W.S. TYLER elevator entrances and cars are flanked by glass mosaic walls in the Libbey-Owens-Ford Glass Company Building in Toledo.


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PUBLISHER'S NOTE

With this issue the editors present their fifth annual survey of the "100 Largest Architectural Firms in the U.S." (see page 14). This will be followed in May by the 100 Biggest General Contractors and in July by the 100 Biggest Corporate Building Clients. Over the years these three lists have proved to be some of the most sought-after articles among Forum's 63,000 subscribers, judging from periodic reader interest surveys and requests for reprints.

Obtaining dollar volume figures for these lists from contractors and clients is relatively easy; most of them look at building primarily as a business matter. The architects are another story; many of them feel, quite properly, that architecture is an art as well. And some decline to participate on the grounds that bigness (or "business") can easily get confused with quality (or "art").

Our survey must look at the 100 biggest architects purely from a business viewpoint; obviously, volume should not be equated with quality of work. As in other fields, quantity sometimes threatens quality:

1. As every principal of a growing architectural firm knows, bigness can mean loss of control over design. Also, it can be hard to find talented designers willing to work in large offices.

2. Some big firms have gotten that way by placing primary emphasis on service to their clients, with design a secondary concern.

3. Others have grown by specializing in buildings that demand far more engineering and production know-how than architectural skill. There are many exceptions where quality and quantity happily go together (see below).

To the best of our knowledge, no one has ever dared to compile a list of the 100 best architects. It would be not only inappropriate but pointless for our editors to attempt such a list because they are constantly evaluating the best architectural work in every issue of the magazine. In feature articles the editors make value judgments on the quality of the architecture they publish, but their lists of the 100 biggest are published strictly as news—in the magazine's News department.

During the last three years, the work of some 300 architectural firms has been featured in Forum. Many of these firms are small, young, up-and-coming ones; some of them may advance to important commissions with Forum's encouragement. Some of the firms are very large and well-established, for there are, of course, a handful that are responsible for a prodigious number of good buildings.

On the basis of a 3-year page count, the work of the following 25 firms (in alphabetical order) has received the greatest amount of editorial space in Forum:

Anshen & Allen; Edward L. Barnes; Marcel Breuer & Associates; Caudill, Rowlett, Scott; Mario J. Ciampi; Curtis & Davis; Ulrich J. Franzen & Associates; Victor Gruen Associates; Harrison & Abramovitz; Hellmuth, Obata & Kassabaum; Victor A. Lundy; Mies van der Rohe; G. F. Murphy Associates; I. M. Pei & Associates; Paul Rudolph; Eero Saarinen and Associates; Sert, Jackson & Gourley; Skidmore, Owings & Merrill; Edward Durrell Stone; The Architects Collaborative; John Carl Warnecke & Associates; Warner, Burns, Toan, Lunde; Harry Weese & Associates; Whitlsey & Conklin; Minoru Yamasaki & Associates.

Few would quibble that most of these 25 firms would appear on anyone's 100 "best" list. Yet it is significant that only 11 of these 25 firms are among this year's 100 biggest. Hopefully, the ratio will increase.

—J.C.H. Jr.
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WASHINGTON, D.C. — The President's Housing and Community Development proposal of 1964 is "the biggest and most dangerous housing bill which has ever been presented to Congress," said Senator A. Willis Robertson (D, Va.) speaking before the National League of Insured Savings Associations. FHA Commissioner Philip N. Brownstein, on the other hand, told the American Bankers Association that "some of the best-directed and most comprehensive tools for orderly urban development ever offered in our national history" are in LBJ's bill.

Last month, the hearings before the House and Senate housing subcommittees began to provide a practical answer to which side was winning out. Best guess: some of the bill's most ambitious proposals are going to have a very hard time getting through Congress.

Experienced Chairman Albert Rains (D, Ala.) of the House housing subcommittee thought that the 1966 bill would have "a tougher fight than the 1961 bill" — which squeaked through a crucial tally with only 18 votes to spare. Senator Joseph S. Clark (D, Pa.) observed in the upper chamber that "the bill that comes out of [the Senate] subcommittee might even be unrecognizable."

Reasons for this outlook were not hard to find. For one thing, the provision of the up-to-$50-million land mortgage insurance for developers of new communities was drawn up without consultation with private organizations in the field. Though HHFA Commissioner Weaver called it the "most significant new departure" in the bill, one after another of the associations testifying before congressional subcommittees pleaded lack of time to assess the provision.

For another thing, according to Rains, the bill contained "too many new ideas." The official increase of the nonresidential exception in urban renewal from 30 to 35 per cent (so that communities might strengthen their tax base with new commercial buildings) drew fire from anti-urbanists. Segregationists also attacked the scheme to purchase 25,000 existing units to supplement public housing's 30,000 regular units because it smacked of bringing Negroes into white areas.

Other critics, however, felt that the proposals did not go far enough. New York's Mayor Wagner urged that the authorization for public housing "be increased to 100,000 units a year" from the proposed 60,000. President Ira S. Robbins of the National Association of Housing and Redevelopment Officials said: "The several provisions that might be of considerable help in the war against poverty are scattered through the legislation in an unrelated pattern and... on too small a scale to really make the massive impact required."

Still other groups, mainly concerned with the cost of the new legislation, attacked it as being too grandiose. Said the National Association of Real Estate Boards' Lyn E. Davis: the proposal represents "a giant step toward the federalization of the communities of tomorrow."

What's ahead? It is most likely that while at least two of the bill's major features (land development and a Cabinet-level Department of Housing and Community Affairs) will be shelved, several others will be reduced in scale and otherwise changed to be enacted later this year. Among the features likely to be adopted: FHA-insured loans to developers to get properly planned sewer and water facilities in their subdivisions; the "land bank" idea whereby public bodies can acquire land, with federal help, before they actually need it; the urban renewal and public housing packages.

FOR SAN FRANCISCO: A NEW FLOOR AREA RATIO
SAN FRANCISCO—This city's Board of Supervisors has voted to reduce the 20:1 floor-area ratio (FAR) in effect since 1959 to 16:1. Thus ends the latest chapter in a battle that has raged intermittently between San Francisco planners and builders for over a dozen years. The new regulation limits the bulk of new buildings in downtown San Francisco...continued on page 7
Huge, prestressed "Y" beams, resting on cast-in-place columns, form the basic structure of this interesting high school gym roof. Cast-in-place parabolic arches between these beams complete the effect. Prestressed double Tee beams, supported from the ends of the "Y" beams, provide a covered walkway. And, the walls are painted concrete masonry units.

LEHIGH EARLY STRENGTH CEMENT BENEFITS EVERY MEMBER OF THE TEAM

Dura-Stress, Inc. used Lehigh Early Strength Cement for the prestressed units in this building. Here, as in almost any concrete work, this cement provides important benefits for manufacturer, contractor and architect alike. Quicker re-use of forms. Earlier availability of units. Assured on-time delivery for smoother planning. Lehigh Portland Cement Company, Allentown, Pa.

Fessenden High School gymnasium in Marion County, Fla. is an interesting combination of prestressed concrete, poured concrete and concrete masonry. Tapered ends of the Lin Y roof beams cantilever to support double Tee Beams covering a walkway.

Owner: Marion County Board of Public Instruction, Ocala, Fla.
Structural Engineer: R. O. Newman, Leesburg, Fla.
Contractor: Thompson Brothers Construction Co., Leesburg, Fla.
Prestressed Manufacturer: Dura-Stress, Inc., Leesburg, Fla.
Concrete Block Manufacturer: Robinson-Scofield Lumber Co., Dunnellon, Fla.

LEHIGH CEMENTS

Eight prestressed Y beams are set in place on 16' centers as the first step in roof construction. Each beam measures 105' long and 8' wide.

To complete the interesting form of the roof, 8' wide parabolic arches are poured-in-place between the beams.
cisco so that for every square foot of site, 16 square feet of building area can be constructed.

The battle to prevent unregulated, downtown San Francisco from becoming a series of dark, airless canyons began in 1952 when the Planning Commission asked for an "optimum" FAR of 10:1 and was turned down by the Board of Supervisors under pressure from business groups and property owners. In 1957, the Planning Commission retreated to a 12:1 ratio—and lost again. Two years later, the 20:1 ratio was adopted after the HHFA told the city that it had to adopt some building bulk restrictions, or else face the loss of renewal funds.

Last year, when John F. Shelley was running for mayor, he came out in favor of a new, less bulky FAR. In January, after being elected, Shelley endorsed the Planning Commission's 16:1 proposal. Such groups as the Downtown Association, the Chamber of Commerce, the Real Estate Board, and the Building Owners and Management Association girded for another fight, claiming that the city would lose new builders if the restrictions were approved. This argument was neatly punctured in mid-February by the Bank of America, which plans to build a monumental new headquarters in the financial district. Reported the bank: "We can live with whatever density and height limits the Board of Supervisors imposes, including 16:1." The Supervisors set the new standards, are now considering meaningful bonuses for arcades, plazas, etc.

While the 16:1 ratio represents an important step forward for San Francisco, it is not a radical step. Other big U.S. cities have equal or lower FARs: New York has a 15:1 ratio, Los Angeles 13:1, Boston 10:1, and Philadelphia 8:1. Also significant is the fact that most of downtown San Francisco's major recent buildings did not use the full 20:1 ratio: the International Building, for instance, uses a 12.5:1 ratio, the Crown Zellerbach Building 6:1, the Hartford Building 17.8:1, and the Hilton Hotel 7.6:1.

SCHOOL EXPERIMENT GETS GREEN LIGHT

SANTA CLARA, Calif. — The School Construction Systems Development (SCSD) project (News, Sept. '63; Forum, Feb. '64) last month overcame the last hurdle before going into actual construction: a lawsuit which threatened to delay the whole experiment—and cast doubt on the legality of performance specifications throughout the U.S.—was decided in SCSD's favor.

At issue was the contract for the interior partitions, one of the four integrated components which the project will use to build schools for 13 California districts. The lowest bidder ($2,273,400) was Virginia Metal Products Co., but the award went to the second lowest bidder ($2,390,000), E. F. Hauserman Co. Reason: according to the project evaluators, the Hauserman partitions met the detailed performance specifications more exactly than VMP's.

When VMP was informed of SCSD's decision, the company threatened suit. The project leaders then rejected all interior parti-

1964 PRIZE WINNING LIBRARY BUILDINGS

WASHINGTON, D. C. — No school library buildings were judged worthy of top honors, but two college libraries and one public library received First Honor Awards last month in the Second Library Buildings Award Program. Sponsors of the Program are the AIA, The American Library Association, and the National Book Committee. A jury (consisting of Architects Arthur Gould Odell, U. Floyd Rible, and David H. Condon, and library experts Dr. Keyes D. Metcalf, Hoyt R. Galvin, and Dr. Richard L. Darling) gave three Awards of Merit to school libraries, along with six to public libraries, and five to college libraries.

Receiving highest awards (photos, left) are the Charles Patterson Van Pelt Library at the University of Pennsylvania by Harbeson, Hough, Livington & Larson; the Beinecke Rare Book and Manuscript Library at Yale University by Skidmore, Owings & Merrill (Forum, Nov. '63); and the Flora B. TENDER Memorial Library in Tacoma, Wash. by Russell N. Garrison.

continued from page 5

continued on page 9
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continued from page 7

HOW WILL CITIES BENEFIT FROM REDISTRICTING?

WASHINGTON, D.C.—In ruling that each member of the House of Representatives must be elected from a congressional district roughly equal in population to other districts in the state, the Supreme Court was, in effect, giving cities and their suburbs more seats in Congress. This means that greater metropolitan areas will have the bigger voice in national affairs that they have been demanding for years. Probable result: more legislation that will help cities—things like aid to mass transit, larger urban renewal and housing programs, and new efforts to combat air and water pollution.

No Washington observers, however, expect really radical changes. One reason is that both Republicans and Democrats feel that they will gain the new seats. Another reason: the Court’s requirement that “as nearly as is practicable, one man’s vote in a congressional election is to be worth as much as another’s” will change a lot of districts in most states, but very well may not change the composition of Congress overly.

Congressional Quarterly recently reviewed the situation in the House and found that of the 435 seats, 203 (47 per cent) are elected by rural districts, 103 (24 per cent) by cities, 50 (11 per cent) by suburbs, and 79 (18 per cent) by mixed areas. Some 32.9 per cent of the population of the U.S. now lives in central cities of more than 50,000 people, CQ found, 20.3 per cent in suburbs, and 46.8 per cent in the country. Final reckoning: a net shift of only 16 congressional seats would be necessary: six would go to cities, ten to the suburbs. (Rural areas would lose 12 seats, and mixed areas four.)

CQ’s tabulation is hypothetical, of course; it is up to the states themselves to draw up new districts. But by last month, it seemed obvious from redistricting plans in Georgia (to give Atlanta another Congressman) and elsewhere that those city-oriented agglomerations called “Standard Metropolitan Areas” would indeed get more seats in the House.

SPAGHETTI ON THE MISSISSIPPI RIVER

ST. LOUIS—Below is Consulting Engineers H. W. Lochner & Co.’s considered solution to meeting someone (possibly another car) in St. Louis. It has been submitted for approval to the Illinois Division of Highways. Freeway levels, overpasses, underpasses, interchanges all snake up to a new bridge over the Mississippi River and to the Saarinen-designed Gateway Arch beyond.

Cost of the span and its approaches is estimated at $90 million, with the federal government picking up 90 per cent of the tab under its Interstate program, and Illinois and Missouri sharing the remainder. Approval of the spaghetti is expected this spring. The bridge will open to traffic in 1966. continued on page 10
**WORLD'S FAIR GOES INTO HOME STRETCH**

NEW YORK—Opening date for the New York World's Fair is April 22. Will it be ready on time? Not quite, said Chief Engineer William Whipple Jr., adding that "eight or ten" pavilions (mainly in the International Section) will not make it.

Fair Boss Robert Moses was indignant: "General Whipple," he said, "is not an officer of the Fair, nor does he have any jurisdiction over construction by exhibitors." According to Bob Moses, only New York City's Hall of Science would miss the deadline.

Another exception, however, will be the $2.2 million World of Food Pavilion, right next to the Main Gate. Moses had tried to drum World of Food out of the exposition because it was lagging far behind construction schedules. The pavilion's promoters and tenants took the case into court, leaving their building looking distinctly undernourished. Last month, the State Supreme Court decided in the promoters' favor, and work immediately resumed on the World of Food. However, nothing short of a miracle is likely to get the pavilion ready in time for the April opening.

On a happier note, the Fair announced that its advance ticket sale was the "biggest in box-office history." Already collected: $35.2 million, or 28 million fair-goers. The money goes to retire $.3 million in 5 per cent bonds (due August 1), and to pay off some $30 million in 6 per cent bonds (due August 1, 1966). This leaves the Fair in good financial shape, with only $24 million in debt to the New York World's Fair Corp.'s own construction program (roads and buildings). Much of this debt will be paid by continued ticket sales (adult admission: $2), the rest by land rentals.

While the Fair's biggest problems are being licked, some small ones remain. Sample: a bakery near the fairgrounds erected a 60-foot-high, 265-foot-long illuminated sign one year ago to dazzle Queens residents, motorists—and coincidentally fair-goers (photo). Moses' countermove: a shield of "artificial shrubbery and balloons," tall enough to block out the mammoth billboard. Upshot: another case for the State Supreme Court.

**EXPERTS DISCUSS LOW-INCOME HOUSING PROBLEMS**

NEW YORK—Public housing officials, redevelopment men, and architects met in this city last month to discuss ways of improving low-rent housing. There was little of the usual buck-passing; architects did not harp on the low fees and antiquated standards that generally go hand-in-hand with such projects, and the officials did not expound on the dreary design of past housing. Everybody was there to learn—and what each heard most about was environmental planning.

Boston Housing Agency Administrator Ellis Ash asked for fresh approaches to total design. The real problem, he said, was tackling the "environment of the culture of poverty," adding that the architect alone cannot handle the problem of environment.

Architect I. M. Pei agreed.

"Whole communities are involved in the "war on poverty." To get better low-income housing, said Pei, improved building methods must be developed. "There has been little or no progress in this field for 30 years," he stated. "Standardization of building components has to come in in a big way without sacrificing living standards." Architect Albert Mayer illustrated what a better environment means with specific examples of successful (as well as unsuccessful) projects. He was followed by Geoffrey Lawford, President of the New York Chapter of the AIA, who praised HHFA and FHA for recent efforts to improve working conditions for architects. The AIA's recommendations for more progress in the future: simplification of bureaucratic procedures; better communications so lessons from good projects in one area of the country might be learned in another area; more research in public housing; and a "pace-maker" project in each of PHA's regions.

**A STREETCAR NAMED CANAL**

NEW ORLEANS—The Canal Street streetcar line, one of this city's most pleasant ways of transit, on its way out. The electric streetcars will be replaced by diesel buses despite persistent, fierce opposition from conservationists. Right now, the wide center island along which the streetcars run is being cut down to broaden the roadway.

New Orleans Public Service, Inc. (NOPSI), a private organization which operates the city's transit facilities, proposed the changeover last year. NOPSI says it wants to provide one-vehicle, air-conditioned service from the Mississippi River to Lake Pontchartrain (the streetcars go only half way), also wants to remove the overhead electric lines and lightpoles—and keep the fare down to its present ten cents.

Canal Street residents immediately protested that the heavy buses would shake their homes and pollute the air with exhaust fumes. Neither of these pleas nor the deep concern of other conservationists impressed the City Council. After several days of public hearings, it voted 6-0 to allow the changeover. Subsequent political maneuvering by various streetcar proponents also failed.

Streetcars Desired, Inc., which has been behind the protest from the beginning, played its highest card a few weeks ago. It collected 10,000 signatures of registered voters asking for a change in the City Charter. The City Council accepted the petition—and took no further action. Mayor Victor H. Schiro, however, said that he would ask for a straw vote on the streetcar controversy in July. Outlook for the conservationists: bad.

The Fair refers to the enormous sign as a "baleful neon eye"
HOW TAX LAW CAN AFFECT BUILDINGS, ARCHITECTS

WASHINGTON, D.C. — Some economists have called the new tax bill the most "dramatic" piece of economic legislation in a decade. It is certain to spur more building—but since its eventual passage was assured late last year, most forecasters took the impact of the tax cut into account in predicting and planning for 1964.

For building investors, an old tax loophole is now narrowed, if not closed altogether. From now on when a building is sold in less than ten years it will lose that portion of any "accelerated" depreciation benefits (which used to be taxed at capital gains rates, but now will be treated as ordinary income) that it had taken in excess of straight-line depreciation. Internal revenue's retroactive "recapture" of these extra benefits will start at 100 per cent and decline 1 per cent a month from the 20th to the 120th month of ownership (ten years). For any sale after that the owners will be taxed at more favorable capital gains rates.

The provision will thus curb wheeler-dealers, who used to be able to buy a building, take full advantage of accelerated depreciation features (by starting the building's depreciable life over again), and then sell it before the carrying charges became heavy. The provision, in other words, encourages use of the traditional straight-line depreciation.

For architects and other professionals whose incomes fluctuate from year to year, the tax bill provides some relief: such self-employed individuals can average out the big income of a single year as if it were spread out over five years. To be eligible for this procedure, however, the windfall year must be one-third larger than the average of the prior four years, and must be at least $3,000 more than this average.

FHA COMES OUT FOR ART

WASHINGTON, D.C. — Last month, that hard-headed public agency, the Federal Housing Administration, changed its underwriting policy to include artworks in apartment buildings.

In general, FHA will give credit of up to 1 per cent of estimated cost for murals, mosaics, and sculpture—preferably by living American artists. FHA demands that the art be considered as part of the real estate to be eligible as part of the mortgage security. It also insists that the artwork be thought beneficial enough to tenants to justify the rentals to support their cost. FHA will review all proposals on matters of art, reserving the right to reject those which do not conform to its general criteria.

GRAND JURY INDICTS AGC UNDER ANTI-TRUST ACT

NEW ORLEANS—A legal hassle that will set important precedents is developing in this city. Involved are the local chapters of the Associated General Contractors of America (AGC) and the AIA. At issue: violation of the Sherman Anti-Trust Act.

According to a federal grand jury, the AGC forbids its members to bid on any job in which the client deals directly with subcontractors. By following this procedure, the indictment charges, some prime and specialty contractors have been prevented from freely competing for $80 million worth of construction annually.

In reply, the AGC claims that this procedure has been in use for over 20 years, and that the federal government has condoned it. Moreover, says the AGC, the system places responsibility for the execution of a construction job squarely upon the shoulders of a single contractor. Thus the owner, in case of a dispute, can deal with one person rather than with a series of subcontractors. The local AIA gets into the act, because it, too, feels that the single-contract method is best.

Outlook: a long, hard battle in the courts.

1964 STARTS WITH BOOM

WASHINGTON, D.C.—The figures for the first two months of 1964 show that nearly every type of construction is well ahead of last year's comparable period. Highlights: all nonfarm residential building (including housing) registered an 11 per cent increase over 1963; private nonresidential building is up 10 per cent, with factories leading the way with a hefty 25 per cent increase.

This last figure jibes with the results of a new Securities and Exchange Commission survey of spending plans by business. Total expenditures for new plant and equipment will probably reach $4.5 billion this year. This represents an expected increase of $4 billion (10 per cent) over 1963.

continued on page 18
A screen-wall application of Schokbeton demonstrating its design plasticity and dimensional precision. Each element is three stories high and weighs 8½ tons.

Bellevue Hospital Parking Garage, N.Y. City / Architect: Associated Architects and Engineers / Contractor: Gerace and Castagna / Schokbeton by Eastern Schokcrete Corp.

SCHOKBETON PRODUCTS CORP. 18 EAST 41 STREET, N.Y.C. 17, N.Y.—A SUBSIDIARY OF THE KAWNEER DIV. OF AMERICAN METAL CLIMAX INC.
QUOTE . . . UNQUOTE

"San Francisco gives you, somehow or other, an instant impression of urbanity. The seams of her stockings are always straight, her manners are invariably polished, and there is nothing sour or curmudgeonly in her tone of voice." — Author James Morris.

"In Chicago the vast expanse of Michigan Avenue is now fittingly closed in by two honky-tonk signs: Pepsi-Cola at one end and Coca-Cola at the other—the alpha and omega of the American way of life." — Critic Lewis Mumford.

"The misery of housing may despoil a community as an open sewer may ruin a river." — Supreme Court Justice William O. Douglas.

"The dominant image of our city can best be described as bland, unimaginative, even crass and materialistic. It suffers, as much of the U.S. does, from our pioneer rejection of our European cultural heritage. The result has been a style of community life one poet described as 'midwestern profane.' " — Columnist Hubert Meeker.

"We have built our utopias and found them wanting. In fact, we have found them perfectly awful. Only dated and cranky architects like Niemeyer and Le Corbusier who are being paid by the underprivileged nations to indulge themselves in orgies of planned discomfort and depersonalization refuse to admit that we are going very, very wrong indeed." — Poet Kenneth Rexroth.

"It is no good spending half our time dolling up the beauties of our heritage if the other half is spent constructing dull, drab architecture and manufacturing outdated designs." — Lord Snowdon.

"Too often in low-income federal housing there is a sorely needed human quality missing. This quality of taking individual needs into consideration is notably present in privately developed housing communities." — Builder Samuel J. Lefrak.

AIA HONORS AND AWARDS

After announcing that its 1964 Gold Medal would go to Pier Luigi Nervi (News, Mar. '64), the AIA followed with its other major awards: British Sculptor Henry Moore will get the Fine Arts Medal; Sculptor-Muralist Jan de Swart, the Craftsmanship Medal; Landscape Architect Lawrence Halprin, the Allied Professions Medal; Designer (and sometime Forum Managing Editor) George Nelson, the Industrial Arts Medal; and Photographer Balthazar Korab (some of whose work appeared on page 103), the Architectural Photography Medal.

The 1964 Citation of an Organization goes to the Educational Facilities Laboratories, Inc. of the Ford Foundation.

The Architectural Firm Award for "demonstrating the principles of shared responsibility for producing work of superior quality" goes to The Architects Collaborative of Cambridge, Mass.

The first Collaborative Achievement Award in Architecture was voted to the many people involved in the creation of the Seagram Building in Manhattan, its plaza, and its restaurant, The Four Seasons. Among the collaborators: Architects Mies van der Rohe and Philip Johnson, Structural Engineers Severud-Elstadt-Krueger, General Contractor George A. Fuller Co., and Furniture Designers Knoll Associates, Landscape Designers Karl Linn and Charles Middleelder, and Acoustical Consultants Bolt, Beranek & Newman.

ALINE SAARINEN IN CARACAS

President Johnson, who has come out "unashamedly in favor of women," last month called on Alina B. Saarinen, author, critic, and widow of Architect Eero Saarinen, to be a member of the President's special delegation to the inauguration of Venezuela's new president, Raúl Leoni. Other members of LBJ's delegation included Secretary of the Interior Stuart Udall; Latin American Expert Dr. Hector Garcia; and Connecticut State Treasurer Gerald A. Lamb. Fine Arts Commission member Saarinen also found time to address students at the local university on art and architecture in the U.S.

Caneca receives Hon. Ph.D.

In Albuquerque last month, the University of New Mexico awarded an honorary degree to Mexican Architect and Engineer Felix Candela, citing him for his pioneer work with over 250 concrete thin-shell structures in Mexico and the U.S.

BRIEFLY NOTED

Judging the entries in the 1964 Awards Program of the Prestressed Concrete Institute will be Architects Richard M. Bennett, AIA President J. Roy Carroll, and last year's first prize winner Maurice Rorillard, with Engineers G. Brooks Earnest and S. Kenneth Johnson.

Among the newly elected members of the prestigious National Institute of Arts and Letters are Architects Louis I. Kahn and Richard Neuhaus. Also chosen to the Institute's Department of Art were Sculptors Chaim Gross and Theodore Roszak (who is a member of the Commission of Fine Arts), and Painters Hans Hofmann and Eugene Berman.
The sixties promise to be a prosperous period for architects if the construction boom revealed in figures for last year's 100 largest architectural firms continues. Repeating the 1962 pattern, the 100 top-volume firms were responsible for $4.5 billion worth of buildings put-in-place or 7.2% of the $62.5 billion total U.S. construction for 1963.

The volume of 51 firms came from the design of a single building type. Educational facilities showed the heaviest concentration of building specialization among architects, with 21 firms reporting their highest percentage of work in schools and colleges to satisfy a fast growing need. (Ralph Calder & Associates of Detroit attributed their total volume to this category.) Fifteen firms attributed the greatest percentage of their volume to office and industrial buildings, and another 15 designated their highest volume in residential buildings—apartments, hotels, and motels. William B. Tabler concentrated his entire design effort on hotels and motels, but only one firm—Cohen, Haft & Associates—reported 40% or more for one- and two-family houses.

Ten firms did their heaviest volume designing medical facilities—hospitals, clinics and institutions, and six firms reported most of their work in retail buildings—stores, shopping centers and restaurants.

**Nuclear research increases**

Indicative of an increasing demand, government-commissioned structures (for space exploration, nuclear research and development, and defense) were frequently mentioned in other categories. Mackie & Kanrath reported 35% governmental work, and Giffels & Rosetti ascribed 25% of last year's volume to space and nuclear construction. One firm reported that a small fraction of its miscellaneous design volume consisted of creating family fallout shelters.

Of the firms responsible for the remaining assortment of building types, only Smith, Smith, Haines Lundberg & Waechter reported over 50% for a civic center, telephone buildings and research laboratories. Other firms, among them Victor Gruen Associates, specified that at least 20% of their work dealt with urban renewal and redevelopment projects.

