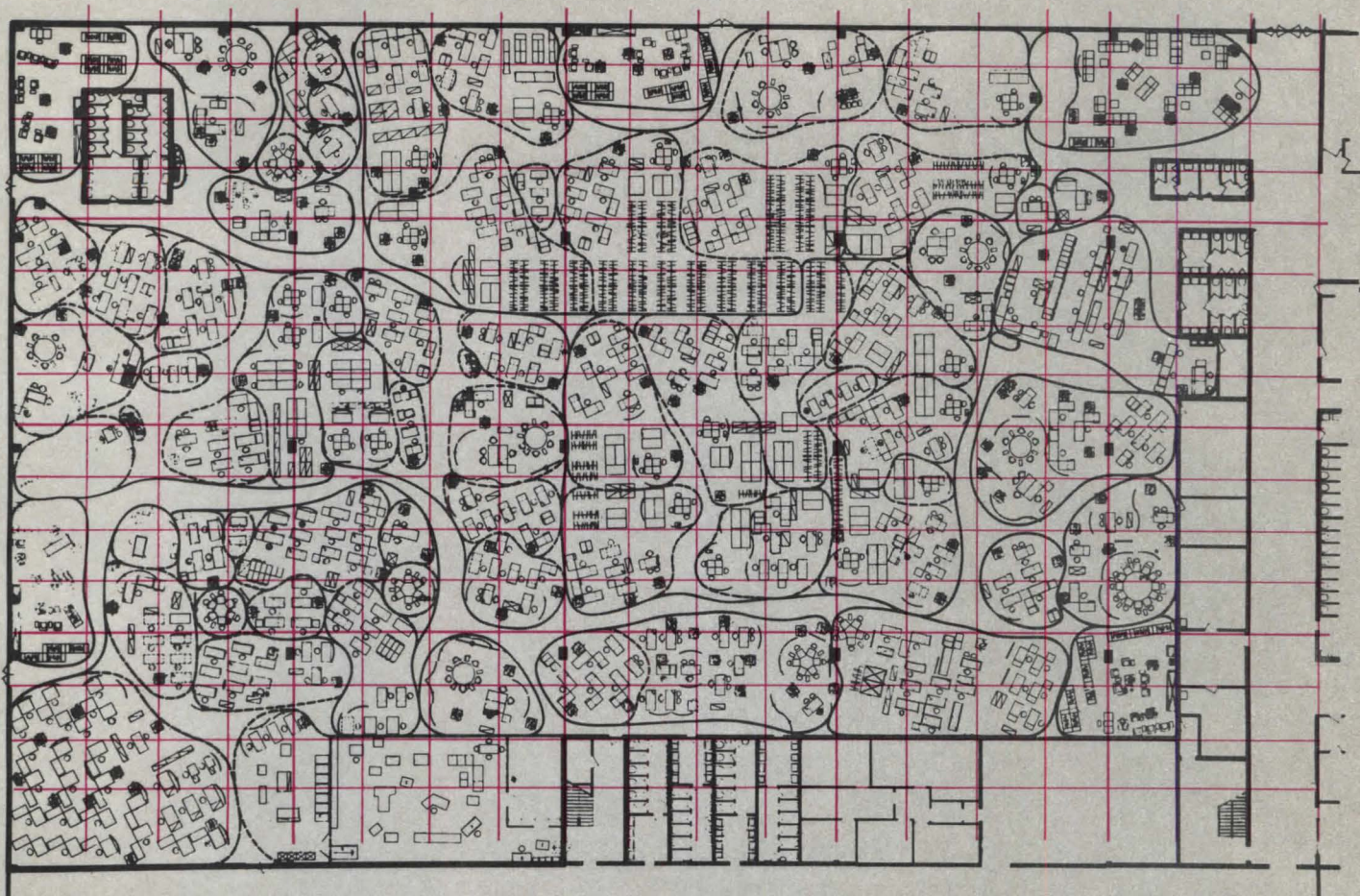
surroundings had a decided effect on employee morale.

Careful and thorough design remain top considerations in establishing the corporate image and attracting personnel. In designing the large New York offices of advertising giants, Benton & Bowles, Marvin Affrime, of the Space Design Group, avoided the open bullpen as much as possible, establishing groups of three to six secretaries (rarely 12) in alcoved corridors. In these settings, each worker was given her own incandescent lamp, both to provide a sense of individuality, and in acknowledgement of a manifest distaste for banks of white, fluorescent fixtures.

The typing pool and accounting department, how-

ever, could not be treated in this intimate fashion. Although fluorescent lighting was unavoidable, Affrime modified its effect by locating these divisions in a context of abundant natural light. Similarly, although he opted for a rectilinear desk layout in the typing pool, obstructions were created in the form of built-in file-cum-closet units to break up an otherwise monotonous space. The accounting department, which followed a symmetrical but not rectilinear plan, was also given variety through the use of colored partitions. The total treatment has the bold, graphic quality associated with a major advertising agency.

The classical system obtained almost universally



A typical Baroque Quickborner landscape, with an organic order invisibly embedded in a complex visual tapestry, contrasts with the geometric order of a modular grid.

until 1960 when the German-based Quickborner Team revolutionized the practice of office planning through the concept of *Bürolandschaft* (Office Landscape). The relation of this concept to landscape gardening has usually been dismissed with a few remarks about the use of plants to help define subspaces, but the link is more profound. In landscape terms, the classical office has the quality of a formal garden, defined by straight alleys of identical trees and clipped boxwood hedges — the imposition of an intellectual, manmade order upon the subtle, organic one of nature. The *Bürolandschaft*, by analogy, is an English garden, whose *apparently* natural order, the product of supreme artifice, was developed by Capa-

bility Brown in the late 18th century. Brown, in effect, acted as nature's guide, urging her in this direction or that, but without contradicting her own innate sense of propriety. Similarly, the Quickborner Team has developed patterns in office layout that might have been devised by the workers themselves, had they approached the problem with the requisite overview. For, one believes, if people were left to their own devices, they would organize physical configurations that permit the most direct and effortless lines of communication. The development of such configurations on the basis of actual workflow and communication patterns is the basis of Quickborner's method. As such, it is a genuine em-

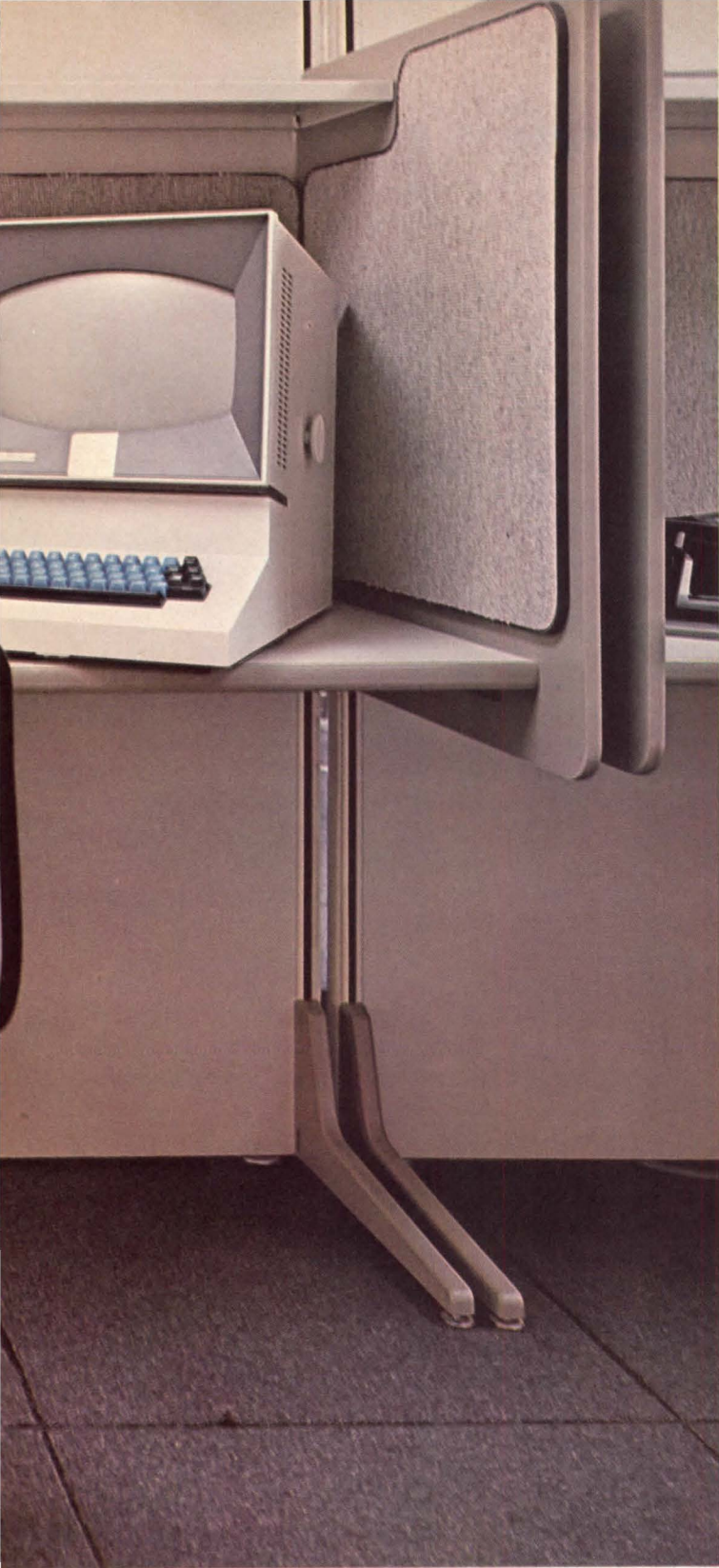


bodiment of the form-follows-function dictum that had largely been used to refer only to building and design elements. The notion that spatial configurations should actually reflect human processes was indeed revolutionary — and it came not from architects but from management consultants.

If classical principles of organization can mask real chaos in apparent order, baroque principles permit the reverse, with an organic order invisibly em-

bedded in a complex visual tapestry. Consequently, the baroque arrangements of landscaped offices *look* disorderly, although in reality they express the complex networks that constitute the office process.

Much discussion of worker's reaction to the system has centered around executive's relative acceptance of new status symbols and loss of old ones (especially the enclosed office). Far more important is the reaction of the clerical rank-and-file whose members



Photos: Myles DeRussy



The Eastern States Bankcard Association required an equally flexible approach when it commissioned JFN to plan its new offices. The Action II System (above) again provided the ideal solution, within a variety of circulation patterns.

rows of desks that marked the classical bullpen are usually replaced by small groupings in looser arrangements. In European examples, coffee breaks at the desk, taking place at fixed hours, yield to voluntary interruptions in a pleasantly furnished rest area, established according to the individual's own patterns of work and relaxation. Careful acoustic control yields the double bonus of a quieter atmosphere and pleasanter surroundings through the extensive use of carpeting. Windows cease to be executive prerogatives, and furniture tends to be more carefully designed and attractive. Finally, most of the petty annoyances created by communications barriers are relieved. The total effect is to produce an environment that is less like a factory and more like a home.

Since Quickborner established an American branch in 1966, the concept has been tried by a series of major business and government operations. All have reported some degree of significant improvement on the established system. For example, 88% of the employees at Eastman Kodak's Rochester headquarters preferred the new system — and efficiency has gone up. In order to avoid the "Hawthorn effect" whereby *any* environmental change (even for the worse) increases output, Eastman waited several months before checking results. They found that output had risen 10% — an incredible source of savings in so large a firm. By landscaping its offices, the John Hancock Mutual Insurance Company of Boston found that it saved over \$17 per work station in moving costs. In their case, over 92% of the experimental group — the Data Processing Department — preferred the new plan, including the managerial staff whose status was marked only by the quality and color of furniture and upholstery. Dupont's Freon Division in Wilmington, one of the earliest to experiment with the program, has experienced difficulties controlling sound levels, but was impressed by lower costs and improved communications. Yet, no existing American installation has been able to experience the economies of the largest

make up the greater part of the office staff. *Bürolandschaft* is not so revolutionary that it dispenses with mindless, repetitive tasks. Its *raison d'être* remains increased efficiency, while amelioration of working conditions counts merely as a fringe benefit, valuable only insofar as it improves morale and thus increases output. But this does not minimize the system's real advantages in providing a more humane work situation. The long regimented

European plans as, for example, the Volvo headquarters near Gothenburg, which contains over 65,000 square feet of landscaped office space.

The revolution in office planning created by *Bürolandschaft* is analagous to that in geometry created by the denial of one Euclidean axiom. When that huge conceptual break was made it 1.) opened up the possibility of designing a series of new geometries and 2.) changed our notions of what a geometry is. Similarly, when the Quickborner Team denied the grid-plan axiom of office planning, it, first, generated a number of new arrangements and second, fundamentally altered our concept of office planning itself.

Since office landscape is more an approach than a formula, it lends itself to a variety of interpretations, conditioned by the requirements of each particular office. Thus Quickborner's projects vary from one another, while other groups using similar approaches have developed schemes that depart more or less radically from the classic plan.

A variation, for example, was developed at COM-CET, a computer equipment firm whose growth potential was enormous and demanded a highly flexible space. Designers Buetow and Associates achieved such a space within an amazingly short time but opted for a rectangular open plan as opposed to the free-form Quickborner approach. This was determined by the square footage available and by the need for an orderly computer image. Offices for the jewelry supply company of B.A. Ballou, on the other hand, did use the freeform pattern, but with a different emphasis. Although work-flow and communication patterns were considered when Research & Design Institute undertook the project for the company's rural Rhode Island headquarters, a more democratic view of space and fixture requirements was adopted than is usually found. Need alone determined the quantity and quality of equipment and space allotment with all personnel consulted at every phase of the designing process. Since the transition between the old and new systems was so carefully and considerably accomplished, the difficulties of adjustment were reduced to a minimum.

The Quickborner Team itself was called in as consultant in designing offices for the Port of New York Authority's planned headquarters in the World Trade Center. (P. 124). When an experimental trial group was studied, it was found "that the physical design of the office, whether landscaped or not, cannot instill motivation within its workforce. At least not within a group of professionals motivated by the intrinsic elements of the job. While a properly designed physical environment may provide some degree of satisfaction for extrinsically motivated clerical workers, it is an unwarranted assumption that these desired features cannot exist out of a landscape's borders or that they are inherent within its physical makeup." Although

the participating staff acknowledged a vast improvement in their physical surroundings, their involvement with the work and their levels of performance remained unaltered since motivation came *from the work itself*.

Beyond variations on the broad office landscape concept, new approaches have been developed that differ even more radically from the standard pattern. Beginning from a more fundamental base, the entire post-Industrial Revolution phenomenon of specialization has been questioned. The alternative is, in a sense, a return to the institution of multiple functions for each office worker that once characterized all bureaucratic operations — although these functions would now be far more sophisticated in nature and technique. The approach has been tried by several firms in England, including Imperial Tobacco in Bristol, and, in a factory situation, by Inland Steel in response to union demands. Although automation and computerization of repetitive, standardized tasks may eventually reduce the office to a skeleton executive staff, there is likely to be a long interim period when relief from tedium can only be provided through variety. On the multiple-function system, workers may cease to be stationary, moving instead from station to station, with each one designed for a different function. If sufficiently compact, lightweight office tools should be developed, it would even be possible for each man to carry his own equipment with him on his rounds. By abandoning the minimum movement principle, which has influenced everything from furniture design to the entire office plan — including *Bürolandschaft* — an entirely new system of layout could evolve.

An important factor in the development of the landscape concept was the need to build into the office plan the possibility of growth and change. It was not enough to conceive of the office as process — the processes themselves are in flux, subject to qualitative modification, expansion, and contraction. The most obvious manifestation of this concern is in the removal of semi-permanent partitions since, in addition to acting as barriers to communication, they are very costly to move. The open plan can be rearranged at selected intervals without incurring great expense or disrupting important processes. Equally essential to this concept is the use of component furniture, wired with electric and telephone outlets for maximum flexibility. Such furniture approaches the Bauhaus ideal of prefabricated housing to achieve variety from unique combinations of standard, basic elements.

Disposability is another factor that requires greater research. Since office processes are changing, and changing at an ever-faster pace, it is essential to avoid large investments in permanent fixtures whose obsolescence is inevitable. The use of plastic or even paper equipment — cheap materials, cheaply fabri-



Dupont's Freon Division, an early experiment with office landscaping, continues to experience difficulties with sound levels, but is impressed by lower costs and improved communications.

Volvo Headquarters near Gothenburg contain over 65,000 sq. ft. of landscaped office space.



cated — would greatly facilitate these necessary changes. On a small scale, for example, SOM's Bruce Graham conceives of a disposable pack containing a weekly supply of clerical materials, to be hung from the lower surface of a desk, thus obviating the need for drawers. The principle embodied in such a pack could be extended to cover a wide range of office equipment.

Behind *Bürolandschaft* and kindred techniques lies a whole new concept of office planning, and planning in general. The systems approach, whose seeds lay in the work-flow studies that began before World War I has grown to a scale so vast as to produce, in effect, a qualitative difference. To plan an office space of as much as 2 million square feet containing an incredibly complex network of departments and a multitude of individuals, is beyond the intuitive genius of a single man — or even an entire design department. The problem is twofold, involving both analysis and synthesis. First, the process must be broken down into discrete, identifiable units so that the function of departments, sub-groups, and individuals can be determined. Second, the various relations between departments, groups, and individuals must be outlined, both horizontally and vertically, so that all may be coordinated into an organic whole that allows for change. Both aspects involve vast amounts of information. Consequently, sophisticated techniques have evolved to elicit the information, codify, analyze, and integrate it. In all phases of the operation, computers play an important role.

All the newer techniques of office planning are used, largely, to apply to a given space whose less than ideal proportions must modify, and compromise, the optimum plan developed by the computer. Although most office buildings are constructed speculatively for a melange of tenants, the planning system outlined here would be most effective if the building could be designed for a single occupant. In that case, its form might differ radically from the conventional cubiform slab.

In an appropriately scientific spirit, the firm of JFN Associates experimented on themselves in their new Chicago office. Extensive studies were made of paper-flow and communications patterns, using the computer as an aid to decision-making. JFN opted for a hexagonal grid, as opposed to the typical German free-form pattern, as the basis for an exceedingly flexible plan. The sub-spaces within the grid are formed by angled, self-supporting panels, 62 or 80 inches high, depending on the need for privacy. Inside these spaces — which can be moved and reformed at will — each worker is provided with his precise needs through a system of furniture components designed by Herman Miller, Inc. Called Action Office II, the system provides a variety of work surfaces — file bins, storage units, shelves, carrels, display panels, and chalk boards — to fill all job demands. Since, to some degree, the worker knows his own requirements best, he can add or subtract from

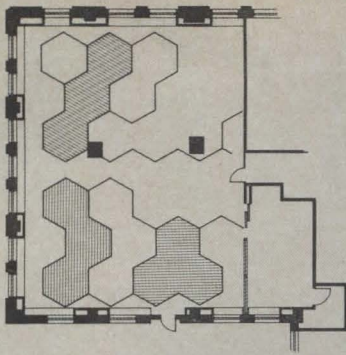


Photos: Myles DeRussy

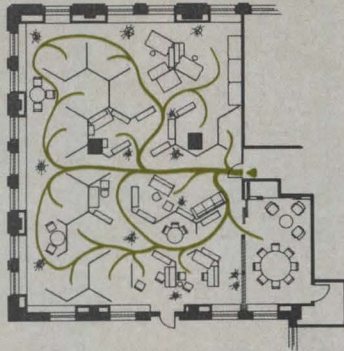
his equipment simply by requisitioning the necessary components.

Perhaps the most significant aspect of JFN's approach, in addition to its extensive analyses of office systems, is the combination of modular and free-form plans. According to Dick Wilson, head of the Chicago office, "the appropriate module makes it possible to pre-plan projected moves within fixed guidelines — an important advantage when working with a fluid open plan." The five-foot hexagonal grid was chosen because:

1. A five-foot work surface accommodates the drawings and plans most often used by the staff.



JFN opted for a five-foot hexagonal grid as the basis for an exceedingly flexible plan through which a free-flowing circulation system can be traced.



At JFN's Chicago office, each worker is provided with his precise needs through a system of component office furniture developed by Herman Miller, called Action Office II. Each unit provides a sense of enclosure and territoriality, without isolating the occupant.

2. It creates an ideal work vector, with information retrieval always at fingertip reach.

3. It permitted the Action Office furniture's 4-foot components to be hung next to one another.

4. The hexagon provides a sense of enclosure and territoriality without totally isolating the occupant.

The Eastern States Bankcard Association required an equally flexible approach when it commissioned JFN to plan its new offices in November 1968. A vast amount of growth and change was expected — but the exact rate of change could not be predicted. The Action Office II system again provided the ideal solution within a framework of hexagonal, rectilinear, and free-form patterns. The system has already proved its worth since the configurations of a number of departments have been altered several times with great ease and without seriously disturbing the work of the office.

As an alternative to drop tubes for outlets, JFN installed a unique floating floor consisting of carpet-covered metal lift-out panels, suspended by jacks. Cables for power and communication run in the hollow space below, permitting the greatest freedom in placement and replacement of equipment.

No matter what the theory behind a flexible office system, some means must be devised to control its orderly development. Two views have been taken of this problem: first, that the original designer should be responsible for all future alterations, keeping up

with current needs and stepping in at set intervals to help effect change. An alternative, espoused by Bruce Graham, is to try to encourage each owner to set up his own office system department. "By involving him in the original design process so that he is aware of its essential principles and procedures," Graham claims, "he will be able to carry it on independently." This approach was used even at Connecticut General where a group was set up under Bruce Hayden that continues to operate on the same system. According to Graham, "if such a group can be established within the company, very much like the mechanical engineers who run the boiler plant . . . a high level of standards can be maintained."

The possibilities for the expanded application of the systems technique are enormous. The office is, after all, but one aspect of the industrial operation. Office processes must, therefore, be coordinated with those in the factory. The factory-office system is itself but one sub-group of a complex that includes all related industries, linked on the one hand with the entire urban environment, and on the other with the entire national — and international — economy. Although all these systems and sub-systems do function, if analogy with the office situation is valid, this functioning is far from optimal. It is a measure of the profundity of the new revolution in office planning that its fundamental concepts can be extended to embrace a Fulleresque universe. — S.A.K.



Who is the New Professional?

Like it or not the interior designer and the space planner are here to stay. Whether he is embraced by the conglomerateur, the merger maker, the architect, or whether he remains fiercely independent depends more than anything else on how architects and the A.I.A. behave.

