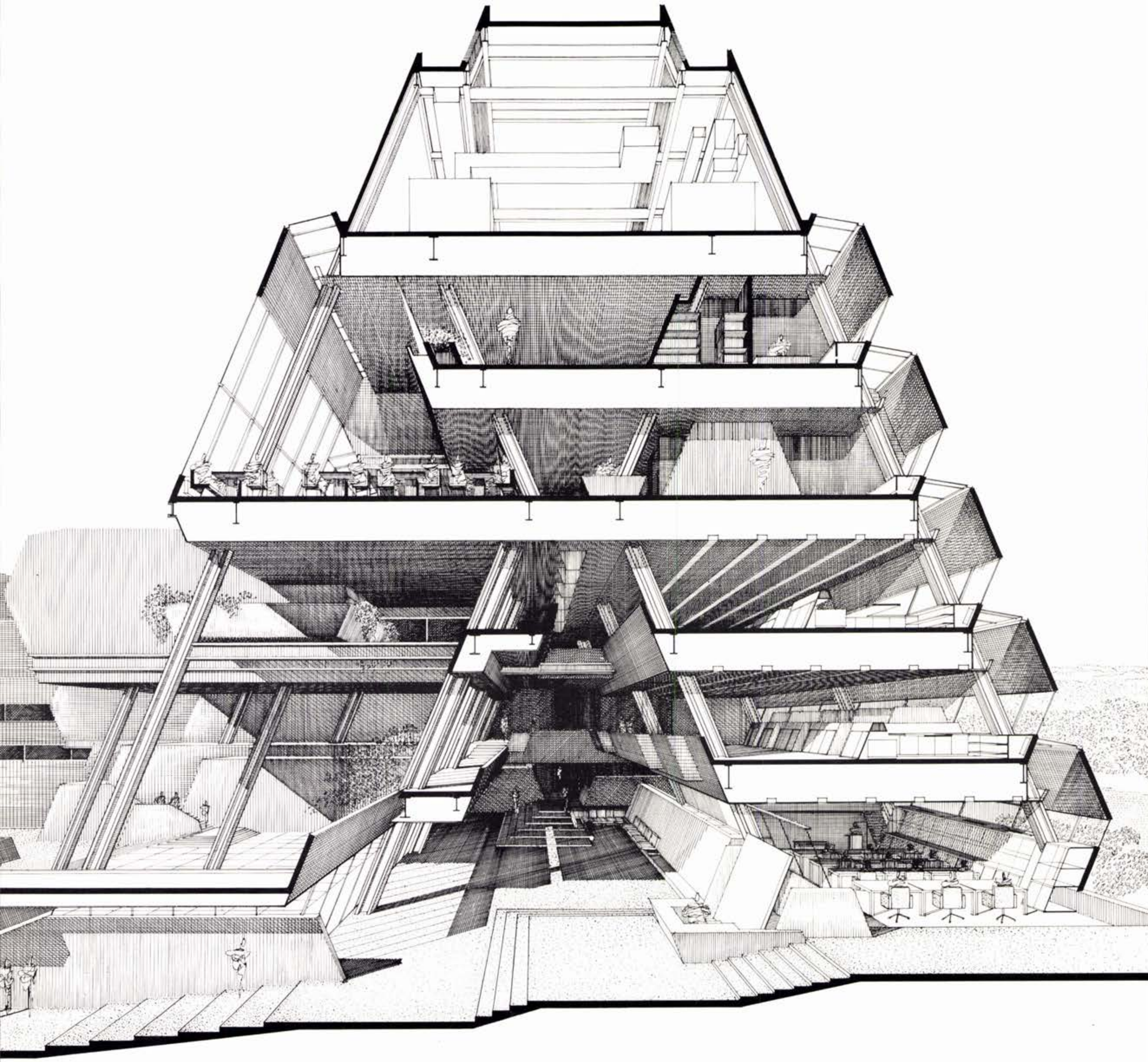


PAUL RUDOLPH: WORK IN PROGRESS

1971 F. W. DODGE CONSTRUCTION OUTLOOK

UNIVERSITY OF NEW HAMPSHIRE DORMITORIES BY ULRICH FRANZEN

BUILDING TYPES STUDY: SCHOOLS

ARCHITECTURAL RECORD

NOVEMBER 1970 11 A McGRAW-HILL PUBLICATION TWO DOLLARS PER COPY

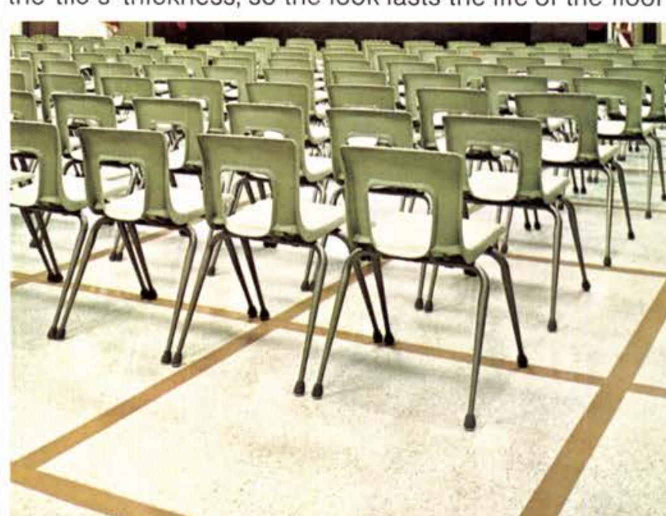
The modular design of the exterior is picked up on the inside by customizing with standard flooring materials: Imperial Modern Excelon Tile and Excelon Feature Strips.

This crisp, modern facade belongs to the Education Center for the Charlotte-Mecklenburg Schools in Charlotte, North Carolina.

ARCHITECTS: Charles Morrison Grier & Associates, Inc., 904 South King's Drive, Charlotte, North Carolina.
INTERIOR DESIGNER: Mrs. Sue Goodman of the Grier firm.
CONTRACTOR: James E. Cox Construction Inc., P.O. Box 11528, Charlotte, North Carolina.
FLOORING CONTRACTOR: Carter Floors, 189 Trade Street, Matthews, North Carolina.

Imperial Modern Excelon (vinyl-asbestos) does a double job for this Charlotte facility. It provides an economical, long-wearing floor. And with 28,000 lineal feet of 3" feature strip, it color-coordinates the files, furniture, and accessories.

The Imperial Modern Excelon used here is ⅛" gauge. Depending on service and budget requirements, 3/32" gauge is available as an alternate. In both cases, the contemporary, mottled pattern goes all the way through the tile's thickness, so the look lasts the life of the floor.



Cover: Burroughs Wellcome & Co., Inc.
Research Triangle Park, North Carolina
Architect: Paul Rudolph

THE RECORD REPORTS

Louis Checkman

ARCHITECTURAL BUSINESS

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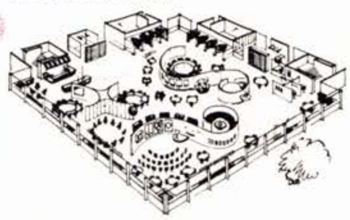

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Alternates to suburban sprawl: new processes, new involvement

The areas around our cities—the suburbs and (I guess it's still a word) the exurbs beyond—don't get too much attention these days. Compared to our central cities they seem less of a problem—and certainly it is generally true that they have fewer poor, fewer social problems, less troubled schools, better housing. But problems there are, and they need attention right now—because next year we're going to be booming away at housing again, in what may be the biggest year for housing since 1950. (George Christie, in the 1971 F. W. Dodge Construction Outlook detailed on page 67, sees a 21 per cent increase in residential building next year, much of it in apartments but plenty of it in single-family housing.)

The problems of the suburbs got some effective attention at a meeting held in mid-October by the American Wood Council. (That organization, an alliance of trade associations and companies in the wood products industry—while understandably very active in the promotion of new, better, and more uses of wood—has also done a great deal of effective work "dedicated to improving America's living environments through the design and construction of better housing and more efficient use of the land."

The Wood Council's seminar was held, appropriately, at Wesleyan Hills—a new community in Middletown, Connecticut (within commuting range of New Haven and Hartford) that is being built as a series of mini-neighborhoods separated by 90 acres of land left open for common use—one alternate (and a nicely designed one) to suburban sprawl.

The cast was a good one: the men responsible for the development of several of the best planned unit developments around the country; NAHB's John King; several architects (Robert Hayes, who is involved in very low-cost, very high-density communities in California; John Schmidt, who is director of architectural and construction research for the United States Savings & Loan League; and John Bloodgood, who recently resumed practice after a long stint as buildings editor of Better Homes & Gardens); planner Fred Bair; Bill Houseman, editor of Environment Monthly; and McKim Norton of the Regional Plan Association of New York.

After a slide presentation (for openers, for reference, and for tears) of typical subdivisions in all price ranges, the panel and the audience (editors from professional and shelter magazines, as well as news weeklies and newspapers) got right to the problems of suburban sprawl and what can and cannot be done about them. The discussion centered mostly on two points:

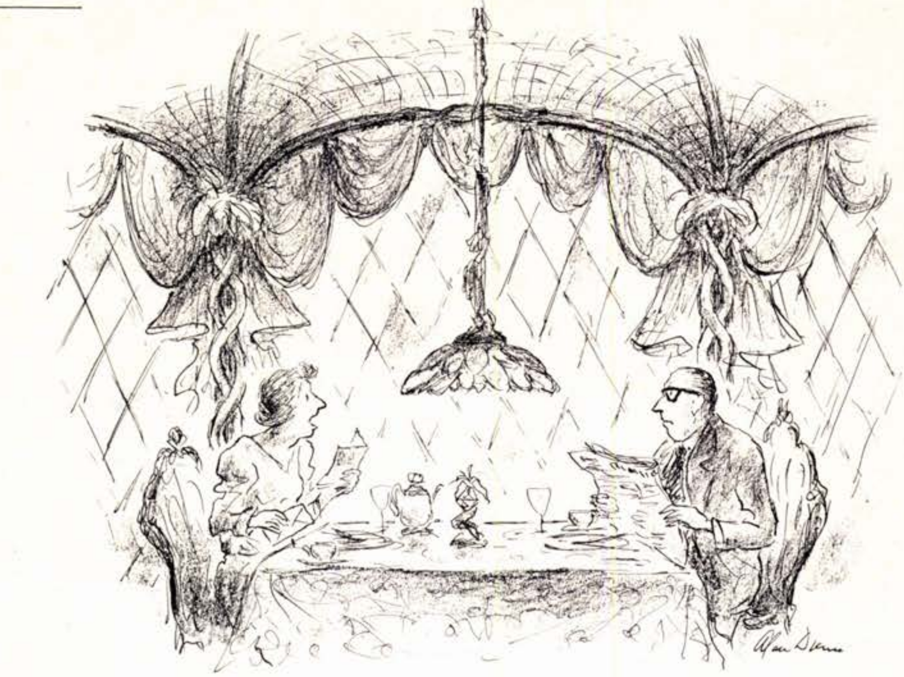
▪ Do home buyers really want "good design"? Builders who have done very well, thank you very much, selling suburban sprawl argue that "we give buyers what they want." What's wrong with the argument, of course, is that with rare exceptions there have been no alternates for buyers to choose from—there have been no communities with planned open space, with pleasant clusters of single-family houses (with a choice of "traditional" or contemporary houses, built-for-sale or custom) and pleasant groupings of garden apartments and condominiums and even, perhaps (as at Reston) high-rise. As Bill Houseman put it: "If the public is apathetic about house design, they've had a lot to be apathetic about." Emil Hanslin's New Seabury on Cape Cod was the first community I ever saw that offered a genuine choice of ways to live—from some Royal Barry Wills' houses that had true respect for the warm traditions of the Cape to some pretty cool contemporary that made the very most of a handsome site. There haven't been many in the 10 years since. Wesleyan Hills is trying it quite directly—some of its mini-neighborhoods are pretty heavily small-paned and shuttered, and others (both single-family, and condominium) have the latest in shed roofs and surprise space—so we will soon have one very direct comparison. (Watch this space for the results!)

John Schmidt, who works with lenders all over the country, feels that we are nearing "the critical mass"—that there are enough good examples of new kinds of residential communities being built that people (not all people, of course, but many people) will begin to demand something more than a standard box (albeit with optional front facades) on a standard street. Bob Hayes offered a simple way to suggest to home buyers how to decide: "Do you like open fields, or side yards you can't use? Do you like country lanes, or straight streets lined with straight sidewalks with lines of houses on the same set-back line? Do you want a pond your children can swim or fish in, or not?

Said Alan Borg: "As long as buyers have the *benefit* of good land and good planning, they are willing to accept new concepts."

▪ In for the biggest criticism was that old bugaboo zoning. And from the group assembled, one could get the feeling that, crack by crack, that wall against better and more flexible land use is being breached. Said Schmidt: "More and more local government planners, and more and more commissioners, are beginning to understand real planning concepts—not just traffic patterns." Said McKim Norton: "The public (and their government representatives) have been suspicious of these new concepts. But

—*Drawn for the RECORD by Alan Dunn*



"It's from Junior and now he says he's going to 'attack the total environment' —I think that's a crack at us—"

I believe that their suspicion is evaporating. . . . Now, more and more, people seem to be coming to the conclusion that maybe the planners are right . . . the opposition to clusters and open space residential developments seems to be disappearing in favor of the alternatives." Said the builders and developers present, all of whom have built or are building "new concept" communities: We've sold the local government on revisions in its zoning, and we're selling houses.

▪ The panel faced squarely the other (only whispered) face of zoning: large-lot zoning. As everyone knows, there are many communities who use zoning to make housing as expensive as possible, in hopes of slowing the influx of people (any people, but, sometimes, especially low-income and black people). This device is seen most clearly in the so-called bedroom towns, with little or no tax base outside the real-estate tax on houses. The arithmetic is simple: with taxes of say $1,000 on a typical house and a per-pupil cost of not much less than that, any new family with more than one child is automatically a loss to the town that must be paid by the people who already live there. What's the solution? One suggestion is a change in the tax base, from sole reliance on real-estate taxation to local income taxes (which more than a few cities have come to already). Federal revenue-sharing was another hope—if the states could and would bear some of the costs imposed on a community by the influx of new families that higher-density zoning would bring in. But at any rate, with the pressure of population in and around all our cities, the problem must be solved. Within a few months, the Supreme Court will be ruling on large-lot zoning in a case brought against Oyster Bay, Long Island—and the implications of that ruling, of course, will be hard to ignore. One appeal to local reason that has been used by several of the successful developers was: "More people are coming! Whether you like it or not. Do you want to start planning now to accept them within the framework of the existing character of your town; or do you want to wait for the dam to break?" Another real appeal to the "restrictive" zoning boards: "If you can't worry about housing the poor can afford, how about worrying about housing your children can afford?"

Well, so what for architects? As noted at the beginning of this piece, we're going to be building a lot more housing in the future, beginning next year. Much of that housing—single-family and multi-family alike—is going to be built in the suburbs and on new land still farther out from the cities. Are we going to see a continuation of mindless sprawl—inefficient use of the land and "communities" that are not communities at all but simply boxes for people? Or cannot builders (whose businesses are at stake) work with skilled planners and architects (whose professional worth is at stake) to create a better alternate—whether it is planned unit development or cluster zoning or (maybe) a whole new land-use concept?

Cannot builders and architects create a better alternate, first by helping zoning officials see that there is an alternate, and then by offering it to the public? For if architects cannot explain what is better about good land use and good design and good neighborhoods and good community facilities, then who can? And then what happens?

What happens of course is more of the same—more mindless subdivision of increasingly valuable land, more housing that is less than the homebuyer deserves for his money, continuing and growing problems between city and suburb.

Again, as noted in the September editorial: It seems clear that the new housing boom will be a new ball game—and this time architects must field a great team and not just boo from the stands.

—*Walter F. Wagner, Jr.*

When is a housing start not a mobile home?

In the September editorial, after reporting (accurately) that "Figures for July put [housing] starts at a 1.585 million annual rate—the highest in 17 months" I *inaccurately* reported that "those figures *do* include mobile homes" and testily added "shame on HUD and Commerce for that." Well, shame on me, and apologies to the Commerce's Bureau of the Census whose figures on housing starts do not (repeat do not) include mobile homes.

Coming next month: hospitals, halls, houses

In December, the subject of the Building Types Study is hospitals—a building type that by all indications will become increasingly active in the years ahead. Included will be an analysis of how medical insurance is changing the kinds of facilities required; the changing ratio of in-patient to out-patient facilities; the design effect of today's rapid changes in medical technologies; the management resources of architects in delivering hospitals in competition with the new "medical package dealers"; and some new design approaches to hospital design that promise both rigorous cost control and technological sophistication.

Also in December: Denver's new convention center, designed by Muchow, Ream & Larson, which is a most innovative approach to the design of this kind of space—for architects and engineers; and a house in the High Sierras. And more, of course.

Quote of the month: zoning department

By Peter McCandless, of Gulf-Reston, at the seminar discussed overleaf: "Can't we make the individual the ultimate unit of zoning?"

—*W. W.*

News in brief

Architect-designed construction continued its strong recovery in August, hitting 293 on the Dodge index (1957-59 equals 100), just short of the all-time high of 312 set last January. The index had sunk as low as 200 in June. August's strength could be found in just about every major type of building. However, it is not expected that contracting at the near-300 level will last very long, since some of this current surge includes projects that were temporarily postponed during the spring financial crisis. Something closer to the mid-200's is a better measure of the current demand for buildings.

New Standards of Ethical Practice of the American Institute of Architects become effective November 1 (August, page 35), having been approved by the A.I.A.'s Board of Directors at its September meeting. The new standards are simpler and shorter than the earlier standards, notably deleting the rule against engagement in building contracting.

There's plenty of money available for apartment building and the adequate supply will continue into the foreseeable future. This was stated by several of the 230 speakers who addressed National Association of Home Builders' first International Apartment Conference in Washington last month. So successful was this first effort to convene those who plan, build and manage apartment structures that Louis R. Barba, president of NAHB's 51,000-member organization, announced that a second conference would be held in Chicago next Sept. 22-26. Federal Home Loan Bank Board chairman Preston Martin said few savings and loans had reached their 15 per cent of assets limitation and that builders should "come and get" loans from them. Congressman Thomas L. Ashley (D-Ohio) urged that public housing programs be scrapped in favor of a new strategy more closely involving state and local officials. His housing subcommittee will investigate. Apartment demand will continue relatively strong for the next 5 years, said NAHB's executive vice president Nathaniel H. Rogg.

Some architects and engineers are refusing to play the Defense Department's game on submitting estimates (October, page 35). The Defense Department's first effort to force design firms to accompany submissions with price backfired when four firms responding to proposals in New Orleans for a Naval facility refused to give price estimates on their services, claiming the plan encourages inferior architecture. All major professional design organizations have protested the Defense Department plan.

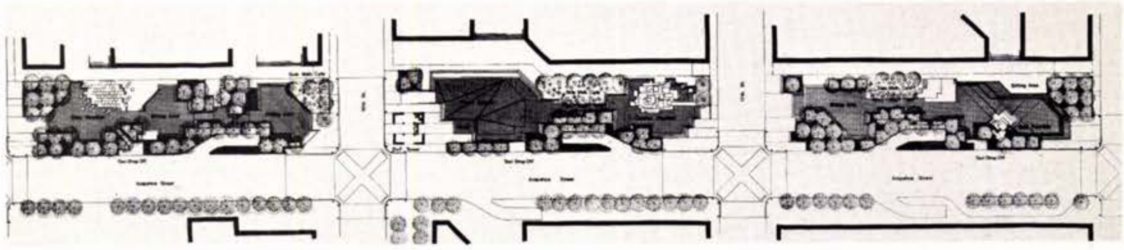
The President's reorganization plan creating a new Environmental Protection Agency (September, page 35) has become effective, centering in one agency Federal regulatory authority relating to water, air, radiation and agricultural chemicals. The agency should be fully underway by the end of this year.

Experiments to improve Model Cities program effectiveness will be carried out in 12 to 18 cities, as a result of the President's determination to strengthen Model Cities. Experiments, to be administered by HUD and the Department of Health, Education and Welfare, will include elimination of most Federal review, developing Model Cities plans for entire cities, not just single neighborhoods, and giving mayors and other local officials new powers of review.

NASA has invited aerospace and architectural engineering firms to submit proposals for assisting in planning ground facilities for a space shuttle system. The shuttles, now in preliminary design, are envisaged as reusable airplane-like vehicles that will transport people and cargo between Earth and space stations.

Architectural students from across the country will meet at the University of California, Berkeley, Nov. 27-29 for the 16th annual Student Forum of the Association of Student Chapters/American Institute of Architects. Workshop topics will include reform of instruction at architectural schools, environmental education of the public, and community work. **The first nationwide conference on the arts and human environment** will be held November 15-18 at The Pennsylvania State University College of Arts and Architecture. Its aim is to strengthen the case for the arts in American life. **4,000 air pollution specialists are expected at the Second International Clean Air Congress,** to be held in Washington, D.C. December 6-11, sponsored by the International Union of Air Pollution Prevention Associations, Pittsburgh.

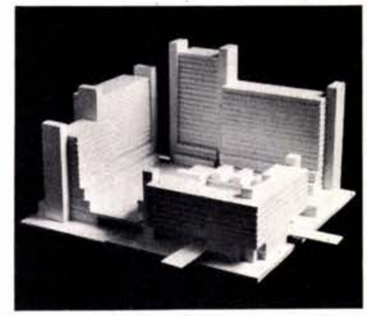
Jerry Bragstad



Denver picks Halprin and RTKL designs for Skyline renewal area

Skyline Park (above) will be "a hub for a variety of people activities," say its designers, Lawrence Halprin and Associates. The park will extend three blocks on the north side of a large downtown street in the new Denver Skyline Redevelopment area. It will be above underground parking structures and will contain a variety of space, running from small spaces to a large gathering area. One older structure on the site, the Daniel and Fisher Tower, will be preserved as the park's focal point in the central section which will accommodate large public functions. This section will also contain a grand sculptural fountain. The two outer blocks will also have fountains, along with sunken sculptural areas created by terraced steps and grass mounding which will permit dense planting of trees and grass over the roof structure. The Denver Urban Renewal Authority recently announced acceptance of the plan in its entirety.

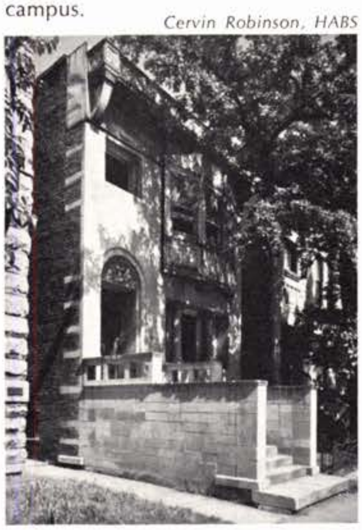
DURA also chose RTKL Inc., architect/planners, in a competition for design of a multi-use project (right) for Skyline Center, which will include high-rise apartments, a hotel, recreation facilities and an office tower using air rights over a street. A pedestrian second-level walkway system will link this hub to adjoining developments.



Landmarks: bad news with a few bright spots

■ Louis Sullivan's Albert Sullivan House in Chicago (below) designed for his mother in 1892 and later the residence of the architect himself, was demolished this spring, having fallen into decay beyond repair. Southern Illinois University plans to reconstruct the facade on a branch campus.

Cervin Robinson, HABS



■ The Chicago City Council voted 37 to 5 not to designate Louis Sullivan's Old Stock Exchange (February, page 42, September, page 35) a city landmark. The way is now open for real estate developers who have purchased the building to construct their proposed 40-story office building on the site.

■ The Old Post Office in St. Louis (above, right), long the object of controversy among preservation-

Ted Schafers

ists, government, and developers, is endangered by an interpretation of Federal preservation rules which would forbid its use as a commercial structure. The building was designed in 1873 by Alfred B. Mullett, who also designed the Old State, War and Navy Building in Washington, D.C. The building's owner, the General Services Administration, is expected to make its precedent-making decision in the near future.

■ Frank Lloyd Wright's Geneva Inn (below), Lake Geneva, Wisconsin, was torn down this year. It was designed in 1912. Wright's Park Inn (1910) in Mason City, Iowa is seriously deteriorated.

■ The owner of Frank Lloyd Wright's Warren Hickox House (1900, Kankakee, Ill.) is looking for a sympathetic purchaser. Contact Bruce Brooks Pfeiffer at the Frank Lloyd Wright Foundation.

Richard Nickel, HABS

Construction industry agrees metrication inevitable

Metrication, the new term applied to adaptation to metric measurement, is undergoing intensive study by the building and construction industry as the National Bureau of Standards prepares a comprehensive report to Congress on the effects of conversion. Construction is one of several industries holding investigative conferences designed to provide input for this major report due by next Aug. 1. NBS hosted the construction conference Oct. 5-6.

The American Institute of Architects voiced the views of several others when its conference paper called for a properly planned and well-organized program of metrication as being preferable to conversion by evolution. A fixed, rather than a variable, time period was urged by the A.I.A. spokesman, H. Leslie Simons. The optimum time period for architects to convert will be far less than the fixed time period of 10 years envisioned by the program, although no one is prepared to say exactly how long it would take, the A.I.A. stated, adding: "Our conversion time would be small but could not even begin until the conversion of product sizes (or at least catalog sizes) and the revision of design tables and their acceptance by the various code groups was well under way."

Direct costs to architects, the A.I.A. said, would be primarily in the re-education of employees and purchase of new standards and reference materials. It has not been uncommon for architects to design foreign projects using dual dimensions—English and metric—it was noted.

Cost estimates for total conversion in the U. S. ran from $40 billion to $200 billion with no firm expression of estimated time required. Since England adopted a 10-year span for its total adoption, that has been used as an accepted interval as discussions progressed.

Industry consensus developed at the NBS meetings indicated a conviction that conversion was inevitable; that it was just a matter of when and over what time span. There was agreement that a period of great confusion could be anticipated, with double inventories for many producers, after a Congressionally mandated start on the long process of adaptation. Education was stressed as a prime requisite, and more than one spokesman talked in terms of a generation being needed for total adjustment.

Opening the conference, Dr. Lawrence M. Kushner, NBS deputy director, outlined three levels of metric reaction—accommodation, adaptation, and conversion. The first assumes a minimal response to increased use of metric units. Adaptation represents expression of product quantities and physical properties in metric units, and conversion is the complete response to increasing metric usage.

Every major industrial nation of the world, except the U.S., today is using the metric system or is converting or planning to convert.

Besides the seven industrial conferences, of which the construction industry's was one, the U. S. Commerce Department (of which NBS is a part) is sending out over 5,000 questionnaires to sample a carefully selected cross section of American manufacturers and is making personal contacts and telephone interviews to get inputs from the non-manufacturing areas.

Architectural sculpture reaches new heights in St. Louis

Saunders Schultz and William Severson are two St. Louis sculptors who have combined their studios into one organization, Scopia,

Ferguson photo

whose work has ranged from symbolic fountains to bas relief elevator door panels. Their most challenging project was recently completed on the 250-foot side of a St. Louis apartment building, Council Plaza East (left), built by the Teamsters Union and designed by architects Schwarz and Henmi. It is a brick bas relief called "Finite-Infinite Quest," symbolizing "man's search and strivings towards God and God reaching down to man," according to its designers.

The two sculptors themselves worked from scaffolding, drawing the outlines of the design on the underlying concrete wall as bricklayers a few feet below filled in the pattern. Tuck pointers later shaped the bricks and painters dyed and sealed them. The artists, unused to working at great heights, often in high winds, sometimes found it a harrowing experience. They hope the work has opened up new possibilities in architectural sculpture.

U.I.A. meets in Washington

The ceaseless battle of world planners to stay a step ahead of land grabbers in attempting to assure desirable open spaces for future development came through clearly at the recent meeting of architects and city planners from 15 nations in Washington, D. C. These were delegates to the five-day conference of the Town Planning Commission of the Union Internationale des Architectes which convenes biennially.

Man's need for open space was an accepted conclusion as these planners began their discussions. From this premise the speakers decried encroachment of industry, business and undesirable housing into land areas they felt should have been preserved for open space development. Several panaceas were proposed: international inventory of available space with ways to retain it, land banks, public and private ownership arrangements in new forms and public conviction that open areas are needed to cleanse air and water, allow for recreation and leisure, and provide relief from acres of buildings, concrete and asphalt.

The A.I.A. hosted the sessions at the Corcoran Gallery of Art.

Architectual delegations study construction in USSR and United States

An unofficial delegation of American architects, engineers and building contractors headed by Max Urbahn, F.A.I.A., future president of the American Institute of Architects, visited the Soviet Union last month. They met with the mayor of Moscow and the Deputy Chairman of the State Committee for Science and Technology and discussed the possibility of collaboration among American and Soviet architects, engineers, and contractors on construction in the U.S.S.R.

In addition to Moscow, the delegation visited Novosibirsk, Tashkent, Samarkand, Sochi, and Leningrad. They also visited factories producing prefabricated construction components.

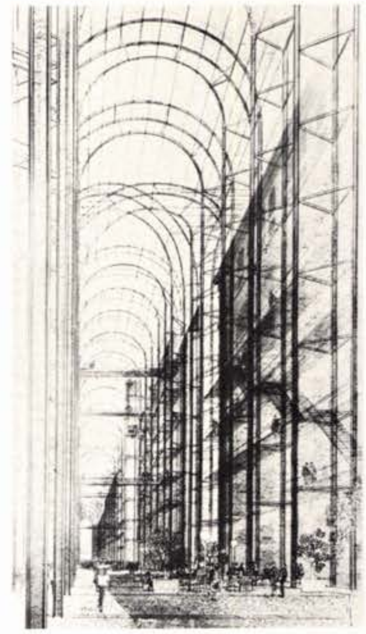
As a result of the trip, it was agreed that the U.S.S.R. would send a delegation to this country in the near future to observe American construction technology and management methods.

Other members of the delegation included Howard Turner, of the Turner Construction Co., Lewis Davis of Davis Brody & Associates, architects, John Carl Warnecke, of John Carl Warnecke & Associates, architects, Carl Koch of Carl Koch & Associates, architects, Lev Zetlin, of Lev Zetlin & Associates, engineers, Dr. Mitchell Rosenthal, sociologist, and A.I.A. executive vice president William L. Slayton.

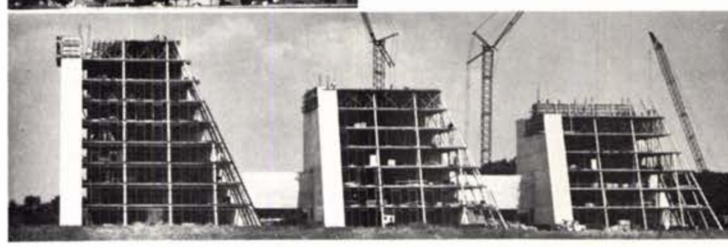
Meanwhile, two Japanese observers, Kiyoshi Kondo and Minoru Yamada, were visiting the School of Architecture at the University of Texas in Austin, having been to New York and Detroit, as part of a world tour on which they were investigating low-cost housing concepts and building techniques. According to Mr. Yamada, Japan will require 6,700,000 housing units for the next five years, of which approximately 25 per cent will be prefabricated.

Johnson, Roche, Rudolph and Lapidus subjects of two exhibitions

Two architectural exhibits announced in October (page 36) have opened in New York City. "Work in Progress: Architecture by Philip Johnson, Kevin Roche, Paul Rudolph" will run at the Museum of Modern Art through January 3. The exhibit was selected and installed by Arthur Drexler, director of the Museum's Department of Architecture and Design.

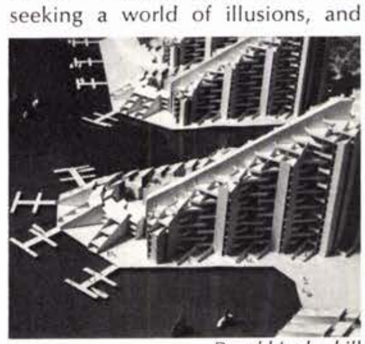


Projects by Philip Johnson include the Twin Towers Office Building for Houston, Texas, a Galleria (right), using existing



streets for New York University, and a convention center for Niagara Falls. Projects by Kevin Roche include the College Life Insurance Company of America Headquarters in Indianapolis (above; May 1968) and the United Nations Development Center in New York (January, page 41). Works of Paul Rudolph (see also page 89) include the Library at Niagara Falls and proposed waterfront housing for Buffalo, N.Y. (below).

"Morris Lapidus: Architecture of Joy" is "wowing 'em" at New York City's Architectural League. As Mr. Lapidus puts it, "I was seeking a world of illusions, and the world of reality for me was something that I'd rather not get involved with." The world, or "phenomenon," as the show's organizer, John S. Margolies, describes it, of Morris Lapidus is extensively shown in photographs and films through November 9. RECORD associate editor Robert Jensen helped organize the exhibit. A staircase in Miami's Fountainebleau Hotel appears below.



Donald Luckenbill

Students design pollution posters

At Ball State's College of Architecture and Planning in Indiana, second year students take a graphics course which aims at relevancy. The course, entitled "Graphic Communication," is designed to increase awareness of social expression, symbol formation and visual design. Roger Brady designed the poster at the left.

The high cost of an eraser.

She needs 100 or more footcandles of light.* What are you giving her?

If you have a heart of gold and aren't disturbed by your typists' typos—then consider that the cost of a dictated business letter just went up to $3.05. And every time it's retyped, it's an extra $2.05.

Now let's go into your accounting department.

How much do you figure you lose every year with all those typos that never get retyped? A little scary, isn't it?

Every year, millions of dollars are lost in mistakes which are simply blamed on human error. But the reason behind the error might be found in your ceiling. Ever thought of that?

What price a new lamp?

The facts are that increased lighting levels alone can increase productivity from 4 to 8%. Care to figure that out in hard, cold cash?

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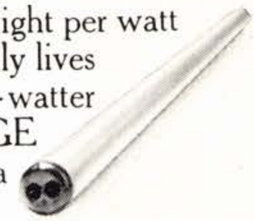
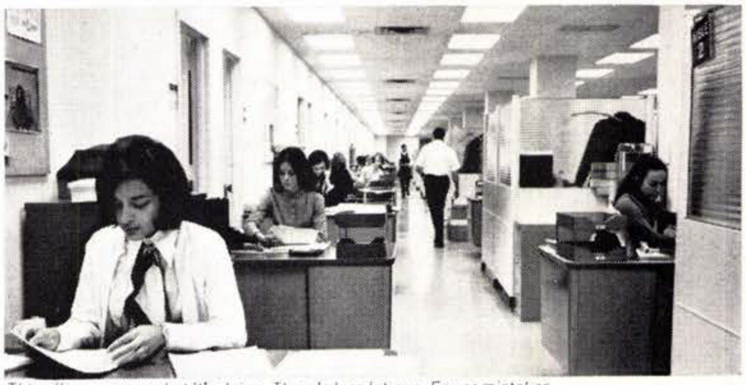
General Electric has just the lamp a smart light buyer like you wants. For example, we have a 40-watt fluorescent that not only gives more light per watt than all others, but actually lives longer. And no other 40-watter costs less to run. It's our GE Mainlighter.** And it's a bargain.



The GE Mainlighter. More light for less dollars.