A prison and a penitentiary accounted for 10% or more of the design volume of two firms: Brown & Guenther and Chapman, Evans & Delaney.


Predictably, the big cities with their heavy concentration of capital investment, have the largest number of the big firms: New York City alone has as many big-volume firms (22) as the next three cities combined: Chicago (9), Los Angeles (8), and Philadelphia (5). Twenty-two states, including Hawaii, are represented by at least one firm.

There are 24 newcomers to this year's list (marked by asterisks in the adjoining table) as opposed to 11 last year; of these, nine did their largest volume in educational buildings, five in residential and five in offices. Brown & Guenther was the only new name to enter the top bracket with a volume of $75,000,000 or more.

For the year 1963, the 100 biggest firms contain a total number of 2,299 registered architects, i.e., approximately 9.1% of all registered architects in the U.S. These firms average 22 architects and 20 engineers, ranging from four architects to 163, and from no engineers to 220. Twenty-six firms employ more engineers than architects.

Although foreign building design is not included in the accompanying tabulations, 16 firms reported a total of $118 million; five firms in the top volume range accounted for approximately half that amount.

Hopeful of continued economic growth, more than one-half of the 95 firms that estimated their volume for 1964 expect to do an increased amount of work this year; 26 expect to do less; and eight expect no change. The hoped-for net average increase is 6.3%.

**Survey in fifth year**

This year marks the fifth of Forum's annual reports of the 100 biggest architectural firms. Looking backward, it is interesting to note that in 1958, when the survey was initiated, only 270 architects were sent questionnaires; for this year's directory, more than 700 firms were contacted. The highest volume reported for 1957 was $250 million; last year's highest reported figure was $191.4 million.

Conversely, the smallest volume in 1957 was $15 million while the reported lowest figure for 1963 was $19.5 million. In 1958, firms were listed according to dollar volume. Although this year's candidates were asked to fill out signed questionnaires stating the actual dollar volume for building construction put-in-place, firms have been listed alphabetically within six volume ranges. Thus it is natural for firms with varying volumes to be side by side in the same category. This year, as in the past two years, Erdos & Morgan, a consulting market research firm handled mailing and tabulations.

Forum believes that several firms, notably Eero Saarinen & Associates, Skidmore, Owings & Merrill, Emery Roth & Sons, Kahn & Jacobs, and Eggers & Higgins, could easily have qualified for the listings; they were not included because of insufficient data. A. M. Kinney Associates, owing to the kind and the complexity of the work performed, submitted only partial data. Daniel, Mann, Johnson & Mendenhall, because of the range and diversity of their work—regional planning, feasibility studies, etc.—are ranked according to a Forum estimate.

Next month Forum will publish the 100 Biggest Building Contractors in the U.S. to be followed in the July issue by the 100 Biggest Building Clients.
<table>
<thead>
<tr>
<th>Construction put in place</th>
<th>Professional staff</th>
<th>Type of Construction as a per cent of 1963 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$75,000,000 or more**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welton Becket and Associates (Los Angeles)</td>
<td>98 35 30 9 1 21 8 10 21</td>
<td>+3</td>
</tr>
<tr>
<td>Leo A. Daly Company (Omaha)</td>
<td>85 90 10 22 14 10 12 5 27</td>
<td>+7</td>
</tr>
<tr>
<td>Daniel, Mann, Johnson &amp; Mendehall (Los Angeles)</td>
<td>56 50 na na na na na na na</td>
<td>na</td>
</tr>
<tr>
<td>Daniel, Mann, Johnson &amp; Mendehall (Los Angeles)</td>
<td>56 50 na na na na na na na</td>
<td>na</td>
</tr>
<tr>
<td>A. Epstein and Sons, Inc. (Chicago)</td>
<td>48 73 8 6 88 4 12 2 10</td>
<td>nc</td>
</tr>
<tr>
<td>Ferrerz &amp; Taylor (New York)</td>
<td>21 2 1 23 17 7 5 1 22</td>
<td>-2</td>
</tr>
<tr>
<td>Gerber &amp; Pancani (Newark)</td>
<td>8 8 na 80 10 10</td>
<td>+15</td>
</tr>
<tr>
<td>Giffels &amp; Rossetti, Inc. (Detroit)</td>
<td>22 147 3 56 5 7 29</td>
<td>+12</td>
</tr>
<tr>
<td>Harrison &amp; Abramowitz (New York)</td>
<td>35 2 90 5</td>
<td>-3</td>
</tr>
<tr>
<td>Lockwood Greene Engineers, Inc. (New York)</td>
<td>18 58 2 5 91 2</td>
<td>-13</td>
</tr>
<tr>
<td>Charles Luckman Associates (Los Angeles)</td>
<td>163 16 23 11 10 19</td>
<td>+8</td>
</tr>
<tr>
<td>Albert C. Martin and Associates (Los Angeles)</td>
<td>25 34 18 12 38 10 15</td>
<td>-7</td>
</tr>
<tr>
<td>Samuel Paul &amp; Seymour Jarmul (New York)</td>
<td>6 1 1 1 96 1 2 1 nc</td>
<td>nc</td>
</tr>
<tr>
<td>Sherwood, Mills and Smith (Stamford, Conn.)</td>
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<tr>
<td>Sverdrup &amp; Parcel and Associates, Inc. (St. Louis)</td>
<td>19 220 5 5 78 1 11</td>
<td>-5</td>
</tr>
<tr>
<td>The Office of Max O. Urbahn (New York)</td>
<td>29 7 5 20 35 9 25</td>
<td>-6</td>
</tr>
</tbody>
</table>

| $60,000,000 to $75,000,000 |                    |                                               |
| Colten, Haft and Associates (Silver Spring, Maryland) | 16 — 2 1 56 41 | -32                                           |
| Etterbe and Company (St. Paul) | 112 140 15 18 1 3 62 | -12                                           |
| Victor Gruen Associates (Beverly Hills) | 40 19 10 — 10 60 20 | nc                                            |
| Albert Kahn, Inc. (Detroit) | 22 33 11 5 60 13 | +12                                           |
| Morris Lapidus Associates (New York) | 8 — 8 1 89 1 | -21                                           |
| William Lescaze (New York) | 7 — 65 — 30 5 | -15                                           |
| C. F. Murphy Associates (Chicago) | 36 48 62 6 12 5 | -13                                           |
| Smith, Smith, Haines, Luntzberg & Waechier (New York) | 49 41 26 15 — 2 | +13                                           |
| Adrian Wilson and Associates (Los Angeles) | 27 44 4 25 8 31 10 | +17                                           |

| $40,000,000 to $60,000,000 |                    |                                               |
| Frank Grad & Sons (Newark) | 23 7 42 9 28 4 2 15 | +43                                           |
| John Graham and Company (Seattle) | 45 38 11 4 35 1 43 6 | +19                                           |
| A. M. Kinney Associates (Cincinnati) | 20 90 na na na na na na | nc                                            |
| Vincent G. Kink (Philadelphia) | 46 — 41 23 30 5 1 | -8                                            |
| Mills, Petticord & Mills (Washington) | 14 15 20 10 25 20 1 7 17 | +7                                            |
| Perkins & Will Partnership (Chicago) | 65 18 7 7 20 | -30                                           |
| Robert and Company Associates (Atlanta) | na na 15 40 5 30 | +11                                           |
| Sargent, Webster, Crenshaw & Folley (Syracuse) | 28 10 5 68 8 6 6 | +9                                            |
| Schmidt, Garden & Erikson (Chicago) | 40 31 6 4 10 2 75 | -20                                           |
| Shaw, Metz and Associates (Chicago) | 23 12 11 10 23 56 | -6                                            |
| Sherwood, Mills and Smith (Stamford, Conn.) | 23 1 2 81 2 7 3 5 | -8                                            |
| J. E. Sirrine Company (Greenville, S.C.) | 5 55 1 5 84 — 1 9 7 | +7                                            |
| Thomas E. Stanley (Dallas) | 18 7 74 2 1 19 2 2 21 | -21                                           |
| Edward Durrell Stone (Dallas) | 53 4 20 56 5 1 18 | +31                                           |

| $30,000,000 to $40,000,000 |                    |                                               |
| *Aeron (Covina, Calif.) | 6 124 10 3 87 | -40                                           |
| George L. Dahl (Dallas) | 10 16 43 20 1 7 14 13 2 | +46                                           |
| Dalton-Dalton Associates (Cleveland) | 13 21 10 30 30 — 10 5 | +18                                           |
| George M. Ewing Co. (Philadelphia) | 23 31 12 17 21 11 28 6 5 | -3                                            |
| Flatow, Moore, Bryan & Fairburn (Albuquerque) | 18 6 48 6 8 26 1 8 3 | +33                                           |
| Harbeson, Hough, Livingston & Larson (Philadelphia) | 24 — 75 11 — 7 4 3 | -26                                           |
| Harley, Ellington, Cawin and Storin, Inc. (Detroit) | 24 18 40 30 15 5 10 | -17                                           |
| Kelly & Gruzen (New York) | 23 6 — 20 58 10 1 | +67                                           |
| Charles H. McCauley (Birmingham, Alabama) | 12 6 20 16 8 3 38 5 | +6                                            |
| William B. Tabler (New York) | 9 2 — — 100 | -23                                           |
| *Wenk, Adams & Slavin, Office of Fellheimer & Wagner (N. Y.) | 13 19 12 17 23 2 7 39 | +1                                            |
| *Welhe, Black & Kerr (Washington) | 4 90 — | -4                                            |

*Newcomers to list of 100 since 1963 survey
**Firms are listed alphabetically within range given
†Registered architects and licensed engineers only
‡Apartments, hotels, motels—does not include houses
na—not available
nc—not change
## Construction put in place

### Professional staff

| Firm (home office) | Architects | Engineers | Office | Educational | Industrial | Residential† | Medical | Retail | Other | Forecast 
<table>
<thead>
<tr>
<th></th>
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<td>$25,000,000 to $30,000,000**</td>
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<td>*Architects Collaborative, Inc. (Cambridge)</td>
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<td>67</td>
<td>30</td>
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<td>Caudill, Rowlett &amp; Scott (Houston)</td>
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<td>3</td>
<td>5</td>
<td>40</td>
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<td>30</td>
<td>4</td>
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<td>*Collins-Kronstadt &amp; Associates (Silver Spring, Md.)</td>
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<td>28</td>
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<td>*Robert Lee Hall and Associates (Memphis)</td>
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<td>40</td>
<td>5</td>
<td>5</td>
<td>30</td>
<td>3</td>
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<td></td>
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<tr>
<td>Holabird &amp; Root (Chicago)</td>
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<td>25</td>
<td>40</td>
<td>24</td>
<td>12</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>-35</td>
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<tr>
<td>Frank L. Hope &amp; Associates (San Diego)</td>
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<td>7</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-23</td>
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<tr>
<td>Hudgins, Thompson, Ball &amp; Assoc. (Oklahoma City)</td>
<td>14</td>
<td>31</td>
<td>19</td>
<td>43</td>
<td>11</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td>-20</td>
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<tr>
<td>S. J. Kessler &amp; Sons (New York)</td>
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<td>5</td>
<td></td>
<td>2</td>
<td>8</td>
<td>71</td>
<td>12</td>
<td>7</td>
<td></td>
<td>-35</td>
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<tr>
<td>*Kistner, Wright &amp; Wright (Los Angeles)</td>
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<td>8</td>
<td></td>
<td>88</td>
<td>8</td>
<td></td>
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<td>-nc</td>
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<tr>
<td>Lennox, Matthews, Simmons &amp; Ford, Inc. (Indianapolis)</td>
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<td>7</td>
<td>15</td>
<td>43</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
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<td>+35</td>
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<tr>
<td>Loeb, Schlossman &amp; Bennett (Chicago)</td>
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<td>30</td>
<td>8</td>
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<td></td>
<td></td>
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<td>12</td>
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<td></td>
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<td>10</td>
<td>7</td>
<td>4</td>
<td>33</td>
<td></td>
<td>-36</td>
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<tr>
<td>Outcault, Guenther, Rode and Bonebrake (Cleveland)</td>
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<td>1</td>
<td>58</td>
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<td></td>
<td></td>
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<td>+10</td>
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<tr>
<td>J. N. Pease Associates (Charlotte)</td>
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<td>19</td>
<td>25</td>
<td>9</td>
<td>46</td>
<td>5</td>
<td>12</td>
<td></td>
<td></td>
<td>+3</td>
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<tr>
<td>*I. M. Pei &amp; Associates (New York)</td>
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<td>15</td>
<td></td>
<td>25</td>
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<td></td>
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<td>+60</td>
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<tr>
<td>*Shreve &amp; Company (Salina, Kansas)</td>
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<td>1</td>
<td>2</td>
<td>69</td>
<td>1</td>
<td>2</td>
<td>19</td>
<td></td>
<td></td>
<td>-nc</td>
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<tr>
<td>*Shreve, Lamb and Harmon Associates (New York)</td>
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<td>86</td>
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<td></td>
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<tr>
<td>*Sorey, Hill &amp; Sorey (Oklahoma City)</td>
<td>9</td>
<td>11</td>
<td>35</td>
<td>24</td>
<td>14</td>
<td>1</td>
<td>9</td>
<td>12</td>
<td></td>
<td>-30</td>
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<tr>
<td>Frederic P. Wiedersum Associates (Valley Stream, N.Y.)</td>
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<td>4</td>
<td>95</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+16</td>
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</table>

### $19,500,000 to $25,000,000

| Abbott, Merk & Company (New York) | 7          | 20        |        | 10          |            |              |        |        |       | +13       |
| Ballinger Company (Philadelphia) | 12         | 17        |        | 15          | 10         | 30           |        |        | 25    | 10        |
| John S. Bolles (San Francisco) | 7           | 3         |        | 18          |            | 21           | 10     | 10     |       | +13       |
| Chelmin, Gauger & Nolan (Washington) | 13         | 3         | 60     | 5           | 5          | 5            |        |        |       | +24       |
| *Daverman Associates (Grand Rapids) | 21         | 15        | 3      | 5           | 5          | 5            | 1      | 8      |       | -5        |
| deYoung & Moscowitz (New York) | 8           | 8         |        | 1           | 8          | 70           | 4      |        |       | -46       |
| Fletcher-Thompson, Inc. (Bridgeport) | 16         | 15        | 5      | 41          | 34         |              |        |        |       | +15       |
| Hellmuth, Obata & Kassabaum, Inc. (St. Louis) | 28         | 6         | 24     | 21          |            | 37           | 3      | 5      | 10    | +15       |
| *Hertzka & Knowles (San Francisco) | 14         |           | 88     | 1           |            |              |        |        |       | -16       |
| *Hirschfeld, Pawlan & Reinheimer (Chicago) | 7          | 8         |        | 3           | 95         |              |        |        |       | -2        |
| Hunter, Campbell & Rea (Altoona, Pa.) | 11         | 6         |        | 75          | 5           |              |        |        |       | -24       |
| James Associates, Inc. (Indianapolis) | 13         | 6         |        | 84          |            |              |        |        |       | +24       |
| Kiff, Voss & Franklin, The Office of York & Sawyer (N.Y.) | 29         | 2         | 4      | 2           |            | 3            | 85     | 5      |       | +6        |
| *Louis C. Kingscott & Associates, Inc. (Kalamazoo) | 16         | 5         | 2      | 70          | 5           |              |        |        |       | -8        |
| Lankton-Ziegler-Terry & Associates (Peoria, Ill.) | 10         | 5         | 10     | 39          | 14         | 8            | 15     | 2      |       | -7        |
| *Lemmon, Freeth, Haines & Jones, Ltd. (Honolulu) | 7          |           |        | 14          | 4           | 6            | 59     | 15     |       | +18       |
| Loewenberg & Loewenberg (Chicago) | 8           | 1         |        |            |            | 85           | 15     |        |       | -       |
| Lyles, Bissett, Carlisle & Wolff (Columbia, S.C.) | 17         | 15        | 11     | 16          | 16         | 18           | 7      | 21     |       | +5        |
| *Reynolds, Smith and Hills (Jacksonville, Fla.) | 21         | 56        | 26     | 28          | 21         | 4            | 11     | 9      |       | +28       |
| *Rogers & Butler (New York) | 21         |           | 26     | 9           |            |              |        |        |       | -16       |
| *Howell Lewis Shay & Associates (Philadelphia) | 16         | 6         |        | 3           | 79          | 14           | 3      |        |       | -24       |
| *Six Associates, Inc. (Asheville, N.C.) | 11         | 7         |        | 7           | 28          | 25           | 4      | 20     | 5      | +11       |
| Stiles & Robert Clements (Los Angeles) | 15         | 3         |        | 10          |            | 30           |        |        | 5      | 40        |
| Thalheimer & Weitz (Philadelphia) | 16         | 8         | 10     | 20          | 20         | 10           | 15     | 25     |       | +59       |
| *John Carl Warnecke & Associates (San Francisco) | 26         |           | 2      | 44          | 38          | 11           | 2      |        |       | -4        |
| Paul R. Williams and Associates (Los Angeles) | 4           | 3         | 15     | 10          |            | 15           | 35     | 5      |       | -28       |

---

*Newcomers to list of 300 since 1962 survey

**Firms are listed alphabetically within ranges given

†Registered architects and licensed engineers only

About, hotels, motels—does not include houses

na—not available

nc=no change
One case of Turn-Towls will provide as much washroom towel service as 3½ cases of ordinary folded towels, and a better-quality service.

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DETROIT'S ROAD OF GOOD INTENTIONS

The pictures at right represent more than just a catalogue of current architectural clichés. They show the end result of what started as a brave attempt to set a new pattern for roadside development in suburban Detroit.

Nearly ten years ago, when Detroit's largest retailer, J. L. Hudson Co., built Northland shopping center, it had two things in mind. One was to bring new convenience, and new amenities, to the suburban marketplace. Designed by Victor Gruen, Northland (background, photo above) more than met that goal; it became the model for many shopping centers built in the ensuing decade.

Hudson's second objective was even more ambitious. The firm realized the value of having other commercial activities around its center—offices, banks, and research buildings—so it bought the adjacent 200 acres along busy Eight-Mile Road for later sale to other developers. And at Architect Gruen's urging, it determined to sell the land only to developers who would adhere to a master plan and use recognized architects.

One of the first of the new commercial buildings, the Reynolds Metals office building by Minoru Yamasaki (foreground, photo above), seemed to augur well for the area's future. As Northland's success spurred interest in the land, however, the pressures for its faster development became steadily more intense.

In the last three years, there has been a spurt of construction along Eight-Mile Road, producing the miscellany of buildings shown opposite. Most are the work of architects, but this fact is all that remains of Hudson's original intentions—no master plan has ever been enforced. The results seem to fall far short of the expectations of a decade ago.

Gruen, however, has become philosophical about such disappointments. "It shouldn't be held against a pioneer that only half the right things get done," he says today. "The great lesson of Northland is that the developer's modest hopes of the project's success, which tempted him to control adjacent development, have been more than realized. Perhaps, now, with the lesson behind us, we can carry the plan somewhat further in the future."

The Eight-Mile Road area, meanwhile, becomes more and more of a hodgepodge. It is no worse than most of new roadside America, but, despite the promise of its beginnings, neither is it much better.
interior
elegance
HINGES ON
... Soss

Soss hinges are called "invisible" because when doors are closed, the hinges tuck themselves neatly out of sight. Where doors meet walls, space gaps and doorjambs are eliminated. Flowing, unbroken lines are created that please the eye and add custom richness to the room. Leading archtects have been recommending Soss Invisible hinges for over fifty years because the touch of elegance they add makes buildings and homes so much more "livable".

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INVISIBLE
HINGES

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DETROIT 12, MICHIGAN

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5621 W. Dickens  Chicago 39, Illinois
Telephone: ... Area Code 312 889-8000

SEE US IN BOOTH 2128 AT THE NRA SHOW, MCCORMICK PLACE, CHICAGO, MAY 25-28
WHY S&G EXIT DEVICES LAST LONGER...

Less moving parts means less wear. S&G builds those two parts strong, hard...to endure and endure. Result? Our 5300, 5410 and 5560 Series (Rim, Vertical and Mortise devices) make building owners and operators completely satisfied...longer!

Other significant features of S&G Exit Devices include: UNI-TRIM® which offers precise location of trim because screws bolt through device case directly into trim lugs; identical outside appearance regardless of whether it's a Rim, Vertical or Mortise device.

Take advantage of the extra durability offered by S&G. Specify S&G Exit Devices with only two moving parts. Both the devices and your clients' satisfaction will last, and last...and last!

WRITE for complete information to Sargent & Greenleaf, Inc.,
100 Bremen Street, Rochester 21, New York

SARGENT & GREENLEAF, INC.
ROCHESTER 21, NEW YORK
Abuse centers on the hinges of all toilet compartment doors. And Mills laboratory tests prove conclusively that after more than 250,000 slam cycles — or "kicks" — Mills toilet compartment doors still swing smoothly, because they're supported by Mills super-strong, wear-resistant, corrosion-proof fittings —

Mills Top Hinges — sturdy stainless steel pintle — rigidly supported at 3 points, locked to a channel reinforcement, welded to inside of door. Suspension arm of hinge bracket rides on this shaft, protected by pressure-fitted, life-time Molybdenum Nylon bushing.

All exposed parts of Mills hinges are non-ferrous, polished, and chrome-plated. All working parts are stainless steel; or corrosion-proof Molybdenum Nylon — heat-resistant and almost friction-free — eliminating the troublesome periodic adjustment required by miniature metal cams, rollers and bearings, and springs.

Mills Company toilet compartments are available in 20 decorator colors; in porcelain and baked-on enamel finishes, and plastic laminate.

MILLS COMPANY
952 WAYSIDE ROAD • CLEVELAND 10, OHIO
Automatic entrances: functional, yet so tasteful they're a gracious invitation to shop.

Never underestimate the customer-pulling power of automatic doors and the convenience they provide. They make entrance and exit easy and safe for shoppers with babies and bundles, older people... everyone. They invite customers and sales, providing an excellent return for your client's investment.

In this drug store application, a Stanley Magic-Door electric operator is concealed above the doors — inside the decorative and functional canopy. Automatic doors can easily be integrated with dramatic entrance designs, when you call in your Stanley Magic-Door Distributor early in the planning stage. He's trained to help you select just the right type and model from the complete Stanley line of hydraulic, electric, and pneumatic operators. He can match your job requirements and your design standards.

Why not recommend Stanley: the automatic door operating equipment that has proved most dependable over the years... so service-free that only Stanley can offer the new "Magic-Door Maintenance" program. (It tells your client in advance exactly how low his annual cost-of-owning will be.)

Write for the name of your nearest Magic-Door Distributor, and your FREE copy of the new Stanley Magic-Door Design Portfolio and Specification Guide.
Tulsa Civic Center (Tulsa, Oklahoma)
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(St. Paul, Minn.)
Arch: Walter Butler Co.
Appl: Northern Placing Co.

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and Court Complex
(Salt Lake City, Utah)
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Now the application of every Zonolite* Lightweight Concrete Insulating Deck is certified

That makes 141 reasons why no other roof deck fits your needs so economically, efficiently and safely

You are a lucky exception if you have not had substandard materials and substandard application of materials on your jobs.

One way to avoid this is to specify Certified application of Zonolite Vermiculite Insulating Concrete for your roof decks.

The approved Zonolite applicator maintains a continuous log of the job; day by day mix proportions, water content, densities and weather conditions. Deck specimens are taken periodically and tested for proper dry density and compressive strength at our labs in Evanston, Illinois. On completion a certificate is issued which states that the concrete was mixed and applied in accordance with the standard specifications of the Vermiculite Institute.

This assures the quality of your deck. But there are 140 more advantages to be considered.

2. LIGHTWEIGHT... as little as 1/6th the weight of ordinary concrete, so supporting structures can be considerably lighter in weight and cost.

3. ANY DESIRED INSULATION VALUE can be obtained by simply varying the thickness of Zonolite Vermiculite Concrete.

4. PERMANENT... composed of completely inorganic materials; won't rot or decompose; lasts the life of the building.

5. MONOLITHIC... continuous surface; no seams to allow tar drip in the event of fire.

6. INCOMBUSTIBLE... Vermiculite Concrete is all mineral, cannot possibly burn.

7. FLEXIBLE... can be used with form boards, paper-backed wire lath, galvanized metal decks or structural concrete.

Adapts easily to conform to any drainage or slope problem.

8. SLOPES FOR DRAINAGE, as prescribed by the built-up roofing industry, are easily and economically provided with Zonolite concrete.

9. ECONOMICAL... original cost is low, maintenance costs are nil. Insulation efficiency may even allow use of smaller heating and cooling units.

10-141. There are 132 skilled applicators who are approved to place these systems in strict accordance with the standard specifications of the Vermiculite Institute.

Other roof deck systems may offer three, four or five of the above advantages, but Zonolite Vermiculite Concrete is the only one that offers all 141. For complete specifications and data file, have your secretary drop us a note.

* A registered trademark of Zonolite Division of W. R. Grace & Co.

ZONOLITE ZONOLITE DIVISION W. R. GRACE & CO. 119 S. L A S A L L E S T R E E T, C H I C A G O, I L L.
The best way to find out is to talk with the Public Telephone Consultant at your local Bell Telephone Company Business Office while you're still in the planning stage.

He'll help you provide for a finished public telephone installation that will be an attractive design asset.

In addition to design, careful early planning is also the practical thing to do, for it eliminates the possibility of expensive, troublesome afterthoughts.

Preplanned, design-coordinated installations are more than decorations. They're a welcome public service and produce income for the building's owner.

Bell Telephone System
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JOINTS

When they move as they will, polysulfide base sealant moves with them

First LeCorbusier building in USA sealed with compound based on Thiokol's LP® polysulfide polymer

Like so many buildings in the modern architectural vein, this outstanding structure—a monument to LeCorbusier's genius with concrete—is weatherproofed with compound based on Thiokol's LP® polysulfide polymer.

Here is quality sealant which measures up to quality design. It joins any and all building materials in any combination with an adhesive bond that's virtually indestructible. Fully cured, it becomes a working building component...adding a structural strength of its own while keeping out wind, water, weather.

To compensate for ordinary joint movement, or even extraordinary movement, sealant with LP® polymer will expand more than twice its original width and shape—and recover—over and over again without tearing, cracking, peeling or diminishing in leakproof serviceability.

Structural sealants based on THIOKOL polysulfide polymer have met the tests of time and wear, have proved their ability to keep structural joints maintenance-free 10 years and more. Shouldn't your buildings, new or old, function this well?


Thiokol
CHEMICAL CORPORATION
780 North Clinton Avenue,
Trenton, New Jersey 08607
In Canada: Naugatuck Chemicals Division,
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Here's the newest, most improved fire extinguisher ever designed. Allen's new ABC model fights any class fire—ordinary combustible materials (Class A); flammable liquids (Class B); or electrical wiring and equipment (Class C). Most important, Allen's ABC weighs only 19½ lbs. filled; is smaller than a 2½ gallon water extinguisher. And it's easy and quick to operate. A slight squeeze on the lever-handle instantly discharges fire-smothering dry chemical. Ask your Allen representative for complete specifications today, or write:

W. D. ALLEN MFG. CO. • 650 SOUTH 25th AVE. • BELLWOOD, ILLINOIS
NEW LOOK
in CAMPUS LIVING!

The Residence Towers consist of three 88-foot diameter circular structures. Rising 15, 18 and 21 stories, including their common three-story pedestal, this complex is an outstanding achievement in modern campus living.

