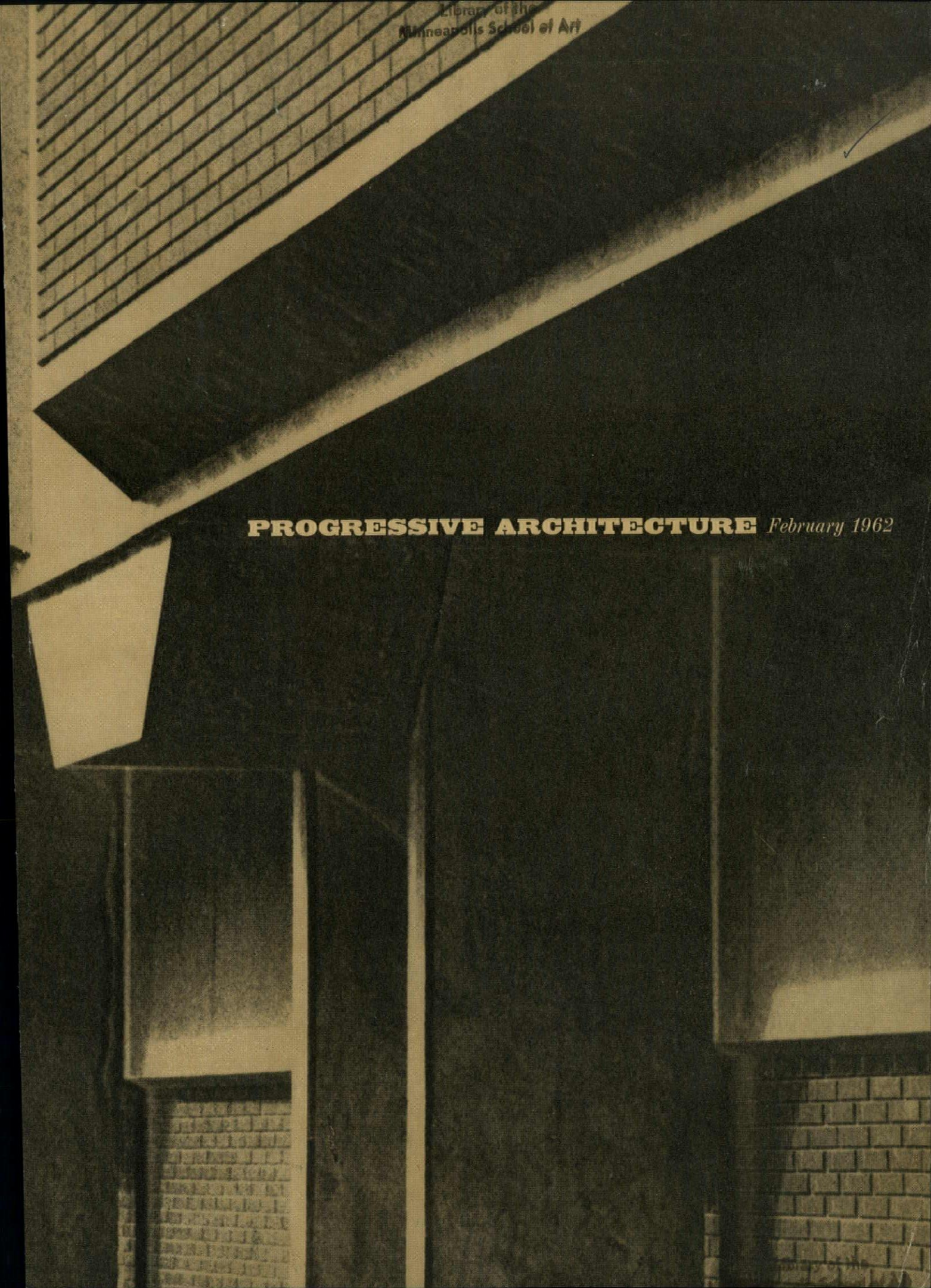
PA-1962-02



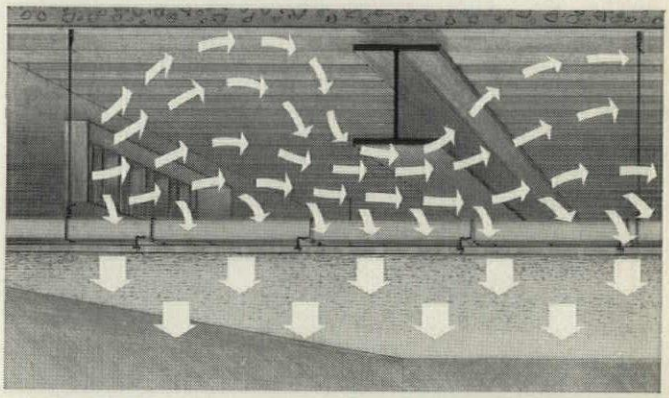
PROGRESSIVE ARCHITECTURE *February 1962*

At Battle Creek Country Club, this new Armstrong Ventilating Ceiling diffuses air evenly, thoroughly and silently—without diffuser ducts, conventional diffusers, dirt or drafts.

AN ARMSTRONG VENTILATING CEILING CAN PROVIDE THESE SIX ADVANTAGES—

1. UNIFORM AIR DIFFUSION—no drafts or stagnant spots.
2. ECONOMY AND SPEED—ductwork is cut, diffusers eliminated.
3. SOUND ABSORPTION—just as efficient as other Armstrong Acoustical Materials.
4. CLEANLINESS—the constant downward air flow is a perpetual barrier against dust or dirt.
5. SMOOTH, UNCLUTTERED BEAUTY—diffusers are eliminated, providing a handsome, unobstructed ceiling.
6. RATED FIRE PROTECTION—when Armstrong Acoustical Fire Guard is used as a Ventilating Ceiling.

DATA. Armstrong Ventilating Ceilings have been thoroughly lab- and job-tested to assure proper performance; are available in five materials (both tile and lay-in units) including Fire Guard, with three different patterns; are compatible with all conventional supply air systems; are effective even for extra-large conditioned spaces. Special plenum-engineering data is available, giving all factors and formulae needed for the correct design and engineering of the Armstrong Ventilating Ceiling system. For information, contact your Armstrong Acoustical Contractor, Armstrong District Office, or write Armstrong Cork Co., 4202 Watson St., Lancaster, Pa.



ARMSTRONG VENTILATING CEILINGS: HOW THEY WORK/WHAT THEY DO

Essentially, this is a new air-diffusion system, using an acoustical ceiling with thousands of perforations that are carefully integrated into the surface patterns. Conditioned air enters the plenum chamber through a single stub-duct opening. Under a uniform plenum pressure, the air is forced down through the ceiling into the room. Every inch of the room gets draft-free heating or cooling.

Battle Creek Country Club, Battle Creek, Mich. • Architects: Haughey, Black & Williams, Battle Creek • Consulting Engineers: Meckler Engineering Company, Toledo, Ohio • General Contractor: Phelps-Wagner Builders, Battle Creek • Acoustical Contractor: B. C. Schuemann Company, Battle Creek.

RENDERING BY ARA DERDERIAN

Armstrong ACOUSTICAL CEILINGS

First in fire-retardant acoustical ceilings

International Arrival Building, New York International Airport—Skidmore, Owings & Merrill, Architects

26 Rotary Oildraulic® Elevators and Lifts

KLM offices and passenger lounge in Airline Wing Building are served by two Oildraulic passenger elevators.

Efficient vertical transportation that contributes to freer architectural design (and often enhances it) is the contribution of Rotary Oildraulic Elevators to fabulous New York International Airport at Idlewild.

Because they're pushed up from below, not pulled from above, Rotary Oildraulic Elevators require no overhead machinery and no objectionable penthouse. This makes them compatible with the sweeping jet-age lines which characterize much of the architecture at this aerial gateway to the United States.

TRUNCATED SHAFT — Pan American's "umbrella" terminal has a center island which stops short of the huge cantilevered roof. Only hydraulic elevators (two were required) would suit this design and Rotary Oildraulic was the choice. In the International Arrival Building there are six Oildraulic passenger and freight elevators manufactured by Rotary.

In addition to elevators with capacities to 15,000 lbs., Rotary equipment installed at the various terminals and hangars includes Levelator Lifts for handling heavy freight and Leva-Dock Ramps for speeding cargo movement across truck docks. The total of 26 installations includes buildings designed by seven architectural firms for The Port of New York Authority and these airlines: American, K.L.M. Royal Dutch, Pan American, Scandinavian, Swissair, T.W.A., United.

ECONOMICAL, DEPENDABLE — For any building to six stories Rotary Oildraulic Elevators offer important design advantages and construction economy. Building owners benefit by efficient, dependable vertical transportation service.

Right: Two Rotary Oildraulic passenger elevators serve "island" in center of Pan American World Airways Terminal Building.

Below: General freight in American Airlines hangar is moved between floors by 15,000 lb. capacity Rotary Oildraulic Elevator.

serve New York's Idlewild Airport

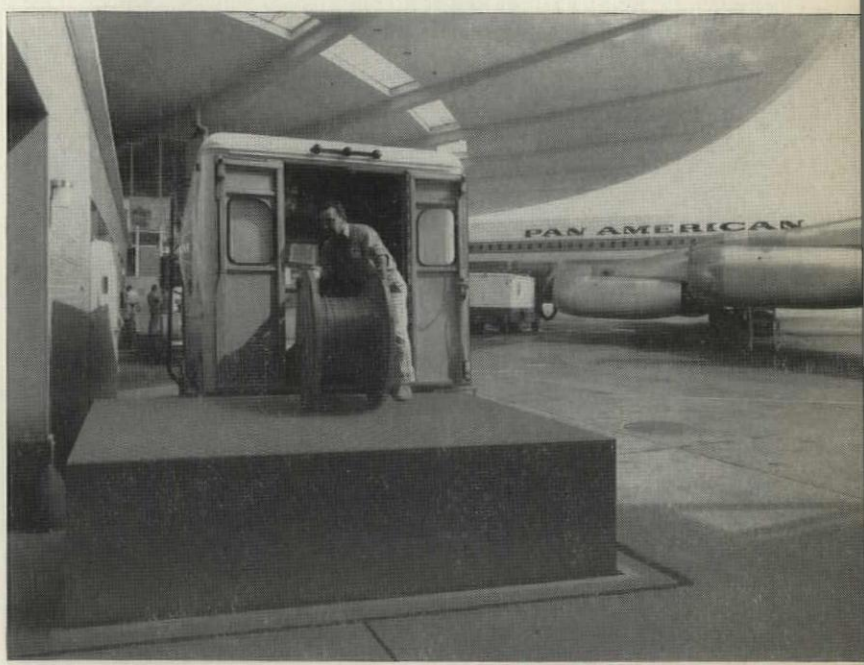
Information on Rotary Oildraulic Elevators and Lifts is available through distributors listed in the phone book yellow pages. See our catalog in Sweet's Files or write for more information.

DOVER CORPORATION
Elevator Division
1107 Kentucky, Memphis 2, Tenn. • Chatham, Ontario

Rotary Oildraulic equipment used in Idlewild buildings designed by these architectural and engineering firms

AMMANN & WHITNEY
BURNS & ROE
KAHN & JACOBS, Architects, ROY S. BENT, Associate
ANTONIN RAYMOND and L. L. RADO
EERO SAARINEN & ASSOCIATES
SKIDMORE, OWINGS & MERRILL
TIPPETTS-ABBETT-McCARTHY-STRATTON and IVES, TURANO & GARDNER, Associates

Rotary Oildraulic equipment installed by BURLINGTON ELEVATORS, INC., NEW YORK



Rotary Levelator Lift (6,000 lb. capacity) raises freight to truck bed height for fast transfer to Pan American plane.

Rotary® Oildraulic® Elevators · *Passenger and Freight*

For more information, turn to Reader Service card, circle No. 328

Horseshoes at 30 feet?

unusual test, but

Durcon®

Laboratory Sinks took it!

To prove ruggedness of Durcon Laboratory Sinks, one laboratory conducted a test, admittedly unusual, in which steel horseshoes were pitched at and into the sink from a distance of thirty feet. The sink survived with only a few scratches which were quickly smoothed out with emery paper and an oily cloth.

Of course, seldom will horseshoe pitching be practiced in laboratories, but this is only one of a wide range of tests that have proven that Durcon Lab Sinks, made of epoxy resin modified by the Duriron Company, will provide years of service. No cracking, no spalling nor other forms of mechanical failure.

Why not take a look at the many other good reasons why you should specify Durcon Lab Sinks. For further information and prices, contact your Laboratory Furniture Manufacturer, or write for new Bulletin PF/5a.

DESIGN—Clean, modern, practical with coved corners and dished bottoms makes them highly functional and attractive plus blending with all laboratory furniture.

CORROSION RESISTANCE—Made of modified epoxy resin, Durcon exhibits almost complete resistance to wide range of acids, alkalies, salts, solvents, and other organic chemicals.

WIDE SELECTION—Table sinks, end sinks, drainboard-sink units, double compartment sinks, cylindrical sinks, cup sinks.

LIGHT WEIGHT—Approximately 40% as heavy as competitive sinks. Normally thickness of stone or porcelain sinks is at least 1″ while Durcon is but ½″ thick.

LOWER COST—Besides lower initial cost, there are savings on freight and installation.

EASIER INSTALLATION—One man can easily install a Durcon sink either under table top or free standing. No hydraulic jack required as for ceramic or stone sinks. Less weight means less complicated supports.

HEAT RESISTANCE—Unlike other plastic laboratory sinks, Durcon will not warp nor soften when exposed to boiling solutions. Neither will Durcon support combustion.

SHOCK RESISTANCE—No failure due to thermal shock need be feared. Wide range of tests also assure many years' service without cracking, spalling or other forms of mechanical or fatigue failure.

MOISTURE ABSORPTION—Durcon sinks are impermeable to liquids. The percentage of moisture absorption over an extended period is a maximum of 0.06%.

THE DURIRON COMPANY, INC.
DAYTON, OHIO

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

THIS MONTH IN P/A

The World's Largest Architectural Circulation

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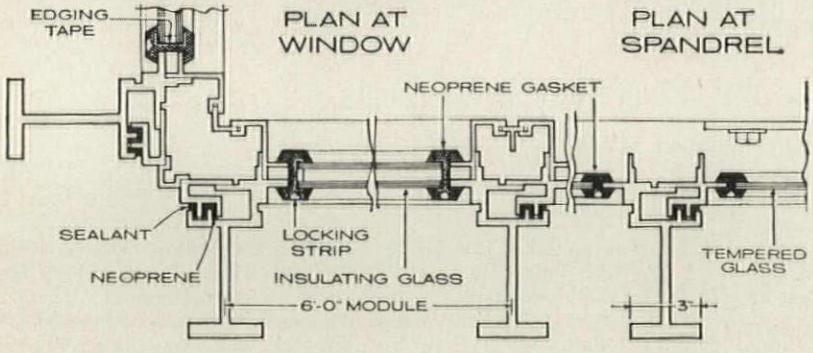
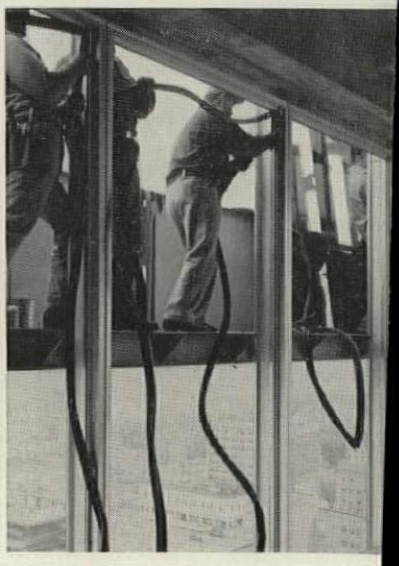
Libbey·Owens·Ford Building, Toledo 1, Ohio — Architects: Skidmore, Owings & Merrill, New York City



FOR ADDITIONAL INFORMATION and detail drawings on installation of glass curtain walls, refer to "Spandrel Glass for Curtain Walls", AIA File 17-A. Or write to L·O·F, 322 Libbey·Owens·Ford Building, Toledo 1, Ohio.

1. Neoprene structural gaskets are inserted in aluminum frames.



"Zipper-glazed" curtain wall

This glass façade in the Libbey·Owens·Ford Building, Toledo, Ohio, was literally "zipped" into place with neoprene gaskets.

The *Thermopane*® insulating glass windows and the *Vitrolux*® glass spandrels were glazed in a continuous gasket, similar to the method used for installing automotive windshields.

Although the 15-story L·O·F Building is the first high-rise office building to be glazed by this method, it has been tried and tested and proved over a six-year period in three 2-story buildings of a large Detroit manufacturer.

ADVANTAGES

This type of setting is resilient, and eliminates need of glazing compounds. The element of human error (such as creation of caulking voids) is greatly reduced. The curtain wall goes up faster, saving on-site labor costs. And since the neoprene gasket is factory made to close tolerances, the system provides an almost foolproof weather seal, whether used with sheet, plate or insulating glass. Or glass spandrels. No clean-up, painting or other finishing is required.

Method used: The gasket is factory assembled into a one-piece, continuous setting member to fit the extruded-aluminum, curtain-wall frame and the glass. The gasket used in the L·O·F Building is essentially an H section (see diagram). The outside channel of the gasket fits over the sash, and the inside channel fits over the edges of the glass.

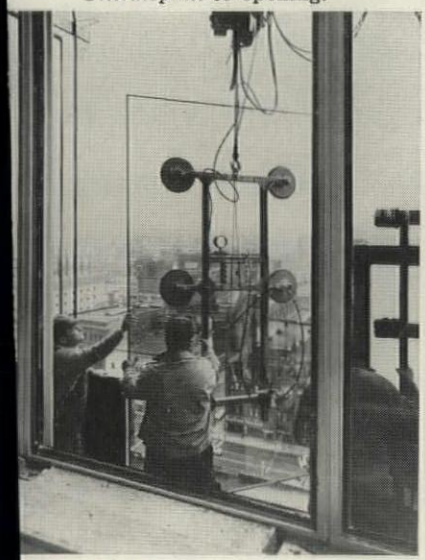
The neoprene gasket is first installed at all four sides of the sash (illustration 1). The glass is lifted into place (in this case with a sucker frame as in illustration 2) and inserted into the bottom of the gasket. A hand tool with a flat spatula-shaped blade is used to complete the setting of the glass in the gasket (illustration 3).

A separate, wedge-shaped, pressure filler strip is then fed or "zipped" into the locking channel in one end of the gasket with a simple hand tool, shown in illustration 4. This creates a powerful compression, effecting a tight, leakproof seal between both the sash and the glass. Replacement of damaged glass or panel sections can be done easily and quickly merely by removing this filler strip to unlock the gasket.

Libbey·Owens·Ford
Toledo 1, Ohio

MADE IN U.S.A. LOF GLASS

2. Power-vacuum equipment on window-cleaning platform lifts *Thermopane* to opening.



3. Glass unit is worked into gasket with special tool.

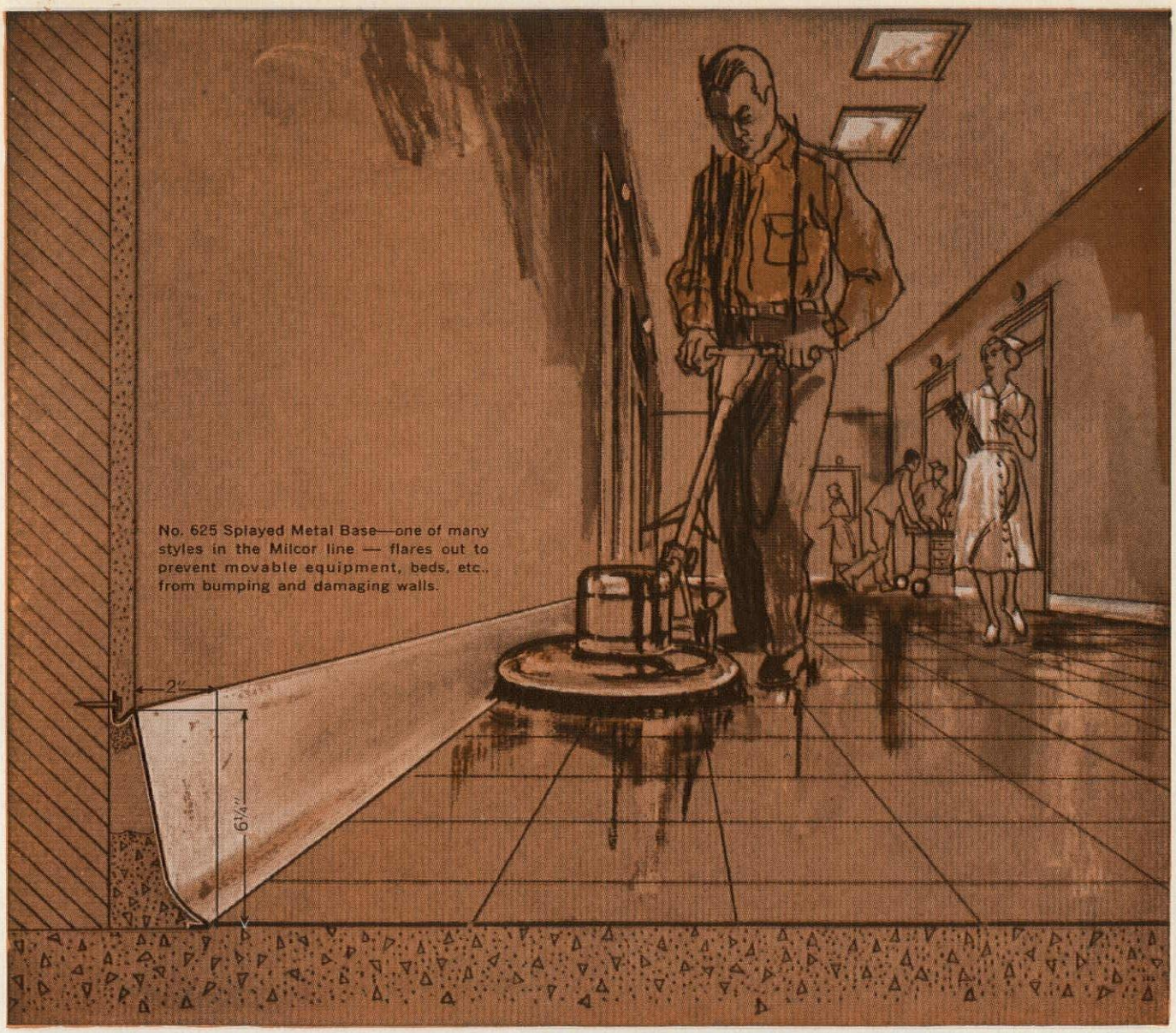
4. Neoprene strip, "zippered" into gasket, serves as locking device.