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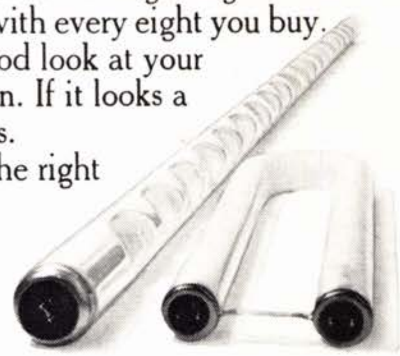

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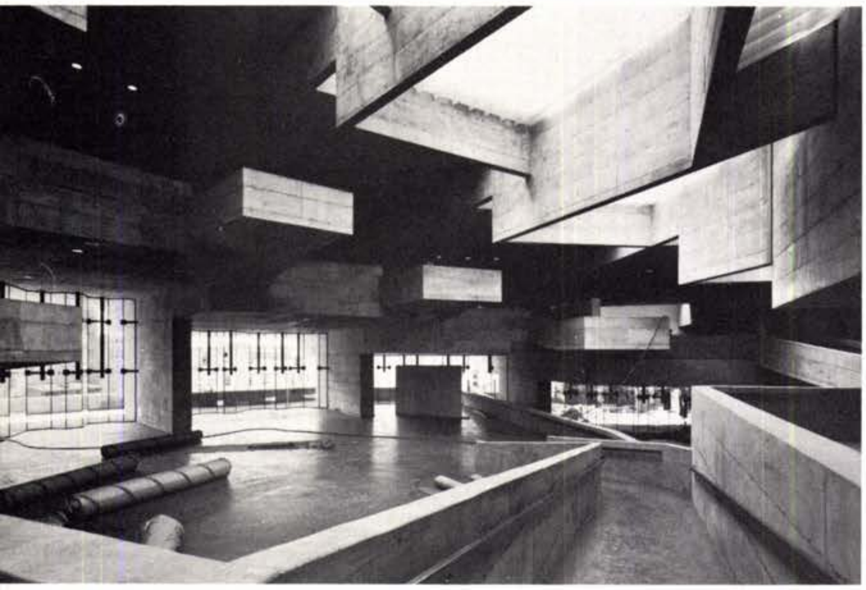
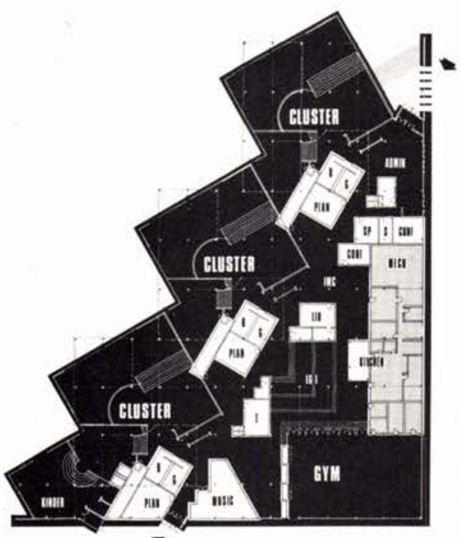
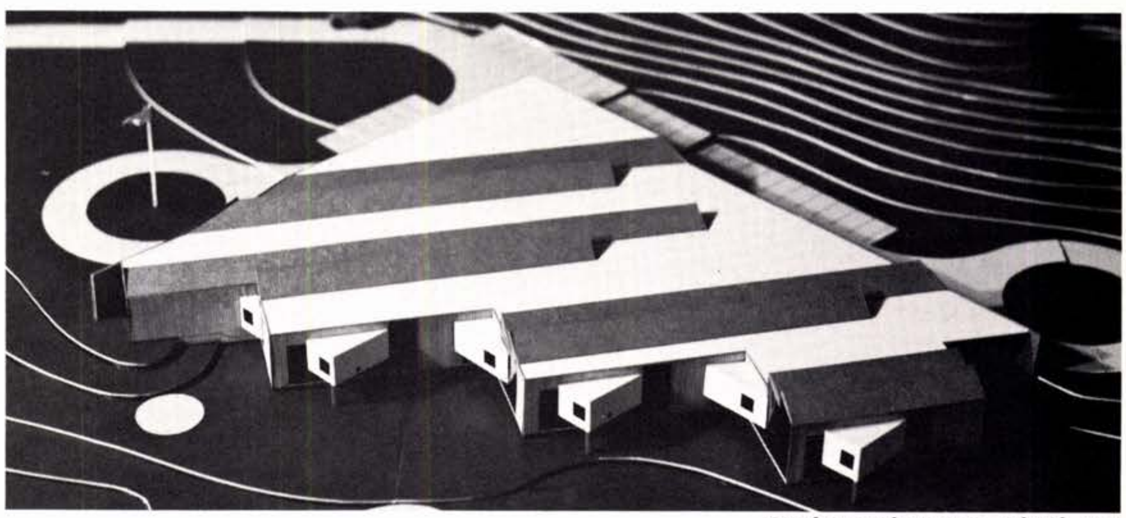


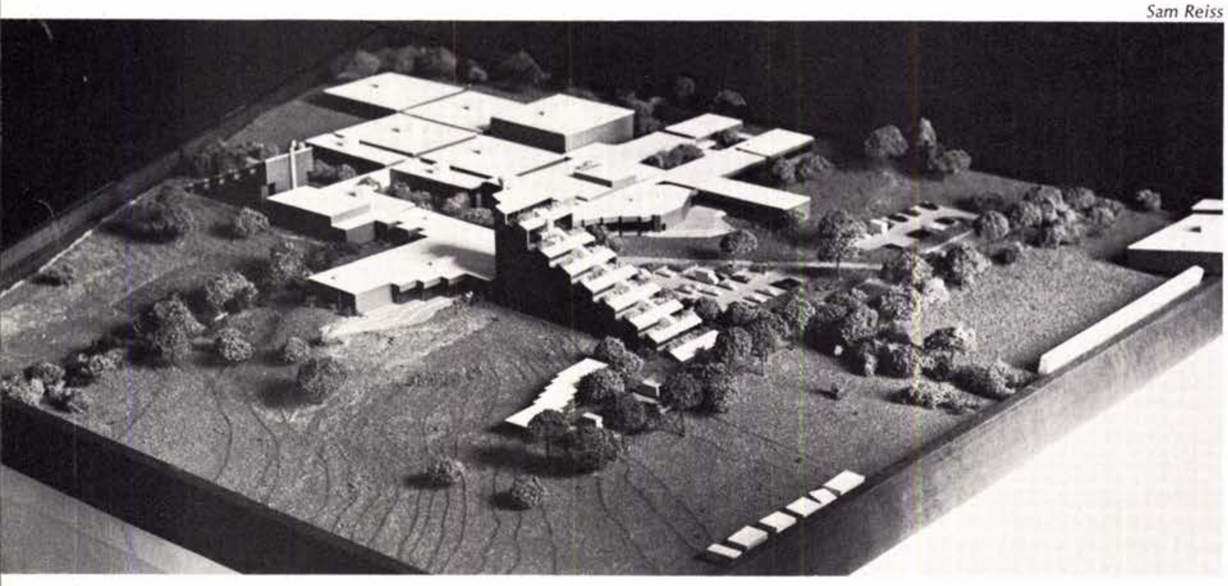
University Art Museum, Berkeley, Calif., by Mario J. Ciampi, F.A.I.A., with Richard L. Jorasch and Ronald E. Wagner, associates, will open November 7. The design, which won a national competition, uses an expandable system of visually interconnected radial terraces for exhibition spaces, also providing a theater for 300, studio and conference facilities (December, 1965, pages 132-134).





Southwest Elementary School, Bartholomew County, Indiana, Hardy Holzman Pfeiffer Associates, architects, is designed for team teaching. Circulation space is devoted to educational activities and classrooms are dissolved into clusters for three age groups (no grades). Specialized areas have an implied separation through the placement of small enclosed storage and work rooms.

Sam Reiss

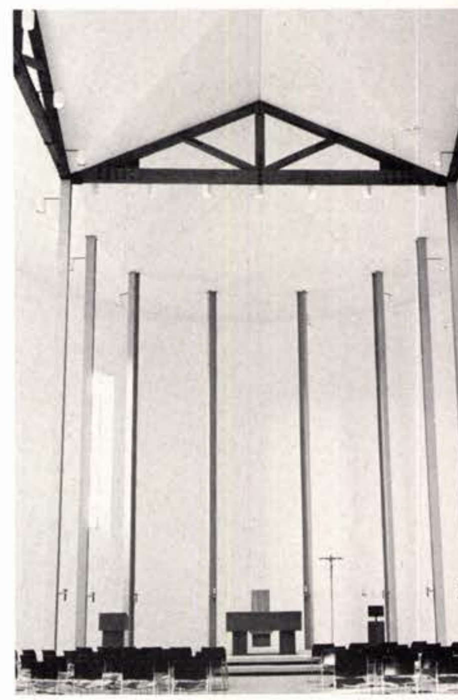


Marine Institute of Technology and Graduate Studies, Baltimore, Louis Gardner, architect with Donald Reay, associate, will contain six training laboratories simulating nautical conditions, a library, auditorium, maritime museum, recreation facilities and living accommodations in stepped structure.

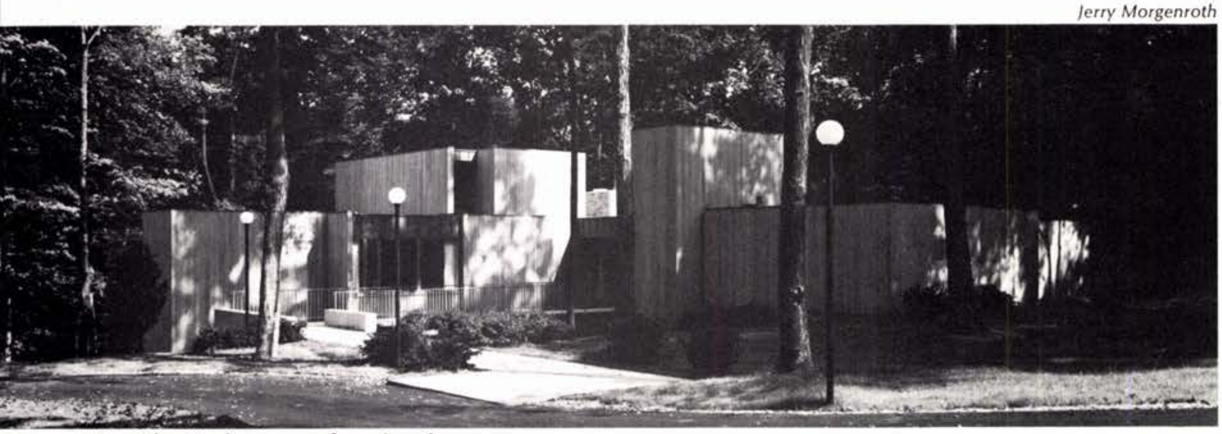
Architects Society of Ohio presents eight honor awards to architects and owners

Eight honor awards were presented to seven Ohio architects by the Architects Society of Ohio in its sixth annual honor awards program. Those not shown below were: St. Margaret of Cortona Church, Columbus, Brubaker/Brandt, Inc. with Pietro Belluschi, architects; Flint Ridge Museum, E. A. Glendening, architect; Mill Street Married Student Apartments, Ohio University, Athens, Holroyd-Meyers, architects; and Xomox Plant and Administration Offices, Cincinnati, Carl A. Strauss and Associates, architects. Plaques were presented to both architects and owners of the award-winning buildings.

Madden Hills Branch Library, Richard Levin Associates, architects, Dayton, was designed to "merchandise culture" to a ghetto area, keep costs very low, and retain residential scale of its neighborhood. Four concrete block shed shapes center on a central charging area.



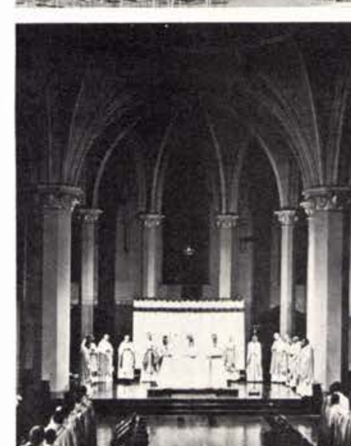
Jerry Morgenroth



President's home and university guest facility, Wright State University, E. A. Glendening, architect, Dayton, was planned to meet the needs of its present occupant, while having flexibility for future users. Siding is cedar, exposed floors of slate. The wooded site was disturbed as little as possible.

Balthazar Korab

Smith residence in Worthington, Ohio, Ireland/Associates, architects, Columbus, emphasizes privacy on a narrow lot. A series of pavilions project inward from a peripheral gallery circulation system. The random inward projections produce a series of small courtyards. Exterior is redwood-trimmed stucco.



Abbey of Gethsemani, Trappist, Ky., was renovated by William Schickel in collaboration with Jones, Peacock, Garn and Partners, architects, Cincinnati. True structure was revealed through removal of false plaster vaults (above) making the building more compatible with the new liturgy.

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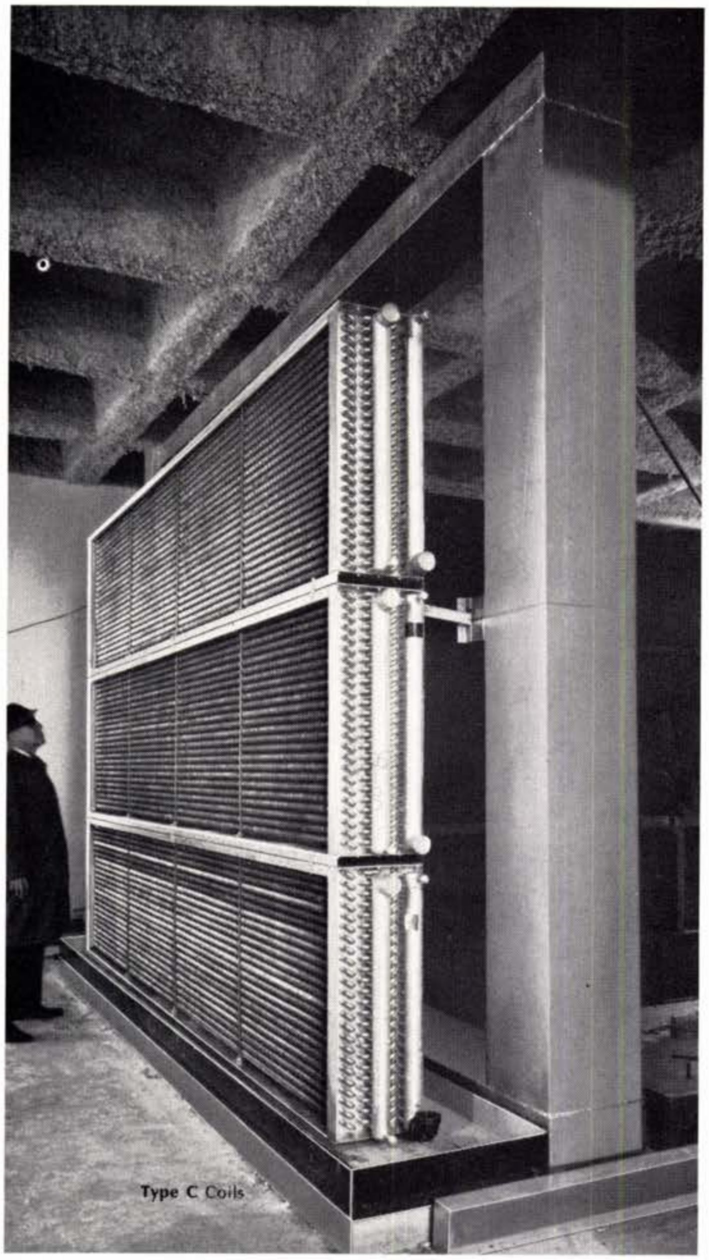

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F. W. Dodge construction outlook: 1971

Prepared by the Economics Department,
McGraw-Hill Information Systems Company
(Formerly F. W. Dodge Company)
George A. Christie, Vice President and Chief Economist

Think of 1970 as a year of transition. That means more than just lateral movement, even though the year's economic growth (in real terms) had to be measured with a micrometer.

Some worthwhile changes have been wrung out of this period of equilibrium. One such improvement in 1970: the nagging inflationary pressures of the past several years finally began to show signs of lessening. Another big plus: a smaller share of our resources is now being used for military purposes, and more emphasis is being given to our many domestic problems. In both areas, we still have a long way to go, but 1970's movement in these directions will yield important long-term benefits.

As is usually the case, these gains weren't accomplished without cost. The price that had to be paid in the short-run was that we had to bear many of the symptoms of recession: absence of growth, rising unemployment, reduced profits. Even *gradual* change doesn't take place without some stress and strain on the economic system.

This transition, or "re-ordering of national priorities," has been making itself felt in construction markets all through 1970 in both positive and negative ways. And if the over-all result in 1970 looks like a standoff (since this year's total of construction contract value is headed for about the same amount as in 1969), that's only because totals often conceal important changes. What makes the difference is the change in the *composition* of the construction market between the opening and closing quarters of 1970. When the year began, nonresidential building was booming, while housing had sunk to its lowest level since the 1966-67 credit crunch. Yet, by the end of the year those two construction markets had exchanged roles. That shift was the really important development in construction during 1970.

The business slowdown was one key to 1970's construction shift: the easing of credit to keep that slowdown from turning into a full-scale recession was another. The first of these put an end to the nonresidential building boom while the second took the lid off the housing market.

Relaxation of the Federal Reserve Board's stranglehold on the money supply, coupled with a higher rate of saving by consumers (who were getting increasingly nervous about the way unemployment was rising) resulted in a rush of funds available for mortgages during the spring and summer months. By mid-year the long decline in housing starts had turned around and a vigorous recovery was on the way.

Result: 1970's flow of new construction work was approximately as strong at the end of the year as it was at the start, though the mix was very different. This trade-off sets up two key questions for the 1971 Construction Outlook: How far will the housing recovery go under its present momentum? When can industrial and commercial building be expected to advance again?

Part of the answer to these questions lies in the kind of economic environment that will set the boundaries of next year's construction markets.

Economic environment 1970/1971

Uppermost in the analysis of where we are and which way we are going is the fact that the business slowdown of 1969-70 didn't just happen all by itself. It was deliberately engineered with the object of breaking inflation's grip. And the means by which it was created—severely restrictive monetary and fiscal policy—were eased greatly during the first half of 1970. These measures, which proved capable of turning the economy off, are now working to turn it on again.

It has taken half a year of monetary expansion and deficit budgeting to spark the gain that looks certain for 1970's third quarter—the first such gain since mid-1969. But the rate of improvement in the economy will be meager for a time. The payoff doesn't come until 1971.

One important new source of demand to offset this expected weakness in business investment is the steady recovery of housing. The heavy flow of savings in 1970's first half supplied the only ingredient that had been missing in this depressed sector, and the upturn in housing starts that followed will gather momentum in 1971.

So, in the early stages of recovery, the expansionary forces of government (the decision to ease up on anti-inflationary restraint) and consumers (whose normal day-to-day spending for goods and services are being reinforced by a big increase in housing investment) are more than balancing off the temporary sag in business capital spending. That's been enough to get things moving. And though expansion is building slowly at first, it is providing the base for better growth in 1971.

Next year's economic environment will be an extension and development of the recovery that is now still in its formative stage. Expanding on 1970's second-half beginnings, 1971 output (GNP) is estimated to grow by 3½ per cent in real terms. That's not quite up to full potential (which is closer to 4½ per cent) but it contrasts favorably with 1970's gain of less than one per cent, or even 1969's 2.8 per cent increase over 1968.

Economic conditions that directly affect construction shape up this way for 1971:

- **Federal government spending** — Very tightly budgeted, at least through mid-year, in order to keep deficit at minimum. Could ease a bit once fiscal-'72 budget takes over next July 1.
- **Monetary policy**—Object is to support 4-4½ per cent growth without rekindling inflation. Once recovery is firmly established, money will be held to slower increase than at present. Long-term interest rates should drift downward through mid-year in 1971.

- **State & local government spending** — Will expand a bit faster in 1971 as states and municipalities find the bond market more receptive to their need for funds.
- **Consumers**—Mortgage availability capable of supporting 20 per cent more conventional housing starts.
- **Capital spending**—Gradualness of recovery here means that excess capacity won't be absorbed quickly. Total outlays for next year: about equal to 1970's $81 billion.

National construction outlook
Business facilities, 1971

Once the decision was made to put the monetary brakes on the economy, it was only a matter of time (and resolve) before the slowdown became a reality. The process took longer than expected, but it was inevitable that the Fed's policy would win out at some point. That point was reached early in 1970. It came in the form of a liquidity crisis and a severe stock market break. The business sector reacted with a sharp cutback in contracting for new commercial and industrial buildings; the Fed reacted by abandoning its policy of severe restraint, shifting to moderate ease.

By mid-summer, the crisis had passed. The shift of Federal Reserve policy and the expectation of improving business conditions in the near future were enough to reverse the spring decline, and in the third quarter contracts for business facilities rebounded halfway back to their earlier peak. But businessmen were eying the future more cautiously than before.

All the available indicators—early investment plans, capital appropriations, profit prospects—point to a fairly brief period of reduced spending, and a total for the year 1971 of approximately the same dollar amount as in 1970. But though next year's capital spending may not yet be much different in total, the mix of building types will change, reflecting the special needs of the business sector in 1971's different economic environment.

Manufacturing buildings: With the exception of a very few industries, the manufacturing sector was carrying enough excess capacity at mid-1970 to fulfill any reasonable estimate of production through 1971. And while this overhang of capacity will limit the urge to start building new plants as soon as profits perk up, companies that plan to be in business beyond next year will find themselves at a distinct cost disadvantage unless they keep providing more efficient capacity.

By the time 1971 is a few months old, firms will have to be breaking ground for any new manufacturing plants they expect to have in operation during 1972. This means that the biggest impact of the business slowdown on industrial construction contracting is likely to be felt in 1970 (though its depressing effect on spending will stretch into 1971), and an upturn in contracting is possible in the spring of 1971—one year after the decline.

With the expectation that contracting for manufacturing plants will fluctuate around the current (3rd quarter '70) rate through spring, and then advance, next year's contract value is estimated at about 5 per cent less than 1970's $4.0 billion.

Commercial buildings: The office building boom reached its peak toward the end of 1969, and by late 1970 the cycle was firmly in a downward phase. The current year's total of newly contracted offices is still holding well above its long-term trend, but will nevertheless be short of 1969's record by nearly 10 per cent.

When all of the extraordinary volume of office construction that has been started since the beginning of 1968 is finally brought to completion, some 500 million square feet of space will have been made available for use. (In terms of the two biggest office building projects ever to come along, 500 million square feet is the equivalent of 70 World Trade Centers, or 115 Sears Towers!) Significantly, a large part of this building boom was concentrated in New York, Chicago, and Boston, where the need has been critical for years. But once the pressure is relieved in these areas, there will be few major cities left with vacancy rates of less than 4-5 per cent. At that level, the demand for additional office space isn't strong enough to reverse the current downward trend, and 1971's total is headed for a further 10 per cent decline.

Another area of commercial building —stores and warehouses—will take up the slack. Store construction hasn't made a worthwhile gain in over two years. If, as is likely, this lack of growth has been linked to the sluggish housing market, then 1971 should bring a solid gain (as much as 15 per cent) in contract value of stores and warehouses as residential building expands next year.

Housing

Longest depressed of all the construction markets, housing is now the one that is ripest for expansion. The latest decline and fall of the housing market dates from early 1969 when a steady, quarter-by-quarter erosion began that resulted in a 20 per cent shrinkage in the rate of starts over the year and a half that followed.

Despite the similarity to the 1966 credit crunch, this time support by the Federal National Mortgage Association and Federal Home Loan Bank Board managed to limit the housing decline until a renewed flow of savings reversed the trend. In the six months following the relaxation of monetary restraint early this year, funds poured back into savings accounts. Savings and Loan Associations and Mutual Savings Banks averaged more than a billion dollars a month net increase in deposits during that period—twice the rate of the preceding year, and *five times* the volume during the prior six months.

As might be expected, the recovery of the housing market began with single-family building, where newly available money can be put to work fastest. By 1970's second quarter, one-family building had already gained 7 per cent over the low first-quarter rate, while apartment building continued to decline. The over-all result was a standoff for a while, but by the third quarter both segments of the housing market were responding to the change in credit availability—and a strong recovery was underway.

That upswing will carry into 1971 . . . and beyond . . . unless the credit market says no again. Some indication of the current pressure of housing demand is given by the decline in vacant units over the past several years. By the early part of 1970, vacancies (including mobile homes) were down to 5.0 per cent for rental units and 1.0 per cent for owner-occupied housing.

Most of the decline in the supply of housing available for occupancy has been fairly recent. Between 1960 and 1966 (which was a period of relatively low family formation) the rental vacancy rate held stable at 7-8 per cent. Since 1966, the combination of a rising marriage rate and suppressed building has reduced vacancies to the lowest rate in the decade that such statistics have been reported.

More insidious is what happens to the *quality* of housing under circumstances like these. As the vacancy rate declines, so does the rate of demolition and replacement of old and substandard dwellings. Instead of making progress toward the goals of the Housing Act of 1968 (which involve increasing the quality as well as the quantity of housing) the events of the past several years — war, inflation, credit restraint—have only increased scarcity and deterioration.

For the short run, at least, conditions are right for a strong housing recovery. Under the pressure of a large backlog of demand, gains should come rapidly at first as housing enjoys the clearest field in the long-term credit market that it has had for a long time. On the strength of the change in credit conditions alone, housing starts—already on the upswing—should be averaging close to 1.7 million units by the middle of next year. After that, the competition of increased corporate demand for long-term funds will inhibit housing's further growth, and continued expansion will depend on Federal support through HUD. But even if housing growth comes only in small increments after mid-1971, the year's total shapes up like 1,675,000. That's nearly 20 per cent above current volume, and more than any year since 1950.

Because single-family housing was more limited by 1969-1970 credit restraint than apartments were, it has a good potential for expansion in 1971, even though demographic trends continue to favor multi-family building. For the year ahead, one- and two-family units are forecast to increase from 1970's 810,000 total to 925,000; apartment units are estimated up from this year's 615,000 to 750,000.

This broad recovery in conventionally

built housing (which includes various degrees of modular construction) will take away some of the advantage that scarcity of shelter has given to the mobile home industry in recent years. No gain, and possibly a small decline, in mobile home output is expected in 1971.

Institutional buildings

During the early half of 1970, many plans for schools, hospitals, and religious buildings had to be put aside until a more favorable financial climate returned. In the special case of public schools—largest of the categories—this sensitivity to money market conditions was heightened by the existence of local borrowing ceilings. When state and municipal bond rates climbed above 7 per cent last spring, contracting for school construction dropped off sharply. Later in the summer easier money conditions encouraged a modest recovery, but for 1970 as a whole educational construction is headed for its first decline in more than a decade.

Hospital construction also backed off during the spring money crisis. Showing a faster response to easing credit conditions (due perhaps to a greater urgency of demand for health facilities), this category recovered most of its early 1970 loss during the late months to show a gain for the year.

If, as it appears, some of 1970's institutional building has been deferred until better borrowing terms are available, 1971 could bring stronger-than-average gains in educational, health, and religious building provided that long-term interest rates continue to decline. And that's the direction the money market will be taking through most of 1971.

If the financial framework indicates that the institutional building market will be at less of a disadvantage in 1971 than it has been in 1970, the political environment is hardly encouraging. In August, Congress had to override the President's veto of next year's $4.4 billion Office of Education bill, in order to preserve half a billion that would have been cut in the interest of budget balance; a month earlier he was overridden on a hospital construction measure.

This combination of an improvement in the capital market and the reluctant support of Federal aid programs leads to a forecast of moderately higher institutional contracting in 1971. Educational building will reverse 1970's decline and show a gain of 4 per cent as some postponed work is made up next year. Hospital contracting, which came through 1970's money squeeze better than schools, will be slated for a bigger gain (about 10 per cent) in 1971.

Public facilities

When the Federal Highway Trust Fund is used for its intended purpose of building highways, highway contracting is quite predictable. When, instead, it is used as an instrument of economic policy, contracting becomes highly erratic. Now, after some violent ups and downs in the past few years, Federally sponsored highway contracting seems to be settling into a period of predictability once more.

In 1968, and again in 1969, Presidents Johnson and Nixon were convinced that by holding back substantial amounts of highway money they would help reduce inflationary pressures in the economy. But since this trust fund money can be used only for highway construction, what was held out had to be released eventually. It meant that each period of restraint (4th quarter 1968 and 4th quarter 1969) was followed by a burst of higher-than-normal contracting as the delayed work went ahead along with normal expansion of the highway program.

Whether this experiment in anti-inflationary fiscal policy achieved anything worthwhile is doubtful. Whatever advantage was gained by the temporary reduction of demand as highway funds were withheld was soon lost during the make-up periods that followed. In fact, by bidding up the price of already scarce highway construction labor during those spurts of accelerated contracting, the net effect of the whole exercise may have turned out to be inflationary.

The Department of Transportation now seems content to let the Highway Trust Fund go its own way for the time being while it explores some other potentials. One is to get its newly created Airport Trust Fund into operation. Another is to expedite passage of the even newer Mass Transit bill.

Big as these programs will be (airports are slated for some $16 billion and mass transit will receive about $10 billion over the next 10-12 years via funds administered by DOT), neither cause will see much more than planning money in 1971—millions rather than billions, and none of it for construction. Meanwhile, highway contracting will increase to about $7.7 billion next year, normal growth for this self-generating construction market.

As the race between the spread of pollution throughout the country and the construction of water supply, sewer, and waste treatment facilities rounded another lap in 1970, it was hard to say which gained more. Through the third quarter, construction contract value was up some 30 per cent, heading for an annual total close to $3 billion. Sewer/water construction value only passed the $2 billion mark as recently as 1967, and the acceleration of its growth in the past few years is an indication of growing concern about the environment.

National estimates/1971

Construction contract value

(millions of dollars)

	1970 preliminary*	1971 forecast	change per cent
nonresidential buildings			
Commercial	$ 9,375	$ 9,325	− 1%
Manufacturing	4,000	3,800	− 5
Educational	5,250	5,450	+ 4
Hospital/health	3,000	3,300	+10
Public	950	1,100	+16
Religious	600	650	+ 8
Recreational	1,100	1,150	+ 5
Miscellaneous	975	1,050	+ 8
TOTAL	$25,250	$25,825	+ 2%
residential buildings			
One- and two-family homes	$15,300	$18,250	+19%
Apartments	8,100	10,350	+28
Nonhousekeeping	1,400	1,450	+ 4
TOTAL	$24,800	$30,050	+21%
TOTAL BUILDINGS	$50,050	$55,875	+12%
nonbuilding construction			
Streets, highways & bridges	$ 7,400	$ 7,725	+ 4%
Utilities	4,300	3,900	− 9
Sewer/water supply	2,900	3,300	+14
Other nonbuilding	3,600	3,550	− 1
TOTAL	$18,200	$18,475	+ 2%
Total Construction	$68,250	$74,350	+ 9%
Dodge Index (1957-59=100)	192	209	
Physical volume of floor area (millions of square feet)			
nonresidential buildings			
Commercial	547	548	—%
Manufacturing	230	239	+ 4
Educational	198	198	—
Hospital/health	83	88	+ 6
Public	29	31	+ 7
Religious	28	29	+ 4
Recreational	48	50	+ 4
Miscellaneous	44	47	+ 7
TOTAL	1,207	1,230	+ 2%
residential buildings			
One- and two-family homes	1,133	1,313	+16%
Apartments	578	713	+23
Nonhousekeeping	66	66	—
TOTAL	1,777	2,092	+18%
TOTAL BUILDINGS	2,984	3,322	+11%

* Eight months actual; four months estimated

Regional construction outlook

1970 roundup

As 1970 began, non-residential building was construction's dynamic force. When the year ended, housing had taken over that role. This change had a different impact from one region to another.

As business-related construction contracting waned in 1970's sagging economy, and excess capacity began to mount, the heavily industrialized Midwest bore the brunt of reduced manufacturing building. The West also was unable to sustain its former level of industrial building, as its aerospace firms absorbed a major share of the military/space spending reduction this past year.

With the office building boom of the last couple of years past its peak, it was the Northeast that felt this decline most, just as it enjoyed most of the gains in 1968 and 1969. (During those years, this region accounted for close to half the national total of office building contracts.) The other important center of office construction, the Midwest, was still going strong in 1970 with two major Chicago starts: Sears and Standard Oil.

The homebuilding market's response to easing credit benefited the South and the West most during 1970. Despite the fact that the greatest need for housing was in the Northeast (as indicated by the extremely low vacancy rate there) that region, along with the Midwest, was slower in responding to the availability of mortgage money.

It was one-family building, which is always quickest to adapt to change, that led the mid-1970 residential recovery. The delay in the Northeast and Midwest was partly because high-rise apartments, which take longest of all to reflect a turnaround situation such as the past year's, make up a bigger share of housing demand there.

Just as the play of 1970's economic events fell with varying impact regionally, so the consequences of the 1971 economic environment are expected to bring further changes.

Northeast

The extreme scarcity of office space that has existed in the Northeast's major cities for several years is finally easing. The office building boom it precipitated began to deliver a heavy volume of new office space to the inventory during 1970, at about the same time that the general economic slowdown was lessening the pressures of demand. Vacancy rates will ease still further through 1971, as more of the massive volume of office space contracted in this region during 1969 and 1970 becomes ready for tenants.

Residential building has been seriously neglected in the Northeast over the past few years. The combination of tight money and high costs of construction, which had effectively frozen many Northeastern cities out of Federal-aid housing programs, has sent vacancy rates to critically low levels. This is particularly true of rental housing, as multi-family construction has fallen far behind the rampant progress of urban decay. With easier money in prospect for 1971, the stage is set for a strong gain—perhaps the strongest of any region—in Northeastern housing.

The Northeast has recently been responding better to needs for institutional and public facilities, and 1971 should see further progress in these categories. Contracting for sewer and water facilities, which was especially strong this year, will continue at high levels in 1971. Schools and health facilities construction is also expected to be a positive factor in the Northeastern construction picture during all of next year.

Midwest

Manufacturing building, the Midwest's weak spot for most of 1970, is likely to become a source of strength in the year ahead. The typical sensitivity of this region's heavy industry to changes in business conditions led to a severe decline in contracting for manufacturing plants during the slowdown. As the pace of business quickens during 1971, the expected spring pickup in industrial construction contracting should also begin in this region.

Commercial construction in the Midwest will reflect the general trends of expanding store building and lower office construction in 1971. Since this region normally accounts for a larger-than-average share of the national total of store construction, this shift in commercial building ought to give Midwestern building a boost

Housing will be expanding next year in all four regions, but the gain in the Midwest will be a bit less than the national average.

South

Commercial building in the South got a lift during 1970 with the start of several large office buildings. In 1971 the region's office building will mirror the generally weaker performance expected for the nation as a whole next year. Store and warehouse building should remain strong.

The petro-chemical and pulp and paper industries, heavily concentrated in the South, are both planning reduced levels of capital expenditures next year. Utilities may take up some of the slack, but the region's total business-related category appears headed for a decline in 1971.

The South has increased its share of new apartment building in every year of the past five, and 1970 will make it six. Rental vacancy rates in the region, now the highest in the country (near 7 per cent), suggest that there is a distinct limit to the South's apartment growth. But single-family housing in the region should about match the national rate of growth next year.

Southern institutional and public facilities construction has lagged behind the national pace during 1970. Better-than-average gains can be expected next year, particularly in the areas of health facilities, street and highway, and sewer and water contracting.

West

The promises 1970 held out for Western commercial building have gone largely unfulfilled, as the cutbacks in defense and aerospace industries permeated other sectors of its economy. Gains in other industries will help to limit a decline in the region's industrial building next year, though, owing to the continuing diversification of Western industry.

Even toward the end of 1970, the region outdid the national residential building average without giving signs of serious surplus. Indications are that there's room for a good gain in Western housing next year.

Institutional building (schools and health treatment facilities) should also do better than the national average next year, as the pressure of tight money is relieved. The area's share of school building has declined steadily over the past five years. But it is now somewhat below the West's proportion of school-age children. This situation isn't likely to prevail for any extended period of time in this area, where dynamic population shifts require a classroom inventory somewhat higher than the national average.

Summary

There's a way to make a rough check on the broad dimensions of 1971's construction outlook. That's by comparing it with two similar periods in the past.

In the early phase of the 1957-58 recession, contracting for new construction made one of its smallest gains in the past two decades. The year 1957 brought only a 2 per cent increase, instead of the average 5-6 per cent. But then, in 1958, as recession deepened and finally reversed itself, construction contracts surged ahead with a 9 per cent gain.

In the early stage of the 1960-61 recession, construction was again held to a small 2 per cent increase. This was followed by an 11 per cent burst in the year that followed.

In both cases the pattern was remarkably similar. The initial weakness was the result of declining industrial and commercial building; the subsequent advance came in housing. And by the time contracting for business facilities recovered, the combined expansion of both nonresidential and residential building produced a period of well-above-average growth for the construction industry.

Of course, circumstances in 1970-71 aren't exactly the same. For one thing, we haven't got the same kind of recession as in the earlier two periods. It's not even being called a recession. But it is producing many similar responses in construction contracting.

Right now we're in the sticky part. Contracts for industrial and commercial building fell sharply last spring. And housing, which has been depressed for more than a year, is only at the beginning of its recovery. For the time being, that leaves something of a gap in the flow of new construction work. It means that 1970 fits the first half of the pattern by winding up only about one per cent above the 1969 total (as in 1957 and 1960).

Two more things have to happen for the whole sequence to work out. Housing must make not only a strong but a sustained recovery—something that lasts all through 1971, and even beyond. Besides that, business construction must eventually reinforce next year's housing expansion. Both these conditions easily fit the framework of the 1971 Dodge Construction Outlook. They add up to a strong advance of nearly 10 per cent in total construction during 1971.

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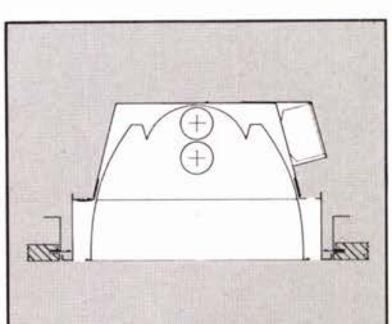

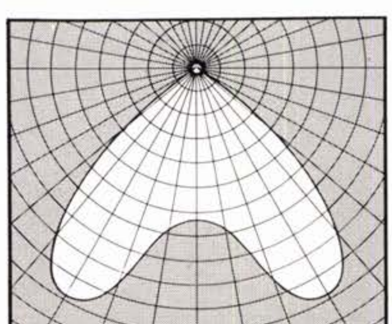

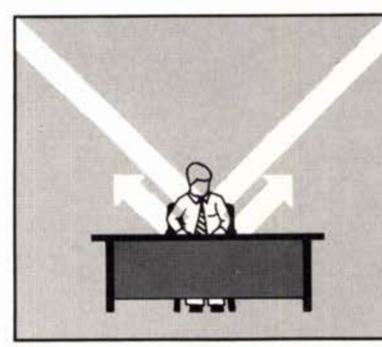

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INDEXES AND INDICATORS

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Dodge Building Cost Services
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SHARPER FOCUS ON COST INDEXES

The national average construction cost increase of 8.1 per cent for the year ending September 30, 1970, calls for sharper focus on index components. Accordingly, two columns have been added to the table at right separating out masonry and steel construction from the over-all more general non-residential index. The 8.1 per cent rise reflects increases of 5 per cent for materials and 12.9 per cent for labor.

Building cost indexes

The information presented in the tables indicates trends of building construction costs in 33 leading cities and their suburban areas (within a 25-mile radius). The table to the right presents correct cost indexes for non-residential construction, residential construction, masonry construction and steel construction. The latter two indexes are new to the RECORD. Differences in costs between two cities can be compared by dividing the cost differential figure of one city by that of a second city.

The table below presents historical building cost indexes for non-residential construction; future costs can be projected after examining past trends.

All the indexes are based on wage rates for nine skilled trades, together with common labor, and prices of five basic building materials are included in the index for each listed city.

1941 average for each city = 100.00

NOVEMBER 1970

Metropolitan area	Cost differential	Current Indexes non-res.	Current Indexes residential	Current Indexes masonry	Current Indexes steel	% change year ago res. & non-res.
U.S. Average	8.5	337.6	316.9	331.3	323.5	+ 7.33
Atlanta	7.8	426.8	402.3	416.1	410.1	+10.23
Baltimore	7.9	354.1	332.8	344.9	338.4	+ 8.25
Birmingham	7.2	312.8	290.9	305.7	300.0	+ 2.19
Boston	8.7	332.2	313.8	329.1	320.1	+11.58
Buffalo	9.2	380.4	357.2	374.1	363.6	+10.17
Chicago	8.8	390.9	371.6	378.6	373.2	+ 8.69
Cincinnati	9.0	352.4	331.5	346.8	338.5	+ 7.19
Cleveland	9.8	384.6	361.8	377.1	369.2	+ 6.28
Columbus, Ohio	9.0	367.5	345.1	358.3	351.9	+ 8.71
Dallas	7.7	329.6	319.1	321.7	316.1	+ 6.25
Denver	8.4	371.5	349.5	368.9	356.5	+ 8.83
Detroit	9.5	380.7	362.7	379.8	367.0	+ 7.09
Houston	8.1	326.4	306.5	319.4	313.2	+ 6.84
Indianapolis	8.8	312.2	293.1	306.4	299.8	+ 3.39
Kansas City, Mo.	8.2	318.7	301.1	311.5	305.8	+ 6.87
Los Angeles	8.1	369.0	337.2	357.6	352.0	+ 5.34
Louisville, Ky.	8.1	330.8	310.6	324.1	317.8	+ 7.17
Memphis	7.8	325.1	305.2	317.8	311.2	+ 6.13
Miami	8.6	356.8	339.9	350.5	342.4	+ 7.44
Milwaukee	9.2	392.8	368.8	388.9	376.1	+ 6.20
Minneapolis	8.9	364.4	342.8	358.7	349.2	+ 9.29
Newark	9.0	340.1	319.3	334.7	326.4	+ 9.80
New Orleans	7.9	322.5	304.3	317.7	310.7	+ 7.36
New York	10.0	373.7	347.4	361.4	354.0	+ 6.42
Philadelphia	8.5	349.6	333.1	343.2	335.0	+ 8.14
Phoenix	8.2	186.3	174.9	180.2	177.7	+ 5.82
Pittsburgh	9.1	330.1	310.5	325.6	317.3	+ 5.40
St. Louis	9.2	348.2	328.6	345.1	333.7	+ 6.25
San Antonio	8.0	137.6	129.2	134.8	131.2	+ 9.09
San Diego	8.2	136.9	128.5	134.2	131.1	+ 7.83
San Francisco	9.0	474.6	433.7	468.0	454.8	+ 5.84
Seattle	9.0	350.0	313.2	348.0	333.7	+ 7.75
Washington, D.C.	7.7	312.0	292.9	305.0	298.9	+ 8.20

Cost differentials compare current local costs, not indexes.