The space planner-interior designer, unlike the hospital or school consultant, actually performs architectural services. Many of these new professionals are architecturally trained; others are not. Ten years ago many interior designers might have welcomed an invitation from the A.I.A. to join or to relate the organization they founded, the National Society of Interior Designers, or the American Institute of Interior Designers to the Institute. Today, many of the interior designers probably would not be interested in either of these alternatives. Some of these new professionals are already architects, who prefer to call themselves interior designers; others have architects on their staffs. Like architects, there are designers who perform careful, ordered work as well as those who operate design factories. Whether interior design is carried on by an architect, an interior design department in an architect's office, or an in-

dependent interior designer, those involved become very involved with the furniture industry. In the case of office design it becomes the "contract" furniture business. This segment of the furniture industry has enjoyed such phenomenal growth that a total of nearly 50 thousand interior design projects valued at around \$19 billion now exists.

The Furniture Dealer

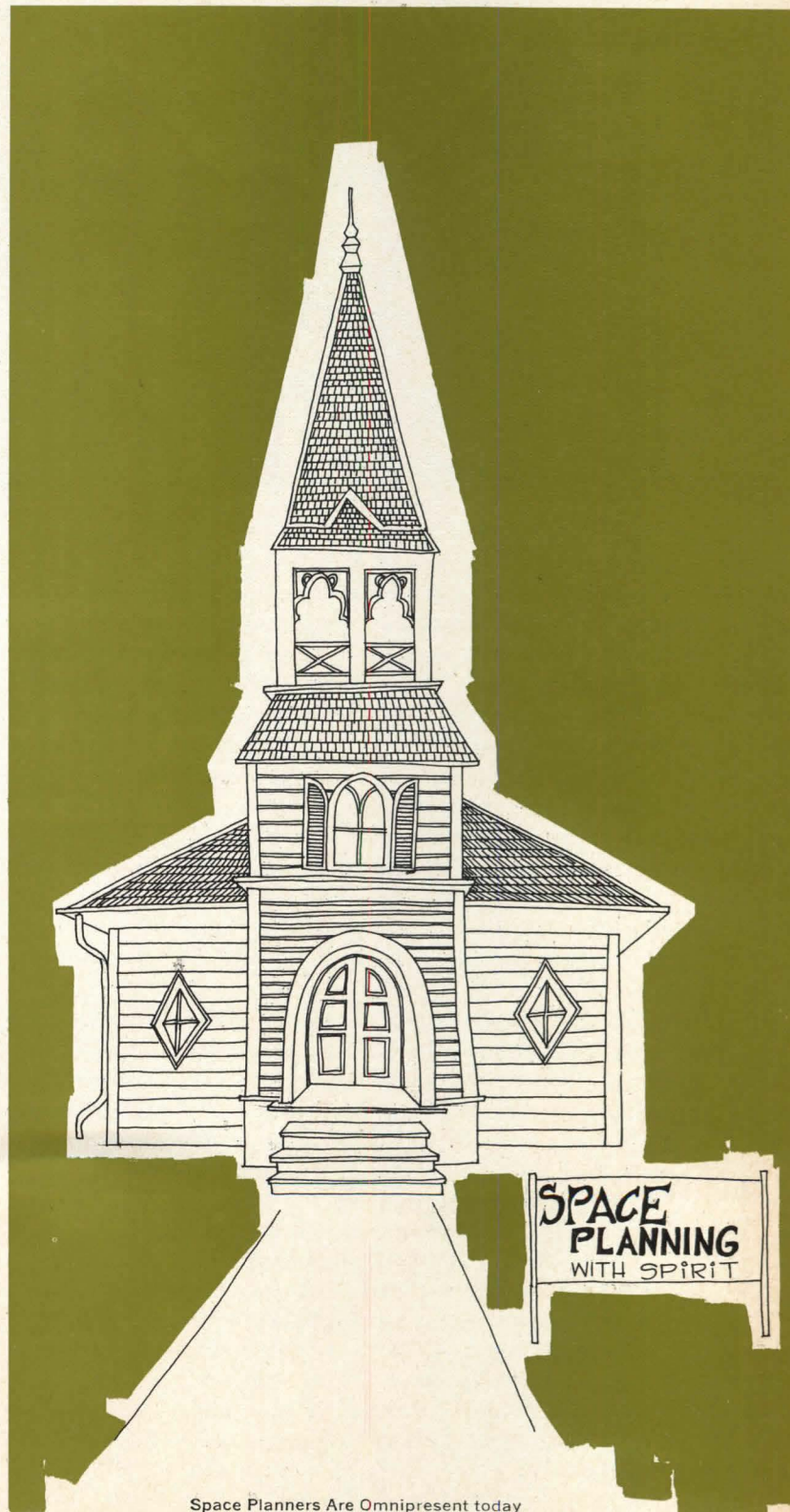
To comprehend the workings of the contract furniture field it is necessary to examine some of the disparate elements that make it up. Knoll International, for example, is a furniture manufacturer that maintains its own design group, the Knoll Planning Unit. They do not solicit business because architects and professional interior designers are their principal customers. The planning group did the interiors for CBS' New York headquarters, the Camino Real Hotel in Mexico City (p. 82, JUNE 1969 P/A), and is now working on new home office buildings for Westinghouse in Pittsburgh and for Owens-Corning Fiberglas in Toledo, Ohio.

The Knoll operation may have inherent in it a

conflict of interest situation. As a furniture manufacturer, its principal interest is the marketing of its furniture. Can it, therefore, be expected to specify furniture in a client's best interest and only in that interest? Of course the answer is that the clients who come to the Planning Unit are interested in Knoll furniture in the first place, but the Unit specifies furniture of other manufacturers. Knoll operates 17 showrooms which are open to the public, but orders must be placed through architects, interior designers, decorators, and furniture dealers.

The retail sector of the contract field has many practitioners, ranging from Chicago's Marshall Field to Sears, Roebuck & Co. One of the largest specialists in office furniture is The Itkins in New York City. "We just finished a 200,000 sq ft job," Ben Itkin, the firm's president, says, "but we'll also do one office — just a desk and a chair if that's all that is needed." Itkin is proud of his company's versatility and has run many advertisements depicting an octopus under the legend "Will the government ever break up The Itkins?" One of the creature's tentacles is labeled "office design," but few architects and designers need worry about The Itkins. The firm's credo, in the words of Ben Itkin, is: "We respect everybody's 'turf.'" The Itkins will not undertake work in some other professional's territory; if a job calls for attention by a design firm because of size or complexity, that is what Itkin will recommend. He would like to sell the furniture because that is his principal interest. The decorating department is merely another service to help furniture sales.

"We offer architects and designers a service that'll save them many headaches," Itkin declares. "This is especially true for the smaller firms with less experience, because if they undertake interior furnishing without help there are a million places where they'll regret they ever began. Take delivery, for example. What happens when the architect discovers that he cannot have the furniture stored at the job site for one or another reason. Does he know the best warehousing facilities available and the costs involved? What does he do for local delivery? Does he realize that delivery or installation by a nonunion firm can cause everyone to walk off his job and stop the building entirely? What does he do when a piece of furniture is broken? If he goes to the manufacturer, he'll be told to see the freight forwarder. The freight forwarder will take his claim, but does the architect know that he has to save the boxes the furniture



Space Planners Are Omnipresent today

HOW INTERIOR DESIGNERS GET PAID

FLAT FEE

Designer agrees to do a specified job for a flat price, determined by his estimate of effort involved.

Advantages: Designer knows (or should know) limits of his job and exact amount of fee.

Disadvantages: Designer may underestimate job's difficulties. Client in position to make excessive time demands, unless fee contract is specific.

Contract should be a printed form (similar to AIA contract) specifying number of sketches, preliminary schemes, who will make models and renderings, arrangements for arbitration.

came in or his claim will be rejected? Can he give his personal attention to inspecting and supervising every facet of furniture placement? These are the kinds of things a good dealer can do to ease the load on the architect."

Itkin has worked with the interior design departments of many architectural and design firms of varying sizes. Each has different requirements; ranging from desks, chairs and file cabinets to carpets, draperies and custom work, with bids requested for specified items. The bid represents the net price to the architect plus local delivery, freight, and installation if that is necessary. "Itkin figures everything from bathroom to boardroom," is the way Ben Itkin puts it.

"If the architect has a really tight budget," he says, "we've got a lot of ways to stretch it for him. Many clients, especially those who are taking expanded space in an existing building, may already have some furniture. We can refurbish it in our own shop and paint it to match whatever new pieces are bought. If the client's budget is too small to buy the furniture he needs, we'll lease it to him."

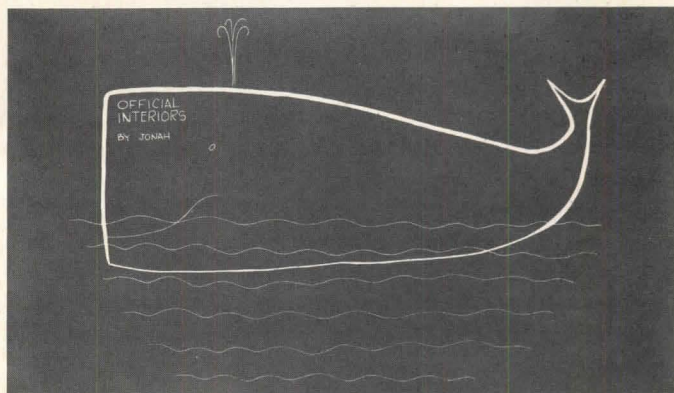
Itkin will bill the furniture to the architect or designer or directly to the client at either net or retail prices. His only extra charges are fees for his services and expenses as they are bid. Most professionals, of course, have him bill at net.

One retail firm, Charles Nathan, charges 50 cents per sq ft as a retainer to be deducted at the rate of 5% of the selling price of the furniture. On a 4,000 sq ft job this would bring a retainer of \$2,000 and that

would be absorbed when furniture purchases reaches \$40,000. James Lowens, executive vice president of the Nathan firm, says his aim is to sell a well-integrated office rather than pieces of furniture. One of the retailer's primary methods is a set-up of several "typical" office settings at its showrooms. Prospective purchasers view the set-ups to decide what they like. They are permitted minor variations in color schemes, fabrics, and pieces of furniture.

The Real Estate Firm

The real estate industry itself is also involved in interior design, principally because it must sell the spaces to lessees and convince them that facilities will be tailored. In one case at least, an interior designer has a partnership with a real estate broker.



Itinerant Experts

STRAIGHT TIME

Based on an hourly rate.

Advantages: Risk to the designer is minimized.

Disadvantages: Client may resist this plan unless a ceiling is placed on job. If job takes enough time for the ceiling to go into effect, the designer is not paid for excess hours.

Some firms charge two rates, a flat fee for design, a moderate straight hourly rate to cover drafting and clerical work.

A regular report to client on time spent (usually weekly) often makes the straight time fee acceptable to the client.

RETAINER

A flat fee agreement, spread out over a period of time.

Advantages: Assures designer of income during design period.

Disadvantages: Sometimes retainer is not used for months; more hours than the agreement calls for are used in other months.

Some retainers are for a specific period. A minimum period with automatic renewal unless either party gives 30 days notice of intent to terminate works well.

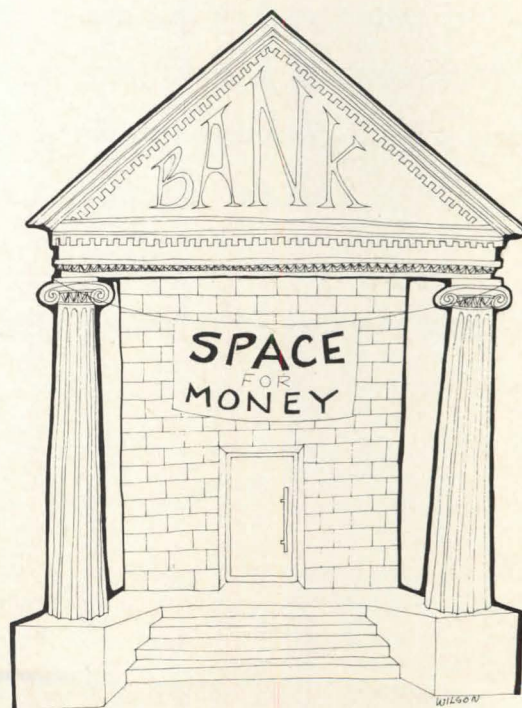
CONSULTATION FEE

Daily fee, much higher than rate for long-term agreement. It is based on importance of consultation to client, client's ability to pay, and probable productivity of report recommending a course of action.

Details of the consultation should be agreed upon in advance and set forth in the contract.

The resulting firm, Friedin-Studley Associates, is an open alliance between designer Jack Friedin and broker Julian J. Studley. Studley will refer clients to the affiliated design firm, but will not hesitate to recommend other architects if the client is concerned about possible conflicts.

Another realtor, Cushman & Wakefield, works intimately with clients and designers on interior spaces of such new projects as One Astor Plaza, soon to rise on the site of the old Astor Hotel on New York's Times Square. The job, according to senior vice president James P. McGuire, is to get interiors set within the building standards of electric outlets, basic lighting, and air conditioning. "Some designers stay within, some do not," he says. In a job like One Astor Plaza, where changes will be made prior to construction, charges are made for alterations in excess of original standards. In remodeling existing structures, the job differs considerably, especially since the areas involved are likely to be quite a bit smaller. "The real estate man will help plan spaces of less than 5,000 sq ft," McGuire says. "But usually this is not necessary because even small space tenants know what they want." Cushman & Wakefield will suggest interior design firms if a client asks them to, he adds. The largest concentration of space planning-interior design firms is in New York city and many of them are, in a way, creatures of the real estate offices. In other sections of the country they are of less importance and the work they do is more likely to be carried out as part of a regular architectural commission.



Men of Principle?

One of the better independent designers was asked whether kick-backs, feesplits, or other subsurface machinations are a part of the contract industry. He answered succinctly, "A person is a person, regardless of what he's trained for. If he's a crook, he'll be a crooked doctor or a crooked lawyer or a crooked designer. Training doesn't have anything to do with it."

MERGERS, CONGLOMERATES, TIME AND MONEY

Mergers are the order of the day. The conglomerate, often representing a merger of mergers, has swallowed architect-engineer firms, space planning-interior design groups, furniture manufacturers, real estate companies, and management consultants.

The Conglomerate — Patron of the Buck

BY RICHARD MANHOFF

Creative people find the trend to artist acquisition distasteful. A partner in Richmond Manhoff Marsh Inc. expresses the reasons for this attitude.

For centuries the patron of the arts has been that benevolent individual who has offered his emotional and financial support to the arts. Today, thanks to the prosperity of our times, a new patron has emerged, acquisitive rather than supportive, interested not in the quality of art and its possible service to society, but in the buck. Benevolent, he is not!

Why should the sincere artist, striving to make his creative statement, seek or accept the overtures of this "patron of the buck?" And why should the conglomerate, owner of experimental laboratories, sophisticated manufacturing facilities, and elaborate transportation systems be interested in acquiring such specialized professional firms as, for example, a design organization?

The motivation of the artist-designer may be his realization that the results of his efforts are insignificant, that his attempted statements contribute nothing and are, at best, comparable to those of dozens of other artist-designers. He may view the acquiring conglomerate with its impressive financial statements, increasing monthly profits, and overly optimistic financial projections as his vehicle for achieving the "American Dream," leadership in big business. As a member of a multi-million dollar conglomerate he will no longer compete on the merits of past performance and future potential.

The conglomerate views his acquisition as a sound financial investment. A service organization produces a relatively high percentage of profit; its overhead is low, there is no inventory requirement. The large volume of people and space required to operate a conglomerate and its holdings efficiently necessitates extensive professional design services. Now, this service is built in, with resulting savings of large professional fees. Participation in the high-volume, high-profit building and home-office furnishings in-

dustry is frequently a goal, with the advice of the acquired design professional an asset. And, in his role as specifier of products in these areas, particularly since specifications often involve hundreds of millions of dollars, his value cannot be underestimated. The captive designer-specifier frequently is less discriminating and more forgiving of a product's shortcomings than the free agent.

During the lengthy and often pressured negotiating period, the potential buyer scrutinizes the firm's monthly financial statements. These statements must continue to indicate the financial promise which initially generated the interest, or the interest wanes. Every dollar of expense reduces the percentage of profit. Thus, extra time to work creatively can adversely effect the month's billing; all expenses must be minimal in order to maintain a high profit statement. An air of uneasiness, an Orwellian "someone is watching" feeling hangs over the staff. What changes will be made? Who will be replaced? What freedoms will be lost? What restrictions will be imposed?

As negotiations progress, specific methods of payment and type of acquisition unfold. Stock transfer is the most common method — the acquired firm's stock is exchanged for a determined amount of the acquirer's stock. The appeal of a tax-free deal rules out a cash transaction, thus the anticipated bundles of cash are bundles of stock, non-negotiable for a specified period. One-half of the agreed selling price is retained by the buyer, with portions of the retained half paid periodically, based upon the relationship of the acquired firm's earnings to its projections. Should these prove overly optimistic, the seller is the loser, and must settle for a reduced quantity of stock; should the projection prove to be understated, again the seller is the loser.

Once the pursuit is over and the papers signed, self-determination becomes a thing of the past. The period of adjustment begins. The former principals of the acquired firm must adjust to their new roles — staff members must attempt to adjust to the demands of their new masters. Their actions are inhibited by the knowledge that a mistake in judgment can bring such penalties as corporate administrative intervention, the possible reduction or withholding of a portion of the purchase price. Meaningful creativity has never resulted from running scared.

In preparation of specifications, impartiality is lost; products manufactured by the parent organization are favored. Unwilling to compromise, some competent staff members must be dismissed; others will resign. Efficiency of operation becomes of prime importance, with sophisticated facilities used to analyze and refine operating procedures. Originality, creativity, quality, and personal satisfaction are significant only in relation to profit.

Where is society headed when the artist, historically the creative innovating force, sells out and accepts the values and standards of success symbolized by the "buck?"

Twentieth Century Merchant Prince

BY LAWRENCE LERNER

Richard Manhoff's argument is by Lawrence Lerner, partner in the firm of Saphier, Lerner, Schindler, a member of Litton Industries.

To arbitrarily corral all multi-effort companies as "patrons of the buck," is to display philosophic and professional naivete. This is an insidious, shot-gun approach, revealing a limited understanding of history and contemporary business methodology.

The merchant princes of the Renaissance were the original "patrons of the buck." Today we look in awe at what they did for art. Many of our present-day so-called "patrons of the buck" own most of the great art collections, and make our whole museum system possible. Many are conglomerators — patrons of professional architects, design consultants, and employers of artists who work in many areas of creative activity. Many of these artists are free to function creatively, and to make a contribution to society, while earning a buck!

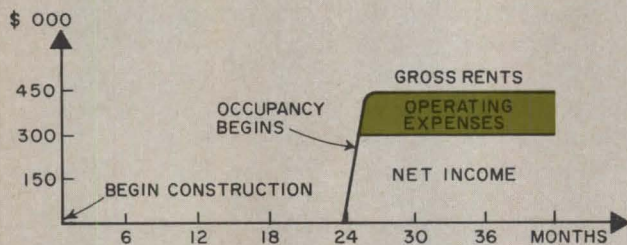
Whether a man or a corporation is concerned with money as the unit of measure of his effort does not mean that he is not concerned with art and its service to humanity. The "Patron of the Buck" article does not reveal an understanding of acquisition methodology; rather it reveals a prejudicial point of view. Generally, acquisition is based on mutual objectives and agreement. The article shows a fledgling knowledge of the day-to-day operation of a professional design organization; its motivations, policies, and philosophies as a large equity stock corporation should be identical pre-and-post merger. Mergers do not create problems that did not exist before.

If managing designers know how to run a profitable business as owners, they naturally know how to run a profitable business as corporate division managers. The best way to create and run a successful design organization as a so-called independent or as a corporate division, is to design the most beautiful, efficient, and economic jobs for all clients.

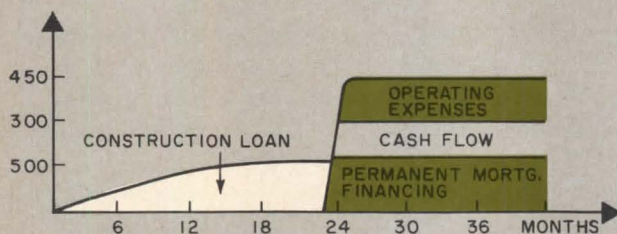
Efficient conglomerate management knows that its divisions must retain their leadership positions in their respective industries in order to create dividends for the corporate stock holders. Such management is aware that to seek an immediate buck at the expense of the future, is to risk killing the golden goose. Common sense will permit no compromise that could preclude any of the conglomerate's subsidiaries' continued success.

It may be that a sober assessment of conglomerate management effect upon the artist and his art would be a worthwhile project. However, it would have to separate fact from fiction and contribute coolly not hysterically to the results. To imply such loss of integrity to a total group as the "Patron of the Buck" attempts is to malign the many who function professionally within the conglomerates on the highest levels of creative endeavor.

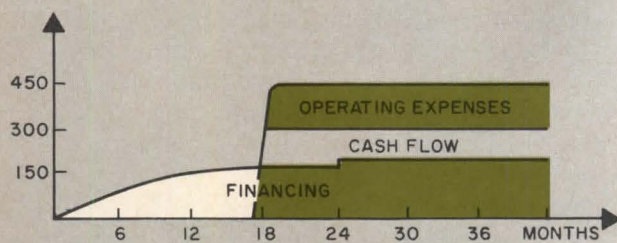
TIME AND MONEY



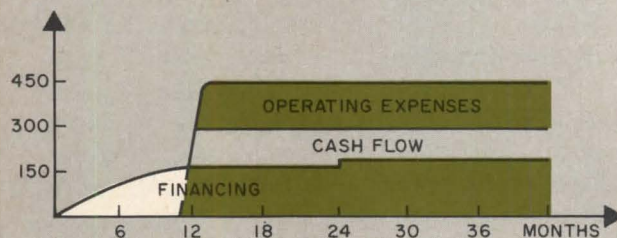
I INCOME AND EXPENSES



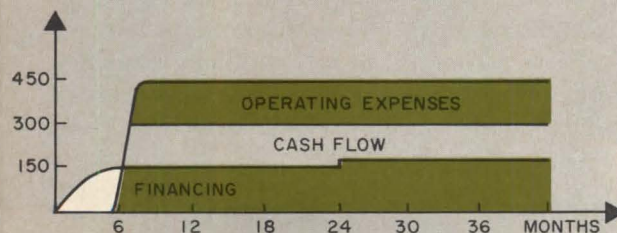
II FIXED FINANCING COSTS



III OCCUPANCY IN EIGHTEEN MONTHS



IV OCCUPANCY IN TWELVE MONTHS



V OCCUPANCY IN SIX MONTHS

The High Cost of Construction Delays

BY PAUL B. FARRELL, JR.