THIS SLIDING HARDWARE WAS INSTALLED 3 DOORS AGO

— and the hardware wasn't made in a vintage year. Grant Sliding Door Hardware is incomparable. It has always been carefully manufactured to uncompromising high standards. For decades, architects have depended on Grant for hardware which matched their specific job requirements. Grant hardware often outlives doors. Not getting replacement orders is a habit to which we're happily resigned. Why not write for your copy of Grant's complete catalog?

GRANT PULLEY & HARDWARE CORPORATION ■ Eastern Division / 49 High Street, West Nyack, N. Y. ■ Western Division / 944 Long Beach Ave., Los Angeles 21, Calif.

Grant Sliding Door Hardware: bantam 900 rocket 1000/6000 grant 7000 grant 1200 grant 1230 grant 5000



This trim can take it! Milcor Metal Base provides the durability and impact resistance of steel at an installed cost competitive with other materials. It's ideal for hospitals, schools, and other public buildings — any area where heavy, careless traffic is a constant threat to weaker products. It's easily installed in plaster or masonry walls. The Milcor Interior Metal Trim line also includes window stools, cove moulds, picture moulds, and chair rails. All are now available through building supply dealers. See Sweet's, section 12a/In, or write for catalog 202.

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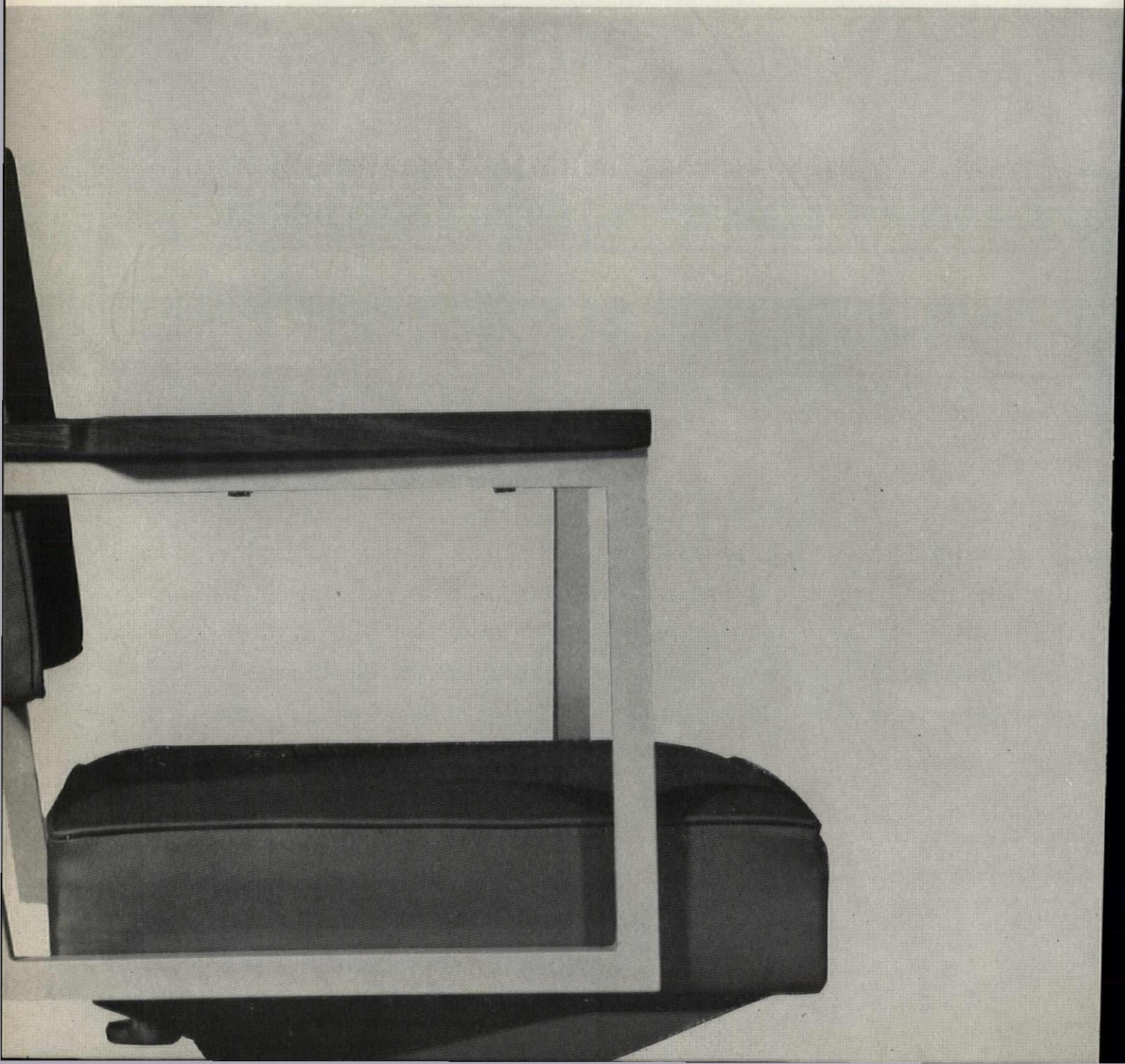
ML-50

MADE FOR EACH OTHER
THIS CHAIR
THIS DESK



The smooth, clean, sharp lines of an outstanding desk deserve complimentary lines in the chair to which it is mated. This necessary co-ordination is the reason for the new Doric Chair. It was made for the Doric Desk.

The same combination of simple line and plane with top quality craftsmanship is to be found in both chair and desk. Both have a wide, tasteful range of finishes: desk tops of fine grained woods, marble or modern plastics; chair arms finished in wood or matched upholstery, with an assortment of high fashion color fabrics or leathers.

A fine range of office components completes the look of contemporary design—the look that won Doric the 1960 AID Citation of Merit for design achievement. The CJ dealer listed in your yellow pages can give you the complete details on Doric—or write to Corry Jamestown Corporation, Department PA-22, Corry, Pennsylvania.

CORRY JAMESTOWN

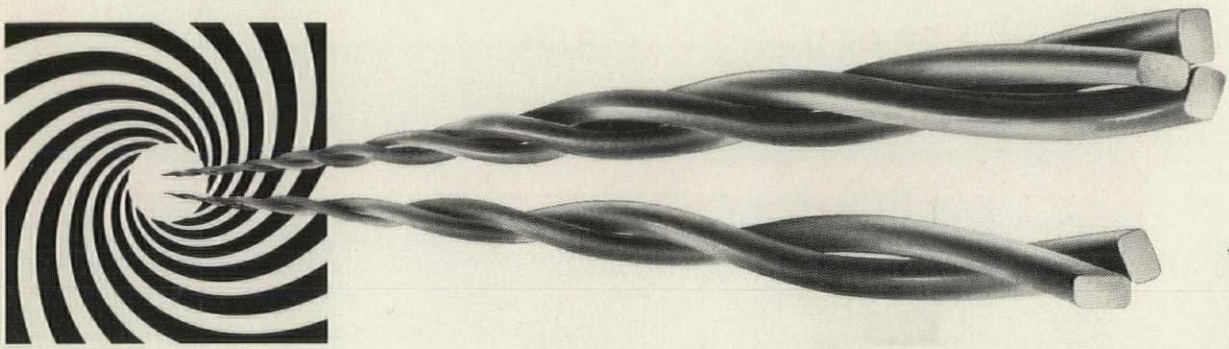
For more information, turn to Reader Service card, circle No. 327

Architects, Engineers! You Can Profit From Exchange Of Ideas By The Prestressed Concrete Industry

There is an attitude in the *Prestressed Concrete Institute* not prevalent in many other similar groups. At the 9th Annual Convention in Denver, engineers, designers, producers and educators gave each other details of their engineering advancements. It happens in every meeting whether in Denver, Berlin, Miami—and it will take place in Rome next year.

What does this mean to architects and engineers interested in designing to attain equal or greater structural strength with less concrete and less steel?

It means that this group which shares its knowledge and experience for the mutual benefit of the industry is better prepared to give full support in the employment of this new concept in design and construction.



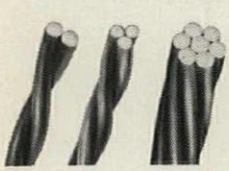
Strength Factor of Prestressed Concrete Increased By Union's Research Laboratory

The rapid growth of the Prestressed Concrete Industry has been called glamorous. But the developers of this industry well know that architects and engineers do not base specifications on glamour.

The collective efforts of the industry is directed at giving you greater design freedom. Some new trends are: Double Wall T-panels for storage buildings and docks, wider coverage units, hollow core prestressed slab and many others. Also the effort is directed at finding new markets, new applications and, most importantly, technological development of greater strength factors.

A remarkable advancement in this field comes from the research and development center of Union Wire Rope, Armco Steel Corporation.

Still Readily Available UNION's ORIGINAL Tufwire



Tufwire for post-tensioning — Tufwire Strand—widely used since the beginning of prestressing in America will continue to be manufactured in unlimited quantities. It is available in coils, wooden reels and the New Tuf-Pak.

New Union Tuf-Lock* Strand Locks Itself in Concrete—Increases Bond Strength up to 100%

Note the shape of the wires. Not round—not flat—but a combination that provides angular grooves and rounded bonding areas. The tendency to slip when cast in concrete is restricted. A locking action takes place as the strand, in seeking release from tension, tends to orient itself. A gripping effect is set up in the concrete locking the strand all along the axial path of the grooves.

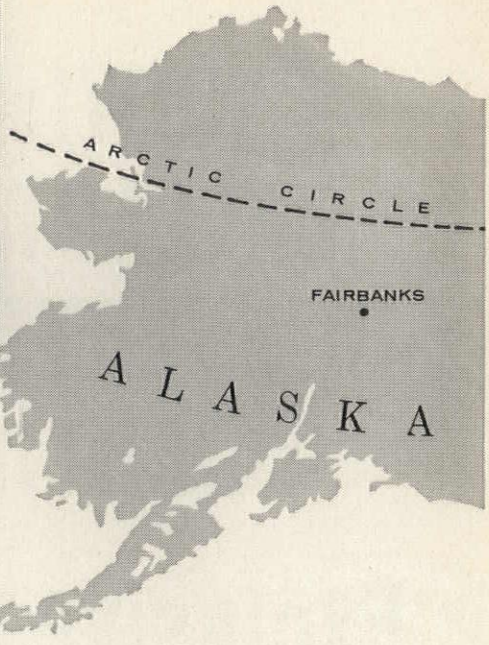
The superior ability of Tuf-Lock strand to transfer the stresses to the concrete has been proved in tests. 100% strand strength is developed by Tuf-Lock in one-half the length required by round wire strand.

FREE Brochure provides information on the physical properties of all Union prestressing products, including the increased bonding qualities of new Tuf-Lock Strand. Also gives methods of shipment including the new Tuf-Pak which makes possible shipment of longer lengths. Write **Union Wire Rope, Armco Steel Corporation, 2314 Manchester Ave., Kansas City 26, Missouri.**

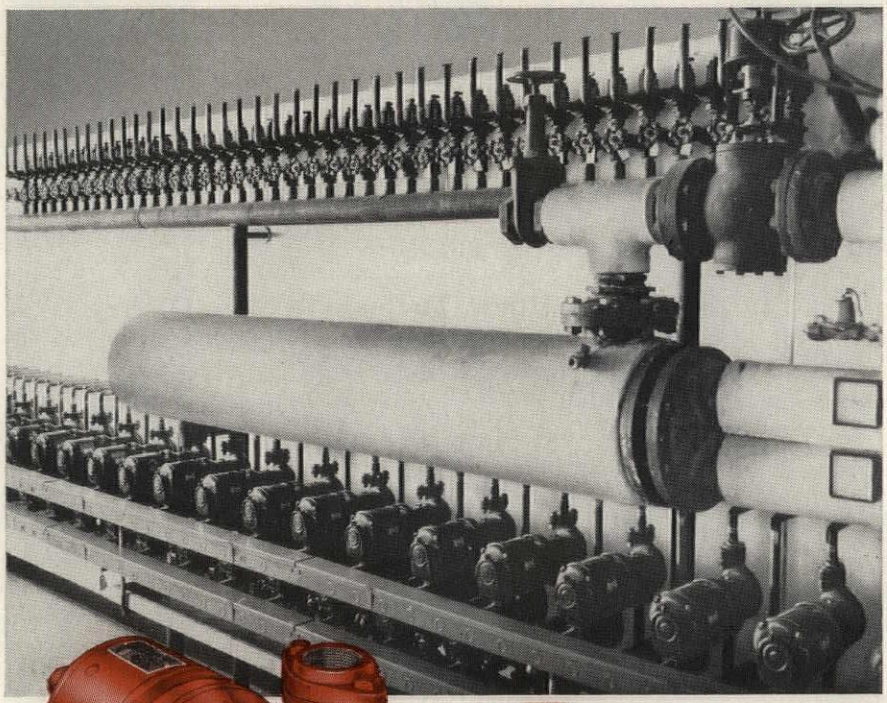
*Pat. Applied for

I-T-62

ARMCO Union Wire Rope



NEAR THE ARCTIC CIRCLE 40 B&G BOOSTERS GIVE RESIDENTS INDIVIDUAL TEMPERATURE CONTROL



B&G BOOSTER

B&G FLO-CONTROL VALVE

The B&G Booster is engineered for compactness, *silent operation* and years of service. It is built by precision manufacturing methods which translate good design into a superior product. Over 3,500,000 have been installed to date.

The B&G Flo-Control Valve is so designed that it can be easily cleaned without removing it from the pipe line.

At Fairbanks, Alaska, tenants in the Anderson Apartments enjoy all the comforts of *radiant Hydro-Flo* heating plus their own choice of temperature. Each apartment is on a separate heating zone and has an individual thermostat to control the operation of a B&G Booster pump. In each circuit, a B&G Flo-Control Valve prevents the possibility of an over-ride in heat.

A 2-pass B&G steam-to-water converter provides hot water for the heating system.

B&G Boosters are designed and built specifically to meet the exacting demands of circulated water heating and cooling systems. Their freedom from maintenance problems as well as quietness of operation explain why B&G Boosters are the preferred pumps.

THE BUILDING:
Anderson Apartments, Fairbanks, Alaska

ARCHITECT:
Philleo Engineering Co.

HEATING ENGINEER:
Fairbanks Plumbing and Heating

PLUMBING AND HEATING:
Fairbanks Plumbing and Heating

GENERAL CONTRACTOR:
Kenneth P. Anderson, Contractor

BELL & GOSSETT
COMPANY
Dept. GZ-37, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

NOW! INDIVIDUAL BALLAST PROTECTION IN EVERY* FLUORESCENT LIGHTING FIXTURE

Exclusive with Day-Brite

...and it doesn't cost you a penny more!

Individual ballast protection in every Day-Brite fixture is designed to prevent undesirable conditions which sometimes result at end of ballast life:

- **prevents ballast smoking**
- **prevents ballast leakage**
- **prevents violent failure**

At the first sign that such unusual conditions are developing, the ballast inside the Day-Brite fixture is immediately de-energized either by a temperature-sensitive system of thermal protectors built into each ballast or by a current-sensitive fuse built into the fixture. These protection measures are not affected by the temporary voltage or current surges that occur during normal lamp operation, thus assuring that you will have no "nuisance" outages. De-energizing of the ballast takes place *only* when it has come to the end of its useful life and needs to be replaced.

Other advantages of Day-Brite individual ballast protection:

- Prevents unauthorized tampering because ballast control is located inside the fixture.
- Speeds up servicing by quickly identifying which fixture has the worn-out ballast.
- Other lighting fixtures on the branch circuit remain lighted during the ballast failure of one fixture because the ballast is de-energized before branch circuit fuse is affected.

For further information on individual ballast protection in Day-Brite fixtures, contact your Day-Brite representative listed in the Yellow Pages or write...

DAY-BRITE LIGHTING, INCORPORATED

6260 North Broadway, St. Louis, Missouri, and Santa Clara, California. In Canada: Amalgamated Electric Corporation, Ltd., Toronto 6, Ontario.

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

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**Except EXIT SIGNS and NITE LIGHTS.*

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Where the need in vinyl wall coverings is greatest... the choice is

Decatur Memorial Hospital, Bainbridge, Ga. — 85 beds; Velmer Turnage, Supt.

"VINYL'S First Three"*

*FABRON® Heavy-Duty PERMON® Super-Duty PERMON®

Stay-fresh wall beauty, damage resistant, virtually stain-proof... highest fire protection rating... surfaces that clean easily, speedily, thoroughly... year-after-year freedom from costly redecorating...

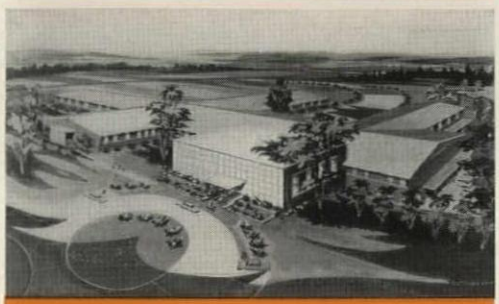
These are among the reasons Gregson & Associates, architects, specified FABRON and the two PERMONs when designing the four hospitals illustrated and others... sound reasons for their specification wherever need exists for lasting interior wall beauty and low maintenance in buildings serving the public.

Over the years, these quality vinyls are actually more economical than the most inexpensive traditional wall treatment. In today's largest selection of colors, prints, textures... skillfully designed for enduring style... offering beauty that is immune to the obsolescence of passing fads. And because of the different weights of virgin vinyl films in which "Vinyl's First Three" are available, you can get the degree of protection to satisfy your individual need... a major money-saving advantage.

Avoid Costly Selection Errors: Write for brochure, "How To Judge Vinyl Wall Coverings."

Memorial Hospital, Waycross, Ga. — 120 beds, with 60-bed addition to be erected this year; O. L. Ferrell, Supt.

Paulding County Hospital, Dallas, Ga. — 30 beds; Lucille Womack, Supt.



Sam Howell Memorial Hospital, Cartersville, Ga. — 60 beds; Wm. C. Baxter, Supt.

FREDERIC BLANK & COMPANY, INC.