The three New Residence Towers for Men at the University of Pittsburgh accommodate 1,868 students, and afford each an outside room. In its unique design the core of each tower houses all utilities, ducts, elevators and toilet facilities.

The Flush Valves in the Residence Towers, of course, are SLOAN—unequalled in over half a century for dependable service, long life, water economy and lowest maintenance cost. They are the Flush Valve of quality.

Your building, too, can have this same Sloan quality. Merely specify Sloan Flush Valves with confidence—most people do.

SLOAN VALVE COMPANY • 4300 WEST LAKE STREET • CHICAGO, ILLINOIS 60624
Construction innovation: Simmons built-in wardrobes form walls in Viennese Hall. Staggered back to back, the wardrobes divide the dormitory into 50 sections. Sturdy Simmons wardrobes hold their shapes through years of hard use.
UNUSUAL DE SALES SEMINARY RESIDENCES
FEATURE IDEAS AND FURNISHINGS BY SIMMONS

This De Sales Preparatory Seminary comprises an extraordinary, multimillion dollar complex of eleven interconnected buildings. Each serves an educational, recreational or living requirement of its 650 students.

For all residential sections, school officials chose Simmons furniture—the all-purpose line designed to last through generations of students. The architect and designer incorporated ideas made possible by Simmons Dorm Line units.

Simmons Dorm Line, Office Span® and upholstered furniture bring De Sales these benefits: Simmons units are adaptable—meet any space requirement. Simmons furniture will last—it's built and finished to stand up under active school living. Simmons furniture is good looking—combines clean lines and a variety of fabrics and colors to give warmth and individuality to every room.

Find out why more and more schools are choosing Simmons from doorway to dormitory. Write for free Simmons catalogs today.

De Sales Preparatory Seminary, Milwaukee, Wisconsin
Architects: Brust and Brust, Milwaukee, Wisconsin
Interiors: Corco, Inc. Chicago, Illinois

In Vianney Hall dormitory, Simmons built-in wardrobes form walls between bays. These units won't sag or buckle and their Fiberesin surfaces resist nicks and scrapes. Simmons panel design beds finished with high-bake satin enamels, with comfortable Simmons mattresses.

Simmons Dorm Line units furnish the two-man college residence rooms in Aquinas Hall. These movable units permit modified room arrangements for individual needs. All offer sturdy welded steel construction. Fiberesin desk and dresser tops are practically damageproof.

Simmons upholstered furniture creates this warm, inviting look in a Proctor's Room at Aquinas Hall. Famous Comfortorc® construction assures years of seating ease and constant use. The desk, with rich-grain laminate top, is from Simmons Office Span group.

Father Leonard T. Busch, Vice-Rector of De Sales, enjoys the comforts of his attractively furnished room. Commenting on Simmons furniture, he points out, "Simmons gives us an important balance of values. It's durable. It's functional. And, very important, it's in good taste."
Is masonry an art or a science?

There may be pure art in the architect's plan, and in the mason's craftsmanship... but science in the building materials gives their work permanence. Lone Star Masonry Cement, used in the structures pictured, is a uniform, dependable product formulated for permanence and economy. Permanence is provided by its high water repellency, low shrinkage, and exceptional bond. The economy comes from a plastic, buttery mortar that clings tight, speeding the work and cutting down wasteful droppage and costly clean-up.

These benefits of science are yours—when you specify Lone Star Masonry Cement.

Lone Star Masonry Cement Corporation
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Best of all, when you buy Smith Walls you deal with the single Smith responsibility for engineering, manufacture, transportation and erection. This single responsibility saves you money, details and worry.

"Smitty builds walls for keeps"

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Which job can you do in the Peace Corps?

Many countries in Asia, South America and Africa need craftsmen with skilled hands and minds to speed their progress. These countries are asking for qualified Peace Corps Volunteers who can help teach the skills basic to their future.

You may qualify for the Peace Corps if you are skilled as a mason, concrete finisher, electrician, heavy equipment operator, roofer, sheet-metal worker or construction foreman . . . or if you are skilled in diesel repair, carpentry, mechanics, plumbing or any one of a dozen other trades and crafts.

Any qualified citizen over 18 is eligible. There is no upper age limit. Married couples may serve together if both are qualified and have no dependents. Peace Corps assignments are for two years, including training in the language and customs of the country to which you are assigned.

You can make an important contribution to your country and to the world . . . and gain enriching experience as well . . . through Peace Corps service. For complete information, write today to the Peace Corps, Washington 25, D.C.
Now there are two manufacturers of cast acrylic sheet who will be producing from raw material to finished product.

One of them is American Cyanamid Company, now marketing acrylic sheet under the trademark ACRYLITE.

This means better service for present users; an expanded market for acrylic sheet; new sales and profits for fabricators and converters.

Since acquiring the ACRYLITE trademark, Cyanamid has devoted three years — and about $15 million to extensive product research and development,
Today Cyanamid's advanced laboratory and production facilities, its complete design service, its stringent quality control requirements are all playing important roles in the marketing of ACRYLITE. Already, new colors have been developed — new textures, new designs, new possibilities for wider use of the material. In fact, Cyanamid has expanded its ACRYLITE line from 3 thicknesses, 8 sizes and a single color to 15 thicknesses, 24 sizes and 50 colors . . . in less than a year!

ACRYLITE is sold at competitive prices. You can expect fast delivery. ACRYLITE offers complete services to users — design, color consultation, fabrication ideas, marketing and merchandising assistance.

Major uses of ACRYLITE include: • indoor and outdoor illuminated signs • spandrel panels • industrial glazing • space dividers and partitions • safety shields • lighting diffusers and fixtures • skylights • boat and aircraft glazing • exhibits and displays • laboratory containers.

For complete information concerning ACRYLITE, write to American Cyanamid Company, Dept. 12, 5 Bay State Road, Cambridge 38, Massachusetts.
The new architectural look in Electric Stairways by Westinghouse.

A new silhouette—trim, light, inviting—to enhance and brighten the mood of any building. Sleek glass panels. Handrails in decorator colors. And behind the scenes, precision Westinghouse engineering at work to guarantee smooth riding and reliability. For more information, write Westinghouse Elevator Division, 150 Pacific Avenue, Jersey City 4, New Jersey.
You can be sure if it's Westinghouse
One of a series of advertisements depicting Lummus' diversified capabilities.

LUMMUS BUILDS AT NEW YORK INTERNATIONAL AIRPORT

The tremendous increase in aircraft fuel consumption at New York International Airport necessitated the development of a distribution system more rapid, efficient and economical than the conventional tank truck delivery to aircraft now in use. The Port of New York Authority, developer and operator of the airport, designed a fuel tankage and underground distribution system which will deliver fuel via pipeline directly to aircraft loading positions at the various passenger terminals.

Having been awarded contracts totaling in excess of $12,000,000, The Lummus Company will construct this system to be completed by mid-1965. Work will include a 50-mile underground network of transfer pipes, suction lines and ramp hydrants for fuel distribution at the passenger terminals, erection of 40 storage tanks, construction of two pumping stations, demolition of two existing piers and construction of two new ones, and provision of a data control system for automatic control of fuel flow.

Among Lummus' current diversified construction activities are the spectacular "Fountain of the Planets" for the New York World's Fair, thermal electric power plants in Bogota, Colombia, and Dhuvaran, India, a steam generation unit in Bombay, India and an air-separation plant in Canada.

For domestic or overseas construction or construction management—consult Lummus.

THE LUMMUS COMPANY

385 Madison Avenue, New York 17, N.Y.


ARCHITECT / ENGINEERS AND CONSTRUCTORS FOR INDUSTRY AND GOVERNMENT

AEROSPACE  NUCLEAR  CHEMICAL  PETROLEUM/  PETROCHEMICAL  AGRICULTURAL  CHEMICAL  PULP & PAPER  METALLURGICAL  GENERAL  CONSTRUCTION  PHARMACEUTICAL  FOOD  PROCESSING  RESINS & PLASTICS
Macy's Park-and-Shop. The grille enveloping Macy's newest branch, in Elmhurst, N. Y., actually masks the garage that winds around the store. This unusual design by Macy's architects, Skidmore, Owings & Merrill, solves the parking problem common to suburban stores. As a byproduct, it also eliminates the sea of cars that has become the branch store's hallmark.

Macy's Queens wraps each selling floor in two rings of parking, stacking 1,500 cars on six levels behind a grille left open to dissipate gas fumes. Theoretically, no car will be more than 75 feet from the department to be visited.

While easy parking was the prime consideration, the peculiar shape of the site (2), made even odder by subtracting a rectangle Macy's doesn't own, imposed limits of its own. SOM and Macy's settled on a circle 426 feet in diameter as the best shape and size for the park-and-shop concept. The automobile ramps in and out (3) are helixes at the eastern edge of the site. During peak traffic periods, such as the end of the day, both helixes can channel traffic one way to speed departing cars. The cores of the helixes will contain mechanical services, leaving the big roof free for more parking.

Shoppers approaching on foot will cross a landscaped plaza to enter the store's five entrances, dispersed beneath a covered arcade. Within a radius of three miles, Macy's figures that there are 600,000 potential patrons, some of whom, such as the tenants in Lefrak City, live almost on the doorstep.

Initially, Macy's Queens will have three selling floors and a basement totaling 326,500 square feet. Later plans are to construct an additional floor and two more rings of parking. Selling floors will not be completely round; slices at opposite sides will be needed for stock rooms.

Exterior material of the big drum is to be reinforced concrete with a quartz aggregate, lightly sandblasted for texture. Construction starts this spring, with the opening scheduled for the fall of 1965. continued on page 40
NEW ORLEANS, LA.

NEW YORK, N. Y.

HOW TO BE **RIGHT ON**

Steel: Symbol of strength, long life, and economy.

ATLANTA, GA.
**THE JOB...**

**NEW ORLEANS, LOUISIANA**
In-place cost of structural framing for Studio Arms IV, a luxury apartment in a New Orleans suburb, was 30% less than with conventional methods. The novel design called for Double Warren trusses fabricated with standard channels as top and bottom chords, and standard angles as diagonals. Junior Beam joists, spanning 24 feet, rest in the vertices of triangles formed by truss diagonals. Results: Lightness and ease of construction, less steel weight per square foot, saving of one foot of height per floor. Builder, Dominion Construction Corp., New Orleans; Design and Fabrication by Milan Engineering Co., New Orleans.

**NEW YORK, NEW YORK**
The architects wanted an unbroken stairway of 200 flights for the Time & Life Building in New York... the answer was lightweight Junior Channels for straight stringer sections, joined at the landings by 3/16-inch sheet that had been bent into a spiral on a brake press. To make the spirals look like part of the straight stringer sections, “dummy” flanges were cut from 12-inch Junior Channels that had been heated and shaped to match the spiral, and were welded in place. “This job could not have worked out so easily without the flexibility we derived from 12-inch Channels,” says Mr. Robert Sexauer, Treasurer, Sexauer & Lemke, Inc., architectural metals firm that fabricated the stairs.

**BALTIMORE, MARYLAND**
In the 9-story 11 Slade Apartments, a Mullan Contracting Company project in Baltimore, secondary floor members (12" Junior Beams and 14" Light Beams) were embedded in reinforced concrete girders. These were formed with removable Junior Channels spanning between columns and supporting secondary beams. Cast iron “K-Clips” were then hooked over the top flanges of the Junior Beams, and plywood forms placed on the protruding ends of the clips. After curing of the concrete girders and the floor, K-Clip ends were knocked off, allowing the plywood forms to drop. Construction efficiency and reuse of forms saved considerable money and time—four days to complete a floor instead of the usual six. Architect, Joseph Foutz; Structural Engineer, Edward S. Klausner; Associate Engineer, Wallace & Gutberlet.

**SOUTH BEND, INDIANA**
Two men can easily install lightweight 6-inch Junior Beams, delivered cut to length, in brackets suspended on prestressed concrete foundation walls. Crawl space is designed as a plenum chamber with a plastic sheet, laid on the ground as a vapor barrier. Ductless heating is provided through registers in the sub-floor and finish flooring. Besides reducing detail work on the site, this method devised by Place & Company of South Bend saves an estimated 15 cents per square foot in construction of their 3-bedroom ranch homes.

**ATLANTA, GEORGIA**
“The 14-inch Light Beams proved to be most economical for the spans and loads involved,” say the designers of Atlanta’s modern air terminal. Light Beams are used extensively in the six protruding 2-story concourse sections that efficiently cope with heavy traffic peaks. Formed metal decking, serving as support for insulation and built-up roofing material, is welded to Light Beam purlins which also help support a maze of concealed piping. Further economy was gained by using Junior Channels as stair stringers. Designers were Robert and Company Associates, an Atlanta architectural and engineering firm. Easily adapted to a wide variety of architectural designs, Lightweight Structural Steel helps to reduce steel tonnage. They’re easy to fabricate, raise and position, and this reduces labor costs. For more facts about lightweight structural steel, call or write direct.

**FUNCTIONS TO SPECIFY J&L LIGHTWEIGHT STEEL STRUCTURALS**

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*Rice & Laughlin Steel Corporation*

3 Gateway Center, Pittsburgh 30, Pa.
4. & 5. CALIFORNIA S&L. These two models show the beginning (4) of the Premier Savings & Loan Association in Orange, Calif., and its ultimate development (5) when it grows two more stories. Architects Ladd & Kelsey of Pasadena designed it so that the mechanical penthouse can be sliced off during construction of the next two stories and simply transplanted to the top. Columns and floors will be poured in place, the big window frames precast.

6. SANTA MONICA RENEWAL. Construction begins this month on the first segment of Santa Monica Shores, two 17-story apartment towers (FORUM, Aug. '63). This urban renewal project of 26 acres was awarded to the Kern County Land Co. and the Del E. Webb Corp. in 1961, and Welton Becket & Associates designed the complete project. The second phase, to begin shortly, is the variegated cluster of five-story condominiums shown above. They will offer several apartment layouts (see section), most of them split levels with bedrooms a half flight up or down from living rooms. Skip-stop elevators will serve each apartment from corridors on the third and fifth levels. The 11 buildings in this second section will be grouped around pleasant courtyards, and first-floor apartments will also have patio gardens. Condominiums in this group will sell in the $20,000 to $25,000 range for one- and two-bedroom apartments. The structure is to be of reinforced concrete, the side walls finished in stucco. Parking for 457 cars will be underground, the garage tops used for recreation.

7. FAIR FLOWERS. An arresting sight at the New York World's Fair will be these sculptured balloons, rather like puffy cauliflowers, marking ten of the Brass Rail refreshment stands. Victor Lundy is the architect in charge, and Birdair Structures, Inc. engineered and built the balloons of woven glass fiber with a vinyl coating. They are supported by internal air pressure. The underneath canopy will be repeated on 15 more Brass Rails, designed by Vollmer Associates, but they will be balloonless.
8. CALIFORNIA BANK. One of the first buildings to rise after the San Francisco fire in 1906, the Bank of California, N.A. (lower right in photo) still stands as a good example of the financial temples of that era. The bank recently announced plans to build a 20-story, $12.5 million tower, but will keep the original; the two will be connected through the lobby and a roof terrace atop the old building, at the foot of a 30-foot cantilever extending the floors of the tower. Anshen & Allen are the architects of the new tower, which will repeat the gray granite facing of the old bank.

9. BOSTON OFFICES. The first private building to go ahead in Boston's mammoth Government Center will be One Center Plaza, designed by Welton Becket & Associates. The outer curve of the 875-foot arc will face the new City Hall; the inner curve, on higher ground, will face Pemberton Square. Two wide flights of stairs will intersect the arc, providing public passage through to Government Plaza. Construction of the first third (right) begins immediately. Materials are to be cast stone for the projecting window frames and brick for the infill panels. Developer and builder: Beacon Construction Co.

10. & 11. LONG ISLAND CAMPUS. Forerunners of a campus expansion at Hofstra College, Hempstead, N.Y. are a tall library (10) and a bridge spanning the Hempstead Turnpike (close-up, 11). Architects Warner, Burns, Toan & Lunde made the library tower the transitional element between the comfortable neo-Georgian campus and the much bigger and more cosmopolitan college Hofstra is becoming. It is to be supported by tapered concrete pylons that will contain elevators and all other services. Card catalogs, general reading rooms, and periodicals will spread out on the lower floors. Massive pylons will carry the handsome bridge, with the open walkway suspended beneath the structure.
Now, office file cabinets designed to the architectural trend for flush, crisp styling.

No protruding handles on the drawer fronts. Name card holders, concealed drawer release and drawer pulls are slightly recessed.

Fine quality construction is complemented with full filing capacity—full drawer progression to more than one inch beyond cabinet front; in one smooth rolling motion.

Literature, photographs and architectural/designer price lists are available of the "4000" Trend Line.

Write, Peerless Steel Equipment Company, Unruh & Hasbrook Ave., Philadelphia, Pa. 19111

Office file cabinets
without protruding handles

PEERLESS
stylized office furniture

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Los Angeles
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Philadelphia

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Member Contract Manufacturers' Center, Mart 11
Peerless Show Rooms—Suite 11-119 and 11-120
In anticipation and appreciation

Earlier this year, Pittsburgh Plate Glass Company, in cooperation with the National Institute for Architectural Education, announced a series of four undergraduate competitions for architectural students. The major competition is an assignment to design an underwater restaurant in a lagoon location. Three additional competitions, in the form of brochure presentations, cover the subject of glass in the areas of Materials and Methods, Structural Design, and the Historical Use of Architectural Glass. The response to these competitions has been so highly gratifying to date that this word of appreciation is in order. We especially wish to thank the NIAE for their efforts in arranging these competitions, and the imagination they have shown in determining the competition subject material.

We appreciate deeply and sincerely the cooperation of the various architectural faculties in merging the competitions into their own current teaching programs. And, lastly, we congratulate those students in architectural schools across the United States who have elected to enter these competitions, which will be judged by the NIAE in June.

Architecture is a demanding as well as a rewarding profession. The range of both its capabilities and responsibilities has never been higher than today. It is our hope that these student competitions will add substantially to the abilities the young graduate architect brings to his first professional assignments.

Elmer A. Lundberg, AIA, Director, Architectural Liaison

Students who have not yet enrolled in these competitions, and who still wish to do so, contact their instructor, or write to the National Institute for Architectural Education, 115 E. 40th St., N. Y., N. Y.

Pittsburgh Plate Glass Company
Glass Conditioning
(a systematic plan for controlling indoor environment with PPG glass products)

Hypothetical Assignment: A projected office building in Chicago, facing Lake Michigan per client's request. Building dimensions: 300 feet high by 100 feet by 50 feet.

Site Conditions: Latitude subject to extremely low temperatures, severe winters with high winds, hot summers. Heating season: approximately 6300 degree days. Air conditioning season: 120 days of which 90 would have an average of 80F for a 12-hour air conditioning period. Indoor temperature to be maintained at 70F.
Eastern Exposure Site Conditions: Direct morning sunlight, intensified by reflection from lake. Low winter temperatures combined with lack of sun, aggravating afternoon heat loss.

Glass Conditioning Recommendation: SOLARGRAY® TWINDOW®—TWINDOW Insulating Glass to reduce heat loss to a "U" factor of 0.6, significantly reduce downdrafts and cold areas near windows.

Northern Exposure Site Conditions: Little sun exposure.

Glass Conditioning Recommendation: TWINDOW—to reduce heat loss and heat gain through conduction. Result: More even indoor temperatures, increased occupant satisfaction, and lower comfort maintenance costs.

Southern Exposure Site Conditions: Extensive sunlight, summer and winter, introducing solar heat gain as a factor which will be welcome in winter, but will significantly increase air conditioning requirements in summer.

Glass Conditioning Recommendation: SOLARGRAY Plate Glass—to reduce heat gain substantially during summer, and soften brightness in all seasons, while providing better control of indoor temperature and environment.

Human Factors: Personal comfort is, after all, the main goal of environmental control. To this end, Glass Conditioning produces pleasant working conditions by improving visual comfort and lessening seasonal extremes of solar heat and severe cold. Glass Conditioning, then, by providing both operating economies and a more attractive working atmosphere, will stimulate rentals and reduce turnover.

For more complete information on

**LIGHT TRANSMITTANCE AND THERMAL CONDUCTIVITY DATA**

<table>
<thead>
<tr>
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<th>Visible Transmittance %</th>
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<td>1/8</td>
<td>0.51</td>
<td>1</td>
</tr>
<tr>
<td>(SHEET GLASS)</td>
<td></td>
<td></td>
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<tr>
<td>Clear</td>
<td>1/8</td>
<td>0.89</td>
<td>1</td>
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<tr>
<td>Graylite “31”</td>
<td>1/8</td>
<td>0.31</td>
<td>1</td>
</tr>
<tr>
<td>Graylite “61”</td>
<td>1/8</td>
<td>0.61</td>
<td>1</td>
</tr>
<tr>
<td>Graylite “56”</td>
<td>1/8</td>
<td>0.56</td>
<td>1</td>
</tr>
<tr>
<td>Graylite “14”</td>
<td>1/8</td>
<td>0.14</td>
<td>1</td>
</tr>
<tr>
<td>Graylite “52”</td>
<td>1/8</td>
<td>0.52</td>
<td>1</td>
</tr>
<tr>
<td>(INSULATING GLASS-1” Metal Edge TWINDOW—1/8” air space)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear 1/5, glass, both sides</td>
<td>0.6</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>with 1/5” Solaray, 1 side</td>
<td>0.6</td>
<td>115</td>
<td></td>
</tr>
<tr>
<td>with 1/5” Solaray, 1 side</td>
<td>0.6</td>
<td>115</td>
<td></td>
</tr>
<tr>
<td>with 1/5” LHR Solaray, 1 side</td>
<td>0.6</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>with 1/5” LHR Solaray, 1 side</td>
<td>0.6</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

*BTU/hr/sq ft/degree F indoor-outdoor temperature difference.
**BTU/hr/sq ft for July 21 Design Day 40° N. 4 P.M. West Elevation.


PPG makes the glass that makes the difference
Remember Styrofoam.
Once a roof has been insulated with Styrofoam® RM brand roof insulation, you won't have to worry about that insulation again. Forget it.

And the same goes for Styrofoam FR for masonry walls. Or Styrofoam SB for slabs and foundations. Or Styrofoam anywhere. But remember to specify Styrofoam next time you want an insulation that can't soak up water. An insulation that serves as its own vapor barrier. An insulation that won't rot, mold, deteriorate—ever.

To help you remember Styrofoam, we've included some information in Sweet's Architectural File 10a/Do and 8a/Dow. Or you can write us, The Dow Chemical Company, Plastics Sales Department 1310LH4, Midland, Michigan.

Styrofoam is Dow's registered trademark for expanded polystyrene produced by an exclusive manufacturing process. Accept no substitutes...look for this trademark on all Styrofoam brand insulation board.
More and more top architects are going Gold Bond

The Gold Bond difference: Acoustiroc
withstood heat, rain and cold
during construction at Humble Building
The acoustical ceilings in the 44-story Humble Building were installed prior to heating and air-conditioning equipment. The weather turned alternately hot, cold and rainy. Condensation was heavy enough to actually saturate the ceiling panels. Open flame-type burners were then used to dry out the building. But the Acoustiroc ceilings were not affected—due to built-in stability achieved by an exclusive felting process that interlocks long mineral wool fibers. Acoustiroc did not sag, shrink or warp.

Each 56" square module in the suspended ceiling is a self-contained unit with its combination lighting-air conditioning fixture integrated with two special tile sizes 14"x48" and 8"x14". This provided the desired flexibility in arrangement of lighting fixtures plus complete flexibility in partitioning and access to above-the-ceiling utilities. Acoustiroc has excellent attenuation and sound-absorbing qualities, and is noncombustible. It is available in a wide variety of sizes and patterns. Like to know more? Ask your Gold Bond® Representative for information. Or write Dept. AF-44, National Gypsum Company, Buffalo 25, New York.

Gold Bond materials and methods make the difference in modern building
Cut building weight one-third with tubular steel

With its higher strength-to-weight ratios, structural steel tubing is finding more and more cost-cutting applications in office buildings, schools, shopping centers, and a variety of other structures.

Buildings erected with tubing will average 30% to 40% lighter than those employing conventional steel members. The lighter framework permits lighter footings and foundations. At the same time, tubular load-bearing columns allow one-third thinner walls for greater usable floor space.

Tubular steel is cut to length and fabricated before delivery to the jobsite. It can be welded by arc and gas welds, spot welding, projection welding, or brazing. Mechanical joining techniques include threaded joints, bolted and riveted joints, telescopic joints, compression joints, flanged joints, and T-joints.

To further increase the design and economic advantages of structural steel tubing, Republic has increased guaranteed minimum yield strength of ELECTRUNITE® Square and Rectangular Tubing by 36% over ASTM Specifications A-7 or A-36.

Detailed in the chart at right and in Republic's new ST-101 Specification, the higher strength can bring about substantial savings in overall costs. You spend less money to get needed bearing strength in columns, posts, lintels, spandrels, and other structurals.

FOR A COPY of Republic's informative, 52-page booklet—"ELECTRUNITE Steel Tubing for Structural Use"—send the coupon. ELECTRUNITE Structural Steel Tubing is available in rounds to six inches O.D., squares and rectangles in peripheries to 20 inches, and wall thicknesses up to .250-inch.

REPUBLIC STEEL
Cleveland, Ohio 44101

You Can Take the Pulse of Progress at Republic Steel

Port of New York Authority Bus Terminal. Square tubing is employed to frame glass and porcelain enamel sandwich panels which protect waiting passengers from bus exhaust fumes. Tubular framework extends from floor to ceiling and full-length along each 200-ft. long platform. Final tube fabrication was by White Plains Iron Works, Peekskill, N.Y.

Extensive service plaza building program. Square and rectangular steel tubing was picked for columns, beams, and spandrels in stations like the one shown. Flat sides of the tubing simplified fitting of glass, masonry, and curtain wall sections. Tubing was fabricated by The Austin Company—Designers, Engineers, and Builders.
Ford Motor Company pavilion at the New York World's Fair. Welton Beckett & Associates, Architects, used over 50 tons of rectangular tubing in the design of this pavilion. Tubing serves as framework support for glass panels enclosing the 235-ft. diameter, 56-ft. high rotunda.

NEW REPUBLIC SPECIFICATION ST-101

<table>
<thead>
<tr>
<th>Grade A</th>
<th>Grade B</th>
<th>Grade C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength, Min. psi.</td>
<td>45,000</td>
<td>33,000</td>
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<tr>
<td>Yield Strength (.2% offset), Min. psi.</td>
<td>33,000</td>
<td>22,000</td>
</tr>
<tr>
<td>Elongation in 2&quot;, Min. percent</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

REPUBLIC STEEL CORPORATION
DEPT. AF-7844
1441 REPUBLIC BUILDING • CLEVELAND, OHIO 44101

Please send a copy of the booklet, ELECTRUNITÉ Steel Tubing for Structural Use.

Name: ____________________________ Title: ____________________________

Company: ____________________________

Address: ____________________________

City: ____________________________ State: __________ Zip: __________

ASTM A-7

| Tensile Strength, psi. for shapes of all thicknesses | 60,000 |
| Yield Point, Min. psi. | 33,000 |
| Elongation in 2", Min. percent | 24 |

ASTM A-36

| Tensile Strength, psi. | 60,000 |
| Yield Point, Min. psi. | 36,000 |
| Elongation in 2", Min. percent | 23 |
Men who know their hardware
choose NORTON

Your builders hardware man is a good man to know. His awareness of door closer requirements is your assurance of proper door control. His awareness of door closer styling is your assurance of attractive installations. He makes an important contribution to the building industry.