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

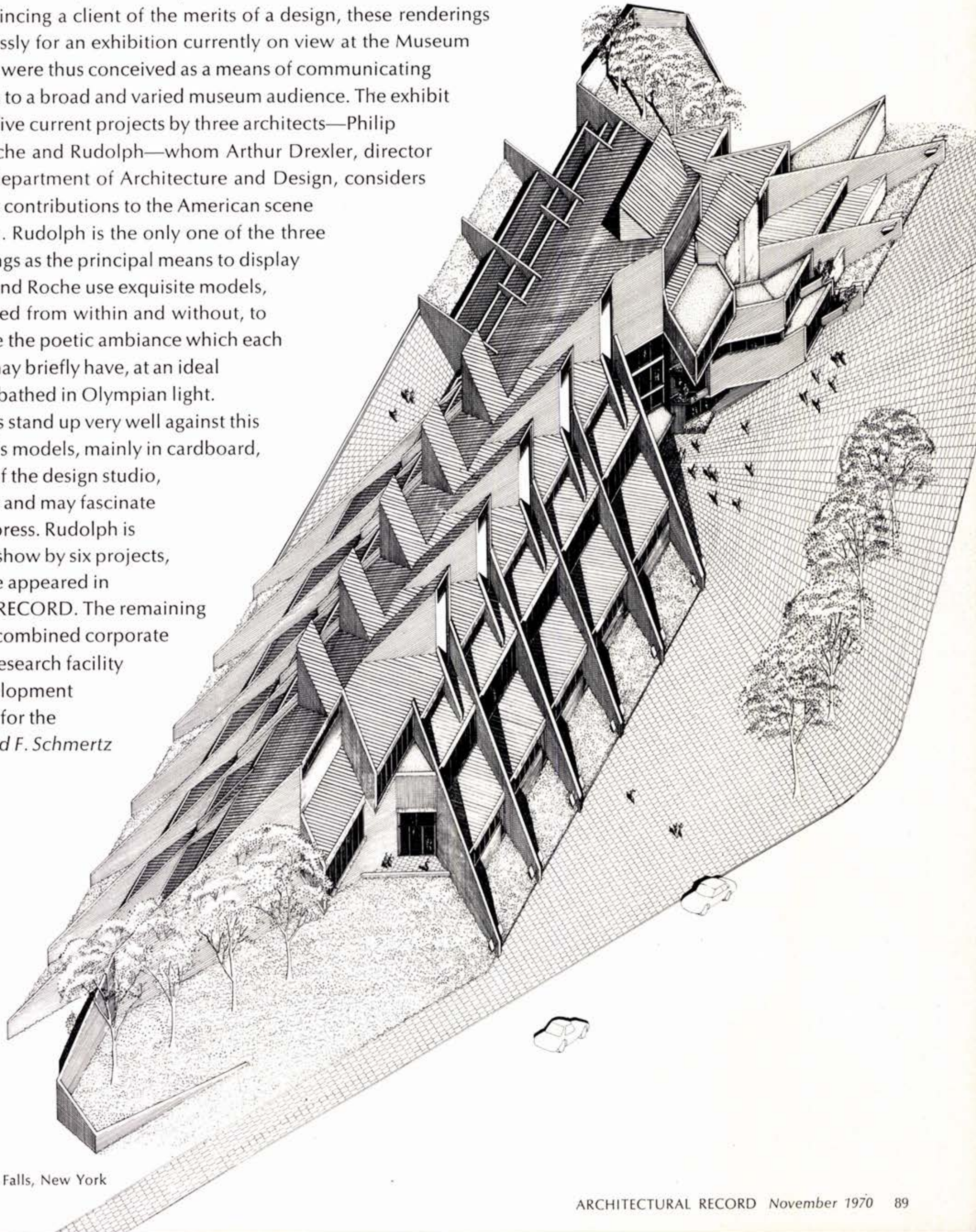
1941 average for each city = 100.00

Metropolitan area	1962	1963	1964	1965	1966	1967	1968	1969 (Quarterly) 1st	1969 2nd	1969 3rd	1969 4th	1970 (Quarterly) 1st	1970 2nd	1970 3rd	1970 4th
Atlanta	298.2	305.7	313.7	321.5	329.8	335.7	353.1	364.2	365.9	382.8	384.0	399.9	406.2	402.9	
Baltimore	271.8	275.5	280.6	285.7	290.9	295.8	308.7	311.4	313.0	321.8	322.8	323.7	330.3	326.3	
Birmingham	250.0	256.3	260.9	265.6	270.7	274.7	284.3	288.4	289.9	302.4	303.4	303.5	308.6	305.9	
Boston	239.8	244.1	252.1	257.8	262.0	265.7	277.1	278.2	279.6	294.0	295.0	300.5	305.6	303.1	
Chicago	292.0	301.0	306.6	311.7	320.4	328.4	339.5	340.4	342.1	354.9	356.1	362.2	368.6	365.1	
Cincinnati	258.8	263.9	269.5	274.0	278.3	288.2	302.6	309.8	311.5	324.8	325.8	332.8	338.4	335.4	
Cleveland	268.5	275.8	283.0	292.3	300.7	303.7	331.5	334.9	336.7	357.1	358.3	359.7	366.1	362.7	
Dallas	246.9	253.0	256.4	260.8	266.9	270.4	281.7	287.2	288.7	307.6	308.6	310.4	314.4	313.0	
Denver	274.9	282.5	287.3	294.0	297.5	305.1	312.5	317.9	318.5	337.9	339.0	343.4	348.4	346.2	
Detroit	265.9	272.2	277.7	284.7	296.9	301.2	316.4	326.8	328.5	351.8	352.9	355.2	360.5	356.3	
Kansas City	240.1	247.8	250.5	256.4	261.0	264.3	278.0	281.0	282.3	294.5	295.5	301.8	306.8	304.5	
Los Angeles	276.3	282.5	288.2	297.1	302.7	310.1	320.1	323.7	325.4	343.0	344.1	346.4	355.3	349.3	
Miami	260.3	269.3	274.4	277.5	284.0	286.1	305.3	309.6	311.2	328.3	329.3	338.2	343.5	341.1	
Minneapolis	269.0	275.3	282.4	285.0	289.4	300.2	309.4	310.6	312.2	330.1	331.2	341.6	346.6		
New Orleans	245.1	248.3	249.9	256.3	259.8	267.6	274.2	285.5	287.1	296.6	297.5	305.4	310.6	307.9	
New York	276.0	282.3	289.4	297.1	304.0	313.6	321.4	324.9	326.6	343.4	344.5	351.1	360.5	353.2	
Philadelphia	265.2	271.2	275.2	280.8	286.6	293.7	301.7	304.6	306.2	320.0	321.0	328.9	337.7	331.7	
Pittsburgh	251.8	258.2	263.8	267.0	271.7	275.0	293.8	297.0	298.6	310.0	311.0	316.9	321.6	319.5	
St. Louis	255.4	263.4	272.1	280.9	288.3	293.2	304.4	306.8	308.3	323.7	324.7	335.2	340.8	338.0	
San Francisco	343.3	352.4	365.4	368.6	386.0	390.8	402.9	415.6	417.5	439.9	441.1	455.4	466.9	458.1	
Seattle	252.5	260.6	266.6	268.9	275.0	283.5	292.2	296.1	297.5	316.8	317.8	325.4	335.1	328.1	

Costs in a given city for a certain period may be compared with costs in another period by dividing one index into the other; if the index for a city for one period (200.0) divided by the index for a second period (150.0) equals 133%, the costs in the one period are 33% higher than the costs in the other. Also, second period costs are 75% of those in the first period (150.0÷200.0=75%) or they are 25% lower in the second period.

PAUL RUDOLPH: WORK IN PROGRESS

The spectacularly beautiful drawings on these pages differ in subtle ways from Rudolph's earlier delineations because, unlike his previous work, almost all of which has been done as a means of convincing a client of the merits of a design, these renderings were created expressly for an exhibition currently on view at the Museum of Modern Art, and were thus conceived as a means of communicating architectural values to a broad and varied museum audience. The exhibit consists of twenty-five current projects by three architects—Philip Johnson, Kevin Roche and Rudolph—whom Arthur Drexler, director of the Museum's Department of Architecture and Design, considers to be making major contributions to the American scene (see News page 37). Rudolph is the only one of the three to rely upon drawings as the principal means to display his work. Johnson and Roche use exquisite models, magically illuminated from within and without, to produce in advance the poetic ambiance which each of their buildings may briefly have, at an ideal moment in time, if bathed in Olympian light. Rudolph's drawings stand up very well against this competition, but his models, mainly in cardboard, suggest the world of the design studio, of work in progress and may fascinate more than they impress. Rudolph is represented in the show by six projects, three of which have appeared in ARCHITECTURAL RECORD. The remaining three—a library, a combined corporate headquarters and research facility and a housing development are here published for the first time. —*Mildred F. Schmertz*

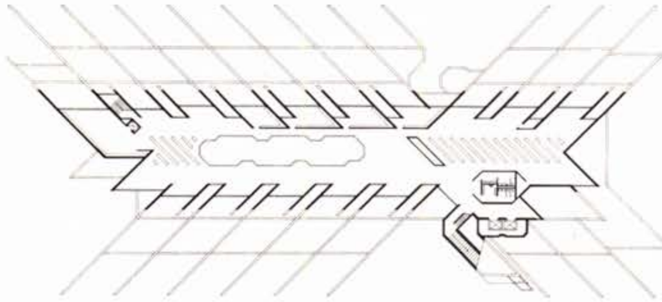


Central Library, Niagara Falls, New York

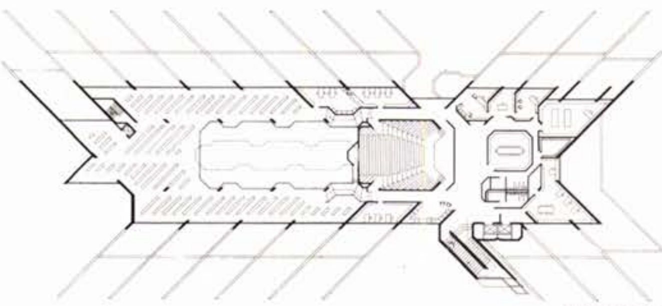
It has been said before that Rudolph's superb drawings so enchant the eye that one is diverted from the designs themselves into contemplation of the wonders of his draftsmanship. To counteract this tendency, it may be useful to set forth those attributes of his work which form its essential design content and which Rudolph himself considers most characteristic.

For him the site is a key consideration. His design is a response to the site and its environment. Where a strong environmental ambiance exists, he reinforces it. Where it does not, he creates it.

His concern with the environmental aspects of design leads him to freshly restate the design problem each time, and causes him to utilize a great variety of forms, scales and materials. His buildings are designed to be read from varying distances and from the air. Buildings are often dramatically articulated from story to story. Clearly expressed and essentially simple structural systems are juxtaposed to specific elements such as stairs, elevators



THIRD FLOOR



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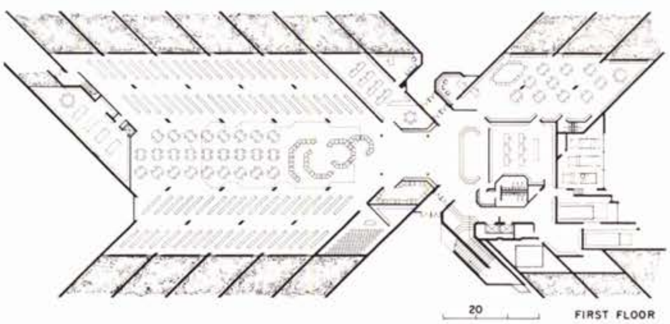
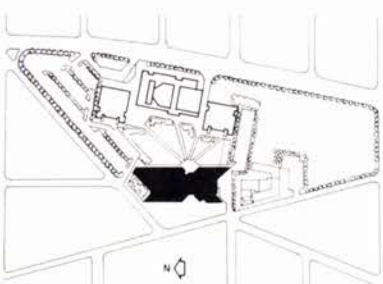
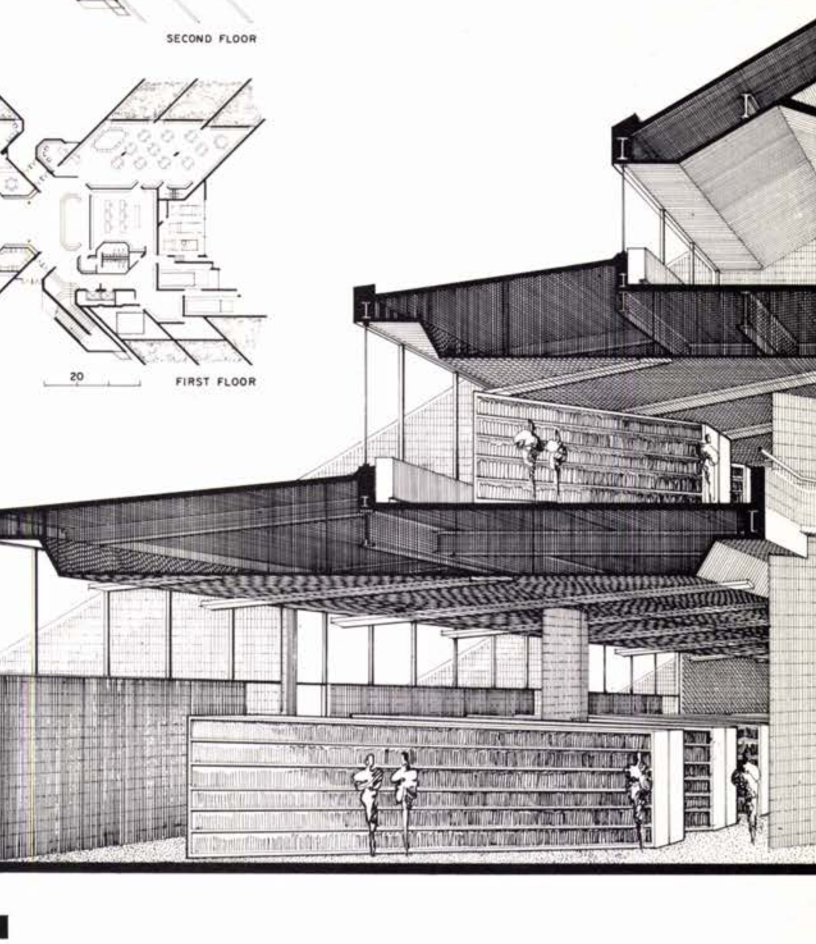
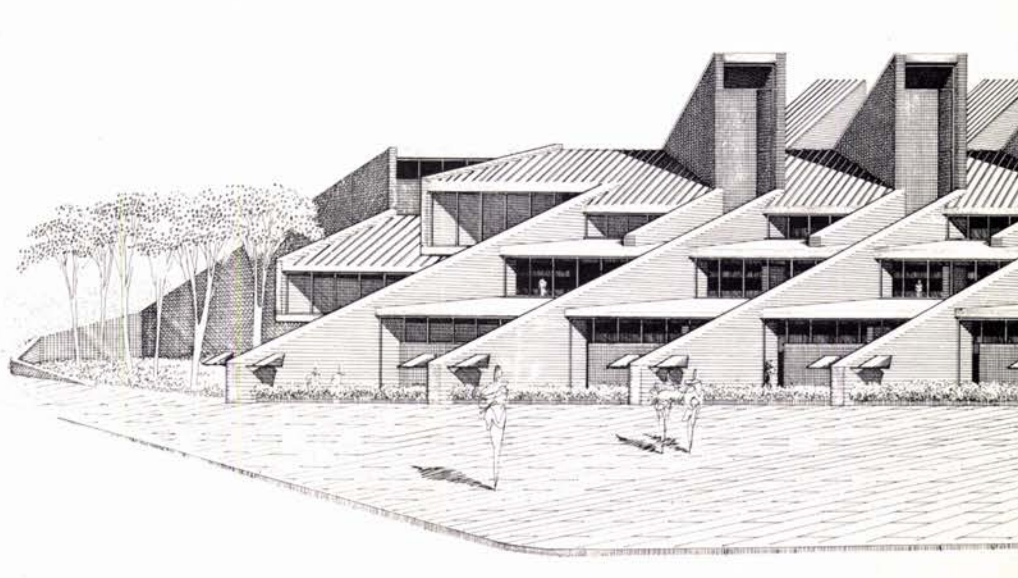


FIRST FLOOR





and mechanical and toilet shafts which have been elaborated as forms. In general, fixed elements are juxtaposed to more flexible generalized uses. The fixed elements often play a dual role acting as "hinges" and "joints" as his buildings sinuously move to follow a street pattern, turn a corner or form a plaza. Frequently these elements are used to lead the eye around the building. Such elements are essential means by which Rudolph manipulates scale. They take many shapes, thus a small conference room might be circular, elliptical, square, a rectangle or a triangle. Often the choice of shape becomes a



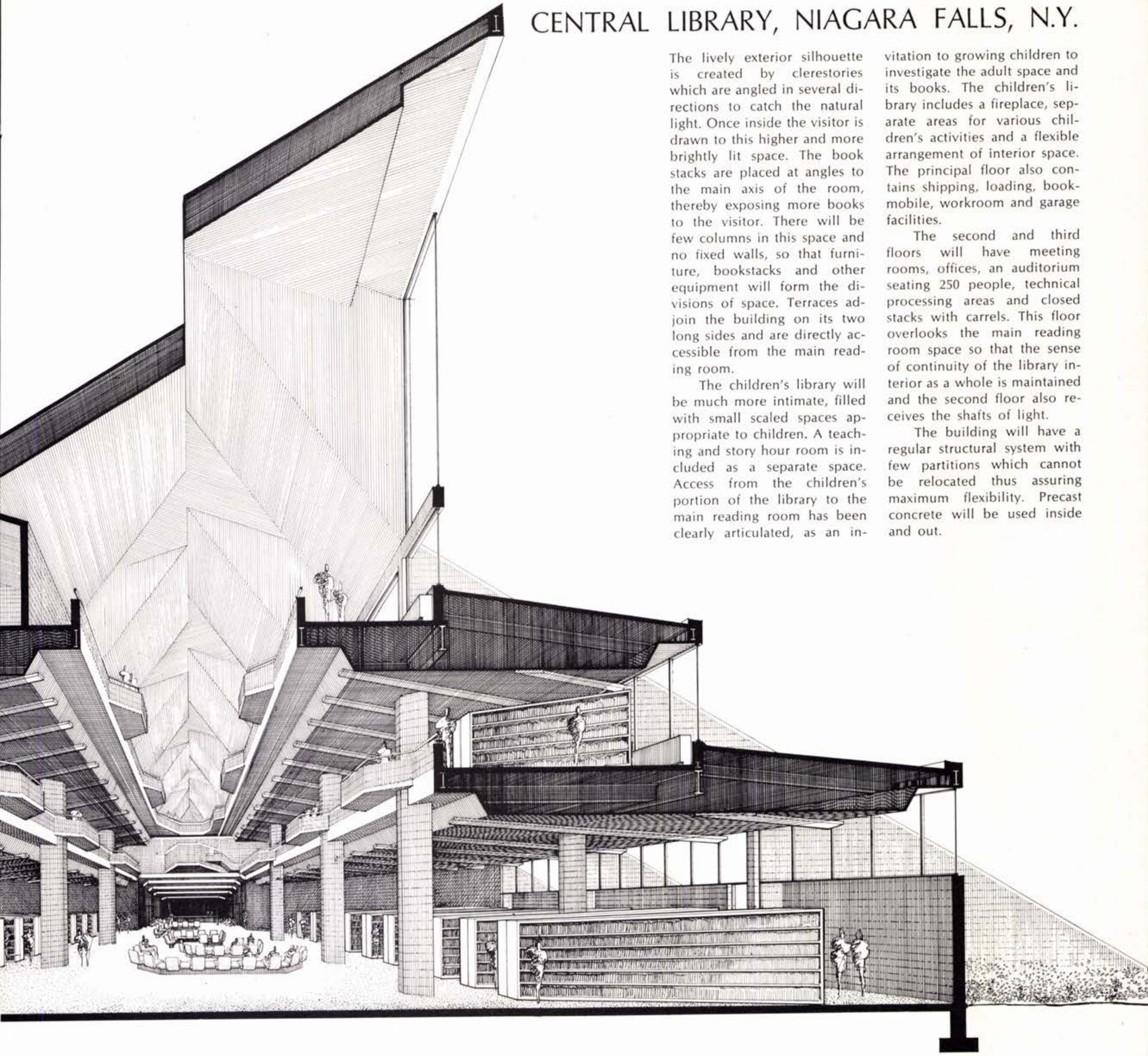
CENTRAL LIBRARY, NIAGARA FALLS, N.Y.

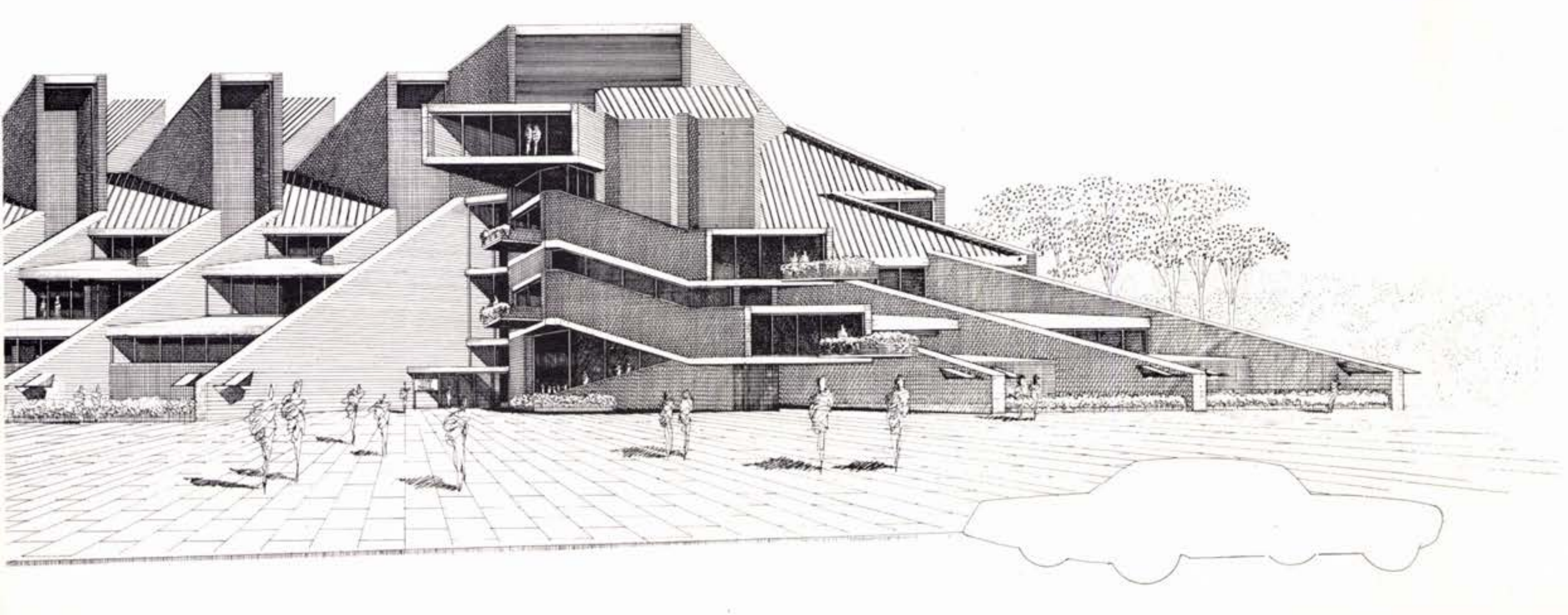
The lively exterior silhouette is created by clerestories which are angled in several directions to catch the natural light. Once inside the visitor is drawn to this higher and more brightly lit space. The book stacks are placed at angles to the main axis of the room, thereby exposing more books to the visitor. There will be few columns in this space and no fixed walls, so that furniture, bookstacks and other equipment will form the divisions of space. Terraces adjoin the building on its two long sides and are directly accessible from the main reading room.

The children's library will be much more intimate, filled with small scaled spaces appropriate to children. A teaching and story hour room is included as a separate space. Access from the children's portion of the library to the main reading room has been clearly articulated, as an invitation to growing children to investigate the adult space and its books. The children's library includes a fireplace, separate areas for various children's activities and a flexible arrangement of interior space. The principal floor also contains shipping, loading, bookmobile, workroom and garage facilities.

The second and third floors will have meeting rooms, offices, an auditorium seating 250 people, technical processing areas and closed stacks with carrels. This floor overlooks the main reading room space so that the sense of continuity of the library interior as a whole is maintained and the second floor also receives the shafts of light.

The building will have a regular structural system with few partitions which cannot be relocated thus assuring maximum flexibility. Precast concrete will be used inside and out.





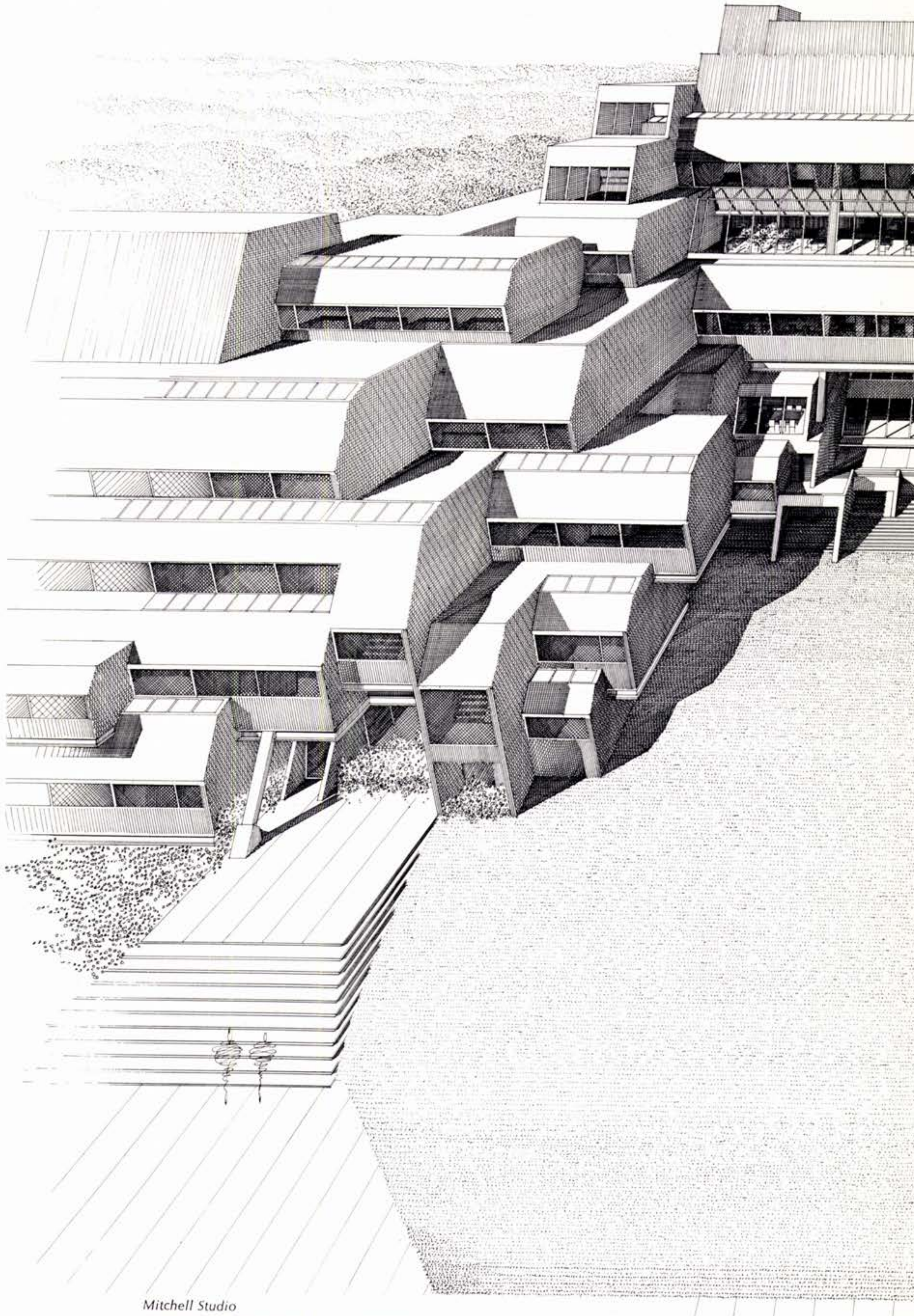
highly personal one and leads to qualities which Rudolph realizes are easily misinterpreted as arbitrary.

Rudolph believes that for very large buildings it is not enough to simply articulate the structure in order to organize such buildings visually. In addition to elaborating the fixed elements, he emphasizes the circulation systems, visually relating vertical circulation to horizontal paths of movement such as vehicular traffic ways, subways and sidewalks. His architecture is topographical when the quality of the landscape justifies this approach.

Rudolph designs buildings which simultaneously defer to the past, yet accommodate the future. He creates definable exterior spaces which relate to existing buildings which are to remain, but he indicates the future by open-ended concepts, infinitely expansible in every direction. His buildings always embody broader design concerns than those represented by the building itself. They are conceived as interventions in behalf of tomorrow—the walls, gates, landmark towers and bridges of a higher urban order to come.

Rudolph's interiors are characterized by the flow of space—horizontally, vertically and diagonally. Again his primary principle is one of juxtaposition —agitated space is opposed to quiet, contented space, tight coves of space flow into multi-storied central space, diagonal space passes through vertical space.

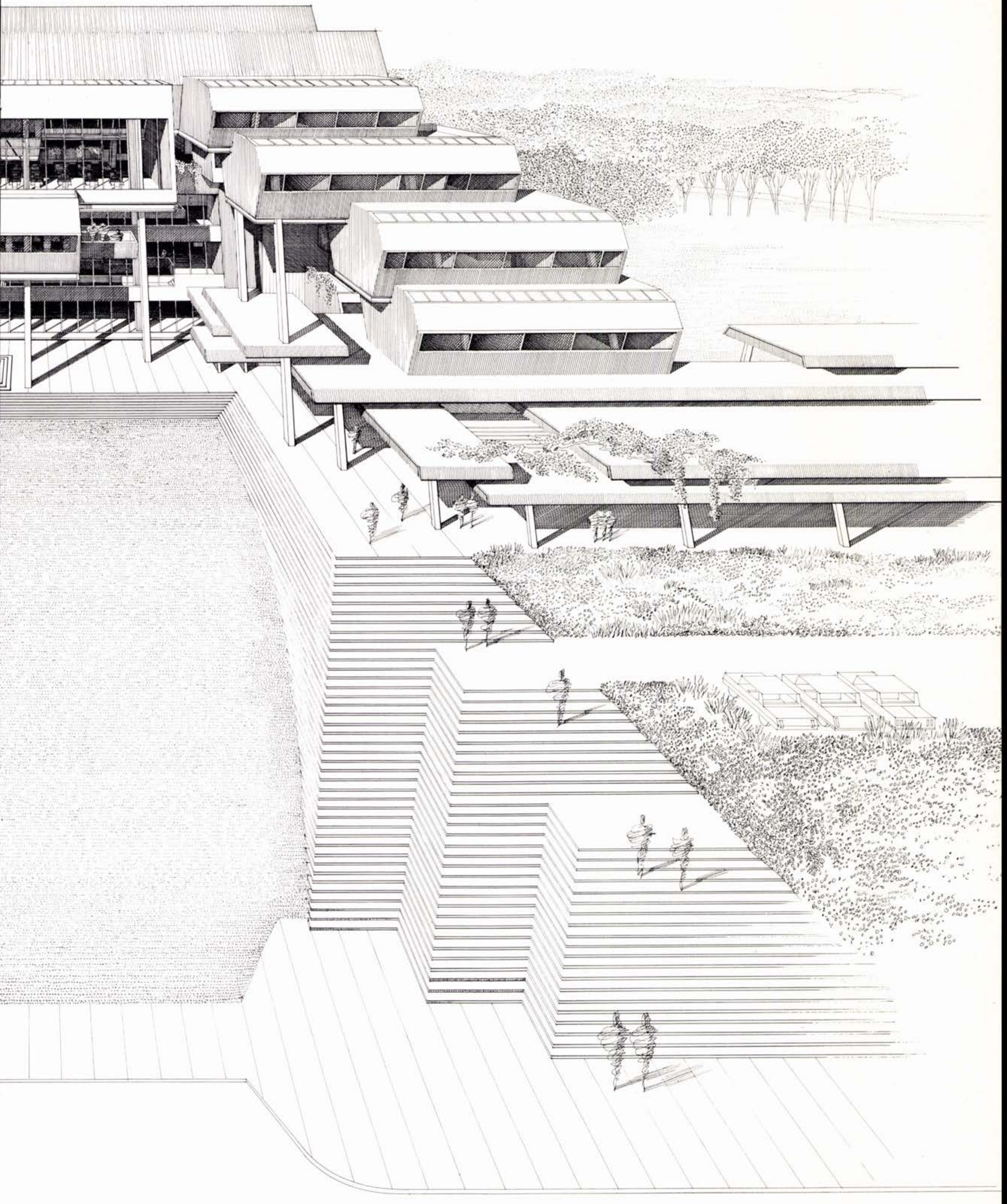
The control of natural light within the interior is a major concern of Rudolph's. In most cases it is indirect, admitted by almost invisible skylights and reflected from broad sloping planes. Rudolph acknowledges that he has learned much about light from Frank Lloyd Wright who he believes "was born with the knowledge of what light will do." Le Corbusier was another mentor and now Rudolph feels that he can really anticipate the effects which variously sized, slanted and orientated openings will have on natural interior illumination.



Mitchell Studio

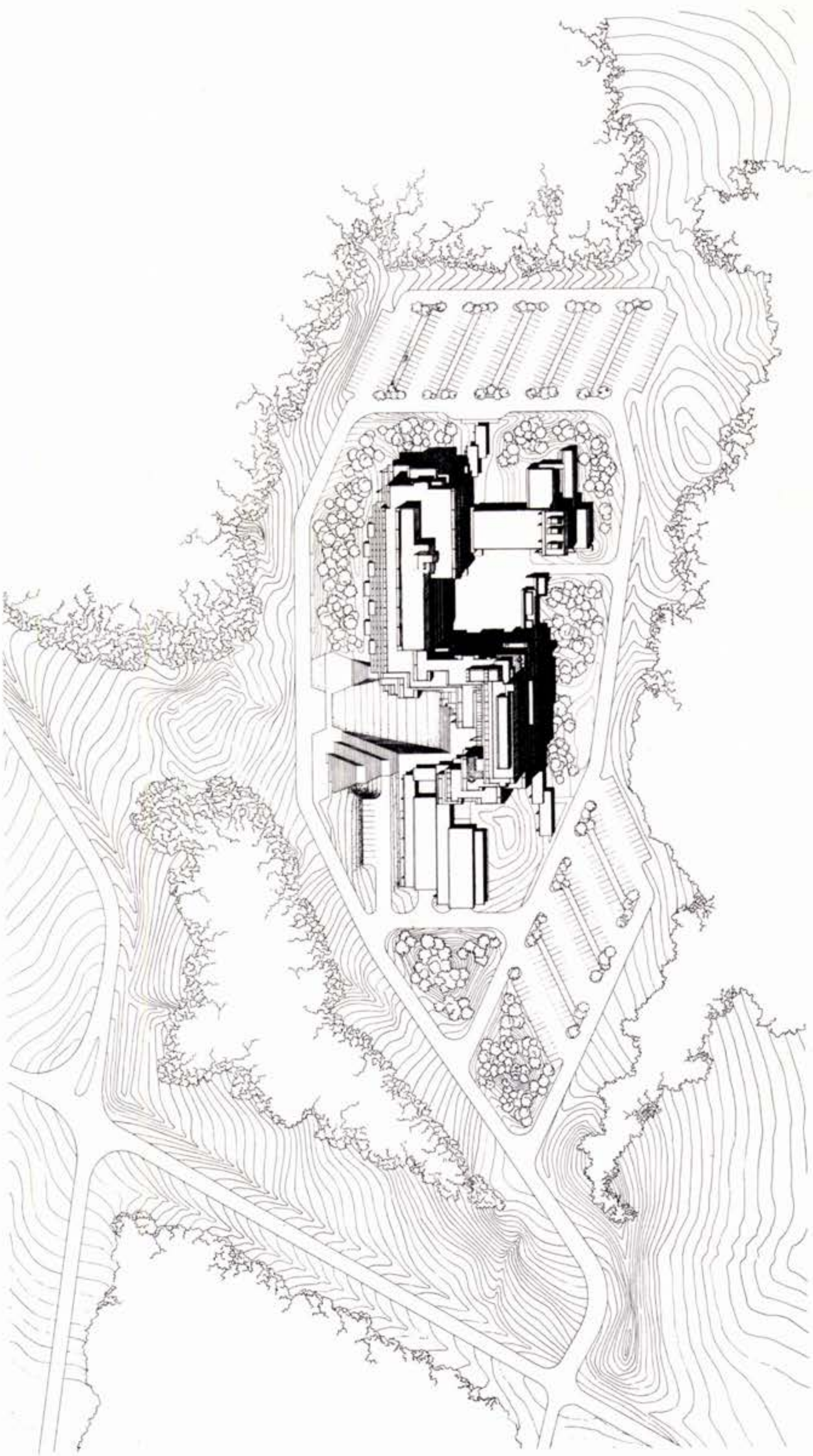
This large complex in Durham County, North Carolina, scheduled for completion in 1971, relates topographically to the broad ridge upon which it is being constructed. It consists of three major blocks, each of which may be expanded. The main approach is shown in the perspective. The steel structural frame and panel system appear in the construction photos at the left.