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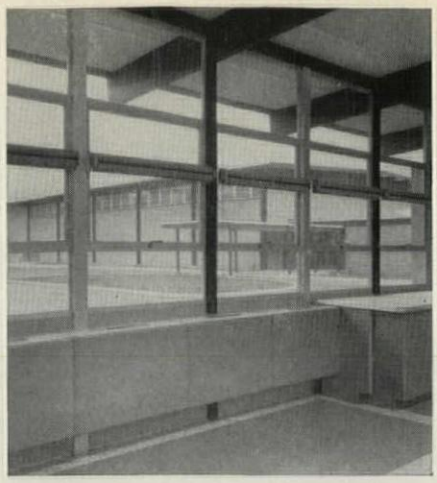
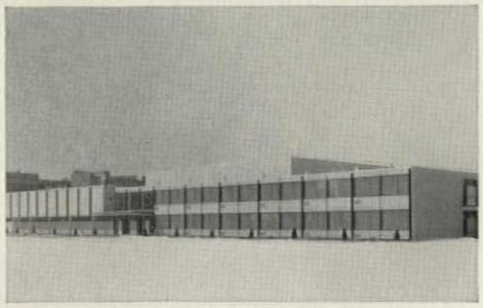
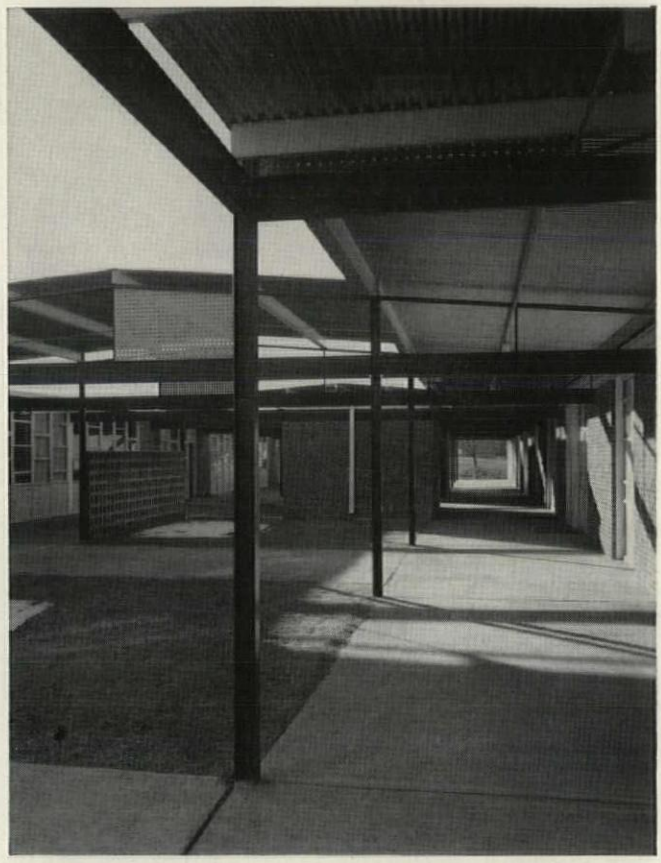
For more information, turn to Reader Service card, circle No. 378

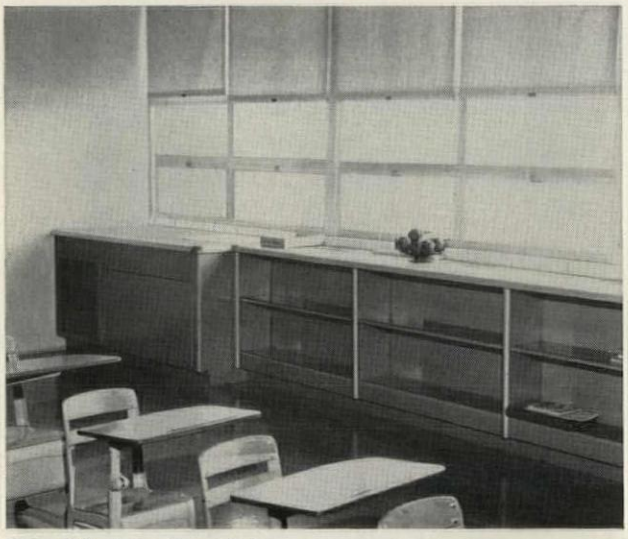
97.8¢ Per Sq. Ft.
total H. & V. cost for 32-room Burrell-Slater High School, Florence, Ala. Architect: Northington, Smith & Kranert Engineers: Clark Engineering Co., Tuscumbia, Ala.



83¢ Per Sq. Ft. *total H. & V. cost for De LaSalle High School Addition, Minneapolis, Minn. Architect: Eugene V. Schaffer & Associates, St. Paul, Minn. Engineer: Gausman & Moore, Inc., St. Paul, Minn.*



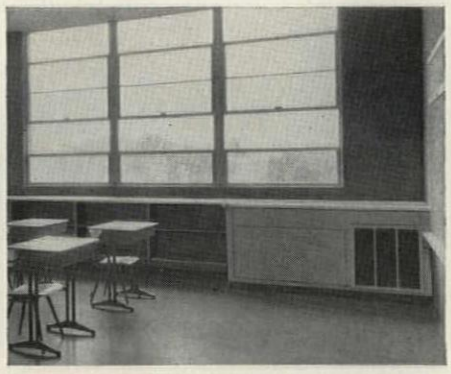




66.2¢ Per Sq. Ft. *total H. & V. cost for James Lane Allen School, Lexington, Ky. Architect: Merriwether, Marye & Associates, Lexington, Ky. Engineer: Procter & Ingalls, Lexington, Ky.*

85¢ Per Sq. Ft. *total H. & V. installation cost for AASA cited Northside Elementary School Addition in Morrilton, Ark. Architect: Ginocchio, Cromwell Carter, Dees and Neyland, Little Rock, Ark. Mech. Contractor: R. O. O'Bryant Co., Morrilton, Ark. Paul G. Liddicoat, Supt., Morrilton Public Schools.*

87.6¢ Per Sq. Ft. *total H. & V. for Mary G. Hogsett School, Danville, Ky. Architect: Merriwether, Marye & Associates, Lexington, Ky. Engineer: George Baxter, Lexington, Ky.*



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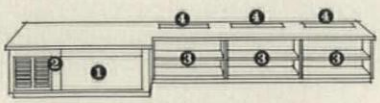
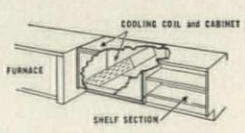


Norman HVS Model illustrating
1. Furnace enclosure. 2. Return air grille. 3. Util-i-Duct® bookshelf. 4. Air diffuser. Also available in Inn-A-Wal Counter Flo Model for use in separate heater room.



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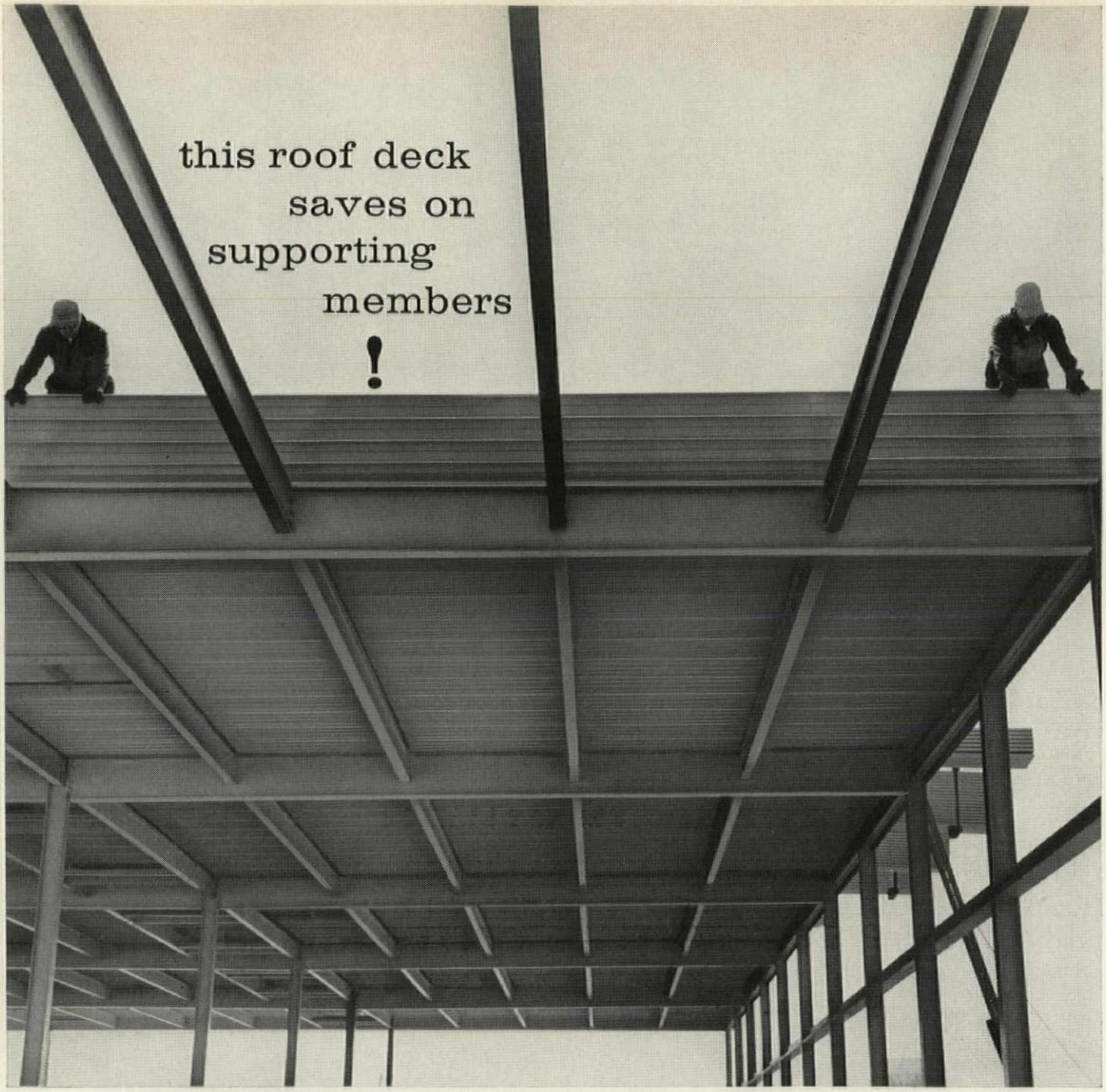

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This means that supporting beams, columns, and footings cost less. So, in the long run, the cost of using steel roof deck is usually far less than for comparable types of construction.

Over-all economy is just one advantage of steel roof deck. Others are detailed in specific product catalogs available upon request to any member company of the Metal Roof Deck Technical Institute. Write for further information today.

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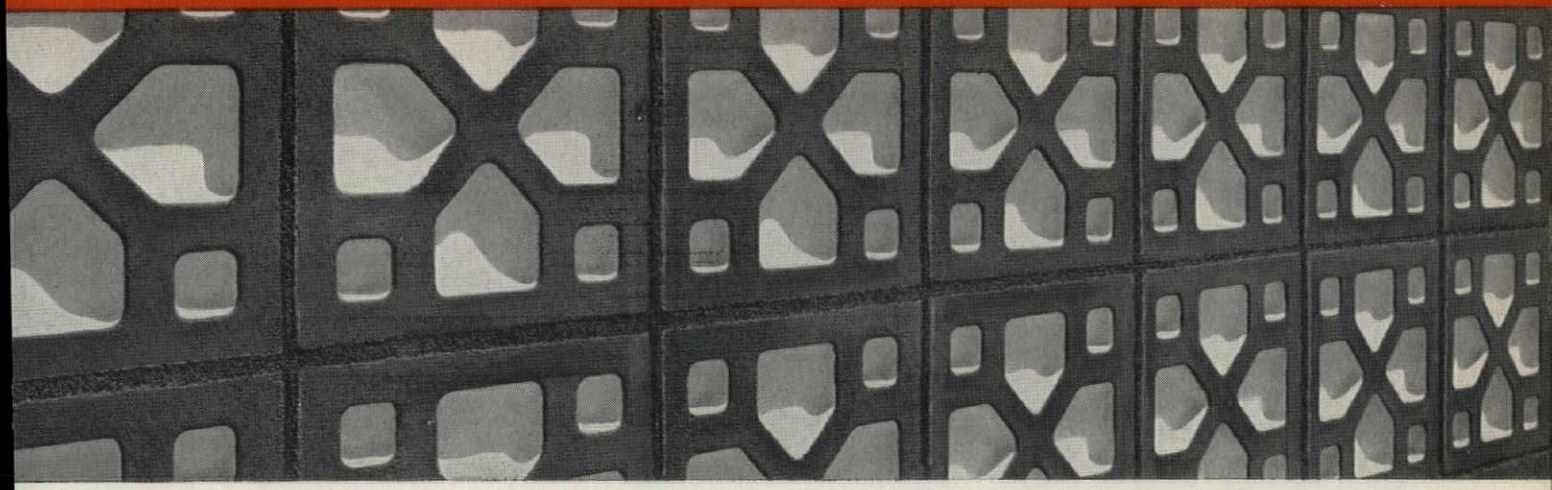
Great new things are shaping up in concrete block



Solid-back grille block: This new concrete unit facilitates the installation of a screen-pattern facing over masonry walls. Ideal for remodeling. For dramatic interest, the screen web and the solid back may be painted different colors. Units are usually available to match pierced grille blocks so the same design can be used for solar screens or free-standing walls. Ask your local block manufacturer. ■ To lay up solid-back grille block, ATLAS MASONRY CEMENT provides the right mortar. It produces a smooth,workable mix...saves labor and waste...gives weather-tight joints that are uniform in color. Complies with ASTM and Federal Specifications. For information on masonry cement, write Universal Atlas, 100 Park Avenue, New York 17, N.Y.

USS **Universal Atlas Cement**
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Aerofin performance data are laboratory and field proved. You can safely specify Aerofin coils at full published ratings.

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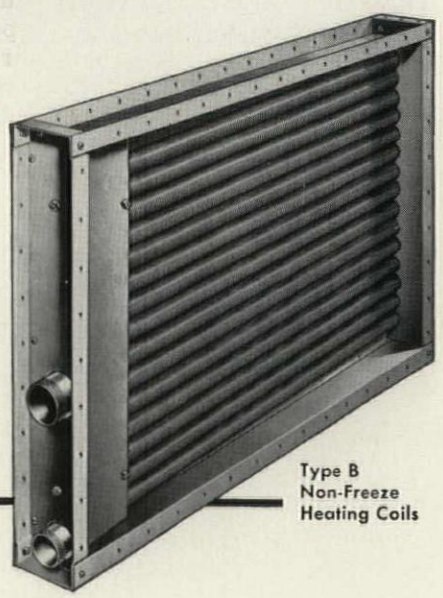

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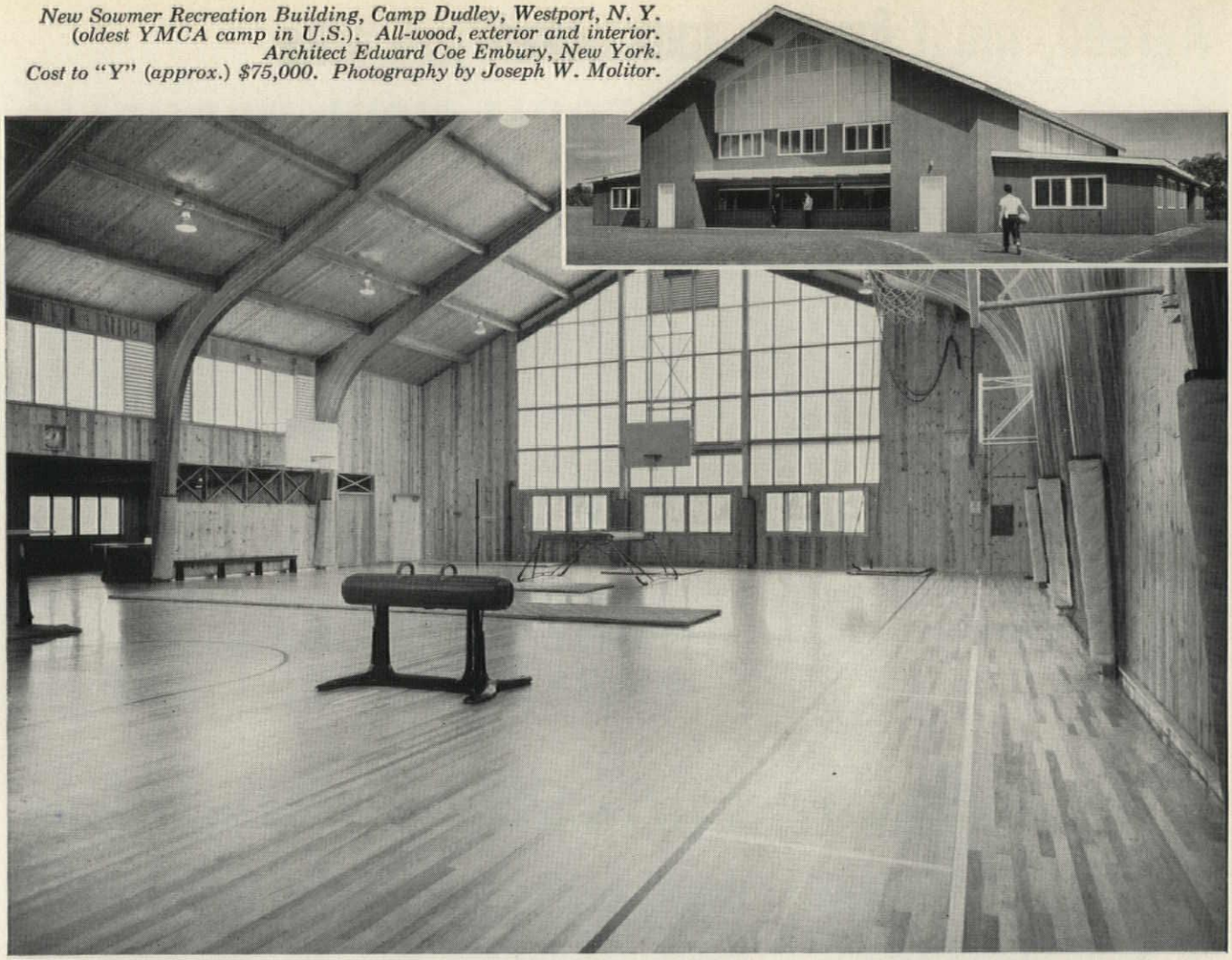
ENGINEERING OFFICES IN PRINCIPAL CITIES

New Sowmer Recreation Building, Camp Dudley, Westport, N. Y. (oldest YMCA camp in U.S.). All-wood, exterior and interior. Architect Edward Coe Embury, New York. Cost to "Y" (approx.) $75,000. Photography by Joseph W. Molitor.



wisely floored, "for life" with *Northern Hard Maple

This superb floor is far from costly. In fact, it's a shining symbol of true foresight. For, with more gymnasium experience than any other organization on earth (a century!), YMCA people are well aware of Northern Hard Maple's almost indestructible stamina.

Every silken-smooth strip of it is MFMA guaranteed *northern hard* maple, milled to highest precision attainable. A floor of MFMA maple, with routine maintenance, outlasts the building. It fights off the scuffs of scampering feet for years, then comes back, fresh-faced after sanding and refinishing.

Coaches, trainers, athletes emphatically prefer floors of Northern Hard Maple. Pupils and teachers, too, are more comfortable on these warm, foot-friendly floors in classrooms and shops.

With such beauty, you get the tight-grained *toughness* that makes MFMA maple stand up for years under roller skating, dancing, dining, community use. Let us help you plan "floors that pay dividends."

Write for technical data. See Sweet's (13-j-MA) for outline specifications and complete grading rules. MFMA flooring is always available in strips, blocks and patterned designs.