Series 1600 Tri-Style Closers—three unique mounting methods non-handed, 15% power adjustment and attractive modern styling.

Series 7000 Closers—with covers of wood to match door and room paneling, of aluminum to match door hardware and primed to be painted to match or contrast decor.

Series 6100 Uni-Trol—unitized door control—all five door control functions performed by this entirely new hardware product; only one installation at the door.

Norton has the most complete line of rack-and-pinion door control on the market today. Closers that are flexible enough to be installed in any location and attractive enough to compliment any decor. And the Norton 80-year reputation for quality is your guarantee of dependability.

"because you can always select just the right closer regardless of the door control requirements," says GARY VISSCHER, T. Keppels' Sons, Holland, Michigan

HOLLAND SENIOR HIGH SCHOOL, Holland, Michigan
Architect: Suren Pilafian, A.I.A., Detroit, Michigan
Building Consultant: Arthur Read, Holland, Michigan
Contractor: Etting & Volkers, Inc., Holland, Michigan
Hardware Distributor: T. Keppels' Sons, Holland, Michigan

"Specifying the right door closer to insure proper door control is one of the most challenging jobs that confronts the modern builders hardware man. The challenge is particularly interesting when the building is a modern high school. Here a door closer line meets all the rigid requirements: beauty to match the architectural design, flexibility to meet the wide applications and dependability to take the abuse of heavy traffic. That's why I always specify Norton Closer, because I know I can always select the right closer regardless of the door control requirement."

Norton has the most complete line of rack-and-pinion door control on the market today. Closers that are flexible enough to be installed in any location and attractive enough to compliment any decor. And the Norton 80-year reputation for quality is your guarantee of dependability.
new ideas in ageless structural clay—brick by Natco

New imaginative uses of brick—one of man's oldest building materials—are now made possible because of the many new colors... new ceramic glazes... new textures and sizes. Photos above show some of the dynamic buildings with Natco Face Brick facades. 1. Charlottetown Mall, Charlotte, N.C. 2. Dr. E. R. Thomas residence, Poland, Ohio 3. Municipal Building, Oak Ridge, Tenn. 4. Atlanta Police Headquarters, Atlanta, Ga. 5. Joseph Horne Co., Pittsburgh, Pa. 6. 225 Barrone Building, New Orleans, La. 7. Cornhusker Motor Club, Omaha, Neb. 8. WOW Television Studio and Kiewit Plaza Office Building, Omaha, Neb. Natco Face Brick is available in all standard, norman, roman, jumbo and norwegian sizes... modular and conventional dimensions... plain and textured finishes... various unglazed shades, and a multitude of ceramic glazed colors are available to meet every design requirement. For complete information, write for catalog #B-163.

Natco corporation

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it's aluminum
built for long wear
shoe replaceable

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GJ444A*
leaver-type door holder

the latest addition to the GJ quality-built line of door holders

OTHER GJ LEVER-TYPE DOOR HOLDERS
GJ4, GJ5
GJ6½
"Hercules"
The finest holder available.

GJ44, GJ45
"Excel"
For moderate cost construction.

GJ444, GJ555
"Security"
For low budget installations.

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...DECORATIVE and FUNCTIONAL

Herringbone,® Mississippi's dramatic new texture in glass, combines jewel-like radiance and arresting diagonal configuration to create a setting high in interest and utility. Used as the perfect partition, transmitted light becomes a vibrant, integral part of the interior . . . contributes charm, freshness and individuality unmatched by any other glazing medium. Herringbone and a host of other exciting Mississippi patterns designed to gain light, drama and distinction are available from leading distributors of quality glass.


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88 Angelica Street • St. Louis, Missouri 63147
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LARGEST DOMESTIC MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS
LIBRARY WITH EYE APPEAL

Taking a page from one of its own books, this library capitalizes fully on translucent, light diffusing Herringbone® glass to achieve a relaxing, eye-comforting atmosphere that invites the reader. Rhythmic partitions flood areas with soft, natural light by day...glow a warm welcome at night. The effect is that of clean, crisp, modern efficiency that still retains a friendly feeling. For lustrous, lasting beauty and practicality, put walls to work with partitions of figured glass by Mississippi. Select from a variety of patterns, wired and unwired, at your quality glass distributor.

* Patent applied for

Central Library, City of Burbank,
Burbank, California
Architect: Fickes & Fickes, AIA,
Arcadia, California
Glazier: Downey Glass Company,
Downey, California

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Approx. Light Transm'N</th>
<th>Weight Unpacked Lbs.-sq. ft.</th>
<th>Maximum Sizes</th>
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<tbody>
<tr>
<td>1/4&quot;</td>
<td>84.5%</td>
<td>2.0</td>
<td>48 x 132</td>
</tr>
<tr>
<td>7/32&quot;</td>
<td>82.0%</td>
<td>2.8</td>
<td>60 x 132</td>
</tr>
</tbody>
</table>

FREE SAMPLE ON REQUEST

MISSISSIPPI GLASS COMPANY
88 Angelica Street • St. Louis, Missouri 63147
NEW YORK • CHICAGO • FULLERTON, CALIF.

NEW CATALOG
Contains pattern descriptions, light distribution charts, transmission data. Send for your free copy today.

See our catalog in Sweet's
DESIGNED FOR THE DESIGNER

Art Metal introduces the Planfile combination drafting table and vertical-storage print file. It's an exceptionally compact, efficient work station. The scuff-resistant board tilts up to a full 90°. Either a cable-guided parallel straightedge or a drafting machine can be easily attached to the board. The filing compartment will hold the equivalent of three 5-drawer flat files. Protection and easy reference to plans and blueprints are provided by indexed vertical folders. Included in the Planfile unit are a reference shelf, instrument tray and convenience drawer. Finished in a variety of standard colors. Write for full details.

ART METAL, INC.
Dept. F7, Jamestown, New York
this resilient tile has REAL MARBLE CHIPS!

That's right! TERRAFINO is the first resilient tile to combine the traditional warmth and beauty of genuine marble with tough, flexible epoxy resins. The surface of each tile is 80% to 85% #1 marble chips! TERRAFINO has already proven its mettle in some of New York City's busiest elevators, bank lobbies and school corridors.

Here is the perfect material where you want terrazzo but haven't the time, space or facilities. TERRAFINO is the tile to use where you want something that not only looks better, but is better.

TERRAFINO's beauty is more than skin deep. This tile has a "memory" which shakes out indentations. Its lustrous surface resists dirt accumulation and scuffing. TERRAFINO can be washed with any type cleaner, on either side of the Ph scale.

TERRAFINO is quickly installed with an ordinary emulsion type adhesive. No special tools, grouts or glues needed.

TERRAFINO's standard color range includes 10 beautiful patterns. It is available in two sizes, 9" x 9" x 1/8" and 12" x 12" x 1/8".

Descriptive literature and samples are available on request.

Terraﬁno CORPORATION, P.O. BOX 52, CARLSTADT, NEW JERSEY
Anaconda selects
ALLIED
for 5,000 ton structural steel job

What else but structural steel for the support of heavy cranes and elevated bins used in concentrating copper ore? What else provides optimum efficiency at minimum cost... and goes up with so little fuss?

5,000 Tons of structural steel for The Anaconda Company's new concentrator building in Butte, Montana, were fabricated and erected by Allied Structural Steel Company and its Industrial Construction Division.

Allied, with four plants geared for any size job, anywhere, assures on-time delivery and problem-free erection. Get your next building up on schedule... or earlier. Start by asking for an Allied bid.

Design and build with structural steel. It's quickly available, goes up fast, fits exactly. It's your key to earlier completion, earlier income from your building.
Ruberoid Travertine Vinyl-Asbestos Floor Tile

...a new texture...a new look of richness

Now—the vein-textured marble of ancient Italy...with nature's subtle shadings and stratifications...has been captured in all its beauty in Vinyl-Asbestos by Ruberoid. Here is a tile for those floor areas where distinction and design are important. Quality built for quality performance...Ruberoid's new TRAVERTINE Vinyl-Asbestos Floor Tile.

The TRAVERTINE sampler containing 3" x 3" samples of all colors and a full size 12" x 12" is yours for the asking. Ask your Ruberoid Sales Representative or write the company.

ET-205 AVOCADO
ET-204 CLAY BUFF
ET-202 GREIGE
ET-201 IVORY
ET-203 NATURAL CREAM
1. WALNUT DESK AND CHAIR. Stainless steel and oiled walnut are combined in this handsome desk from Janet Rosenblum Inc.*, designed by Carter Winter. The chair swivels from a cast aluminum or walnut base. Net costs: desk, $540 for the one shown, $415 in painted rather than stainless steel; chair, $105 in muslin.

2. DANISH DESK. Teak, oak, or wengé are the woods in which this desk is made for George Tanier Inc. It has a writing surface 5 feet long and 2½ feet wide and shallow drawers cantilevered from the frame. Designers: Nan-na and Jorgen Ditzel. Cost: $350, plus about $100 for the cane-bottomed chair.

3. NEW MILLER FABRICS. The photograph at left is Herman Miller's "Hopsak," an upholstery fabric of 100 per cent nylon, available in 26 colors. At right is an all-Dacron drapery fabric, "Graph," in three colors on white, the pattern repeated every 2 inches. Net costs: $13 per yard for Hopsak, 54 inches wide; $2.25 for Graph, 48 inches. Both designs are by Alexander Girard.

4. CURVY SLING. Architect Eric Defty's leather-and-chrome chair is intended to be a kindred spirit to Mies van der Rohe's Barcelona chair. The leather cushion curves over a steel frame laced with saddle leather straps. Available on order from the H. Balaban Carp Gallery and Lammert's, St. Louis. Cost: $450.

5. CONFERENCE CHAIR. Solid teak or walnut, hand rubbed to a glowing finish, forms the sculptured frame of this new conference chair from Dux, Inc., San Francisco. Foam rubber pads the seat and back, covered in leather or vinyl. Designer: Ray Zimmerman. Cost: $259 in black leather.


7. SECRETARIAL SWIVEL. A new version of the Time Inc. furniture made by the Domore Chair Co., Inc., Elkhart, Ind. is this secretarial posture chair. The base and back stem are chrome-plated steel. Cost: $115 in muslin.

*Unless otherwise noted, all firms are in New York City.
ONLY ALLSPANS

combine the strength of cold rolled steel with unparalleled design freedom

ALLSPAN® joists are without equal where long, strong open-web steel framing members are a must. You can span areas to 152 feet in width—column-free. ALLSPANS utilize nailable V-Section chords (patented) and tube webs cold rollformed from custom steels. ALLSPAN open-web design provides a freeway for conduits, ductwork and wiring. Metal roof deck may be attached by welding or nailing. Quality control of production is supervised by Pittsburgh Testing Laboratory inspectors. Write for our complete design manual.

MACOMBER INCORPORATED
CANTON, OHIO
SUBSIDIARY OF SHARON STEEL CORPORATION
EXTRA QUIET...FOR HEATING AND COOLING SYSTEMS

B&G pumps for this purpose are designed and built specifically to assure three things: First, quietness of operation; second, dependable, trouble-free performance; third, long life.

B&G heating and cooling system pumps are immune to trouble because foreign material in the heating system water cannot affect the bearings; unusual water conditions do not affect pump lubrication; today’s higher design temperatures which frequently reach 240° are not injurious to the pump.

Nation-wide service is available, even in remotest locations.

Your local B&G Representative is well qualified to help you with your pump selection problems. He is listed in the Classified Telephone Directory. Or write to ITT Bell & Gossett Inc., Morton Grove, Ill., Dept. HZ-62.

EXTRA RUGGED...FOR INDUSTRIAL USE...PRESSURE BOOSTING

Where the extreme quietness required in heating and cooling systems is not a factor, B&G industrial pumps offer proved dependability and efficient performance.

Why these pumps give years of trouble-free service is evident from their design. Vertical split-case construction permits removal of the bearing bracket without disconnecting pipe line or motor leads. Special alloy steel shafts are super-finished and oversized to keep deflection at a minimum. Leak-proof operation is assured by the “Remite” mechanical seal which eliminates packing rings and gland adjustment.

A stock of most commonly used sizes is maintained near you for immediate delivery.

ITT BELL & Gossett INC.
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION
This unusual window design was a challenge to the manufacturer. Stainless Steel came through—in strength, appearance and cost.

The architect’s requirements called for strong, weather-tight, corrosion-resistant windows at competitive cost. Adams & Westlake produced them in nickel stainless steel from two roll-formed sections that were bent instead of cut.

The high strength of stainless steel reduces designers’ and manufacturers’ limitations by permitting the use of thinner gauge components—and brings costs close to those of competitive materials.

Stainless steel is economical over the years, too. It’s solid stainless right through—maintains its gleaming, corrosion-resistant finish for life with a minimum of care. And its low thermal conductivity reduces heat losses in winter and heat gain in summer.

For further information on the many design advantages of nickel stainless steel and a list of fabricators, write for Inco's "Suggested Guide Specifications for Stainless Steel Windows."

The International Nickel Company, Inc.
Hager creates for the Ornatologist

Where luxury is projected by traditional design, ornamentation must be rigidly disciplined. Architects who avoid ostentation yet make full use of the design freedom allowed deserve special identification. We call them ornatologists and entrust the use of the obviously artistic Modelé Hinge to their discerning judgment. This new hinge from Hager in a choice of rich finishes carries impeccable taste right to the doorway of traditional interiors. HAGER HINGE CO., ST. LOUIS 4, MO.
HOW DOES STEEL FRAMING COMPARE IN COST WITH OTHER MATERIALS?

Reports from all over the country prove that steel can produce savings in structures that once might have been more economical in other materials. Here are some examples:

A ST. PETERSBURG, FLORIDA, SCHOOL in the $800,000 class was originally planned in prestressed concrete. Re-design in steel is reported to have saved nearly $100,000.

A THREE-LEVEL PARKING GARAGE in Mount Vernon, New York, with approximately 140,000 sq ft of space, was designed in Bethlehem's V45 high-strength steel. It was completed in five months for $1,400 a car. A garage in a nearby community, designed in precast and prestressed concrete, took far longer to build and cost over $2,000 per car.

13-STORY BALTIMORE APARTMENT BUILDING was built with structural steel for $2.29 psf — $.40 less psf than poured concrete. In addition, steel permitted faster erection during winter months, making possible earlier occupancy.

4- STORY LANCASTER, S. C., WAREHOUSE, was considered in pre-stressed concrete and in structural steel. Steel proved more economical. Further investigation proved that composite design in steel saved an additional $20,000.

5-STORY CITY HALL in Allentown, Pa., was investigated in both reinforced concrete and structural steel. The steel estimate was slightly less than the alternative, and provided better solutions to such design features as cantilevered floors and curtain walls.

DON'T OVERLOOK THE LATEST DEVELOPMENTS IN STEEL! Increasingly popular composite, continuous, and plastic design in structural steel, as well as new products such as Bethlehem's economical, high-strength V Steels, offer dramatic savings to alert designers. Don't hesitate to call on steel fabricators for technical information and helpful tips.

(Names of the architectural and engineering firms responsible for the projects named above will gladly be furnished on request.)
G-E Perma-Kleen tile is a new, completely different type of flooring...a high-pressure plastic laminate with a super-hard surface that will not indent from weight or impact of furniture, equipment, or spiked heels. The non-porous surface is highly resistant to soil penetration, stains, and cigarette burns. Even scuff marks come off easily.

This revolutionary new floor tile is available through leading elevated floor system manufacturers.

ANNOUNCING PERMA-KLEEN* TILE
a remarkable new surfacing discovery for elevated floors...from GENERAL ELECTRIC

* a General Electric Company trademark

General Electric Company, Coshocton, Ohio, Dept. AF-44
Send G-E Perma-Kleen Tile product data.

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Firm__________________________City________________________
Street________________________State________________________
Best of all, our drainline kits now cost 30% less.

You can save time and money by designing these underbench drainlines into your next laboratory.

The kits now cost about 30% less than field-assembled old-style parts and fittings. And they practically slip into place.

Units can be adjusted both horizontally and vertically to meet specific bench needs in the lab. The units include sink strainers, cup sinks, traps, and fittings with a minimum of four inches of adjustment at any adapter coupling joint.

All components which contact wastes are inert and highly resistant to corrosion.

Of course, this would be just one part of the PYREX® brand drainline which you can specify and forget in any lab.

Write for more information about the drainline, the underbench kits, or both. Or ask your laboratory equipment manufacturer about them.

Why put a heater on the ceiling in an office building?

To begin with, because floor space costs so much. Why waste any of it? Put the heaters on the ceiling.

Besides, it's more efficient to heat from the ceiling. CORNING® Electric Radiant Heaters flood the whole area with safe, clean, quiet, efficient far infrared heating energy.

No desks or files or other equipment can block the heat when it comes from the ceiling. On the other hand, nothing can get overheated from being too close to the source.

You can put these 2' x 4' panel heaters on or in the ceiling with surface mounting or suspended T-bar mounting. No ductwork or blowers required.

You can paint and repaint them to blend with the décor of each room without affecting their heating performance.

Might not be a bad idea to put some in your own office... give yourself a chance to stay warm and get used to CORNING panels at the same time.

Talk to your electrical contractor and you'll find out just how little it would cost to use our heat and how fast he could install it.

The best of two glasses in one panel.

One of the most popular lighting glasses we sell is a hybrid. Our CRISTOPAL panels give you a truly beautiful blend of crystal and opal glass.

We start with crystal base of exceptional clarity and add a goodly portion of one of our best opal materials. Formed into the surface of this unique combination is a low-brightness prismatic structure.

The result is a panel that combines the efficiency and light and color control of prismatic crystal with the softness and warmth of opal diffusion.

Consider CRISTOPAL panels for your next lighting installation and see if they don't add a certain something to your rooms.

For more information on any product discussed here or any other Corning product made for architects and builders, please write to Building Products Department, Corning Glass Works, 9704 Crystal Street, Corning, N. Y.—where today's developments become tomorrow's standards in the building industry.
Architrac lets you standardize, lets tenants individualize.

With Architrac® double traverse sets, closing the room-side draperies also closes the outside drapery. (We do this by using ingenious interlocking master slides.) This gives a uniform exterior appearance and still allows tenants individual choice of color and design in room-side draw draperies.

Our recessed and ceiling mount Architrac permits another sort of standardization. The extruded track can be installed around the entire building perimeter, regardless of where interior partitions may be placed.

After tracks are installed, each unit can be partitioned to tenants' individual requirements. Then the component parts are inserted in the track. If partitions are moved, the component parts are easily repositioned allowing complete flexibility of office layout.

We supply Architrac in nine styles (cord and hand operated) for flush, recessed, flanged or bracket mounting. For details on our full line of Architrac drapery hardware, see Sweet's, section 18F/K1. For complete specifications covering Kirsch Architrac interlocking master slides and perimeter applications, write us. Ask, too, for our free catalog, price-estimation information and about our nationwide consultation service. Kirsch Company, 332 Prospect Street, Sturgis, Michigan.
NOTHING COMPARES to the beauty and radiance of optional Panelux translucent sandwich door panels. They are acrylic modified polyester reinforced with continuous strand glass fiber... strong, stable, resistant to weather, water and impact! And, they compliment any material or texture. EXTERIOR and INTERIOR Panels have high thermal insulating qualities, and they are available in standard door sizes in a choice of 3" x 3" or 3" x 6" grid patterns. Custom sizes and color designs may be ordered. Get details from your Amarlite representative. Specify AMARLITE... there's no equal!

GET MORE IN A DOOR! 1 EXCLUSIVE AMARLOCK has new recessed cylinder eliminating gripping surface for unscrewing; extended bolt protection. 2 SECURITY CLIPS... easily installed... prevent removal of exterior stops without proof of entry. 3 NEW PIVOTS and butts have ball bearings and stainless steel pins.
NOW...a true stormproof louver!

The vulnerable portion of a louver is where the blades connect to the jamb. A leak at this point can mean water in your building.

The illustration at the left shows how Walcon engineers have effectively eliminated the possibility of leakage by turning up the blade ends and interlocking them with the jamb. This patented feature also eliminates costly welding and unsightly riveting.

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For complete specification, performance and ordering information on the new M-1 lens, write Dept. 113.
WORLD TRADE CENTER

Forum: In the face of imminent disaster, we wish to appeal to the native intelligence of all sensitive people concerning the proposed erection of Yamasaki's twin towers ("World's Biggest Skyscrapers," March '64).

All good buildings throughout history fit their sites well; the concept of the twin towers is totally wrong. If they are erected, the whole of Manhattan will be thrown into a different scale and ruin what is now one of the most exciting spatial arrangements in the world.

If the Chase Manhattan building can be challenged for the destruction of Wall Street's consistency, then the twin towers will add the final touches to this fatal feat.

As Frank Lloyd once said, "... a doctor can bury his mistakes, an architect can only advise his clients to grow vines." How do we get the vines all the way up there?

THE CLASS OF ARCHITECTURAL DESIGN 112X

Ernest Audon Richard Keith Michael Price
Norman Becker Robert Rubin
Edgar Bermudez Max Kauer Henry Ritter
Jack Chernick Frank Kishonash Michael Storin
Donald Feibiger Walter Litvack Michael Wolfe
Richard Jansen Ernest Poeschki Charles Wong

New York City College of New York

Forum: The structures reminded me of a project you published some years ago by Harry Weese called the "poor man's skyscraper" (Jan. '62) which also featured supporting walls.

The plaza seems to be a dead end and does not open on its western edge to the waterfront, which is, after all, its reason for being. With the proposed Hudson River re-development now under study, this seems an oversight.

New York City Daniel B. Klein
Housing and Redevelopment Board

MAN AND ART AT YALE

Forum: It was with considerable surprise that I read the following statement in the February issue (Yale's Art and Architecture building): "At this point, says the architect, most contractors might have simply walked off the job, saying 'sue me.'"

We have been in the building business for 36 years, and we have had a number of jobs which were considerably sicker than the one in question. However, we have never yet walked off a job saying "sue me," [nor do we] know of a contractor who has. If you have any proof that I am wrong, I am certain that the Associated General Contractors of America would like to hear about it for consideration under their code of ethics.

Walter W. Lathrop
Toledo, Ohio
The Lathrop Co.

Both the architect quoted and Forum obviously intended a figure of speech, not a reflection on the contracting industry—ED.

Forum: Mrs. Moholy-Nagy's analysis of Mr. Rudolph's "splendid achievement" overlooks the esthetic discrepancy between the fortress-like feeling of his "béton brut" and the smooth elegance of his own office.

The A & A building displays a curious "double-think" attitude: (a) via a semi-handicraft treatment of concrete, the architect has created a complex celebration of the new effluence, as if for the historical record; but (b) for himself—to express that "chez soi" feeling of his own office—he has returned to the simplicity of the international purism of the '20s. (According to Mrs. Moholy-Nagy, the complex agitation of space and the multitude of details mark the start of the "long voyage home to architecture," and those "few faithfuls" who still believe in economy of action and simplicity, just seem to repeat "the old incantations."

The 36 levels, the interior bridges, the array of old and new details, the roof-scape, etc.—in short, this new architectural abundance—make one think of Mies' IIT building, designed for similar purposes, and of Pissarro's prophetic words: "One starts to get young at the age of 60—and then it's too late! Only then does one start to feel free; only then has one learned to strip oneself to one's creative simplicity."

St. Petersburg, Fla.

St. Petersburgh, Fla.

Forum: I was especially pleased to see the tribute to Whitney Griswold's creative reign, and for the attention which Charles Solomon and his organization received.

KINGMAN BREWSTER
New Haven, Conn
Yale University

SCHOOL COMPONENTS

Forum: Your February issue contained an interesting and commendable report on the outcome of the First California Commission on School Construction Systems Development. As one of the four manufacturers normally engaged in the lighting field that carried through this demanding procedure to the bid stage, I was disappointed that you did not see fit to cover the "Lighting-Ceiling" category more thoroughly. You did state that it was probably the most demanding category of the four; I might add it was also the most frustrating from our point of view as a low bidder, eased into second place by Inland Steel Products' excellent entry which came up lower in cost when combined with their structural bid.

As one who participated, I can say with all sincerity that a project of this type deserves much better support from industry, particularly ours, than this one received. We were all offered a challenge to show what our companies could do. We are proud to have participated and would do it again.

Arthur W. Kroh
Vice President
Chicago
Luminous Ceilings, Inc.

Forum regrets that space did not permit a full exploration of the many worthy systems which did not receive awards—ED.

Forum: Being active in the field of prefabrication, I read the article "School Cost Cut by New Components" with interest.

A program of 22 schools with a total of 1.4 to 2.4 million square feet alone makes possible substantial cost reductions. It might reasonably be wondered whether the savings will result essentially from design features or mass purchase. This question has also been raised with regard to the CLASP work in Great Britain.

Roger Halle
Architect

Pound Ridge, N.Y.

ST. GALLEN SCHOOL

Forum: The Swiss school in St. Gallen (Jan. '64) is an excellent choice among recent European buildings of significance. This "lesson in concrete" certainly combines different aspects of concrete technology.

The philosophy that guides the site plan is wonderfully carried out in the individual spaces. The expression of the concrete seems to be mostly in its "skin," with the exception of the retaining walls. The prefabrication of the parts of the building strongly recalls steel or timber technology.

The use of board forms produces an agreeable unity of surfaces, yet its "craftiness" somehow appears incongruous with the structure's standardized techniques and rhythmic precision.

It is a great building, however, for its nobility of plan, for its richness of spaces, and for what it does architecturally for the community.

Romaldo Giurgola
Architect

Philadelphia
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One needs only to compare Le Corbusier's work to that of the St. Gallen team to see that the younger men are much more dead than one of the fountainheads from which they drink. The architects of St. Gallen relied on their knowledge of modern formulas, rather than on an understanding of forms. One illustration: post and lintel expression is appropriate to precast concrete, which implies a certain precision not expressed in rough finish. Le béton brut is primarily an expression of concrete placed in situ and implies a continuous structure, which is not very compatible with an expression of post and lintel.

Americans would do well to combine private and governmental means to develop our public (and private) institutions of learning as the Swiss do with such apparent success. We might also fare better if the selection of architects for any major public building were done by a competent jury in an open design competition. Finally, our environment would be enriched if public funds were allocated for art as an integral part of design.

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LETTERS

St. Paul, Minn.  
VALENIUS L. MICHIELSON  
Architect

FHA AWARDS

Forum: Regarding "FHA Makes First Awards for Good Design" (News, Jan. '64), the "800" building mentions W. S. Arrasmith as architect. At the time this building was designed, and the working drawings prepared, submitted, and approved by FHA, our firm name was "Arrasmith and Tyler."  

WILLIAM C. TYLER, JR.  
Architect

CORRECTION: In the News story on building research (Mar. '64, page 7), some of the first-run copies incorrectly carried a picture of Everett P. Palmatter of Carrier Corp. in place of the Institute for Applied Technology's Donald Schon. Our apologies.

ARCHITECTURAL FORUM  
540 N. Michigan Ave., Chicago, Ill. 60611

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ARCHITECTURAL FORUM / April 1964
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Man with a shrewd lasso. One sure signal of a masterful politician's technique is the tendency of his audience to ask each other warily, "Yes I heard what he said, but what did he really mean?". On this basis, President Lyndon B. Johnson must be enjoying the puzzlement which hangs like a haze about his housing message of January 28, soon to be up for Congressional action.