As the cost of money rises spaceward the allowable time for the completion of a design becomes an extremely critical element. The architect may soon find it necessary to design an office building for a site to which the client holds only an option.

To promote their construction management services and to emphasize the high cost of construction delays, the Turner Construction Company recently ran an advertisement which was headlined "... every month of construction is a month's rent lost." Although their point is well taken, the impact of delays is more crucial than a loss of operating rents.

The length of time required for construction of an office or other speculative building, often has a substantial effect on the amount of necessary equity money; a lengthy construction period will reduce the return on equity investment and may even force the investors out of the project.

An apartment project with gross rents of \$450,000 beginning in the 24th month after construction is illustrated in Chart I. It is assumed that annual operating expenses will be one-third (\$150,000) of the gross rents so that net income will be \$300,000 per year. Thus, a stream of revenue begins after the second year of construction.

The total project cost is \$2,250,000 as indicated in the Financing Table. \$1,830,000 will be invested in the structure, site improvements, personality (appliances, blinds, drapes), land, professional fees, taxes, insurance, and other costs. There also are various interim financing costs: the mortgage banker who arranged the financing (including the long-term mortgage) will receive 2.5 per cent of a \$1,700,000 loan and the lenders themselves want a discount of \$95,000 on the loan. (Based on a percentage of the loan, these so-called "points" are usually deducted in advance of payment and are not related to interest charges.)

Interest on the construction loan will be \$282,500 for a two-year period based on a rate of 9.5 per cent and adjusted for the gradual draw of loan receipts corresponding to the contractor's progress payments. This interest-only financing charge will occur at an annual rate of \$161,000 as indicated on Chart

II. (The financing will increase to \$180,000 annually when the permanent loan requires an amortization of principal payment in addition to interest.)

The project will require \$2,250,000 in funds during the first two years before the permanent financing will become effective. The mortgage will provide \$1,700,000 as indicated in the financing table. Security deposits made by new tenants will produce \$50,000 in cash, which will become available about the time personalty items must be installed. Thus, another half million dollars is required to make the project fly. One source of these funds is the net income from the completed project; another is from the pockets of the equity investors in the project.

a) If the project is built and occupied in 18 months, net income of \$150,000 will be generated for the last six months of the two-year period. Therefore, the equity owners must put up a \$350,000 investment (Chart III).

b) If the project is built in 12 months, net income of \$300,000 will be thrown off, and the equity owners will have to invest only \$200,000 (Chart IV).

c) If the project can be built and occupied in 6 months, \$450,000 in net income will be generated and the equity investors will have to invest only \$50,000 (Chart V).

Charts III, IV, and V illustrate the effect of shortening the period during construction prior to occupancy. The dark section of the financing indicates an out-of-pocket investment by the equity owners. The sooner there will be funds available to cover financing charges, the sooner the equity investors will stop putting up their own money to carry the cost of financing. Put another way, the money required by the equity investors can be reduced by 85 per cent if the time to occupancy can be reduced from eighteen to six months; roughly \$25,000 savings per month to the equity investors.

After the second year this project will generate an annual cash flow of \$120,000; \$450,000 rents minus \$150,000 operating expenses and \$180,000 financing costs. This cash flow will occur annually regardless of the amount of equity invested in the project. Obviously the equity owners would prefer to realize this amount of cash flow on a \$50,000 investment rather than on \$350,000; a result that can be achieved through effective construction management by shortening the time to occupancy.

FINANCING TABLE

PROJECT COSTS

Structures	\$1,340,000
Site Improvements	210,000
Personalty	145,000
Land	25,000
Fees, Insurance, Taxes	110,000
	\$1,830,000

INTERIM FINANCING

Mortgage Banker	42,500
Loan Discount	95,000
Construction Interest	282,500
	\$ 420,000

TOTAL INVESTMENT

\$2,250,000

SOURCE OF FUNDS

Loan Receipts	\$1,700,000
Security Deposits	50,000
Net Income (6 mo.)	150,000
Equity	350,000

TOTAL FINANCING

\$2,250,000

SUMMARY FOR 24 MONTH FINANCING PERIOD

Time in Construction	Net Income	Equity Invested
18 months	\$150,000	\$350,000
12 months	\$300,000	\$200,000
6 months	\$450,000	\$ 50,000

What is the Systems Approach?

The systems approach is more than a technological flash in the pan; it is an attitude toward planning which may change the fundamental beliefs of architects, designers, and planners everywhere.

BY JAMES R. BOYCE

The 1960's will be remembered as a time when America experienced a fundamental division in attitudes. The tremor began gradually but, at the close of the decade, increased toward a major cultural polarization. One pole, dominated by conservative industrial institutions, might be termed the technocratic. The other, the humanistic pole, is represented by a radical, liberal group that is anti-establishment. In architecture the technocratic pole is represented by conglomerates, most large architectural firms, and the industrialized builders. The humanist pole includes new left student movements and social activist architects dealing with community problems, often more involved with politics than plans.

The technocrats have been so manipulated by the industrial machine that when we squint our eyes the great movement of modern science appears to shrink to a mere puppet show run by cigar-smoking entrepreneurs.

On the other hand, it must be said with equal vigor, that the humanists' ranks have been dominated by negativistic leaders who chose to abandon reason, science, and everything else that has been touched by established institutions.

During the past two decades a third body of thought has been forming. Felt only as a ripple in the midst of the technocratic-humanist conflict, this third force is now entering into the arena with its own ideas on how to solve growing world problems. Called *the systems approach**, this force calls for a return to the use of rationalist-based principles for solving large-scale planning and design problems.

But let us step back briefly and view this approach historically, as well as in light of our understanding of today's human needs. Renaissance man found it advantageous to subdivide his bodies of knowledge, at first through crafts, and later through fields of science and the arts. This process has often been labeled instrumentalization. Without this method for repeatedly breaking down and expanding knowledge,

we never would have accumulated the wealth of information which we now possess about man and his environments. This accumulation of information was requisite to detailed analyses yet it yielded few insights into problems. This is because the problems crossed over into a number of disciplines. Recent history thus suggested a strangling paradox: while we were increasing our detailed understanding of man and environments, we were apparently decreasing our capability to cope with the problems that man and environment inflicted upon each other. We could build a comfortable air conditioning system for a building but failed to air condition our cities.

Modes of government quickly adopted the scientific divisions of knowledge, making it difficult to legislate collective actions. It once was thought that problems were always with us, and turned up only at a given point in time by a given culture's point of view. Today the problems are literally enveloping us beyond all cultural dynamics. The natural environment is rapidly being polluted and destroyed. Even the most cautious conservationists agree that man's very existence is threatened unless the patterns are reversed quickly. World economies and governments are geared toward population growth, with starvation and territorial conflicts constant problems. The ecological problems are now so enormous that they are essentially cross-disciplinary.

The systems approach provides a method of dealing with large-scale problems. Counter to popular thought this approach is more than computers, methods for design, and PERT charts. The systems approach requires a revitalized planning purpose to drive our actions. Rationalist based methods are used, then, to collectively manipulate the instruments of knowledge toward that planning purpose. Men have just begun to realize the power of man's image of himself, and the world's image of itself. Moreover, the ability of men and the world to fulfill their images can be recognized within the systems approach. Man's worldly endeavors are shifting from the artisan and his artifacts to problems and performance.

This brief introduction to the systems approach

*To my knowledge, first called "the systems approach" by members of the Systems Research Center, Case Institute of Technology, whose roster included C.W. Churchman, Hilary Putnam and Kenneth Boulding.

leads to the three major design management processes: sequential, cyclic, and evolutionary.

Sequential-Design Processes

As projects grow in scale, their success or failure depends more on the role of project management and design methods. Sequential design is the most common of the processes. It can be found in most architectural offices. These processes are characterized by a rather abrupt beginning and end. This reflects architecture's current propensity not to involve itself before or after the building process. The linear sequential process (1A) must be familiar to all architects; services are begun with schematic design (SD), then design development (DD), construction documents (CD) and finally construction administration (CA).

A refinement of the linear process is the linear overlapping sequential process (1B). It is utilized primarily to reduce the planning period to fit early construction scheduling demands.

Another nearly identical sequential process is the parallel alternative. The difference is that during the SD and DD periods (1C) alternate design solutions are simultaneously but independently developed and then evaluated one against the other by an individual or a review board.

The final sequential process popularized by the aero-space industries, is known as the collapsible time-frame (1D). This process relies on careful pre-planning and rigid control to integrate many design and development functions toward some exact completion date. This technique entails a more detailed breakdown and control of sub-tasks within each of SD, DD, CD, and CA.

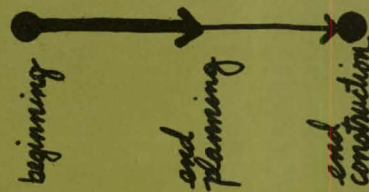
If a project is small and well defined, with design priorities clearly established at the outset, (e.g., design a low cost office building, a single detached dwelling, or a small bank) then sequential processes are satisfactory.

However, these processes fail as an exploratory approach to solving non-simplistic problems. On projects with a diversity of client-users and activities, such as housing, commercial, or educational complexes, we usually glean knowledge about hidden design priorities only after we have made tentative design decisions and developed these decisions toward formal schemes and evaluations. This process may have to be repeated several times before the final problem definition and solution appear. With these solutions complementary decisions can be reached.

The design result from a sequential process is almost predetermined due to the absence of formal evaluation procedures. Any evaluation after the building is completed is usually left to the mercies of architectural critics and historians.

It is also difficult to bring about cooperation among the planning participants of a cross-disciplinary project when sequential processes are employed. This is because the job is usually performed by frag-

1 Sequential Processes



Separation between planning and use.
Design decisions built up sequentially, making the earliest decisions extremely critical because they are non-alterable.
No built-in mechanisms to cope with design evaluation.

CONTROL SYSTEM ILLUSTRATION

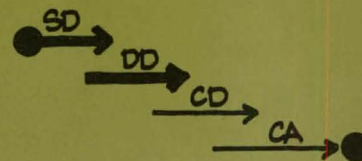
DESCRIPTIONS & REFERENCES

A. Linear



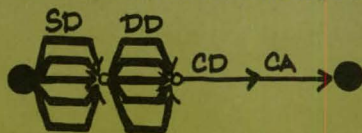
Architects Handbook of Professional Practice (Washington, D. C.: American Institute of Architects, 1963). "Project Procedures," Chapter 11.

B. Linear Overlapping



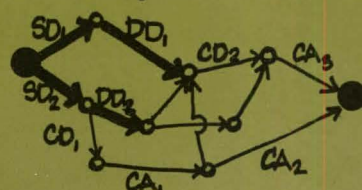
The Chicago Office of Skidmore, Owings & Merrill, Architects.
Production Management Systems and Synthesis, Martin Kenneth Starr (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1964) "Production Management Models," pp. 112 and 139.

C. Parallel Alternatives



The San Francisco Office of John Carl Warnecke, Architects.

D. Collapsible Time Frame

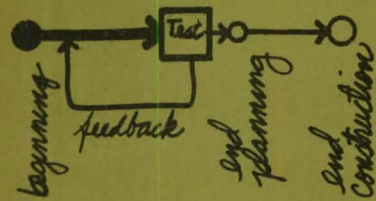


Aero-Space Industries' Project Control (Lockheed Missiles and Space Division, Sunnyvale, California).

mented departments of large offices and the client's opportunity to evaluate the issues and solutions is too brief. Communication, then, rests essentially with project managers, who must convey messages from isolated designers to questioning clients and tired out production men. The success of such a project can usually be measured by the project manager's ability to keep everyone calm and happy, rather than on more substantive planning concerns.

Sequential design management processes were developed in a period when more emphasis was placed on the design act and the artifacts that accompanied a job than on the significance and intricacies of the

2 Cyclic Processes



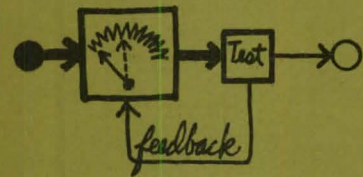
Feedback testing each of a series of design solutions to predesignated performance criteria until a solution satisfies the criteria, thereby ending the process.

As a planning process, emphasis rests with design and use-evaluation over time.

CONTROL SYSTEM ILLUSTRATION

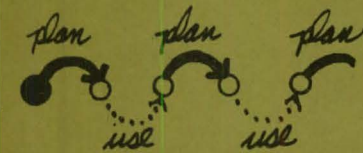
DESCRIPTIONS & REFERENCES

A. Linear Feedback



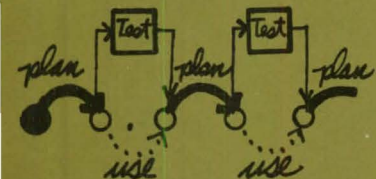
An Introduction to Cybernetics, Ross W. Ashby (New York: John Wiley & Sons, Inc., 1967).

B. Developmental Planning



Developmental Planning, Richard Meier (New York: McGraw-Hill Book Co 1965).

C. Empirical Evaluation



Dorms at Berkeley, An Environmental Analysis, Sim Van der Ryn and Murray Silverstein (New York: Educational Facilities Laboratory, 1967).

"Techniques for the Measurement of Performance," Horst Rittel, Robert Fessendon, and Henry Sanoff (Berkeley: Dept. of Architecture, Univ. of California, 1965).

problems being acted upon. It is questionable whether this problem-solving attitude will survive the shift in emphasis to problems rather than designs.

Cyclic-Design Processes

Cyclic-design is the second major design management process. The term "feedback" has become a buzz word for progressive sounding architects. What does it mean when immersed in the design management process? Each of the three cyclic processes employ feedback. The simplest of the three is linear

feedback (2A). This process implies the presence of performance criteria against which successive design alternatives are measured until one solution satisfies the criteria. This type of design management suits projects with rigid, well defined, and measurable performance standards (e.g., a radiology laboratory, an operating room, or an aerospace rocket launch and test center).

Developmental planning (2B) is a cyclic process that requires any design to be considered as part of a cycle of events over time. Some buildings must be evaluated after a period of use, others require updating that calls for a new plan, and other situations require additional plans after a project is complete. Each new incremental plan differs from the previous one in its recognition of new needs.

The third cyclic process is termed empirical evaluation (2C). By this design management process architects predict how future buildings will work to satisfy user needs. However, a serious question is whether documenting how people presently use buildings is a satisfactory measure of their present or future needs and preferences.

Cyclic processes are, in principle, good "solution-corroboration devices" since they impose the discipline of recycling, or redesigning until a solution meets the criteria.

Cyclic processes are primarily aimed at fulfilling specific performance criteria rather than improving or gaining experience in working with them. More than with any other problem solving method, feedback subjects the success of a project to the correct initial problem definition and delineation of performance criteria.

Cyclic processes are very good when used as a planning method to integrate design and use. By employing feedback from the use-evaluation of a building complex, we can program and define problems better for the next related project design. As planning tools, cyclic processes aid in the communications, coordination, and cooperation between users and designers.

In summary, the chief weakness of cyclic processes in design and planning lies in the fact that they have little concern for the problem itself; performance criteria are tacitly fixed in the design and evaluation process. Nor do cyclic processes provide for systematically evaluating and improving upon the description of the problems involved.

Evolutionary Design Processes

As architects move from the design of single isolated buildings to large-scale projects, they must adopt new management attitudes and processes to fuse today's urgent social, cultural, and economic problems. Evolutionary processes are helpful in the necessary fusion.

To visualize an evolutionary process, imagine for a moment a problem-describing/problem-solving machine. Then assume that it is possible to continually

make a better machine by finding any faults in the previous machine's ability to describe and solve a given problem. After this, the machine is operated by management processes at time — t — on a pre-designated problem so as to evolve a better machine at time — $t + 1$. The new machine will be more capable of centralizing the design issues and of solving the problem. Not until the point in time has been reached when a sufficiently good machine has been developed will actual design decisions be made.

Cyclic processes provide feedback to fixed performance criteria. Evolutionary processes are concerned with feedback to new performance criteria which came out of previous tentative definitions and solutions (3). This approach has been described metaphorically as a parent-sibling relationship. The offspring management-machine itself becomes a parent when it reaches the point that it is a better problem describer/solver than its parent.

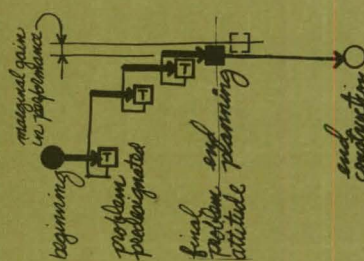
Now to proceed it is necessary to replace the ideated machine with a design team. Then we can proceed to the first of three evolutionary processes, *developmental designs* (3A). This method was originated for cross-disciplinary architecture. With this process instead of choosing the best of alternate solutions, it is possible to find a series of better solutions each time a design solution has been generated.

The fresh thing about developmental design is that the designer or team proclaims total uncertainty of the "problem field" from the outset. The goal of the process is to minimize this uncertainty. Success is measured by how well a designer or team can both define and solve the relevant problems. With developmental design the search is for those problem formulations that best engender the felt necessities — the intuitive, human understanding of the needs of the time — that justify all action in developmental design.

When the interval between design iterations is reduced to a very small period of time the process becomes on-line design (3B). This process is possible when computers are employed to speed the analysis and presentation aspects of architecture. On-line design depends on how fast the designer can: 1) simulate a design action and receive a sufficiently comprehensive evaluation, 2) revise and generate another solution, and 3) sort and record learned behavior. It is possible for a single designer to change both the criteria and the design actions through the computer console, or the same procedures can be followed in an equally effective manner by a team of designer, client, and consultants to more highly corroborated design solutions.

The last of the three evolutionary type processes is on-line planning. For this type of process, the professional designer is not required. The users of facilities and building products become the designers and planners. On-line planning will soon dominate office facilities planning, where totally industrialized products can be manipulated by users and their computers. As the larger building market becomes more in-

3 Evolutionary Processes

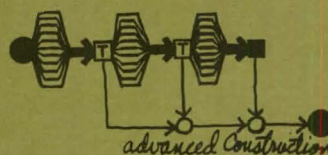


Design embodied in a larger process which tries to find and solve man's exigent problems as they manifest themselves through the environment. Assumes increasing ability to simulate both the significance of problem formulations and consequences of problem solutions.

CONTROL SYSTEM ILLUSTRATION

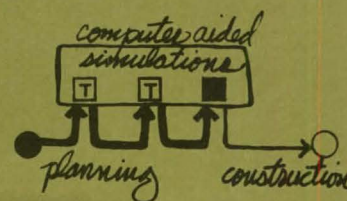
DESCRIPTIONS & REFERENCES

A. Developmental Design



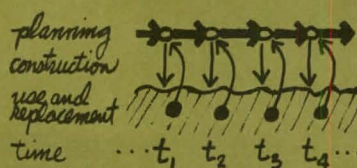
The New York Offices of Design Futures.
The New York Office of Caudill Rowlett Scott, Architects.

B. On Line Design



ADEPT, a comprehensive computer software and hardware system (including graphic displays) designed and developed by the Boston Office of Design Systems Inc.

C. On Line Planning

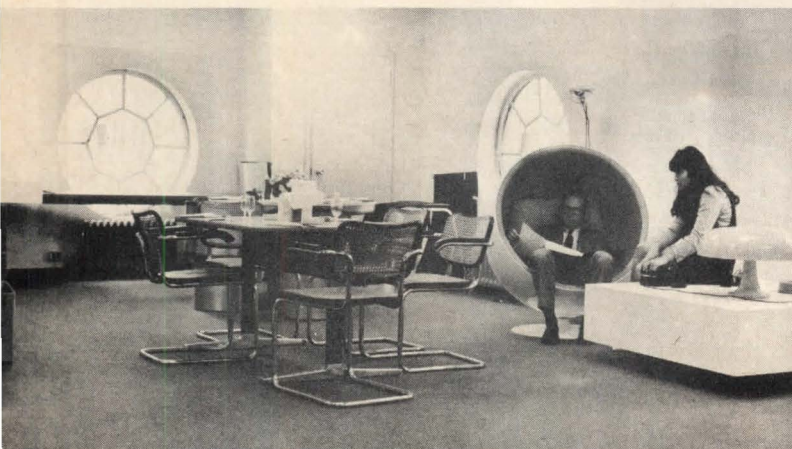
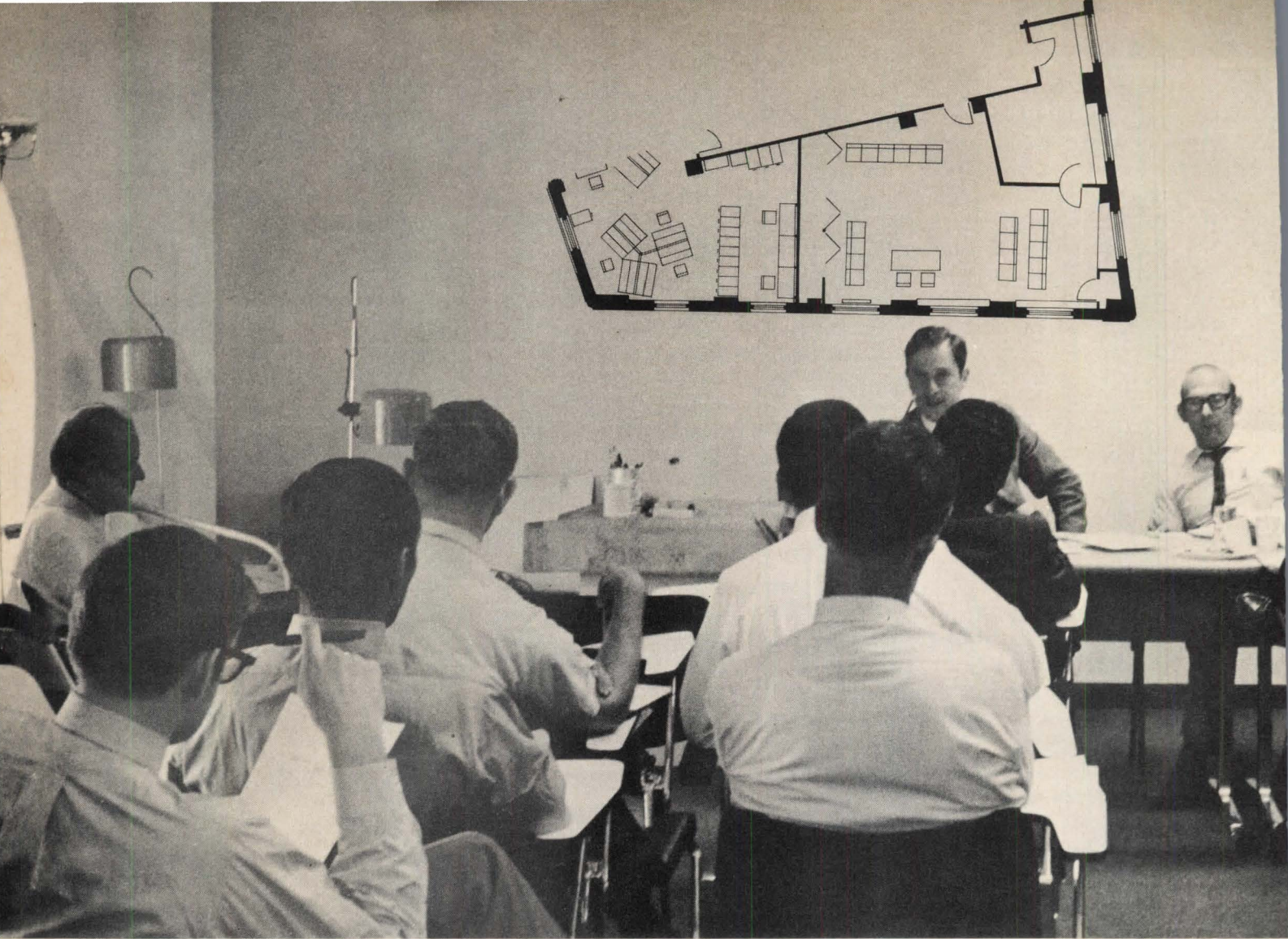


"Totipotontology: the Theory of Planning for Alternative Futures," the author first presented at the Parsons School of Design, New York, March, 1969.