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Northern Hard Maple
BEECH and BIRCH

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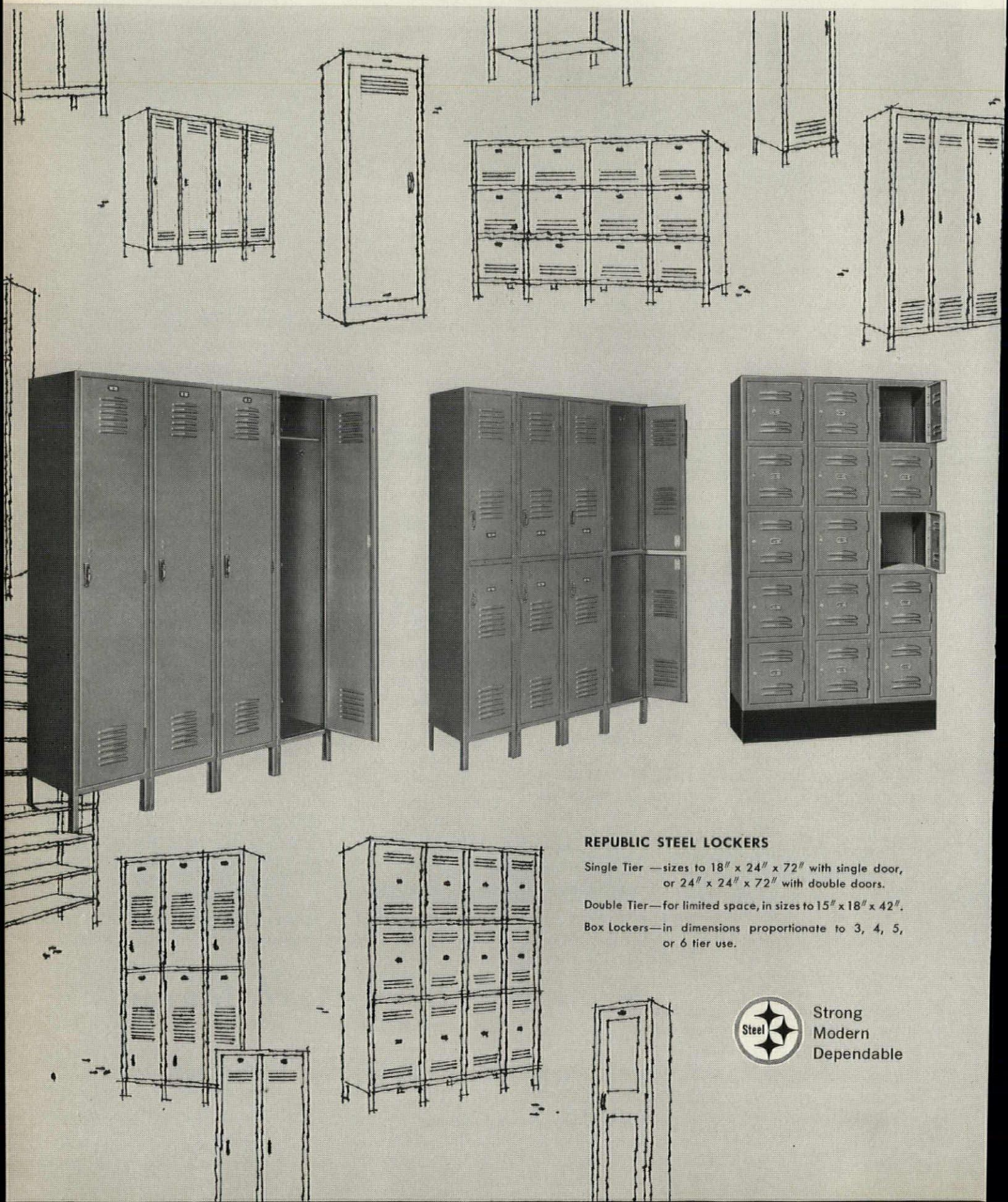
Agreed, most lockers look alike

The difference? YEARS FROM NOW REPUBLIC



REPUBLIC STEEL LOCKERS

Single Tier —sizes to 18″ x 24″ x 72″ with single door, or 24″ x 24″ x 72″ with double doors.

Double Tier—for limited space, in sizes to 15″ x 18″ x 42″.

Box Lockers—in dimensions proportionate to 3, 4, 5, or 6 tier use.

Steel

Strong
Modern
Dependable

LOCKERS WILL STILL LOOK NEW!

There's really no reason why lockers shouldn't look alike. A single tier locker, for example, *should* be a tall rectangular shape, to accommodate a coat and provide a shelf space above. And it should have a door with a locking handle and ventilating slots. *There is a difference, though. In Republic Steel Lockers, it is:*

CONSTRUCTION DESIGNED TO STAND HARDER USE—Heavy, fully flanged doors, door frames, and body parts. The extra steel used in Republic-Berger Lockers means longer, trouble-free product life.

FIVE-LOOP PIN TYPE HINGES—Doors strongly supported on 2" wide double leaf hinges, welded to the door frame, bolted to the door.

POSITIVE, QUIET LATCHING AND LOCKING—Pre-locking door design that permits locked door to be closed without raising latching bar. The largest live rubber silencers found in any locker insure quiet operation. (Door handles are attached with tamper-proof Gulmite screws and lock washers. Your choice of popular locking systems.)

FIVE-STEP BONDERIZING—As contrasted to usual three-step method. Resultant coating seals out corrosion, assures permanent adherence of baked enamel finish, and provides maximum resistance to chipping and scratching. (Chrome-plated door handles with integral padlock strike provide an additional guarantee of lasting "new" appearance.)

COMPLETE DESIGN FLEXIBILITY—Available in every style and proportion, Republic Steel Lockers are made on the unit principle—every part interchangeable for complete adaptability in original installation, or in future re-arrangement.

To sum up, we can agree that all lockers *look* alike—but a closer look reveals, Republic-Berger Lockers offer a vital difference in *extra* quality. Ask for a demonstration to prove this fact. We're sure you'll be convinced the difference means lower maintenance costs. You can get more information, and locker planning help, and catalogs for your file, by calling your Republic Locker Distributor, or by mailing the coupon below.

OPEN SHELF FILING—The latest innovation in the housing of modern, efficient filing systems. Open Shelf Filing speeds file procedures, increases file room efficiency, yet the initial equipment cost can be as much as 70% lower.

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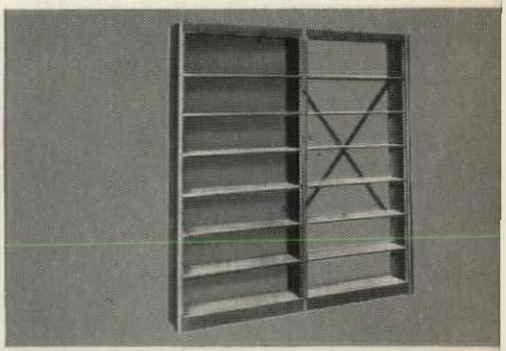

ADJUSTABLE TO ANY BOOK SIZE—Republic Book Shelf Units adapt quickly to any book storage need. Choice of decorator colors, open or closed styles, 84" or 90" height. Counter-high Book Shelf Units available, too.

REPUBLIC STEEL

REPUBLIC STEEL

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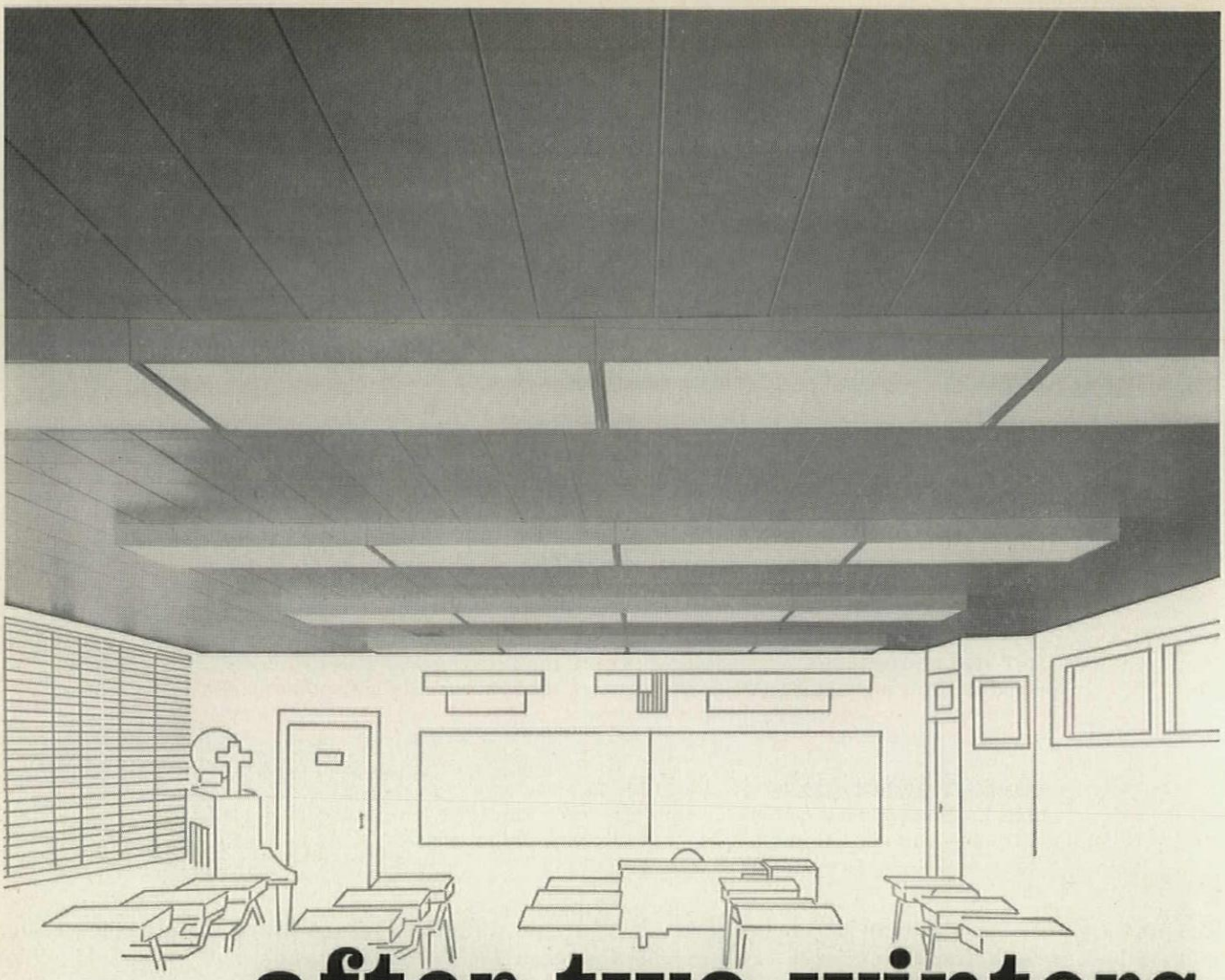
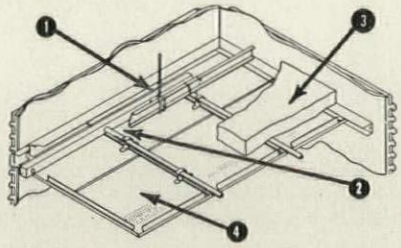


after two winters

"Air circulation, comfortable uniform heating, dependable performance, ease of maintenance and unanticipated economy in operation . . . and, our installation has performed with complete satisfaction. We believe that it has provided the greatest comfort and the best possible atmosphere for school children and faculty", reports Rev. W. P. Sauer, St. John's Ev. Lutheran School, West Bend, Wisconsin about the Burgess-Manning Radiant Panel Ceiling installed September, 1959.

The superior advantages and true economies, as reported by school after school, will be hard to equal with any other method of heating, or cooling. With Burgess-Manning Radiant Panel Ceilings you set the highest efficiency of acoustic control, too!

Remember, your school is *better* . . . your budget no *bigger*. Write for complete descriptive literature.



Note the relatively simple construction, consisting of 4 simple components— (1) suspension grid, (2) water circulating coil, (3) acoustic-thermal insulating blanket, and (4) snap-on panels.

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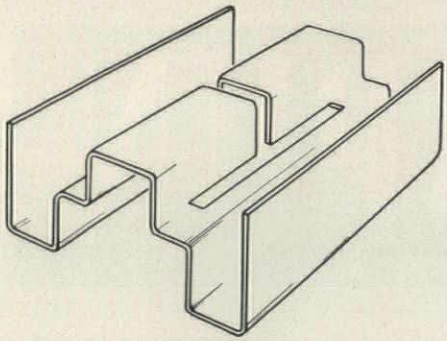

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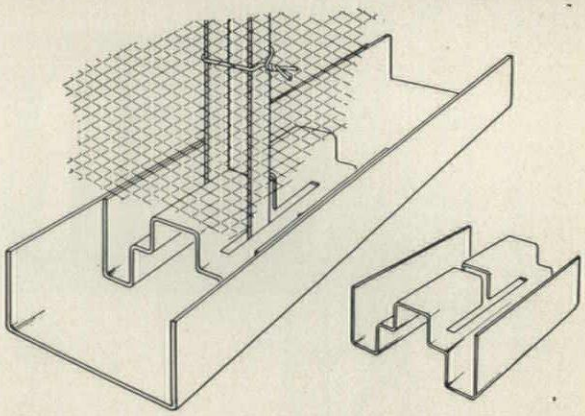
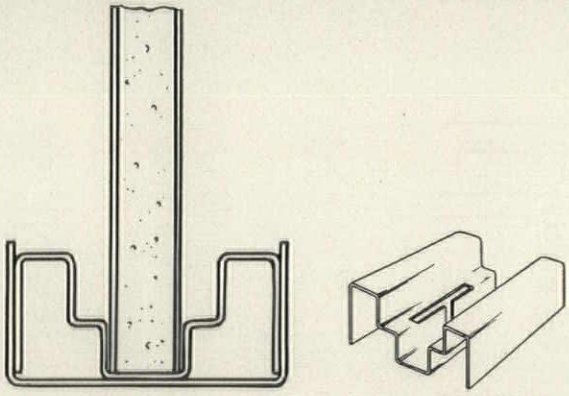
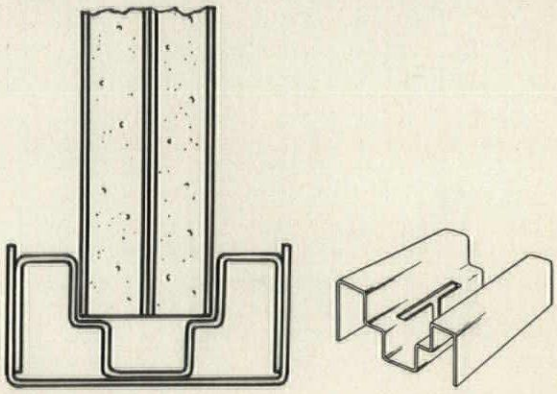


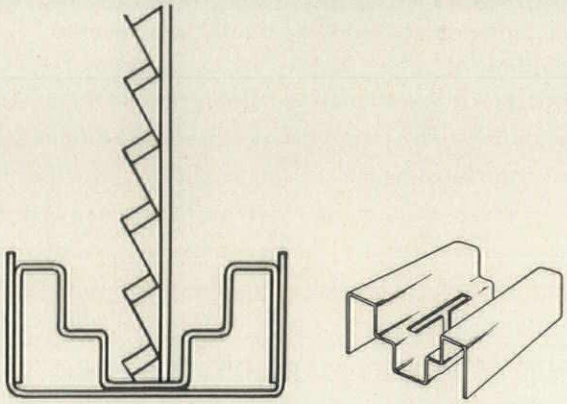
With ¾" channel and Diamond Mesh Metal Lath wire-tied to one side of the channel.



With ½" Long-Length Gypsum Lath.



With 1" Gold Bond Laminated Long-Length Gypsum Lath (patented interlocking edges).



With ⅜" Rib Lath Base grouted with gypsum.

Another example of spacesaving, moneysaving, timesaving modern lath and plaster systems through imagination . . . from Gold Bond®.

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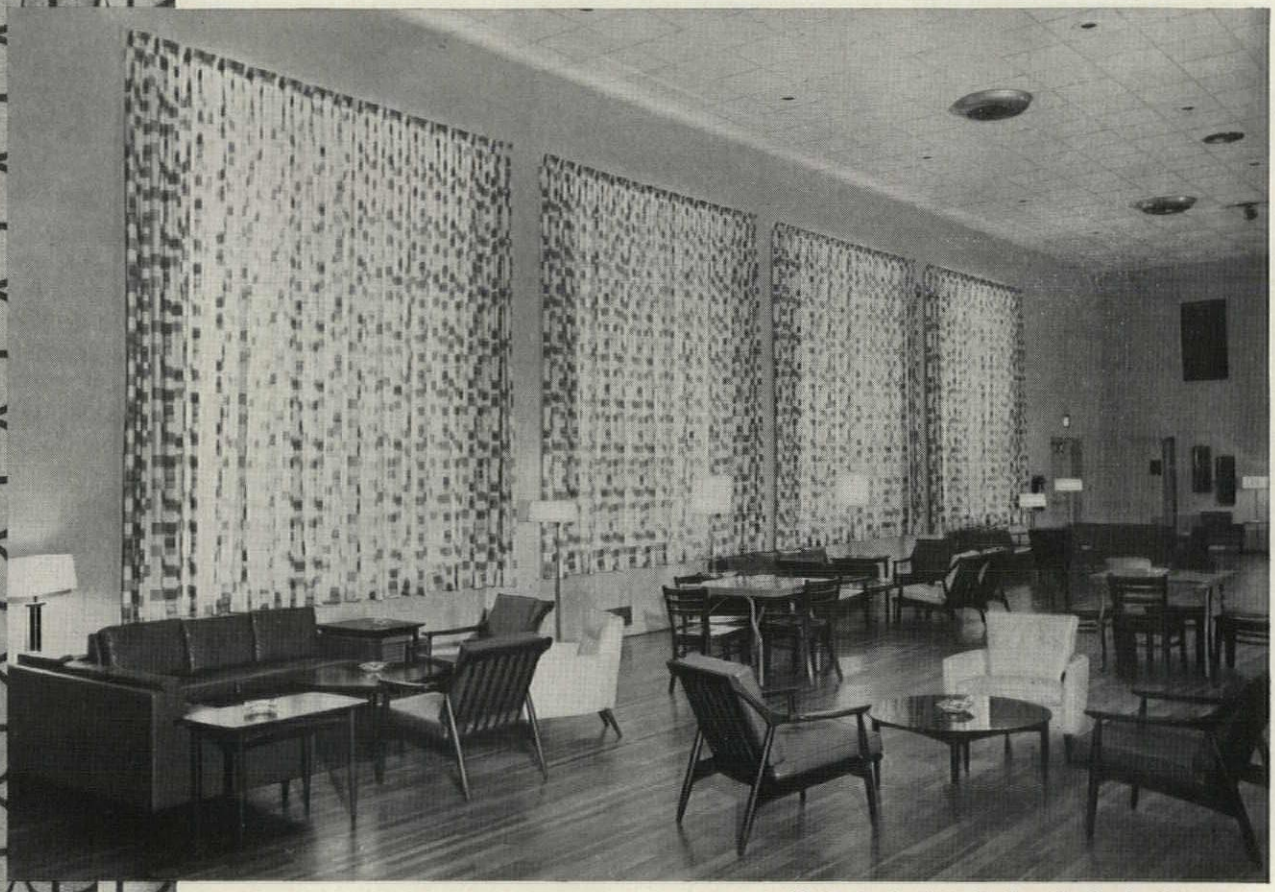

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Please send me information on powder actuated tool fastening.

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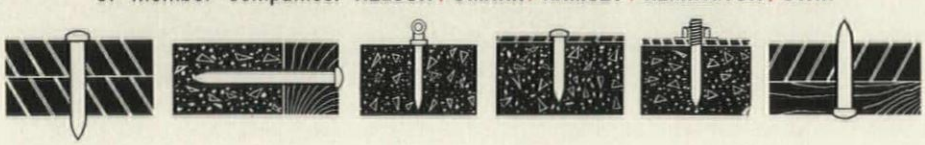
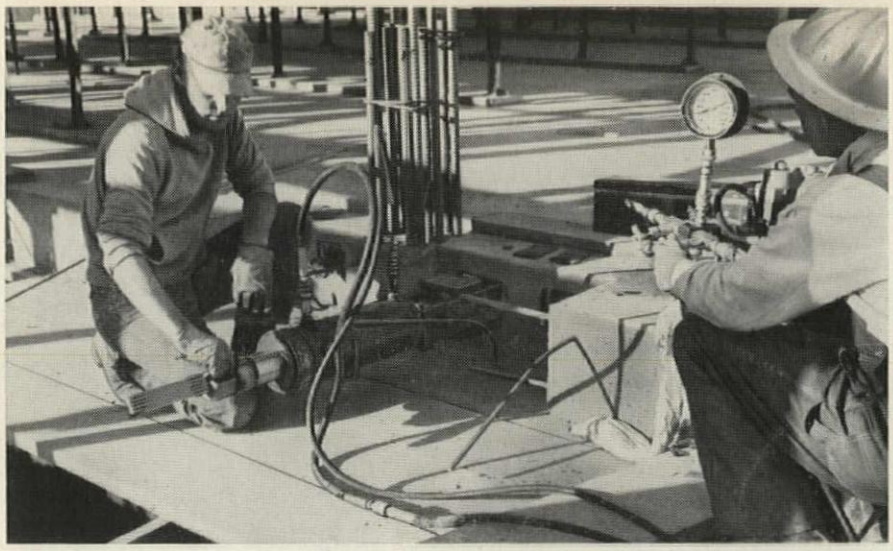
For the best in powder actuated tool fastening, rely on these brand names of member companies: **NELSON / OMARK / RAMSET / REMINGTON / STAR**

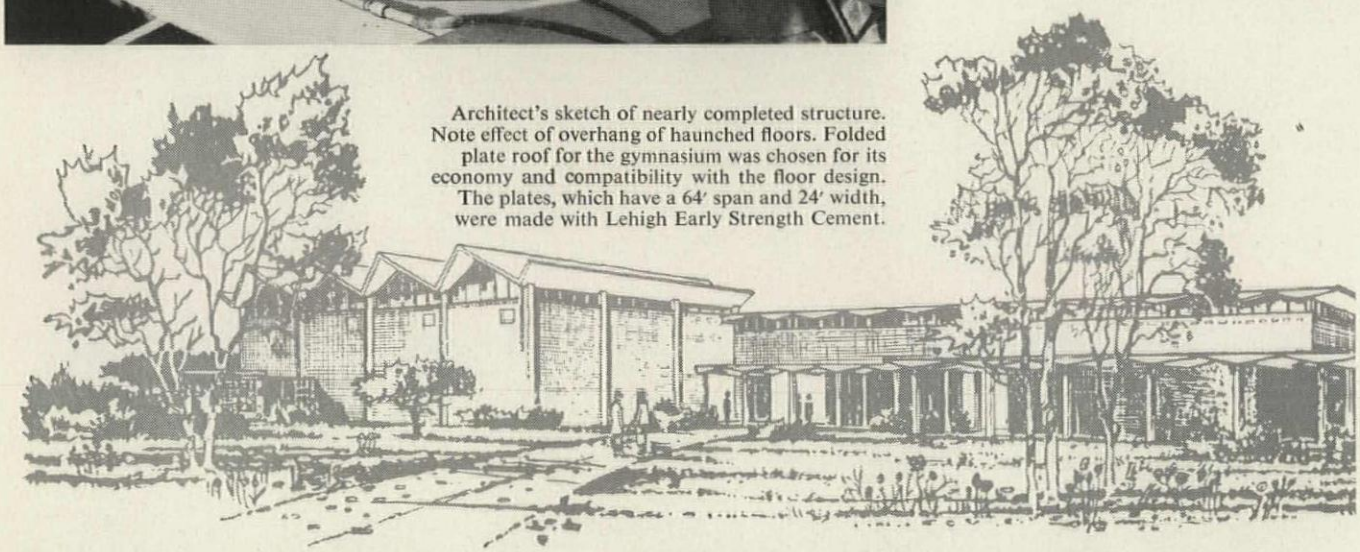


For more information, turn to Reader Service card, circle No. 355

Post-Tensioned Concrete Floors for new school



Floors were poured in sections. As concrete in each section reached 3500 psi, post-tensioning was applied. Thickness of floors varied from 6" to 12".