On the face of it, the message (whose provisions were reported in the March news section of this magazine) is almost a piously liberal declaration of intent to continue the current urban renewal program—not so pious, however, as to neglect the price tag: $1.4 billion for the next two years. The chief confusion has been caused by the provisions for assisting the financing of totally new towns. "Or does he mean the same old subdivisions?" is the querulous question. It is fairly clear the President does not; the quiet emphasis all through the message is on planning—on, for example, the practicalities of building realistic sewerage systems before building towns instead of just erecting more armies of suburban cesspools; and on the satisfaction in a well-made suburb, beyond the simple statistics of so many more dwelling units. Even included in the President's suggestions was the appropriation of funds to train more professional planners.

Most of the rest of the message may have sounded blandly repetitious of past housing goals, but a more careful examination revises that feeling. Consider the provision to reshape some of the proposed public housing. We have all been depressed by those gigantic, anti-architectural slabs of public housing which stand dumbly here and there about our cities. They have turned out to be little better than esthetic punishments for poverty. Professionals know these buildings are more the product of crippling codes and other local regulations than of the architects who produce the working drawings. The President's message simply suggests shifting some public housing out from under these regulations to older, rehabilitated buildings in existing neighborhoods—a very good thing, in that it avoids more bad architecture. Put strong in the message were the social aims of housing particularly in the "war on poverty." Unsaid, but certainly implied, was another fact of national life: urban renewal can succeed only by improvement of the relocation process. (Ask any mayor.)

The splendid opacity of the wording of the message surrounds another shrewd recognition of reality: it is not necessarily the laying down of proud new policies in Washington which genuinely determines the result of renewal. Instead it is the testing and interpretation of Federal policy out in the field—in the cities—which finally shapes the result. The President and his advisers have been wise in going back to the drafting board with many of the older Federal provisions—to sharpen some of them, to liberalize others, and to suggest new ones only broadly, rather than in specific detail. And speaking of practical politics as we are, President Johnson must have been particularly pleased with the first Republican reaction to his message. Congressman William Widnall (R., N. J.) ranking member of the House special housing subcommittee, was placed in the position of objecting to the message because, in effect, it was not sufficiently liberal. With three colleagues, Rep. Widnall submitted an alternate proposal which differs slightly in approach but agrees in goals. The rancher from Texas is evidently not going to get all he asked from Congress, particularly in the matter of new towns. But he has not yet broken the loop in his lariat; it still is twirling nicely over Congress.
If progress has complicated other building problems, it has hit hospital design with a vengeance. The hospital surgery, for example, was once a single room like the historic amphitheater at Massachusetts General Hospital (below). Today it is an intricate complex laid out to facilitate sterile technique, equipped with elaborate mechanical, communication, and monitoring networks, linked to laboratories and other rooms for anesthesia, recovery, and intensive care (opposite).

Yet radical as the innovations are, hospital architecture is being outpaced by still newer developments in medical care, from Betatron units to hyperbaric chambers. Program requirements, hard to pin down in the first place, change even as a new hospital is being designed. To complicate the matter further, any hospital building or modernization must also emerge from its own peculiar tangle of construction priorities, government and private financing, community planning controls, and mounting operating costs.

Little wonder that architecture often gets short shrift, and that hospitals can be among the ungainliest, if not the ugliest, of large buildings today. To understand why they are—and how they might become less so—Forum explores 1) how hospitals grow, and how they might grow more rationally, with four case studies of expansion, pages 82-89; 2) how complex new communications networks are beginning to have a profound impact on hospital planning, pages 90-91; and 3) how a prototype of the future—the first new medical center to be built from scratch since World War II—evolved in the 17 years it was a building (pages 92-95). From even this quick tour, it is evident that hospitals must be conceived and built on a much larger framework than they presently are. To make that frame-
work possible, wholesale changes are called for in policy, planning, and design.

At this moment, most major U.S. hospitals are either raising money to build, planning to build, or actually building. Many are doing all three simultaneously, and will continue to do so for a long time to come. But all too few are building the right facility in the right place. Still fewer are sticking to an overall plan. And hardly any can afford to build in economy-sized chunks.

The trouble starts at the beginning—with money. Private philanthropy, which still accounts for most of a hospital's building dollar, is inclined to give money for specific parts of a hospital, and plaques are liberally scattered throughout public areas (fund raisers call these "opportunities for identification"). As a result, plans are sometimes contorted to provide memorial "buildings" or "wings," and the number of unused entrances and lobbies in U.S. hospitals is legion. Meanwhile, the increasingly important basic plant is often neglected. (Who, for example, wants to donate a telephone equipment room or safety and traffic headquarters?)

Government financing, unhappily, often contributes to planning contortions, too. The Hill-Burton program, which has made immense contributions to improving U.S. hospitals since World War II, worked well in the early days when the primary need was for small, discrete facilities outside the urban centers. But today, with its complex system of allotments based on often-shallow state plans, and with its cumbersome public bidding requirements, Hill-Burton financing tends to force hospitals to build in bits and pieces.

One hope lies in President Johnson's recent proposal for federal help to renovate urban hospitals. Three such bills are now before Congress; one should pass this year. But a remodeling job can seldom be pinned down neatly in bidding documents; a cost-plus, maximum-ceiling contract is often the cheapest way. Thus it is to be hoped that the

The contrast between the 19th century surgical amphitheater at Massachusetts General Hospital (opposite) and the prototype design for a surgical center of tomorrow (below) symbolizes the growth and change in hospital design. In the prototype study, central sterile work space is flanked by surgeries, to which patients are brought via perimeter corridors. On the service floor above are observation galleries, closed circuit television installations, and physiological monitoring equipment.
legislation will emerge with a more useful formula for protecting public moneys than the present public bidding rule. (The newer Health Research Facilities program, administered by the National Institutes of Health, is happily less encumbered; but, like Hill-Burton funds, its grants encourage hospitals to build to fit specific projects rather than overall needs.)

The actual purse strings of Hill-Burton are only part of the problem faced by hospitals which need modernizing. A larger problem is in getting help in fitting their plans to overall community plans.

Hill-Burton distributes funds according to state-determined hospital needs. As a direct consequence, networks of local, regional, and state planning councils and agencies are now established in all states. In too many cases, however, “planning” is a euphemism: dominated by existing institutions and health insurance plans, it is too seldom coordinated with general city planning or concerned with population trends, highway mapping, and urban renewal (despite the incentive offered by U.R.A.’s Section 112, which gives credits for hospital site expansion).

An even more serious indictment of most hospital planning agencies is their failure to maintain a proper evaluation of existing facilities and use it in determining fund allocation. State Hill-Burton agencies should insist that applications be supported with proper and up-to-date master plans. They should stop basing plans on the total number of hospital beds in a community and start being more concerned with the number of antiquated beds in institutions of poor caliber. In fact, generally declining occupancy statistics are distorted by good beds in bad hospitals and antiquated beds in good hospitals—the best hospitals still can’t get enough beds.

The confused state of hospital planning and finance is likely to be compounded when two new federal programs get under way: aid for medical schools and aid for community mental health facilities. While each program provides essential, if minimal, assistance to these important aspects of the nation’s health facilities, they may merely add to the confusion of bits and pieces unless steps are taken to integrate all federal programs.

The big, economy size

The need for integrated programs is becoming increasingly evident as the emphasis shifts to renovation. Perhaps as much as 75 per cent of the $1.65 billion going into hospital construction this year will be spent on existing institutions. In some cases, the emphasis on renovation is unwise, but most hospitals are too deeply committed to present locations—and too busy trying to satisfy immediate needs—to contemplate any long-range programs for new plants.

Contrary to common assumption, the most economical and flexible hospital is often the entirely new hospital on a new site.

With the pace of change picking up, big and flexible structures are called for (drawing above). Old buildings simply can’t be revamped to fit this need. The logic is simple: hospitals with basic plants more than 20 years old need extensive new mechanical services before they can be fitted with up-to-date surgeries, X-ray suites, laboratories, central sterile services, computer centers (and a substantial part of hospital construction money is being spent in these areas). On patient-care units, too, mechanical services are generally inadequate and must be revamped before modern air conditioning, plumbing, electrical, and communications services can continued on page 84

A NEW LABORATORY SET BETWEEN OLD WINGS

A crisp glass wall cantilevered out from a concrete base (right) allows the polite intrusion of new clinical laboratories into the center of The Community Hospital at Glen Cove, N.Y., where they tie in well with the existing plant. The architects, reasoning that elegant lightness was the best foil for the nondescript old buildings, kept the glass-spandrel and aluminum curtain wall to slim dimensions.

Part of a long-range plan for the hospital, the new labs and related offices are arranged around a core of utility, service, and storage rooms (plan, below right).

Careful detailing inside yielded uncommonly neat laboratories (lower photo). Stock casework is trimmed with special hardware; white plastic tops are edged in wood; door and drawer fronts are deep blue in white frames.

FACTS AND FIGURES

The Community Hospital, Glen Cove, Long Island, N.Y.
Architects: Helge Westermann (Joseph L. Russo, job captain).
Engineers: Lev Zetlin & Associates (structural), Benjamin & Flack (mechanical and electrical).
General contractor: Preston-Brady, Inc. Construction area: 5,540 square feet (new wing: 4,500 square feet; renovated connecting area: 1,040 square feet). Construction cost: $197,000 (includes fixed equipment). Cost per square foot: $35.50.
Glass spandrels and windows framed in aluminum (above) mark 4-foot module of labs and offices (plan below). Typical lab is shown below at right.
be brought to the patient's room.

Since mechanical costs run as high as 50 cents of every hospital building dollar, the useful shell of an existing building is less valuable than it might first appear to be. If extensive rearrangement of spaces is also needed, the re-use value of an existing structure can be reduced to 20 cents on the dollar—often less than the value of the land it occupies.

Yet despite its economic logic, the brand-new hospital is a comparative rarity in 1964. Not only is the kind of cash needed generally unavailable, but few hospitals are likely to abandon a new laboratory building or X-ray department added just last year.

Expansion makes most sense in hospitals ten to 20 years old, where the basic bed facilities are often quite adequate for extended use. Beds, however, are a small part of a hospital's equipment. Hospital construction money today is being spent on the research, diagnostic, outpatient, and ancillary facilities that can change a hospital into an integrated medical center. Not too many years ago, according to Consultant Edwin A. Salmon, hospital beds took 65 per cent of gross hospital space. Now, the percentage is almost exactly reversed: patient care units take closer to 35 per cent of the total space. Additions and renovations will provide most of the space for this shift.

In providing this space, construction economy is often a secondary consideration in the view of administrators and trustees. Even when large hospitals and medical centers are committed to replace their facilities entirely at some future date, they are likely to spend hundreds of thousands of dollars each year satisfying immediate, imperative needs. As one research M.D. put it: "I don't care that we'll have a new hospital ten years from now. Ten years is probably one-third of my professional life and I'm not going to wait that long for adequate work space."

In the seemingly interminable time it takes to build a new institution (the N.Y.U. Medical Center took nearly two decades), a break-through in cancer research may come in a laboratory quickly remodeled at $60 or more per square foot. Many architects, unrolling soundly conceived long-range plans, have been brought up short against just such arguments.

**Designed for remodeling**

The implications of such dynamic forces are strongest for new institutions. A design that fixes functions in an articulated plan—whether of the campus or pavilion varieties—will not adapt easily to changing hospital needs. The only fitting solution may be an entirely new kind of hospital: a dense, multilevel structure of big, flexible bays served by clearly differentiated spaces for transportation of people and goods as well as mechanical and communications networks.

The need for such big spaces is greatest on the lower floors (commonly termed the "base"). Up above, where patients' rooms take over, space can be gathered into towers (connected perhaps by flying bridges) or consolidated to provide terraces and step-backs—somewhat like a small city on a massive, man-made plateau.

Hospitals, in fact, are beginning to take such forms. The section shown above is of the recently completed 19-story Mercy Hospital in Baltimore, Md. (Associated Architects: Taylor & Fischer, Westermann and Catalano). It consists of a 140 by 115 foot tower over a three-floor service base nearly one acre in size. At Mercy, the long-range planning goes further than the big tower on a bigger base: large areas of the hospital were left as unoccupied "shell" space to be filled in later.

**continued on page 86**
Precast concrete wall panels (above) enclose a neatly organized private patient wing (plan below). First floor corridor is pictured below at right.
as hospital needs and financing may determine. The advantages of big base floors need not be confined to large new hospitals, however. The laboratory addition to The Community Hospital at Glen Cove, N.Y. (page 82) was quietly shoe-horned into a court flanked by existing hospital wings, thus adding space at the service level without adding to already extended walking distances.

**Method 1: filling in**

Filling in courts and between wings is not a radical notion. Many hospitals have done it if only because their sites were confined. All too commonly, however, the process is casual, with willy-nilly assignment of space. And corridors become tortuous. The process can also be expensive. Without a careful study of existing foundations, the need for expensive underpinning may be discovered—too late. New structural columns usually must be set away from existing buildings and framing systems may become exceedingly complex. But filling-in quite simply makes new space available near the heart of the hospital, where it is most desperately needed (drawing below). It can also make the hospital a pleasanter place by leaving small areas for landscaped, open-air courts between buildings, and outdoor roof terraces on top of them.

As one advanced example, the master plan for Montefiore Hospital in The Bronx, N.Y. takes advantage of a difference in street elevations, eventually provides a new main entrance level above the present main floor, which will be filled in and extended as a base. Thus, relieved of all but staff and service traffic, it can become an efficient block for new functions.

**Method 2: building out**

The traditional way of adding to a hospital is by building a wing, as at Peter Bent Brigham Hospital in Boston (page 84), or Memorial Hospital in Worcester, Mass. (opposite). In each case, however, the wing was located carefully to keep the plant from becoming overextended. At Worcester, for example, the new wing stands between two older wings, which eventually will be replaced. Thus, a compact T-shaped hospital (also tied to an extensive base) will be the final result.

The critical question in attaching a wing to a hospital is: where should it be placed for maximum benefit? The answer depends on many factors. Most often the location of the elevators determines the spot, but sometimes a carefully placed wing will allow a single inefficient nursing unit to grow to two units, each equipped with a new nursing station and utility rooms, as at the Porter Hospital (page 88). Although it is obviously cheaper to stack new facilities in a single wing rather than scatter them throughout the plant in smaller patchwork additions, it is often difficult to find a good place to add a stack of varied functions so they connect properly with the existing building on each floor.

In fact, it is sometimes better to relocate functions entirely if this makes it possible to concentrate new construction in a single multistory wing. Generally, it is more practical to place the functions requiring extensive mechanical services in the new wing, and to use the old space for offices, patient rooms, or service and storage areas. (Laboratories, surgical suites, and X-ray facilities can become very expensive in remodeled space.)

It is also wise to stage renovation so that the hospital can operate with minimum interference during construction, which can drag out for two years or more. It is usually best to vacate continued on page 88
Big brick piers (above) carry utilities and patient toilets (plan below). Single room (below, right) has its own built-in basin, shower, and toilet.
space being remodeled or space adjacent to a new wing. This indicates a relocation of functions whenever possible. Thus, the building process is best planned like a game of musical chairs with minimum inconvenience at any one place.

**Method 3: building up**

The most common plan for hospital expansion—adding floors upward—is probably the most overrated. To add floors to old structures often requires extensive structural stiffening below. And even where relatively new structures get additional floors, the difficulties can be extreme. The most careful planning of structural and mechanical systems for expansion upward rarely proves out ideally. Generally, by the time the expansion takes place, changes in function and planning require relocation of mechanical stubs, and occasionally a structural plan needs to be revised. Careful—and adventurous—planning of the basic structure can help. But, even so, raising elevators and adding stops is expensive and inconvenient.

The most economical way to add by building up is to provide extra "shell" floors which can be finished out later. The difficulty is that shell floors require the pre-investment of funds which hospitals rarely have—and which neither Hill-Burton nor donors will provide. But careful planning of shell floors—and all-important basic mechanical equipment—can provide unoccupied expansion space for about one-third the cost of finished space. The money is usually well spent.

**The continuing plan**

Regardless of whether a hospital is expanded by filling in, building out, or building up, it is essential that a continuously revised master plan accompany construction, and that space utilization, maintenance, renovation, and new construction be viewed as a single process.

In this process some fundamentals can be discerned:

- The master plan should schedule ultimate removal of all existing buildings. Every building has a more-or-less fixed useful life regardless of remodeling. To establish this life helps set remodeling policy.
- Capital programing should be planned on a long-range basis so that funds can be accumulated for construction in the largest, most economical chunks.
- Construction should be carefully staged to interfere as little as possible with hospital operation. This often means that functions should be relocated, leaving space vacated for major renovation.
- The master plan should provide an integrated structural and mechanical framework. In order to preserve flexibility, today's detailed space arrangements should not determine and freeze the ultimate form.
- In laying out interior spaces, hospital functions which can be easily relocated should be placed adjacent to functions likely to expand (example: locker rooms next to X-ray suites).
- Vertical circulation should be concentrated for maximum efficiency. Elevators in several locations can increase traffic and cause departments to be interrupted by through traffic.
- Plans should aim toward a large base structure for basic hospital services, for distribution of goods, and for circulation of patients, staff, and visitors.
- Separation of distribution and circulation patterns should be maintained, either on separate floors of the base or in separate corridors.

There is little doubt that better hospital buildings can make possible better medical care at lower costs. But the art of hospital design can keep pace with the rapid advances of medicine only if it is viewed in these broader terms.

**FACTS AND FIGURES**

The Porter Hospital, Middlebury, Vt.


General contractor: H. P. Cummings Construction Co.

Building area: 18,000 square feet (new: 10,600 square feet; renovated: 7,400 square feet). Cost: $460,000 (includes fixed equipment). Cost per square foot: $25.00.

Architect Richard A. Miller, a former Senior Editor of (and now a consultant to) FORUM, is Senior Associate in the New York architectural firm of Helge Westermann. He is also an Adjunct Associate Professor at Columbia University's School of Public Health and Administrative Medicine.
Two-bed rooms share pairs of large windows (above). Centrally located in the floor plan are two new nurses' stations, one of which is shown below.
ELECTRONICS: NEW FORCE IN HOSPITAL DESIGN

BY JAMES FALICK

A few years ago, the little tableau shown at left might have been dismissed as pure science fiction. But today it could very well happen in many major U.S. hospitals—and it is only one of the many possible sequences in modern medical communications that may radically change hospital design.

Our hypothetical episode starts at the top, where an outside laboratory technician (1) telephones test results on a patient to the hospital switchboard (2). The operator transmits the information to the patient's doctor through a tiny pocket radio he carries (3). The doctor goes to his office (4) to consult records before calling a nurse (5) on the hospital's intercom system; he asks her to check the patient (6) on closed circuit television and read his blood pressure and temperature remotely on the dials of a physiological monitoring console at the nurses' station. After she reports back on the intercom, the doctor writes out a program of treatment on a card, which he inserts into a special data-transmission device linked by cable to the hospital's computer information center (9), as well as to its medical records and accounting departments (7, 8). The computer tells the pharmacy (10) what medication to deliver and when, and transmits the doctor's treatment instructions to the nurse. The computer also selects any desired medical information and stores it for research and educational purposes.

The whole process described above can take place in minutes, enabling the patient to receive proper treatment quickly, and allowing the medical staff to move on to other pressing duties without a minimum of wasted motion and time.

Few hospitals, of course, are yet equipped with such an instant and all-embracing communications system. The expense is considerable, and so are the problems of using all the proliferating marvels of electronics. But the elements, in one degree of development or another, all exist:

"Pocket paging" now allows two-way communication between the switchboard and a staff member through a small radio receiver and transmitter about the size of a large wallet. It usually takes only a few seconds to locate and talk to personnel anywhere, even in a large complex of medical buildings. The cost averages about $125 for each receiver, which is less than the cost of most complete loudspeaker systems, including equipment, wiring, and installation. Pocket paging, moreover, reaches only the person wanted and does not disturb patients.

Telephone systems now allow staff members and patients to have their own telephones which act as inside lines as well as direct outside lines with private numbers. While not available in all areas, this "Centrex" system has been in use in Manhattan's Columbia Presbyterian Medical Center for about a year, and reportedly will cut in half the number of switchboard operators needed.

Physiological monitoring, only recently introduced, can measure as many as ten different body functions (blood pressure, temperature, electrocardiogram, electroencephalogram) on electronic devices by means of tiny sensory elements called transducers attached to the patient. These devices reproduce information on

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read-out equipment at any distance or location, allowing nurses, physicians, and members of the hospital's research and education staff to be constantly informed. (Some functions can be transmitted by radio, but the main system depends on cable.) Automatic alarms warn the nurse when preset danger limits of blood pressure, respiration, etc., are reached.

Since physiological monitoring equipment is quite expensive—up to $10,000 for each patient monitored—hospital administrators are weighing its advantages. Many small hospitals are considering it for intensive care or recovery rooms. Large hospitals and medical centers are already finding it a valuable aid in medical care, education, and research. The Perth Amboy, N.J. General Hospital, for example, last fall installed three portable monitoring units serving 15 beds as an initial step. And a major New York medical center plans to monitor any or all of the 100 beds in a proposed addition.

Closed circuit television systems are in growing use in hospitals, not only for education and entertainment, but for patient monitoring, and for security as well. Coordinated with audio-monitoring, information can be sent to receivers in many different locations simultaneously. TV equipment is portable, so it can be used in any part of the hospital on a 24-hour-a-day basis. The same camera can be used in the morning to conduct a maternity training class for new mothers, transmitting from nursery to bedside; in the afternoon to demonstrate new procedures from the X-ray department to a conference of radiologists; and at night to enable a small nursing staff to observe a large number of patients in scattered areas.

For medical training, a transmitted picture, unobstructed by doctors and nurses around a patient, can often give a closer view than amphitheatere observation. In surgery a TV camera placed overhead can be remotely manipulated by students in a seminar to "shoot" any angle or closeup of the operation in progress (see sketches, below). Not only can information be dialed at will, but it can be taped and replayed. Stored films of important operations or interesting cases can thus become a valuable new type of medical library.

Before long, two-way television may even let a doctor in his office "visit" a patient in the hospital, or a patient in isolation talk face-to-face with his family.

Data transmission equipment now allows records and other information once transmitted in written form by messenger or pneumatic tube to be carried directly from one location to another by cable. This can be done either within the hospital on special circuits, or through telephone lines outside the building. Messages, written on special forms, or spoken into new devices, are translated into electrical impulses and reproduced at another location. Data transmission devices being developed will become still more important for hospitals by saving the increasingly expensive time of technical personnel.

Computers are already being used in hospitals for medical records and accounting as well as for research projects. But as medical aids they can do a lot more than have a patient's bill ready within ten seconds of his discharge. Linked together in total systems, small-capacity computers, used for individual operations, can act as programmers to larger computers for larger projects. In this way, a computer center can become a major resource at the heart of the hospital—correlating, storing, and abstracting information at amazing speeds. Most hospitals will continue to rent rather than buy computers, since both their design and medical uses are changing rapidly.

As remarkable as these systems may seem individually, it is in combining them carefully that hospitals can realize the full potential inherent in each. To be able to operate at full potential, each system should have maximum flexibility built into it so that hospital administrators can adapt it to changing medical practices as well as its own most efficient use. Flexibility implies design on a modular basis to allow for future expansion, and for integration with other systems.

Combinations of systems, in fact, are beginning to form communications cores at the center of more than one hospital complex, with services spreading outward like tentacles. The implications for planning are, quite literally, widespread: closed circuit television, physiological monitoring, computers, and data transmission systems can operate over great distances; the need for one kind of space to be immediately next to a related space is less basic to hospital design than it once was. This means that spaces can become less specialized, and in fact interchangeable, if they are serviced uniformly so that any activity—be it medical care, research, or teaching—can "plug in" as needed and operate properly. Most communications systems can be provided in a vertical and horizontal pattern of duct spaces through which they can flow; future expansion and new systems can be accommodated by overlaying these spaces. Combined with mechanical and structural modules, these communications modules could transform hospitals into clusters of multipurpose cells as promising architecturally as they are medically.

This kind of flexibility can be more expensive to build initially. But hospitals tend to have a long life, and they must change as quickly as medical technology changes. Indeed, government support, through the Hill-Burton program, might well make special extra allowances for the building-in of flexibility to provide for future medical care, education, and research needs. This could be done by giving additional subsidies to designs that provide flexibility even at higher initial cost, and by establishing basic standards of space required as architectural guidelines.

The impact of communications, however, will not stop at the individual hospital's walls. One day the big medical centers in our cities may become simply the cores of whole integrated regional networks spreading out to satellite hospitals and clinics many miles away. Central medical records, stored and tapped electronically, may allow a patient to go to any outlying branch, and have his full medical history instantly available for proper evaluation and treatment. His local doctor may be able to use closed circuit television and physiological monitoring to consult on his health with medical-center specialists downtown. And research and education might benefit broadly too: medical centers could collect valuable information from greater sample groups of patients than has ever been possible before.
HOSPITALS: THE RACE WITH CHANGE

THE HOSPITAL IN THE CITY: N.Y.U.'S GIANT MEDICAL CENTER

The new $50 million New York University Medical Center is the first major U.S. medical center planned and completed since the end of World War II. Linked to the City's older Bellevue Hospital next door, it is also one of the largest in America, with some 4,500 beds to draw on. But its significance has less to do with size than with these two facts:

- It represents a serious attempt by its designers, Skidmore, Owings & Merrill, to make architectural out of a building type that is seldom graced by more than a massive institutional look.
- It is a study not only in intricate medical planning but in large-scale urban planning as well.

SOM laid out the center as five architecturally unified buildings. From the left in the model photograph below, they are: the partly hidden Institute of Physical Medicine & Rehabilitation, the tall slab of the University Hospital, the long, T-shaped Medical Science building with the lecture rooms of Alumni Hall in front, and the small tower of the students' and nurses' Hall of Residence. The basic scheme called for all buildings except the hospital and the dormitory to be arranged in a "jack-straw" pattern of closely related pavilions forming a six-story base for teaching and research. The 600-bed hospital was then stacked on top, the dormitory joined at one end.

As the air view (left) suggests, the basic SOM scheme has been followed closely. (During the seemingly endless 17-year period in which the center was being built, however, some of the architectural details underwent inevitable change—see overleaf.)

Whatever architectural compromises were made, N.Y.U. has concentrated on sound planning. It has tried to make urban sense not only out of its own small, four-block site but out of a large area around it as well. The motives were not entirely altruistic: N.Y.U. needed, and still needs, a lot of inexpensive housing for its personnel.

Planning the neighborhood

To this end the University, in 1947, agreed with the City to coordinate redevelopment of the whole ten-block area between First and Second Avenues, running from 23rd Street to 33rd Street. This area, which was scheduled for slum clearance, was to be developed to provide related paramedical institutions as well as plenty of moderate-cost housing ($30 to $35 per room per month). In the 17 years since, however, only three of the ten blocks have been redeveloped. On them stand the two handsome slabs of Kips Bay Plaza (FORUM, Aug. '61). But with average rentals of $65 per room per month, they are twice as expensive as the housing N.Y.U. had envisioned.

Happily, the prospects are brighter for the remaining seven-block area, Bellevue South. Under New York's new Housing & Development Board, this project will benefit from partial tax exemption and low-cost public mortgage loans, as well as controls on building costs. Bellevue South, now under review by the HHFA, calls for 2,050 units, one fifth of them to rent for an average of $18 per room per month, the remainder for under $30.

In planning its own five-building complex, N.Y.U. and the architects first laid out each department as if it were an inde-
pendent institution. From these separate studies, a common denominator emerged: a module roughly 20 feet square which could be multiplied or subdivided to accommodate research labs, offices, or patient-care units. All spaces are laid out on this module, with full mechanical services built in so that an office, for example, can be converted into a lab with a minimum of change.