The Office — A Facility Based On Change, Robert Propst (Elmhurst, Illinois: The Business Press, 1968).

dustrialized, the same will take place in architecture and city planning. It appears that to the degree to which products can be standardized to interfit, easily adjust, or systematically decompose to changing needs, to that degree the problems of assembling and maintaining these products can be given over to computers and the users' direct manipulation.

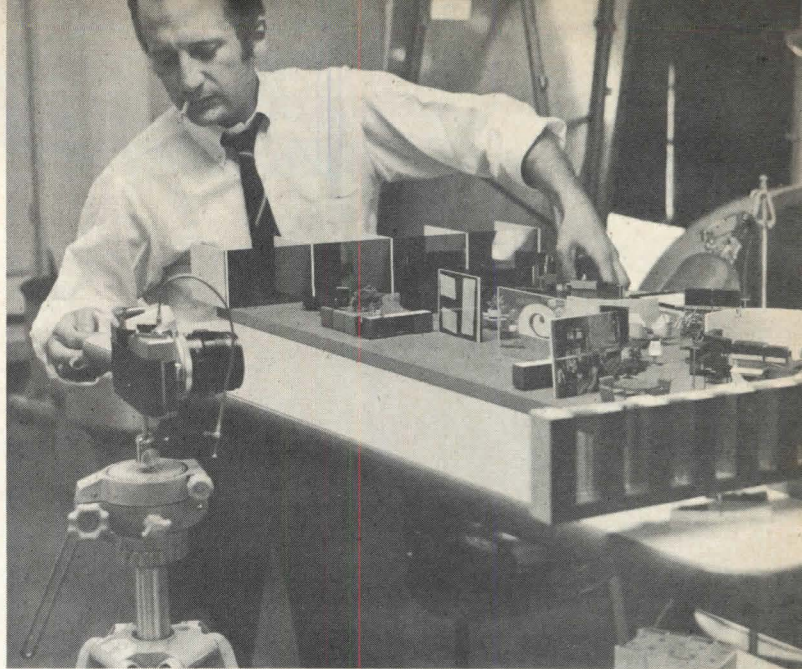
Evolutionary management design processes will be increasingly important as the splintered planning disciplines seek out larger and more user-participatory systems of planning.





ROOM FOR SELF CRITICISM

JFN, an interior design firm, tries out its theories in a multiple use room.



"Man's sense of space and distance is not static, . . . it has very little to do with the single-viewpoint linear perspective developed by the Renaissance artists and still taught in most schools of art and architecture. Instead man senses distance as other animals do. His perception of space is dynamic because it is related to action — what can be done in a given space — rather than what is seen by passive viewing." This quote from Edward T. Hall's *The Hidden Dimension*, is JFN's philosophy-in-a-nutshell, and portrays the spirit of this unconventional use of space.

JFN's "8th Floor Conference Room" is misleadingly named for, like the rural town hall, it functions as anything from an informal after-hours employee cocktail lounge to an elaborate presentation room — perhaps, least of all, a conference room.

The space — about 830 square feet — is simply decorated and furnished with lightweight, portable chairs and tables which can be moved about with a minimum amount of work and time. Adjacent is a fully equipped kitchen and pantry, with a cook employed to provide and serve luncheon meetings and evening cocktails.

During the average work-week this multifarious conference room may be used for educational seminars, client presentations, luncheon meetings, regular board, executive and staff meetings, and, on special occasions, for office parties.

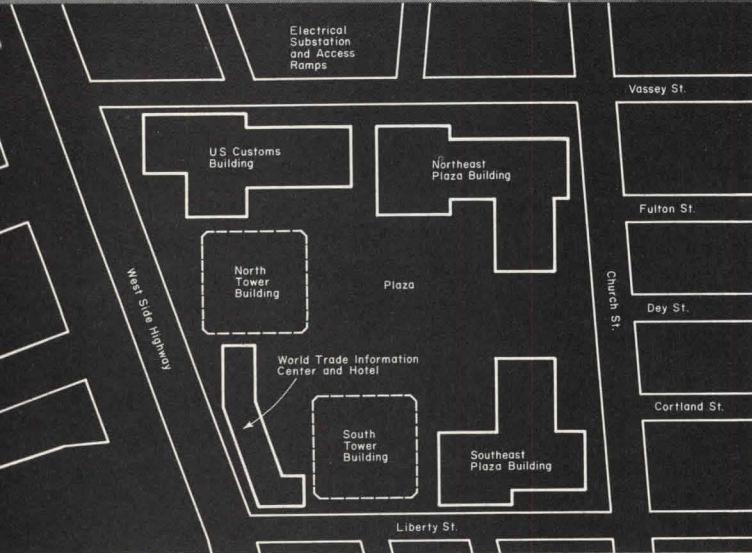
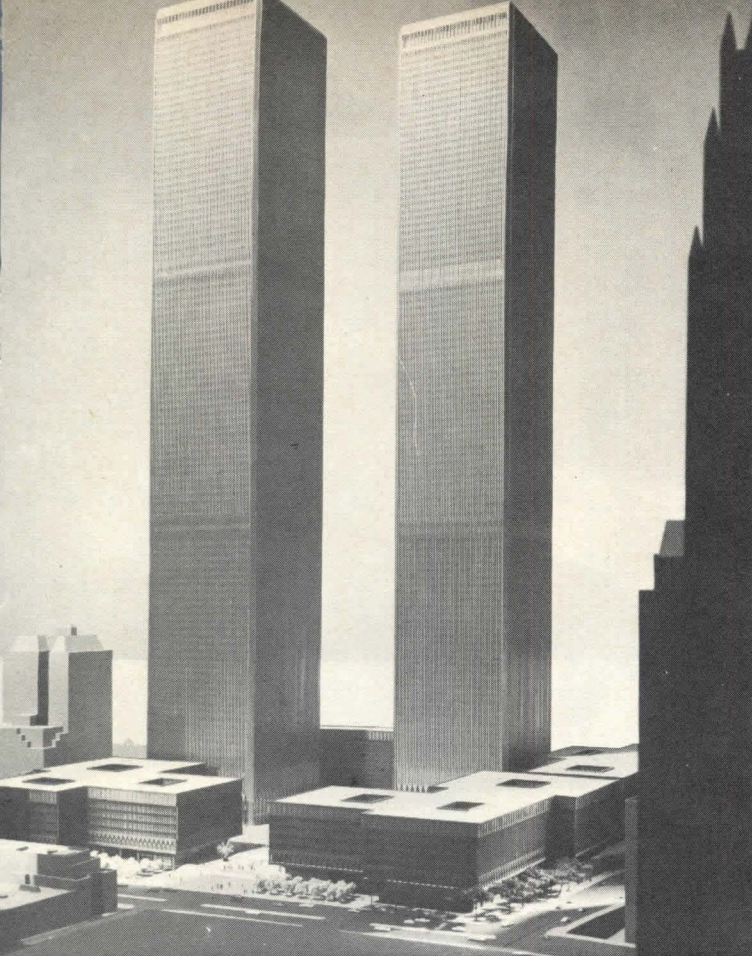
For a recent design presentation to the planning committee of a large corporation, the conference room was completely redesigned — using portable partitions and models — to simulate the prospective design of the corporation's office-to-be. After the presentation, it took three men about twenty minutes to dismantle the whole display.

The weekly luncheon meeting is held here for JFN's forty-odd account executives, providing a pleasant and informal atmosphere for an otherwise gruesome production and scheduling session.

The conference room is also often used as a project work area for tasks that require more space than is normally available.



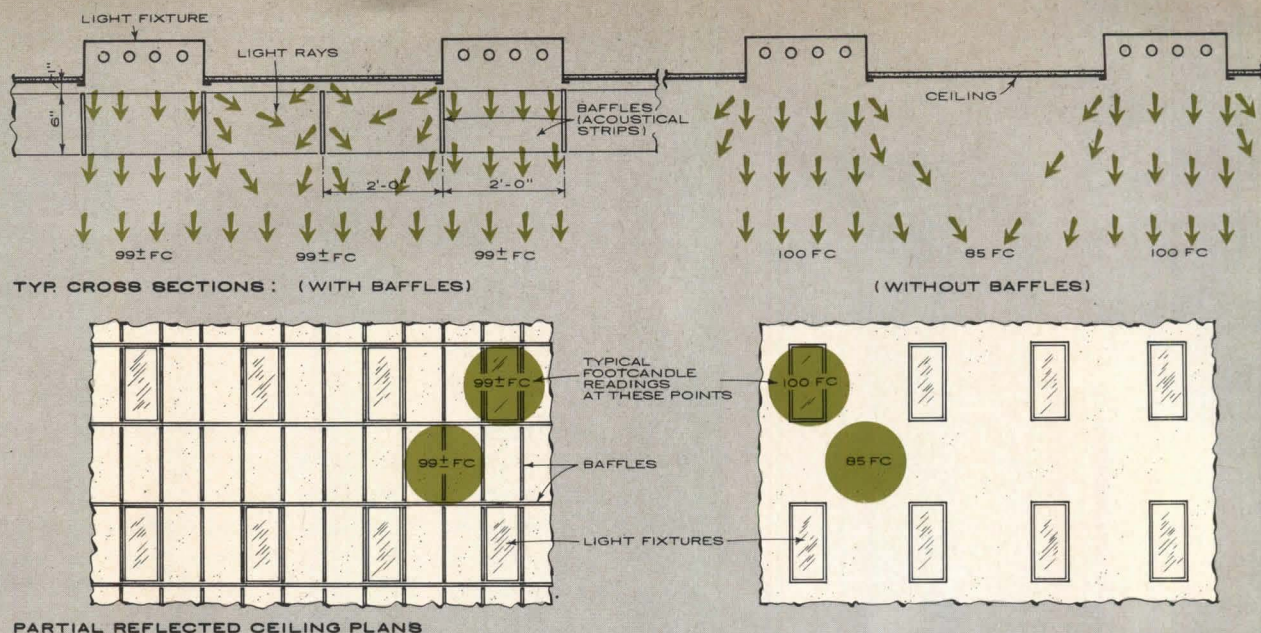
**World's Largest
Office Space**



With nearly 10 million square feet of office space to contend with, and with Minoru Yamasaki as architect-at-the-helm, the Port Authority expects to maintain reasonable design control through its rental agreements. But how can so huge a project be humanized? To find out, P/A explores the World Trade Center as a whole, then puts the spotlight on the Port Authority's own 20 floors of office space.

Those big bad 110-story towers rising between Church Street and the West Side Highway in New York may teach us more about space than the moon shot. Here at the World Trade Center, its sponsor, the Port of New York Authority, is adding nearly 10 million square feet of office space to the New York inventory in twin buildings designed by Minoru Yamasaki & Associates. How does one go about organizing this quantity of space? How can one bring two such tremendous buildings — each is 1350 ft high — down to human scale? Is it possible to provide amenities sufficient to keep the 44,000 people, who ultimately will occupy the buildings, happy all day long? P/A posed these and other questions to Malcolm Levy, Chief of the World Trade Center Planning and Construction Division, Robert J. Linn, Manager of Project Planning, William B. Warren, Supervisor of Office Management Services of the Port Authority, and to many others within and without the World Trade Center and the Port Authority.

The problems faced, or to be faced, by designers of interior rental space in the WTC towers may be better understood against some background on the size and scope of the project. To begin with, a 30-year-old architect who was on the job when the project started in 1962 will be 41 years old by the time the building is completed in 1973. The prime years of his architectural career will have been spent on one job! During that time, however, the Yamasaki firm, Emery Roth & Sons, Associated Architects, Ford & Earle, Interior Designers, and professionals in various fields of endeavor — some unheard of on a building project before — will have contributed in various ways to the project. Most clients do not have architectural staffs of their own but the Port of New York Authority, a self-supporting public agency representing the states of New York and New Jersey, unlike most clients, does. Malcolm Levy is in charge of planning and construction under Guy F. Tozzoli, the Director of the entire World Trade Center project. Levy says that the systems approach is rare in building design, indicating, among other things, lack of research and testing. One of the plus values of an architecturally sophisticated client like the Port Authority is, then, that money and staff are available to conduct research. Levy adds that during the long history of office design and building there are many areas of adequacy but few of excellence. Research on this project has made it possible to raise standards; very often, in fact, the improvement costs no more than the earlier, poorer standard had cost. "Take the



Drawing (not to scale) shows how ceiling baffle arrangement improved lighting conditions.

fire alarm system, for example," Levy said. The World Trade Center will have a loudspeaker system instead of the usual fire gongs and other emergencies. If there is a rubbish fire on the 25th floor and smoke starts pouring through the offices, the emergency can be reported immediately to the central control desk through a microphone and the people on the floor and any others affected can be advised of the exact nature and source of the smoke and requested calmly to leave the floor or to remain, depending upon the seriousness of the situation.

Ah, But the World Trade Center is too High!

Not so, says the Port Authority and once again research comes into play. What makes a building too tall? Appearance? Yamasaki says this is not so and the Port Authority agrees with him. He says extensive research on this point is not necessary and his mother-in-law survey does, indeed, seem valid. If one takes a trip around New York City and looks up at buildings, like an old-fashioned rubber-necker, Yamasaki says, he will be unable to recognize whether a building is 30-, 60-, or 100-stories high. TV reception? All taken care of says the Port Authority. As soon as the first tower is complete the master radio-transmitter will be erected on top of it thus providing, if anything, better transmission than the present one atop the Empire State Building. Safety? The World Trade Center will be the first building in New York to provide guaranteed elevator service. "No one will ever get stuck in an elevator in these buildings," Levy says. There are a total of 95 passenger elevators in each building and each 110-story tower is, in fact, three buildings placed vertically atop one another rather than horizontally. Thus, there are three lobbies, the impressive 70-foot ground floor main lobby and two sky lobbies at the 44th and 78th floors. The sky lobbies are connected to the main lobby by 23 elevators with a capacity of 55

passengers each. These load on one side and unload on the other so that the first people in are the first out. It is from these lobbies, which are equipped with newsstands, snack bars, telephones, and other amenities, that the office worker reaches his own floor. There is also an emergency 3000 kw power system, large enough to provide lighting and elevating even during a power blackout.

Comfort

Throughout the design of the buildings, the Port Authority and the architects have been concerned with the people who are to occupy the space. They sought to provide a pleasant, friendly, humanly-scaled environment in which to work. They also located the facility so that it was easy to reach by public transportation. Though the Port Authority got its start in the bridge and tunnel business (George Washington Bridge, Holland and Lincoln Tunnels), the World Trade Center encourages people to use mass transportation. One of the many sub-basements will contain a new expanded Hudson Terminal into which the PATH (Jersey Tubes) trains and three New York subways will discharge passengers. The concourse of this terminal will actually be a shopping center designed to serve tenants of the building and of the neighboring buildings which are already springing up around the WTC. Levy was frank to admit he did not know whether there was enough restaurants. However, he does know there is plenty of room for whatever is needed in the way of mass feeding facilities and shortly after the first tenants occupy the first building exact needs will be projected.

Two problems that many people share about tall buildings are acrophobia and worry over sway. Yamasaki had already done some research on the first problem in his Michigan Consolidated Gas Co. Building in Detroit, Michigan. He knew that women, particularly, are afraid to approach a floor-to-ceiling

glass wall in a high building. He visited and studied a number of buildings in New York and elsewhere. As a result the floor-to-ceiling windows in the Detroit building are long and narrow. Women feel so secure in this building that they lean against the windows. This and similar research led Yamasaki to make windows in the World Trade Center 21 inches wide.

The sway of a building is another matter, according to Levy. People will accept sway in moving vehicles, he said, but when it comes to buildings, worry starts as soon as the movement becomes discernible. Extensive tests were carried out to determine what the allowable sway would be. Subjects were placed in rooms that were swayed to determine when they first noticed the movement. By testing a number of subjects a sway index was arrived at and the building was designed to relate this index to the known wind loads to which the building would be subjected.

Interior Design

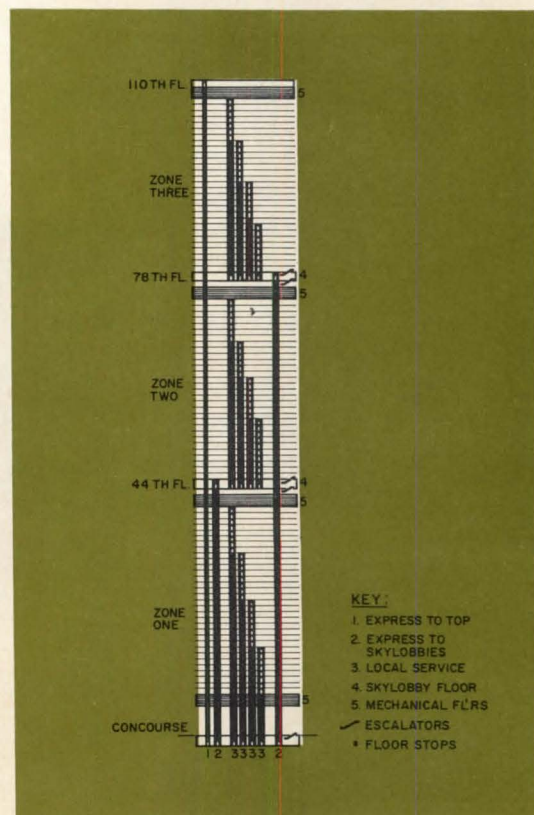
Tenant space in the World Trade Center, like tenant space in any speculative building will be designed by the tenant's own architect or designer. Leases will control the tenant's treatment of windows so that the exterior appearance of the building will not be disturbed — standard draperies have been designed and must be maintained by the tenant. There also is an extremely flexible standard ceiling and floor plenum (see detail p. 128) containing electrical and telephone wiring, lighting, and air conditioning trunks. The standard partitioning unit is still in the testing stage. The twenty floors to be occupied by the Port Authority itself are being designed by Ford and Earle. Here again, because the client is architecturally oriented it has been possible to research some things rather more carefully than usual. The Quickborner Team from Germany, originators of the office landscape (p. 102) was engaged as consultant and presented its ideas for an office landscape for the general office spaces. The Port Authority planners modified its scheme somewhat and have been testing the concept and the modifications in an office in the present Port Authority Building on Eighth Avenue. Although the Quickborner Team indicated that European users reported a 40–50% reduction in space requirements, William B. Warren said that the Port Authority was not interested in the density of 100 sq ft per person reached by the Quickborner Team in other installations. There were two reasons for this: The first is that staff in the main office of the Port Authority is predominantly managerial and professional and has a greater need for privacy and work/storage space than a purely clerical staff. In addition, and here is a good example of man's uncanny ability to outsmart himself, the World Trade Center elevators are designed to handle a density of one person per 125 sq ft of space. The Quickborner Team and their followers are able to reduce the per person per sq ft area from 125 to 100 sq ft. There is nothing to prevent the tenants of the towers from working to

this greater density. Thus a 20,000 sq ft floor, which should contain 160 people may contain 200 — 40 more than the elevators can handle. If this occurs, the carefully designed elevator system will be inadequate even before the buildings are completed.