Architect's sketch of nearly completed structure. Note effect of overhang of haunched floors. Folded plate roof for the gymnasium was chosen for its economy and compatibility with the floor design. The plates, which have a 64' span and 24' width, were made with Lehigh Early Strength Cement.

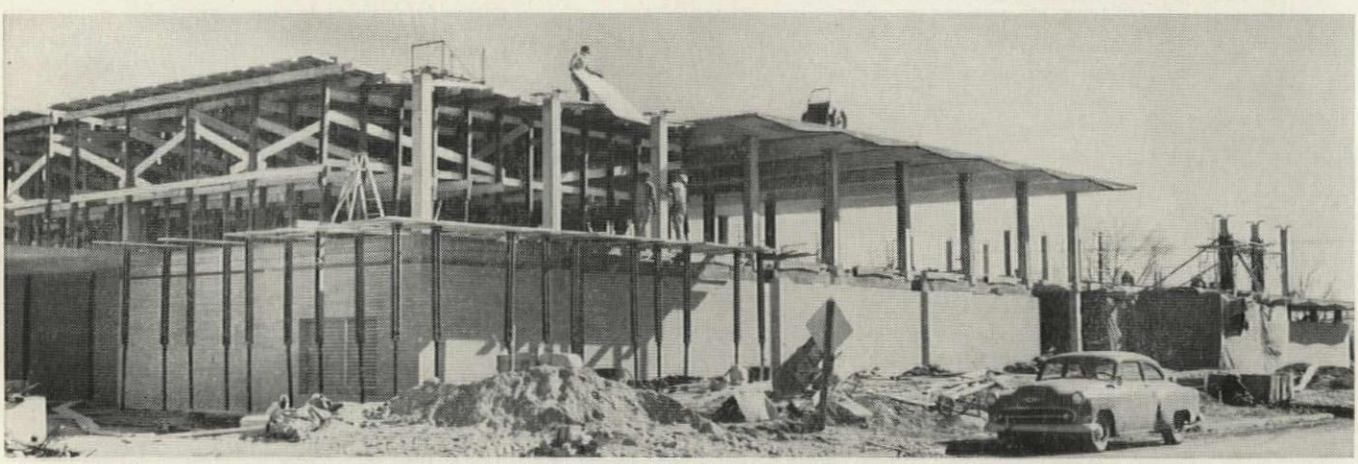
• For both economy and looks, an ingenious floor and roof design was created for Colby, Kansas' new Junior High School. Lightweight post-tensioned haunched slabs made possible a savings in material costs and provided great flexibility in the allocation of floor area. A folded plate roof for the gymnasium adds to the fresh overall appearance of the finished job.

Lehigh Early Strength Cement speeds winter construction. To meet the fast winter construction schedule, the use of early strength cement in the slabs was, in the contractor's words, "The only answer consistent with economy." With Lehigh Early Strength Cement, the slabs reached tensioning strength in one half the usual time, keeping the job on schedule with multiple use of a single set of forms. In addition, the reduced curing time meant savings on *winter* protection costs.

This job is another example of how modern concrete construction and Lehigh Early Strength Cement offer almost unlimited opportunities for design freedom, construction economy and attractive appearance. Lehigh Portland Cement Company, Allentown, Pa.

Architect: Mann and Company, Hutchinson, Kansas
Contractor: L. R. Foy Construction Co., Hutchinson, Kansas

LEHIGH CEMENTS



Concrete for first and second floor and roof was made with a lightweight aggregate and Lehigh Early Strength Cement. The haunched design added to the overall architectural effect as well as contributed to the saving of materials. Lehigh Mortar Cement was used for all masonry.

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IT'S THE NEW

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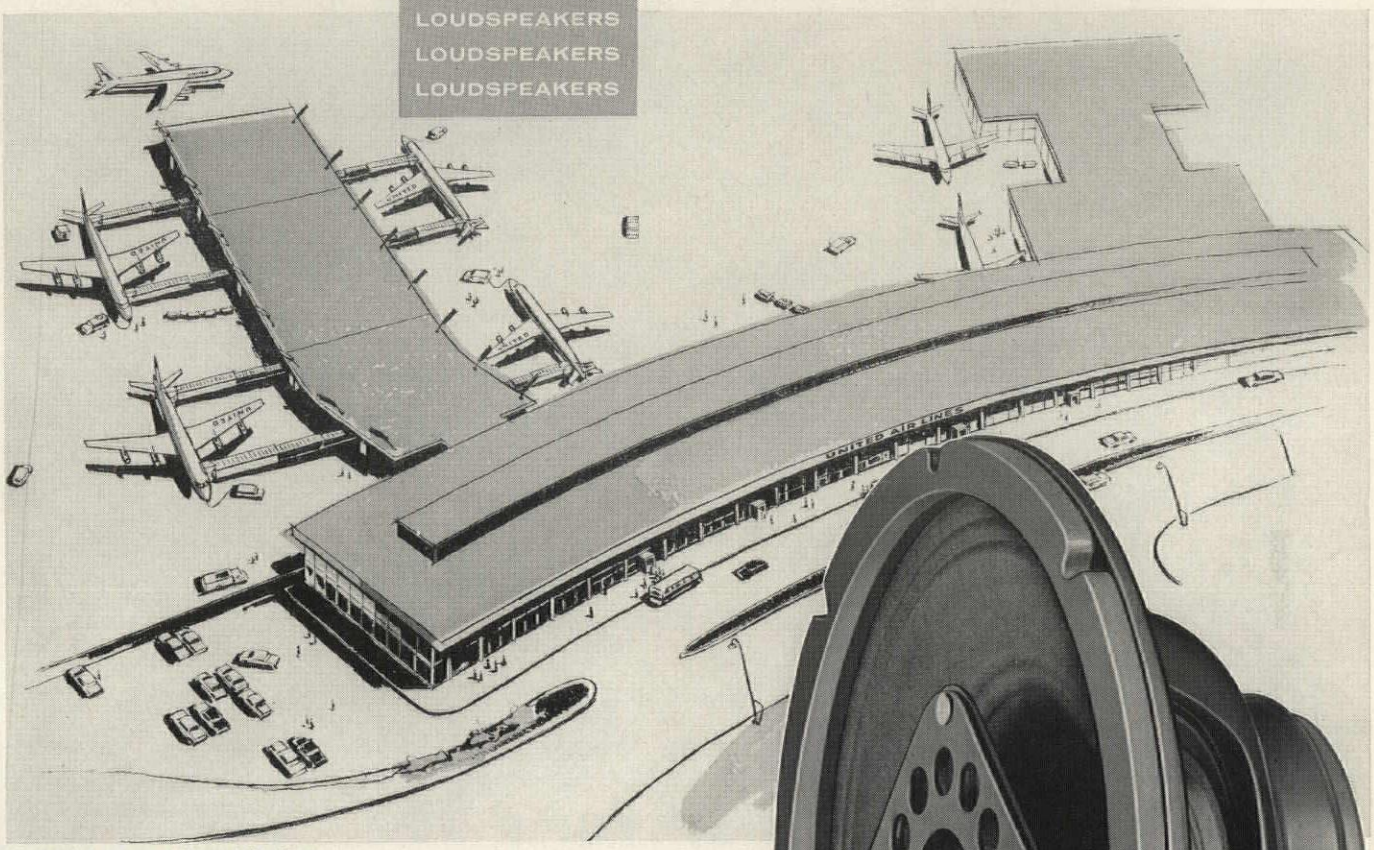
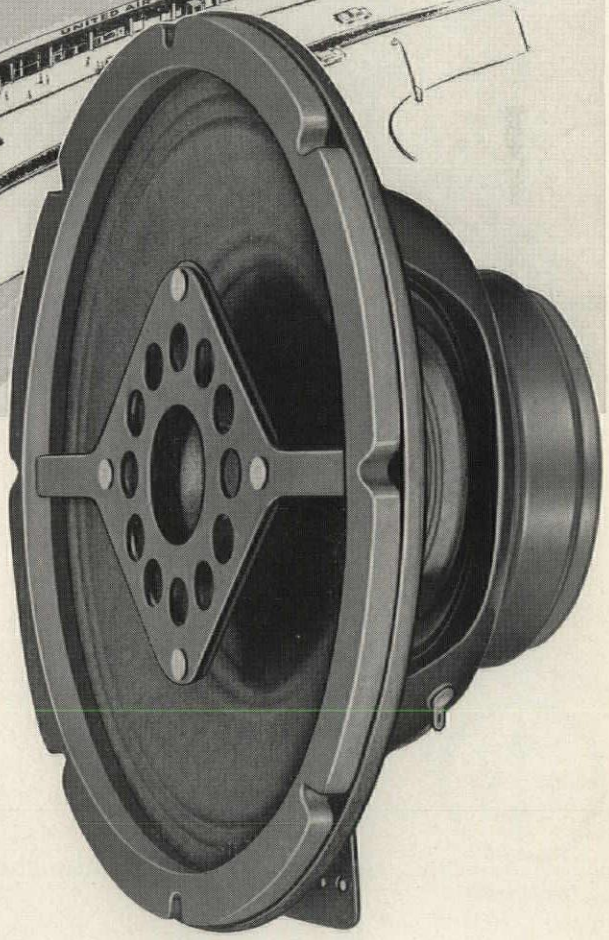


Illustration courtesy United Air Lines

Two new major jet age airports are equipped with Jensen's new K-950 loudspeakers.

Why was the K-950 chosen? Because it gives substantially improved reproduction quality, and drastically reduced variation in loudness and articulation with listening position compared with conventional simple cone speakers.

Whether it's an airport, school or industrial installation . . . wherever it is important for every word to be heard . . . be sure to consider the K-950. Cost is surprisingly modest for such high performance.



K-950. 8″ 2-way coaxial distributed sound loudspeaker. Write for specification sheet CPS-102

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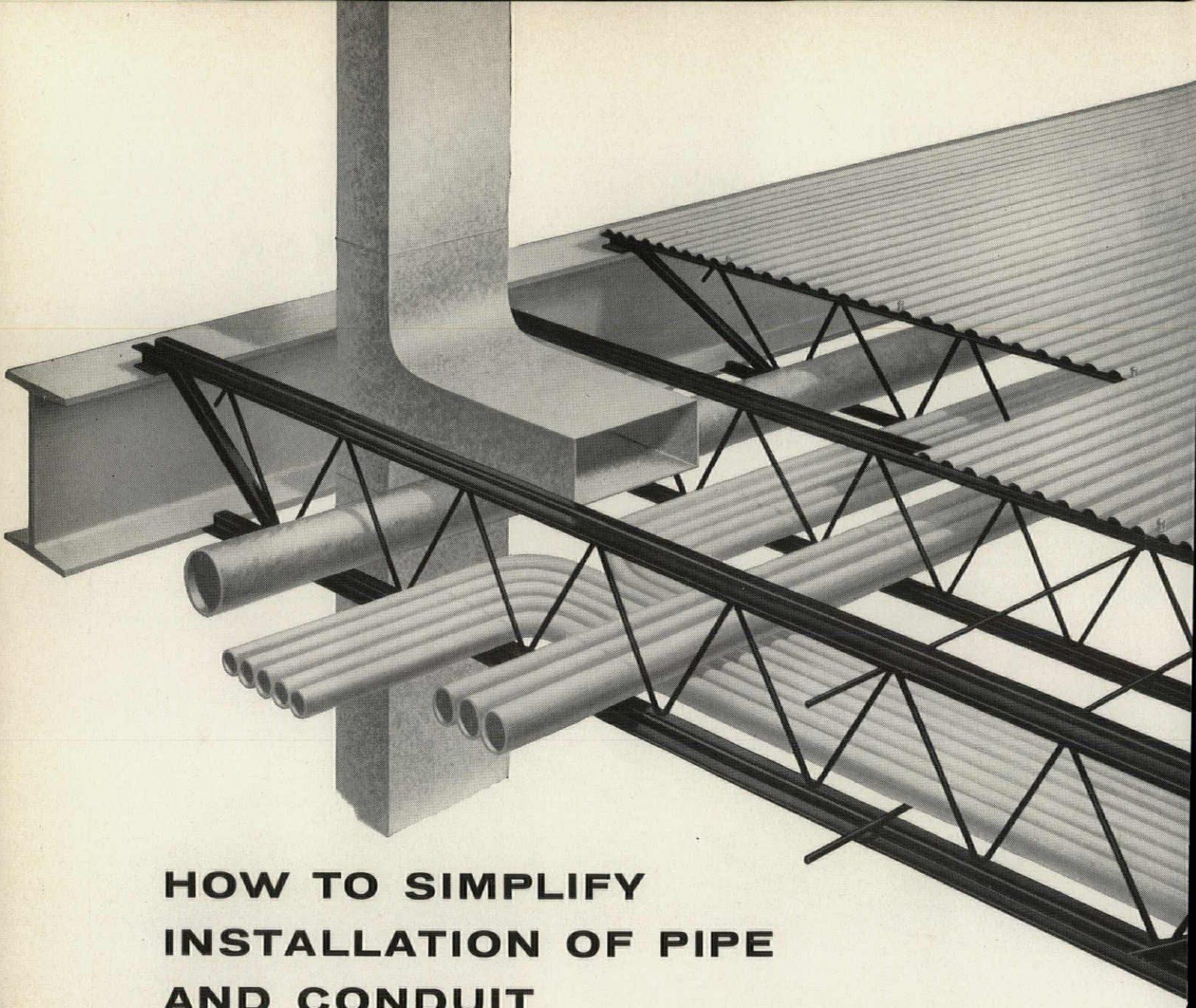

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One of the many advantages of designing with Bethlehem open-web steel joists is the ease with which you can install pipe and conduit. As shown above, the open-webs make it so simple to pass through pipe, wires, heating lines—*in any direction*. And installation of recessed lighting fixtures, plus their wiring, is also simplified.

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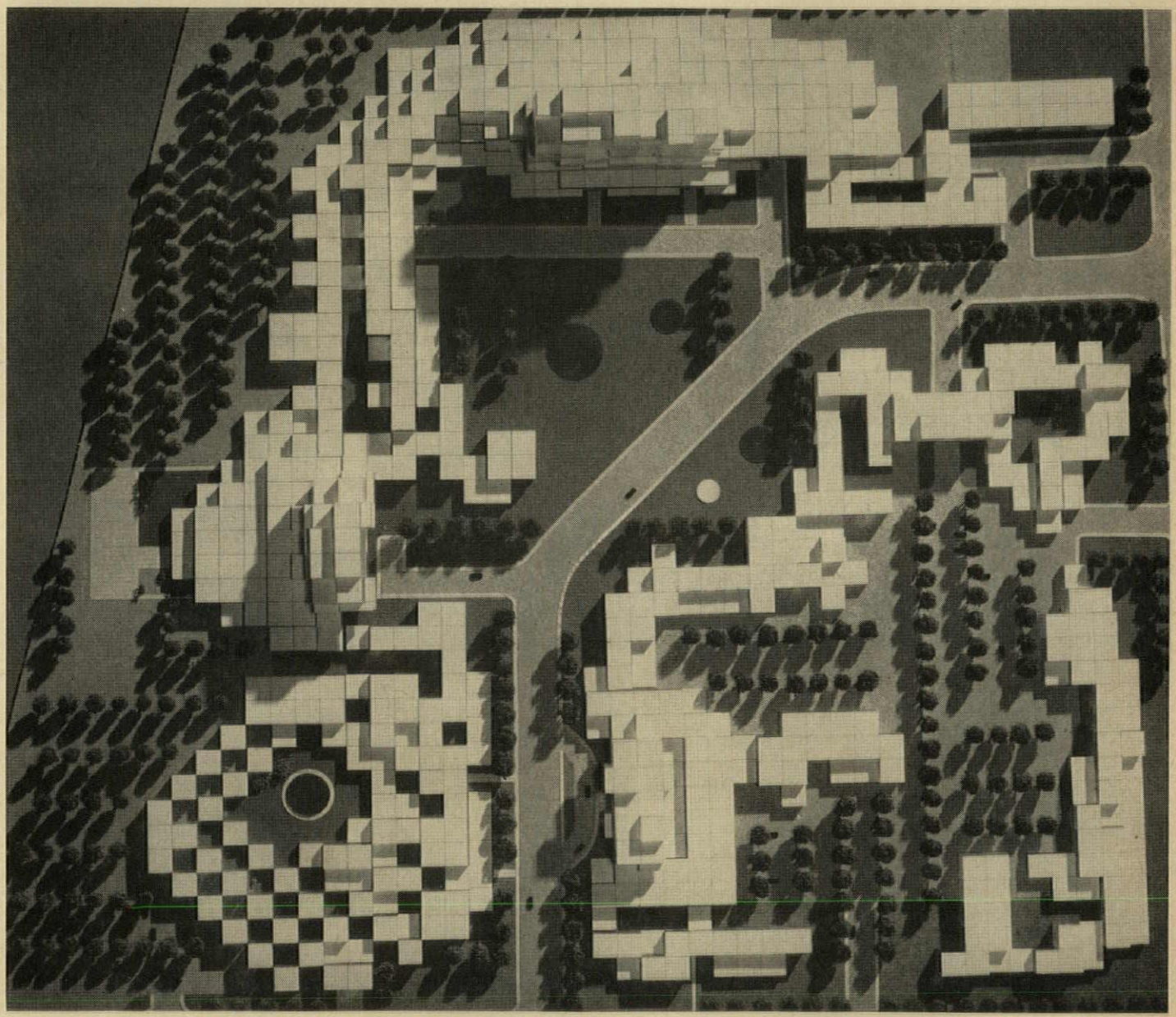
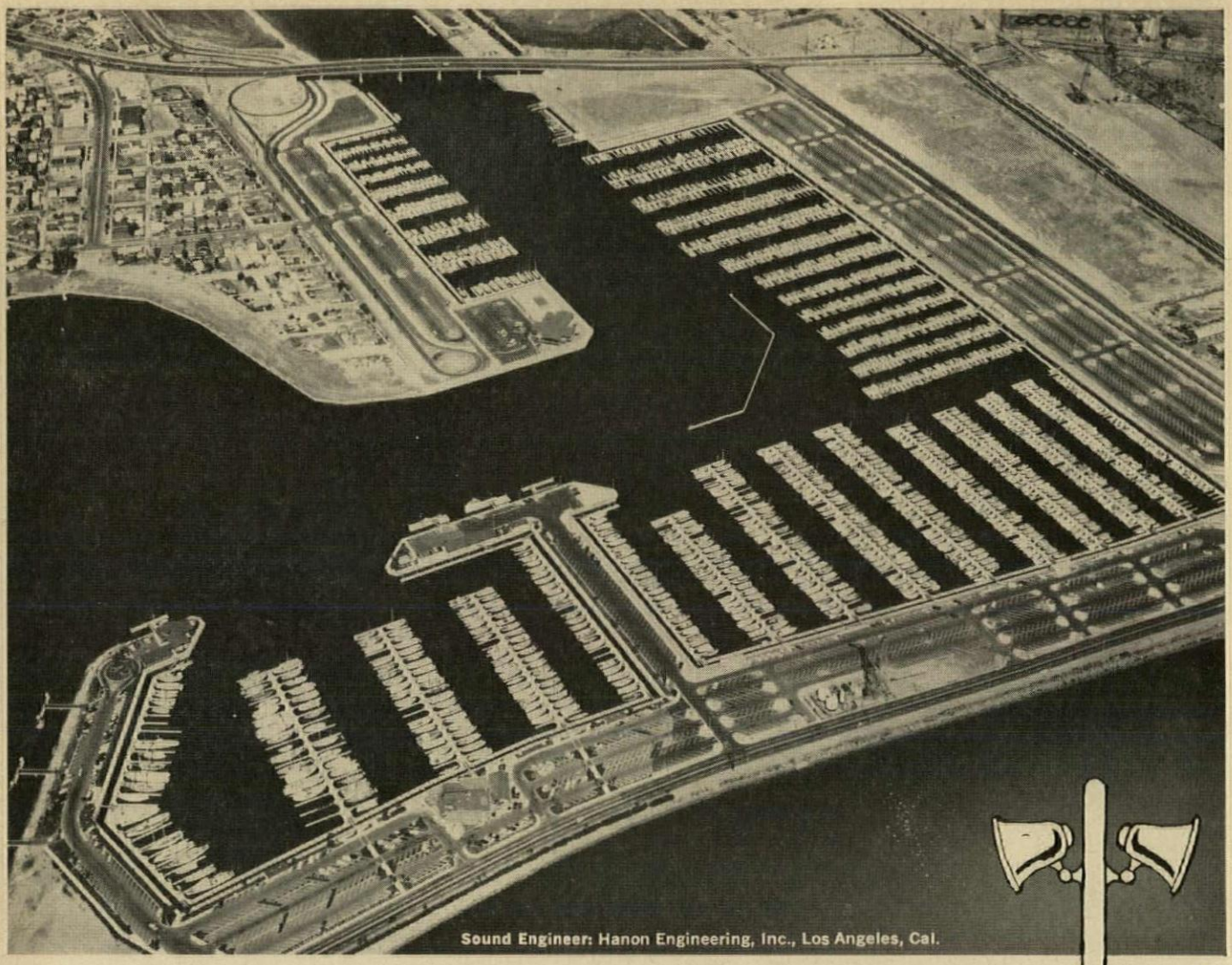
NEWS REPORT

Architecture's Monthly News Digest of Buildings and Projects, Personalities, New Products



Aerial view of model showing flexibility of modular building-block concept to be employed at International Science Center.