CORPORATE HEADQUARTERS

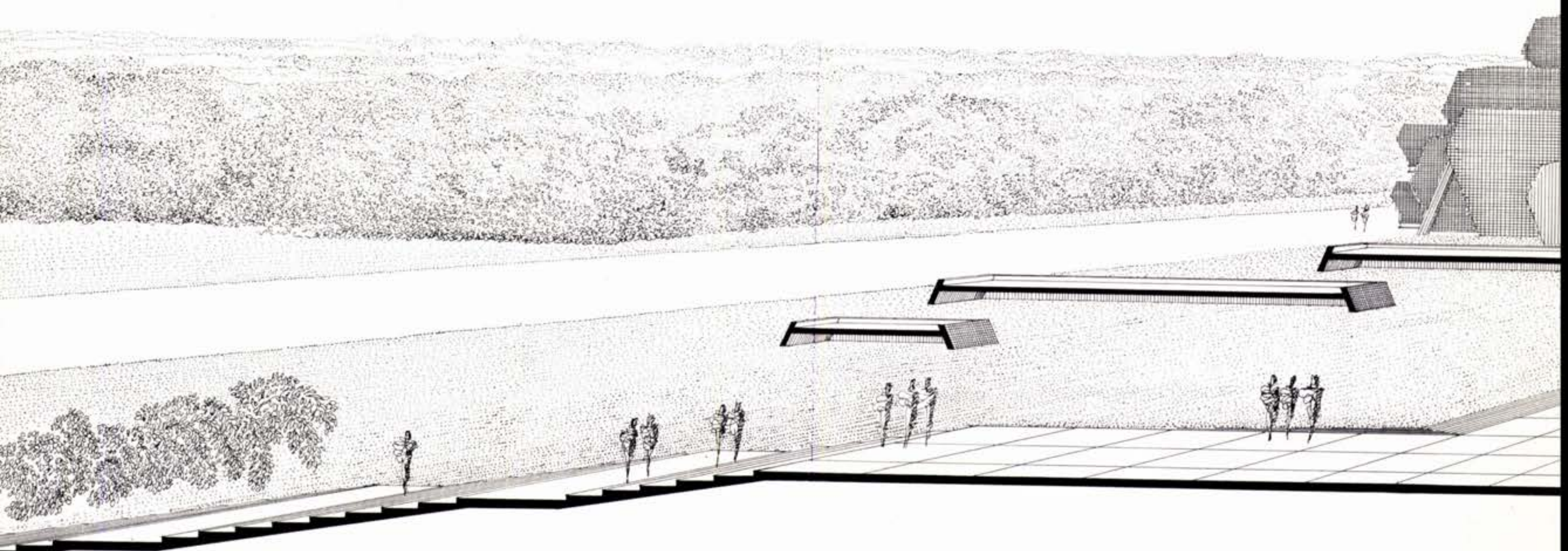


AND RESEARCH LABORATORIES FOR BURROUGHS WELLCOME & CO., INC.

A final characteristic by which Rudolph's work may be readily recognized is his use of space modules as integral elements forming the building complex. Like Japan's Metabolists, he believes that sooner or later most buildings in technologically advanced countries will be built of large scale, three-dimensional modules with structure, finishes, air conditioning, heating, plumbing and electrical facilities built in. He points out that most buildings constructed in the United States are basically made up of relatively small cubes of space (residential units, motel and hotel rooms, hospital rooms, classrooms, etc.) These units or modules will eventually lend themselves to large scale, three-dimensional industrialization and become the predominant element in the city scape. Those projects by Rudolph in which space modules are clearly articulated, although not totally prefabricated, can be considered prototypes being developed to hasten the arrival of this technological advance.



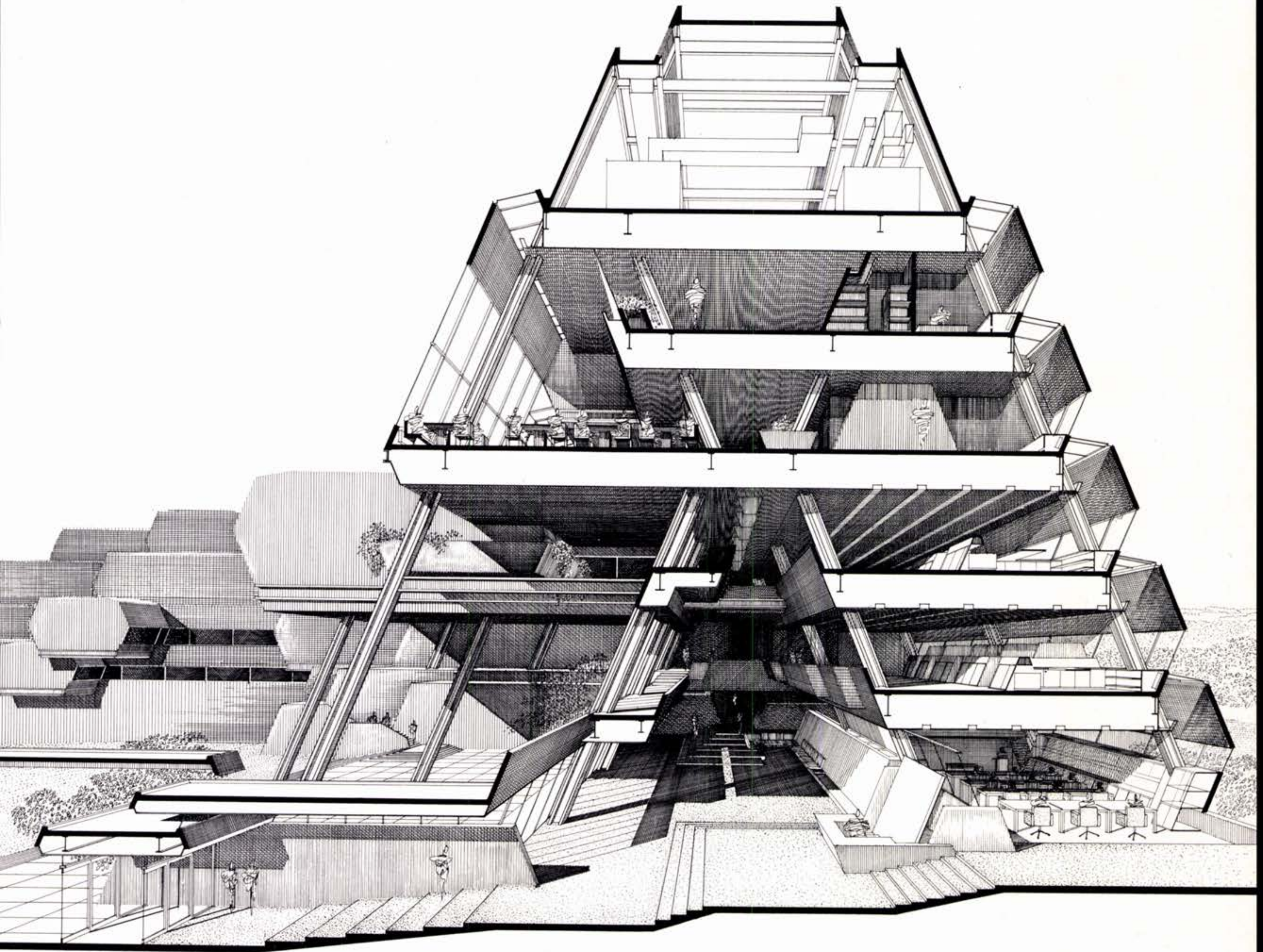
Niagara Falls Central Library
This proposed library (see pages 89-91) will be located on the city's main street in a dominant location which will render it highly visible as a focal point for the secondary streets which converge into the main traffic artery. It has been designed as part of a superblock which will also contain school facilities, a playground area, a small park and parking facilities. No through roads are planned for



The building is designed in an S-shape, which allows one leg of the "S" to wrap itself around the main entry court, and the other leg to wrap around a service court. Administrative offices and the building's services—a cafeteria, an auditorium, a library and information center—will flank the entry court; research laboratories, offices and special services will flank the service court.

The lobby is three stories high, with floors on several levels following the contours of the hillside. In addition to its function as the building reception area, the lobby will also be the focal point of the building's communications. Approximately three-fourths of the building's offices are grouped around this lobby which will thus be animated by constant use.

The building utilizes a truncated steel A-frame. The diagonal supporting members are linked at the roof by a horizontal system of beams. The building's mechanical systems, which are particularly extensive in the research wing, will be housed in both vertical and diagonal shafts so that all systems will converge at a common location on the penthouse as shown in the section below.



the superblock, thus insuring the peace and quiet of the area.

Rudolph wished to design a building which would in his words "open its arms to the citizens of Niagara Falls." He has located it within the superblock in such a way that it is easily accessible to the public by automobile or by foot. The main entrance fronts upon a broad plaza and has splayed walls to invite the public in. The dominant characteristics of the building are the sloping walls, which were derived from the necessity of providing the largest area on the ground floor, a smaller area on the second floor and a still smaller area on the third floor. By means of these sloping walls and a pitched roof Rudolph has attempted to achieve a building almost domestic in quality. The splayed walls are extended beyond the infilling walls, most of which will be glass, in order to reduce the glare and give a sense of enclosure to the interior. These splayed walls will permit each floor to be extended, should this become necessary in the future. This flexibility with regard to the size of the building is characteristic of Rudolph's work.

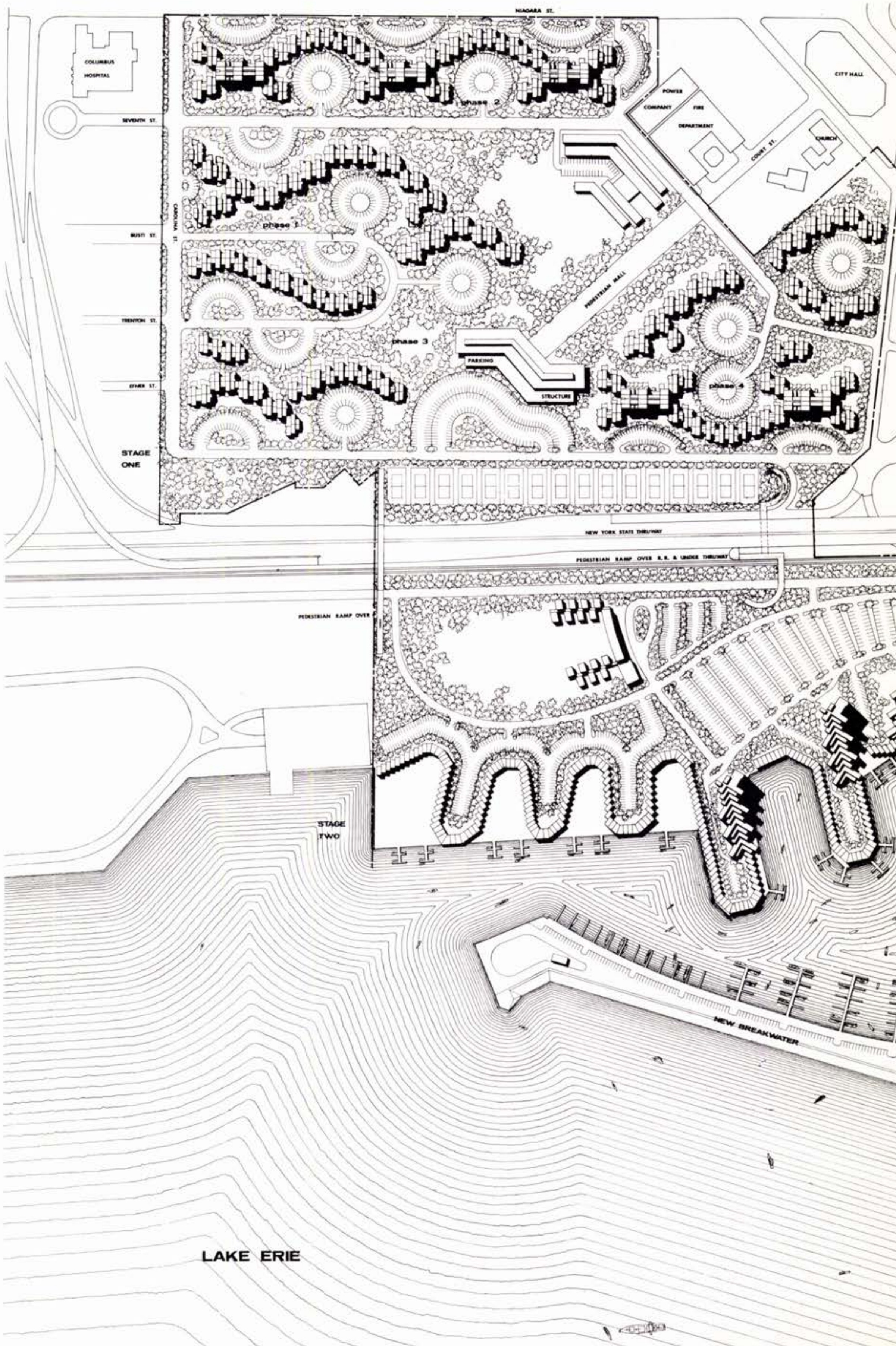
The two entrances are placed opposite each other—one at the apex of the main street, the other on the plaza and playground side. Upon entering the building one has immediate access to the directory, the main circulation desk, general circulation space, display cases, lockers, stairs, elevators, copying machines and toilets. This central space leads directly to the children's library or to the main reading room with its open stacks. The principal reading room will be lighted from the sides, as well as through clerestories at the top of a three-story-high space in the center of the building.

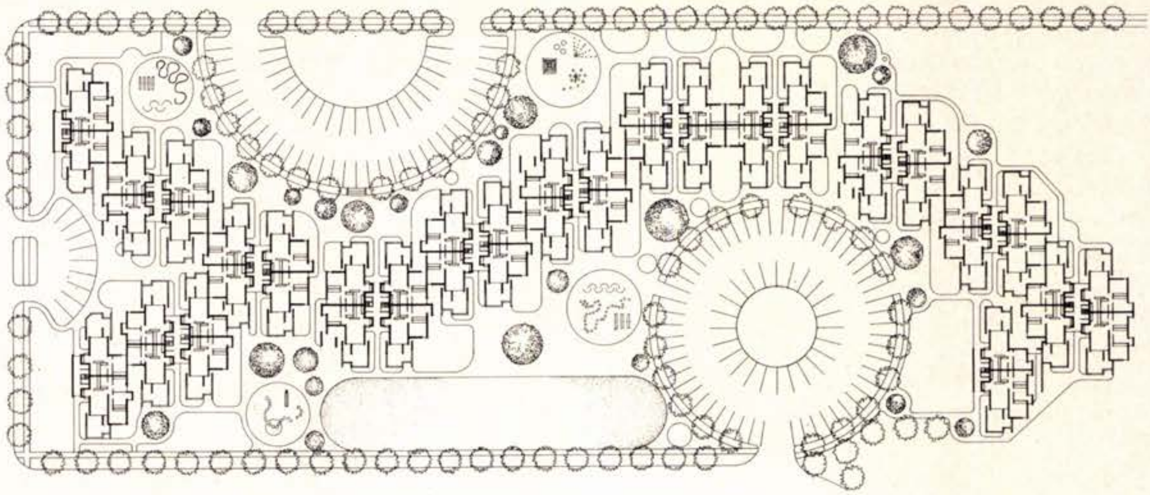
Corporate Headquarters

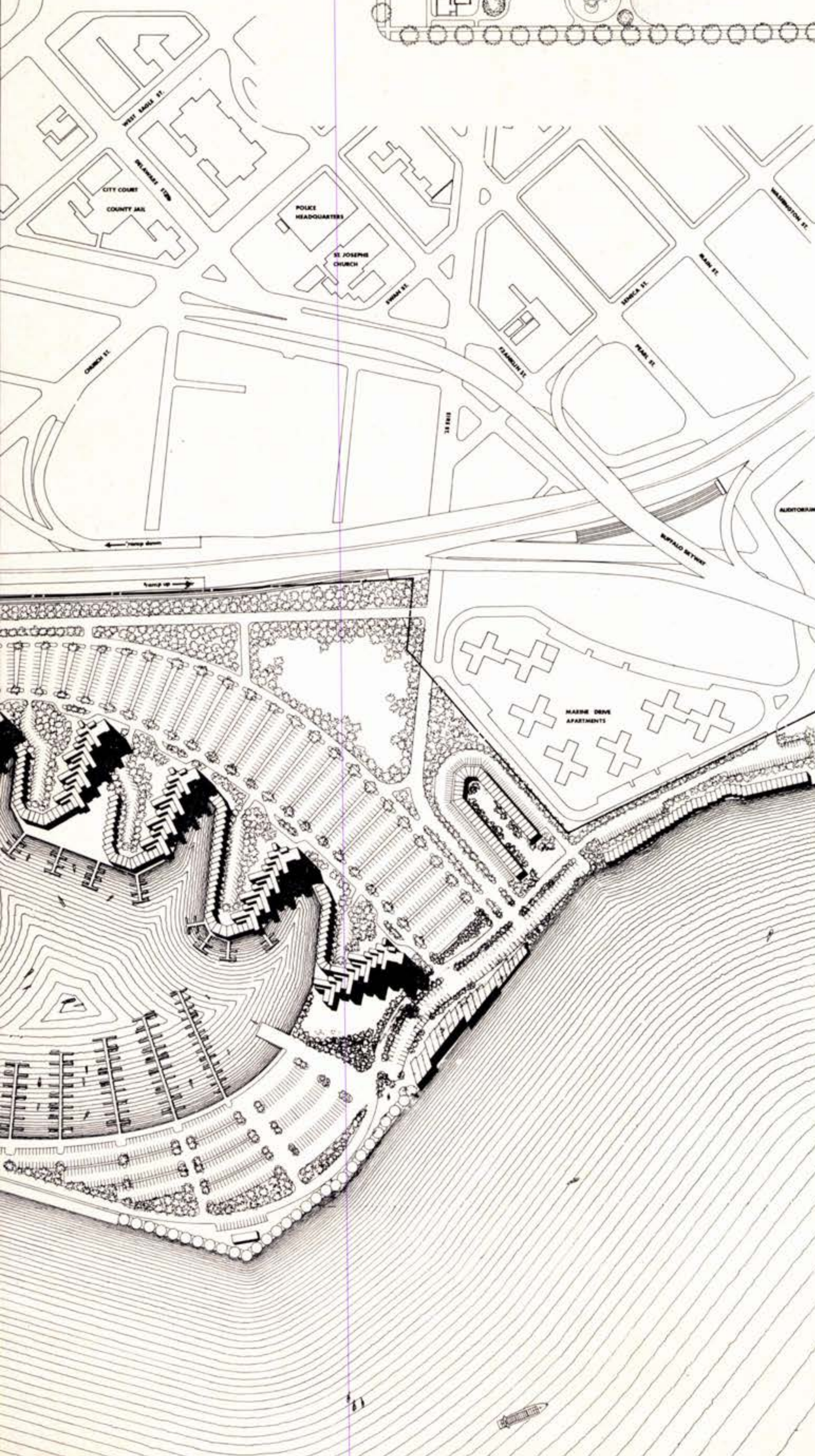
Rudolph conceives this building—the Corporate Headquarters and Research Laboratories for Burroughs Wellcome & Co., Inc.—as a man-made extension of the

BUFFALO WATERFRONT DEVELOPMENT, BUFFALO, N.Y.

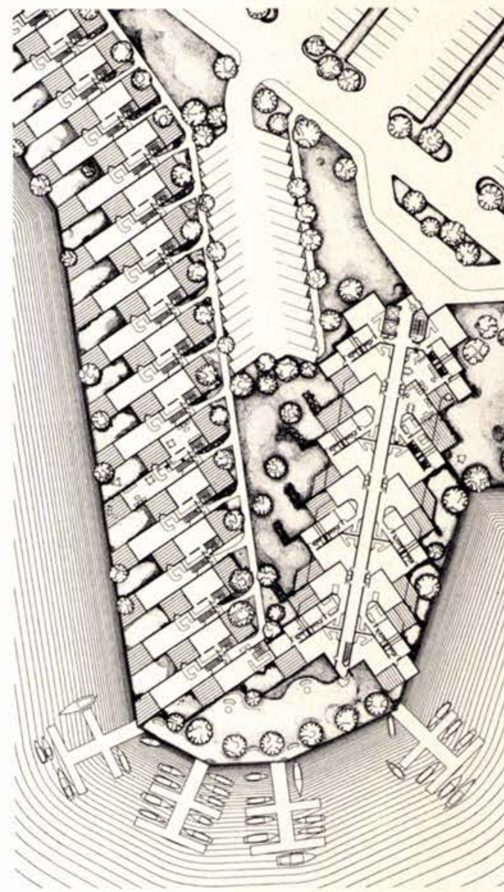
Rudolph was among the first architects to be commissioned by the newly formed New York State Urban Development Corporation—a public authority launched by Governor Rockefeller, funded by bond issues, headed by Edward Logue and charged with the responsibility of erecting massive new housing developments in the state. Rudolph's scheme for UDC has been described by Arthur Drexler as achieving variety "not by the arrangement of mass produced units, but rather by the deployment of large building forms in a total configuration related to the natural landscape. The result is not 'organic' in the sense of imitating natural forms, yet the buildings become a mountain range."







WEST EAGLE ST.
DELAWARE
CITY COURT
COUNTY JAIL
POLICE HEADQUARTERS
ST. JOSEPHS CHURCH
SWAN ST.
WASHINGTON ST.
MAIN ST.
SENECA ST.
PEARL ST.
FRANKLIN ST.
CHURCH ST.
ERIE ST.
AUDITORIUM
BUFFALO SKYWAY
ramp down
ramp up
MARINE DRIVE APARTMENTS

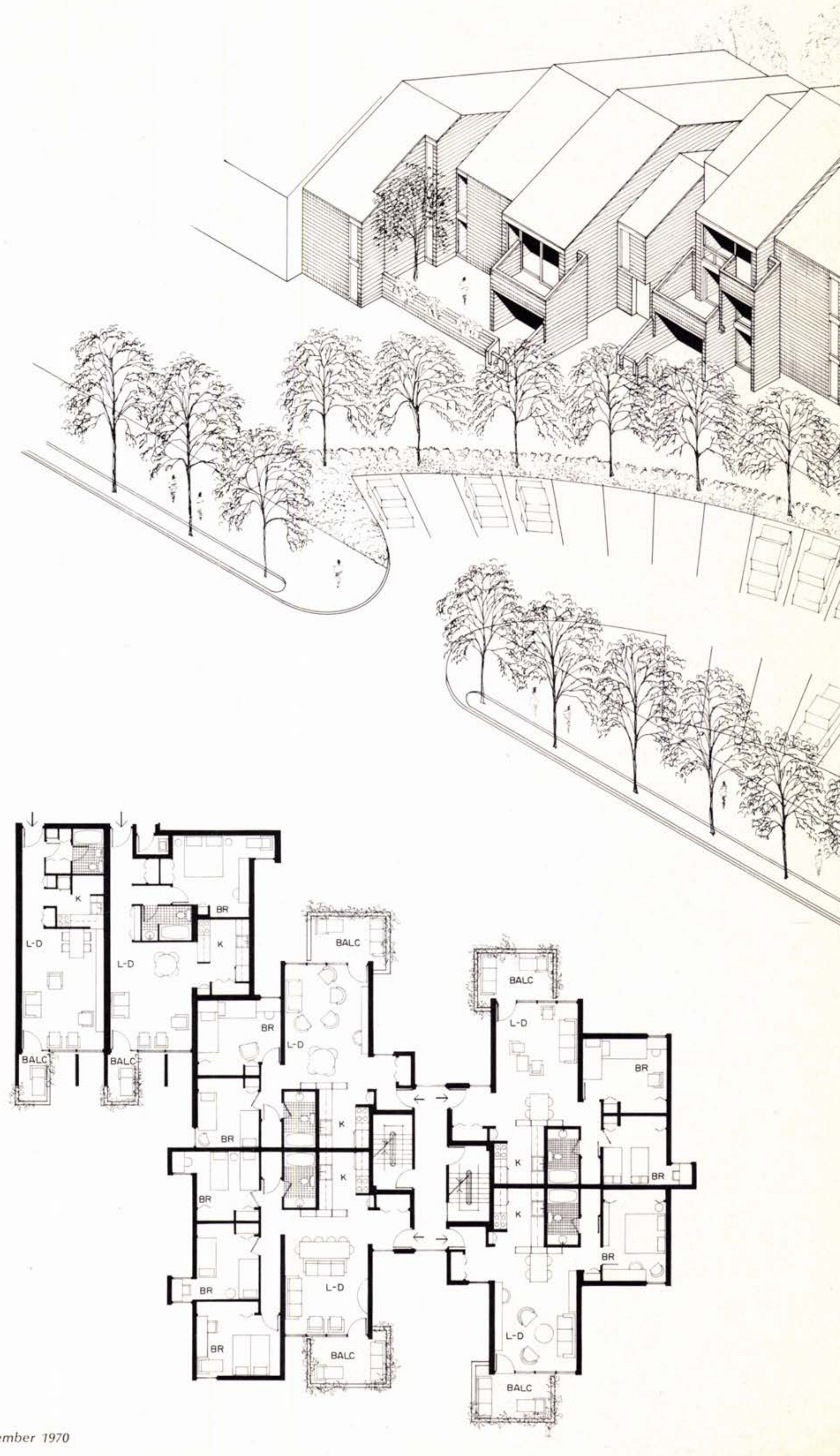


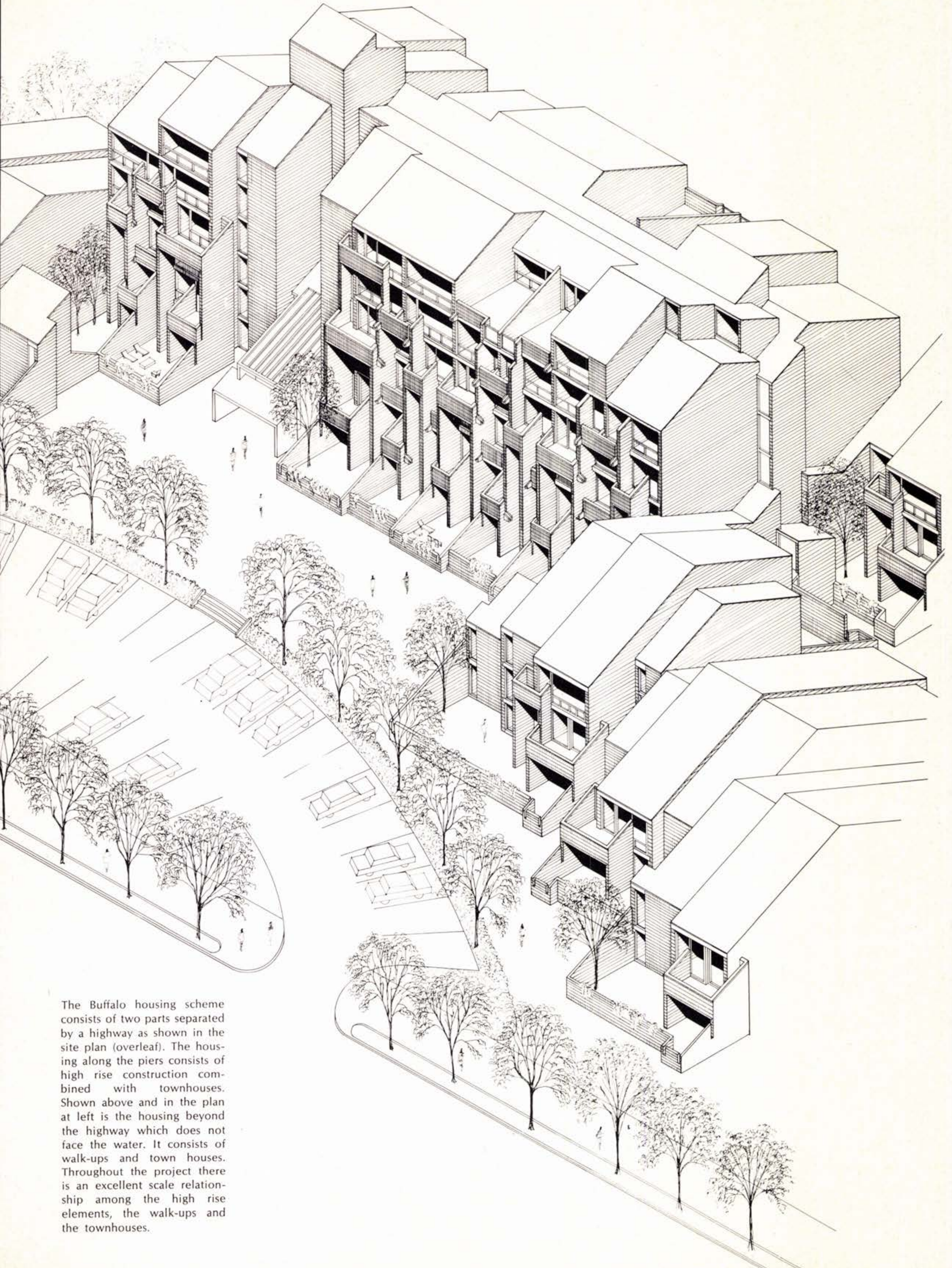
ridge upon which it is being built. Thus, the building steps back, providing man-made terraces at the apex of the ridge. Its placement allows people to enter it from below, walking up multi-leveled terraces, up more stairs and into the lobby.

According to Rudolph: "From a spatial viewpoint, the interior is given a new dimension with its sloping walls, giving an impression not unlike a growing tree—angles, light, shadow, flexibility. The building will impart a sense of being a living organism, rather than a box-like form. The laboratories will have an individuality and uniqueness quite unlike other laboratories because they will have higher ceilings lit by skylights at each end.

"The functions of the building are celebrated architecturally. There is contrast between those things that cannot be changed (mechanical shafts, columns, etc.) and the parts that can be changed—for example, the laboratories and other work areas which must be essentially flexible. Permanent interior structural components are being finished the same as the building's exterior—in rough textured sprayed aggregate within a plastic binder. The flexible components are being finished in a variety of surfaces—paneling, painted drywall etc. In a sense the building can be read according to the materials."

This building may be considered a summation of the characteristics by which Rudolph's architecture may be identified. The site has been a key consideration and the building is essentially topographical, single stories are clearly articulated to define scale, specific elements are elaborated within a clear and regular structural system, the plan is infinitely expansible in each of its three major blocks, and great attention has been paid to the flow of interior space as well as to the handling of reflected light. The building, although it doesn't actually consist of totally prefabricated space modules inserted within





The Buffalo housing scheme consists of two parts separated by a highway as shown in the site plan (overleaf). The housing along the piers consists of high rise construction combined with townhouses. Shown above and in the plan at left is the housing beyond the highway which does not face the water. It consists of walk-ups and town houses. Throughout the project there is an excellent scale relationship among the high rise elements, the walk-ups and the townhouses.

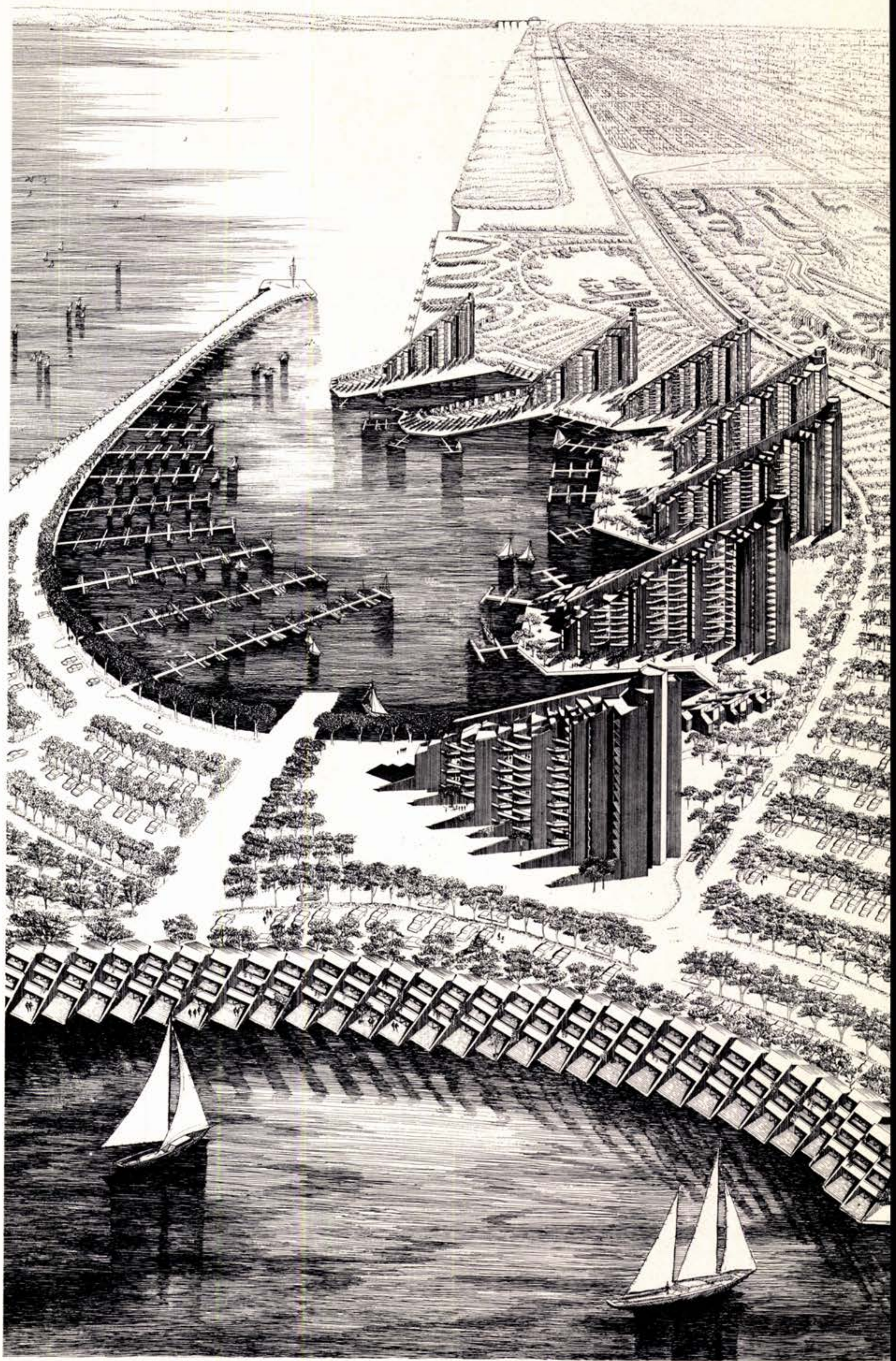
a structural frame, almost looks as though it does, and thus it prefigures and helps lay the groundwork for future technological development.

Buffalo Waterfront Development

Designed in 1969 for the New York State Urban Development Corporation it began as a topographical solution—essentially acording to Rudolph: "an undulating wall forming a bowl of space defined by the conjunction of land, water and cliffs." The buildings follow the configuration of the existing piers which will remain and be transformed into a marina.

A note about Rudolph's drawings

For those who wonder how an architect who is a great draftsman, but heads a busy practice can find time to draw like a master, the answer is that he draws, like many old masters painted, with the help of skilled assistants trained to fill in the details. For the Museum of Modern Art Show Rudolph himself set up all the perspectives, isometrics and other drawings, determined their limits and placement and established a scale of tonal values for each. He was assisted by Ralph Brescia, Paul Garrett, Robert Hill, Donald Luckenbill, Mart Mannik and Yugi Noga.



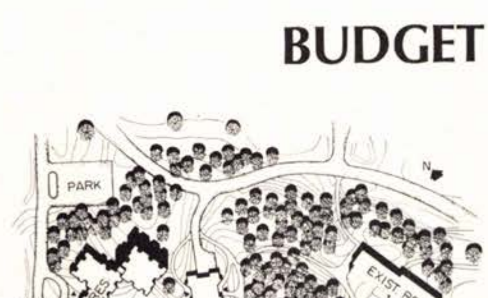
CENTRAL LIBRARY, Niagara Falls, N.Y. Owner: *The City of Niagara Falls, N.Y.* Architect: *Paul Rudolph;* structural engineer: *Lev Zetlin & Associates;* mechanical and electrical engineers: *Sherry Associates;* library consultants: *Charles M. Mohrhardt and Ralph A. Ulveling.*
CORPORATE HEADQUARTERS, RESEARCH LABORATORIES AND OTHER RELATED FACILITIES—BURROUGHS WELLCOME & CO., INC., Research Triangle Park, North Carolina. Owner: *Burroughs Wellcome & Co., Inc.* Architect: *Paul Rudolph;* structural, mechanical, electrical & site engineers: *Lockwood Greene Engineers, Inc.;* general contractor: *Daniel Construction Co., Inc.*
BUFFALO WATERFRONT DEVELOPMENT, Buffalo, N.Y. Owner: *N.Y. State Urban Development Corp.* Architect: *Paul Rudolph;* structural engineers: *Souza and True;* consulting engineers: *Simpson, Gumpertz and Heger;* mechanical and electrical engineers: *Sherry Associates;* marina design: *Webber, Di Donato, Renaldo;* general contractor: *Siegfried Construction Co., Inc.*

George Cserna photos

EXPRESSIONIST FORMS ON A BUDGET

Ulrich Franzen's new residence hall at the University of New Hampshire exhibits his characteristic modeling of forms, accomplished on a restricted budget. The building cost $23.30 per square foot to build, including site work but excluding furnishings, and this is a phenomenally low price on which to improve the visual strength and social functioning of the usual dormitory, as Franzen has done here; often such budgets produce only straight-walled barracks.