Even before the center was completed, the loose arrangement of separate but linked buildings paid off in the redesign of the tall hospital slab. The tower was originally planned as a single-corridor, non-air-conditioned building. But once air-conditioning became economically practical, the advantages of a double-corridor system were apparent (plans, right): by making the floors shorter and fatter, and then dividing each into two nursing units separated by a back-to-back elevator core, the architects were able to cut down substantially the distance from patients' rooms to each nursing station (photo, below). This also allowed more space for seminar rooms and laboratories bracketing the core.

With the spread-out master plan, SOM could easily accommodate this basic design change without disrupting the center's overall organization. It did, however, disrupt the design visually, producing a building twice as fat, 30 feet shorter, and considerably less elegant than the original thin slab. Moreover, the fact that the fatter building no longer reached out to the street opened the door for a small three-story building housing doctors' outpatient offices, tacked onto the lofty slab (left in photo, opposite).

Still another dilution of the original scheme can be seen in the pattern of horizontal windows, one of SOM's earliest visual devices to unify the complex. With the strong horizontal sunshields on the hospital eliminated because of air conditioning, the facades suffer from glare inside and out, and from an inevitable jumpiness of the now-necessary window shades. And on the lower Medical Science building, a rash of protruding air conditioners advertises an earlier decision to do without central cooling there.

Overpurchase of land

N.Y.U. purchased its four-block site in parcels, bit by bit, for less than $10 per square foot—in an area where land is now being condemned for $25 per square foot. The university deliberately overbought land to allow for expansion; its wisdom is demonstrated by the fact that another major medical institution in New York, having exhausted its present site, is now buying adjacent land for $65 per square foot.

N.Y.U. has not come close to exhausting its site. The new buildings contain 1.25 million square feet, covering 32 per cent of the 11-acre property. Plans call for an additional 350,000 square feet (in research facilities), bringing the coverage up to 36 per cent.

In addition to having now the obvious pleasures of open space, N.Y.U. has provided for its future both in medicine and in the community. And it has provided well.

FACTS AND FIGURES

New York University Medical Center,
New York, N.Y.


Engineers: Seelye, Stevenson, Value & Knecht (structural), Syska & Hennessy, Inc. (mechanical, electrical).


Total project cost: $50 million, including $5.5 million in site purchase and improvement, largely financed ($43 million) by private funds. END
Several months ago, Novelist Norman Mailer devoted two of his columns in Esquire Magazine to an attack on contemporary architecture. A condensation of Mr. Mailer's columns is reproduced below, with the author's permission. Next to this condensation is a rebuttal written at FORUM's request by Vincent J. Scully, Jr., Professor of Art History at Yale. Following these two statements are a few final words by Mr. Mailer, written in response to FORUM's invitation to him to have the last word.

Mailer vs. Scully

Totalitarianism . . . has haunted the twentieth century . . . And it proliferates in that new architecture which rests like an incubus upon the American landscape, that new architecture which cannot be called modern because it is not architecture but opposed to architecture. Modern architecture began with the desire to use the building materials of the twentieth century — steel, glass, reinforced concrete — and such techniques as cantilevered structure to increase the sculptural beauty of buildings while enlarging their function. It was the first art to be enguished by the totalitarianists who distorted the search of modern architecture for simplicity, and converted it to monotony. The essence of totalitarianism is that it beheads. It beheads individuality, variety, dissent, extreme possibility, romantic faith; it blinds vision, deadens instinct; it obliterates the past. Since it is also irrational, it puts up buildings with flat roofs and huge expanses of glass in northern climates and then suffocates the inhabitants with super-heating systems while the flat roof leaks under a weight of snow. Since totalitarianism is a cancer within the body of history, it obliterates distinctions. It makes factories look like college campuses or mental hospitals, where once factories had the specific beauty of revealing their huge and sometimes brutal function — beauty cannot exist without revelation, nor man maybe without beauty. It makes the new buildings on college campuses look like factories. It depresses the average American with the unconscious recognition that he is installed in a gelatin of totalitarian environment which is bound to deaden his most individual efforts. This new architecture, this totalitarian architecture, destroys the past. There is no trace of the forms which lived in the centuries before us, none of their arrogance, their privilege, their aspirations, their canniness, their creations, their vulgarities. We are left with less and less sense of the lives of men and women who came before us. So we are less able to judge the sheer psychic values of the present: overkill, fallout shelters, and adjurations . . . to drink a glass of milk each day . . .

People who admire the new architecture find it of value because it obliterates the past. They learned at their mother's knee. The literate magazines have an eerie fascination for the visual arts that have a totalitarian value. Children would get emotional content, or, better yet, as sociational value. Children would get sentimental shots. It is an excellent nine-teenth century idea; I should have said that Mr. Mailer is simply uninformed, and his articles do have that lovely loose quality which only pure indifference can provide. For example, the work of Wright, Le Corbusier, and Aalto — not, surely, to mention that of Lou Kahn — flatly contradicts everything, absolutely everything, Mr. Mailer has to say. Just read it in reverse and you've got it, especially that bit about destroying the past.

I mean, in reverse unless Mr. Mailer actually wants those schools to be Romanesque in style. Why couldn't they be? The answer, one supposes, is another question, such as: Why couldn't the naked and the dead have been another CHANSON DE ROLAND? Maybe just a few old fragments could be built into them, though, like the Roman debris stuck on the walls of Italian apartment houses. Each piece might, as Mr. Mailer's comments suggest, be chosen for its peculiar emotional content, or, better yet, associational value. Children would get in touch with life and all through wounding contacts with them, like getting shots. It is an excellent nineteenth century idea, I should have said they had rather worked it out at the
MAILER (cont'd)

additional cubic feet of air space in elementary schools, does not see himself as a benefactor? Can he comprehend that the somewhat clammy pleasure he obtains from looking at knots and Romanesque oppressions is by the false, needless and useless ornament, origins, prejudices, not even a peaked roof or spire to engage the heavens.

This lack of ornamentation, complexity, and mystery I choose to call totalitarian. Vincent Scully must have all but deliberately missed the point. If the classic totalitarian regimes, Germany, Italy, Russia, were programmatic — no matter. It should be obvious that in 30 years an aesthetic movement can shift from a force which opens possibilities to one which closes them. Once totalitarianism is seen as a social process which deadens human possibilities, and therefore lets one accept my point that American totalitarianism (the repression having shifted from the force of the state to the power of the oppression which now takes place within each psyche), it is not too great a jump to declare that the Guggenheim Museum may be a totalitarian work of art, and the man who was, on a time, so imaginative as to design a house about a waterfall, must have taken, a long, long route before his death to end with the construction as ill-intentioned as the Guggenheim. That museum shatters the mood of the neighborhood. Destroy its possibilities. More completely, wantonly, barbarically than the Pan Am building kills the sense of vista on Park Avenue. It is too cheap to separate Mafia architects with their Mussolini Modern (concrete dormitories on junior college campuses) from serious modern architects. No, I think Le Corbusier and Wright, and all the particular giants of the Bauhaus are the true villains; the Mafia architects are their proper sons; modern architecture at its best is even more anomalous than at its worst, for it tends to excite the Faustian and empty appetites of the architect's ego rather than reveal an artist's vision of our collective desire for shelter which is pleasurable, substantial, intricate, intimate, delicate, detailed, fobled, rich in gargoyle, guignol, false closet, secret stair, witch's heath, attic, grandeur, kitsch, a world of buildings as diverse as the need within the eye for stimulus and variation. For beware: the ultimate promise of modern architecture is collective sightlessness for the species. Blindness is the fruit of your design.
WHAT'S BEEN HAPPENING TO CITY HALL?

American communities, engaged in a minor municipal building boom, are rapidly changing the face of City Hall. In 1872, when Owego, N. Y. built the redoubtable structure above, City Hall was a monument to civic pride and rectitude. It still evokes nostalgia, except, perhaps, among those who have to work in the dark corridors behind its fortress-like red brick walls. But today, as illustrated by the new administrative seat of Fullerton, Calif., at right, City Hall is likely to be bright, inviting, and not at all boastful of its civic dignity. Actually,
the symmetry and slender concrete arches of the Fullerton example, the work of Architects Smith, Powell & Morgridge, give it more monumentality than most of the current crop of municipal buildings, although even here the monumentality is of a weightless and unassuming sort. The building makes still another point about today's City Hall: it is a businesslike place, owing a debt to the efficiency of commercial architecture, with flexible office floors and public spaces put where they are most easily accessible (see ground floor plan at right). On the following pages are four other recent versions of City Hall, ranging from campuses of small buildings to compact multistory blocks, serving communities that vary in size from 5,500 to 450,000. All share some of the qualities that are described above, plus something more: there is scarcely a single gloomy corridor to be found among them.
In designing the 14-acre Municipal Center of suburban Tenafly, Architect Vincent Kling had in mind the character of a New England village green. The full range of municipal functions are thus distributed among four single-story buildings—library, offices, council chamber, and public safety, from left to right above—linked by a covered arcade. The 68-foot hose tower of the public safety building is the tallest structure in Tenafly, making the center its unrivaled focal point.

The four buildings are made of concrete block with a red brick veneer. They vary in size and shape, giving the complex a pleasantly random quality, but their strength is diminished by white masonry headers pasted above the windows and arcade columns. The windowless walls of the council chamber bear a cruciform pattern of bricks.

**FACTS AND FIGURES**

- **Tenafly Municipal Center, Tenafly, New Jersey.**
- **Architect:** Vincent G. Kling (Shirley Vernon, team designer). Associate architect for library: Ira Davey.
- **Building area:** 49,270 square feet.
- **Construction cost:** $1.24 million.
- **Unit cost:** $22.82 per square foot.
Cruciform pattern of bricks is repeated on both the inside and outside walls of the council chamber, which opens from the long central arcade.
The upper floors of the Ann Arbor City Hall by Architect Alden Dow seem to sprout from either side of a great brick wall in the center. Actually, the floors are continuous, and the brick element has three parts: identical towers on each end, containing elevators, stairwells, and restrooms; and a connecting penthouse above, containing heating and cooling equipment. The twin towers penetrate the four-foot-deep concrete spandrels which hold plenums for the building's ventilating ceilings.

The police, treasury, and health departments, which do a great deal of public business, are on the building's ground floor (plan left), and the council chamber is on the second, surrounded by a wide promenade deck for exhibits and outdoor ceremonies. Office floors from there up get progressively wider, giving the building something of the look of a rectilinear Guggenheim Museum.

**FACTS AND FIGURES**

IN PHOENIX, ARIZONA: WHITE PRECAST FACADE

The nine-story Municipal Building in Phoenix could be a clean-cut commercial building, but Architects Varney and Haver have provided three clues to its public character: a broad plaza, which even the most generous commercial client could scarcely afford; a dignified arcade of flaring concrete columns at its base; and a separate circular council chamber, whose blank walls attest that it is not a bank.

The arcade performs a non-visual function as well, shading the Municipal Building's ground floor from the hot Phoenix sun. The offices above have narrow gray glass windows in gleaming rows of recessed precast concrete frames. Exterior walls of the council chamber are exposed aggregate concrete panels, also precast, and the interior is richly finished in wood beneath the converging scallops of the roof.

FACTS AND FIGURES
IN MESQUITE, TEXAS: SKYLIGHTED INNER MALL

Architects Caudill, Rowlett & Scott solved the sun problem in the Mesquite City Hall simply by making its brick exterior walls very nearly windowless. The council chamber and municipal offices open onto an enclosed mall, illuminated by umbrella-shaped plastic skylights and shallow clerestories on the sides. The mall joins the building's two asymmetrical wings, and their concrete exterior columns become the mall's decorative interior posts.

The tidily zoned plan places the council chamber on axis with the main entrance, with folding doors so that overflow crowds can be seated in the versatile mall. The police department can be entered from the side without going into any other part of the building. And utility bills can be paid by automobile, night or day, through a drive-up depository in the accounting office.

FACTS AND FIGURES

Mesquite City Hall, Mesquite, Texas.
Architects and engineers: Caudill, Rowlett & Scott (Virgil Dean, project architect; Charles E. Lawrence, partner in charge of design; Edward F. Nye, structural engineer; Joe B. Thomas mechanical engineer). Contractor: Miller & Norton.

Building area: 10,305 square feet. Construction cost: $235,042.82, including equipment for the city jail and all site development. Unit cost: $22.80 per square foot.
Skylights, clerestories brighten the spacious mall, which leads light to the windowless offices. Police department has separate side entry (below).
Construction can be—and sometimes actually is—the happy climax to the entire lengthy process of creating a building. Construction also can be a nightmare of disappointment and discord, negating all the work that has gone before.

Whether construction is a climax or a nightmare will be determined, in part, by the client’s earlier decisions and the architect’s earlier labors: the care taken in the selection of the architect himself, of the consultants, and of the contractors; the realism of the design; and the precision with which which the design has been reduced to plans and specifications.

And it will also be determined by the client’s actions during the construction period ahead. The start of construction means changes in the relationship between client and architect, and it also means establishing new relationships—with contractors and building tradesmen. The client must know when to spend and when to save, when to authorize changes and when to stand pat, and, above all, when to take a hand in the building process and when to retreat behind the terms of the construction contract.

Experience is by far the best teacher in all these things. The only advice to be offered the first-time client, as construction begins, is (1) to keep his eyes wide open, and (2) to go by the book, insofar as possible. The trouble is that even the book is unclear on certain significant matters.

The architect administers, the contractor manages

The basic ground rules for the construction process can be found in the American Institute of Architects’ newly revised Handbook of Architectural Practice, and in the so-called general conditions of AIA's standard building contract. Together, they form the closest thing to a common law for the building industry, codifying both tradition and practice.

One of the significant matters which they leave a bit muddy is what the architect himself does while construction is under way. They are quite specific about a number of his functions, spelling out what he is to do about change orders, shop drawings, certificates of payment, and other essentials. But the lack of clarity concerns the most crucial task of all, which is seeing that the building is built exactly as it was designed.

“In administering the construction contract,” says Chapter 18 of the Handbook, “the architect determines in general if the contractor's work conforms with the contract documents.” But then it goes on in the very next sentence, “The architect is not responsible for the contractor’s failure to execute the work in accordance with the contract documents.”

This seeming ambiguity represents an attempt by the architectural profession to establish a distinction so fine that it

This is the final article in the FORUM series "What It Takes To Be a Client." The entire series of five articles shortly will be made available in the form of a special reprint.
would do justice to a medieval philosopher—out of the justifiable motives of client-service and self-defense.

The architect's role in construction used to be described as "supervision" or "superintendence." The abandonment of these terms by AIA came in response to a series of court decisions in which the architect's construction responsibilities in the eyes of the law were steadily, and somewhat frighteningly, broadened. Individual architects were held liable for mistakes that were clearly the fault of contractors, subcontractors, and others; it began to seem that the architect could be sued if a deliveryman tripped and broke his leg while bringing coffee and doughnuts to the carpenters.

The easy way out, of course, would have been for architects to disclaim any further concern with the contractors' work—after all, it is the builder, not the architect, who contracts to see that everything turns out as intended. But this would be an unacceptable abridgement of architectural services. For one thing, few conscientious architects want to give up some measure of control over the execution of their designs, except in unusual circumstances. For another, the concept of the architect as the client's independent agent, protecting the client's interests during the building process, is one of the profession's best counter arguments to the sales pitches of the package design and construction services.

Hence AIA's recourse to semantics, intended as a restatement rather than a change in the ways things always have been done. The term "construction superintendence" is donated to the contractor; it is he, says the Handbook, who is responsible "for delivering to the owner a project in full conformance with the contract documents." And it is the contractor who also has the duty of "management of the construction process."

Managing construction is much like managing any enterprise involving the production of goods. It entails such everyday managerial functions as the purchase and assembly of materials and components, the handling of personnel, and the coordination of a complex process according to a stated schedule of delivery. Not surprisingly, contractors have turned more and more to the methods of business and industry for management tools, from bar charts to the computerized critical path method of keeping the job going.

To maintain the analogy, the architect's relationship to the contractor is something like that of a member of the board of directors to the chief operating executive. The revised Handbook calls it "construction contract administration," a term which covers a multitude of functions.

The architect, to begin with, is the prime interpreter of the working drawings and specifications, establishing and maintaining the standards which the work must meet. He is the judge of whether these documents and standards are being followed, checking shop drawings of building components, approving samples of materials and equipment, and authorizing any necessary changes in the work. And he is the one who certifies progress payments to the contractor as the work proceeds.

He does these things by making "periodic" visits to the site, says the Handbook, introducing another unavoidable ambiguity. The meaning of "periodic" has to be worked out jointly by the client and architect on the basis of the particular situation at hand. Under a normal fee arrangement, on a normal size building, and with a normal lump-sum contract, it does not mean that the architect will camp at the job full time. Instead, he, his representative (often the same staff member who has seen the building through plans and specifications), or one of his consultants will try to be there at all crucial stages of the work.

There are many cases, however, in which full-time "administration" is indeed a necessity. If the project is large and complex, one or several permanent inspectors may be required. If it is awarded on a cost-plus basis, there must be continual auditing of man-hours expended and materials purchased. The client has the option of paying the architect extra for these extra services, or hiring his own inspector to keep an eye on things. The use of an inspector—sometimes poetically called the clerk of the works—can pay off handsomely, but he must be chosen with care and he should, in all cases, report to the architect. Otherwise, the client is only adding another strand to the already complicated web created by the various lines of authority over the job.

Lines of authority, from the client to the workmen

These lines of authority, somewhat paralleling the responsibilities outlined above, are spelled out in the general conditions of the contract, which place the client in the catbird seat. His responsibilities are few, although rather important—he provides the site and pays the bills—and his authority is ultimate.

The tricky part of the client's job is the delegation of this.
WHAT IT TAKES TO BE A CLIENT

authority to the architect and contractor. It is the client's money and the client's building, but he must rely almost entirely on his chosen agent (architect) and project manager (contractor) to see the job through. Should he take a personal hand in things, moreover, he can lose some of the construction contract's safeguards and guarantees—he, not the architect or contractor, can become responsible for defects in any parts of the work he has directed. The client, however, still has an ace in the hole: he can fire the architect any time, and he can dismiss the contractor for a variety of reasons, including tardiness or incompetence.

The authority wielded by the architect (or those reporting to him) is the delegated authority of the client. He can order the contractor to speed things up, to return substandard materials or building components, even to tear whole sections of the building out and start over, all in the client's name.

He is far from autonomous, however. He has a voice in the general procedures and even equipment which the contractor proposes to use on the project, but within these limits it is up to the contractor to manage things the way he thinks best. If the architect interferes unduly, he can unwittingly take on some of the contractor's legal responsibilities. And the client can, at any time, pull the rug of authority out from under the architect's feet. Some contractors (and even suppliers) are highly skilled at circumventing the architect and establishing a direct relationship with the client. Once this happens—and if the contractor turns out to be unscrupulous—the client is at his mercy, with no one to blame but himself.

The contractor has authority over the subcontractors (except when a segregated contract is used) and over the workmen (within the sometimes narrow provisions of their union agreements). Otherwise, as one author of a contracting textbook has put it, he has "few rights and many obligations." He is responsible for completing the project on time, within the contract price, and, as previously noted, in accordance with the plans and specifications. Even if these documents are incomplete, or are incorrectly interpreted by the architect, the contractor can be stuck should something go amiss unless he registers a protest in writing during construction. He also has prime responsibility for safety on the job. If he has submitted a lump-sum bid, he must exercise these obligations come hell or high water. Small wonder that the cost-plus system is gaining in popularity among the contracting profession.

Even going by the book, then, the distribution of responsibility, liability, and authority during construction is a delicate balance. In practice, the human factor is all-important. More often than not, it alone is what makes the balance work.

Sore spots: craftsmanship, changes, and the calendar

Were it not for the fact that client, architect, and contractor normally share a desire to see the job done well, very few buildings would ever reach completion. For there comes a time on every job when problems arise that could pit one against the other, and then "the book" is of very little help.

One area in which such problems frequently come up is quality of workmanship. The specifications are supposed to set the standards to be enforced on the job, but the specifications can only go so far—they would be endless if taken to the last fine point of craftsmanship. Also, there are some standards that neither words nor drawings can convey with precision. Specification of a certain texture in an exposed concrete wall, for example, may bring quite a different picture to the minds of the workmen than was in the mind of the architect.

Another sore spot can be the matter of changes and extra work. The source may be the plans and specifications themselves—the building process is bound to reveal gaps in even the most tightly drawn set of drawings and specs. Or it may be the architect, who finds that a detail that looked so masterful on paper looks crude and clumsy in place. Or it may be the client, who suddenly blurts out a long-suppressed feeling that he has always hated one kind of paneling, and would like another wood instead.

A third creator of crisis can be the calendar. The job is going swimmingly—and then comes a strike, a shortage of materials, a long spell of rain, or a virus that runs rampant...
through the building trades. The client has made all sorts of plans—and established his budget—on the basis of a schedule which (he thought) allowed plenty of time for contingencies. The contractor has agreed to meet the schedule. But now the entire project has bogged down, and there is no telling when it will get going again.

Enter the human factor. The architect, when he finds sloppy workmanship, can rant against the decline of the building crafts, demand that the whole thing be done over, and hint darkly that he intends to blacken the name of the contractor unless the level of quality improves. The contractor, when he finds holes in the drawings or is asked to make a minor change, can tell the client that he expects to be paid for every extra minute his men spend on the job, and pointedly ask why the client didn't get a more realistic architect. The client, when he finds the job falling behind schedule, can squeeze the last penny in penalties out of the contractor, even if it drives the contractor close to bankruptcy.

The result of such behavior—in each instance perfectly justified by the terms of the contract—is to make big problems out of little ones, and, quite possibly, to bring the whole project to a temporary halt. Fortunately, very few architects and contractors act that way, and the wise client emulates the restraint of the majority. His most effective safeguard is not a bond, or the authority to withhold payment, or any such device; it is the desire of most building professionals to do good work, and to maintain reputations it has taken years to build.

Once in a while, however, a major crisis is allowed to develop, and then it is time for arbitration. When the dispute is between client and contractor, it is the architect who is the arbiter. This is the major difference between the architect-client relationship at this and at earlier stages. The architect is still the client's agent, but when the client and contractor disagree, the architect is expected to render an impartial, professional judgment.

Should the disagreement be a serious one, or should the architect himself be involved, it is common practice to resort to a more formal sort of arbitration. AIA offers a standard form of arbitration procedure, and a similar code issued by the American Arbitration Association is sometimes used. Normally, a three-man board is appointed, whose members are familiar with construction practices, and this board decides the dispute after a full hearing of both sides. The most significant advantage of arbitration is that work can proceed pending the decision.

**What to do before sending for the moving van**

At some point during the latter stages of construction, the client is likely to wonder if the process will ever end. The shell of the building went up fast enough, but now the finish work seems to be dragging on interminably. Then he gets a call from the contractor: his men should be through in about ten days; the client can begin to make his moving plans. Thus begins the ritual of closing out the project. The architect makes one last inspection, more searching than any that have gone before. If he finds deficiencies, they must be corrected; if not, he recommends to the owner that the contractor be paid in full and the building accepted. Sometimes, when the owner is in a hurry to move in, he accepts the building as "substantially completed," meaning that it is ready for use even though some work may remain to be done.

The amount owing the contractor on acceptance is the last of the progress payments plus the so-called "retained percentage." This is the amount which the client will have held back from earlier payments to the contractor; usually it runs between 5 and 20 per cent of the total. The retainage is a form of insurance that the contractor will not leave the job until the client and his architect-agent are fully satisfied.

Before the contractor gets his money, he is asked for a release absolving the owner from liens or claims from subcontractors, suppliers, or others. Otherwise, the owner might find his building attached six months hence because of a bill the contractor neglected to pay. If any liens or claims are outstanding when the building is accepted by the owner, they are deducted from the contractor's final payment. The owner also receives a warranty from the contractor for a set period of time, usually a year, after acceptance. Should the roof leak or the walls develop cracks during that time, the contract requires that the builder come back and fix things up.

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This column base, outside a warehouse at 20 Greene Street, shows how freely the prefabricators of our Cast Iron Age departed from conventional neoclassical detail. Some of the applied ornament was designed to cover bolts used in assembly. Opposite: a row of cast iron fronts on Worth Street.
In one nearly forgotten rectangle on the map of Manhattan, off lower Broadway, there stands a grimy collection of some of the most extraordinary buildings constructed anywhere in the past 100 years. These are the cast-iron-and-glass-faced commercial structures that were the standard American vernacular during the brief half-century after their inventor, James Bogardus, first patented this system of prefabricated building in 1850. Most of the structures shown here, in photographs taken for *Forum* by Walker Evans, were assembled from more-or-less standard elements—columns, lintels, arches, etc.—available from manufacturers such as Daniel Badger, whose Architectural Iron Works supplied some of the earliest of these prefabricated metal walls. Their detail was neoclassical, and the only way to make certain, nowadays, that one is looking at a “genuine cast iron” façade is to spot one of the bolts used in the construction.

Today these façades are important to us as forerunners of 20th century building technology, for some of these structures have a higher percentage of glass than the ultramodern Seagram building uptown. Alas, though these samples of America’s “metallic renaissance” are now revered by architects and historians, they are contemptuously ignored by many of their owners—some of whom have begun to “modernize” the stately façades with the trashy materials of the jukebox trade—or have simply torn them down, to make way for a nice big parking lot…

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**AMERICA'S CAST IRON AGE**
At the corner of Broadway and Broome Street (above) stands a store designed by J. P. Gaynor in 1857. Although the 5-story building suffers from some neglect, it has not been seriously defaced by latter-day improvements.

462 Broadway (opposite) is a building with unusually graceful columns. Unhappily, the ground floor has been "modernized."
A VEST-POCKET SKYSCRAPER IN HOLLYWOOD

Rising out of the sprawl at its base like some tall exclamation mark, Hollywood's new Sunset-Vine Tower (opposite) is an improbable building on several counts:

- It is a skyscraper with pint-sized typical floors 72 feet square, containing only 4,200 square feet net.
- Its simple silhouette and the restrained sobriety of its gray glass and aluminum walls are a surprising and welcome exception in a city whose buildings tend to exotic shapes and bright hues.
- It is the only high-rise building for miles and, for the moment, the tallest in all Los Angeles.
- It carries its vertical ductwork on the outside, applied to eight perimeter columns (photo, right), thus eliminating space-consuming chases inside.

The 20-story shaft, set back from the busy intersection on a landscaped plaza, took its unusual dimensions partly from the nature of its rental market. Coming after a long dearth of speculative office construction in Hollywood, it was planned to attract the galaxy of small firms—advertising, public relations, talent agencies, and others—who serve television and motion pictures. But the most important reason for the tower's tall, lean look was the wish of the client, Los Angeles Federal Savings & Loan Association, to make it exactly what it is: the dominant landmark of the entire area.

To squeeze the maximum rental area out of the tiny office floors (which have an efficiency factor of over 80 per cent), Architects Honnold & Rex applied the vertical ducts to the perimeter columns (see plan detail at right); the ducts are serviced by fan rooms on the second floor feeding up, and on the nineteenth floor feeding down. They and the narrow, closely-spaced aluminum mullion strips, both stopping short of the ground, give the building its strong vertical emphasis.

The 300-foot-high tower contains 16 tenant floors which rent for an average of $6 per square foot per year. The floors are column-free, with a central elevator core and two stair and toilet cores at opposite sides of the building (plan, lower right). Local codes,
which require at least one smoke tower with direct access to the outside, were responsible for the placement of the stairs along the perimeter, but their position in the east and west walls also reduces air-conditioning loads.