Long Beach Marina: world's largest . . .

sound planned with WEBSTER COMMUNICATIONS

Formerly a quiet anchorage, Alamitos Bay at Long Beach, California is now a busy place. 1800 boats up to 100 feet long tie up here; 2700 cars fill an adjacent parking area; there's a restaurant, marine supply store and a fuel dock to serve the boaters' needs. It's the largest municipally owned and operated marina in the world!

And it's sound planned with Webster Electric Communications! A Consolette dual channel sound center — combining Teletalk intercommunications and public address — is used for paging individuals at each of the 37 rows of slips. To reach an across-the-channel docking area, Webster Telecom — a private telephone-type intercom — is used in conjunction with a leased line. Each area can be contacted separately, and monitored "after hours."

The versatility and compatability of Webster Communications provide a wide latitude in integral sound planning. Your Webster Electric dealer* is ready to work with you . . . call for details and a demonstration.

** Listed in the Yellow Pages — "Intercommunications Systems"*

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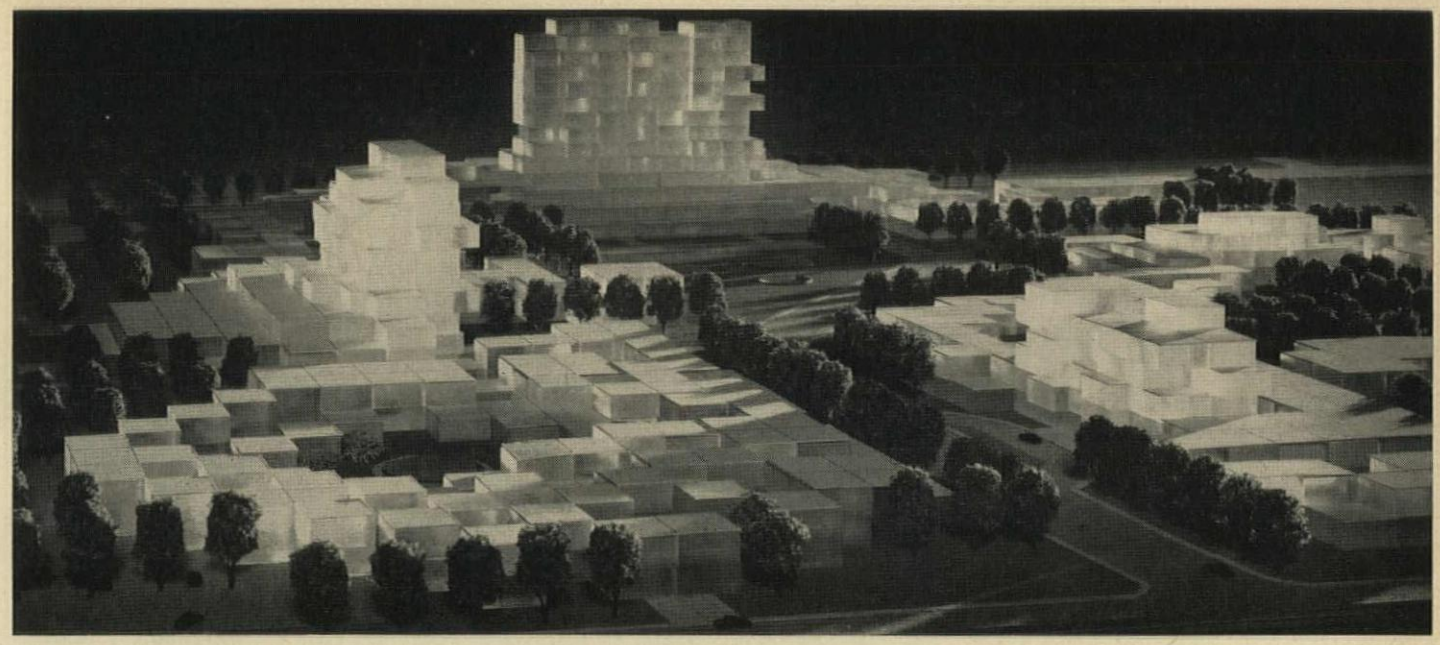


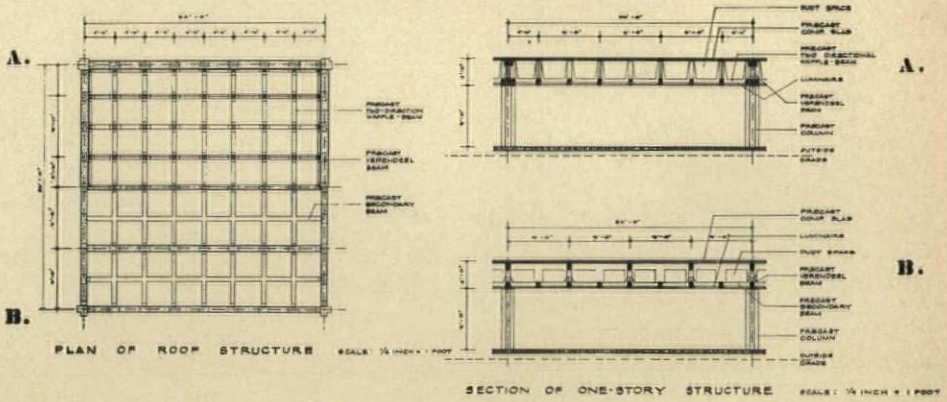
FLEXIBILITY KEYSTONE OF SCIENCE CENTER

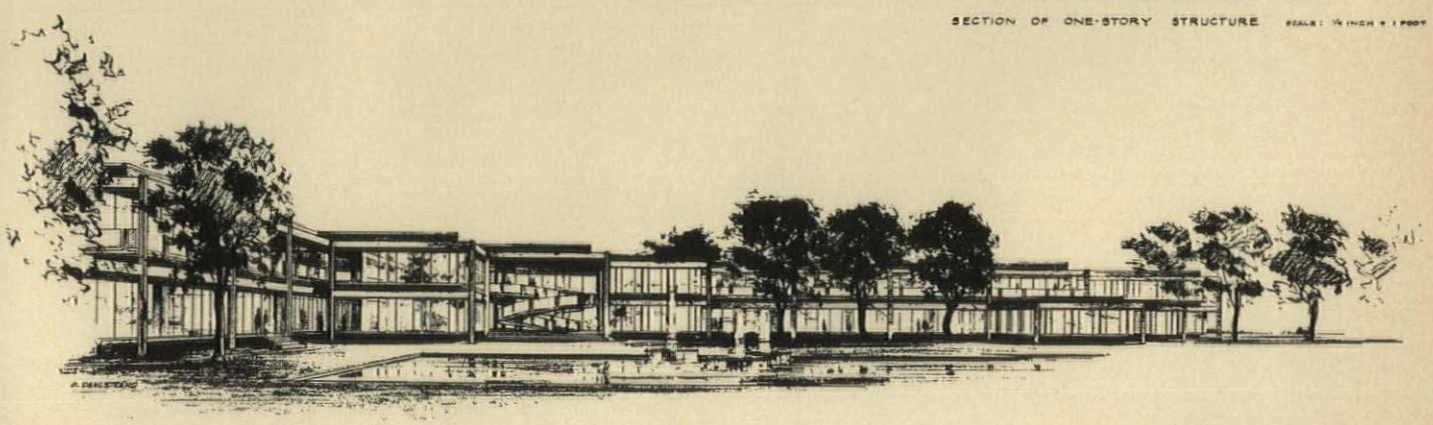
SUNNYVALE, CALIF. International Science Center, a proposed development in the expanding scientific and electronic community at the head of the San Francisco peninsula, will be a center for corporations and nonprofit organizations engaged in scientific research and development. The Center, which is being developed by The Draper Companies on behalf of the International Science Foundation, is expected to encourage freer interchange of ideas and facts between various scientific and engineering disciplines.

Instead of the usual spread-out, ragtag type of development common to industrial parks, Neill Smith & Associates, Architect and Planning Consultant for the Center, has envisioned a cohesive and highly co-ordinated, yet extremely flexible scheme. The basic unit of the entire concept is a 36-ft-sq structural component (*left*) which can expand horizontally or vertically to provide space for many activities: laboratories, offices, meeting halls, dining areas, motel rooms, and shopping areas. The units, or combinations thereof, would be varied by exterior and interior treatment, fenestration, equipment, and landscaping, but yet would achieve a homogeniety of over-all appearance desirable in a "campus" atmosphere such as this. Photos here and on page 39 show possible arrangements of the modules. Below is seen a later drawing for the structures around the central plaza. In addition to research and office facilities, the Center will ultimately contain services such as the Science Foundation Library, specialized functions such as an Armed Forces Technical Information Agency and a microfilm library, a motel, and a "Cosmos Club" (no relation to the notorious one). Smith writes that 40 more acres have already been added to the master plan.

Two methods of parking have been studied: sinking open parking spaces behind landscaped berms, and employing the structural module for parking spaces within the high-rise buildings.

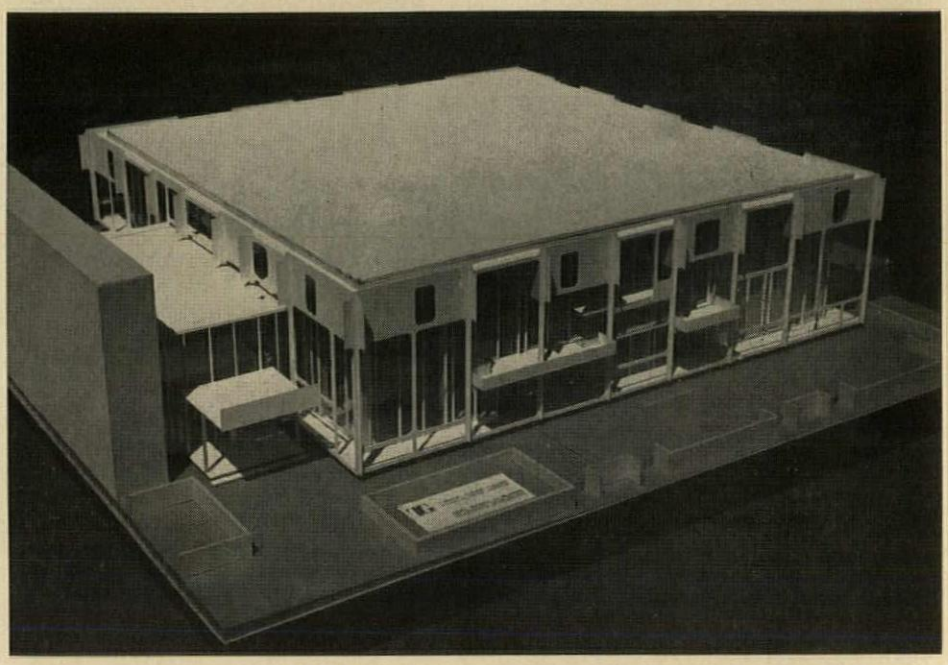
Landscape Architect: Lawrence Halprin & Associates; Structural Engineer: Stefan J. Medwadowski.





TYRONE GUTHRIE THEATER REDESIGNED

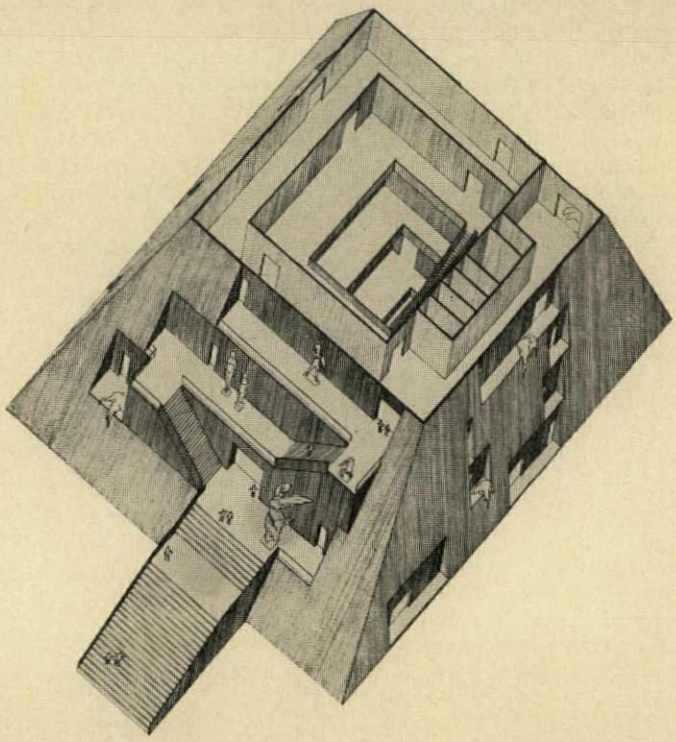
MINNEAPOLIS, MINN. The Tyrone Guthrie Theater has been redesigned by Architect Ralph Rapson since winning an Award Citation in last year's P/A Design Awards Program (pp. 103–104, JANUARY 1961 P/A). As shown then, the theater had a tall fly loft and a roof of curved, joined elements supported on columns terminating outside the auditorium walls to create an exhibition concourse. In the present design (*right*), now under construction, the fly loft has been reduced to a rudimentary form not visible from the exterior, the roof line has undergone simplification, and the exterior walls now face a pedestrian promenade bounded by vertical piers. Fascia panels define closed work spaces. The theater will be joined to the Walker Art Center by a two-story lobby connection. Further data on this project may be found on pages 104–105 of this issue of P/A.

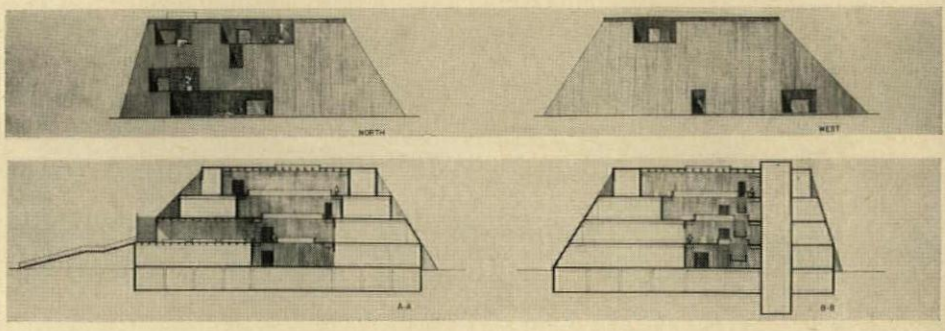


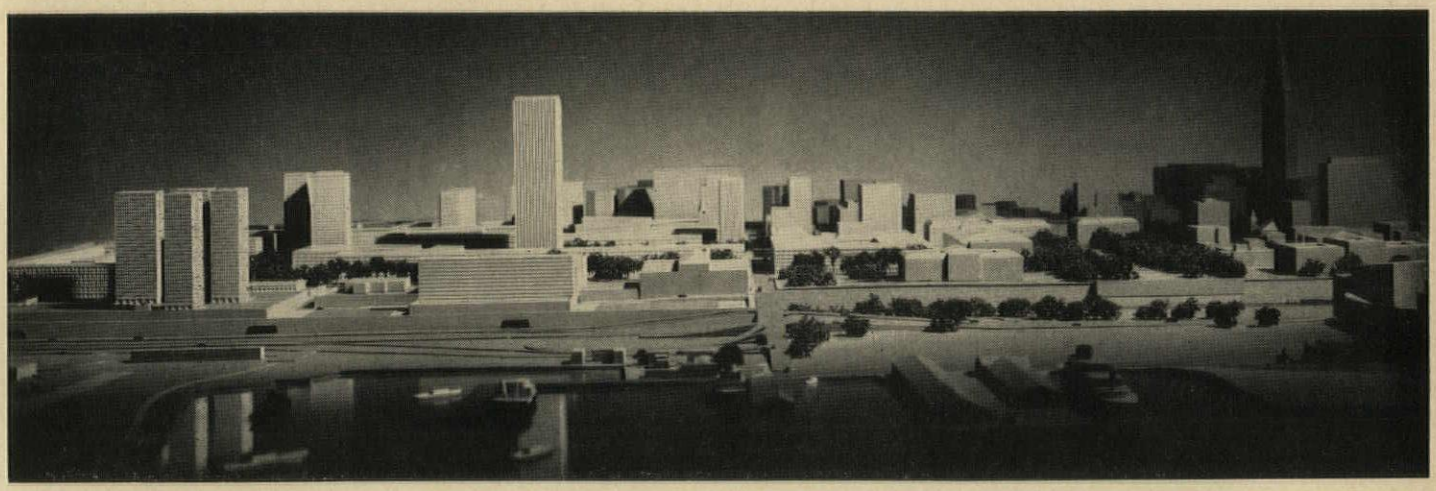
ART MUSEUM OF SPORT

The National Art Museum of Sport Committee has been formed to sponsor the establishment of an art museum devoted to art works of the sports world. Recently, the committee sponsored a $500 design competition for the design of such a museum at Yale and the University of Pennsylvania. For purposes of the competition, the site was in Washington, D.C. The winning Yale design, by student Donald R. Watson, is shown here.

Watson's proposal, a truncated pyramid, is a four-story structure, entered at the second floor via a monumental rise of steps. The bottom floor contains an auditorium, library, dining room and kitchen, and educational displays; the three upper floors are principally dedicated to exhibition space. An interior, skylighted court pierces the building and is used for sculpture and sitting areas. The main circulation occurs around this court. Gallery areas, diminishing in size as one moves upward, are on three sides of the court; the fourth side is reserved for offices, toilets, and elevators. Galleries are mostly closed, artificially lighted rooms, though occasionally there are windows with balconies for sculpture. The main façade features a series of outside sculpture terraces which one can descend after leaving the interior exhibit on the fourth floor.