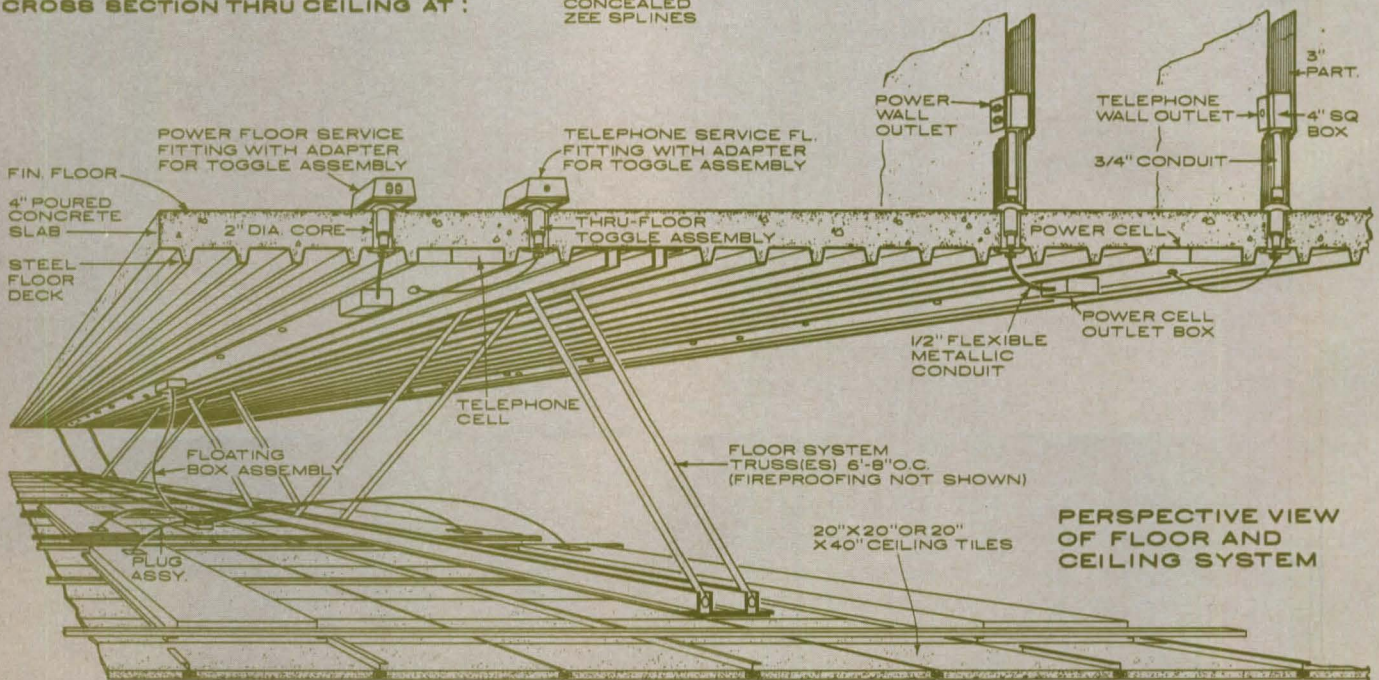
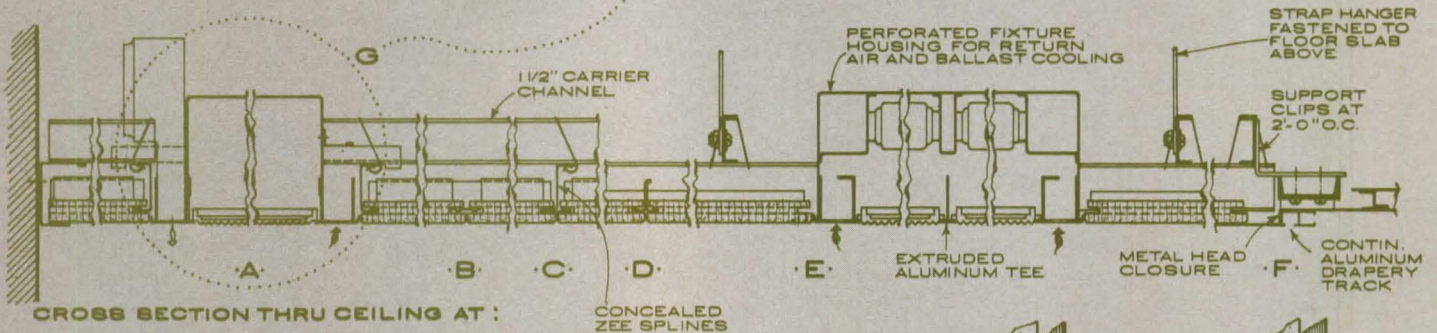
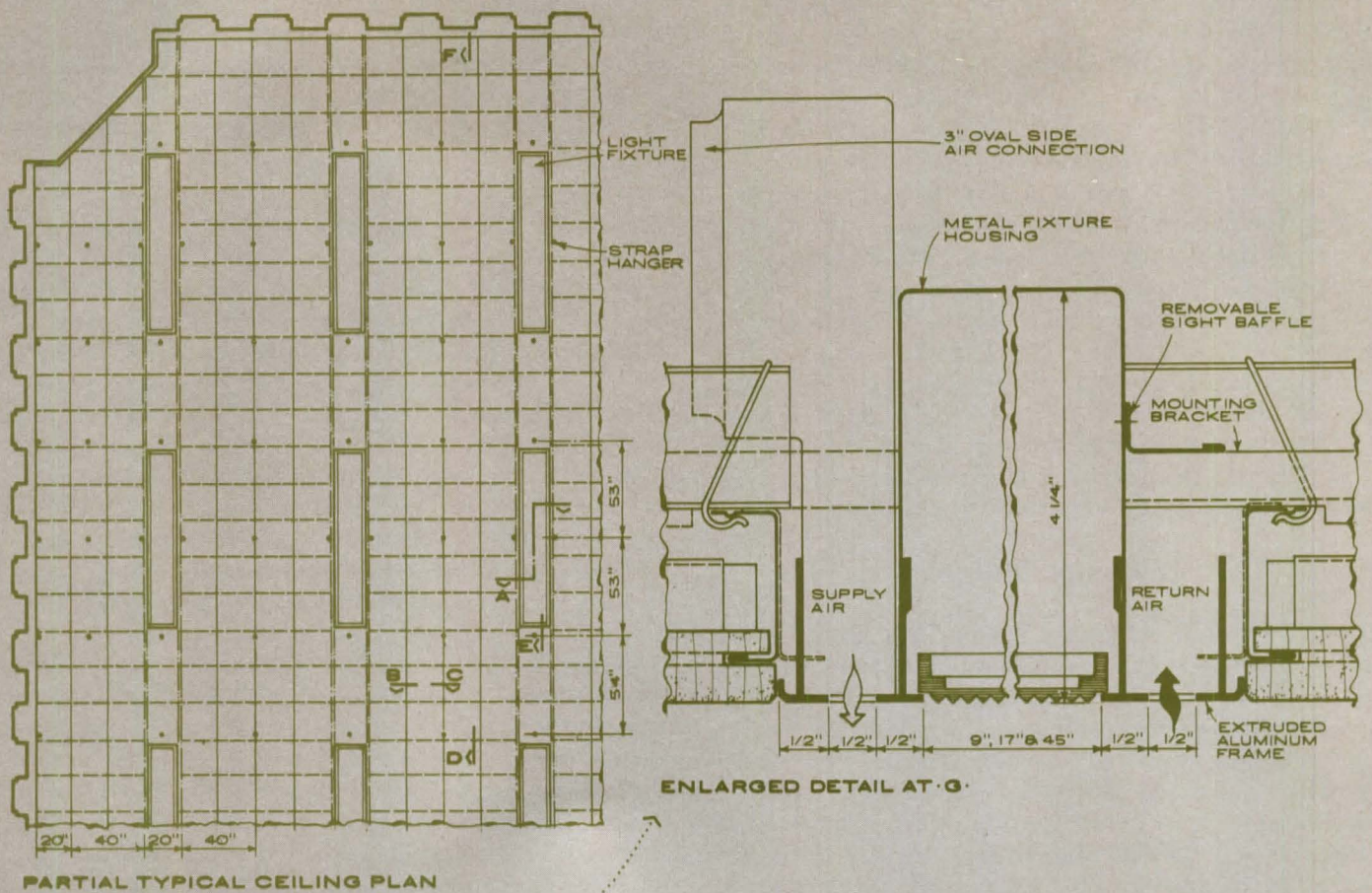
Test Space

It was decided to use the Organization and Procedures Department, in which Warren works, for the test. This department of 36 persons had been crowded into a 3700 sq ft conventional office providing 103 sq ft per person. The test space is 5760 sq ft with a wall-to-wall dimension similar to that recommended by the Quickborner Team and of similar configuration to the World Trade Center space. The office of the director of the O & P department, Harvey Sherman is included in the test landscape. Although many confidential conferences take place in Sherman's office, there has been no problem about leakage of information. Warren feels that this is because nothing special, such as the closing of a door, occurs when confidential talks are underway. Outside conferees are somewhat nervous about being overheard at first, Warren says, but soon forget they are not securely behind closed doors.

Tests to measure the influence of the conventional space against the modified office landscape were conducted by Lawrence R. Zeitlin of the City University of New York, a consultant in industrial psychology. The Port Authority wanted to assess the non-environmental aspects of the test space as it affected the



WTC elevating system showing sky lobbies.





Office landscape in WTC test area.

communication and circulation pattern and to do so, a voluminous questionnaire was developed. Included in it were multiple choice, yes and no, and rating questions seeking personal and job information, job attitude information, reactions to the physical environment, the office layout and organization, and the furniture and equipment. Respondents were also invited to make their own broad comments. Highest priority was given to employee satisfaction and morale and questions were phrased to elicit as much information as possible on how respondents felt about the old layout and the changed space.

All replies were anonymous with one set of questionnaires completed several months before the conversion to office landscape, and another set after the test office had been occupied for six months. It is worth noting that the test population was sophisticated, interested, and cooperative about the project. Results of the study indicate that the landscaped office is as good a work environment as the conventional office, but not the great influence for improved work as was anticipated (see p. 106). The physical environment, however, improved markedly. Noise control is better than in a conventional office. This is partly because additional acoustical material was added at the ceiling in the form of a series of acoustical baffles. The sketch (p. 126) shows how this baffle arrangement was worked around the existing light sources. Before the baffles were installed readings directly below the light sources were 100 fc and those in the dead space in the center were 85. After the baffles were installed readings throughout the office did not vary more than one fc — from 100 to 99 fc! In addition the quality of the light throughout the space was vastly improved. Instead of a series of

harsh bright areas surrounded by dull dark appearing areas, the whole space was bathed in a pleasant diffused light. This accident so impressed A. Gordon Larimer, Chief Architect of the Port Authority, that a baffle arrangement may be installed in the ceilings in the Port Authority offices. Another lucky accident, this one having to do with both the conservation of space and human relations, occurred in a conference area where it was discovered that it is possible to seat six people around a 42-in. diameter table if the table top was lowered to 26½ inches making it the same height as the arms of the chairs. People conferring around such a table used the arm of the chair as a rest for the writing arm rather than the table top as is usually the case. This brought the conferees closer together and, as a consequence, discussions tended to be less formal. Several visiting conferees who have used the new experimental area have noticed a very definite improvement in the time it takes to reach decisions. Although there are no definite data to prove this point, Warren feels that the closeness of the conferees in this situation vis a vis a traditional large conference table, lessens the tendency toward confrontation. Few people are likely to scream or yell at someone who is practically eyeball to eyeball away — and, apparently, few people do. The total area consumed for this new, intimate conference arrangement is 100 sq ft.

The office landscape in the test area also has some experimental acoustical and visual screens designed by the architects and made by Art Metal. These contain blank areas in the base for electrical and telephone wiring and for electrical outlets and telephone jacks. The architects also have tested new carpeting produced by Commercial Carpet Corp., to inhibit static electricity. In the test one half of the office was covered with the new carpeting, the other half with the same carpeting with a bronze metal strand woven into it. No static electricity problem arose with either half thus eliminating the need for the bronze strand and saving the \$1 per yard extra that this costs.

Whiz Bang Estimate

As soon as enough information was available to work up a cost estimate for the World Trade Center — in 1962 — Malcolm Levy asked the Roth Organization to work on it. Under the direction of Julian Roth, a team of five men, representing the Center's consulting engineers and architects, spent a couple of weeks on the costs and came up with a tentative estimate of \$26 per sq ft. Today, six years later, nearly all bids are in and the building will cost almost exactly \$26 per sq ft. Recognizing the importance of the computer in reaching fantastic conclusions, P/A asked what part the computer played in this wizardry. "Oh, we did not use a computer, we just worked with pads and pencils," was the offhand reply.

— W.W.A.

A MAZE OF CONTRADICTIONS

A human factors engineer explains the research problem involved to systematize the general office space and poses some questions to the architect and designer.

BY MALCOLM J. BROOKES,

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The modern ethos of social interaction and universal human equality is represented in office planning by Bürolandschaft. The sociological implications of open office planning seem obvious enough: working groups, free discussion and exchange of ideas, and communication are highlighted. This would seem to lead to a naturally stimulating working environment, increased productivity, and the overall betterment of the worker and the corporation in general.

The functional claims of open offices are also highly attractive: increased space utilization, ease of maintenance, and ease of installation. However, evidence is increasing that the advantages to open office planning have been over-sold on the sociological side. There can be little or no grumble with the functional aspect of open planning; the tangible returns are there to be counted in dollars and cents, though not quite to the extent that they appear at first.

Implications Of Open Office Planning

The morality of increased interactions/communications/groupness is not in question. But what are the implications and consequences for the corporation? By redesigning an office in open plan form can the employer count on improved morale, better working rapport, increased output, better quality of decisions? It is doubtful. In fact, as open office planning is *practiced today*, there is reliable hard data which demonstrates that unless meaningful organizational changes take place, *there is no change in work patterns and no change in job satisfaction when a conventional office becomes landscaped on a one-for-one basis.*

F. B. Herzberg and his American school of researchers implied this many years ago, of course. The aesthetics of an office, whether cubical or open, austere or softened with potted plants, does not in itself improve the output of the office worker. Visitors might be impressed, management satisfied that it had accomplished something by potted plant design, but as far as occupants go, it's all one to them. Herzberg's data are apparently validated by a more

recent in-depth study of attitudinal change before and after landscaping. Lawrence R. Zeitlin (p. 106) reports, "To fulfill its promise, the office landscape should be designed not only to facilitate communication and interpersonal interaction but also to assist in developing the maximum amount of internalized motivation feasible within a given job. . . ."

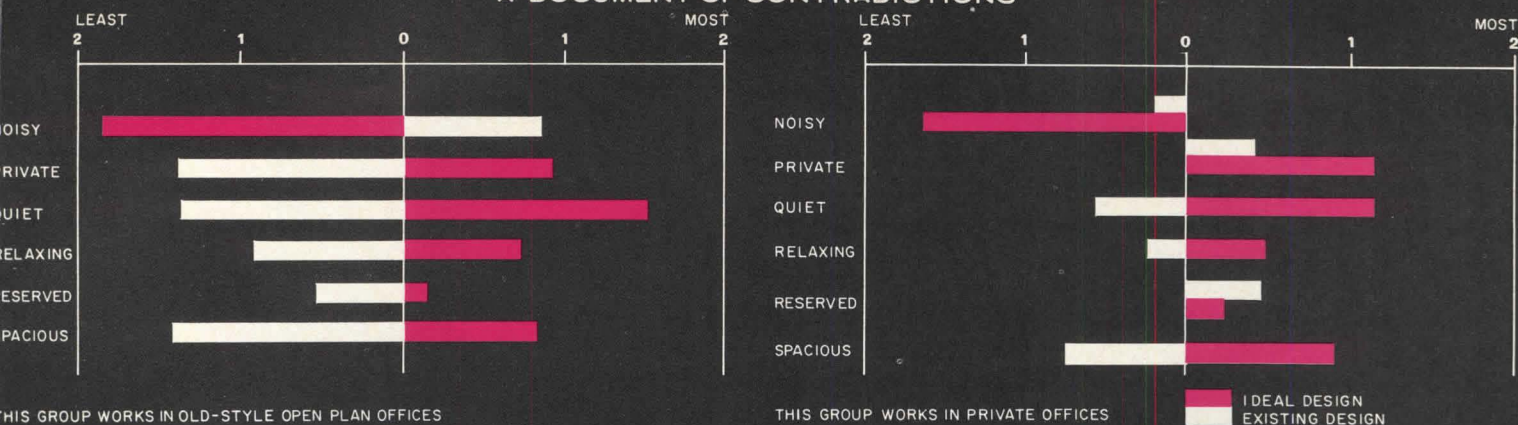
Zeitlin's findings are similar to those of a study presently being undertaken by our own office. Techniques and instruments have been developed to deal with the special problems of test and evaluation in a real working office environment. The aim is to find out if, and in what manner, the office design affects human performance. By performance we are not solely concerned with quantities of papers handled and frequencies of messages received, but also the quality of the decisions which are made: can decision quality be improved, for instance?

Using various groups of office workers an attempt is being made to discover what relationships exist, if any, between the physical characteristics of the environment and aspects of group behavior such as cohesiveness and personality. With the first analysis of tests on one hundred subjects completed there is no indication of reliable relationships between style of furnishings, general layout, and group behavior.

This seems to knock out the old "form follows function" cliché. Is office communication improved just by grouping those people who work together into the one area? How did "communication" get by before the space planner cum sociologist thought it could be improved? By what degree is a group's meaningful output changed in a realistic office situation by changing the layout and so changing "interaction?" Have we affected the quality of decisions in a manner favorable to the system as a whole?

Herein lies the crux of the matter. Space planners and architects have never been in a position to examine the effects of their work on corporate goals, on the system as a whole. To make up for this they appear to have fallen into the same trap that human factors engineers fell into in the mid thirties — but unlike the human engineer, they have not tried or, perhaps, seen the need to extricate themselves.

A DOCUMENT OF CONTRADICTIONS



A study of office occupants' descriptions of present working space compared with "ideal" conditions.

The pitfall is one of narrowness of approach. The human engineer sought for biological compatibility as the criterion for improved performance. However, the human engineer soon realized that this idea of microcompatibility misses the vital point that man is engaged in a purposeful activity which is distinct from his own immediate environment. The larger the system, the greater the degree of remoteness. The systems approach was born from the realization that system goals and individual goals differ. In like manner, the space planners seem to believe that looking at the microcosm of the workers' interface with his environment will provide the clue to dramatic corporate gains: that a pretty decor, or better personal adjacencies were all that was lacking. Not so! If office design is to provide a positive contribution to corporate goals, then it must be undertaken in the light of changes in organization, procedures, and practices. An old organization in a new skin is just that and nothing more.

Unless office procedures and practices are also changed when an office is redesigned, no change in group behavior will be discernible despite expressions of enthusiasm with the environment. A group of office workers does not just adapt itself automatically to better ways of working through a flexible, adaptable environment. It cannot. Organizational restraints preclude the group organism from changing. And perhaps it is just as well they should; it is possible the adaptation may be to the detriment of management as a whole.

Personal Differences

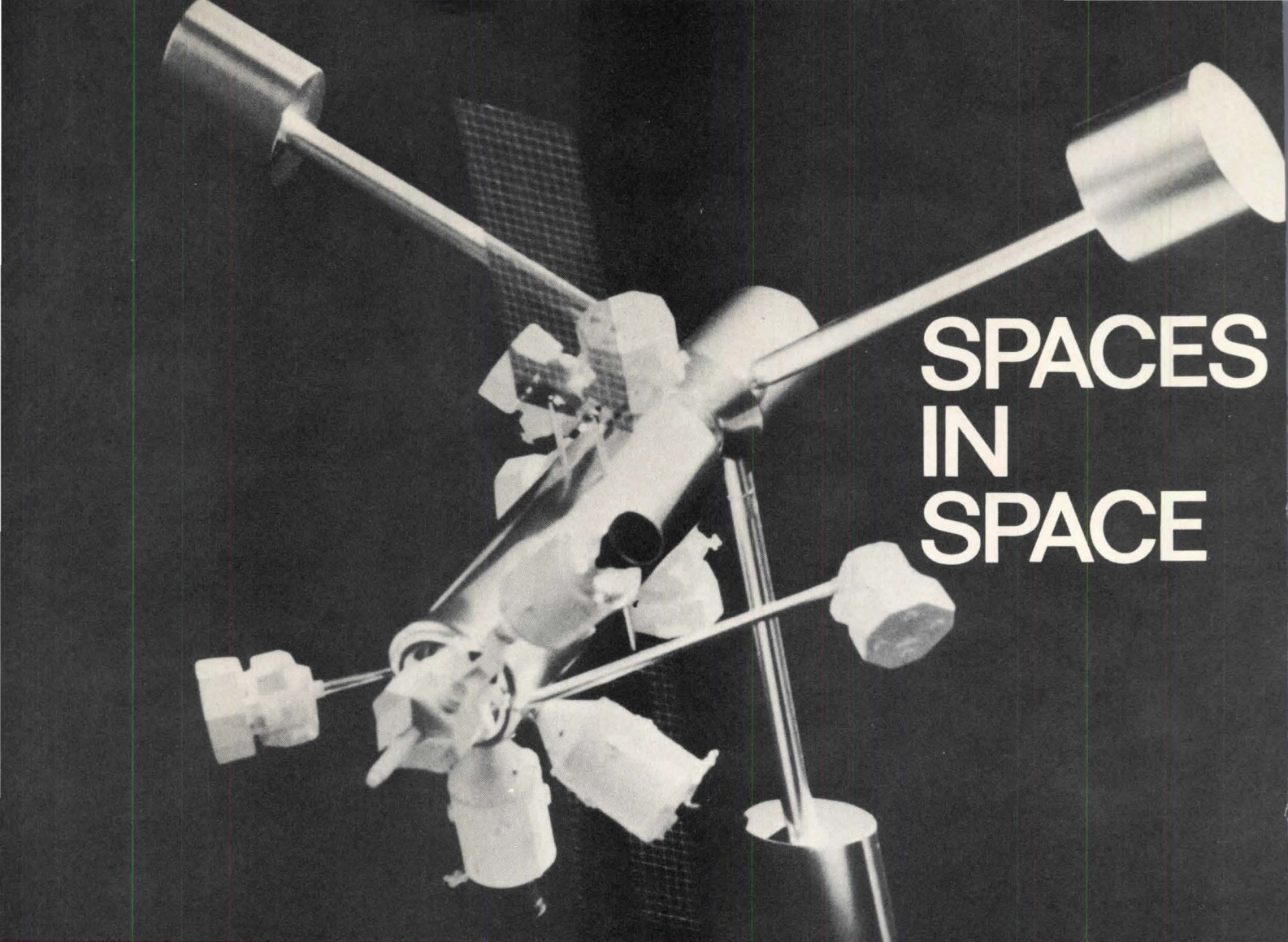
There is a second aspect to office design to be considered. If the new design does not *motivate* the worker, it may demotivate him. Recent research by Daniel Landis and a group of associates demonstrate the relationship between an individual's dogmatism and his evaluation of a situation. V. H. Vroom's studies on personality characteristics and the effects of group participation seem to be in similar vein. In short, if a person does not like a situation, whatever his reasons, his performance may be lowered.

Does this apply to design, literally, to shape, to form, to texture and to color? There are few indications that it does. But impose a *social* situation that is unsatisfactory in some way — too private or too open, for example — and you can expect to find deteriorations in office performance — tangible not just attitudinal.