The tower's structure is also unusual. There are eight perimeter columns, pulled back from the cantilevered corners. Pairs of these beefy columns (they are as wide as 56 inches on the first three floors) are joined by girders on each of the building's faces to form ladder-like, moment-resisting frames 20 stories high. All lateral loads are taken by these frames; the loads are transferred to them by the floor slabs. The slabs, which are composed of a 1½-inch corrugated steel deck and 5½ inches of light-weight concrete, also act as stiffening diaphragms against torsional movement.

Generally in shade, the recessed, solid base sets off the mass of the tower above. The base is even tighter in area than the office floors and has a total height of 38 feet. Yet shoehorned within it are a small tenant lobby; a customer service area for Los Angeles Federal; and, on a mezzanine, the firm's branch offices. The low mezzanine floats over the tellers' counters (photo, above right) and is reached by a stair to one side.

There is space for 11 cars on grade at the rear of the site. Most of the parking, in fact 40 per cent more than was required by law, is provided by three underground levels which were designed with one-way circulation to facilitate self-parking.

FACTS AND FIGURES
A SPLIT-LEVEL SHOWCASE IN MANHATTAN

Behind the big arch at left is one of the most exciting stores in one of New York's most sophisticated shopping areas. At Design Research, Inc. (also known as D/R), shopping, as the saying goes, is fun—partly because of the handsome and intriguing merchandise, and partly because of the way the building has been remodeled. Among the things that make D/R such an interesting store is its multilevel plan—for D/R is a shop on seven levels, with a split-level system of stairs connecting the seven. One result of this split-level plan is an almost constant change in ceiling heights; another is a sense of spaciousness not normally found in an 18-foot-wide New York townhouse.

The interior of the store is in sharp contrast to the classical façade, which was left untouched. Built in 1877, the structure was first a plush town house, next an art gallery, then a fashionable milliner's showroom, and, finally, another art gallery before D/R leased the building. Remodeling sometime in the past set the entrance and lobby at street level, putting the first floor several feet below grade and making a mezzanine out of the original first floor.

For D/R, the basic spaces inside were kept intact. An open stairwell was removed, and an enclosed fire stair leading directly to the second floor was put in above the stairs to the mezzanine (picture, facing page). The existing mezzanine was cut back to give more space to the

Both the first floor and the mezzanine of Design Research, Inc. can be seen through the high arched display window (left). A reverse view of the entrance as seen from the front of the mezzanine is shown on the facing page.
entrance lobby. Throughout the store spot lighting is used. The walls are a white plaster, except for a few areas where the brick party wall has been exposed for contrast.

D/R is the brain child of Benjamin Thompson, one of the partners in The Architects Collaborative and new chairman of the Harvard Department of Architecture. His concern with the design quality of furniture and furnishings led him to open the original D/R store in Cambridge, Mass. (FORUM, Sept. '59). He approves all items for sale and personally picks out many of them.

Most of the merchandise at D/R is imported, such as glassware and handscreened prints from Finland, handspun wool fabrics and rugs from Malta, and leather boxes from Italy. Among the American products are a down-filled sofa and chair group, a sofa-daybed, and butcherboard tables in a variety of heights, all designed by Thompson.

Finnish dresses, like the one in the front window, are part of the store's wares because Thompson believes that design is an "all-encompassing world" and that fashion is part of this.

FACTS AND FIGURES
Design Research Inc., 53 East 57th St., New York City. Owner: Design Research Inc.
Architect: Benjamin Thompson.
Associate architect: Paul Dietrich.
Mechanical engineer: Samuel Schiffer.
Interior designers: Benjamin Thompson & Paul Dietrich.
Contractor: Alfred Benzenberg.
Building area: 8,000 square feet.
Remodeling cost: $77,000. Furnishings and equipment: $11,000. Square foot cost: $11, including equipment and furnishings.

In the back of the main floor, three steps lead up to a small, skylighted room (2 in section) with special displays. Stairs at left lead to the mezzanine.

On the landing between the mezzanine and the second floor there is a small niche (3 in section) perfect in scale for displaying children's furniture. Brick party wall at left contrasts with drapery hanging on back wall. Furniture and accessories for cooking and dining are displayed on the mezzanine (photo opposite and 4 in section). Spotlights mounted on metal tracks are used throughout the store.
Late last year, in Havana, on the occasion of the Congress of the International Union of Architects (U.I.A.), Diana Rowntree, an editor of the British magazine, *Architectural Design*, made a quick, on-the-spot survey for FORUM of the new architecture of Cuba since the advent of Castro. For familiar reasons, no U.S. architects attended the Havana meeting and few, if any, U.S. architects or other qualified U.S. judges of building, planning, and design have seen what has been built under Castro.

For that reason alone, FORUM is publishing this first-hand survey by an expert qualified to make such judgements and experienced at making them. Mrs. Rowntree's conclusions, like her judgements, are her own, and she has not attempted to measure the cost, in human terms, of the practical achievements of the Castro regime in the field of building. Except for some unavoidable condensation, Mrs. Rowntree's very personal account of those practical achievements as she saw them, is published herewith as she wrote it.—ED.

*The new architecture of CASTRO'S CUBA*

BY DIANA ROWNTREE
One cannot tour Cuba in a wok. What I did was to talk to every Cuban, architect or otherwise, who came my way, use my eyes, and pour over the records of the photographic department at the Ministry of Construction. These findings were continually checked against those of other members of the Congress of the U.I.A., of all nationalities, and amplified by their findings.

I judge with English eyes. That is to say I am used to a building speed as slow as any in the world, to poor workmanship and to a somewhat defeatist attitude to environment. It so happens that the particular virtues of Cuban architecture today are speed, realism and a sense of infinite possibility. Make allowances if you like. On the other hand what better formula could you find for architecture, or any kind of creative art, than a combination of realism and a sense of infinite possibility?

Judging by the balance and excellence of their buildings, Cuba's architects seem to be of a high order. Some of them are immigrants from Europe fleeing the defeatist attitude I have mentioned. It is not easy to know whether to ascribe the quality of the work—both the crash program of essential building, and the superbly finished exhibitions put on for the Congress—to the talents and training of the architects or to the favorable climate in which they work. (By this I mean their ideal relationship to the society they serve.) Naturally the result of the revolutionary effort and the present period of creative enthusiasm is to form a united society, in which the architect's role is obvious: buildings are desperately needed.

Happily in this set-up, there is no one with the time to spare—either bureaucrat or tycoon—to interfere with the architect's activities. He therefore takes the whole responsibility for the aesthetic character of his work, a rare if not a unique situation in the world today.

We did not expect to see a great volume of built work. We expected to assess the future architectural outlook according to the thinking of the architects and the organization set up to carry out Cuba's building program.

The organization was impressive in itself. Building activity and the supply of materials were coordinated within a single ministry, which had, even at this pressing stage of development, set up a research department to take stock of mass-production techniques. The proof of its productivity and flexibility was to be seen everywhere: flats, hospitals, cooperatives, schools, universities and factories just as one would expect, though in greater quantities. The unexpected item was the New Arts Centre in Havana (1, 2, 3), an elegantly finished tour de force by Ricardo Porro, the most idiosyncratic work of art ever produced, I imagine, by a people's revolution.

The problem of being an underdeveloped country—"that tremendous limitation" as Castro described it in his closing speech to the UIA Congress—is the need to begin everywhere: flats, hospitals, cooperatives, schools, universities and factories just as one would expect, though in greater quantities. The unexpected item was the New Arts Centre in Havana (1, 2, 3), an elegantly finished tour de force by Ricardo Porro, the most idiosyncratic work of art ever produced, I imagine, by a people's revolution.

The productive industries succeeded housing in priority of building; however, it was in the painful experience of the initial housing drive that the Cuban architects came to terms with the realities of their situation. Though there was no great architecture produced in Havana in the years before the revolution, the general standard was extremely sophisticated. So it was natural
for the revolution to start off its slum clearance program in the manner of a highly developed, rather than an underdeveloped nation, using the latest architectural and building techniques.

Havana del Este (4, 5, 6, 7, 8), the dormitory neighborhood that lies between the eastern motorway out of Havana and the sea, is a high-density development that can stand comparison with any new town in the world that antedates the new British town of Cumbernauld. Havana del Este now houses 3,000 families with their schools, canteens and social and sports facilities. The spaces between the buildings are subtly, and extremely successfully, related. The planting is handsome, yet it takes into account the fact that many of the children brought there from the worst slums of old Havana had no experience of gardens or plants at all. Space standards in the apartments were higher than those current in Europe, and seemed ideal.

Havana del Este photographs extremely badly (6). The density is so high that composite shots show a crowd of tall buildings, while intimate shots in the small enclosed spaces give no impression of the neighborhood's urbanity. The color too, so masterly in fact (with predominantly light tones but enough strong ones to keep it alive), gives a garish, patchy impression when reproduced in black and white. The detailed design of the buildings is very varied, without the unity of material or any obvious discipline of design as there is at Roehampton.

The variety of these color schemes does, however, disguise a strict unity of scale. There is also a unity of intention. As you walk round the place you notice certain details recurring in quite different designs: for instance, the articulation of the joints between concrete members, as though they were timber beams overhanging their posts. This underlying agreement of style and discipline of scale may account for the astonishingly general admiration for this project among the U.I.A. delegates from 60 nations.

A minor mistake at Havana del Este was the reliance on color washes on the concrete and rendered surfaces. This Cuban tradition is out of place in the new set-up. No modern society, certainly not an egalitarian one, can afford so much expenditure on maintenance. Havana itself is a city of peeling paint, and the Ministry's research unit is considering permanent finishes for the concrete which is now Cuba's basic building material.

Havana del Este proved to be outside Cuba's present economic "realities." This word occurs continually in Castro's thinking and it is equally evident in the buildings themselves, and in the variety and the appropriateness of the forms that are being tried. Tall buildings, for instance, need elevators, and since these must be imported, their use strains Cuba's balance of payments. So the attempt to build high-rise apartments as the highly developed industrial nations do, has been abandoned (9, 10, 11, 12, 13). So, at the other end of the scale, has the attempt to build co-operatives at very low density in keeping with the farmer's traditional preferences. The farmers are reported to be accepting electric light and modern drainage as a fair exchange for their solitude. With three criteria to guide them—i.e., "that housing be functional, economical, and pleasant"—Cuba's architects are concentrating their energies on lowering standards of space and cost.

The research unit of the Ministry of Construction is systematically exploring ways of mass-producing housing, just as it experiments with ways of industrializing the production of railway sleepers, pylons and multistory stanchions of reinforced concrete. Since Portland cement is produced in Cuba, concrete is the most economic building material, although steel production is increasing. The elegant and extremely informative Construction Exhibition arranged for the U.I.A. Congress (which included Cuba's first home-built
portal crane) showed many housing solutions: large-panel construction for walk-up apartment blocks, buildings raised story by story with sectional concrete floors that interlock, panel frames ready to be filled with blocks of local clay or bricks, and a pair of dwellings whose components can be assembled without mechanical aid...

Cuba's factories are neater than some of our free-enterprise industrial structures that have to compete to catch the eye (15, 16). But architecturally, Cuba's new factories are nothing wonderful. I had the impression that the pick of the architects had been working on housing, educational building and resort building, which has a special significance in the revolutionary scale of values. In spite of the Cuban climate and the extent of the coastline, beaches, before the revolution, were the prerogative of the wealthy. So the development of "Peoples' Beaches" and resorts (17, 18) is a telling symbol of a new way of life. There are two present styles of resort building, the traditional thatched hut, usually circular, and simple concrete forms, usually barrel vaults or sweeping curves.

Every form of school is being built (19, 20): nurseries, elementary schools, high schools, pre-university schools, universities, and technical colleges. The Technical University of Havana is one of the most interesting in terms of construction. It is going up quickly even by Cuban standards where construction time is often measured in days. A hydraulic system is being used here. The columns are built first, with the hydraulic gear attached to them. Then the seven floors are cast on the ground, in the form of box grids, one above the other. Next, the floors are hoisted into position. Finally, infill slabs are dropped onto the concrete grid.

The universal problem of providing modern educational opportunities for children from scattered farms and mountain home-steads is being tackled in Cuba by the creation of "School Cities"—complexes of boarding schools for children of all ages, with a total population of up to 20,000.

In the midst of this all-out production drive the Cuban architects managed not only to produce two beautifully finished exhibitions for the U.I.A. Congress, but even to have them really and truly finished for the opening. The Cuba Exhibition, which will be a permanent feature of La Rampa, is a cross between a woodland glade and a museum of social history. The Construction Exhibition, mentioned earlier, showed the range of projects that are under consideration and construction, to the music of a mechanical vibrator and the smooth motor of a great new crane. The organic looking concrete forms that provided the visual appeal were not thought up for the occasion, but are the components of prefabrication projects.

"We are babies at planning," one Cuban architect told me. And it is disturbing to see that for all the fresh architectural approach and business-like performance, this new nation may still repeat the mistakes of those nations whose industrial revolution preceded the invention of the automobile. It is, of course, possible that the automobile may be obsolete before Cuba reaches the stage of prosperity where this machine becomes a major problem. Havana del Este, for instance, is planned on pedestrian principles, with a ring road for cars and limited service access.

But the idea that one day every one of the 3,000 households in this new development may own an automobile is being side-stepped, for so many problems are more pressing. Nevertheless, building new communities at the speed they are doing, the Cubans will be very unwise to dodge this consideration much longer. If the automobile lasts another century the Cubans will find themselves in the same muddle that older nations are in now.
PLYWOOD: NEW SHAPES YIELD NEW STRENGTH

The plywood supporting the scalloped roofs of the little lakeside pavilion at left is behaving in a significantly different manner than most of the 2 billion square feet that went into U.S. commercial, industrial, and public buildings last year. Its behavior, moreover, points the way both to more efficient use of plywood's inherent strength, and to more imaginative shapes for plywood components.

The key to all this is simply turning sheets of plywood so that structural loads, instead of being taken on the flat sides of the panels, flow through the edges. In the pavilion, part of the desert new town of California City, Architects Smith & Williams upended plywood panels and cut them into a series of umbrella-like arches. The panels thus act as structural diaphragms, resisting stresses through their breadth rather than just their thickness.

Turning the panels also gives architects a wider range of space-enclosing forms to work with, as shown by the pavilion, the church at right, and the two buildings on the pages which follow. As knowledge of the behavior of plywood diaphragms increases, so does the freedom to try new shapes without exceeding the limitations of the material.

**Testing for reliability**

The idea of using plywood this way can be traced all the way back to studies made in the 1940's by the U.S. Department of Agriculture's Forest Products Laboratory. But its development into a usable tool of design was largely the work of the Douglas Fir Plywood Association's extensive research and testing program.

This program, in fact, has a good deal to do with the plywood producers' record as the fastest growing major industry in the U.S. during the past decade.

Begun in the late 1930's with a few men in the basement of an office building in Tacoma, Washington, DFPA now has an 85-man technical staff and a battery of advanced testing equipment (left). The first significant result of its efforts was the gradual evolution of a series of reliable formulas to predict the complex behavior of plywood in a wide variety of configurations. Subsequently, DFPA's research produced a whole vocabulary of plywood structural forms—box beams, folded plates, stressed skin panels, plywood gusset struts—that can now be used as confidently as a standard beam.

As these standard components found their way into thousands of structures, information on their behavior was fed back to the DFPA laboratories. It is this experience-based information that has made more complex, freely formed structures possible.

**Fabricating the shapes**

To aid in the application of this research, plywood fabricators throughout the U.S. have joined in support of a quality control agency, Plywood Fabricator Service Inc., that certifies components to be plant fabricated to DFPA standards. When the units are large and complex, however, they may be more easily assembled in the field, using relatively simple joining details.

For example, the eight vertical sheets that cantilever out from the columns of the Smith and Williams pavilion and church are attached by welding along a steel plate that is fastened to the bearing edge of the plywood with screws (see detail at right). The larger brackets, those used in the church, cantilever some 18 feet from the support. They are made up of several sheets of 1/4-inch thick plywood joined with both factory-made scarf joints and shiplap field splices. To further stiffen the web of plywood, 5-inch-wide flanges made up of four layers of 3/4-inch plywood were laminated in a curve and attached to it at top and bottom.

The California City buildings clearly demonstrate the edge-loading principle, but their design puts only modest demands on its potential efficiency. The folded forms shown on the following pages are more complex in their behavior, combining the strength of the flat sides and edges of plywood panels to extract the most enclosure from the least material.
BIG PLYWOOD TRIANGLES
ROOF TEMPLE SANCTUARY

The 12 enormous triangles that were stacked together to roof the sanctuary of the Sinai Reform Temple in Bayshore, N.Y. are probably the largest plywood components ever made. At their base, the units follow the outline of Architects Edelman and Salzman's Star of David plan. But then they soar upward at six different angles to form an irregular pinnacle some 42 feet above the floor of the bema (drawings, right).

The panels of this complex folded plate roof, for which structural engineer was John Mascioni, were far too large to be transported to the site from a fabricating plant (the longest has a 72 foot chord). Instead, they were built up on three simple work platforms a few yards from the foundation (photo, bottom right).

The intricate geometry of the roof made it necessary to calculate the true sizes of the panels to an accuracy of one ten-thousandth of a foot. And although a two-inch clearance was specified at the intersection of the panels (see detail), the builder had to hold construction tolerances to 1/16 of an inch for each unit.

To meet these close tolerances, the fabricators, Weldwood Structures, Inc., had the boundary members of the triangles laminated from carefully selected Douglas Fir in a West Coast plant. When these were joined in the field they formed an extremely accurate jig for the attachment of the grid of 2 by 6 stiffeners and 3/4-inch plywood cover.

Two cranes were used for the delicate erection job. While one crane supported the steel compression ring set atop a light scaffold, the other swung the panel onto the bracket supports that were designed to make the roof hover over the foundation (detail, bottom right). Then adjacent panels were joined by welding a steel angle into the space between the channel-shaped edge members of the panels. The critical test of the calculations and workmanship came when the last panel was swung into place. It fit.
In nearly completed structure, plywood roof hovers above glass walls.

Because they span 176 feet, the slender beams that make up the festooned ring of structure around St. Peter's Church in Linda Mar, California are precast concrete. But a search for the most effective enclosure for this church-in-the-round led its designers (Architects Mario Ciampi and Paul Reiter, Structural Engineer Isadore Thompson) to the system of multifaceted plywood components shown on these pages.

Each of the 20 segments of the folded plate structure is suspended from a concrete beam at only two points (see details at left). This arrangement reduces to a minimum the amount of structural material required for both the beams and the roof deck. None of the roof load is brought into the center section of the sloping beams where it would produce the greatest amount of bending stress (section, left). And the diaphragm stresses in the plywood sheets are tensile rather than compressive since they are supported from above. Plywood has a greater reserve of strength in tension than in compression.

The resulting structure is so efficient that only 3/8-inch plywood was required for the skin. The stiffeners, which span 20 feet across the widest part of the components, are only 2 by 4's.

The contractor, Pacific Coast Builders, fabricated the components over a jig on the building site (photo, bottom left). To be sure each unit would be exactly the same size, the first one made was taken apart and used as a template for the others.

The problem of construction tolerance was virtually eliminated by the method of connection. Because of their shape, the units could be moved up or down along the long 1 1/4-inch supporting bolts until they locked together like the stones of an arch. When the right height was found, the bolts were welded to a steel plate in the component. Finally, adjacent components were fastened together with bolts every 2 feet along the valley edge members.
THE EARTHBOUND FEET OF ANTAEUS

Beauty was something that hardly got mentioned publicly by modern architects or periodicals over many years. To say that nobody cared would be false. Yet a great deal of ugly stuff was built, as happens when new ideas are being worked out. "Functional" ones.

Today is more sophisticated, and younger editors are able to rave about a new university building about which it is agreed that there is no importance in whether it works or not. But it is called beautiful, melding as it does the handsome manners of Wright (pre-1920), Corbu, Kahn, new brutalists, and its author Paul Rudolph; while historians think they are able to cite still more distant formal sources.

The historians would be more convincing if their buildings stand best also to precedents of meaning. For such a building seems to stand at the end of a line, not a beginning. Meaning has become diffused.

There is of course a fine survival possible to a building with so grand a counterpoint and so rich a presence. Like Gothic churches at the end of their period, it may enter history. For a few buildings in every age step out of the time-frame in which they were built and into a more or less conscious position, in which it does not matter whether the use of Versailles was cruel or whether Athens was destroyed by the Acropolis or France nearly bankrupted by her cathedrals.

Generally speaking, however, those buildings stand best which reflect their period's growth lines. They leave an account not only of forms but of beliefs to which the stones gave proclamation: form and content.

In terms of content, I find two kinds of architecture most imaginative: one bent toward magnanimity, one toward revelation. I never did like the usual description of the conflict of our times in terms of beauty vs. "functionalism." For functionalism is only the bare bones of something bigger—magnanimity, with its own kind of handsomeness. It was magnanimity that gave the age of science its appeal: the promise of control; it would be benign provided men were good enough.

But William Jordy recently pointed to a heap made by the early Le Corbusier. Corbu liked cars, ships, planes, not just because they function well but because "these are the things that move us." So his translation of their kind of form into architecture was not so much functional as symbolic, bent less to service than to revelation, celebration.

Today that faith in magnanimity is gone, along with the belief in an imminent social advancement; fear rules instead. So forms alone remain out of the great upheaval, and happy compositions remain, and architects hasten to adapt them and fit them in with their universities' earlier eclectic left-overs.

And that is where, 40 years ago, I came in, for in the student magazine on which I started my architectural voyage I called these earlier products of sentiment and mannerism "flotsam and jetsam." Is it not time that we overcame our fear, and seized our souls, and went ahead? Sure death awaits the "West" on the fear-ridden path that it now takes. For the West now threatens the world with total destruction through science, but refuses to apply and to proclaim in its art what science has given it as benign powers. It is said that American chemical companies right now could turn out housing for Africa by the mile, at a cost not much above mud huts, though really sanitary. To be sure, these would not yet be esthetically "interesting." But this would not only house the primitive nations; it might wow them. For it would be a most inviting architecture of total habitation. If such magnanimity could be shared, not "given," it would greatly overcome our ill repulse as science's "bomb-carrying devils."

Back in the 1920's I learned of the need that architecture has for statesmanship, and a chief exponent was Lewis Mumford, once a great mentor (though only three years older). Yet as he took the high road (and I was among the many who took the low road to develop a real skepticism about those who subject whole ages to scorn out of philosophical principles—including Mumford's phobias about the "machine age." For architecture is complex and tricky, and yields sudden, unexpected human triumph; but it reveals many of its tougher secrets only to those who run its daily errands.

Like the mythical giant Antaeus, the creative architect is intrinsically earthbound, and, from time to time, out of being bound to earth and time, he develops unexpectedly constructive powers. So the critic who sticks close to those who run its daily errands can learn much more than he teaches. I have had innumerable surprises that keep me from being a pessimist. Things that seemed never to want to yield on general principles would suddenly yield to architects' daily trying. Fulcrum points would be found, unexpectedly.

As Paul Valéry set forth in his essay, "Eupalinos," architecture lives only in the present day or slightly ahead of it; the roots of architecture are in the ground literally; its models come from there; no matter what doubts the architect may entertain, or what hopes for a distant future, he has no choice but to act, here and now, and his action constitutes a statement. His building says something, and says it in hard materials in physical combinations which, once in place, listen to no further explanations.

It is in that daily life that journalism must live. The reader has the good luck that space is not left on this page for bragging about bits of earthy leadership through journalism, especially in the new realms of urban architecture. So too there is left no space for a defense of journalism for being scattered. And we editors all go out as we came in—whipping boys for architecture's sensationalisms. Our best recollections are of times when we helped prepare a path for a greater or lesser genuine triumph.

To younger journalists all good luck, and one belief: the time is here again when architecture should establish greater contact with people by the million. And this pen will keep on exploring.

Dear Editor,

The earthbound feet of Antaeus.

C. J. H. Faull

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Designing to meet a medical facility's special conditions of temperature, humidity, air cleanliness and circulation

The environmental requirements of today's hospital increase the demand for total air conditioning. Thirty years ago, air conditioning a hospital was big news. In fact, air conditioning anything was new and exciting; the concept of a controlled indoor environment had just dawned.

Many basic ideas now common in air conditioning practice were born in that period. Force-fed by the pressure of great building programs, they matured and were refined into highly efficient systems. But they had their limitations.

The vast volume of air used to heat and cool a large building required extensive mechanical equipment and ductwork. Wet refrigerating coils had a bad habit of accumulating and propagating airborne contaminants. These deposits tended to develop into colonies of bacteria and other micro-organisms which passed into the air stream during the system's operation.

Great strides were made by filter designers to reduce this hazard. But one weakness of the filter remains: it has to be serviced regularly and faithfully by human beings — and is subject to consequences of their vagaries.

Need for a New Approach
The basic ideas of the 1930's were great in their day, but we are now in the mid-1960's. The need now is for an up-dated approach to hospital comfort control — one that takes into account the special conditions of the hospital.

Designing an air-conditioning system to satisfy these particular requirements differs from designing for other building types. Problems indigenous to hospitals are:

1. The need for 100% exchange of air.
2. Complete control of airborne contamination.
3. Temperature, humidity, and air movement favorable to a patient's health and comfort.
4. Cleanliness and ease of maintenance.
5. Economy — both in first cost and in operation.

There is a new awareness of air conditioning as a contributing factor in sanitation, as well as comfort. Obviously, it is inconsistent to spend time and money to create aseptic conditions in surgery and other critical departments by sterilization methods and then permit contaminating influences to exist in the air conditioning system.

Growth of New Technics
Technological advances over the past decade have placed at the disposal of the hospital architect new equipment, methods and procedures that are capable of improving environmental conditions in medical facilities — at the same time, contributing to economy of installation and operation.

One of the newest developments is the Inland Radiant Comfort System. Here is a completely new concept in total air conditioning specifically designed for the needs of the hospital.

This system combines three widely accepted, proven components into one engineered design: (1) a radiant-acoustic ceiling, (2) a chemical air conditioner, and (3) a cellular steel floor. Because of the integrated design, each component assists in the functioning of the others.

100% Exchange of Air
The arguments for and against using only outside air as an air-conditioning source, instead of recirculating inside air, are academic. If it weren't for its record of excessive costs (until now), everyone would prefer to start with outside air, condition it, feed it into the patient's room, then exhaust it. Outdoor air, by action of the sun and massive dilution, usually is less contaminated than recirculated air, both given the same degree of filtration.

Recirculating inside hospital air is a touchy procedure completely dependent upon filter efficiencies which can be variable, due to maintenance problems. Equally or more hazardous is to attempt flushing air completely in some parts of the hospital and not in others, depending upon balanced pressures to prevent cross-contamination.

No one prefers these compromise measures. They were forced upon hospital designers by the high cost of conditioning the large volumes of air required by conventional, all-air systems. To add the cost of conditioning outside air was to prohibit it.

This is no longer so, with the Inland Radiant Comfort System for hospitals. By efficiently handling only a small amount of air, the IRC System introduces 100 per cent outside air throughout the hospital and does it at no extra cost.

This contrasts with conventional air conditioning systems which generally are based on the principle of using large quantities of air, most of it recirculated. Decontaminating air in large quantities not only is impractical, but the fan horsepower to move such air adds to the expense of operation.

With Inland's modern system, it is practical to exhaust all air without recirculation. The air can be decontaminated very effectively, because of the small amount used.
Radiant Panel Ceiling System

The inherent advantages of radiant-acoustic ceiling panels help to make the new Inland technology a sound approach to hospital air conditioning.