The original program called for larger ground floor common spaces than this building now provides. Franzen took issue with the size of these programmed spaces, and convinced the client to reduce them, putting the money thus saved into the rooms and suites; he provided a communal study/lounge for every twelve rooms, while reducing the ground floor areas common to the building as a whole. The study/lounges were placed in different locations on each floor; a student feels the change in his floor

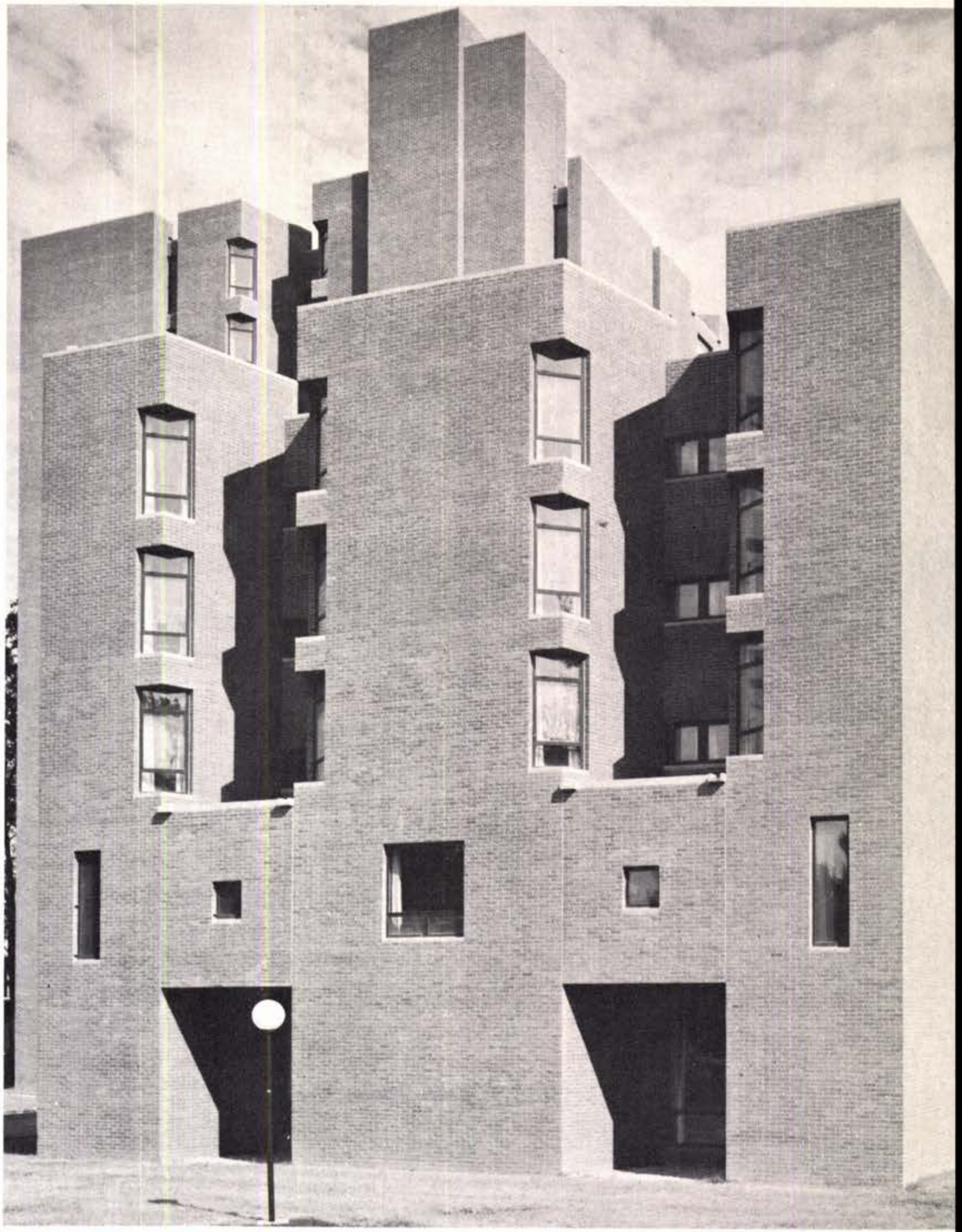


SITE PLAN

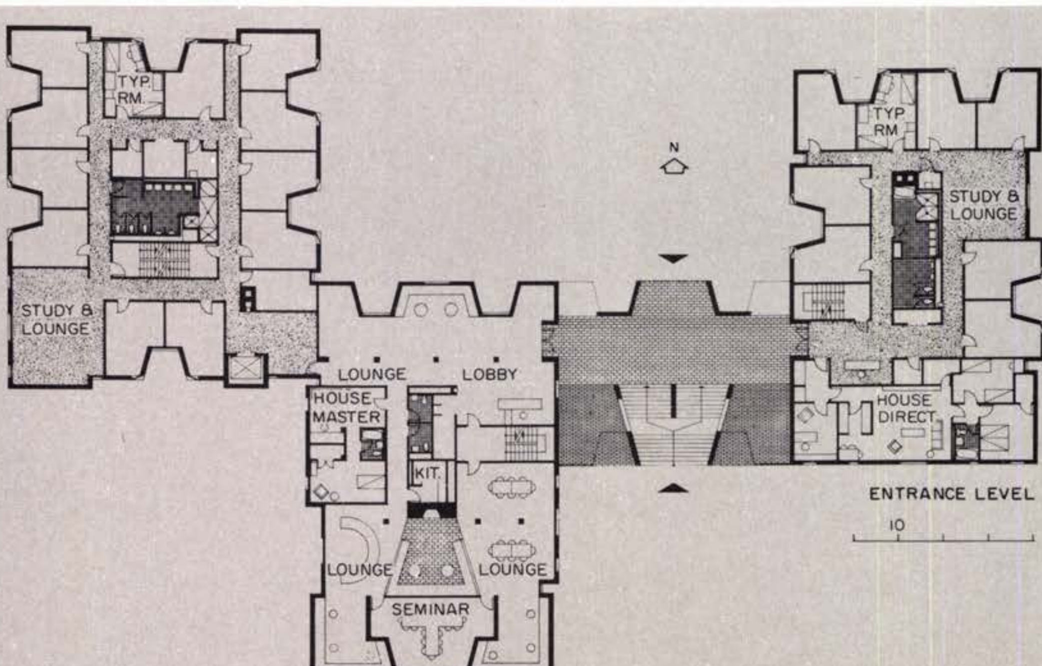
over similar floors above and below it. In the study rooms themselves, each one has been divided into two different "nooks" with one desk, one bed, and one window per nook. This is designed to give each student the feeling that a part of the room is his alone, within the usual format of two-man occupancy. The dormitory as a whole is composed into three separate but repetitive units, one a high-rise tower and the other two low-rise.

All of these issues relate to the architect seeing his building as an aid to the social well-being of the people who use it: their sense of privacy, their ability to communicate with others, the ability of the university to provide for students' needs. And the visual character of the building is partially an expression of those social functions it was intended to support. The three-part division of the plan expresses the general and flexible ways the building may be separated between men and women, with a "neutral" entrance—it is a coed dormitory with a total capacity of 450 students, and a series of floors or a whole section may be men one year and women the next, depending on admissions. One of the three sections is further separated from the other two by its height. As the study/lounges are relocated from floor to floor, they occasionally are expressed as "bridges" over the deep facade recessions between every two rooms; one such bridge can be seen in the upper portion of the photo on page 101. The rhythmic facade recessions themselves are a consequence of Franzen making the rooms a fat "L" shape, providing that private nook for each student. The windows in the recessions look straight out, but the windows along the outside facade are turned at an angle, changing the outlook slightly, and these turned windows are powerful visual forms on the exterior.

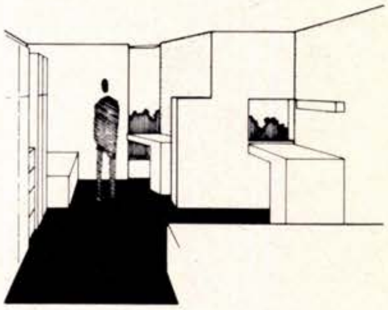
While Franzen has consciously expressed these social functions of his building, emphasizing their importance, he has chosen not to express other issues of lesser consequence to the students' well-being. Structure is one; the building is the simplest possible concrete frame, with evenly spaced columns, and beams and slabs poured integrally, on site. This was the least expensive way of framing, and mandatory on a tight budget. It is not necessarily an expression of any material, though it is a demonstration in the use of one. The exterior cavity walls are brick with block back-up, and the block is usually furred out and covered with gypsum board inside. Interior partitions are largely metal studs and gypsum board. The whole building becomes an expression of what the architect thought his building should try to do, and his attempt to fulfill these values with the money at hand.



RESIDENCE HALL FOR THE UNIVERSITY OF NEW HAMPSHIRE, Durham, New Hampshire. Architects: *Ulrich Franzen and Associates*—associate-in-charge, *Samuel E. Nylen;* structural engineers: *Garfinkel, Marenberg and Associates;* mechanical engineers: *John L. Altieri;* contractor: *Harvey Construction.*

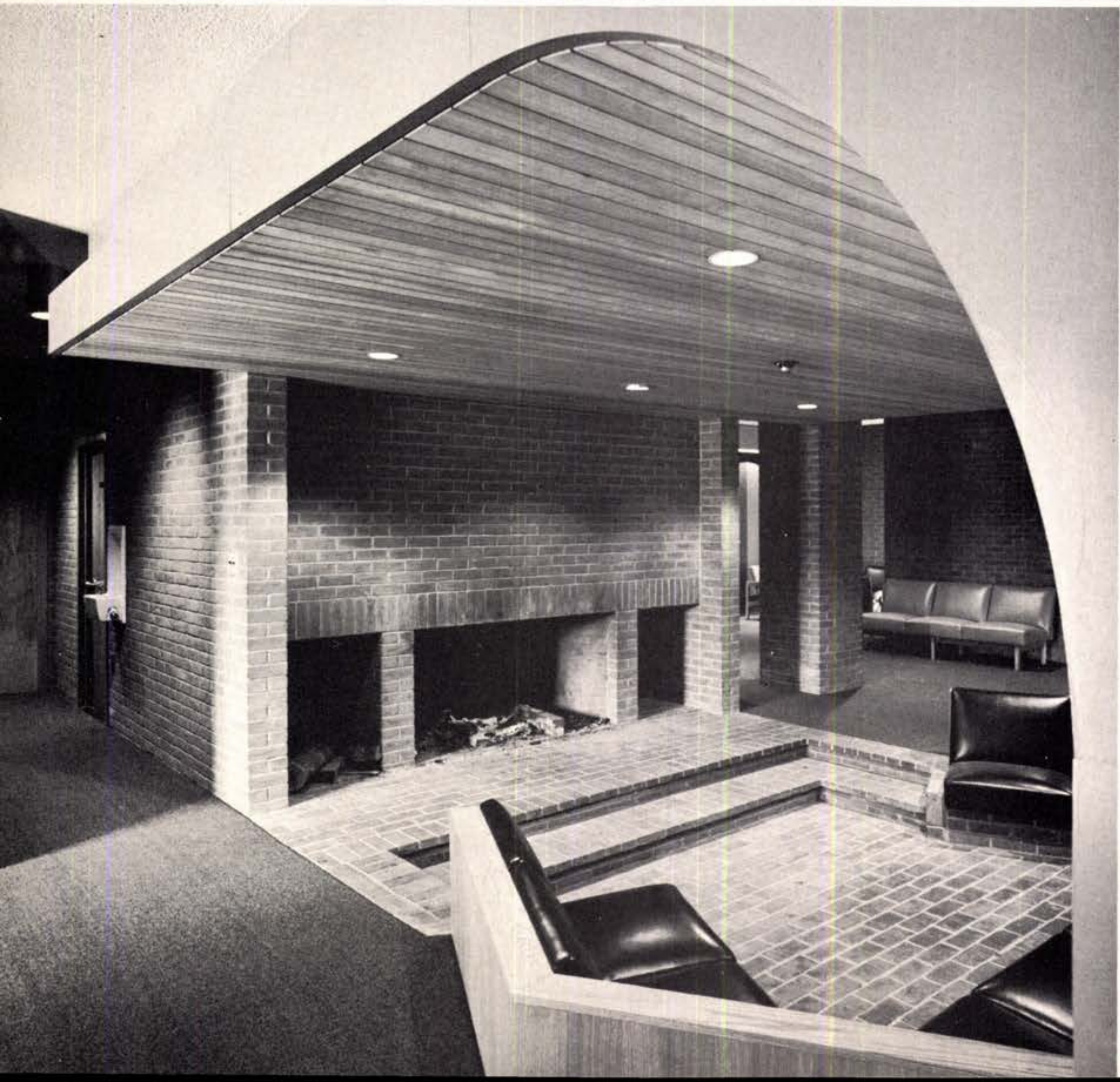


The plan at left shows the first floor, as designated from the uphill side, for there is a full story difference between entrance levels on the north versus the south facades. Each floor is divided into twelve rooms, twenty-four people to a floor, with common lavatory and shower facilities in the core of each of the three major living sections of the residence hall. The fixtures and facilities are identical in each section, usable by either men or women. The photo above shows the southern face of the two low-rise sections, with the third tower section showing in the upper left. The dorm is faced entirely with red brick, bearing on ledger angles where the rooms are overhanging. This building is part of a larger group of buildings, all by Franzen, shown on the site plan, page 101. One of the other residence halls is nearing completion.

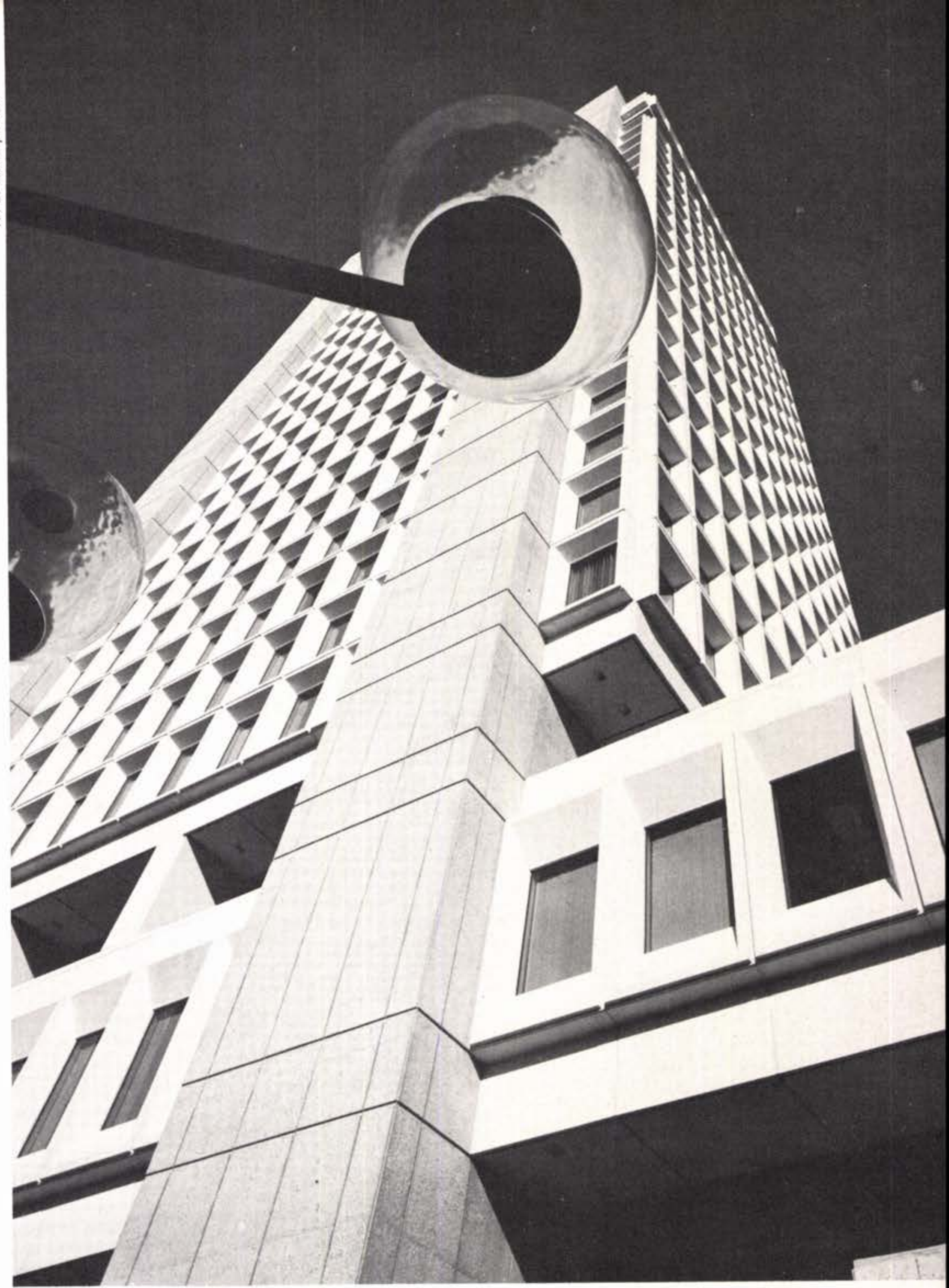


TYPICAL DORMITORY ROOM

Above is an interior sketch of a two-person room, and the photos show ground floor common facilities in the dorm. The fireplace and its seating area was part of the contract, but most of the other furniture was provided separately. The wall graphics were bid with the rest of the building, the specs calling for so many square feet of paneling and paint, in conformance with a design to be provided in shop drawings.



W. E. Davis photos

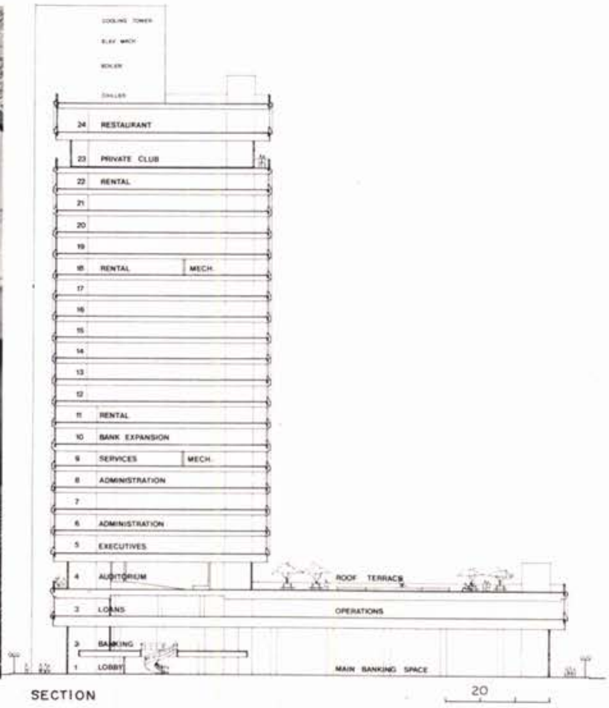


BIG BANK IN LITTLE ROCK

The Worthen Bank Building is one of several new towers rising in Little Rock, Arkansas. In its scale and in its architectural character, the Worthen Bank would not be unique in cities of a similar size on the East or West coasts, nor in larger cities anywhere in the country. But it is one of the best new buildings in Arkansas, and as a clean, competent attempt to enhance the quality of the center city, the bank communicates its good intentions to the people and grows from some of the best established modern architectural traditions. The high-rise portion and its broad low base are carefully joined, and unified by repeated forms—the large, loose pattern of concrete circulation towers at one scale, the strict repetition of small precast window panels at another scale. The proportion of the whole composition shows signs of having been studied and carefully worked. Local artists from throughout Arkansas were hired to provide paintings, sculpture, and decorative motifs on the interior, and the bank has won a national award for this fostering of regional culture. The Worthen Bank is a useful example of good commercial architecture, as Little Rock continues its downtown growth.

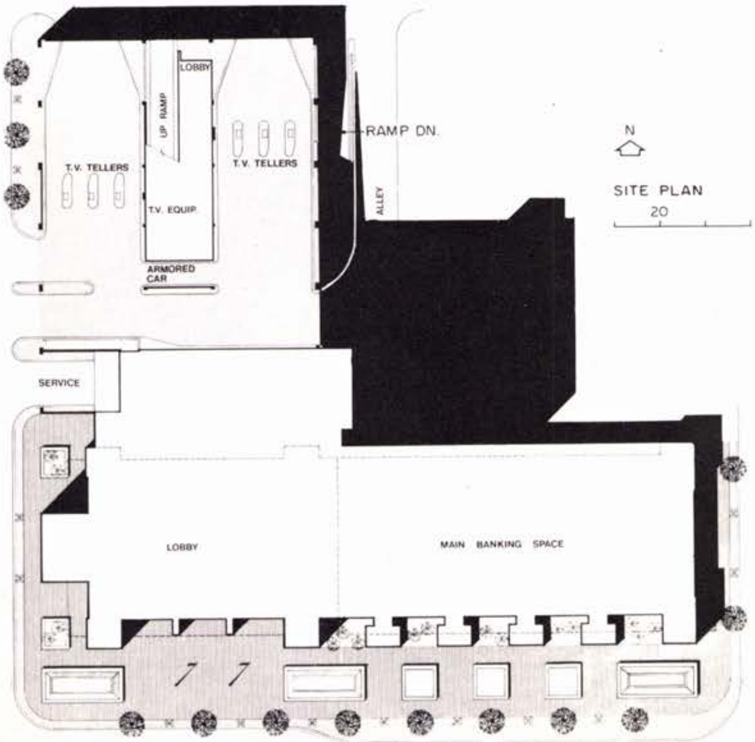
WORTHEN BANK, Little Rock, Arkansas. Architect: *Erhart Eichenbaum Rauch and Blass.* Engineer: *E. K. Riddick;* contractor: *Matson-Bellows* joint venture; landscape consultant: *Wiley Jones, Jr.;* interior design: *ISD, Incorporated,* Louis M. S. Beal, officer in charge; 5th floor interiors: *Information Management Facilities;* 23rd and 24th floor interiors: *Brock Arms.*

The upper portion of the broad, low base of the Worthen Bank has been surfaced with precast window panels and allowed to "float" above the ground and the two-story-high main banking space. This floating cap is continued into the base of the tower at the same horizontal elevations, then the upper portion of the tower is separated from this continuation by facade recessions at the fourth floor. There is a careful interweaving of the tall narrow mass with the low broad one. The high-rise portion is similarly capped by recessing the twenty-third or next-to-last floor from the top floor and the ones below it. The bank is set back twenty-five feet from the street on the south, and the designers have given this exterior promenade to the bank by continuing the brick paving pattern onto the sidewalk and lining it with planters and benches which echo the building form. Westerly window exposures are very hot during Arkansas afternoons, so the elevator and stair shafts, the lavatories and mechanical equipment spaces were placed on this facade of the tower. The first floor lobby contains a spiral stairway (below) made of concrete poured-in-place, with a sandblasted finish. The spiral is self-supporting and becomes a dramatic curving element in the otherwise rectalinear plan, acting as a landmark from which the visitor can orientate himself in the large ground floor. Besides the brick paving, the other exposed exterior materials are concrete and glass. The vertical elevator and stair shafts are poured-in-place, with strong horizontal formwork joints which continue the grid already created in the window pattern. The window facades are precast concrete curtain wall using a white concrete with white aggregate. It is almost completely a white building then, with contrasting black shadows cast during the day. The fourth floor has a large roof terrace for meetings and parties, well shielded from the western sun, with ample planting areas and benches.

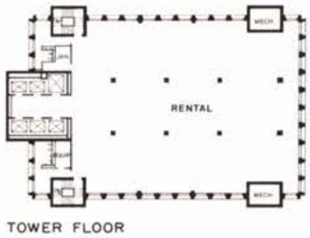


SECTION

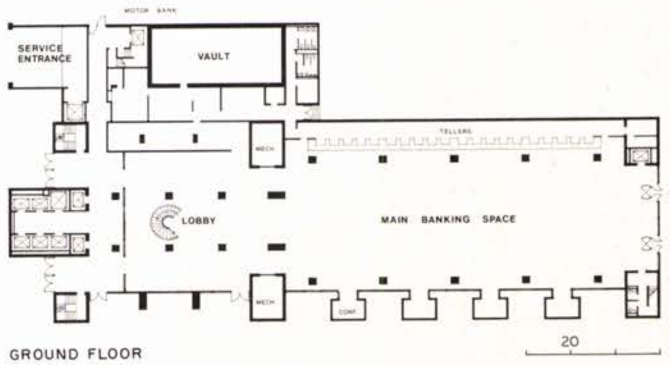
The section at left shows the bank's spaces in relation to the rented floors. The two-story main banking area is very large, and can be entered either from the lobby or from the street directly to the east. The fourth floor auditorium acts as a separating element dividing the tower from the base. Beginning at the eleventh floor there are twelve levels of rentable space, with excellent views of the surrounding city. There are drive-in services attached to the north of the bank, as shown in the plan, right. Above the drive-in booths are seven floors of parking with direct access to the office towers. The stair, elevator, and mechanical equipment shafts absorb all of the wind pressure on the tower, and much of the vertical load. Eight columns have been added on the interior of the tower, however, to make the floor framing members more economical.



SITE PLAN



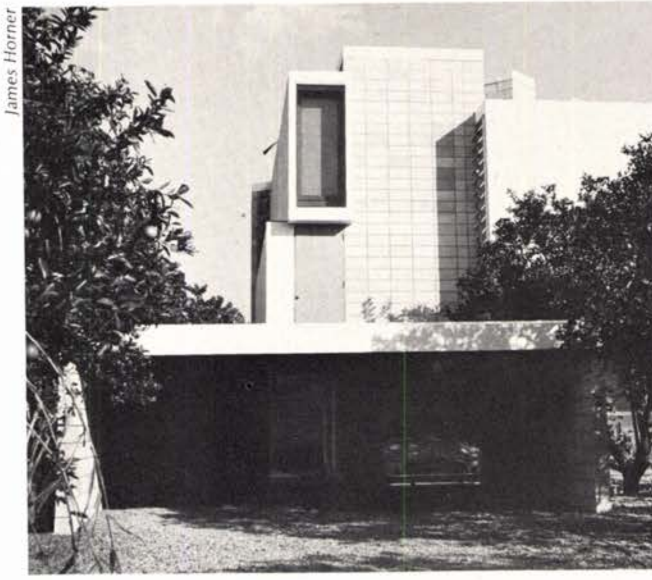
TOWER FLOOR



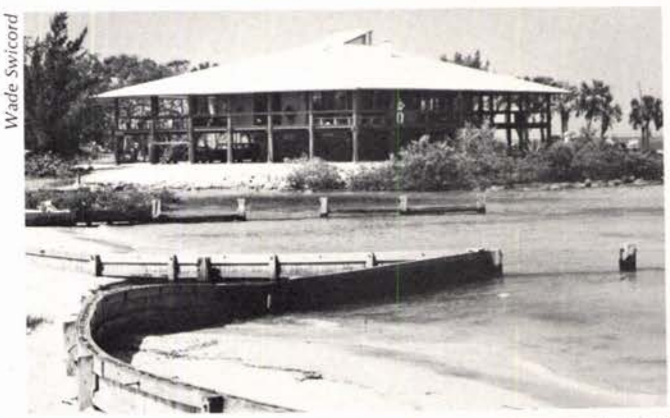
GROUND FLOOR

The main banking room (above, left) has 28-foot ceilings and is 168 feet long. Behind the tellers' counter is a huge wall tapestry designed and woven especially for the bank. The creation of Efrem Weitzman, it is the largest of the many pieces of art commissioned by the bank for its new headquarters. Wall materials in the banking area are sandblasted concrete, with large areas of oak paneling; the tellers' counters and the stand-up checking counters are also made of oak. One of the upper floor banking areas is shown at right, with its cane-backed chairs and clean, custom designed desks by ISD. Above is one of the rented office spaces, also designed by ISD.

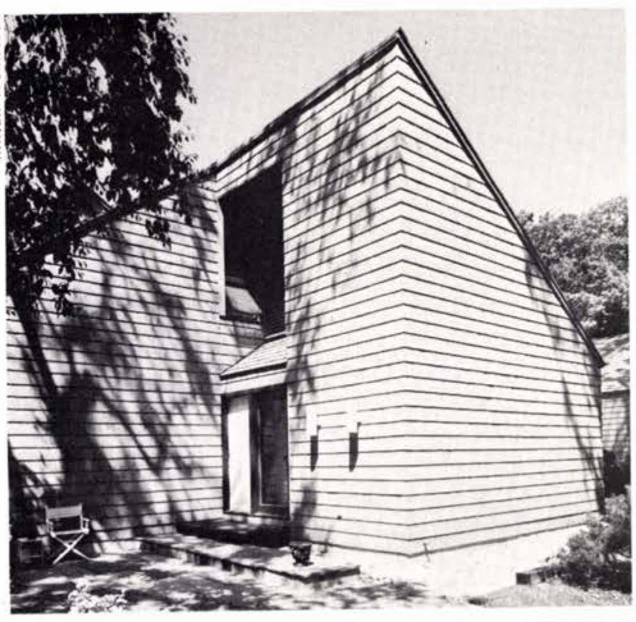
James Horner



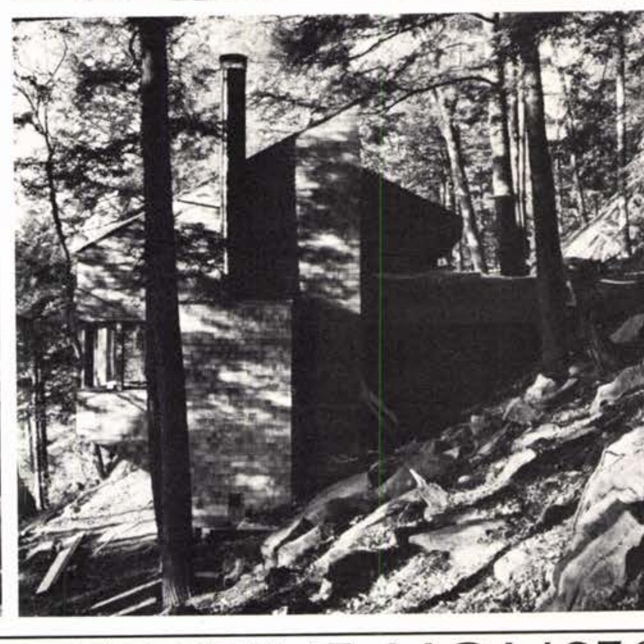
Wade Swicord



Milton Weinstock



John T. Hill



FIVE DISTINCTIVE HOUSES

Leland Y. Lee

The five houses shown here, and in more detail on the following pages, all show an acutely perceptive suitability for the climate and setting in which each is built—from New England quiet to Florida tropicality to desert spectacular. Each house also represents a singularly interesting plan solution for its owner's very individualistic program requirements, and a choice of materials and structural system that is most appropriate for both its particular site and its general region.

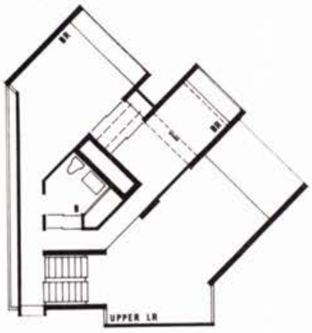
Joseph W. Molitor photos

CONCRETE BLOCK HOUSE IN FORT LAUDERDALE, FLORIDA

Carefully-placed masonry panels are the key to both the functional flexibility and the spatial openness of this Fort Lauderdale house by architect Donald Singer.

The grove of fruit trees in which the house is sited was the principal generator of the plan and consequently of the spatial relationships; the house had to be tall to reach above the trees and had to be on the diagonal from the planted rows in order to face the prevailing south-east winds. Large screened surfaces toward the breeze, above, pull air gently through the spaces and expel it vigorously through much smaller openings in the western wall, using the Venturi principle. Those relatively blank walls, in turn, protect from afternoon heat.

Interlocking interior relationships turn the smallish rooms into a space continuum that makes the house a carnival for the two young Niiler sons. From their play yard at the very bottom to their bunks at the very top of the tallest element, the boys can move about, never far from their mother's eyes. From her kitchen, top right, she can see all lower floor areas as well as the living



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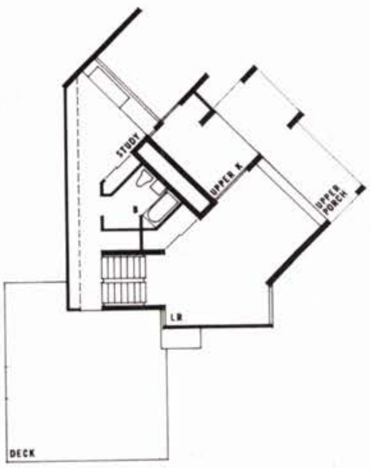

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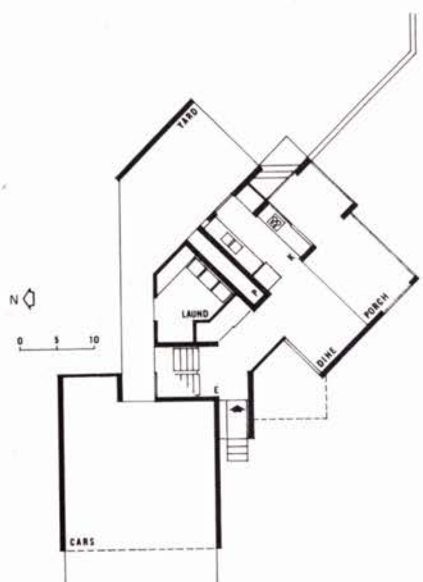

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room through the shelves above the refrigerator. From the living room, above, the passage to the boys' room is seen beyond another set of shelves. But when Dr. Niiler, a mathematician working in theoretical oceanography, must have privacy, he can retire to a study that does *not* share in the general spatial openness.

But for all its visual richness, the house is the result of a tight and rational design. Following common practice in Florida, the concrete block walls are reinforced with frequent solid cores and wire mesh every other course. They are unified by a continuous poured concrete lintel tied to the foundation with steel rods. Thus the stack bond, seemingly illogical in bearing walls, works because the walls are actually structural panels. Except for the plenum, which serves as a shear structure, and one return in the garage, all masonry is basically two-dimensional. The result is that the diagonal juxtaposition of house and garage takes place with no complicated masonry joints. The walls that do turn the 45-degree corner are frame, coated with the silicone rubber that is also used as roofing.

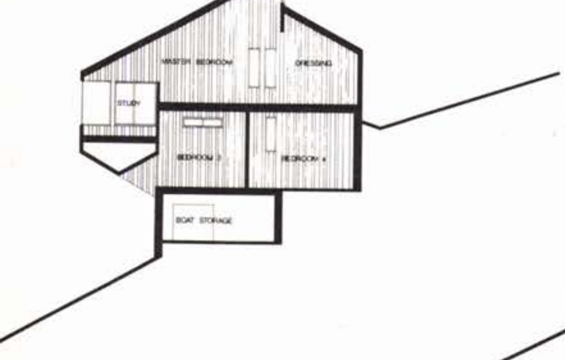
Not only does the plenum serve structurally and visually as the pivot about which the spaces interrelate, but it houses virtually all the mechanical equipment for the house as well in a space wide enough to allow for walk-in servicing. The economical planning here and in the structure paid off: a very complete house built for less than $29,000 in 1968.

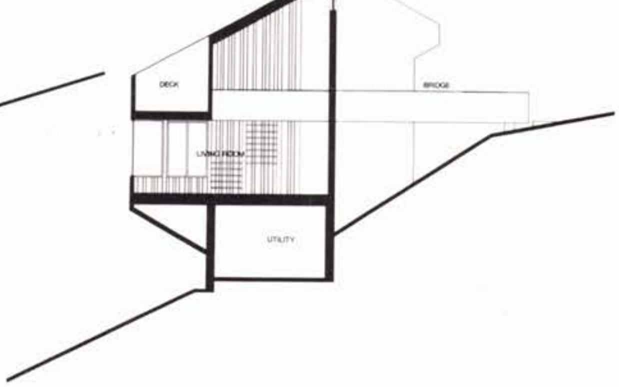
Residence for Dr. and Mrs. P. Peter Niiler; location: Fort Lauderdale, Fla.; architect: *Donald I. Singer;* contractor: *Harry Filkins, Jr.*

John T. Hill photos

Three bays thrusting out from the line of the foundation wall create tree-house spaces throughout this hillside house. Photo near right is the living room, with a built-in couch that provides three-way views. Above it is an open deck let into the roof and reached from the upper-level entryway. Photo beyond shows the master bedroom and study. The use of mitred glass in the corners of bays of course reinforces the sense of lightness and extension out over the site which make these rooms so exciting.