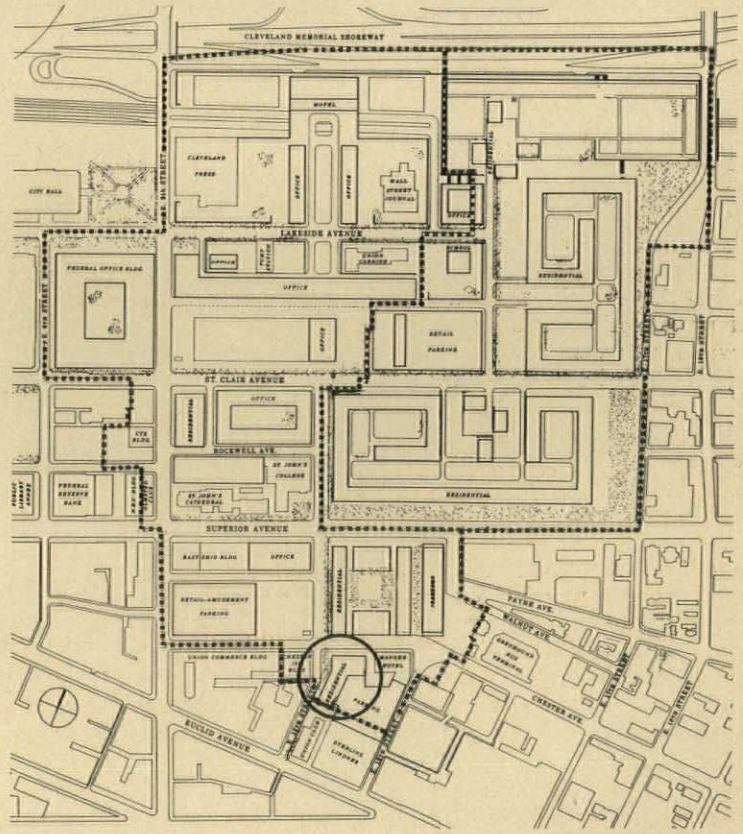
PEI PLANS DOWNTOWN CLEVELAND

CLEVELAND, OHIO Erieview, the redevelopment plan for 163-acres of downtown Cleveland, has been begun with the assigning of the first land parcel. With an urban renewal plan created by I.M. Pei & Associates, Architects and Planners (Vincent Ponte, Associate in Charge), the city intends to convert a blighted area presently yielding $840,000 in annual taxes into a complex of office and commercial buildings, public buildings, and apartment dwellings producing taxes of $2,900,000. Construction will proceed generally in two phases: the larger, mixed commercial and residential section first; the smaller, mostly apartment section later. More than half the land area will be set aside for lawns, parks, and malls.

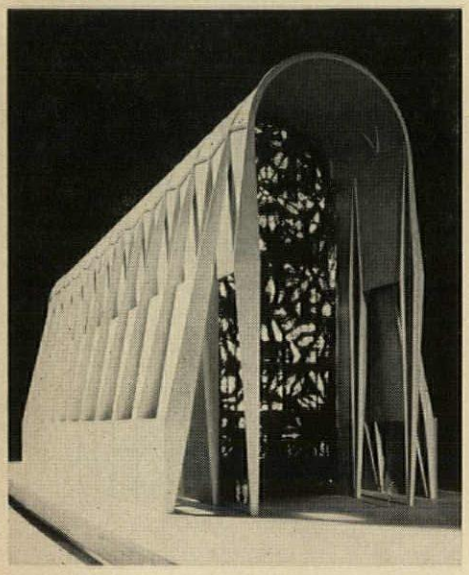
Focal point of the composition will be Erieview Tower, a high-rise office building commanding the commercial section of the plan. The tower will be situated at the end of a long reflecting pool and plaza which, in turn, will be bordered on both sides by lower office buildings, and will terminate in a Federal office building.

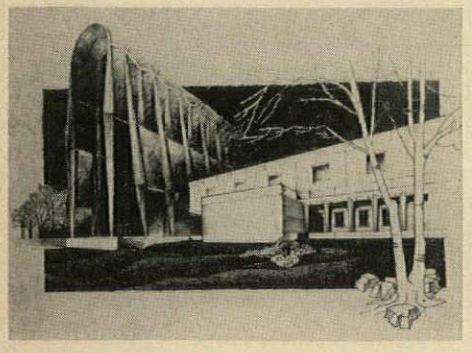
Residential provisions in the area include a 30-story building in the commercial area overlooking the pool, three 20-story apartments, two long, six-story apartments planned around court spaces, and seven 30-story towers, three at one end and four at the other end of the residential street. An Erieview-length terrace over the lakefront railroad tracks will serve as platform for one of the towers and a 600-room hotel-motel.

First assigned parcel in Erieview (circled in site plan below) went to Redeveloper B-G-R Associates, whose architect, Weinberg & Teare of Cleveland, with Charles Luckman Associates as planning and design consultants, developed a 400-apartment, L-shaped project (*below left*). Roof of the adjoining parking garage will provide a handsomely landscaped recreation area. On the street side, the first and second floors will be recessed behind columns to create a colonnade. There will be a rooftop swimming pool. Project will have 400 units, ranging from efficiency to penthouses.



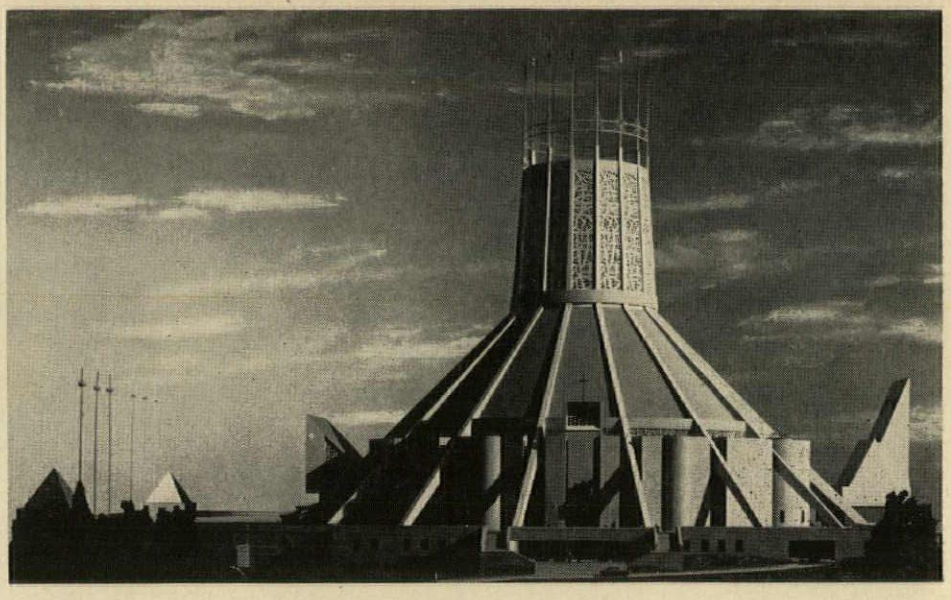
JOHNSON'S ABBEY CHURCH





WASHINGTON, D.C. For the church of St. Anselm's Abbey here, Philip C. Johnson has designed a lofty concrete arch form, 92 ft high and 220 ft long over-all. The church will boast an interesting system of concrete butresses (*above*), with great panels of stained glass on the eastern end of the church, in the north and south side walls, and behind the main altar. Horizontal panels of stained glass on the side walls between the inclined concrete panels and the vertical panels above and below them will flood the walls with multicolored light. The vertical columns of the immense arch will separate the side aisles from the 33-ft wide central nave. Stalls for 80 choir monks will be separated from the nave by the communion rail. The church will seat 400 worshippers.

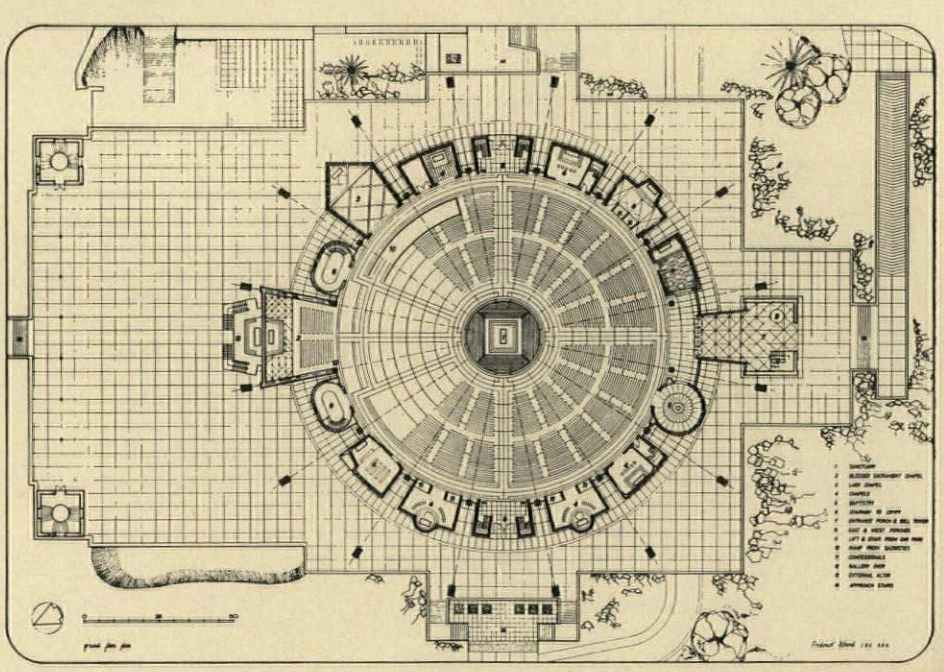
A new monastery building designed by Johnson (*bottom*) will adjoin the church and connect with the existing monastery. Structure will be brick and precast concrete panels supported by a framework of concrete and Lally columns. Unit will have office and teaching areas and cells for 24 monks.



FINAL DESIGN SET FOR LIVERPOOL CATHEDRAL

LIVERPOOL, ENGLAND. Frederick Gibberd's design for the Roman Catholic Metropolitan Cathedral of Christ the King, winner of an open competition in 1960, has gone through its completed design phases, and preliminary foundation work began last month. Completion is expected in 1965.

In this circular building, 3000 people sit around a centrally located sanctuary surmounted by the high altar. The conical roof of the nave is crowned with a tapering colored glass tower located directly over the sanctuary. Differing elements occur at either end of the podium on which the cathedral will sit. At one end will be the approach ramp, detached entrance porch, and bell tower; at the other will be the Chapel of the Blessed Sacrament. The podium was created by extending the roof of the existing crypt. Chapels, baptistry, and entrance porches will occur at 16 "self-contained buildings" between the soaring concrete trusses. Design revisions have made these elements more similar and precise in external form. Other changes result from the new use of a modular dimension: the tower is now wider, slightly lower, and with only a slight taper; the entrance porch now has a rectangular rather than triangular façade. The whole of the structural frame will be faced with white mosaic because of what Gibberd feels to be "the uncertain weathering properties of concrete."



PERSONALITIES

Robert F. Seery is a bristle-browed young Louisvillian who heads up an organization which has—without their probably knowing it—a noticeable effect on architects in this country.

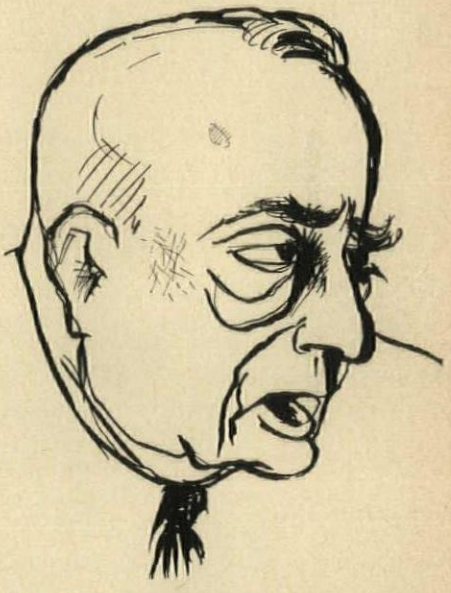
Possessing a degree in civil engineering from Northwestern University, Seery was in architectural and engineering practice and in the architectural departments of U.S. Gypsum and Reynolds Metals before setting up his own firm in Louisville. For lack of a better term, he calls Seery & Company a "marketing agency," though to tell the truth its major impact on the architectural field has been in product design and development and graphic design. A list of Seery's clients and the designs his company has created for them is quite impressive: General Electric—Thru-wall air conditioner applications; Michaels Art Bronze—wall systems; Julius Blum & Company—screen, railing, and treillage systems; Indiana Limestone Company—wall panels and new concrete aggregates; Owens-Illinois—pressed glass tile. Other clients for graphic services or market development studies include Olin Mathieson, Kawneer, Pawling Rubber Company, and International Nickel Company. Work on the boards right now includes a new architectural metals catalog for Blum, and a stainless steel industry market development program with International Steel Company (encompassing specifications development with Architect Ben Dyer). Since Seery & Company confines itself to the architectural market exclusively, its design philosophy might, in part, be that of a practicing architect. For instance: "Do not be restricted to present technology"; "Convey design requirements into practical technology"; "Allow the architect as much freedom and variation as possible"; "Product must look right, then function right"; and, "Understand relationship of all construction materials." Added to these comments are Seery's concern with costs, his ability to co-ordinate several industrial design talents, and his ever-continuing examination of the architectural market, its needs and design requirements. It is plain to see why this architecturally-oriented engineer-businessman will continue to influence the field in the years that lie ahead.

MARIO G. SALVADORI, Professor of Civil Engineering and Architecture at Columbia University, received a "Great Teacher Award" from the university's Society of Older Graduates . . . A marriage will take place on the 17th of this month uniting NATALIE RAYMOND OWINGS, daughter of SOM founder and senior partner NATHANIEL A. OWINGS, and JOHN FELL STEVENSON, son of U.S. Ambassador to the United Nations ADLAI E. STEVENSON . . . New chairman of the Visiting Committee to the Department of Architecture at Carnegie Tech is WILLIAM R. OLIVER, assistant treasurer of Jones & Laughlin Steel Corp. . . . FRED BASSETTI (Bassetti & Morse, Seattle) reports that he will serve as visiting professor to the senior class at Columbia in the spring. "While I am convinced that architecture cannot be taught," he says, "at least I might learn something there" . . . Also in the Columbia spring term, P/A Editor THOMAS H. CREIGHTON will give a course on the criticism and evaluation of objects from artifacts to cities . . . LYLE E. BOULWARE is 1962 president of the Philadelphia chapter AIA . . . Working under a grant from the National Park Service, WALTER E. GEORGE, JR., of the architectural faculty at University of Texas, has compiled a collection of more than 100 architectural drawings and photographs of the Alamo and other historic Central and South Texas structures.

Robert Moses, whose impulse toward invective is matched only by his perpetual outrage that there can be people who do not agree with the Mosaic code, distinguished himself for his choler twice in January: once in an intemperate tirade against Lewis Mumford in *The Atlantic Monthly*, and once at a hearing on the question of establishing Long Island's Mitchel Field as a private airport, where he was gaveled down for impugning the integrity of the Federal Aviation Agency.

In the *Atlantic* article, "Are Cities Dead?," the cadences of contempt and scorn roll forth from the mountain against the author of the recently published, widely praised *The City in History*. Citing in endless rodomontade the works of Robert Moses, Robert Moses characterizes Mumford, in effect, as a troublemaking know-nothing who never had to meet a payroll. One looks forward to Mumford's reply, he being as agile as his antagonist with the play of purple prose.

At the hearing on Mitchel Field, Moses, in criticizing the supporters of the move to turn the abandoned Air Force base into a private airport, turned his ire on the Federal Aviation Agency. "There has been nothing remotely approaching a judicial attitude on the part of this agency," he declaimed, "something which contributes little to respect for the Federal alphabetical agencies and for what is known as the democratic process." On being gaveled down as out of order by the

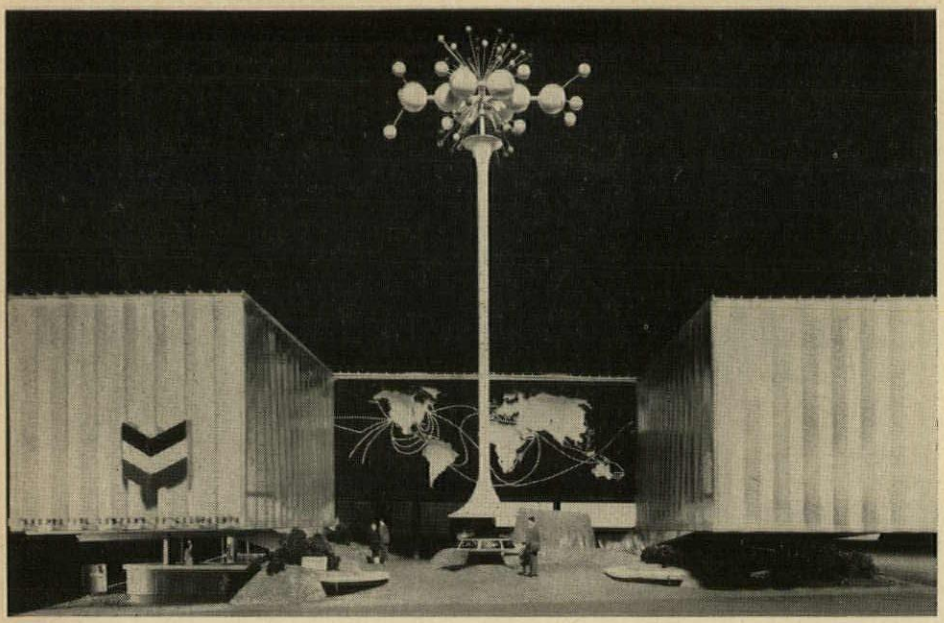


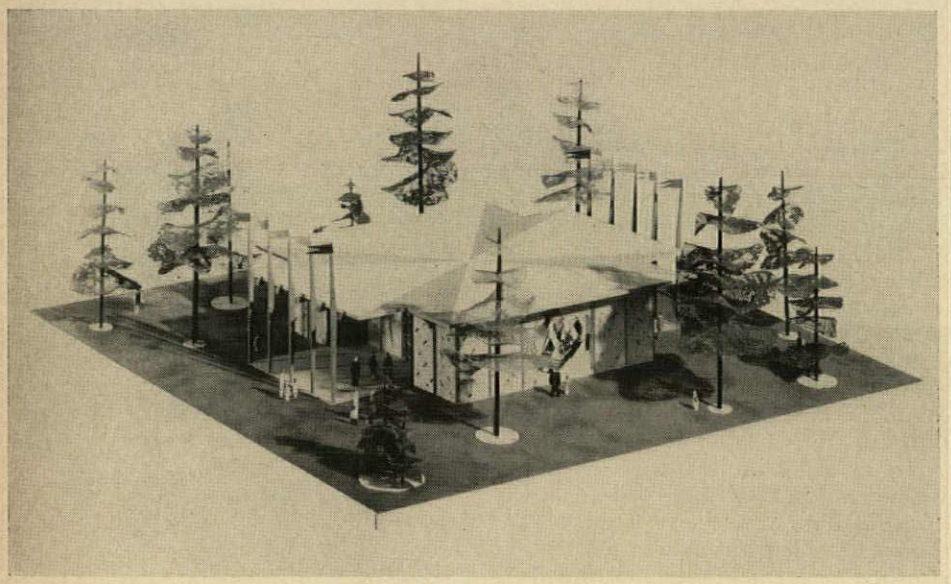
chairman of the hearing, the Moses wattles reddened, the Moses hands went on the hips, and he attempted a riposte. Upon being cautioned again, he quickly finished reading his statement, and stalked huffily from the hall.

Temper, temper, Mr. Moses.

An architectural tour of Europe, which will include visits to Scandinavia and Greece, will be led this summer by New York Architect-Author JEFFREY ELLIS ARONIN; tour will be from June 25 through August 18; for details, write Aronin at 101 Park Ave., New York 17, N.Y. . . . MARIO CIAMPI, San Francisco, was elected to life membership as a Fellow in the International Institute of Arts & Letters, Kreuzlingen, Switzerland.

Sketches by Romeo Corbelletti





TWO FOR 21

As the April opening of Seattle's Century 21 Exposition draws nigh, each new pavilion reaffirms the fair's design superiority over the 1964–65 New York World's Fair.

Perhaps the closest thing to a New York-like design to emerge so far is the pavilion for Standard Oil Company of California by New York industrial designer Michael Saphier Associates (*top*). Theme for the exhibit is "Man, Energy, and Time"; it will show how products and energy derived from petroleum will affect us in the 21st Century. The U-shaped pavilion will have a central courtyard dominated by a 40-ft tower supporting an illuminated, revolving model of the para-xylene molecule, the chemical nucleus of plastic. The building will be a steel space frame sheathed with pre-formed plastic panels.

The display theater for the Forest Industries' exhibit (*bottom*) will feature a 15-minute, wide-screen film showing techniques of producing and fabricating wood and allied products in the next century. Designed by Tacoma Architect Robert Billsbrough Price, the building will have a structure of laminated wood beams and columns supporting a stressed-skin plywood roof and wall system. The building will be in a grove of cedar, fir, spruce, and hemlock trees, plus native rhododendron; landscape architect is Lawrence Halprin. Entrance walls will have large photomurals of wood production processes. The end walls and the projection booth will sport wood-relief sculptured surfaces by Harold Balazs. Because of its proximity to the "Space Needle" the roof will have a jaunty two-tone pattern.