The implications are that the space planner should be able to design for different situations. As an example, a study of a large company was recently undertaken in order to generate some design specifications. The aim was to see whether three of the corporation's departments could be relocated in a landscaped office. The results of structured questionnaires using a form of semantic scaling indicated significant differences and similarities between groups. For instance, those who presently occupy private offices wanted a little more privacy; those already working in a form of open office wanted a great deal more privacy, (See Chart). One wonders if their needs will be met in an open office. It is hard to believe that an impression of privacy can be conveyed when, in truth, it will not exist. The ability to turn one's back on a group, as office landscapers suggest can be done, will hardly satisfy a need for privacy.

A dynamic challenge to architects and space planners exists. If they really know how they affect the human occupants of their designs, how productivity is altered, how emotions are changed, how psycho-physiological responses are varied, and how the office worker's behavioral patterns are affected, let them now stand up and prove it. Hard data that demonstrates goodness of fit, association and correlation of cause and effect, is needed. Outside of the laboratory, can designers clearly point to data which shows how group behavior is affected by design in the long run?

This is not a case for or against open planning and landscaped offices. The case is that the consequences of design decisions in office planning are not well understood. Space planners have reconceived the idea of the open office, based on partially assimilated and untested sociological theories. It is now time to test and evaluate various situations, using the many newly developed technological tools to do the job.



In one of the most exciting architectural commissions of the present generation, Warner Burns Toan and Lunde is working as consultant to Grumman Aerospace Corporation on the design of a manned laboratory satellite. Their research may lead to new criteria in space planning on earth.

1975, CAPE KENNEDY. "... THREE, TWO, ONE ... BLASTOFF. WE HAVE BLASTOFF." And behind the earth-rocking thunder and clouds of flame, the computers at Mission Control in Houston are ticking off all systems "Go" on the flight of man's first home in space.

Barring budget problems, 1975 is NASA's goal for a manned laboratory satellite and way station to the moon ... or beyond.

Thus far, man's ventures into space have been a series of brief excursions into a terrifying but incredibly beautiful new realm. While science fiction

buffs and television viewers travel to far off galaxies on luxurious vessels such as Star Trek's USS Enterprise, real-world technology performs more modestly, but no less breathtakingly, in its exploration of the frontiers beyond earth. And the space station is the next giant step toward a Star Trek era.

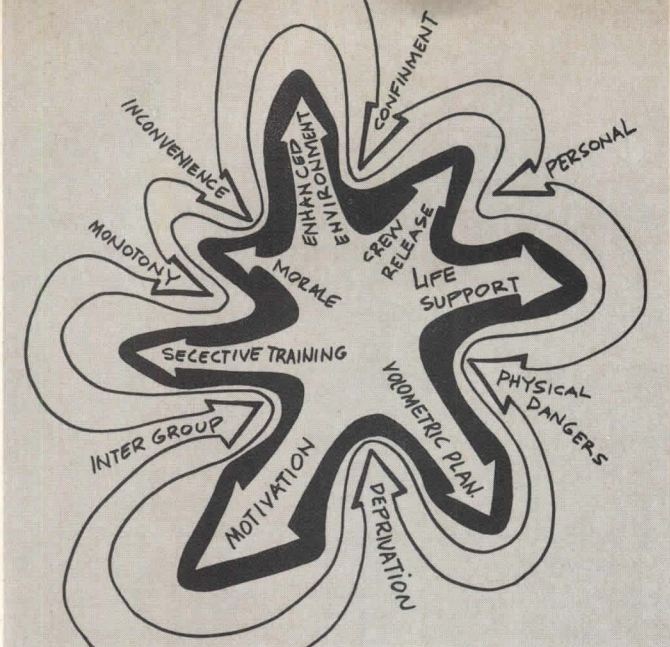
Manned continuously by a crew of 6 to 12 men doing tours of duty lasting from three to six months, the station will be our most godlike gesture to date, the creation of a new and habitable satellite.

It will orbit at 260 miles up, at a 60 degree inclination to the equator. Its instruments will send back to earth approximately 10.5×10^9 computer bits of information per day. Its scientific tasks will be the accumulation of data on astronomy, astrophysics, and earth resources (meteorology, agriculture, oceanography, mapping, geology). Its scientist-astronauts will conduct experiments in bio-medicine, perhaps even manufacturing. (It has been suggested, for example, that the weightless vacuum of space might be used to produce flawless ball bearings, which need not be machined since drops of molten metal would form into perfect spheres.)

The business magazine *Forbes* in a special issue last year pointed out some of the long-range promise of the space program for expanding world economy, particularly for increasing agricultural productivity

Early model facing page shows three-unit space station (plus experiment modules) designed for artificial gravity. Full-scale mockup of latest design for living deck (below) illustrates use of open volumes in communal area.





Stressors impinging on crew are counteracted by supporting forces, some design-controlled.

through photographic analysis of soils and crops. And the 12-man station is apparently only the beginning. Already NASA has set in motion the planning of a 50-man base to be launched by the mid-1980's.

Architectural Space vs Astrophysical Space

What of the experience for man? Will the solitudes of space bring him deeper understanding of himself and his place in the universe—or will his confrontation with his fellow crew members—and his machines—keep him from “grooving on space,” as one young observer put it? The very ability to survive may in fact depend as much upon retaining a sense of self as upon the proper functioning of life support systems.

What is the best supporting environment possible within present space-program constraints and capabilities? Grumman Aerospace Corporation, after four years of extensive in-house research, decided to include the thinking of an architect on the question of habitability. And in September 1967, the New York office of Warner Burns Toan and Lunde landed one of the most exciting architectural commissions of the present generation—a commission that is unique in both the architectural profession and in the aerospace industry.

As part of Grumman's design team, WBTL immediately assumed the role of advocate for man; man who must be shielded from an alien environment, protected against the encroachment of support equipment, and somehow released from the restrictions of the station itself—being both buffered against, and brought together with, his companions. Acting as consultants on “internal configuration and habitability,” the architects began a search for valid criteria in the planning of volumes in space.

(At 260 miles up, the term “space” becomes somewhat ambiguous. The architects have, therefore, adopted the NASA convention of speaking in terms

of “volumes” rather than “spaces.” The premium placed on each cubic foot of the container, and the possibilities of three-dimensional orientation in a weightless, zero-gravity environment also force designers to think in terms of volume.)

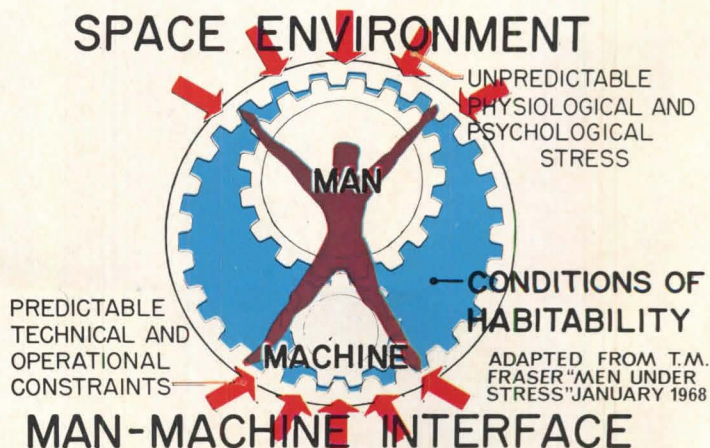
What Is Habitable?

Investigating human response to environment, WBTL researchers set out to develop criteria that would take into account not only man's response to the physical environment, but his relationships to his companions within that environment. They found the basic bibliography frequently vague or contradictory. Although NASA has issued studies of man's reactions to confined volumes, there are very few earth models to study. The submarine is one, and prisons have certain similarities. But the Antarctic stations, WBTL finally concluded, are perhaps the most relevant. Their mission is also scientific, and crews are severely restricted during the six-month polar winter.

The social order of the Antarctic stations was at first quite hierarchical, but the system proved unworkable and as the stations relaxed, rank and class barriers broke down between enlisted men, officers, and scientists. The informal arrangement improved morale and made team efforts easier.

The architects' work has included stations for 6, 9 and 12 men, as well as preliminaries on the base for 50 or more. The social dynamics vary with each increment in size, and also with the mission, but WBTL feels that any size station will function best on principles of cooperation rather than hierarchy. In terms of the physical environment, this shows up primarily in the crews' quarters, which are identical except for changes the men might want to make themselves.

About 10 months after the architects began their work, a NASA-funded report was published on “The Intangibles of Habitability During Long Duration



Man-machine interface plays crucial role in habitability of space station. Drawing adapted from work of T.M. Fraser.

Space Missions." The study, by professor of biomedical engineering T. M. Fraser, M.Sc., M.D. defines "habitability," a NASA term, as a state of equilibrium that results from "the interactions among the components of a man-machine-environment-mission complex which permits man to maintain physiological homeostasis, adequate performance and acceptable social relationships." As for expecting valid absolutes in the environmental field, Fraser believes it is "very doubtful if much is to be gained by developing indices of habitability in the current state of the art. Many of the factors involved are not quantifiable, and many of those that are quantifiable cannot be expressed with the precision and accuracy necessary for the purpose. . . . It is probable that a more meaningful appraisal of habitability would be obtained by a skilled subjective and objective assessment of all factors involved, followed by exercise of the best informed human judgment."

Although WBTL designers found that the work they had done was in basic agreement with Fraser, there was disagreement on specifics — particularly on the cubic-feet-per-man required for satisfactory performance.

Two of the parameters that Fraser believes most directly affect the volume required for each crew member are the number of men and length of stay, although duration is considered more critical. The longer the stay and the larger the crew, the larger the volume per man. Up to about three months, Fraser's volumetric figures increase in a straight line up to a tolerance point of 150 cu ft.

Now even though Fraser's "tolerance point" does not pretend to optimum performance, the thought of confining men in such a volume for that length of time seems far from credible. To draw a somewhat macabre comparison, it is barely larger than a coffin. The figure, however, reflects space-program thinking at the time. Fraser's present estimates for satisfactory crew performance total 600–700 cu ft per man for all activities. WBTL's projections are even higher, but exact figures are still in flux.

Rationalizing Volumes

One of WBTL's first concerns was to separate man and machine. Instead of an homogenized pudding of man-machine spaces, or volumes, they proposed to isolate support machinery, and devise a variety of volumes for recreation, exercise, experimentation, work, dining, and sleep.

"Man is greedy for volume," the design team concluded after an informal poll of the WBTL office. In assessing their own homes and apartments, even architects valued sheer volume, or space, above pleasing proportions, elegance of detail, or other aesthetic amenities. The space-station team, therefore, began to work away from the idea of completely specialized compartments and to open up some of the volumes

that could be combined. They developed "volumetric time-lines" that spelled out the amount of time spent in each volume at various hours of the day," and found that instrument-panel banks, dining, and recreation could be combined to form a major public volume.

The architect felt most strongly about a place of privacy for each man. Next to a dull diet and the lack of female companionship, the lack of privacy is probably the largest source of irritation to men in restricted environments, such as the Antarctic stations or ships. Although there is a faction in the space program that favors "hot bunks" (used in shifts by several men), both Grumman and WBTL felt that performance and morale would be significantly improved if each man were assigned a place of inviolate territory. The problem was then to arrive at an optimum size. How large a volume could be afforded, and how small was too small? WBTL finally arrived at an idealized minimum of 350 cu ft — or a 7 ft cube, which is about the dimensions of the human form with arms outstretched. This provides stretching room in each dimension, and gives the crew members the option of changing their "floor" plane. Although floor planes are fixed in most areas of the station, the weightlessness of zero-gravity makes it possible in private quarters to indulge in a bit of play-

STATES OF BEING/STATES OF STRESS MATRIX

HABITABILITY CRITERIA										DESIGN FACTORS	
PHYSICAL COMFORT	CONVENIENCE	EASE OF MOVEMENT	EASE OF MAINT.	SAFETY, RELIABILITY	SENSE OF SECURITY	SENSE OF ORIENT	PERSONAL IDENTIFICATION	SOCIAL AREAS	PRIVACY AREAS	AESTHETIC VALUES	VARIABILITY
●		●	■	●		●	■	■	■	●	■
				●		●	●	■	■	●	●
					●	■	■	●		●	●
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●	■	■		■			●	●			
■	●	●	■						■	■	●
				●	●	●				■	
				●	●	●					■

Relative importance of design-habitability relationships are represented by blanks (least important), squares (most important), circles (intermediate importance). For example, freedom of crew to change environment (Flexibility) is relatively important to a Sense of Personal Identification.

It is probable that stations will eventually operate in artificial gravity, to be created by spinning the station like a centrifuge. In the first station, however, artificial gravity is now planned only as an experiment and the normal state of existence will be Zero-G; so provisions are made for the hazards and problems — or delights — of weightlessness.

Environmental stresses will obviously affect the habitability of the space station. And the well being, if not the survival, of the crew will depend to a great extent upon the control of stresses.

that the work of physician Dr. Hans Selye not only provided new insights but corroborated much of their intuitive conjecture. Dr. Selye's research into the effects of stress on physiology and endocrinology spans almost half a century, but has only recently been discovered by environmentalists.

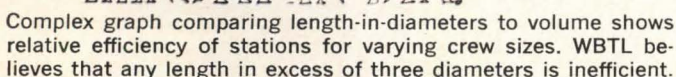
Selye has found that certain types of unrelieved stress can cause the body to fail in much the same manner, coincidentally, that steel fails. He points out, however, that complete lack of stress also leads to degeneration, and some of it is needed to properly maintain the body.

Some of the design details that have been suggested to provide stimuli are worth noting; Contrast of lighting to denote "night" and "day" and to mark off different functional areas, bright spots of color, which provide "the most impact for the least money," variations in texture, and changes in temperature.

To say that Project Space Station captured the imagination of the architects (best known for their campus, hotel, and library work) would be something of an understatement. It became a day-and-night obsession with several of the staff who finally had to be rotated to other projects in the office. "After a while, we have to give them a vacation," explains Dan Toan, partner-in-charge.

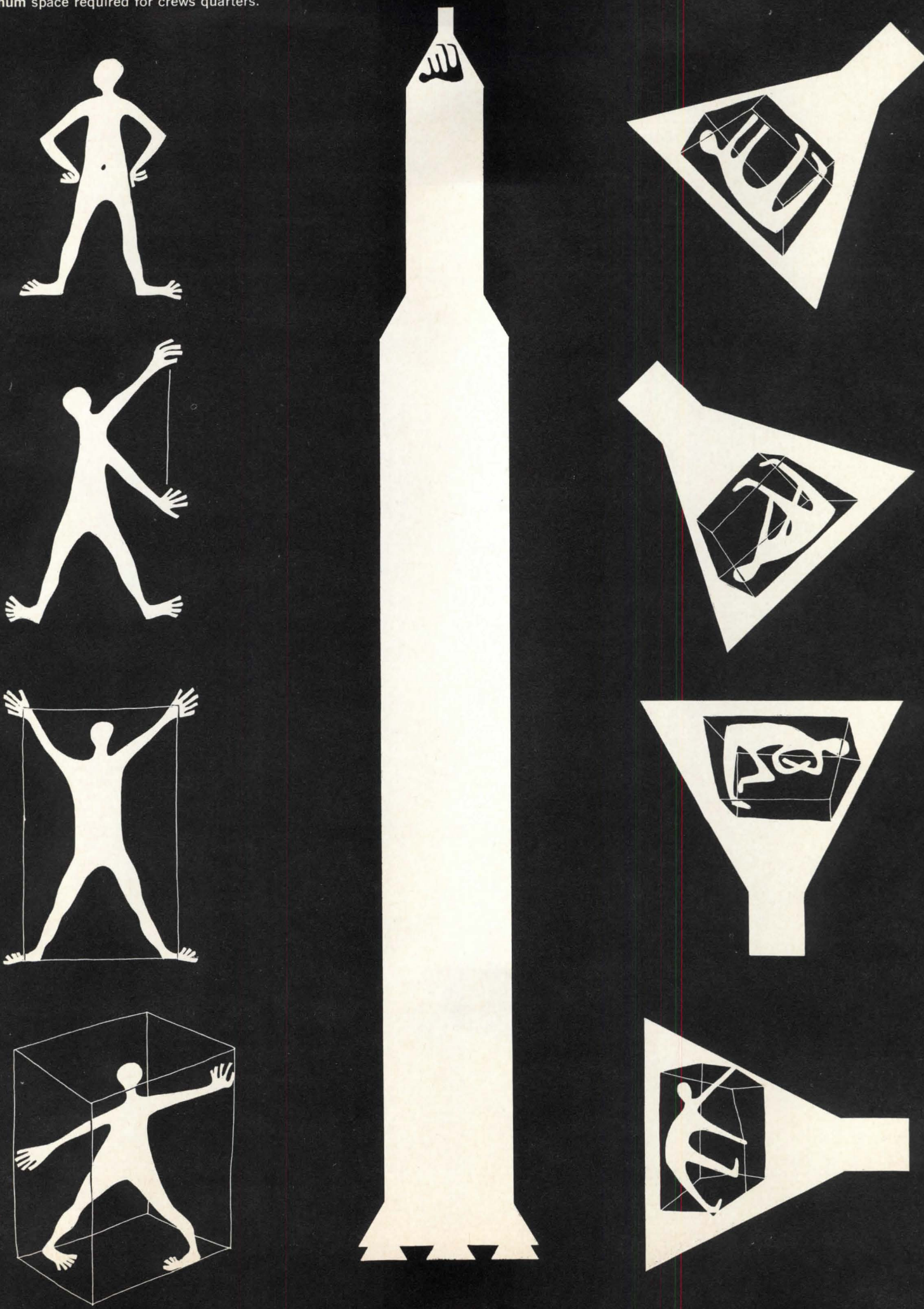
Many alternate plans came off the boards, reams of reports, charts and diagrams were drawn up and filed away, many models built, a full scale mock-up constructed at the Grumman plant on Long Island, a 20-minute film on habitability (*2001* in miniature) produced. WBTL reports that the films proved to be the most effective way of conveying ideas on the use of volume, and may have been instrumental in influencing the new standards issued by NASA last spring.

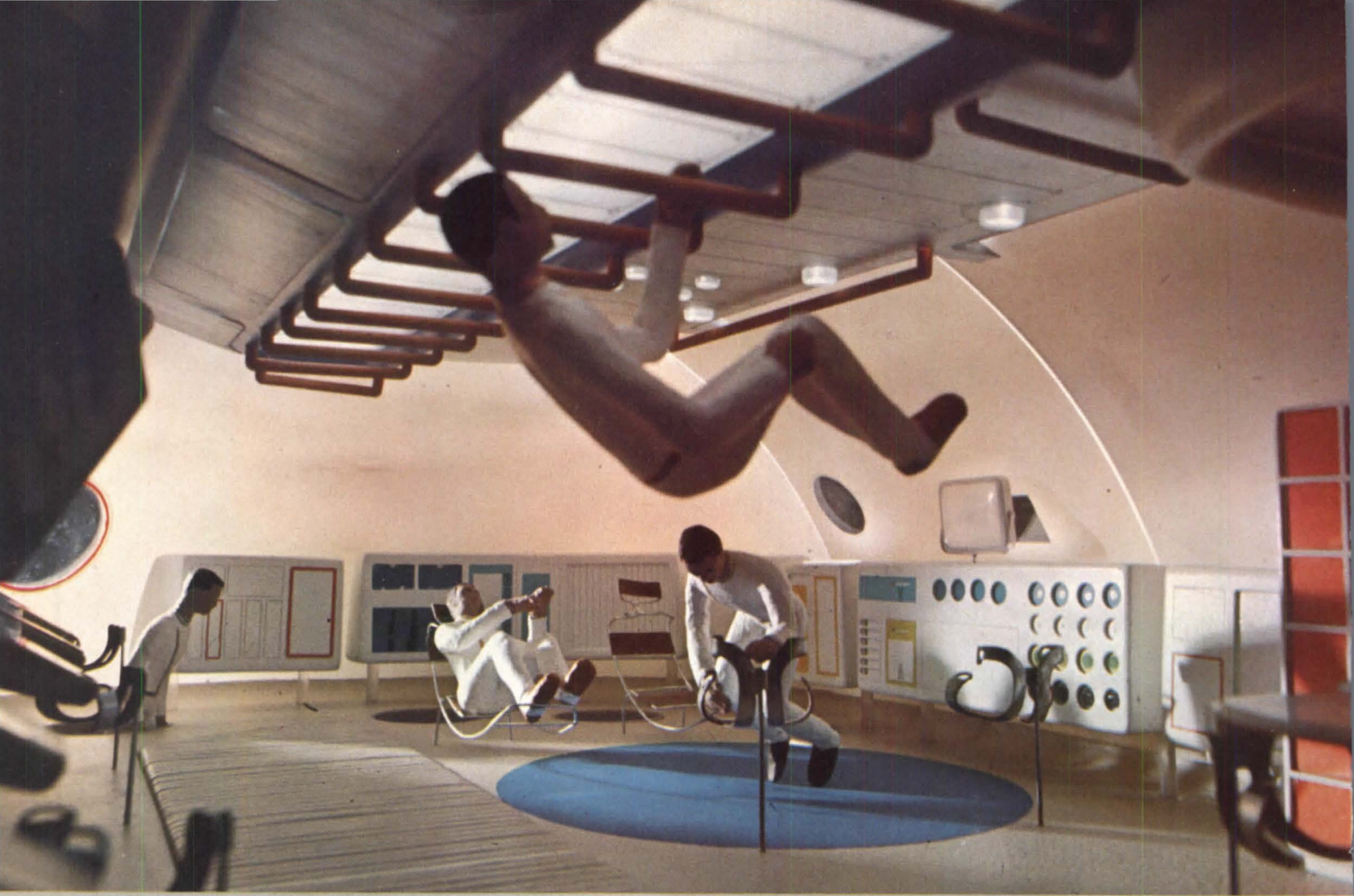
The sampling of schemes shown on these pages is selected from among many. It illustrates the comparatively non-technical, idea-generating function of the architects in the Grumman team. Magic markers, models, and the classic architectural "but why can't we do this" approach launches architecture into the space age.



GETTING INSIDE SPACE

Cartoon strip abstracts development of ideas on ideal minimum space required for crews quarters.