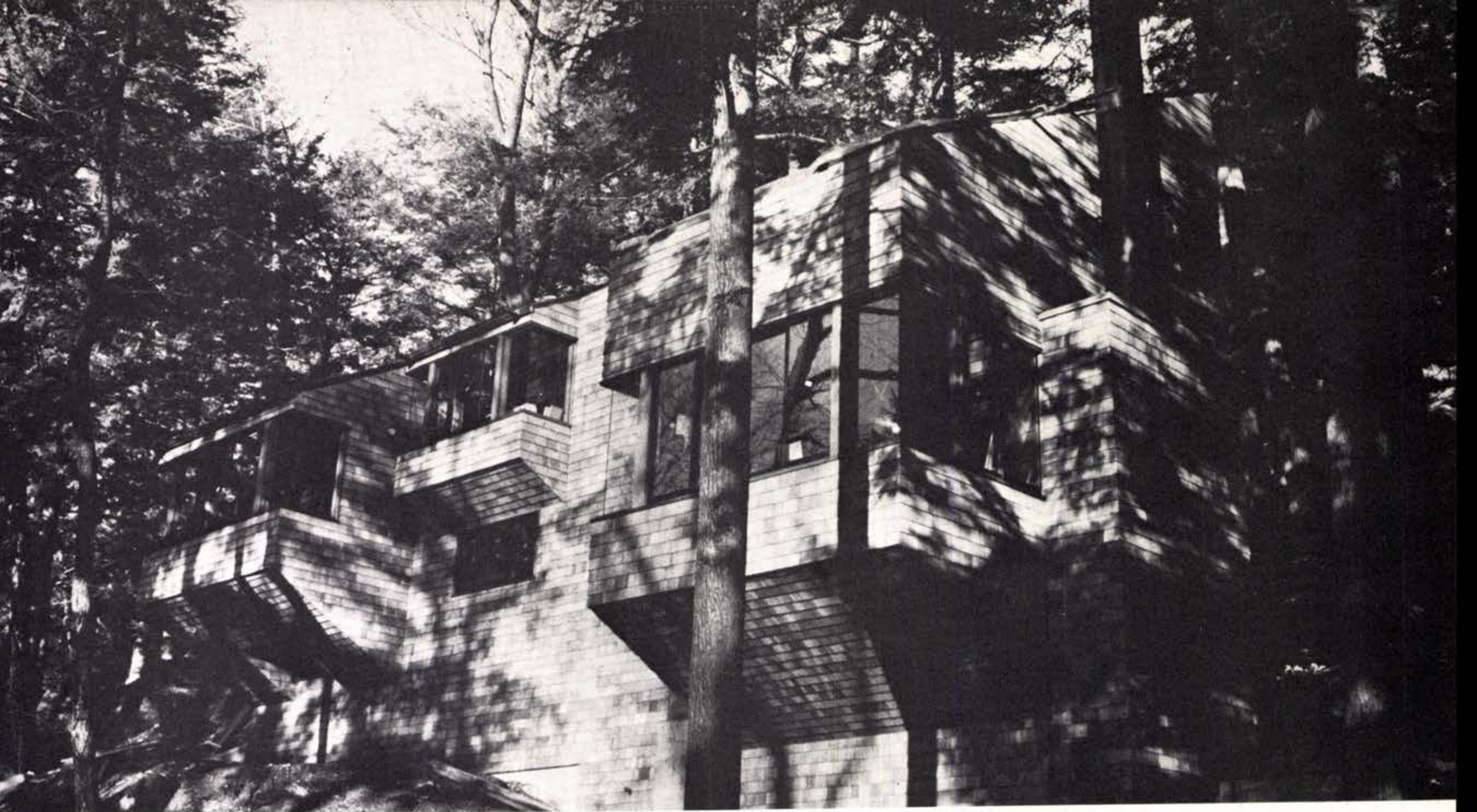
HILLSIDE HOUSE IN SHERMAN, CONNECTICUT

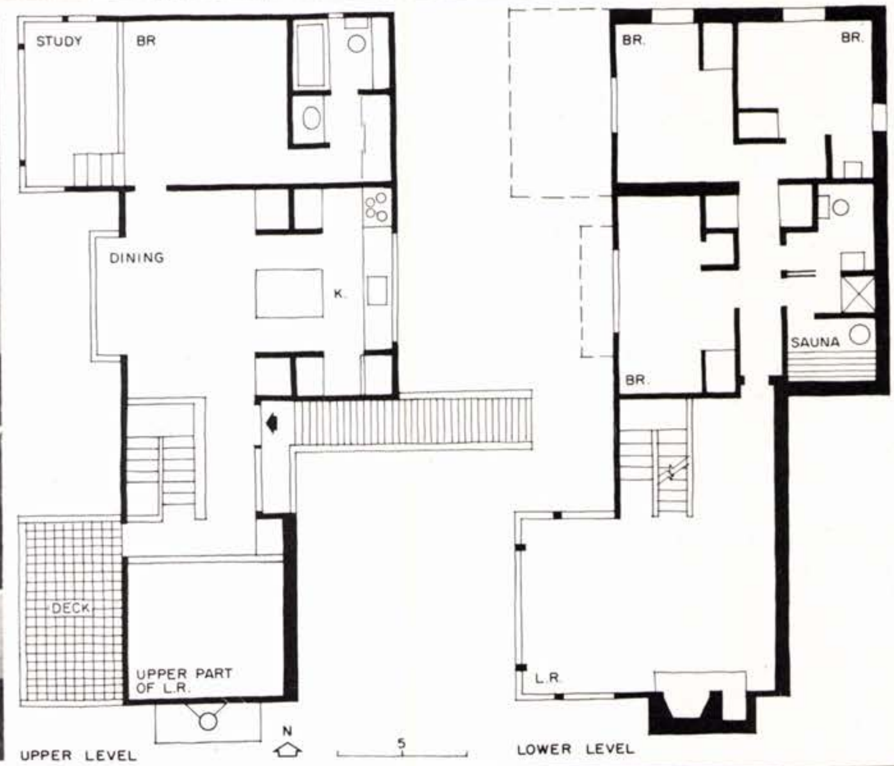




In every part of its conception, design, and construction, this house is inventively, ingeniously, and most pleasantly related to its steep and heavily wooded site in Sherman, Connecticut.

To begin with, excavation on the hillside was minimized by the form of the house (see sections, left). At the living room end of the house (near section, bottom in plans above) the footings are only 12 feet apart; at the other end of the house (far section) somewhat more—but never extensive—cutting and a third foundation wall





was used to fit lower level rooms into the slope.

On the downhill side of the house, the living area is extended beyond the foundation wall by simply extending the floor joists and bracing them with 2 x 6's that return to the foundation, creating the two big (8-foot deep) and one small "bay" shown in the photos at the top of the page. The two big bays differ in depth, as the photo above shows most clearly, reflecting the side slope of the hill.

The house is entered by a bridge on the uphill side (see plan and section). One turns right to the kitchen and dining area, with its table set in the small bay.

Beyond is the master suite, with a compartmented bath and—down five steps following the slope of the roof and the hill—a tree-house study, set in the smaller of the two bays (see photo above).

From the entryway to the left is a balcony overlooking the two-story living room and leading to an open deck let into the roof of the larger bay (near section). Stairs lead down from the balcony to the living room (photo left above) which extends into the bay for three-way views of the site. Three more bedrooms, a compartmented bath and a sauna are also located on the lower level.

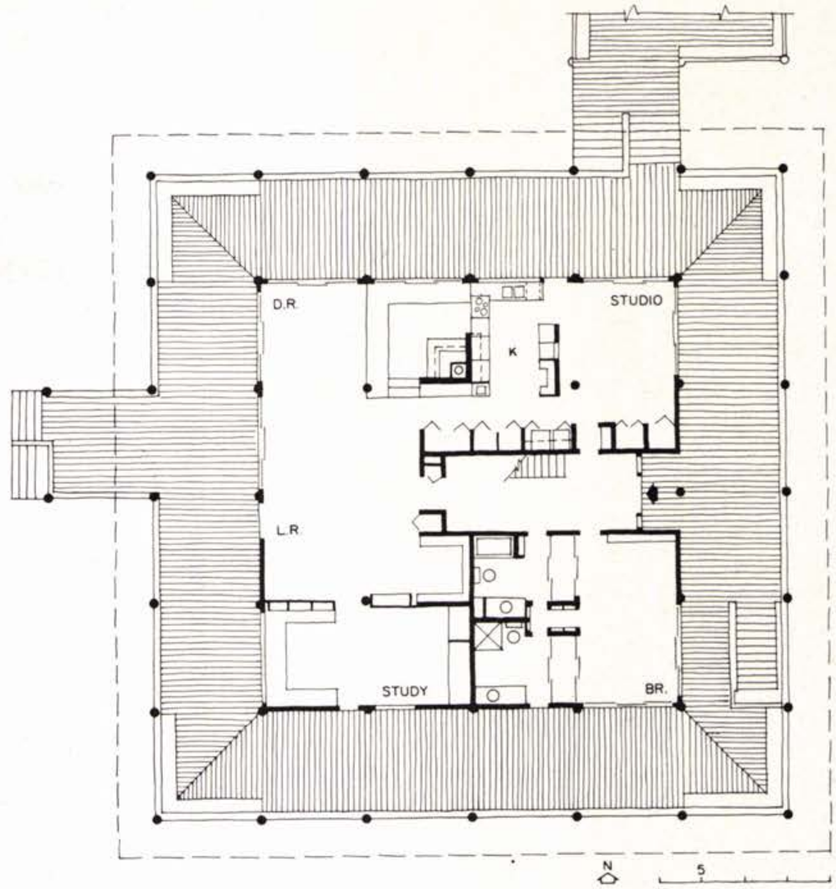
All of the finishes, inside and out, are natural wood, most appropriate to the site. Interior walls and ceilings are rough-sawn cypress, floors are oak, and the exterior is cedar shingle.

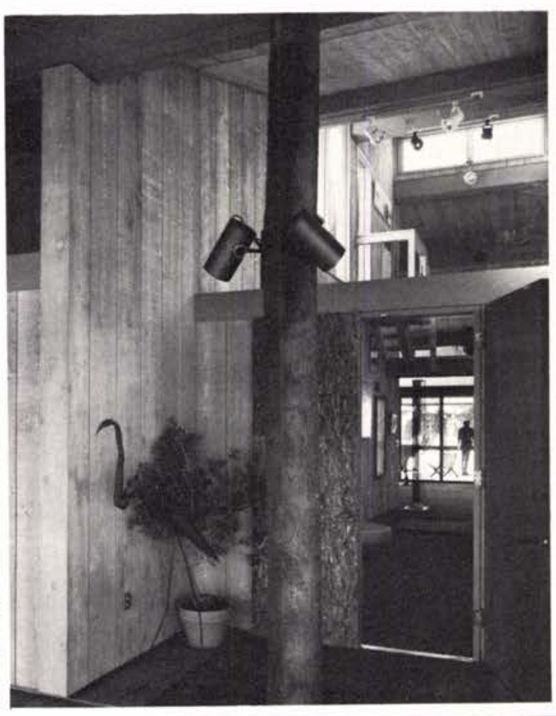
Residence for Carl Fisher, Sherman, Connecticut. Co-designers: *Norman Jaffe, A.I.A.*, and *Nicos Zographos*; contractor: *Clifford Hirsch*

Wade Swicord photos

POLE HOUSE IN SARASOTA, FLORIDA

Designed for a semi-tropical point of land at the mouth of an inlet to Sarasota Bay, this house represents an extremely convenient and contemporary version of the traditional columned, verandahed, broad-roofed house of the tropics. In this case, however, the columns are telephone poles, seven to a side, and the spaces above and below the raised living spaces are devoted to such modern amenities as a mechanical equipment core, storage rooms, bedroom and bath for maid or guests and sun decks and terraces. The three levels are contained within a simple square defined by a grid of full-height telephone pole structural members. The foundations consist of 18-foot creosote poles driven into the ground 12 feet apart, and capped with concrete at ground level. The floors are supported by heavy timber beams, and the roof is laminated, rough-sawn cedar decking covered with unpainted galvanized metal roofing. All of the walls, inside and out are either sliding glass panels or rough-sawn cedar siding. All structural members are left exposed, with considerable attention given



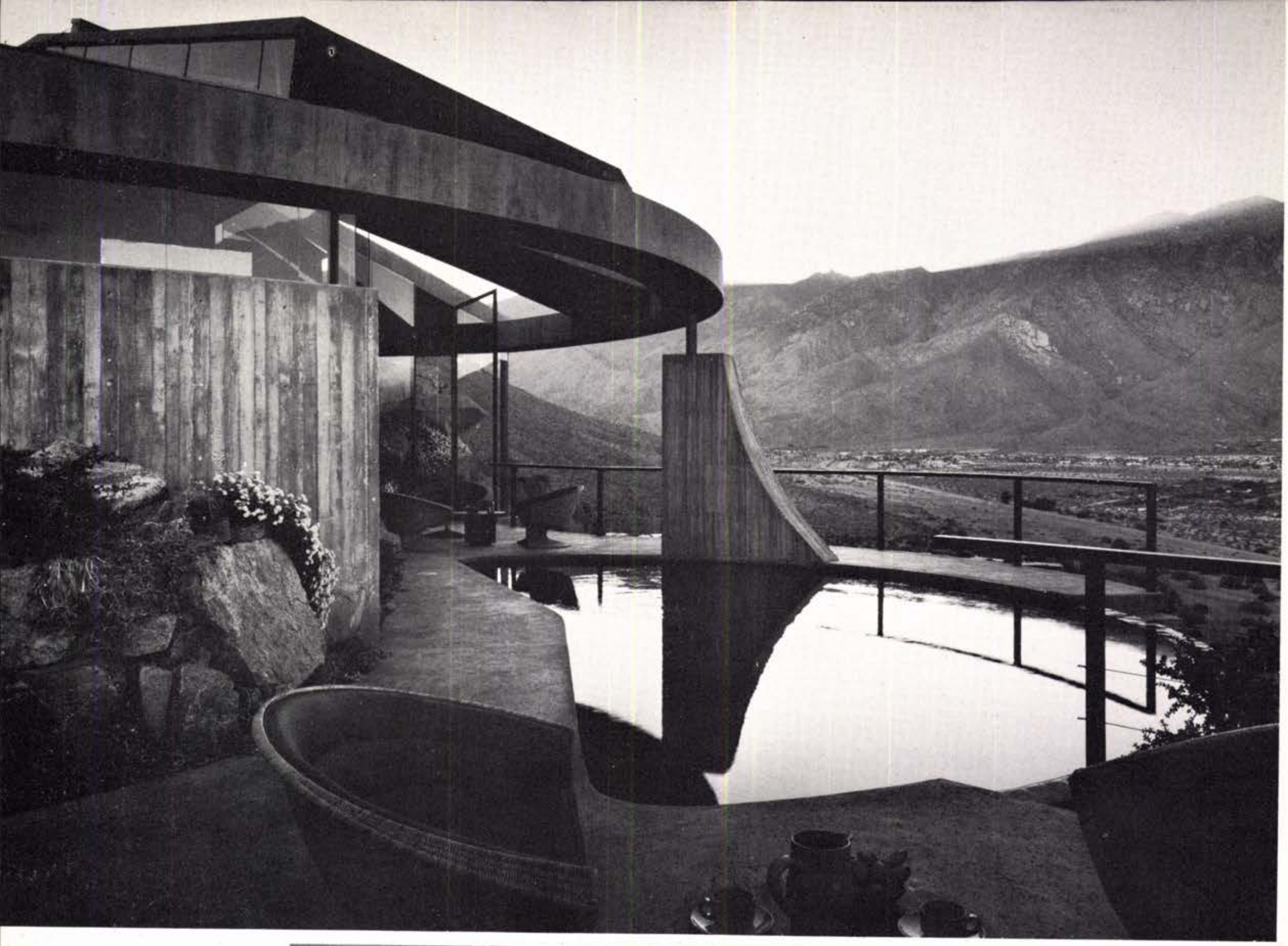


This atmospheric house was designed to provide permanent, year-round living and working quarters for the owners, and by the use of natural building materials and sympathetic forms, to quietly fit into its semi-tropical setting. All principal living spaces are on the main, raised level shown in the plan above. A free-standing staircase (photo left of plan) leads to an upper level containing storage space and a sun deck sunk into the roof. From the main-level verandah, a stair descends to a secondary square deck projecting from one corner of the house. The ground level contains a space for mechanical equipment, storage areas, and a small bedroom and bath; the remaining space at this level is gravel surfaced.

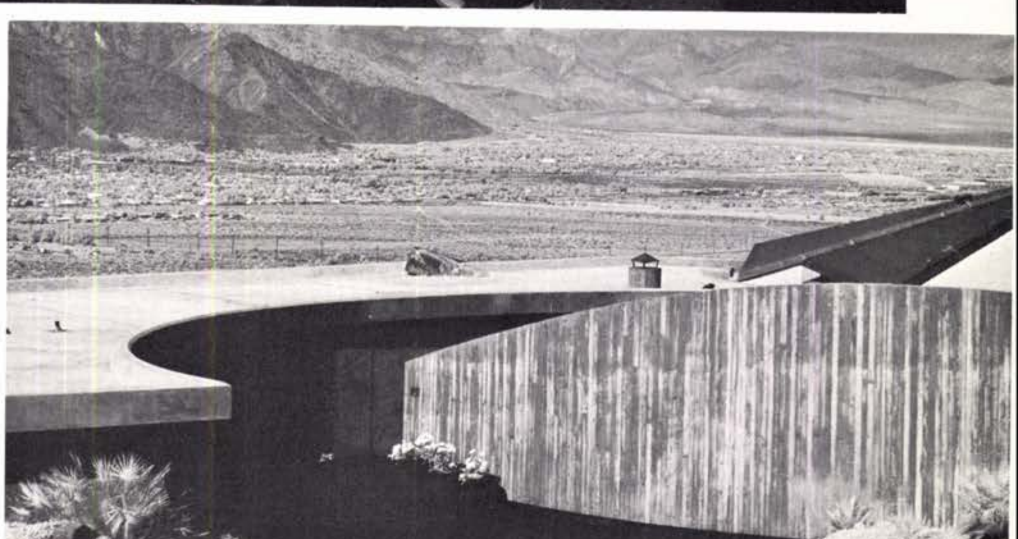
to the detailing of wall plane and pole junctures.

The natural condition of the site has been maintained, with the structure placed among existing palms, oak and mangrove. The raised living areas and verandahs surrounding the house afford a view of the Gulf from nearly every area in the house. Inside, all spaces except for bedrooms and baths, are defined by relatively low (8-foot-high) storage walls and by built-in furnishings, thus preserving most of the interior as a large, open space. The living spaces formed in this manner include a generous living/dining area, a sunken conversation and fireplace pit, a kitchen area, a reading and lounging area, and two work studios. The entrance leads to a full height foyer which serves as a gallery for paintings and sculpture. The graveled space on the lower level serves for general outdoor living and as a carport.

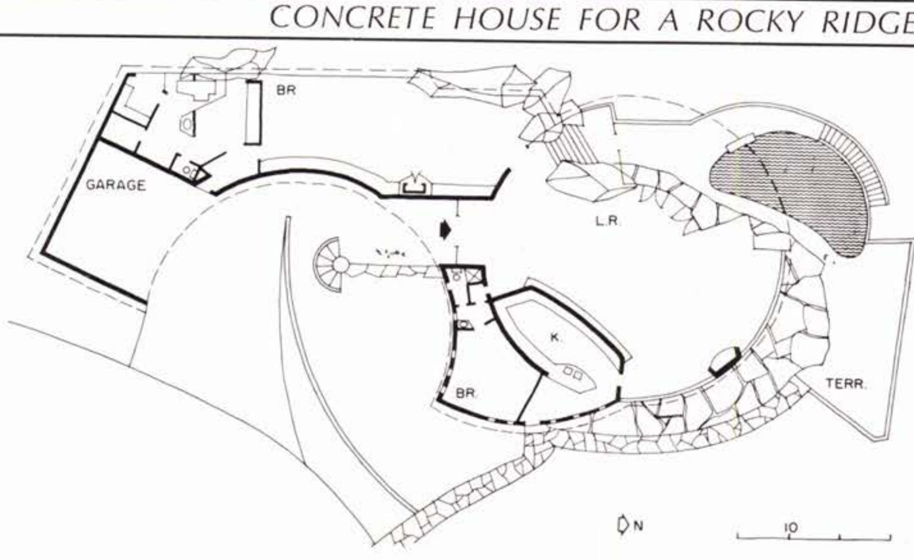
Residence for Mr. and Mrs. John D. MacDonald, Sarasota, Florida. Architect: *Edward J. Seibert;* associate architect: *D. Richmond;* contractor: *Thyne Construction Company.*



Leland Y. Lee photos

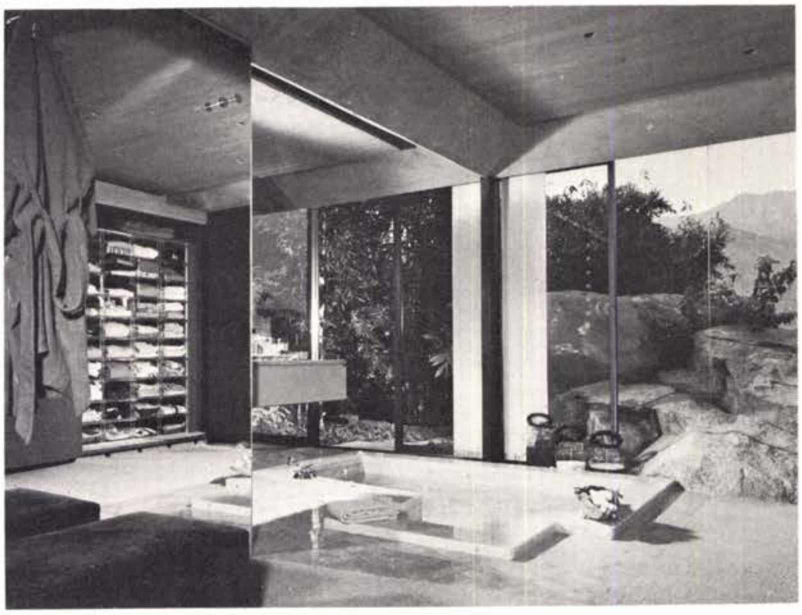


CONCRETE HOUSE FOR A ROCKY RIDGE IN PALM SPRINGS, CALIFORNIA



This very special and especially dramatic house sits at the edge of a rocky ridge in Palm Springs, California. In some ways, it looks as if it grew there; in other ways it has all the man-made strength of a hill-top fortress.

Designed by architect John Lautner for interior designer Arthur Elrod, the house has almost 6,000 square feet of living space in five rooms all on one level. Most spectacular of the spectaculars is the 60-foot-diameter living room—partially indoors, partially outdoors, and all covered by a



Spectacular views open off all the flowing spaces of the house. Far left, the pool terrace off the living room; this page, left, the dining area near the big fireplace, the stairs—leading through natural site rock—to the sculpture garden, the master bath. Below, left to right: the entryway, a view from the drive, and a broad view of the living room.

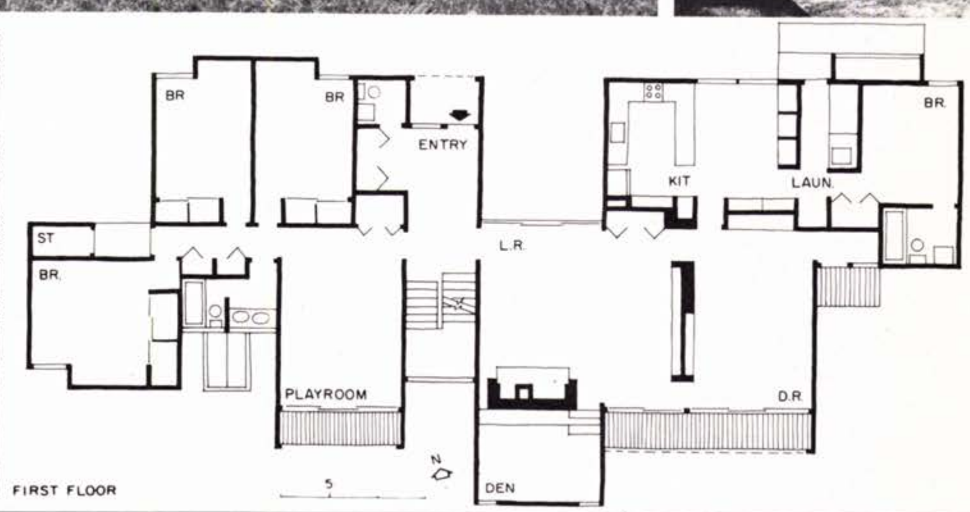
glass and concrete dome. The photos directly above best show the dome inside and out. The poured-in-place, post-tensioned compression ring is supported by the fireplace, the pylon near the pool (photo top left) and the slenderest of columns—which all around the house seem to float the massive concrete roof as if it were polystyrene. Radiating inward from the ring are nine concrete sections with triangular spaces between. Two of these spaces are infilled with clear glass creating sky-windows, the others have triangular copper wedges with glass clerestories that let light into every section of the big room. The glass in the big view window is mitred and epoxy-glued so that there are no interruptions in the 160-degree view to the valley floor.

As the plan left shows, the kitchen is partitioned off under the big roof. Entered off the living room on the view side is the enormous master bedroom-study-office suite, with dressing room beyond. Along the view wall in this area, some of the great rocks of the site come through the glass wall, which is carefully fitted over them. Across the entryway is a small suite for guests, overlooking a sculpture garden, which in turn opens to the garage.

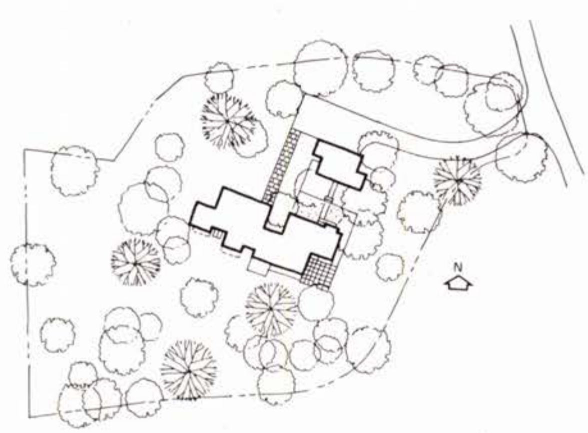
Throughout, the concrete surfaces are textured by the form boards. The other materials used extensively—copper, rich woods and fabrics, textured rugs, and slate—create a contrasting warmth.

Residence for Arthur Elrod, Palm Springs, California. Architect: *John Lautner;* interior designer: *Arthur Elrod Associates, Inc.;* engineer: *Richard R. Bradshaw, Inc.;* contractor: *Wally Niewiadomski*

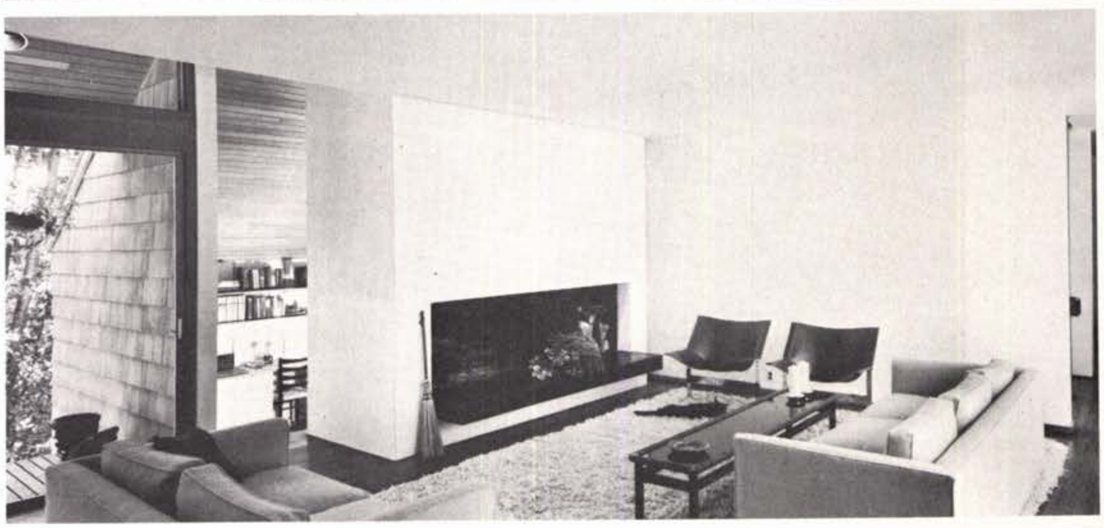
Almost Cape Cod-like in its conglomeration of shed roof forms and gray shingle exterior, this house is, however, the fresh result of very careful, thoughtful planning and design. Rooms are the size and place they need to be, but framing is straightforward and simple, with roofs indented or extending up or out beyond the basic gable form. In some cases they extend a bit to shelter small storage elements or to cover small cantilevered decks (photo right). Neatly defined gravel beds are placed beneath all these cantilevered elements. The varied roof line is echoed on the inside by changes in ceiling planes.

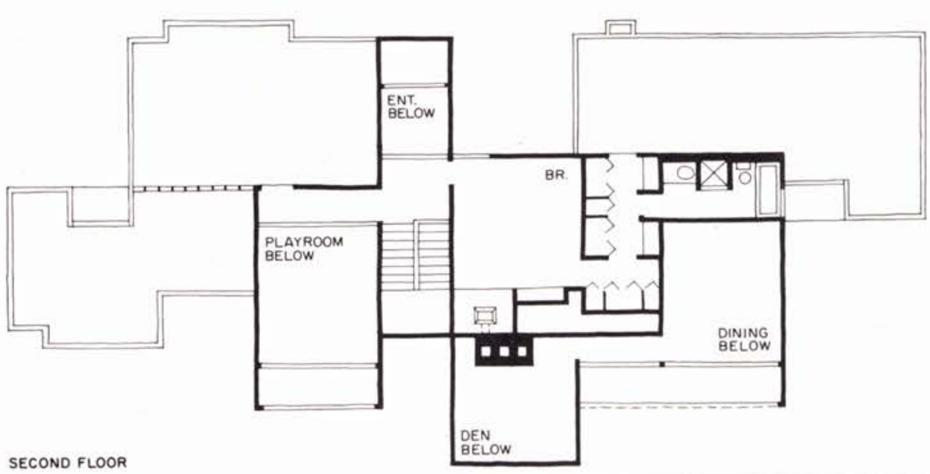


SHINGLE HOUSE IN HUNTINGTON, LONG ISLAND



Seemingly a loose, informal arrangement of shed-roofed pavilions, this extremely comfortable, trimly detailed house is actually a tightly organized structure exactly reflecting the owners' program requirements. The plan is a bi-nuclear one, with separate wings for children and adults connected by a two-story stair hall. On the main level, a circulation path forms a central spine for the entire plan, with rooms of varying shapes and volumes arrayed to either side of it as required. For added privacy and outlook over an adjoining ravine, the major rooms are





SECOND FLOOR

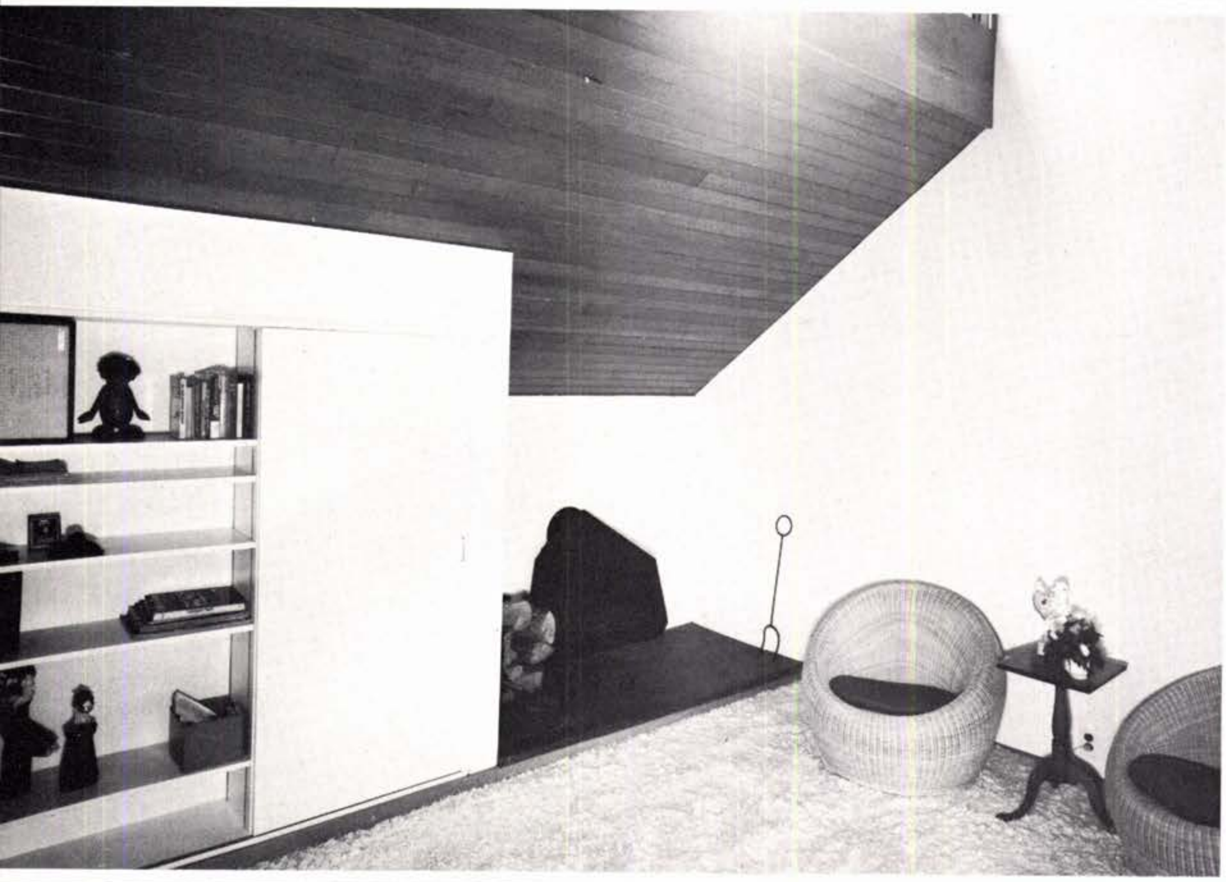
opened to the back, and a garage and greenhouse are placed to shield a walled-in terrace and garden off the kitchen-breakfast area in the front.

The major living spaces, though of ample size (the entire house has about 3500 sq ft of enclosed space), all gain in visual area by an open, but carefully baffled arrangement, and by small, covered terraces extending out beyond the glass areas on either side. The living room, dining room and den, plus the outdoor terraces function conveniently together for entertaining large groups. The childrens' wing, which has three bedrooms and two baths, also has its own living-play room with an adjoining deck, and a separate entrance at the end of the house. The upper floor of the house contains a very comfortable master bedroom suite for the parents, and connects via the stair hall to a balcony overlooking the playroom for occasional supervision of the children.

To unify the irregular shapes and rooflines of the exterior, gray cedar shingles were used to cover the entire simply-framed wood structure. Black trim and white doors accent the quiet, gray exterior. Landscaping has been kept relatively simple, but considerable effort was made in siting the house to focus on the ravine view, and to save all existing trees. The total result is an up-to-the-minute house that still continues the sense of New England tradition.

Residence for Dr. Stephen Gettinger, Huntington Bay Village, Long Island, N.Y. Architect: *Willis N. Mills Jr.*; associate architect: *Timothy Martin*; engineers: *Samford Hess*; interior design: *Al Herbert*; contractor: *Howard Phillips*

Milton Weinstock photos



The kitchen-breakfast room (photo top) opens on a private terrace and garden at the front of the house, which is screened from the road by the garage and greenhouse. The main dining room (left) also has an adjoining terrace for outdoor meals at the rear of the house. The master bedroom suite (two photos center) includes a fireplace and sitting area, and generous dressing and bath facilities off the closet-lined passage (in the photo directly above).

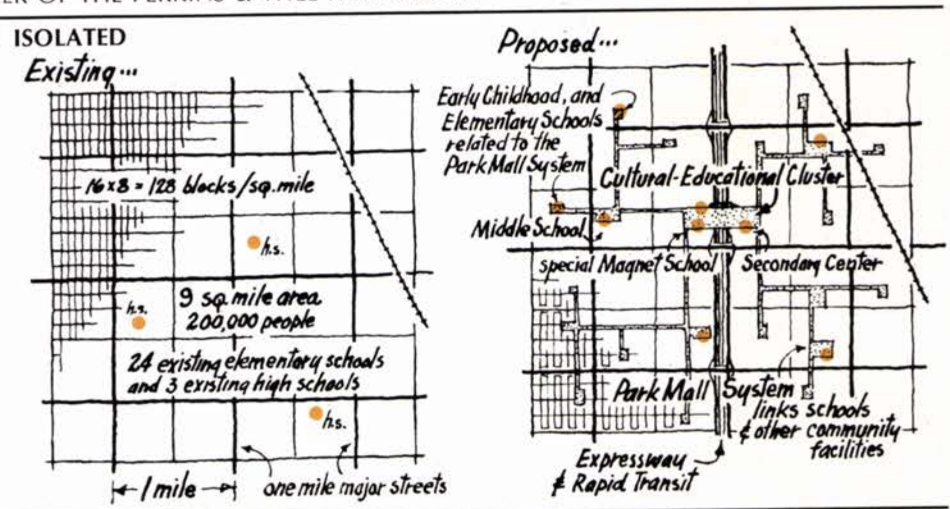
NEW DIRECTIONS IN SCHOOL PLANNING

In response to an invitation from RECORD's editors, two firms with wide experience in school planning and design have set down their current thinking on this subject in text and diagrams. The two manuscripts have been edited only as necessary to shape each to RECORD's format. Bill Brubaker, spokesman for The Perkins & Will Partnership, Chicago, New York and Washington, concentrates on new planning opportunities and emphasizes the need to re-examine certain assumptions long central to educational planning. Howard Patterson Jr., speaking for The SMS Architects, of Stamford, Connecticut, delineates his firm's approach to school planning and hints at some of the alternatives facing educators and their architects in the decade to come. Taken together, these two pieces begin a dialogue that will continue in these pages from time to time as other firms—perhaps with differing views—are invited to make similar submissions.—*Barclay F. Gordon*

1 BY CHARLES WILLIAM BRUBAKER OF THE PERKINS & WILL PARTNERSHIP

SCHOOL DESIGN IS NO LONGER ISOLATED

The new school system is a sub-system of the social system and school design is a component of community design. School concerns have expanded to include broader community concerns and planning concurrently gives new importance to schools. . . to their locations, forms, and relationships to the community. The new school facility is more and more the whole city with its infinite potential for varied experience.



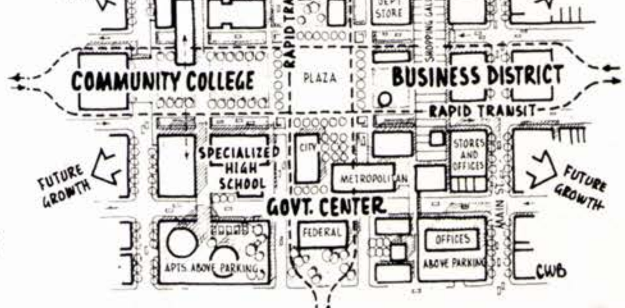
THE NEW COMMUNITY SCHOOL MIX

By utilizing existing community services, resources and facilities, schools influence the laws, taxes, and agencies which deliver services, control resources and provide facilities.

Conversely, by utilizing school services, resources and facilities, the community will more directly influence the school's decision-making processes. The design response is toward school concepts that are closely related to total community.

Example: Chicago's Metro High School (similar to Philadelphia's Parkway School) with home-base in a commercial office building on State Street, utilizes many places and people in the city for its program.

Example: At the new middle school in Mamaroneck, N.Y., the physical education facilities, especially the indoor-outdoor swimming pool, are used for community recreation, evenings, weekends and all summer.



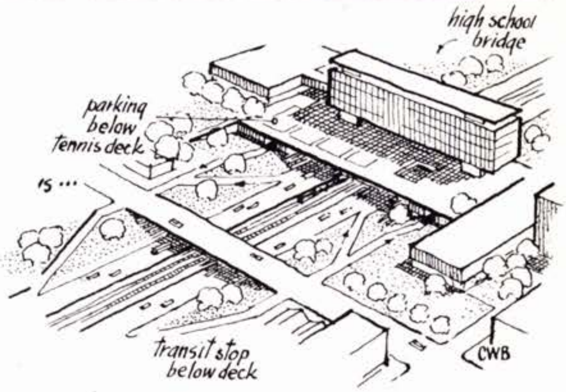
Part of the educational program can happen at the community center .... utilizing the cultural and government buildings, parts of the business district, and the community college.