As its name implies, the radiant-acoustic ceiling heats and cools by the principle of radiant heat transfer and, at the same time, provides acoustical control to the room spaces.

Acoustical treatment is simple. Perforations in the aluminum panels, with glass-fiber insulation above, give this ceiling system an excellent acoustical rating—noise reduction coefficients as high as .90. Sounds disturbing to a restful atmosphere, e.g., the extra noise level during visiting hours, are dampened.

The radiant-acoustic ceiling acts as a single, wall-to-wall heat exchanger—heating when the thermostat calls for heat, and cooling when circumstances require. The ceiling heats in the same manner as the sun. Low-frequency waves of heat energy travel in straight lines from the ceiling to every part of the room, bathing all surfaces in warmth. This steady, gentle comfort is patient-oriented. Physiologists have determined that more than one-half of our body heat is lost by radiation. Therefore, the most practical method of maintaining comfort is to control the rate of heat gain or loss by radiant means.

Here's where radiant heating is ideally suited to the needs of a hospital patient. It bathes his body in continual warmth, free of drafts. Even without a blanket, the rate of his body heat loss is kept at a uniform rate throughout the day and night. Because radiant heating is not dependent upon moving air to raise room temperature, there are no hot blasts from registers, no strong convection currents. Radiant cooling obeys the same physical law of radiant energy transfer as radiant heating, but in reverse. Now, the ceiling is made cool and it absorbs heat from all surfaces in a room, including a patient's body. The human body loses heat most comfortably through radiation, without chilling drafts.

Only ventilation is required of the air system. Ventilating air is supplied at low velocity and held to desirable humidity levels.

Chemical Air Conditioning

Chemical air conditioners have long been recognized as superior devices for controlling humidity and air purity in operating rooms, recovery rooms, and other critical hospital areas. In the integrated design of the Inland Radiant Comfort System, a Kathabar® Chemical Air Conditioner* treats the hospital's entire ventilation-air system.

Air is conditioned by a spray of lithium chloride. This traps up to 97 per cent of all airborne impurities.

Conventional air conditioners use refrigeration coils to cool and dehumidify the air. For many years, these wet coils have been recognized as breeding places for colonies of bacteria and micro-organisms.

Trouble arises when matter from these colonies blows off into the hospital's air stream. Elaborate filter systems have been designed to remove this contamination from the air, but their complete effectiveness frequently has been questioned. Hospital administrators, bacteriologists, and others have been shocked at the contaminating effect of conventional air conditioning systems.

Substantial Construction

Savings Possible

Where hospital plans include a steel frame, significant savings in construction costs accrue from the IRC System's third basic component, a cellular steel floor.

Ventilating air is carried through cells in Inland Cellular, eliminating tons of expensive ductwork. This not only saves money on materials and labor, it reduces the space required between floors. This can drop the total height of a multi-story building by as much as 5 per cent, without sacrificing a cubic inch of interior space. Obviously, there are consequent cost savings all along the line — including savings in the foundation, since building weight shrinks with the height.

There are other advantages to consider here, during the planning stage of a new hospital. The greater erection speed of steel-frame construction. The flexibility of electrification made possible only by a cellular steel floor.

Breakthrough in Hospital Comfort Control

Of great importance to the hospital architect, the Inland Radiant Comfort System delivers all of its advantages well within the budget for an ordinary hospital air conditioning system. Key to its economy is its concept of three basic components working together. By balancing the high performance of these components through careful engineering, the IRC System saves on both first cost and operating costs.

Further information is available in a new brochure, "Breakthrough in Hospital Comfort Control." Write for your copy today. Address Inland Steel Products Company, Engineered Products Division, 4031 West Burnham Street, Milwaukee, Wisconsin 53201.
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Tange Cathedral. In his competition-winning design for Tokyo's new Catholic cathedral, Kenzo Tange has turned away from his characteristic concrete bluntness in favor of a serene composition of sweeping shells. The shells do not quite meet as they converge, and the spaces in between are filled with glass (protected by shutters). From the air, the effect will be that of a giant, luminous cross. Inside the curving walls is seating for 800, grouped close around the altar, and standing room for 1,000 more. On each side of the long branch of the cross will be low, blocky chapels. Nearby will be the bishop’s house, a monastery, a convent, and a school. Construction is expected to begin this year.
SIMPLICITY IN FINLAND. The white limed brick walls of the Imatra burial chapel in Tainionkoski, Finland, shine from behind the tall pine trees on all sides. The chapel itself is a simple square room whose roof is given a two-way slope by finely crafted wood framing members (left). Circulation has been sensitively worked out: entrance is to the left of the bell tower (extreme right, below), leading through an open courtyard to the chapel's foyer or, adjacent to it, a private room and a sheltered second courtyard for mourners. Architects: Jaakko Kontio and Kalle Raikke.

ORTHODOXY IN MONTREAL. This new Greek Orthodox church in Montreal follows the traditional rectangular shape topped by a dome. Architects Affleck, Desbarats, Dimakopoulos, Lebensold, & Sise have departed from tradition in the cantilevered lamella roof with its hexagonal pattern, in placing the dome at the center rather than above the transept, and in the serrated brick walls.

INGENUITY IN GERMANY. The laminated wood arches that frame the Lutheran Church of the Redeemer in Klettham, Germany, swoop inward as well as upward. The result is a graceful, self-bracing structure. The arches are tied at the top and bracketed to rails just above the red brick, non-bearing walls at the sides. All wood members were prefabricated, and were erected without scaffolding in only 14 days. In pleasant (and liturgically sound) contrast to this soaring roof, the altar and pulpit are solid and plain. A bell tower (left) stands inside a brick enclosure next to the open-air choir platform. Architect: Hans Busse von Buse. END
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This visually exciting Armstrong Luminaire Ceiling gives new drama and comfort to the Cypress Room at the New Orleans Hilton Inn.

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Hilton Inn, New Orleans, La.
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MORE INFORMATION: For complete data, information and specifications on the new Armstrong Luminaire Ceiling System, contact your local Armstrong District Office or Armstrong Ceiling Systems Contractor. For a free illustrated portfolio and photometric data, write Armstrong Cork Co., 4204 Rooney St., Lancaster, Penna.

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PERKINS & WILL DESIGNS
THE SCHOOL OF THE CITY

The city generates this exciting high school and community college.

Six compact school units, each on four floors for 480 students, are arranged vertically in a tower. The commons floor of each school group is served by its own elevator. In the low-rise building, and underground, are spaces for the specialized facilities which serve all six schools...administration, large assemblies, physical education, laboratories and shops, utilities and parking.

As in skyscraper office buildings, services for this urban school tower are concentrated in a central core with surrounding space open and flexible to accommodate the varied and changing educational program needs of today and tomorrow.

The tower, symbol of the city, identifies the school as a center for both student and adult. It occupies only 2 acres of valuable land.

Perkins & Will partner, Charles William Brubaker, A.I.A., suggests that this design will prove a thought-provoking challenge to all school space concepts based upon today's widespread 50-acre suburban school.

The Philip Carey Mfg. Company is delighted to sponsor the presentation of this design prophecy to the architectural and educational professions. It is surely a stimulating key to the solution of a major problem faced by many of our cities. As they progress to better use of expensive urban land, architectural thinking of this high order can give real meaning to urban revitalization.

Throughout this school structure, many well-known Philip Carey building products can be specified with assurance. This is true both on the visible structural surfaces and in those hidden areas which determine the long life of a low-maintenance building.

In addition to the Carey products listed at the left, much convenience can be built in with Miami-Carey bathroom cabinets, framed mirrors and steel access doors.

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An accent of blue at the Golden Gate

Panels of nonfading Glasweld echo the color of sky and deep water on this striking new high-rise apartment

The new Royal Towers overlooking Telegraph Hill in San Francisco (shown under construction), offers some of the most spectacular views in the country—the Bay, the mists boiling over the hills, and sunsets at the Golden Gate.

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Architect: Borbochano, Ivanitsky & Associates, El Cerrito, California

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BOOKS

BRICKS AND MORTARBOARDS. A Report from Educational Facilities Laboratories Inc. on College Planning and Building. Published by Educational Facilities Laboratories, 477 Madison Ave., New York 22, N.Y. 166 pp. 10" x 9". Illus. Single copies available without charge.


These two books are intended to prepare all concerned with college and university building for a crisis just ahead. EFL's Bricks and Mortarboards is for "the people who make basic decisions affecting the future of American higher education—college trustees, lawmakers, potential donors. Consultant Richard Dober's Campus Planning is primarily for building professionals.

The crisis is the doubling of college enrollments forecast for the decade ahead. There are now just over 4 million college-level students in the U.S.; according to EFL, there will be 8.5 million by 1974.

Moreover, Bricks and Mortarboards finds campus development lagging behind even the demands of today. The colleges are building at a record rate of $1.2 billion a year. It should be more like $1.9 billion—and even that presupposes a 20 per cent increase in the efficiency of using existing campus facilities.

EFL is worried about where this money will come from, but it also raises questions of how well it will be spent. The purpose of Bricks and Mortarboards, then, is to "help insure that an unprecedented national investment in facilities for higher education will produce buildings that serve rather than stifle higher education in the crucial years ahead."

EFL's technique has been to hire professional writers, rather than professional planners, to report on classrooms, laboratories, libraries, dormitories, and campus planning as a whole. One result of this approach is that the book is thoroughly researched and highly readable. Another, less fortunate re-

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suit is that it is uneven in the depth and sophistication of its conclusions.

The unevenness is most noticeable in the treatment of problems and solutions. On the whole, the problems are stated clearly and completely: probably nowhere else has so much program information on college buildings been put together in one place (in this aspect, the book is every bit as useful to architects as to the “decision-makers”). In citing solutions, however, the authors frequently place undue emphasis on novelty and ingenuity.

A good antidote for any misconceptions this might generate is Campus Planning, Dober, who has served as consultant to such institutions as M.I.T., Harvard, and Drake, also has put a good deal of program data into his book, but his strong point is the analysis of both buildings and plans. He conveys a welcome sense of the wholeness of architectural and planning problems. He also adds the dimension of history: his first 42 pages review the development of campus planning in the U.S. from Harvard's Old College (1638) to Herbert Baumer's Antioch science building (1929).

Dober's work is, in the best sense of the term, a textbook. It is detailed, comprehensive, and current. It may seem elementary at times to those experienced in campus planning and design, but that is probably all to the good. Such experience is not particularly widespread at the moment, and the accelerated rate of college building is sure to bring a great many architects and others into the field for the first time.

This, in fact, is the great value of both these books. The kind of shared expertise and guidelines developed for school design in postwar years is still generally lacking at the college campus level. The two volumes fill some large gaps, and it is to be hoped that others will follow. The time for preparation, as EFL points out, is extremely short—D.C.

THE MOSAICS OF JEANNE REYNAL. By Dore Ashton, Lawrence Campbell, Elaine de Kooning, Bernard Pfiem, Parker Tyler, and Jeanne Reynal. Published by George Wittenborn Inc., 1018 Madison Ave., New York 21, N.Y. 111 pp. 11" x 8 1/2". Illus. $5.

Mosaicist Jeanne Reynal has reached the conclusion that the medium of mosaic "is an art whose essential quality is texture and luminosity. This comes from the fact that the tesserae are placed in the cement so that they can reflect the smallest light... A wall clothed in mosaic thus becomes a presence."

This quality was achieved by the artists of Byzantium, who made mosaics in situ by inserting the colored tesserae into the wet buttern coat. During the Renaissance, mosaics copied paintings and the tesserae were glued into place atop a reverse drawing, then applied to the wall. The paper was stripped

continued on page 168
ENGINEERED BEAUTY and PERMANENCE

This *Ellison* stainless steel entrance with 4 *Ellison* Balanced Doors was recently installed in the New York Clearing House. *Ellison*, ONE SOURCE RESPONSIBILITY for entrances, provides complete custom design and engineering service that has proven a boon to many of the country's leading architects. *Ellison* engineers, backed by 48 years company experience, are ready to help architects with any entrance problems.

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off, leaving the tesserae in an even plane unable to catch the light.

Miss Reynal was trained in the reverse technique, but she now prefers to use the direct method. Pictures of many of her mosaics are shown, including what she describes as her "crowning experience," a free-standing concave wall, 30 feet high and 20 feet long, that stands in back of the altar in the chapel of Our Lady of Florida in Palm Beach, Florida (above). The wall was commissioned by the architect, Paul Damaz, then of the office of Brother Cajetan J. B. Baumann.

The book also contains a short history of mosaics, illustrating some of the more famous ancient works, and fascinating pictures following Jeanne Reynal through all the steps involved in both methods of making mosaics.

**DIE BIBLIOTHEK DER TECHNISCHEN HOCHSCHULE STUTTGART 1962.** Published by the library of the Technische Hochschule (Institute of Technology) Stuttgart, Germany, edited by Manfred Koschig. 266 pages. 7½" x 9½". Illus. Available from publishers for $9.50.

This unusual book, deservedly voted among the 50 most beautiful made in Germany last year, is another volume commemorating the peace. It is the story of the library built at the Institute of Technology in Stuttgart to replace the building which was destroyed by bombing in the summer of 1944. Not only was the major cost of the structure contributed by the Max Kade Foundation of New York, but architectural inspiration is
attributed to the handsome library at Georgia Institute of Technology by Architects Bush-Brown, Gailey & Hefterman (Forum, Mar. '55).

Architect Hans Volkart and his assistant, J. K. Zabel, designed their spacious building after a study trip to America in 1957 which was arranged by the U.S. Library of Congress. It is one of the most advanced libraries in Germany; and its beginnings are traced from 1830, when the collection was first begun, to date. The text is in German, with no translation.

EARLY BYZANTINE CHURCHES IN MACEDONIA AND SOUTHERN SERBIA. By R. F. Hoddinott. Published by St. Martin's Press Inc., 175 Fifth Ave., New York 10, N. Y. 263 pp. 9 1/2 x 12". Illus. $49.

Archaeologists have uncovered a rich store of early Byzantine churches in Macedonia and Southern Serbia. The author reports on many of these discoveries, their interrelationships, and their significance to all of Byzantium. This is the first time detailed information has been generally available: until now much of the basic material has been published only in Greek or Serbo-Croat and scattered in archaeological journals, many out of print. The book contains nearly 300 photographs taken by the author, including 12 in color, and has three large fold-out maps.

RUMANIA: PAINTED CHURCHES OF MOLDAVIA. Preface by Andre Grabar. Introduction by Georges Oprescu. Published by the New York Graphic Society, Greenwich, Conn. 15" x 19". Illus. $18.

In the Rumanian province of Moldavia, there are 14 small country churches whose exterior walls were completely covered with Byzantine-style murals in the 16th and 17th centuries. Six of the churches are displayed in 32 full-page color plates. The murals, mostly showing Biblical scenes and processions of saints, are extraordinarily beautiful; so is this book, the 19th volume in the UNESCO World Art Series.

CATHEDRALS AND ABBEY CHURCHES OF THE RHINE. By Ernest Gall. Translated and adapted by Olive Cook. Published by Harry N. Abrams, Inc., 6 W. 57th St., New York 19, N. Y. 178 pp. 8" x 11". Illus. $15.

The Rhineland has more medieval cathedrals and abbey churches than any other part of Germany, and Mr. Gall does a fine job of tracing them from early Christian days through the Baroque period. Fifty buildings are shown in 200 illustrations.

CHURCHES AND PUBLIC BUILDINGS. By Helen Mary Petter. Published by Oxford University Press, 417 Fifth Ave., New York 16, N. Y. 96 pp. 6 1/2 x 9 1/2". Illus. $2.20.

A superficial treatment of English churches and public buildings since Stonehenge, with amateurish pen-and-ink drawings of some typical structures and details.

continued on page 169

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Mortise Lock with screwless trim
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IntegraLock with fired copper rose
DESIGNING FOR THE DISABLED. By Selwyn Goldsmith. Published by the Royal Institute of British Architects, 66 Portland Place, London W1, England. 236 pp. 8½" x 12". Illus. £2.10s.

This handbook uses diagrams with dimensions to show how building details, including lighting levels, spaces needed for wheelchairs, and special built-in fixtures, should be planned for the physically impaired and the elderly. Most of the information concerns housing, but much of the material can be adapted for other types of buildings as well. The author has included a highly useful glossary of pertinent medical terms, and an extensive bibliography on all aspects of his subject.


The book is too small, there aren't enough pictures, and the captions don't give architect's names. But these are common complaints, and in this case trivial. Dr. Murray traces the course of the Italian Renaissance in a thoughtful and fascinating way. He is at his best when discussing the mannerists, and the eight pages of Giulio Romano's Palazzo del Te in Mantua are alone worth the price of the book.


This was clearly a labor of love: the author visited all the extant buildings she discusses and made over 1500 drawings, to which the 64 full-page black-and-white photographs and six color plates are only supplementary. The drawings have the distinct advantage of showing the original buildings without additions or defacements. In an effort to include almost everything built in England since prehistoric mud huts, however, the book has become a catalogue. Some buildings illustrated are scarcely mentioned in the text, moreover; and drawings and text are rarely together.

TRADITION OF JAPANESE GARDEN. By Sutemi Horiguchi. Published by The Kokusaishinkokai, Tokyo. Distributed by East West Center Press, Honolulu 14, Hawaii. 188 pp., with 140 plates, 8 in color. 15½" x 11½". $15.

This handsome book consists of a 14-page discussion of the various types of Japanese gardens, followed by the plates, many of them full page. It ends with brief but detailed notes on the individual plates. The photographs are outstanding. The short text, however, is confusing and seems strangely disjointed, possibly because of poor translation. This suspicion is strengthened by the book's curiously abbreviated title.

OLD NEW ENGLAND CHURCHES. By Elise Lathrop. Published by the Charles E. Tuttle Co., Rutland, Vt. 170 pp. 7½" x 10½". Illus. $5.

Drawings by H. T. Welsh show many of the churches built during Colonial days and the early years of the Republic, while the text tells of some of the hazards and amusements of church-building—and church-going—in those times. This is a new edition of the book, identical to the original, which was published in 1938.


More than 1000 illustrations accompany the detailed text that covers the art and architecture of Europe, the Near East, India, and the Far East. This is the second of four volumes in the "Art and Mankind" series.
Wood invites guests into Dinah's Motel, Palo Alto, Calif. Strong vertical lines, in posts, planked siding, railings, and screens, add visual height to this low structure. Campbell & Wong & Associates, architecture and planning.
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Used lavishly, wood makes this house at home on its wooded site. Ver­
tical boards panel both inside and outside walls. Contrasting finishes
are most effective. Architect: Joseph Esherick, A.I.A., San Francisco.
There are 27 buildings in the public housing project, Joseph A. Fowler Homes, Memphis, Tennessee. One is an administration building; the rest residential buildings containing 320 apartments. Walls are of brick veneer concrete block with Keywall in alternate courses, used to control thermal movement and to serve as a brick tie. Interior walls are of rock lath plaster utilizing Keycorner and Keystrip as reinforcement.

ARCHITECT: Charles S. Peele & Associates, Memphis
GENERAL CONTRACTOR: McDonough Construction Co., Atlanta, Georgia
MASONRY CONTRACTOR: Memphis Masonry Company, Memphis
PLASTERING CONTRACTOR: F. M. Gravler Plastering Co., Atlanta

WHAT HOLDS THE WALLS OF THE JOSEPH A. FOWLER HOMES TOGETHER?

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mortar and Keywall (what else?)

It's a coincidence you should ask about the advantages of Keywall. You can see from the tight pattern that it gives you more mortar locks with block (and/or brick). Which in turn controls shrinkage and thermal movement better, resulting in greater crack resistance.

And because Keywall comes in rolls, masons lay Keywall in place more easily and quickly.

You might think that you would have to pay more for a masonry reinforcement with such advantages. Not so.

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MODULAR EXHIBIT SYSTEM

System Abstracta is a modular structural system for exhibits and displays, based on a few simple components that can be combined in seemingly endless ways. It was designed by Danish architect Poul Cadovius and is manufactured here by the Nissen Corp.

The key element in this system is, of course, the connector (1), which looks like a stray jack from a children's game. Depending on how it is to be used, the connector supplies anywhere from two to six legs which slide into metal tubes. The other major component is a steel panel that hooks around the tubes to make shelves or to enclose parts of the structure. There are other parts to the system, such as floor levelers, plastic tips, and hangers of several kinds, which are useful accessories, but the first three are basic. Assembly begins with connecting horizontal layers and then building them up with vertical supports (2). Bigger systems are usually built in sections and then joined horizontally (3).

The system's module is 5 inches, and all components are multiples of 5, up to a maximum panel size of 15 by 35 inches. System Abstracta may be ordered in kits which range in price from $125 to $325 or in cartons containing 100 pieces of each component.

Manufacturer: Nissen Corp., 930 27th Ave. S.W., Cedar Rapids, Iowa.

NEW INTEGRATED CEILING

The Armstrong Luminaire ceiling introduced last year (Products, Oct. '63) is now offered in a new version, the H-48, that costs less to install, having fewer parts. The metal triangles bracketing each module have disappeared: instead, the new ceiling has continuous troughs (see drawing, left).

Another difference is the change in module dimension from 50 to 48 inches. Because of this change and the continuous runs, one industrial lighting fixture 96 inches long can be used to light two modules. Two lamps and a shield may be used if desired (above).

In other respects—acoustical control, uniform air distribution, lighting efficiency—the new ceiling offers the same performance as the introductory Luminaire.

THREE BUYERS: ONE SALE

When your product or service goes on the block in the building construction industry, it must be sold more than once. No sale is final until all three building principals — architect/engineer, contractor/subcontractor and client/owner have put their heads together and satisfied themselves with the character, availability and the cost of that product or service.

Architectural FORUM is a market place where your advertising may be seen, judged and approved by all three at the same time. For FORUM is the one magazine in the field that deals editorially with the art of architecture, the technology of construction and the economics of building — and, in doing so, attracts a substantial number of readers from all three areas.

Because of this, FORUM is essentially different — the most productive* sales platform for manufacturers serving the building construction industry.

*One elevator manufacturer traced a million dollar sale directly to one FORUM advertisement; a metal product advertiser's annual sales increased 10% as a result of his FORUM campaign; one ad of a plastic grill manufacturer produced more than 500 direct inquiries from FORUM readers.

FORUM: essentially different— for readers ... and for advertisers
PRODUCTS  continued from page 176

Modern Aluminum Racks
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- Built to your specified length
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What interests a reader?

One measure of reader interest in FORUM is a survey conducted among subscribers every other month by Readex, Inc. These surveys have proved that FORUM's editorial material is of great interest to all of its readers, - architects, contractors and clients alike. Its reader interest scores are among the highest of the many different magazines which Readex rates.

In fact, the reader interest in each editorial page of FORUM averages 56%; the top rated article registered a 95%.

Despite the validity of such studies, FORUM is not edited on the basis of survey results—and never will be. Instead, the editors will continue to present what they feel should interest the building industry. The reader interest survey is merely a useful check-up on past performance. Moreover, the editors are less impressed by anonymous statistics than by signed letters, like those regularly presented in the "Letters" column. — From Publisher's Note: FORUM, July 1963

FORUM: essentially different—for readers...and for advertisers

MUSIC STORAGE

This handsome array of cabinets fills one wall of a prototype school band room in the new Conn Music Center, Elkhart, Ind., where C. G. Conn Ltd. displays the musical instruments it manufactures. The storage units, known as Multiplex, were designed and made by the nearby firm of Mutschler Brothers Co., and they corresponded exactly with the maximum size case for each kind of instrument. There is space on the wall, too, for music and for band costumes, the latter hung in big closets at either end of the instrument cases.

All Multiplex units are made of hardwood with a clear scuff-resistant finish. The doors are metal grilles, their edges bound in rubber to eliminate any noise from banging.

A storage wall roughly twice the size of the one shown, in which 241 instruments and 250 uniforms, hats, and choir robes could be filed away in orderly fashion, would cost about $19,000.

Manufacturer: Mutschler Brothers Co., Nappanee, Ind.

SMALL AIR RIVETER

A new cast aluminum riveting gun from United Shoe Machinery, the PRG 520 Pop Riveter, weighs only 3 ½ pounds, yet it sets rivets of large enough dimension for field erection of curtain walls, installation of duct work, and shop assembly of steel and aluminum panels.

Air-hydraulically powered, the PRG 520 sets rivets of about ⅝- to ¾-inch "grip" (the thickness of the two elements to be fastened), depending on the rivet selected. It costs $145 f.o.b.

Manufacturer: Fastener Division, United Shoe Machinery Corp., Shelton, Conn.

GERMLESS CEILING

A bacteria-free finish, Armstrong's newest addition to acoustical ceilings, is said to reduce the bacteria count by more than 90 per cent, and to be particularly effective against staphylococcus aureus. The full name of the new ceiling is the Armstrong Self-Sanitizing M-90 System.

M-90 is a chemical substance in white vinyl latex paint that not only kills bacteria but also prevents their future growth for an indefinite period. In addition to the obvious market for germ-free ceilings in hospitals and medical laboratories, Armstrong expects to sell it to food processing plants, institutional kitchens, cafeterias, and restaurants.

In order to maintain its effectiveness, the M-90 finish must be vacuumed periodically to remove surface dust and dirt, but it does not need to be washed. The new finish is offered as lay-in panels for suspended ceilings in 24 by 48-inch Minaboard and Acoustical Fire Guard Panels, and in 12 by 12-inch squares of Fire Guard Tile. Costs: Minaboard, 40 to 50 cents per square foot, installed; Fire Guard, 60 to 90 cents.


continued on page 180
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TOUGH, BRIGHT GLASS
The dramatic photograph above demonstrates the impact resistance of Herculite K, a new tempered glass from Pittsburgh Plate. By means of a new thermal tempering process in which the glass slides horizontally on a cushion of air instead of being held vertically, PPG produces flatter, stronger glass in thinner dimensions than it has ever made before.

The sample in the photograph, impervious to a 25-pound weight dropped from a height of 8 feet, is 3/16-inch thick, and 1/4-inch sheets soon will be commercially available. Herculite K is intended for sliding doors, school windows, and shower enclosures. Thermal tempering makes it three to five times stronger than regular glass, PPG says, but is no guarantee against ultimate breakage. Should it break, the sheet crumbles into small, comparatively dull pieces to prevent injury. Still thinner glass, Herculite II, has been developed for the F-111 supersonic military fighter; it is only 1/10-inch thick, yet is about ten times as strong as regular glass. Architectural applications have not yet been explored.

Another new PPG product is the first float glass made at a new plant in Cumberland, Md., under license from Pilkington Brothers Ltd. of Great Britain (Products, Oct. '62). A sample of the best plate, compared side by side with glass made by the less expensive float process, can't be told apart even by glass men, PPG says, though to the expert eye the float sample has more brilliance than the polished plate. PPG plans to sell it at about the same price as plate on grounds that it is equal in quality. It is available in limited quantities.

Manufacturer: Pittsburgh Plate Glass Co., 632 Fort Duquesne Blvd., Pittsburgh 22.

PREVIEW
Reduced costs for concrete construction may result from experiments the U. S. Department of Agriculture is undertaking. Compounds of linseed oil and an emulsifier, sprayed over fresh concrete, form a film that prevents water from escaping as fast as it does in untreated concrete, allowing time to develop to full strength. The same spray treatment works on cured concrete to prevent spalling and scaling. Linseed oil compositions developed by William L. Kubie at the Northern Utilization Laboratory in Peoria, III. are being tested at Kansas State University under a USDA contract.
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