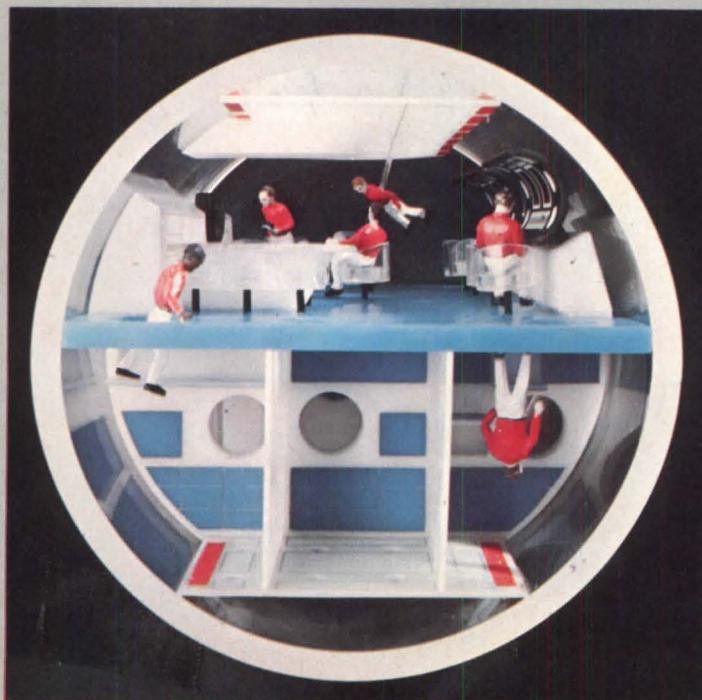


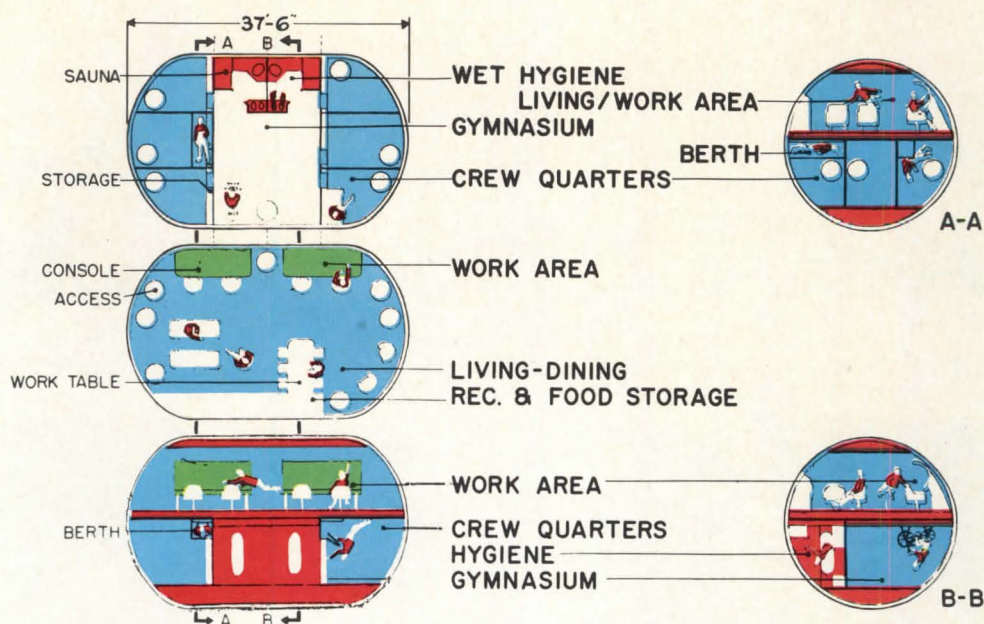


Roomy interior combines work consoles with living areas on "top" deck. Open corridor is marked by textured floor runner and grip bars above. Section below includes crews' quarters on "bottom" deck.

The Longitudinal Deck:

STRETCHING VOLUMES





22' Ø 6 MAN PROTOTYPE

The cylindrical shape of the station has been rather firmly determined by its launching rocket, the Saturn V. Length is flexible since "cans" are built up in increments from 7 ft-6 in.-long drums, and diameters up to 33 ft can be fitted to the rocket assembly. When Warner Burns Toan and Lunde entered the picture, Grumman was working with a stack of horizontal decks. Dan Toan's first design decision was to turn decks longitudinally. This gave the eye, on one deck at least, a rest from confined volumes with a sightline running the length of the station. Grumman engineers dubbed it the "hero" (New York's long sandwich on a loaf), as opposed to their "hamburger."

Several volumetric configurations were explored using the long deck. Although WBTL worked with a 15 ft diameter, they opposed the severely restricted volume. They feel that the 22 ft can is feasible, and the 33 ft preferable.

Dividing the station with two decks was tried, but the final scheme called for one deck running through the middle of the station. Working and living areas on either side of the deck were oriented foot-to-foot, which makes the plan feasible only for Zero-G. The architects felt that the astronauts could easily orient to the scheme since they will probably pull themselves through deck hatches head first and arrive on the "bottom" deck with their feet toward the floor.

In major areas of the station, a conventional "up" and "down" was felt to be desirable for a number of reasons. It simulates an earthlike environment and

therefore promotes a sense of security; it makes face to face communications easier since facial expressions are all but unreadable upside down; collisions will be less likely if the plane of vision is constant; and volumes will be less crowded if "ceiling" planes are left free of work stations.

An important contribution made by the architectural team was actually an engineering idea — to organize the equipment into a multi-purpose deck. This concept of the central utility core carries through all later schemes.

ASPECTS OF ORIENTATION MOVEMENT RELATIVE TO A "FLOOR"

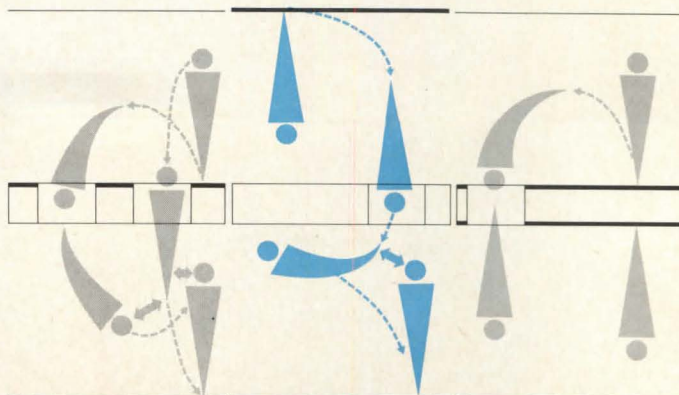
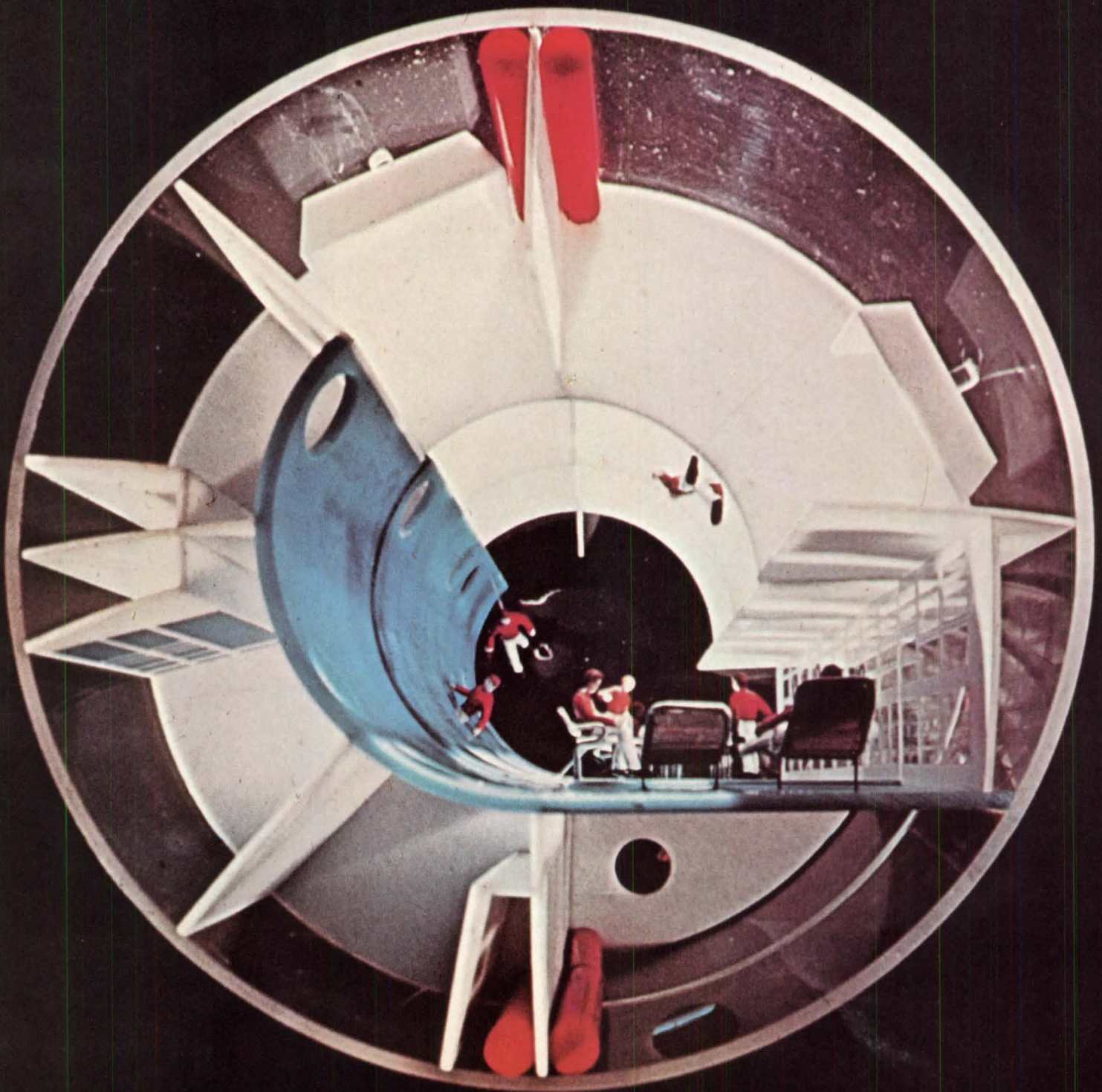
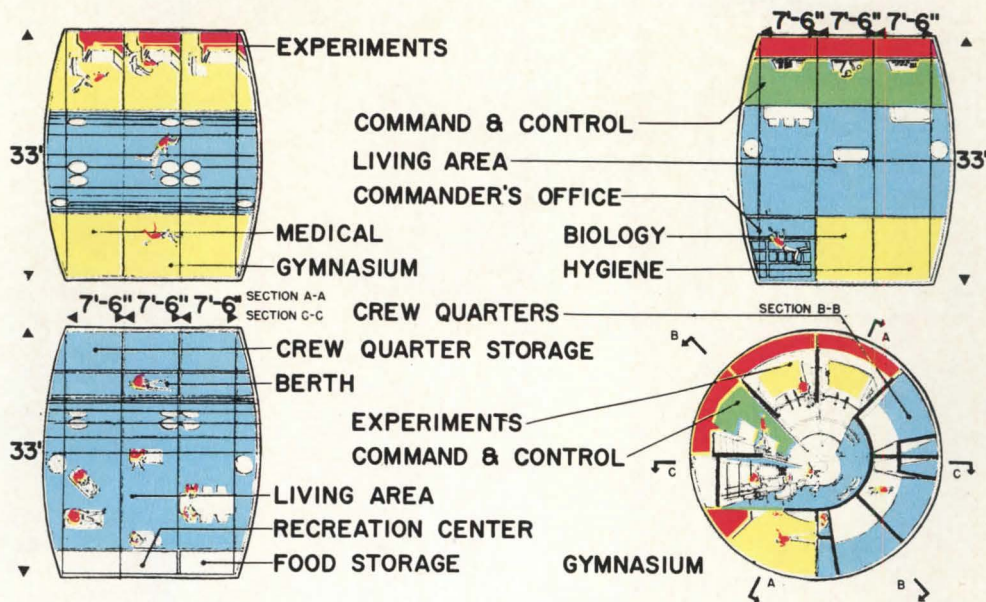


Diagram above illustrates why architects chose foot-to-foot decks over other two orientations.

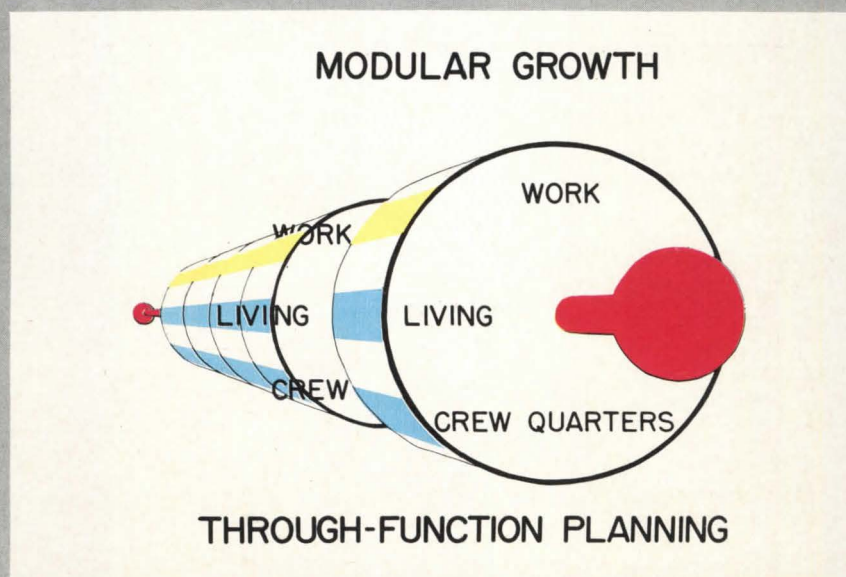
Taking Advantage of Zero Gravity: WRAPAROUND VOLUMES

Double orientation takes full advantage of weightlessness. Station growth diagram illustrates advantages (in both longitudinal and wraparound decks) of adding all functions in each 7 ft 6 in. drum.





33' Ø 6 MAN PROTOTYPE



Perhaps the most intriguing volumetric plan is one that takes full advantage of the properties of weightlessness. Decks are oriented horizontally as well as vertically around a central volume that is both compact and spacious.

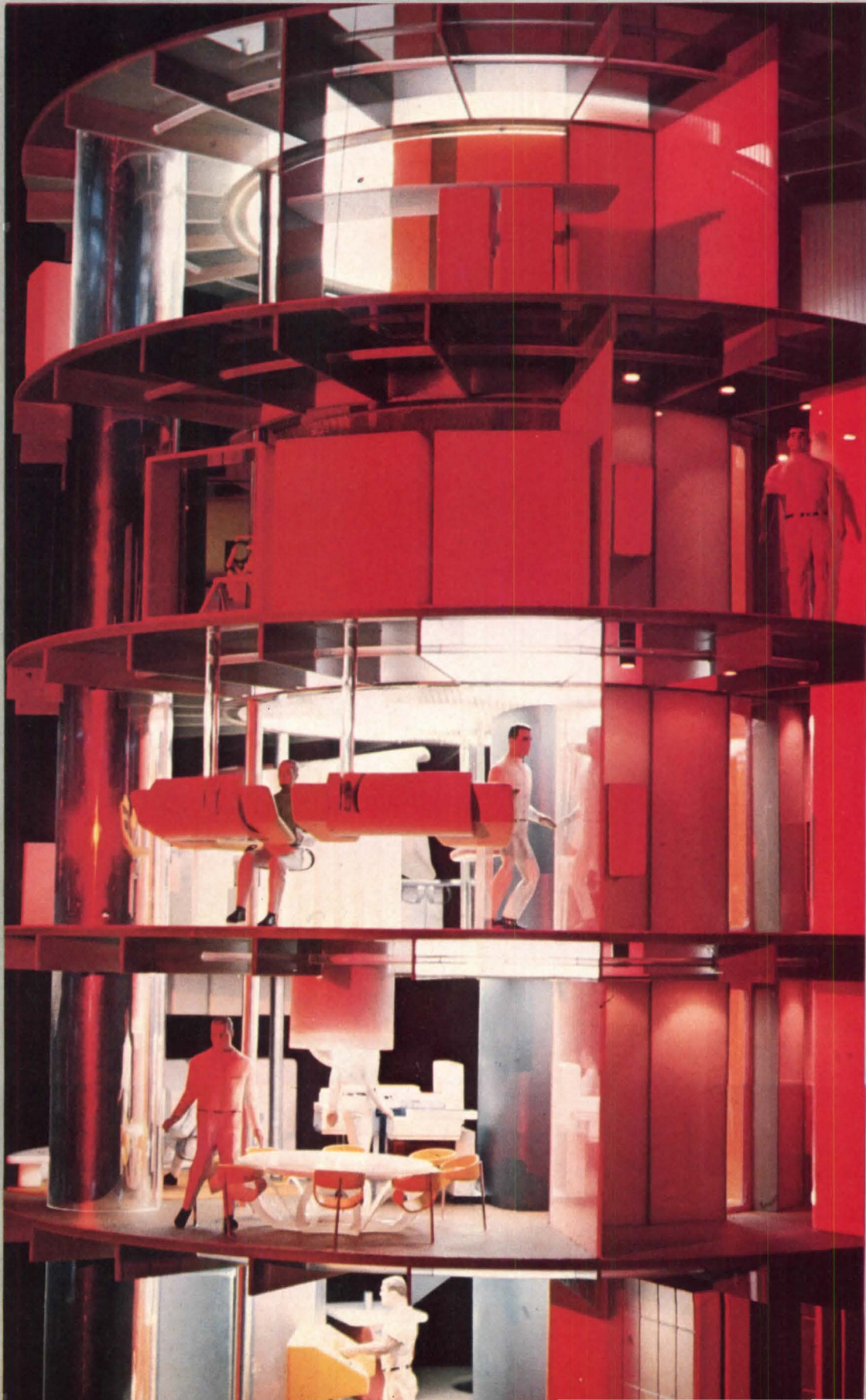
Command and control, laboratories, and instrumentation occupy open balconies around one half of the central volume, while a curved floor/wall on the other side provides separation for crews' quarters, exercise room, hygiene stations, and so on. NASA would like to have as much flexibility as possible in changing stations on the ground — adding or

subtracting the 7 ft 6 in. modules. "Stubby," as the architects call it, is most successful from that point of view since with each module, parts of each functional area are added.

Even though the scheme could not be used in a continued artificial gravity situation, its clear expression of the properties of space, of life in space, of the body freedom, are appealing to the imagination. Where is the fun, after all, if the earth environment is too closely duplicated? Taken to extremes, it could mean lace curtains and French provincial in lightweight plastic.

Launch-Pad Convenience:

HORIZONTAL VOLUMES



Bio-Medical

Experiments

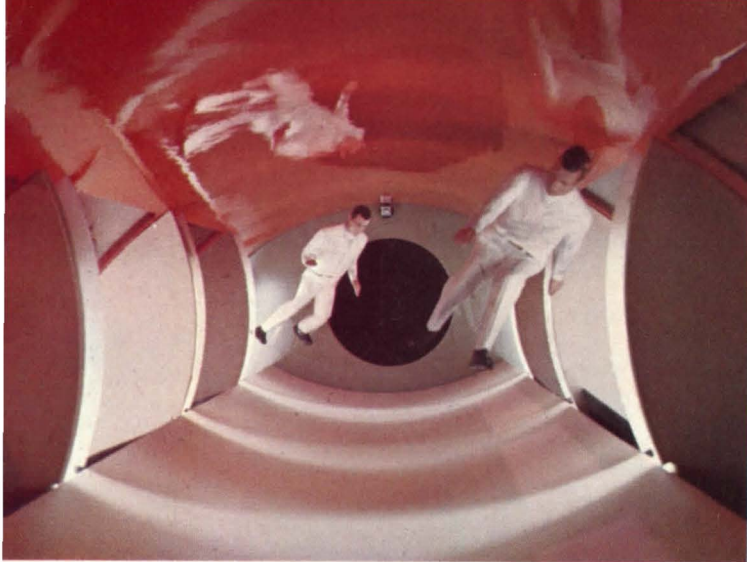
Gymnasium

Command and
Control

Crews Quarters

Living

Logistics



Escape-circulation corridor connects station vertically.

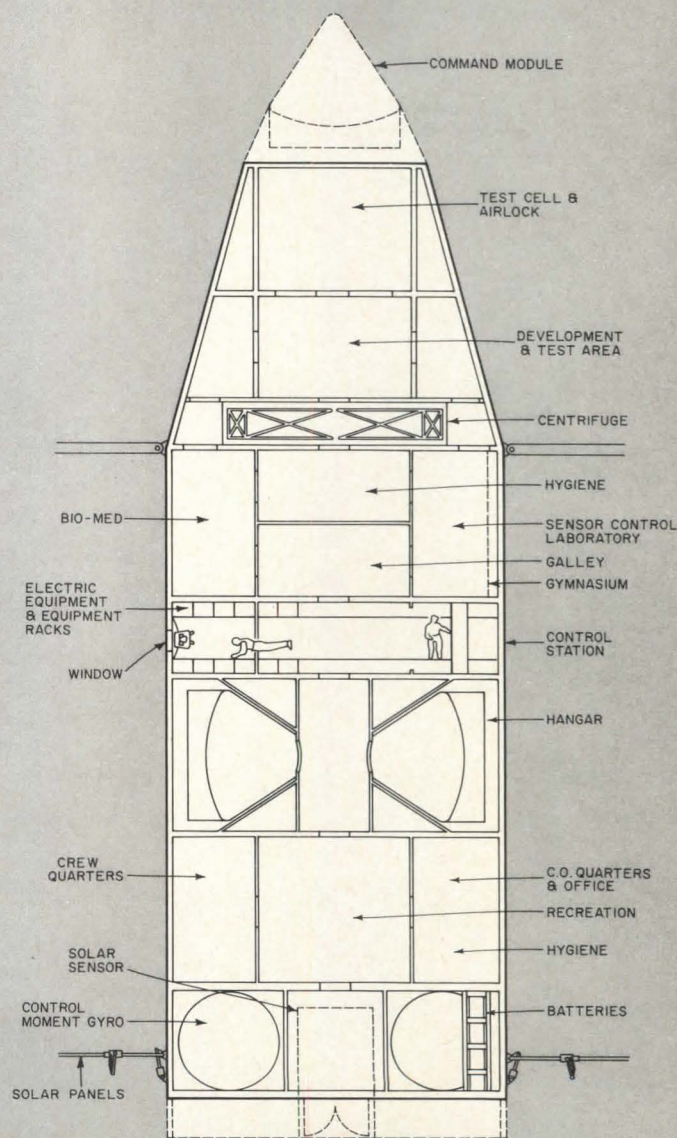
The *current proposal* for vertical stacking goes back to early Grumman schemes, and is the result of a request from NASA, which feels that any other configuration would be too difficult to check out on the launch pad.