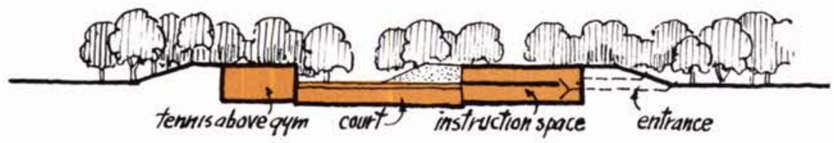
SCHOOLS FIND NEW KINDS OF SITES AND ADOPT NEW BUILDING FORMS

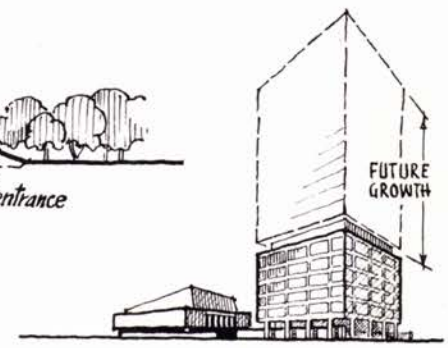
In metropolitan areas, with land increasingly scarce and costly, the old habits of the past yield to new concepts of property use and new building forms. By making use of air rights and bridge decks, neighborhoods cut apart by expressways can be tied back together . . . and apartments can utilize air rights over schools.

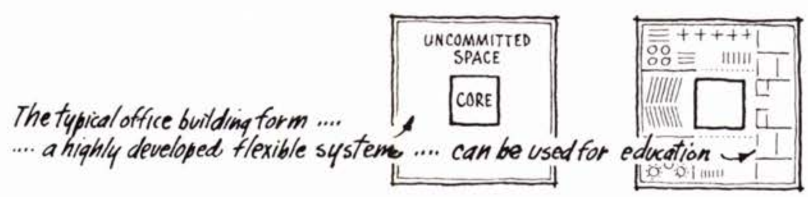
Schools in parks? By using cut and fill, by creating berms and lower level courts, schools and parks become good neighbors. *Example:* Jones Commercial High School, on State Street, downtown Chicago, includes a six floor office building structure which will grow vertically. Jones has a work study program with students gaining experience in Loop offices.

Private enterprise operates efficiently in leased space, sharing land and structure with other users . . . gaining flexibility and the opportunity to expand. The educational program is the tenant. As program changes, space changes.





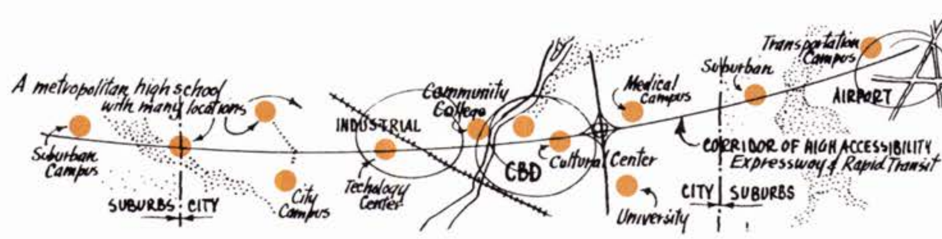


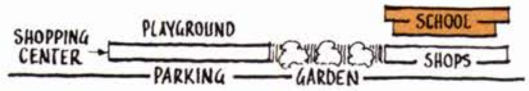


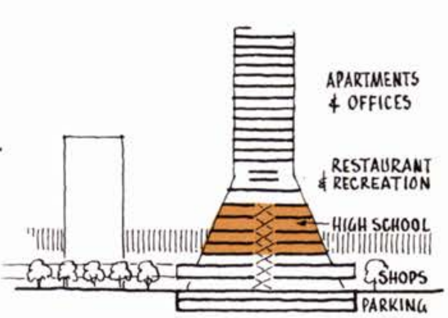
SCHOOLS ARE NO LONGER LIMITED TO THE RIGID FORMAT OF THE PAST

In the past, school design was limited by many unwritten laws. Among these:

1. *A single location*
   Today's schools may be multi-locational, part of a mobile society.
2. *Isolated property*
   Not only are walls and fences disappearing, but schools may now share property with other activities: a high school at a community center or an elementary school over a shopping center. . .
3. *Institutional character*
   The educational home base which is surrounded by fluid space is replacing the boxes and corridor concept.
4. *Standardized programs*
   Independent study and individualized programs allow each student to proceed at his own pace
5. *Learning programs based on lectures*
   . . . Then came TV.
6. *Rigid grade system*
   Non-graded schools often work well and offer obvious advantages over the

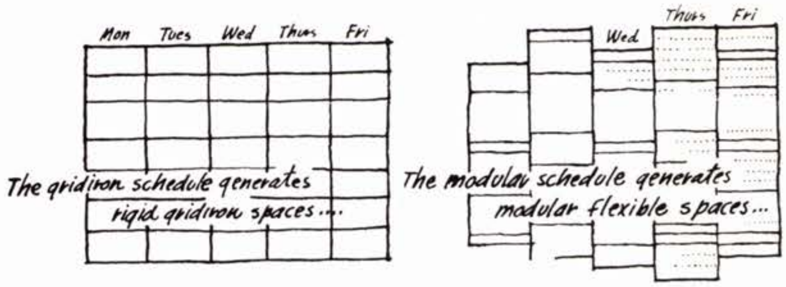


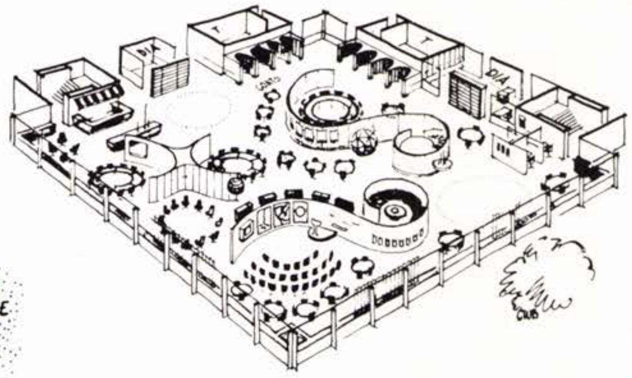


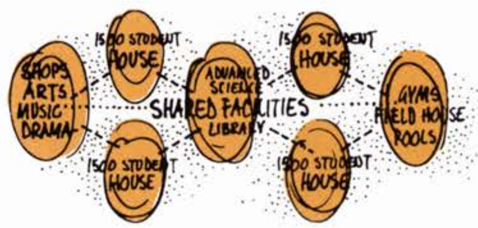


30 students for 12 years system.

7. *Standard schedule*
   Each student may now have his own program with a modular scheduling system
8. *Desire for unchanging space*
   In a changing world, a school must include flexible, adaptable space.
9. *Desire for finished space*
   Unfinished space permits both the growth and the change that all educators anticipate.
10. *Standard staff*
    Many new kinds of people may supplement teachers and principals in the school system.
11. *Serving a specific territory*
    New schools may serve all parts of a metro area and, in fact, compete with many kinds of new schools.







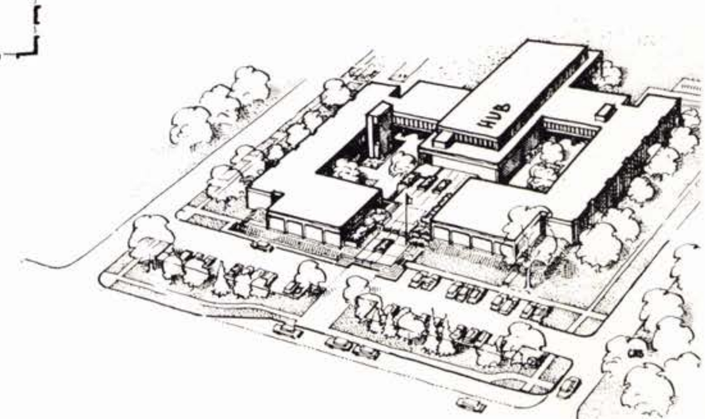
WHAT ARE THESE NEW KINDS OF SCHOOLS?

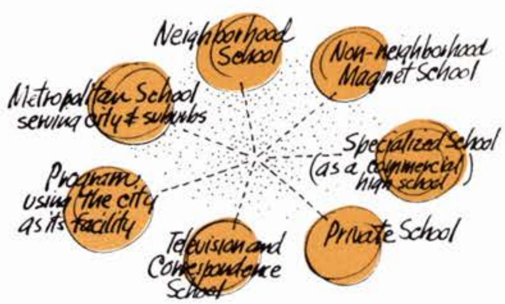
Early childhood pre-schools
Open plan elementary schools
Example: Butternut School in North Olmstead, Ohio, mixes large and small instruction areas without doors, around a garden and library.

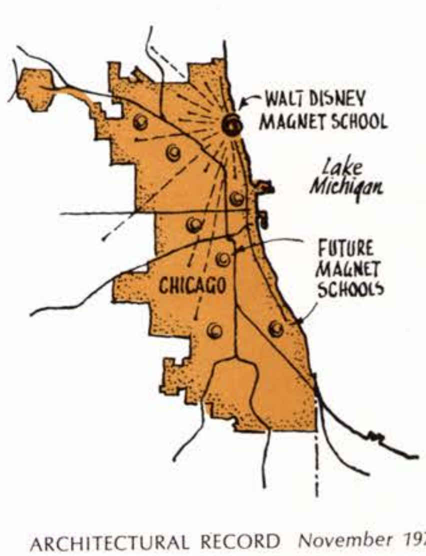
Middle schools
Example: Carleton W. Washburne School in Winnetka, Illinois, clusters two houses around courts and a hub.

Large secondary schools
Example: Sub-divided into smaller houses, the 6,000 student Evanston Township High School, in Illinois, gains the advantages of big and small schools with four houses of 1,500 students each.

Special program schools
Example: Walt Disney Magnet School, overlooking Lake Michigan in Chicago, will attract students from all parts of the city for a program emphasizing communication arts. In addition to 1,800 lower, middle and upper school pupils, every two weeks 600 transient pupils will visit the school for two, week-long programs in the arts. This is to be a non-neighborhood school that provides an option for pupils from all over the city and some suburban areas.



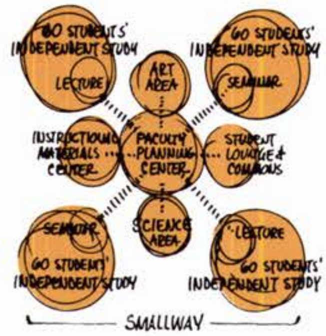


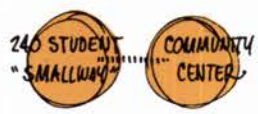


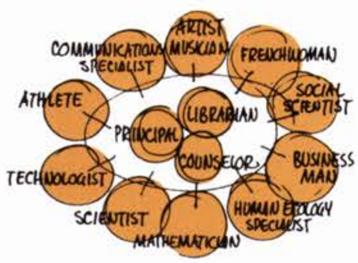
WHAT ABOUT THE RETURN OF THE SMALL SCHOOL?

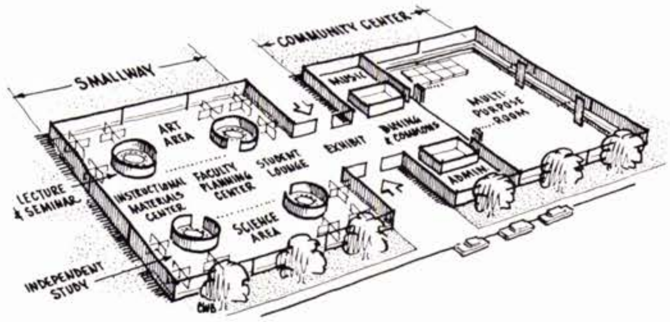
Noting a revival of interest in neighborhood government, smaller communities, and renewed interest in smaller schools with their potential for individualized instruction, *Leggett, Shapiro, Cohodes & Brubaker,* educational consultants, developed the "Smallway Concept" to re-examine the advantages of a 240 student high school.

The educational program requires a single open-plan space and a dozen faculty members supplemented by other people in the community. By utilizing community facilities . . . linking Smallway to the community center . . . the concept becomes economical.









NEW PLANNING TOOLS FOR PROGRAMMING AND DESIGNING SCHOOLS

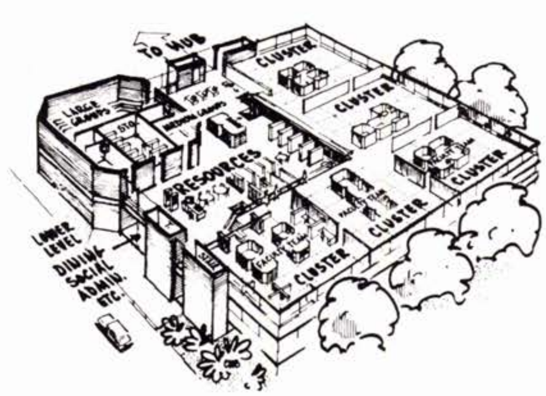
A multi-discipline team that understands the complexity of the problem and recognizes the urgency of working together towards solutions.

The computer and other office machines and techniques that organize the growing quantities of necessary data and make the evaluation of alternatives faster and more accurate.

Community involvement and advocacy planning which permit interested groups to have a voice in matters that affect them vitally.

The charette that provides a condensed period in which students, teachers, citizens and architects can work creatively in concert.

The simultaneous development of all these tools will lead to a clearer understanding of the goals of education, and the means to those goals.



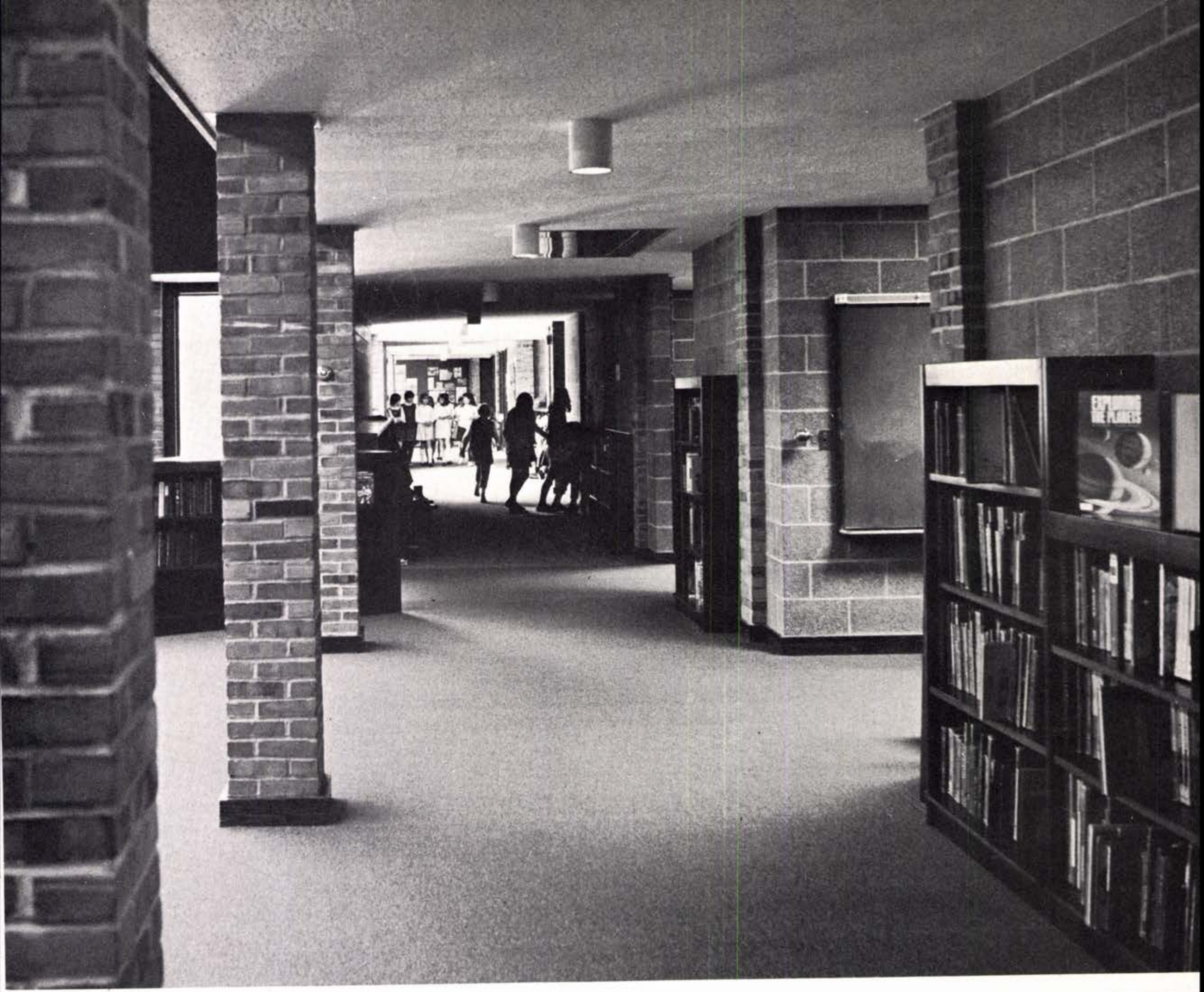
Bill Rothschild

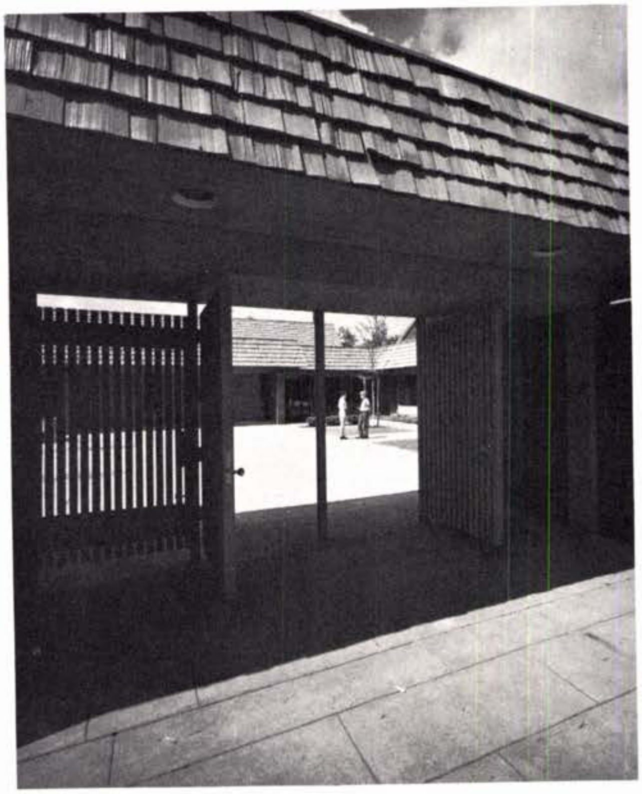
At the Martin Luther King School in Schenectady, New York, conventional classroom space is supplemented by small, informal learning areas that provide an intimate and specialized environment for small group instruction. Half-height walls, combined with a change of level, achieve a sense of separation from busier surrounding areas.

Orlando R. Cabanban photos

THE PERKINS & WILL PARTNERSHIP

Robert N. Ward photos





Bill Rothschild photos

The Butternut School (above) in North Olmstead, Ohio, mixes large and small instruction areas, without doors, around a garden and library (see text, page 123). Glass walls isolate the resource center acoustically, but do little to hinder the free flow of space that gives this school its pleasant openness.

The Charles W. Washburn School in Winnetka, Illinois (left) and the Martin Luther King School in Schenectady, New York (right) provide students with handsomely landscaped courts for varied activities both planned and unplanned.

2 BY HOWARD A. PATTERSON, JR. OF THE SMS ARCHITECTS

TECHNIQUES FOR CREATING EFFECTIVE EDUCATIONAL FACILITIES

If we truly believe that a tool should be shaped to the function of its task, this principle must somehow be reflected in the way we design our school buildings. The work of the architect will be subject to the same critical scrutiny we are trying to foster in our students.

Creative site utilization

Natural site characteristics, impossible to duplicate with structure alone, should be exploited wherever possible to reinforce or supplement the educational program. An economical auditorium, for instance, with superior acoustical characteristics and sight lines can result from preservation of an existing sloping grade. (Figure 1).

The school should not be thought of as a container, but as a sequence of interrelated events extending beyond the structure out onto the site. The spaces between buildings can enhance the opportunities of the educator to expose students to varied stimuli. Seminars, classes and student socialization can be encouraged by careful architectural handling of these spaces. (Figure 2).

Life and vitality can be generated in an outdoor courtyard by arranging the common spaces (cafeteria, home arts, library and student commons) around this courtyard, which itself becomes the focal point of the site. (Figure 3).

Provision for adaptability to varied activities.

Despite the range of functional class sizes produced by differing neighborhood needs and new educational approaches, the good school should be capable of providing appropriate space for almost any activity. Options should be provided and alternatives made available. Spatial mix is an absolute necessity. Within limits, the activities and group sizes using an educational facility are predictable. Programs for education are neither so vague nor so mysterious that a concise, thoroughly-designed and articulated facility cannot be developed. Why, then, must the client be expected to settle for less? The educational value of auditoriums can be significantly increased by the use of sound retardant folding partitions. These dividers can produce a variety of smaller spaces which accommodate a wide range of activities. (Figure 4).

A library or resource center can be designed to easily expand, if necessary, into flanking academic areas without major structural or mechanical modifications. This process is reversible, and such a resource center can be smoothly reduced to its original size and purpose. (Figure 5).

Special attention to structural and mechanical systems can produce large, unobstructed, sky-lit spaces. Such spaces, when fully carpeted, can be suited to practically any educational purpose. (Figure 6).

Careful attention to environmental control

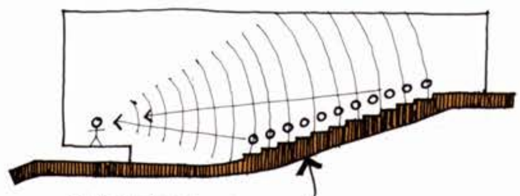
Proper orientation, overhangs, and window protection can substantially reduce the cost of mechanical climate control. The appropriate utilization of newly available materials, such as heat absorbing or mirror glass, can also make an important contribution toward effective climate control. Ceiling air distribution systems, powered by rooftop multi-zone units, have many advantages. They eliminate most ductwork; they are economical and, most important, they allow flexible space planning and partition arrangements.

Color coding and door graphics can greatly simplify communication and circulation problems within a schoolhouse. Carpeting is a powerful tool for creating a quiet environment with few distractions and therefore is widely used in many of our recent schools.

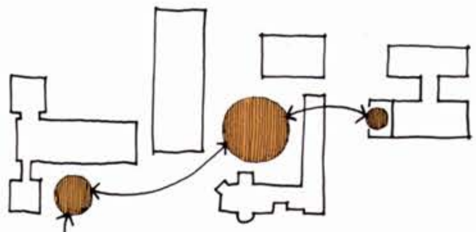
Adequate and convenient circulation space

The elimination of enclosed corridors reduces congestion and provides pleasant, open, educational space. Widened corridors can effectively serve as auxiliary classroom space. (Figures 7, 8).

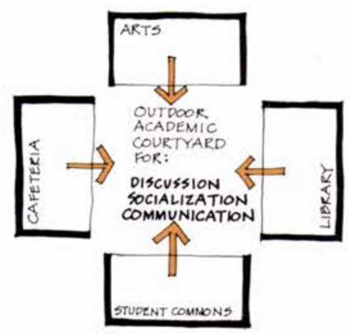
Circulation space can be organized into a wide pedestrian "street" which offers con-



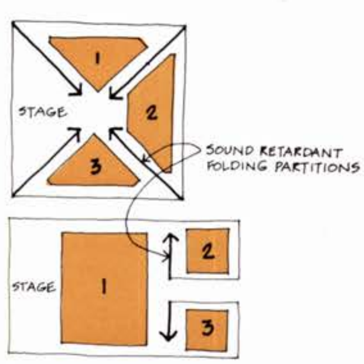
1 UTILIZATION OF **EXISTING GRADE** CAN PRODUCE: SUPERIOR SITE AND SOUND LINES



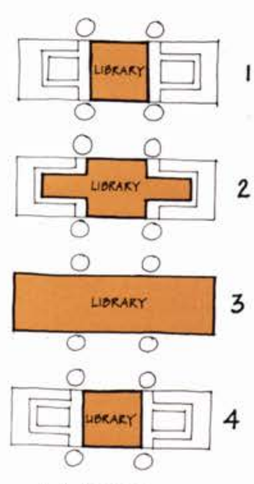
2 PAVED SPACES PROVIDED BETWEEN BUILDINGS AND SHELTERED FROM THE ELEMENTS CAN BE UTILIZED FOR: **CLASSES, SEMINARS, SOCIALIZATION**



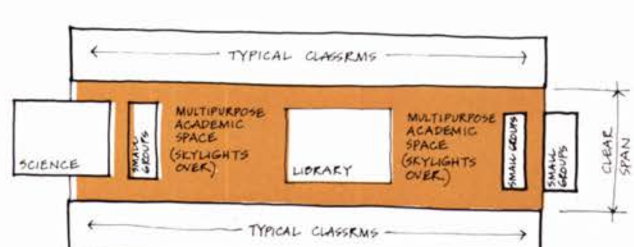
3 A PROPERLY LOCATED, SHELTERED OUTDOOR COURTYARD ENCOURAGES **COMMUNICATION**



4 AN AUDITORIUM CAN SERVE AS THREE **TEACHING STATIONS**



5 A LIBRARY WHICH CAN EXPAND OR CONTRACT.



6 LONG SPANS CAN PRODUCE **ADAPTABLE EDUCATIONAL SPACE** WITH NO CORRIDORS

venient access to quiet educational areas with no through traffic. (Figure 9)

Straight circulation corridors can be made interesting and educationally valuable by devising a variety of views, spaces and activities along their entire length. (Figure 10).

An adequately sized, properly equipped library

The library should properly be a resource center, ranging far beyond a mere book repository to include films, tapes, records, TV and other learning materials. The library can be a centrally-located, multi-level learning laboratory, with wet and dry carrels for individual, monitored study. Such a space can be fully integrated with other educational facilities such as faculty offices, laboratories, lecture rooms, work rooms, and an audio-visual center. The library can also be decentralized into more than one resource center. For example, a separate library may be provided for the sciences, including reference and periodical space, student study carrels, individual student laboratories, space for a computer, and faculty offices. At the elementary level, the library can be an effective media center encompassing group study space, carrels and teachers' offices.

Adequate provision for educational aids

Provision must be made for housing and servicing electronic media and newly developed audio-visual aids to education. Equipment is becoming increasingly sophisticated and school plants must be receptive to its demands. The special requirements of overhead projection and display have become an integral part of architectural design. The educational value of a planetarium can be more easily justified if it is designed to double as a science demonstration laboratory. Electronic aids in general can substantially upgrade the educational effectiveness of a school plant. Some practical examples which we incorporated in the Briarcliff Manor High School are:

- A computer for the science department
- An electronic console in the library
- An audio-visual aids room which can supply pre-recorded programs to all wet carrels as well as any classroom in the school
- A fully-equipped language laboratory
- A stepped lecture room for 100 students which can accommodate a fully-equipped demonstration table, as well as future TV monitoring.

Provision for growth

Patterns of growth should be anticipated in educational planning. Growth and adaptability must be considered together. Expansion is adaptation by enlargement, and requires a thorough investigation of programmed needs present and future. Extended patterns often tend to produce nodes and sub-patterns, thus generating new spaces and sub-centers throughout an entire complex. As functions shift, spaces are reprogrammed and remodeled.

A clearly organized future growth pattern can be implicit in the initial plan organization. (Figure 11).

Temporary classrooms, for instance, can become administrative offices at a future date. (Figure 12).

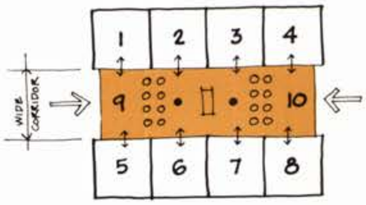
Central core facilities can be organized to initially accommodate a single academic "house" for 600 students, as well as a future pool, auditorium and academic "house" for an additional 600 students. (Figure 13).

Future growth on a sloping site can occur by extending the major student circulation "street" up the hill. Academic spaces as needed can be generated along the "street" without the normal distracting requirement for through circulation. (Figure 14)

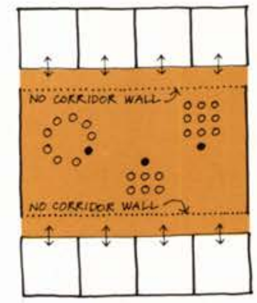
Projected growth should occur in direct response to a master plan, designed to be accomplished over a period of years. (Figure 15).

Effective utilization of rapidly developing technology

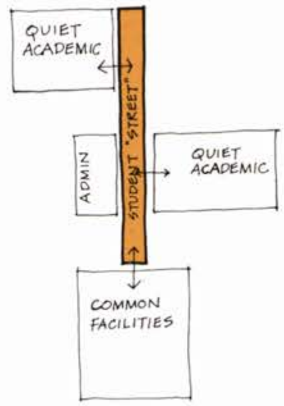
Careful attention to new techniques and materials can speed construction, lower initial cost, and future maintenance costs. New structural components (eg. prestressed, precast concrete tees) can be rapidly erected and effectively utilized in a variety of ways. Extremely long clear spans of up to 120 feet become practical. The same tees can provide an economical, maintenance-free weather wall. Long span acoustical steel deck of-



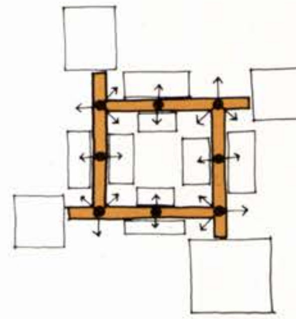
7 ACCESS CORRIDORS CAN BE USEFUL EDUCATIONAL SPACE



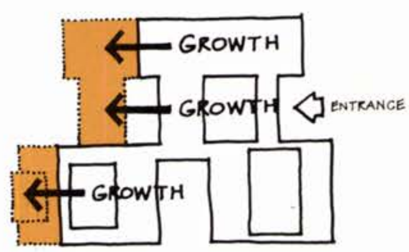
8 THE OMISSION OF CORRIDORS CAN MAKE EDUCATIONAL SENSE.



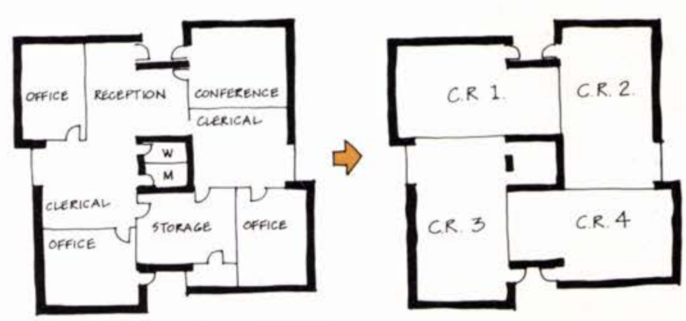
9 QUIET ACADEMIC AREAS ARE NOT DISTURBED BY THROUGH CIRCULATION



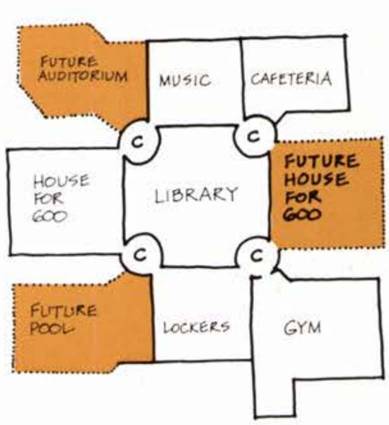
10 MOVING ABOUT CAN BE AN INTERESTING ACTIVITY WHICH OFFERS VARIED VIEWS AND SPACES



11 LINEAR GROWTH



12 GROWTH CAN BE ACCOMMODATED BY **PROGRAMMED USE CHANGES**



13 CORE FACILITIES CAN BE PLANNED TO ACCOMMODATE **A FUTURE HOUSE**

fers an economical, maintenance-free roof structure. Prestressed, precast concrete plank can provide fireproof, economical floor and roof structures. This plank can be left exposed, and provides relatively long, clear spans with minimum structural depth.

Ceiling distribution systems, powered by newly available roof mounted multizone heating and cooling units, have many advantages. Such systems eliminate most ductwork, are economical to install and maintain, and provide flexible floor space.

New materials

New materials are constantly appearing on the market. SMS spends a significant amount of time analyzing them. A master specification is stored in a computer bank for easy retrieval. Newly available materials for use in educational buildings are selected for one or more of the following reasons: lower initial cost, lower maintenance, better appearance, longer life, more rapid installation or better performance. These materials include: through wall masonry bearing units, colored mortar, weathering steel, prefabricated flashing, seamless roofing, and heat absorbing glass. Some newly available finishes are: vinyl wall covering, spray-on-glaze wall finishes, trowelled-on seamless flooring, long life synthetic carpeting that is easily maintained, duranodic anodizing, sandblasted concrete and black chrome finishes on hardware.

Newly packaged systems

Manufacturers are currently concerned with assemblages of building parts of systems, which they market as a package. Many of these systems are outgrowths of the School Construction Systems Development. For example, ceiling systems are available to provide light, ventilation, heating, cooling and sound absorption, all on a modular basis, and allow flexible partition arrangements. Sophisticated partition systems are also available. Such systems, though diverse, are generally directed toward a common goal: planned flexibility. SMS has used such systems in whole or part in a number of schoolhouses, and plans to increase this use in the future.

Appropriate response to the community served

Each educational project includes the following variables: existing site and surroundings, the educational program, the community program for the use of the facility, if any, and budget. Each community is unique, not only in the educational program it develops and the money it makes available, but in general philosophy, use and esthetic approach. This precludes any "all-purpose" school design, since each plant must respond to a unique set of circumstances.

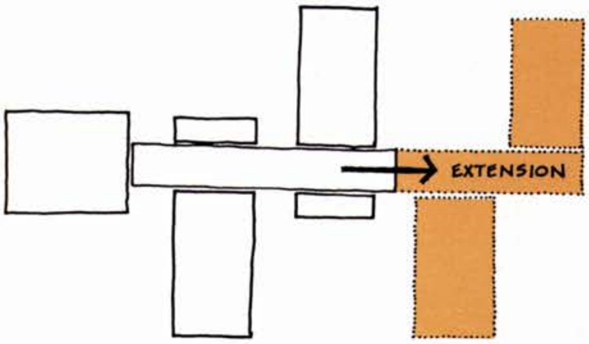
Shifting educational patterns

Schools are anxiously competing for highly skilled, experienced teachers. Since teaching salaries are competitive, upgrading the physical facilities available to teachers has become increasingly important.

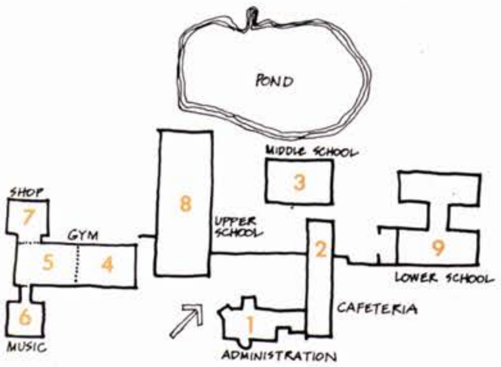
It has also become important to liberate teachers at times during the working day so they can pursue their own, independent activities. Most school programs do not recognize the urgency of continuing education or provide sufficient opportunity for adult study. Remedial summer programs place an added burden on school facilities and educators are searching for ways to do more with the limited facilities available to them. A centralized media center, containing new electronic aids, is increasingly common. Many older teachers do not know how to use the new equipment. Someone must show them. There is a definite trend toward individual lab work which can be done during unscheduled time.

The design response

Shifting needs and opportunities are already changing traditional design concepts. Such static expressions are gradually giving way to a series of logical decisions, pointed toward flexible, carpeted, air-conditioned space. While much remains unclear, some vectors are already beginning to emerge. Future schoolhouses must exploit both technological advances and a flexible approach to construction. Adaptable, interchangeable components will allow a closer accommodation of building to program, and hopefully, yield a logical, visual vocabulary, generated by immediate need and function.



14 GROWTH BY EXTENSION



15 GROWTH BY MEANS OF AN ESTABLISHED MASTER PLAN

A steeply sloping site is used to good advantage to create new space for the laboratory sciences at the South Kent School in rural Connecticut. Entrance lobbies at both levels are tied together by a scissor stair that shields mechanical spaces buried in the hillside. White brick and roof pitches are in deference to older neighbors.

Milton Weinstock photos

THE SMS ARCHITECTS

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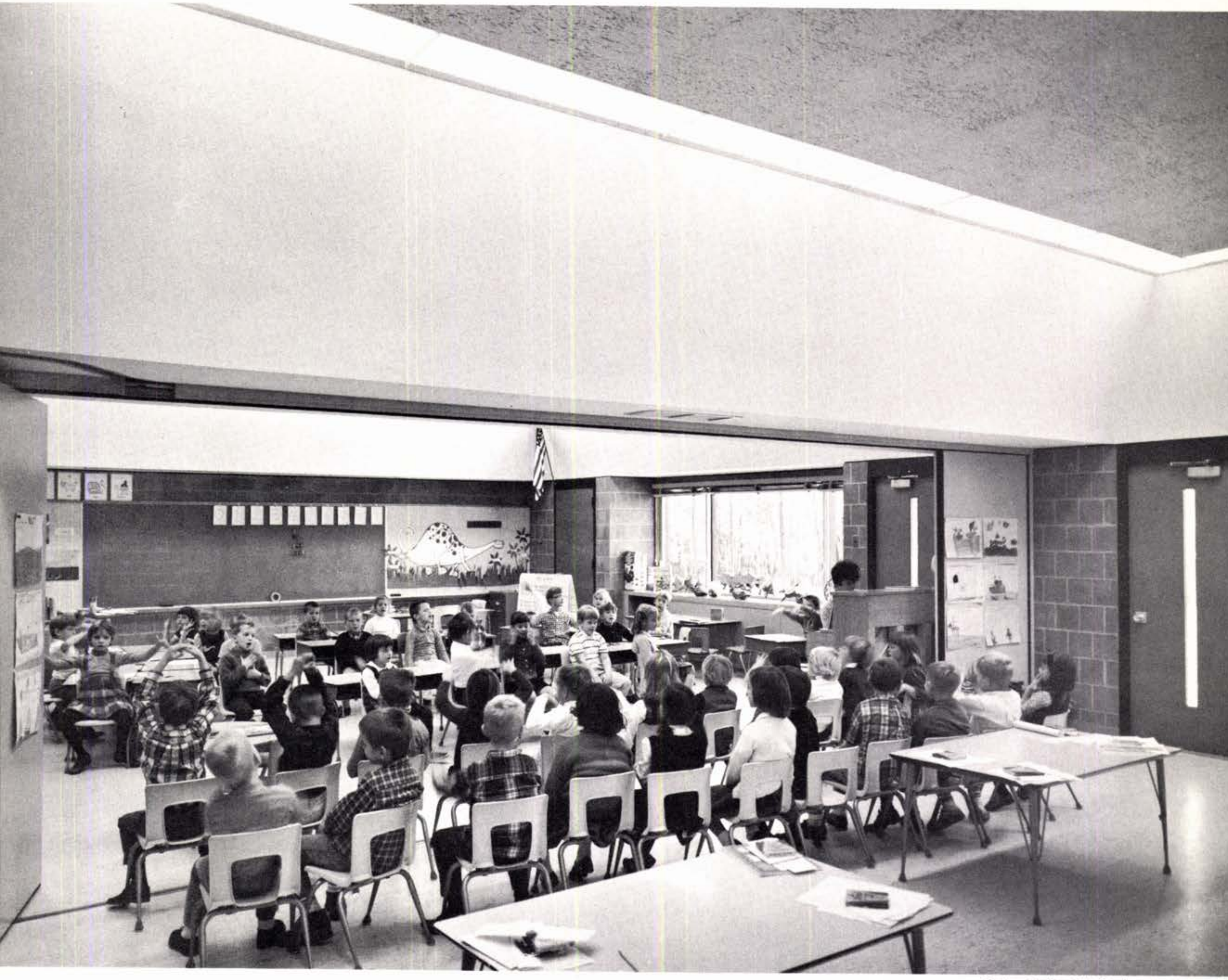
Malcolm Smith photos

At the Low Heywood School in Stamford, Connecticut (upper left) classrooms are designed as air-conditioned, carpeted, flexible spaces flanked by open corridors with dropped ceilings.

Long span, acoustical steel deck forms the ceiling for both the library and the sciences classroom at the Easton Elementary School in Easton, Connecticut (above and right).

The new dining hall for The Masters School in Dobbs Ferry, New York is subdivided into four pavilions that open into a flat-roofed circulation and serving area. Construction is steel frame with concrete-topped corruform floor framing.



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Expandable classroom space for kindergartners at the Ox Ridge Elementary School in Darien, Connecticut. Shingled, mansard roofs echo the plan organization and provide a canted inside surface for overhead projection.

FULL-SCALE FIRES USED TO TEST INTERIOR FINISHES

Initial results of a pioneering experimental program show that currently accepted tests do not adequately predict the relative hazards of combustible finishes for a variety of design conditions and occupancies, and that more factors should be applied in interpreting results of standard tests.

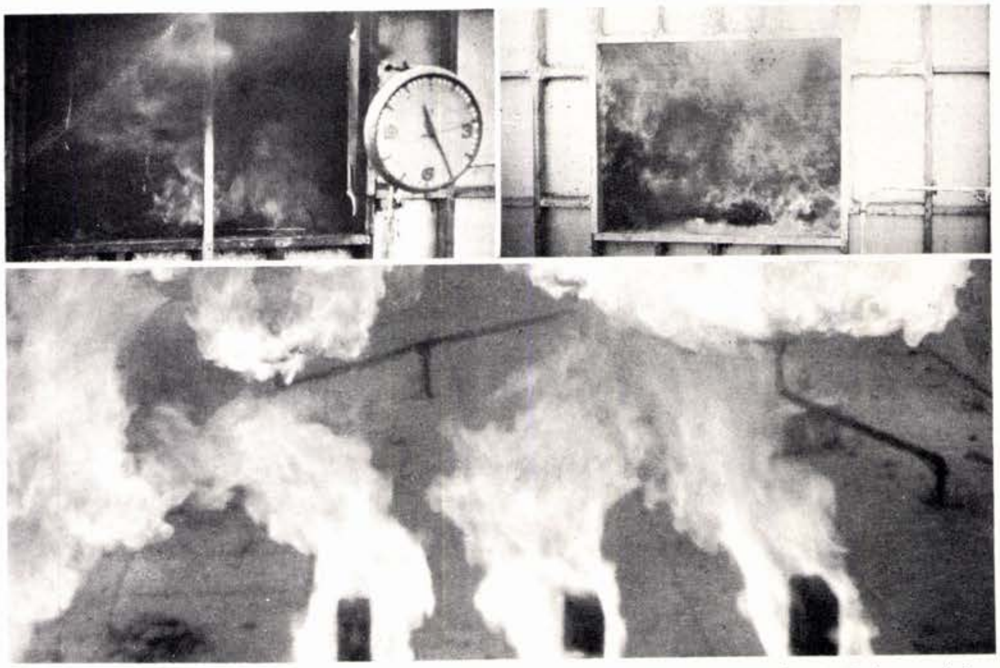
The question of how adequately laboratory tests on construction materials and assemblies mirror real-life application has been occurring more and more frequently lately.

A case in point is fire testing, particularly that related to interior finishes. Code provisions regulating the use of interior finishes in different types of occupancies have been based pretty much on educated guesses as to how materials having different degrees of flammability (as indicated by current standard tests) would react in "real-fire" situations. The reason is that until very recently no comprehensive program of full-scale fire testing had been conducted on interior finishes.

But now the first results have been reported of an ongoing series of full-scale fire studies sponsored by The Society of the Plastics Industry at IIT Research Institute in Chicago, which show that the "flammability, smoke, and fire gas values assigned materials in standard tests do not adequately predict the results under realistic conditions. Rather, these values vary according to the fire environment [intensity, duration and fuel contribution of a fire] and the distribution of the finish materials."

The tests, begun four years ago, are among the most comprehensive fire experiments being conducted in the U. S. So far, some 200 experimental fires have been studied. Basically, the purpose of the project is to compare in a variety of real building fires the behavior of a range of interior finish materials already characterized by standard fire tests. With results from these tests it should be possible to ascribe a more meaningful and realistic interpretation to the numbers obtained in current standard tests, such as the ASTM E-84 tunnel test.

The plastics industry obviously has an interest in the solution of the many unresolved problems of fire-test rating in order that, on the one hand, plastic materials do not create intolerable fire hazards in build-



Fires using actual room contents were set to determine intensities of "real" fires (top photos show high- and medium-intensity fires). "Reference" fires were established by using gas burners (bottom).

ings, and, on the other hand, are not arbitrarily excluded from use because of unrealistic standards.

What architects and regulatory bodies are concerned about

During 1965, IIT Research Institute held meetings with an advisory board formed of architects, building code administrators, fire test authorities and insurance men to find out what additional information they desired to make more reasonable and uniform regulations on plastics used as building elements or surfacings. The board came to these conclusions:

- Code administrators find it difficult to identify fire hazard, even when extensive data are available. Thus, there is an urgent need to develop more meaningful correlation between existing fire test ratings and actual contribution to life and property hazard.
- Architects find onerous and undiscerning the code provisions that material above a certain fire test rating cannot be used, while material below such rating can be used in unlimited quantity. Architects and code men agreed that partial use of specific materials of a higher flammability than now permitted could be safe in some circumstances, but more uniform and workable criteria are needed. For example, they said, it seems that a material used for counter tops and wainscotting should be recognized as less hazardous than when used for a ceiling or for the uppermost wall finish.

The program requested by the advisory board was to use full-scale or large-scale fires to determine:

1. Behavior of combustible interior finishes that have been previously characterized by accepted tests, so as to determine the rationale for using such standard tests to predict behavior and control usage.

2. Bases for judging the contribution to life hazard associated with the material behaviors over a variety of occupancies.

3. Ways for fire safety codes to relate pertinent properties, configurations, and mountings of interior finishes to building occupancies and design.

So far the project has explored:

1. Outputs of heat, flame, smoke and fire gases from fully developed fires of typical bedroom, domestic kitchen, office, school stationery storeroom, hotel linen storeroom, and small janitor closet.

2. Contribution to such occupancy fires of a range of interior finishes in the fire room.

3. Behavior as wall or ceiling finish of the same range of finishes as in the adjacent corridor, when ignited and propelled by room fires of typical occupancies.

4. The effect in the corridor of variation in amount and distribution of a range of interior finishes.

5. Effect of varying the building ventilation.

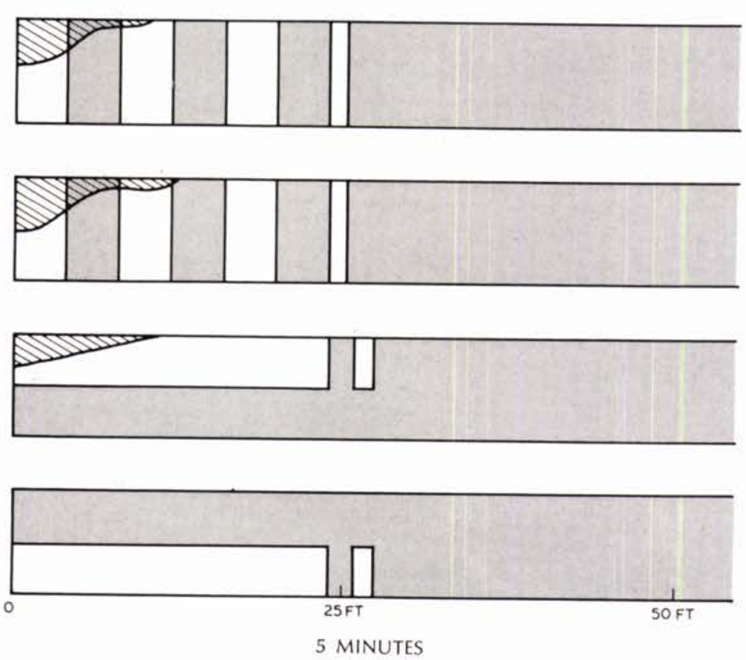
The basic hazards caused by fire are considered to be flame, obscuring smoke, and irritating or toxic fire gases. The advisory board found it difficult to think of these hazards in terms other than those indicated by the ASTM E84 tunnel test. Although tunnel scores are widely used in codes, there has been very little comprehensive experimentation, until now, to find out what a spectrum of tunnel flame and smoke ratings show in actual fires. The SPI-IITRI project is not intended to devise new tests, although it will undoubtedly suggest new types to explore, particularly for measuring smoke. The prime objective of the project is to see how the results from present tests should best be utilized in code regulations.

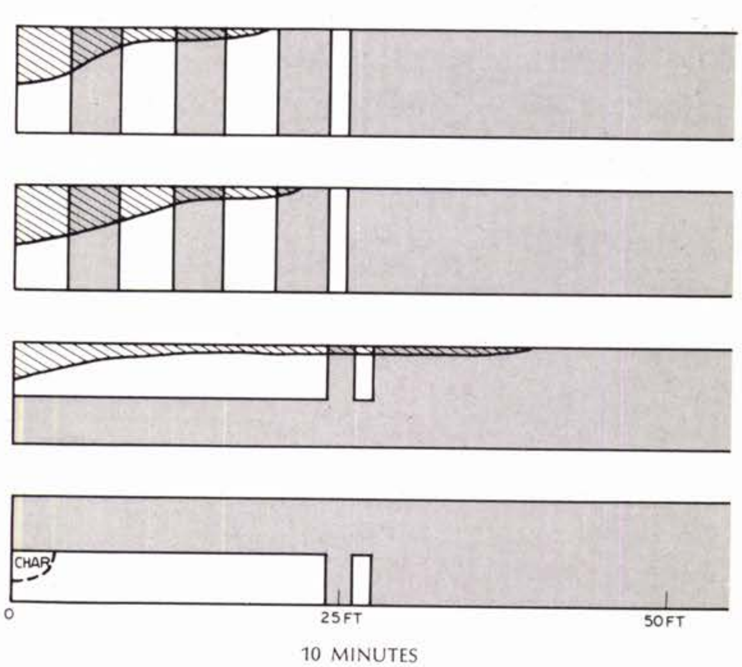
How results of the tunnel test are used in building codes

The ASTM E84 tunnel test is performed in a fire-brick chamber approximately 1-ft high, 1½-ft wide and 25 ft long. The material to be tested is mounted on the ceiling and ignited at one end by means of gas burners having a fixed rate of fuel supply. How fast the flame travels in the tunnel, or how far the flame travels down the tunnel before ceasing or receding determines the flame spread rating. Red oak flooring has been arbitrarily assigned a flame-spread rating of 100, and asbestos-cement board, a rating of zero. Values for fuel contribution and smoke are obtained by comparison with curves for red oak flooring.

The tunnel test—developed primarily in response to the need for determining the rate of flame spread for combustible acoustical tile—has been in existence for over 20 years and has been an ASTM standard since 1961.

TIME-ORIENTED DIAGRAMS OF FLAME PATTERNS IN CORRIDOR FIRE TESTS





These diagrams illustrate the fire spread histories of a series of corridor experiments involving an interior finish having a flame spread rating of 90, exposed to a closet "reference" fire. The "reference" fire simulates a "real" fire in terms of intensity and heat produced.

Depicted in the time-oriented diagrams is the wall of the corridor of the experimental facility (see page 138) opposite the closet "fire" which is the ignition source. The corridor is 8 ft high and 50 ft long. The white portions indicate where the combustible finish material was installed for the experiments; the gray area indicates non-combustible wall area; and the cross-hatched areas indicate the flaming zone.

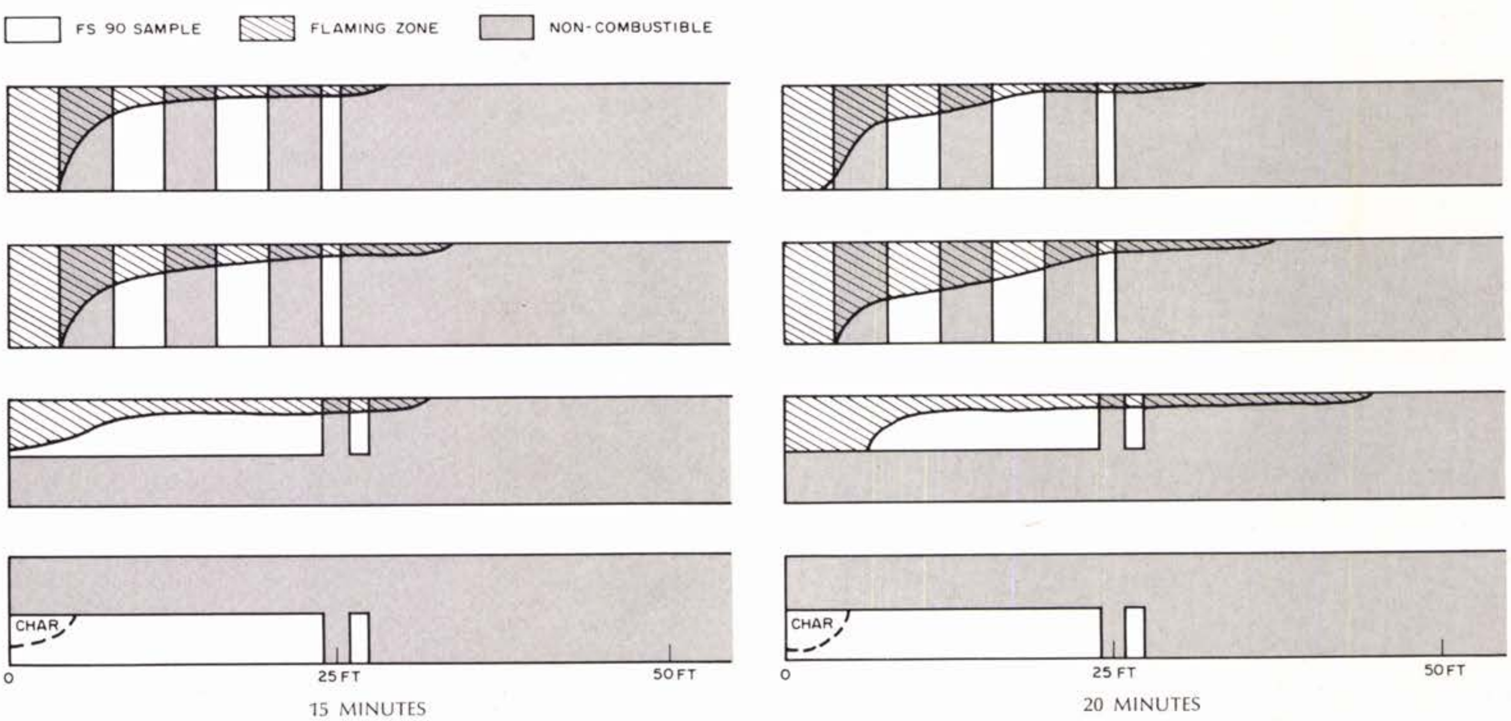
Purpose of the experiments shown here was to determine the effect of partial coverage of wall surfaces on flame spread hazard. The material, with a flame-spread rating of 90, is just beyond the restriction (75) imposed by many codes for a given classification. The finish was evaluated for the configurations which have potential practical application. The top two rows show 4-ft-wide combustible panels alternated with non-combustible

REAL FIRES SUGGEST NEW INTERPRETATIONS FOR STANDARD SMALL-SCALE TESTS

Objectives of the on-going SPI-IITRI experimental program are to use full-scale fires to find: 1) behavior of combustible interior finishes, previously characterized by accepted tests, in order to determine the rationale for using standard tests to predict behavior and to control usage; 2) bases for judging contribution to life hazard associated with these material behaviors for a variety of occupancies; 3) ways for fire safety codes to relate pertinent properties, configurations and amounts of interior finishes to building occupancies and design.

Findings and implications

1. Real fires behave in a different manner from what might be projected from laboratory tests that are generally used for building codes.
2. Flammability, smoke and fire gas values assigned to combustible materials in standard tests do not adequately predict the results under more realistic conditions in full-scale experimental fires.
3. Material location and magnitude of fire exposure both have a pronounced effect on material behavior in a fire.
4. Attempts to distinguish between the hazards of materials whose tunnel test flame spread numbers differ by only 25 or less do not seem justified, although this is done in some present codes.
5. Experiments indicate that the tunnel test flame spread number in combination with some function of material properties such as thickness, ignition temperature, and the rate at which heat passes through material, might be used to place materials in a proper relative hazard order. Placement of materials in order of presently-used ascending tunnel test ratings does not quite place them in the order of increasing flame spread as measured by full-scale tests.
6. Each location and each expected fire severity should eventually be considered in order to convert from a relative to an absolute hazard scale.
7. Full-scale tests on smoke production indicate that no single smoke rating number can adequately define the relative smoke hazards of interior finishes as used in a variety of locations and occupancies.
8. Experiments confirm that wainscoting is far less hazardous than paneling up to the ceiling. Tests show that coverage limited to a single wall, or to the lower half of both walls significantly decreases the hazard. Some codes already recognize this by permitting combustible wainscoting up to 4 ft high.
9. Sharp lines of demarcation for bracketing flame spread numbers to establish classifications for building code purposes do not seem to make sense.



wall; the third row shows combustible finish at the upper half of the wall; and the bottom row shows the finish at the lower half of the wall. For the first and third rows, the finish material was installed only on the wall opposite the fire; for the second and fourth rows, the finish material was installed on both walls. The panel patterns repeat until at least 24 ft of horizontal run are covered; a 2-ft panel was used to complete a sequence within 24 ft.

The diagrams illustrate that interruption of combustible finish by non-combustible segments did not produce discontinuities in the burn lines; thus, the non-combustible panels do not act as barriers to spread of fire, but only decrease the fire intensity by replacing what otherwise would have been fuel.

Full coverage of both walls of the test corridor (not shown here) resulted in rapid propagation of flame from an exposing closet fire. Apparently the fire was self-sustaining. Configurations with less than total coverage were not self-sustaining spreaders of fire. Coverage limited to a single wall, or to the lower half of both walls significantly decreased the hazard.

In building codes, interior finishes are classified according to certain bracketed ranges. Results of the IITRI test confirm that it does not make sense to use more than three brackets of flame spread. As currently used in some codes these ranges are 0-25, 26-75, and 76-225. A material with a flamespread rating of 25 is considered to be noncombustile by a number of codes. Usage of these classifications in codes is exemplified by the following typical requirements:

1. Finishes for walls of vertical exitways (stairways) shall have a flame-spread rating of no higher than 25

2. Finishes for other exitways (corridors) shall have a flame-spread rating of no more than 75

3. Room finishes shall have a flame-spread rating of no more than 225 (except for occupancies such as mental hospitals, general hospitals, nursing homes, jails, etc.)

A number of state and city codes, however, have narrower ranges than those listed above, but the IITRI tests demonstrate the lack of logic for such narrow bracketing because the intensity of the propelling fire, and the location and the amount of interior finish are more critical to propagation than "flammability" as indicated by present standard tests.

How tests were conducted to determine affect of combustible finishes

The experiments conducted by IITRI have been directed mainly toward:

1. Determining the amount of smoke, heat and gases produced by fully-developed fires in several different types of occupancies (mentioned earlier), and the incremental increase in smoke, heat and gases caused by the addition of combustible finish materials:

2. Understanding the interactions between finish materials in one or more locations (as in a corridor—one wall, two walls, etc.), and the effect of partial coverage of wall surfaces. Experiments sought to determine whether or not a combustible material, which may pose a hazard if used for total wall surface of a corridor, can be safely used in lesser amounts.

The test facility consists of a primary burn room 10 by 15 ft with an 8 ft high ceiling, and with double doors opening onto a corridor 6 ft wide, 8 ft high and 50 ft long. First experiments consisted of burning actual furnishings or storage items for five occupancies—bedroom, linen room, kitchen, office, and storeroom—and for a closet condition to establish the approximate upper limit of severity. These were called "guideline" fires. Real fires differ even when conditions appear identical.

A second category of fire, called "reference fires," was established using propane burners to provide three levels of heat release analogous to three actual occupancy fires. These fires were conceived in order to make the program manageable, and to have fires with sufficiently low smoke to permit accurate measurement of smoke from room finishes. The first type of refence fire is a high-intensity room fire which represents greatest severity of real room fire; the second type is a low-intensity fire which still fills the room and is capable of igniting finish materials in a corridor; the third type is a closet reference fire which produces localized high intensity heating, but not the high heat release of a room fire.

The third category of fire in the experiments is "finish fires," which are those with candidate finishes in room or corridor, usually against a calibrated "reference" fire in a room.

Full-scale tests show that the rigidity of current ratings is unwarranted

The SPI-IITRI findings to date based upon the use of a combustible finish on a ceiling or along one corridor wall are:

Flammability

1. Although the increase in hazard of the experimental fires generally parallels rising E84 flame-spread scores, the E84 ratings frequently misplace some finishes on a relative scale by more than 25.

2. Use of more than three brackets of E84 flame spread is inadvisable for categorizing interior finish.

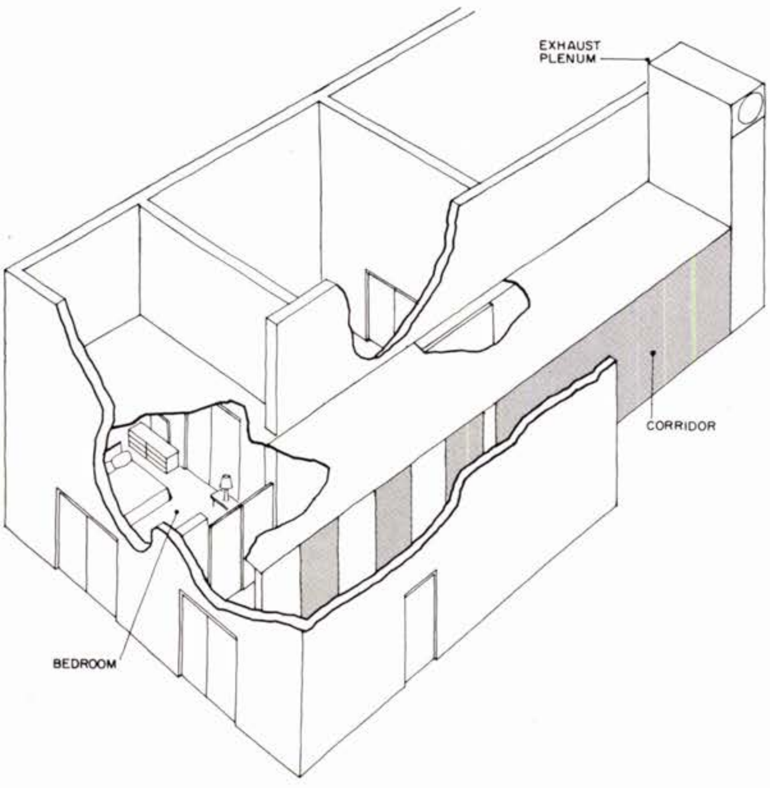
3. Materials having an E84 flame spread below 25 will propagate flame only with other fuel burning adjacent.

4. Materials with E84 flame spread scores around 100 will propagate at the ceiling. But a vertical surface will propagate only with good conservation of heat.

5. Materials with intermediate E84 flame spread ratings (26 to 75 or 100—a typical code category) are highly variable regarding propagation. The intensity of room fire and distribution of finish easily obscure distinction between materials of flame spread 25 and 75, or 75 and 225.

Measurement of smoke

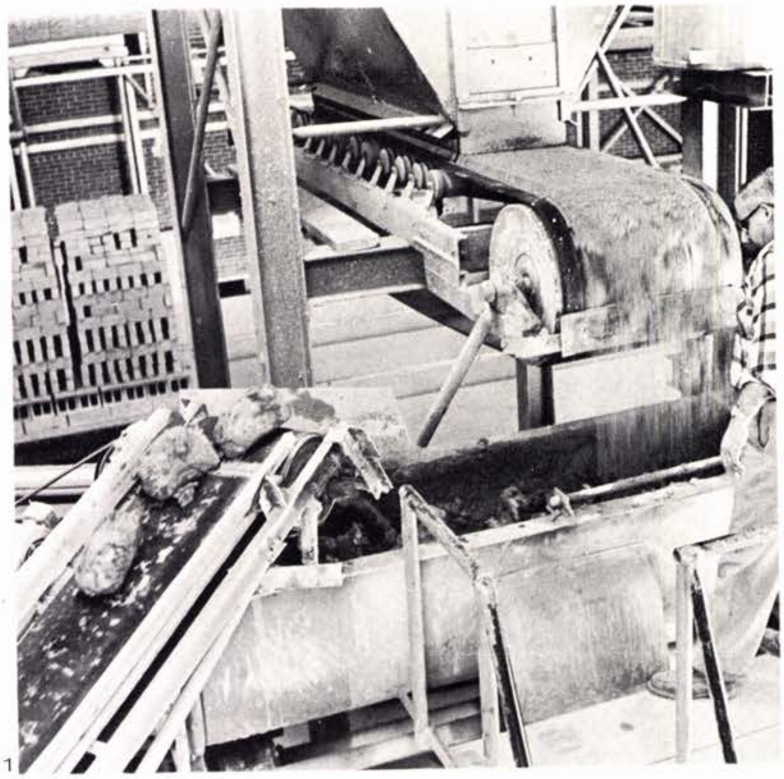
Smoke production in actual IITRI fires differed so greatly from, and show so little correlation with, tests by standard methods, that it is doubtful that any *single* smoke rating can accurately define the relative hazard for a variety of real fires. For example, in some cases the interior finish in the room where the fire was burning provided more smoke than did the same material located in the corridor which was exposed to the same room fire. The studies on corridor fires suggest that a method of calculating existing E84 smoke data on an optical density basis shows promise for evaluating finish materials in corridors.



The IITRI facility was subdivided to provide a primary burn room 10 by 15 ft with double doors opening onto a corridor 6 ft wide, 8 ft high and 50 ft long. Optionally, a prefabricated closet can be installed in the doorway between the primary burn room and the corridor—substituting a small fire volume for a large fire volume. Temperature, heat outputs, gas compositions and smoke and air flows are measured.

For more information circle selected item numbers on Readers Service Inquiry Card, pages 213-214

Old-fashioned bricks with hand-made look made with modern factory techniques



1

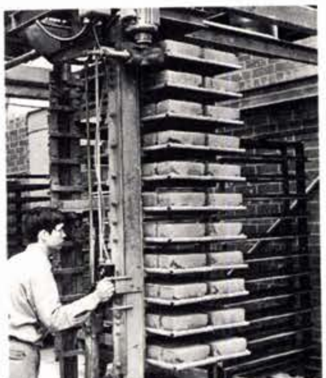
This brick making process combines the look of hand-made bricks with the speed and accuracy of automated techniques. It uses machinery for carrying, mixing, kneading and control, but the molding is done by hand. Conveyor belts move prepared clays to the electric pug mill which mixes the clay preparations with water and kneads them together. The mixture is then cut into slugs and brought by conveyor belt to the throwing station. Here it is hand-thrown into wooden molds. Excess clay is automatically removed and the bricks are washed and sanded before being placed in a drying chamber. The dried bricks are brought to the tunnel kilns where they are loaded for the firing process. The kiln temperatures are regulated for color and size control.

The customer is able to choose a brick which meets his specifications and then see a sample submitted by the company; nothing further is done until the sample is approved. ▪ Old Carolina Brick Co., Salisburg, N.C.

Circle 300 on inquiry card

more products on page 152

2



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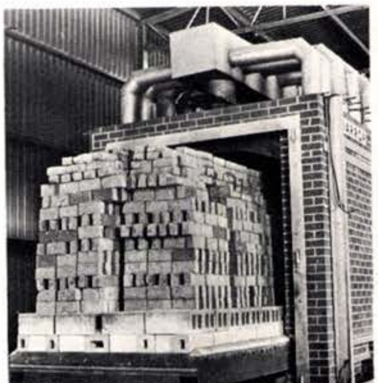
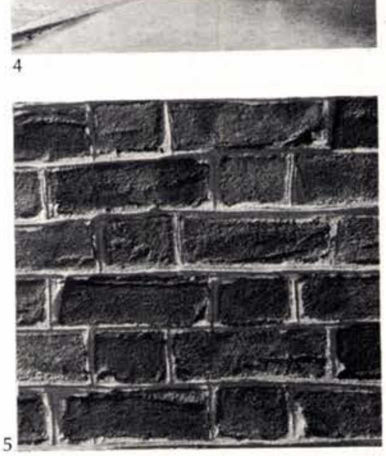


4

1) The pug mill where the clay is mixed and kneaded. 2) Hand-throwing into molds. 3) All handling is by conveyor belt or pallets. 4) The bricks ready for firing. 5) Finished product.

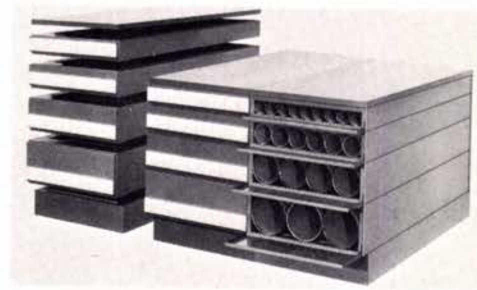


5

continued from page 143

DURABLE DECORATING MATERIAL / *Zilqua* is pure quartz and silica sand fused to form a non-porous weather-resistant material that is harder than granite. It may be clear, opaque or translucent, and comes in many textures, thicknesses and colors (metal oxides are used for coloring). It can be cut, ground and shot-blasted to form a variety of designs for indoor and outdoor decoration. It will not fade or decay, and is abrasion resistant. ▪ Thermal American Fused Quartz Co., Montville, N.J.

Circle 301 on inquiry card



MODULAR ROLL FILE / This system uses differently sized steel modules filled with horizontally arranged steel-rimmed fiberboard tubes. The modules are interlocking and any combination (of the same length) may be stacked to any height to meet individual needs. A cap and base complete the cabinet. Each unit has a spring activated door on the front with label for identification. There are 4 tube diameters and eight lengths, all of the same width. ▪ Stacor Corp., Newark, N.J.

Circle 302 on inquiry card

COLOR-FUSED PANELS / Miraweld panels consist of inorganic pigmentation in a choice of 16 colors thermally fused to an asbestos cement core. They can be used as facings over new or existing structures, as curtain or window wall treatments, balcony fronts, soffit and fascia panels, mansard roofs and store fronts. The panels may also be laminated back to back with color finish on both sides, laminated to an insulated core, or the asbestos core can be painted. The panels come in 3 or 4 ft widths, 6, 8, or 10 ft lengths, and a 5/32 in. standard thickness. ▪ Kaiser Aluminum and Chemical Corp., Oakland, Calif.

Circle 303 on inquiry card

more products on page 164

For more information circle selected item numbers on Reader Service Inquiry Card, pages 213-214

FRAMING ANCHORS / A product design and specification sheet describes a line of framing anchors used in roof, wall and floor construction. Manufactured from zinc-coated steel, the anchors are available in three different styles. Some applications include the anchoring of floor joists to beams, solid blocking to plate, dormer framing, rafters or trusses to purlins, chimney framing, ceiling joists to beams or trusses, stair carriage to header or trimmer, and corner post framing. ▪ Timber Engineering Co., Washington, D.C.

Circle 400 on inquiry card

CENSUS DATA / "Catalog of 1970 Census Data" contains 24 pages of information about computer census tapes, microfilm and microfiche sold by the company, officially recognized by the U.S. Bureau of the Census as a 1970 census summary tape-processing center. Articles and illustrations in the catalog describe all six counts of the official U.S. Census of Population and Housing. Included are suggested techniques for using this data in city planning and utility planning. Price lists are included. Copies are free. ▪ Write National Planning Data Corp., 65 Broad Street, Rochester, N.Y. 14614.

COPPER / "Cast Products", a 240-page volume, presents data and standards of copper and copper alloy castings. The first section gives data on 89 commercial casting alloys. The second section is a cross-index of eight U.S. specification systems arranged in numerical order and completely cross-indexed by casting method. Volume is free. ▪ Write Copper Development Assoc., Inc., 405 Lexington Avenue, New York City, 10017.

FLOOR-CEILING SYSTEMS / Described in a 32-page booklet is a floor-ceiling system with a structural deck working through the coaction of formed steel decking with a cover slab of poured-in-place concrete. According to the brochure, the floor is capable of carrying heavy loads for spans of up to 32 ft. while incorporating various mechanical services. Some of the optimal service features are acoustical control, communications and electrical raceways, air diffusion and distribution, and recessed lighting troffers. The assembly is U.F. fire-rated up to two hours. Specifications, properties and load tables are given. ▪ H. H. Robertson Co., Pittsburgh.*

Circle 401 on inquiry card

AGGREGATE COATINGS / A 6-page brochure describes a line of exposed aggregate coatings and illustrates design possibilities. The coatings are available in three separate systems in a range of colors and textures. ▪ Desco International Assoc., Buffalo.

Circle 402 on inquiry card

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

more literature on page 204

Owner: City of Hampton, Va.; Architect: A. G. Odell, Jr. and Associates; Consulting structural engineer: Severud-Perrone-Sturm-Conlin-Bandel; Steel fabricator and erector: Bristol Steel & Iron Works, Inc.; General contractor: McDevitt & Street Company.

The new $6.5-million Hampton Roads Coliseum serves more than a million people in Tidewater Virginia with sports events, exhibitions, shows, and conventions under its column-free roof. Located in Hampton, the facility is convenient to Norfolk, Newport News, and Portsmouth.

MORE THAN 1.3 MILES OF STEEL CABLE. Bethlehem Steel provided 7,344 ft of 2-in.-dia, zinc-coated pre-stretched, steel strand for the single-layer cable roof. Shipped in specially packaged coils—48 lengths, each 153 ft long—the cables were fabricated with open sockets on one end and adjustable anchor sockets on the other.

SIMPLE ERECTION PROCEDURE. In the roof erection scheme, the steel tension ring was raised to the height of the perimeter connection points and supported by falsework. Next, the anchor-socketed ends of the cables were lifted, one by one, to the perimeter connecting points where they were inserted through weldments and affixed with spanner nuts. Then, cables were lifted and connected to the tension ring. After all 48 cables were in place, the tension ring was lowered to its final position via the removal of the upper part of the falsework. (A six-in. length of thread, specified for the end of the anchor socket, permitted final adjustment of cable lengths.)

INTEGRATED SUPPORT SYSTEM. The compression ring, normally present in a cable system of this type, is located 17½ ft below the tops of the diamond-shaped perimeter panels. The panels were designed to be reminiscent of white boat sails characteristic of the Tidewater area.

STRUCTURAL STEEL ON CABLES. Some 350 tons of Bethlehem steel plate and structural members were used in this structure. Of these, about 50 tons were light shapes, which were placed atop the cables. They support the unusual folded roof which melds into the side panels. The area under the roof and above the cables contains a portion of the coliseum's mechanical and electrical system, including ductwork for its 1,000-ton air-conditioning unit.

CABLE DATA AVAILABLE. Bethlehem furnished the information required for the specification of cables and end-fittings for this major structure. We'll be happy to supply this data for your designs. Just write: Room 1049 HRC, Bethlehem Steel Corporation, Bethlehem, PA 18016

BETHLEHEM STEEL

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (ACT OF OCTOBER 23, 1962; SECTION 4369, TITLE 39, UNITED STATES CODE)

1. Date of filing—Oct. 1, 1970.

2. Title of Publication.—ARCHITECTURAL RECORD (combined with American Architect, Architecture and Western Architect and Engineer).

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7. The owner is McGraw-Hill, Inc., 330 West 42nd St., New York, N.Y.—10036. Stockholders holding 1 per cent or more of stock are: Paul T. Babson, 330 Beacon St., Boston, Mass.—02116; Barnett & Co., c/o Bankers Trust Company, 16 Wall St., New York, N.Y.—10015; Maxwell M. Geffen, 1271 Avenue of the Americas, New York, N.Y.—10020; Donald C. McGraw, Elizabeth McGraw Webster, Donald C. McGraw, Jr. & Harold W. McGraw, Jr., Trustees under Indenture of Trust m/b James McGraw, dated 1/14/21 as modified; Donald C. McGraw, Trustee under an Indenture of Trust m/b James H. McGraw, dated 7/1/37 as amended; Donald C. McGraw, individually; Donald C. McGraw and Catharine McGraw Rock, as Trustees of the Estate of Mildred W. McGraw, all of 330 West 42nd St., New York, N.Y.—10036; Stanford E. Taylor, Hawk Dr., Lloyd Harbor, Huntington, N.Y.—11742.

8. Known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities.—None.

9. Not applicable.

10. Extent and nature of circulation:

A. Total number copies printed—average number copies each issue during preceding 12 months, 60,166; actual number of copies of single issue published nearest to filing date, 57,225.

B. Paid Circulation. 1. Sales through dealers and carriers, street vendors and counter sales—average number of copies of single issue published nearest to filing date—none. 2. Mail subscriptions—average number copies each issue during preceding 12 months, 52,246; actual number of copies of single issue published nearest to filing date, 51,713.

C. Total paid circulation—average number copies each issue during preceding 12 months, 52,246; actual number of copies of single issue published nearest to filing date, 51,713.

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G. Total—average number copies each issue during preceding 12 months, 60,166; actual number of copies of single issue published nearest to filing date, 57,225.

I certify that the statements made by me above are correct and complete.

McGRAW-HILL, INC.
By John J. Cooke,
Senior Vice President and Secretary