The stacking of horizontal decks not only eliminates the major volume, but further restricts deck space with a vertical corridor. The corridor shaft serves two purposes: 1) circulation, which may be by fold-away elevator in artificial gravity, and 2) an escape tunnel where the crew can retreat if the outer skin of the station is punctured by meteorites. In such an emergency, the tunnel can be sealed off while repairs are made by crew members in protective suits. The utility wall now surrounds the main shaft and rises vertically through the station.

WBTL has gained as much space as possible by pushing the tunnel off center to free the space amidships for work and communal areas. They have also flattened it from a cylinder to an oblate tube. This makes it easier for the men to orient themselves while floating between decks, helps to prevent collisions, and makes the spaces adjacent to the shaft more workable.

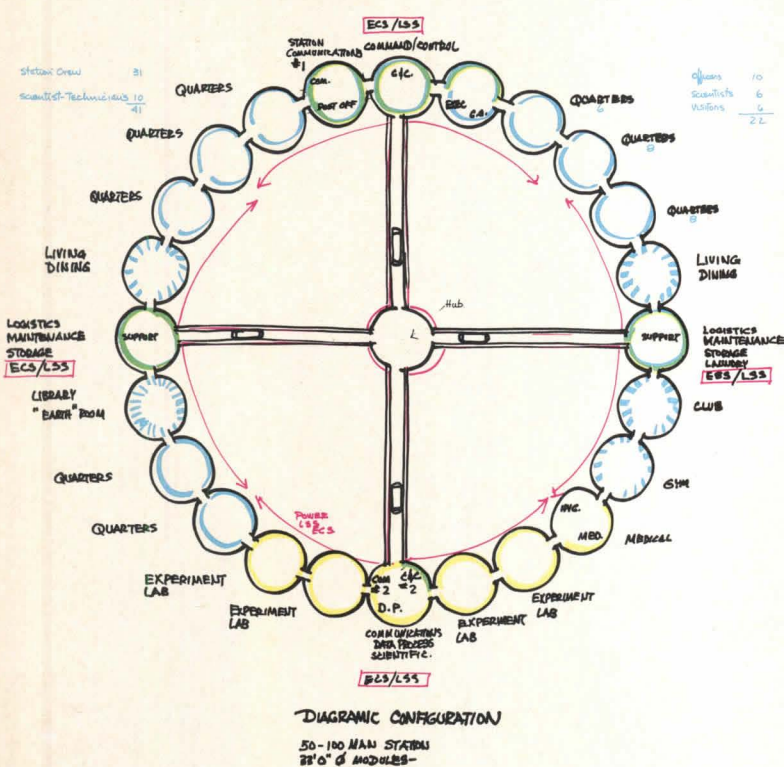
Design work has now progressed to a stage where the architects feel that the help of specialized consultants is needed. They are talking to Mel Par, Inc. (plumbing), ILC Industries, Inc. (clothing & fabrics), an international hotel chain, and Herman Miller.

It is too early to tell what Miller might recommend in the way of furniture, but Toan is thinking in terms of inflatables — not only for chairs and beds, but for walls. And floors covered with soft plastics . . . and weightlessness . . . and floating in space . . . and what did Nero's Rome have on outer space!



Architects' recommendations since this 1967 Grumman design have influenced two major aspects of internal configuration. Docking has been transferred from mid-point to the end of the station, where it will not divide human spaces. And the tunnel-corridor has been substituted for hatches, thus facilitating through circulation. Also note that special quarters for the commanding officer have been dropped from the architects' designs.

Wheeling in Space: COMMUNITY VOLUMES



CREDITS: SPACES IN SPACE

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John Rigsby — Habitability
Ernest Hansberry — Human Factors

NOTE: The information in the accompanying article is proprietary with Warner Burns Toan and Lunde and the Grumman Aerospace Corporation, and is to be included in a forthcoming book on the subject of Habitability.

Photography:
P. 132, (top) Louis Checkman
P. 132, 133 (bottom) Robert Galbraith
P. 138, 140 Robert Galbraith
P. 142, 143 Jerry Spearman

Along with other formal requests from NASA last spring, including that for vertical stacking, came the announcement that work should begin on the 50-man base. And any firm wanting to stay in the competitive race for design and hardware contracts will, like Grumman, expand its program to include the base, which is to be assembled in station-size units in space. Speculation now is that the space program may go to this more ambitious stage of development very soon after putting up the first station, rather than waiting until the mid-80's.

Whereas individual stations might be compared to a family unit, a base of 50 men, and perhaps women, must be analyzed in terms of community and the sociology of large groups. WBTL drew on today's knowledge of urban ecology in their analysis of the "communitability" of large bases. The two major alternatives were either a series of stations rotating around a Zero-G hub on long tubes or one large cylinder made up of a stack of stations. The architects opposed both of these proposals as they stood since both would be isolative; one in the manner of the suburbs, and one like a high-rise urban building. They proposed instead a scheme that would be comparable to the low-rise cluster — a compact interconnected ring of stations. The units would extend from the central Zero-G hub, but would also be connected to each other so that traffic could flow almost directly from station to station.

An important factor in choosing an earthside neighborhood, WBTL's informal office poll not surprisingly discovered, is accessibility. This means not only that you can get there in a hurry, but that you can also get away in a hurry. And this, in turn, assumes that there are attractive activities close by. The architects therefore propose a variety of specialized stations rotating about the hub: residential and work stations will be supplemented by entertainment and service units such as restaurants, bars, theatres, a post office, and a gymnasium.

In the face of the country's domestic crisis, the space program is under heavy fire these days. But a top space science administrator has pointed out that man's major problems are rarely solved directly, and that in moving to new frontiers, old problems often disappear and new solutions come to light. From the standpoint of architectural standards, man's earth environment may benefit from the exploration of the space frontier.

As Dr. Fraser remarked, the state of the environmentalist's art is still far from rigorous. The intelligent use of space, particularly in cities and urban buildings, is becoming critical, and the lack of reliable standards is often lamented. Perhaps the work of Warner Burns Toan and Lunde in habitability and communitability will help to fill that gap in the textbooks when their successes and failures have been measured in space. — A.R.



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Systems Building and Performance Criteria

A shift from our present materials-oriented approach to design to systems design will change the nature of specifications writing. Rosen is Chief Specifications Writer for Skidmore, Owings & Merrill, New York City.

The advent of systems buildings and design and the increasing use of the computer may very well change the manner in which specifications are written today. Generally speaking, architectural specifications are divided into a series of technical sections, each of which describes materials and their installation related to a unit of work.

For example, the masonry work shown on drawings might include face brick, concrete block, gypsum block, mortar, metal ties, and anchors. Specification writers can take several routes to incorporate the information required for these items concerning the quality of materials and workmanship into their technical sections. They can write separate fragmented sections, each dealing with only one area of the scope of work, or they can amalgamate all of the information into one section as follows:

EXAMPLE 1

- 4A: MASONRY, GENERAL
 - 4B: MASONRY MORTARS
 - 4C: FACE BRICK
 - 4D: CONCRETE BLOCK
 - 4E: GYPSUM BLOCK
 - 4F: STRUCTURAL FACING TILE
 - 4G: MASONRY ANCHORS AND TIES
-

EXAMPLE 2

-
- 4A: UNIT MASONRY
-

In Example 1, MASONRY, GENERAL includes primarily the installation of all masonry materials specified under the separate sections listed below it. In addition, in Example 1, each of the materials are specified under separate sections. The reason for this fragmentation is to enable

the specifier to write Master or Guide Specifications for each individual item. For the specific project, some sections on materials are omitted where they do not appear on the drawings, and each of the remaining sections are edited to conform to the project requirements and then issued as a series of technical sections.

In Example 2, all of the masonry materials and their installation are written in a single section. In typical state highway department specifications for roadwork, one finds that, traditionally, all materials are described in one section of the specifications and workmanship and installation are specified in another section.

All of these methods of organizing the material that comprise specifications and the manner in which they are written will undergo dramatic change as we enter the era of building systems design and the employment of the computer.

Systems building and design will be concerned more with subassemblies and composites rather than with individual materials and products. Our current test methods and procedures for the evaluation of performance is based primarily upon individual components. Very few standards exist on the performance of subassemblies and composites. In addition, the design of a building system will cut across the design disciplines as we know them today. Architects and engineers will have to merge in order to design composite units. Likewise manufacturing plants in the production of these subassemblies will resemble automobile or aerospace plants rather than building materials manufacturers. The installation of these subassemblies, too, will

defy current traditional labor practices. The entire design and construction process involved in systems building will affect the current concept of specifications writing.

It is still too early to predict how specifications will be written to conform to this new concept. However, if we can understand the new dimensions of systems buildings we can begin to formulate the requirements of tomorrow's specifications. First, new test methods will have to be devised to cope with the performance requirements of subassemblies and assemblies. This will require the establishment of criteria for structural adequacy, fire resistivity, sound transmission, thermal conductivity, sound attenuation, and mechanical and electrical properties to provide for physical comfort by controlling heating, cooling, and illumination.

One approach to systems building may require that the design team establish the parameters for a project, setting forth aesthetic controls, with the specifier establishing the performance characteristics required to meet these conditions. Obviously, the specifier will no longer be dealing in items of specific materials or products, but rather in the broader range of subassemblies and components. No longer will he be describing in cook book fashion how to lay brick upon brick. Instead, his specification will be concerned primarily with performance and results rather than description and methods. Individual or combined sections on materials and their installation will give way to systems performance specifications where technical sections will establish the parameters of assemblies of floors, ceilings, and walls on the basis of life safety, acoustics, structure, and so on. But before he can write these requirements, standards making bodies such as ASTM will have to get involved in the writing of test procedures for the evaluation of these criteria.

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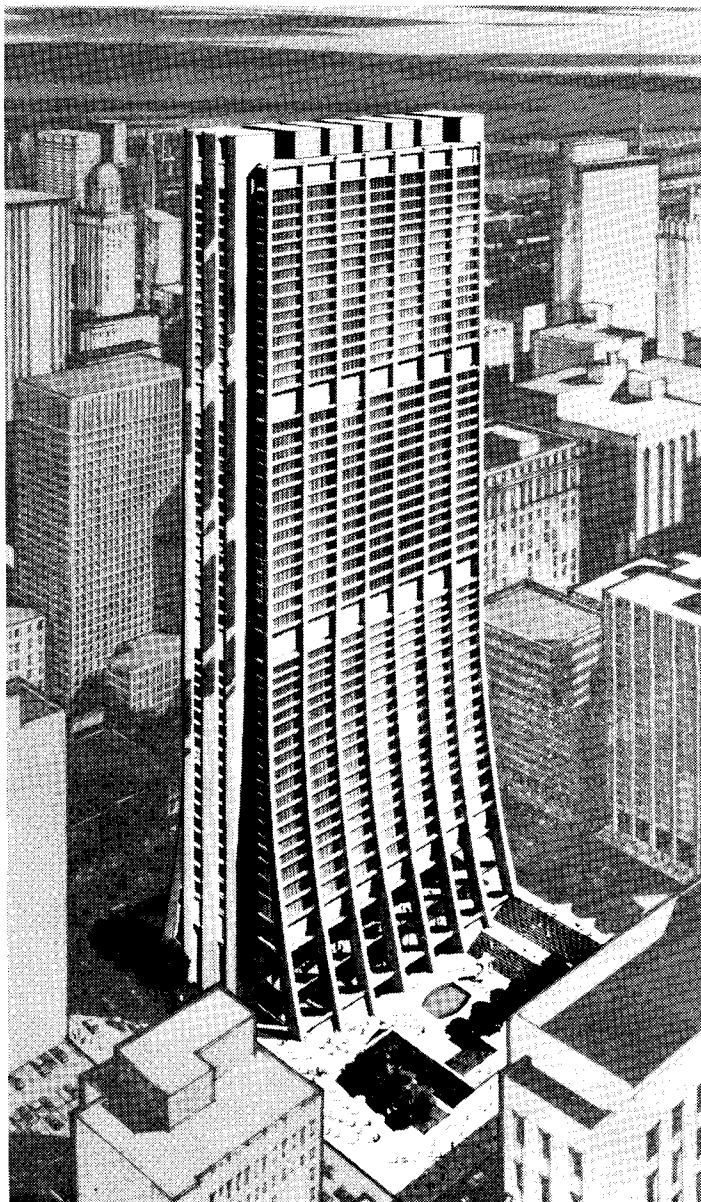
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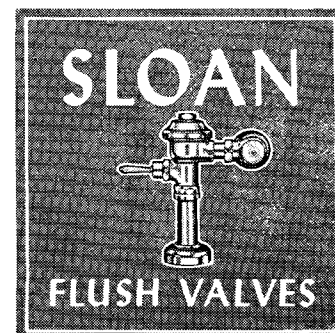
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Consultation Contracts! Where Are They Valid?

If an architect from one state is called upon for consultation services by an architect from another state, is the contractual arrangement valid if the consultant is not licensed to practice in the other state?

The Supreme Court of Vermont has rendered a decision which can seriously inhibit the practice of architectural firms who are called upon by other architects for consultation. The issue before the Court was whether the rendering of consulting services in Vermont by a Massachusetts firm, none of whose members were licensed in Vermont, constituted a violation of the Vermont Architectural Registration and Licensing Law. The Court concluded that the rendering of consulting services was contrary to the Vermont statute, and that the contract between the consulting architect and the architect of record was therefore unenforceable. (*Markus & Nooka v. Julian Goodrich Architects, Inc.*, 250 A. 2d 739).

In this case the defendant, a Vermont architect, was retained to design a project consisting of an addition to a hospital located in Burlington, Vermont. The addition was to incorporate an outpatient department, emergency department laboratory and x-ray department. The architect was directed by his client to engage the services of a Massachusetts architectural firm, specializing in hospital design, as consultant. The consulting firm rendered services which included the study of the medical needs to be incorporated, inspection of the premises, consultation with the hospital staff, preparation of equipment and construction cost estimates, detailed drawings of specialized rooms, and participation in revision of preliminary sketches. The design recommendations of the consulting firm were not accepted and the project was actually put

out to bid and constructed on the basis of the working drawings and plans of the defendant, the architect of record. Although the contract between the architect of record and his consultant called for compensation to the consultant at the rate of 1% of the cost of construction plus expenses, the architect refused to pay the consultant any compensation and the latter instituted suit to collect the same. After trial a judgment was awarded in favor of the consultant. This judgment was reversed on appeal.

The Architectural Registration and Licensing Statute of Vermont provides that the practice of architecture for which a Vermont license is required includes "any professional services, such as consultation, investigation, evaluation, planning, designing . . . or responsible supervision of construction in connection with any buildings, structures or projects . . . wherein the safeguarding of life, health or property is concerned or involved." The Supreme Court of Vermont, in reversing the award of damages by the trial court to the consulting firm stated the following:

"Architectural contracts entered into in violation of such registration statutes are held to be illegal, and the provisions for payment of commissions under them are unenforceable. The underlying policy is one of protecting the citizens of the state from untrained, unqualified and unauthorized practitioners. It has been applied to many professions and special occupations for similar protective purposes."

* * *

"It is unquestioned that these activities were carried on in connection with con-

struction to be undertaken within Vermont. The facts show that the plans and sketches were developed on the basis of information obtained from visits to the Vermont site and consultation with the Vermont Hospital personnel. Indeed, the acts evidencing performance under the contract, sufficient at law or not, have no other relevance than to this Vermont project on its Vermont site. Thus they are within the ambit of the Vermont architectural registration statute, 26 V.S.A. sec. 121, previously set out."

* * *

"26 V.S.A. sec. 121 specifically mentions consultation as one of the activities proscribed for one not registered. This is not to say that any kind of consultation between architects of different states can be contractually valid only with registration. It does mean that when the non-resident architect presumes to consult, advise and service, in some direct measure, a Vermont client relative to Vermont construction, he is putting himself within the scope of the Vermont architectural registration law. Nothing in that law suggests that the services must be somehow repetitive to be prohibited. No basis for excusing this plaintiff from its express provisions appears here."

The assumption of responsibility for plans and specifications which are prepared and filed for a particular project is one of the primary elements in the practice of architecture. However, the courts and state regulatory agencies do not necessarily accept responsibility as the sole factor in determining whether architecture is being practiced. In many instances, such as in the case reported on, they define that practice in terms of the functions being performed. If the profession is to have greater flexibility then it would seem that the licensing and registration law of many states require modification.



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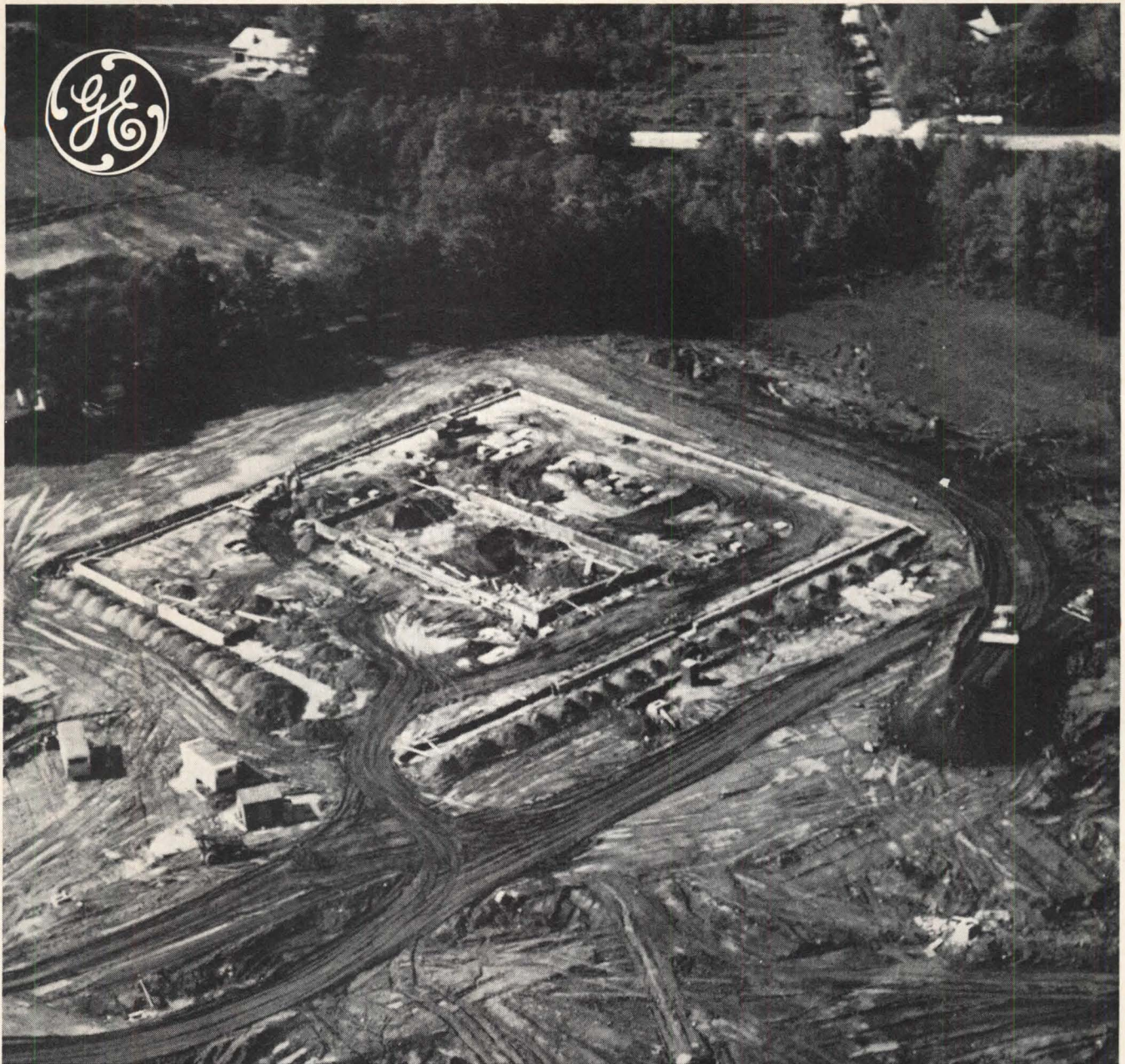
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BOOK REVIEWS

Modern Hammurabi Code

A REVIEW BY JEFFREY ELLIS ARONIN

LEGAL PITFALLS IN ARCHITECTURE, ENGINEERING AND BUILDING CONSTRUCTION. *By Nathan Walker, LL.B., and Theodor K. Rohdenburg, McGraw Hill Book Company, 330 West 42nd Street, New York, N.Y., 1968. 270 pp., \$11.95. The reviewer is an architect practicing in New York City.*

In 1801, Napoleon Bonaparte pinpointed the responsibilities of architects as follows: "If a building perish in whole or in part within ten years, from a defect in construction, or even from the unfavorable nature of the ground, the architect superintending the work, and the builder are jointly and severally liable for the loss."

Architects know that laws pertaining to architecture exist, but they are not always sure of their application. It is fortunate and timely, therefore, that the two distinguished authors, Nathan Walker and Theodor K. Rohdenburg, have placed in focus the principal legal responsibilities of architects, engineers, and contractors in the U.S. These responsibilities become pitfalls when they are not followed.

The book is entirely positive in flavor, since Rohdenburg is a practicing architect and Walker has been a legal counsel during the past 20 years for the New York Chapter of the AIA.

The authors cover the legal implications of architectural documents in different states. They remind us that in New York the contract *must* be in writing if the services are not to be completed within one year. No work should be started before an agreement has been signed. How many architects are negligent on this score, either willingly or unwillingly? With private clients, we have a choice; but not so with public ones, where we have to play along with school boards until voters approve bond issues, or with other groups until funding is obtained from Federal or state sources. Walker and Rohdenburg lay down the ground rules, but do not always relate them to the problems of doing business in 1969. If there is any weakness in the book, it is in this area. Judicial decisions handed down in 1898, 1919, or even 1930 carry little weight if they are not relevant to today's society. I hope that, to supplement this otherwise fine volume, the authors will write another that will indicate what new laws should be enacted to protect and guide the architect in the *future*. They could consider such topics as: statutes of limitation (a *Nixonic Code*?) ; multi-zoning of a given property; laws for new forms of construction (as where coastal waters and lagoons form sites for housing) ; the merits

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(Continued on page 160)



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