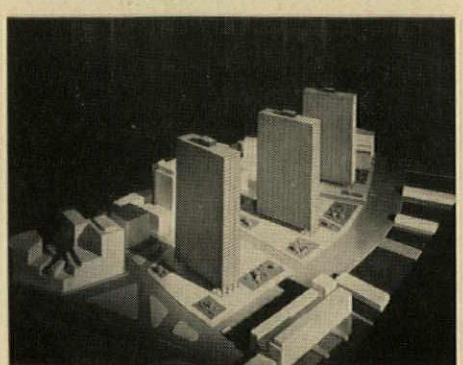
UN Plaza to Get Church Center

For the Methodist Board of Christian Social Concerns, Architect William Lescaze has designed a 12-story, curtain-wall building to rise across United Nations Plaza from UN headquarters. Although the building will be financed and owned by the Methodist Church, which will occupy part of

it, space will be made available "to all faiths and races interested in the promotion of world peace." The basement will contain a cafeteria and two dining rooms; a chapel will be on the ground floor; meeting rooms will occupy the second floor; and the subsequent nine floors will be devoted to office space. The penthouse will contain a library, lounge, and meditation rooms, with a landscaped terrace overlooking the UN buildings and the East River.

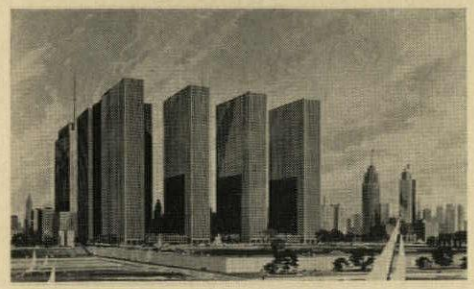
Slabs in New York; Slabs in Chicago

Waterfronts of New York and Chicago will be a little slabsided if two major redevelopment projects go through. In Manhattan, two 44-story apartment towers by Mies van der Rohe form, with open plazas and walk-



ways, the replacement for almost 13 acres of "substandard and insanitary" slums on the East River. Third building in picture of the Battery Park project is a contemplated extension. The sponsor of the project is Metropolitan Structures, Inc. (same firm did Mies's Newark buildings), under the name of Metropolitan Battery Corporation.

On the lakefront in Chicago, Naess & Murphy has designed a six square block redevelopment which will eventually contain four apartment towers, office buildings, and a major hotel.

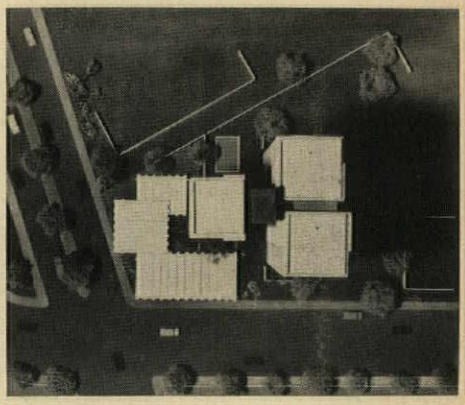


The site is adjacent to Grant Park and within walking distance of the central business district. The ultimate population of the project is estimated at 30,000; parking for "several thousand" automobiles will be provided on three subsurface levels.

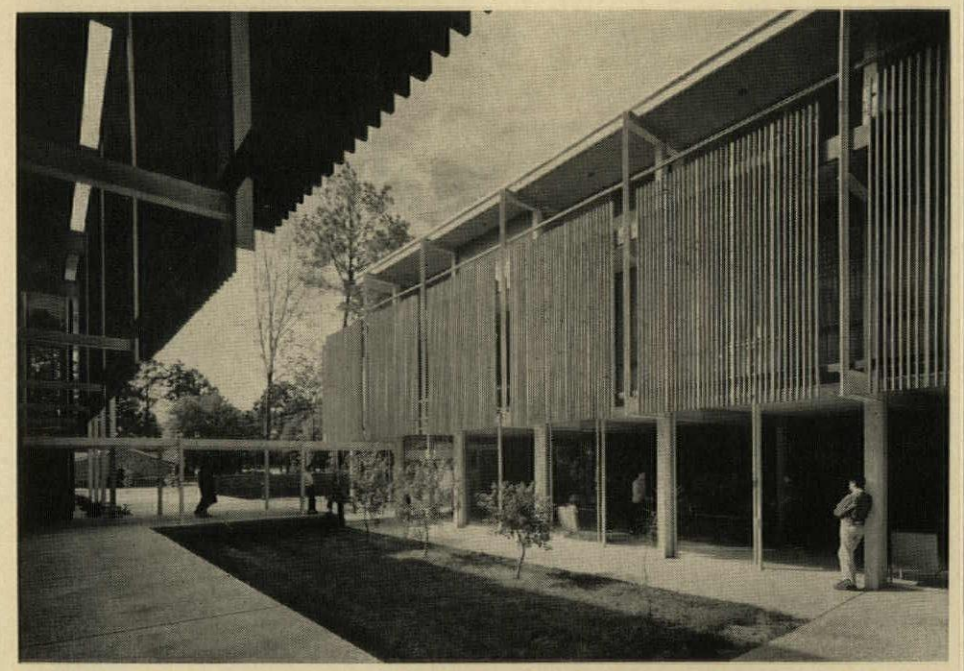
Tri-Towered Apartment for Honolulu

Gateway Towers, a high-rise apartment complex for Waikiki designed by Leo S. Wou (John W. St. Martin, Associate), will consist of three 26-story towers grouped around a common elevator and stair nucleus. Planning of only two living units per floor in each tower will provide maximum privacy plus views in at least two directions. In addition to 154 rental units—48 two-bedroom units and 96 one-bedroom units—there will be six duplex penthouses at the top and four duplex townhouses at ground level. A

restaurant and shop structure will join the apartment on the main street exposure. Structure will be locally extruded prestressed hollow concrete



planks for the floors and poured-in-place exterior bearing walls. The architect states that "The development of the extruding operation using lightweight aggregates is new here, but has been proved quite successful."



Gulf States AIA Presents Honor Awards

Two of four Gulf States AIA Honor Awards at that group's recent Baton Rouge convention went to the young firm of Desmond & Miremont of Baton Rouge and Hammond, La. Winners were the Catholic Student Center at Southeastern Louisiana College in Hammond (*above*, with Bill Burks as Associate) and St. Thomas More Catholic School in Baton Rouge. Two other Honor Awards went to Glankler & Broadwell of Alexandria, La., for the Redeemer Lutheran Church there, and Wittenburg, Delony & Davison of Little Rock for the home offices of the Empire Life Insurance Company.

Nominated as new director of the Gulf States Region, to take office at the AIA Convention in May, was G. Scott Smitherman of Shreveport, La.

AIA President Phil Will, attending as major luncheon speaker, was presented a commission as colonel on the staff of Louisiana Governor Jimmie Davis. Colonel Will exhorted his colleagues to their proper role in creating our environment. "If we move now," he said, "seize leadership and act with the wisdom of statesmanship, we can re-create a nation."

CALENDAR

American Society of Civil Engineers meets in Houston, February 19-23; convention theme is "Planning and Building for Industrial Growth" . . . Michigan Society of Architects has its 48th annual convention in Detroit, March 28–30 . . . Bermuda will be scene of 24th annual conclave of National Association of Architectural Metal Manufacturers, April 29–May 5 . . . School of Civil Engineering of Oklahoma State University, Stillwater, will conduct a summer institute for college teachers of structures and soil mechanics from June 11 to August 10; for information, contact Director Jan J. Tuma at the School . . . National Warm Air Heating and Air

(Continued on page 50)

Enduring Beauty...and new F/R

In bringing you news of two recent developments in Lo-Tone® F/R (Fire-Rated) Mineral Acoustical Ceiling Boards, we offer you products of new utility and fire protection . . . *plus* the classic, enduring beauty of Lo-Tone. ■ The news concerns two recent Underwriters' Laboratories tests. In the first, Lo-Tone ⅝″ F/R Mineral Acoustical Ceiling Board received a 2-hour fire rating with 4-hour beam protection. This test was made with 24″ x 48″ panels, in a fire-rated exposed grid system including recessed lighting fixtures. ■ The second test was made with Lo-Tone F/R ceiling board under a wood joist assembly, in a fire-rated exposed grid system. Here, Lo-Tone achieved a 1½-hour U.L. fire rating. ■ These tests give striking evidence of the strong, dense and uniform mineral board produced by the Lo-Tone wet-felted process; and of precision fabrication. ■ As a further recent product development, we now offer Lo-Tone boards with improved furnish and coatings which give greater resistance to mildew and high humidity. Whites are whiter, textures have more depth and contrast. For technical data, write: Wood Conversion Co., First National Bank Bldg., St. Paul 1, Minnesota.

For enduring beauty, specify:

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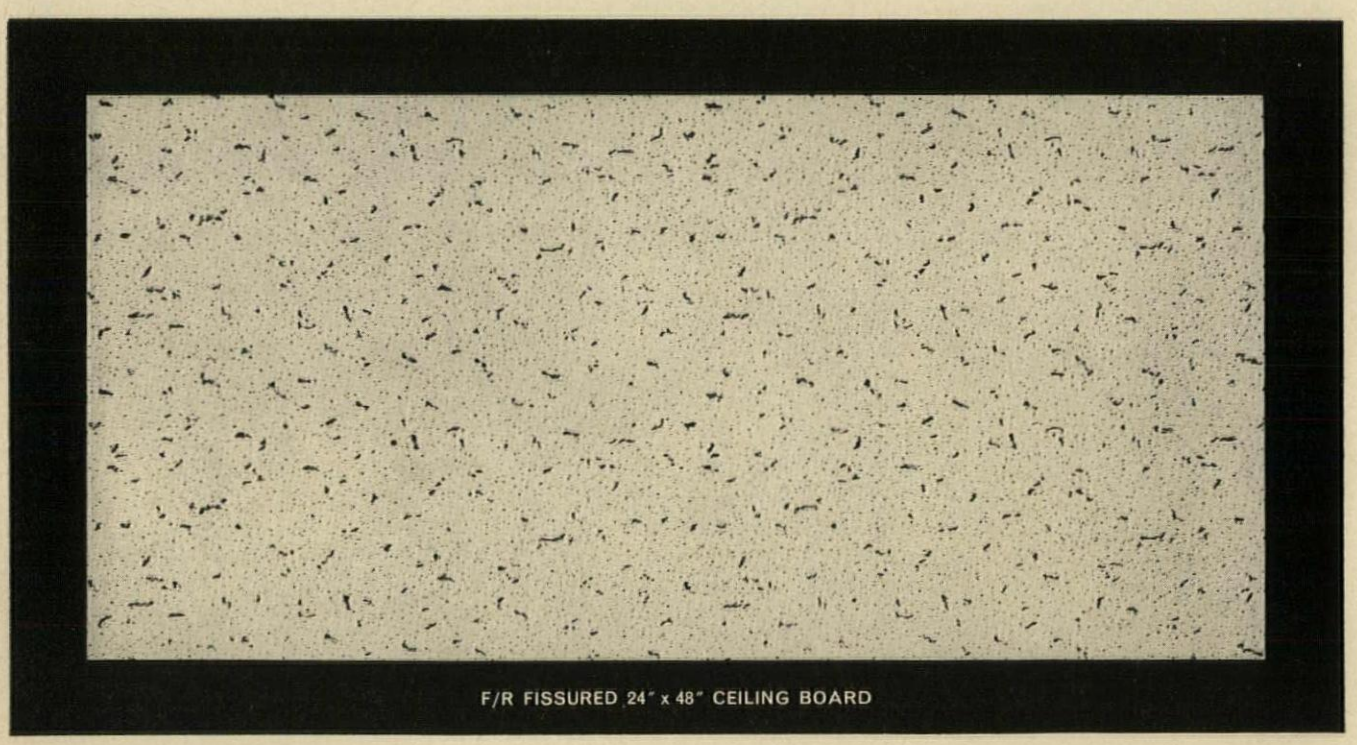
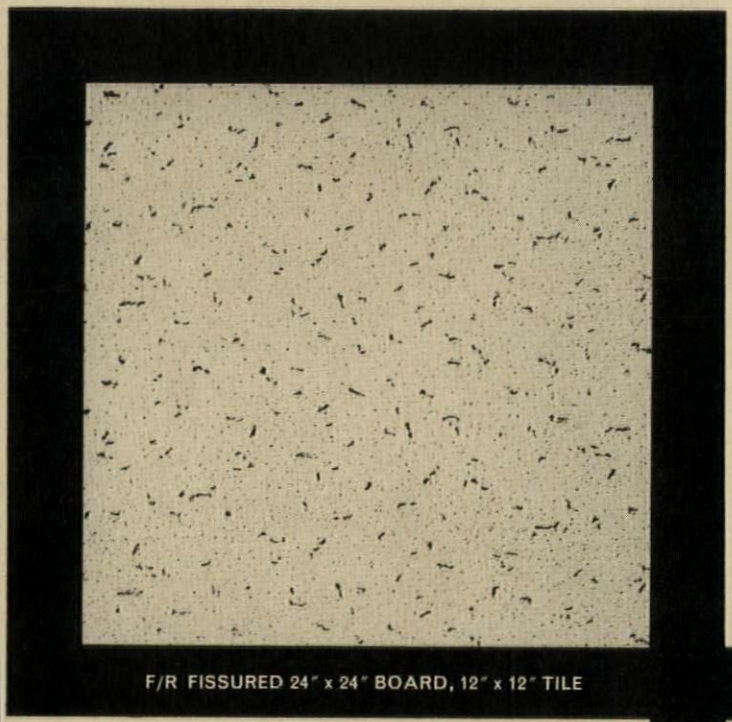
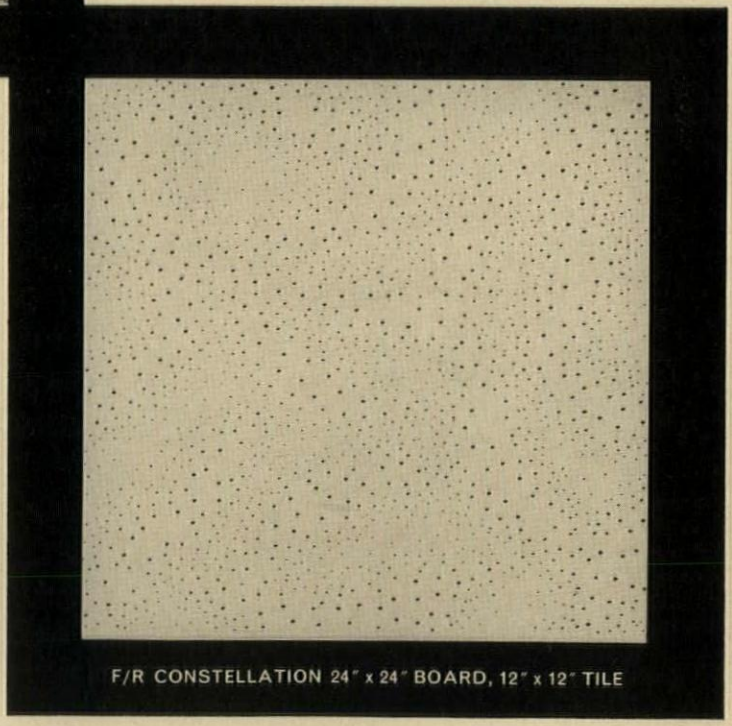


F/R FISSURED 24″ x 48″ CEILING BOARD

ratings under steel or wood!



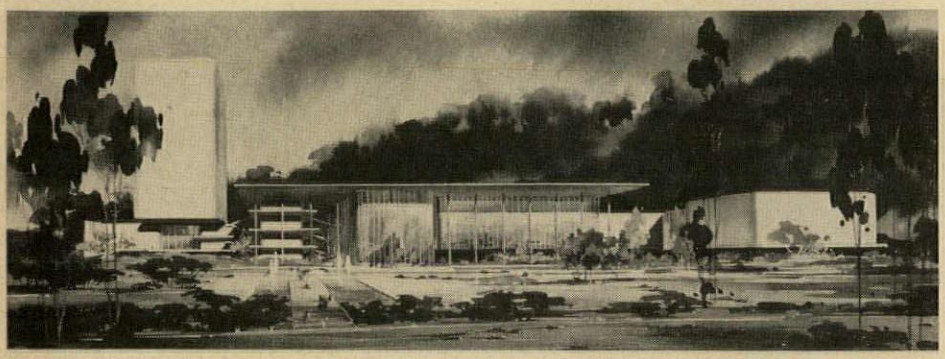
F/R FISSURED 24" x 24" BOARD, 12" x 12" TILE



F/R CONSTELLATION 24" x 24" BOARD, 12" x 12" TILE

"The Goddess Maat," Egyptian art on stone. Its simple beauty has endured for over 3,000 years.

(Continued from page 47)
Conditioning Association meets November 7–9 in Jacksonville, Fla. . . . An "International Symposium on Humidity and Moisture - Measurement and Control in Science and Industry" will be held at the Sheraton-Park in Washington, D.C., May 20–23, 1963; sponsors are National Bureau of Standards, Weather Bureau of U.S. Department of Commerce, Instrument Society of America, American Meteorological Society, and American Society of Heating Refrigerating and Air Conditioning Engineers . . . Looking into the future, Lincoln Center in New York will present the first of an annual series of summer festivals in 1966; both new and repertory works will be performed by all constituent organizations of the Center.



PEREIRA HOUSES THE ARTS, OLD AND NEW

Works of art ranging from a T'ang Dynasty figurine to the latest Debbie Reynolds film will be housed in one or the other of two projects being designed by William L. Pereira & Associates.

The redesigned Hollywood Motion Picture and Television Museum (*above*, and p. 60, FEBRUARY 1961 P/A), in addition to the works of Miss Reynolds, will shelter displays concerning Newton Minow's favorite medium, television. The museum will be composed of three units connected by glass-enclosed corridors. The central building will house the main exhibit area. Behind the glass of the entrance wall will be a gigantic display wall giving graphic recapitulations of the exhibits inside. This building will have a great roof of prestressed concrete curving out over the hill behind and projecting over the façade. To the south, a windowless building will contain sound stages where visitors can see movies and TV shows in production. The tower to the north, planned for later construction, will house educational, research, and administrative facilities. The central building will contain, in addition to extensive exhibit areas and "live storage" space, a restaurant with indoor and outdoor dining areas each "decorated in the style of a famous motion picture set," a 500-seat theater, libraries and film vaults, and administrative offices.

A three-part structure will also be seen in Pereira's new Los Angeles County Museum of Art (*bottom*). Three large-scale "pavilions" will sit on a raised plaza in a pool of water. The main building, to house the permanent collection, will be a four-level structure planned around an atrium. It will be known as the Ahmanson Gallery of Art, and will have a three-story high Great Hall for the display of large-scale works. The Lytton Gallery, at the northeast corner of the site, will be mainly for temporary and loan exhibitions, and its exhibit spaces accordingly have been designed with great flexibility in mind.

The third unit will be the Bing Education and Auditorium Building, to contain a library, children's art classrooms, lounge for museum members, cafeteria, 600-seat auditorium, and dressing and rehearsal rooms and kitchen.

Exterior materials of the buildings will be marble and glass, surrounded by colonnades of cast-stone columns incised with bronze-anodized aluminum. Buildings will be connected by trellises of aluminum and glass.

OBITUARIES

Henry Hofmeister of Reinhard & Hofmeister, general architects for Rockefeller Center, died at age 71; he had been a consultant on the Lincoln Center project.

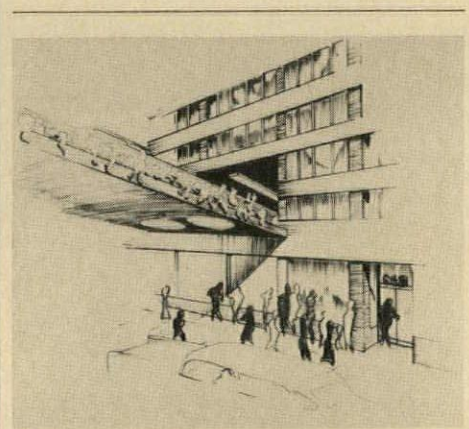
A resolution mourning the passing of Henry Hornbostel, FAIA, was passed by the New York State Association of Architects.

Benjamin F. Fairless, who had been president, chairman, and chief executive officer of U.S. Steel Corp. and, since 1955, president of the American Iron and Steel Institute, died on the first day of 1962.

Painter Kurt Seligmann accidentally shot and killed himself at his farm home on January 2.

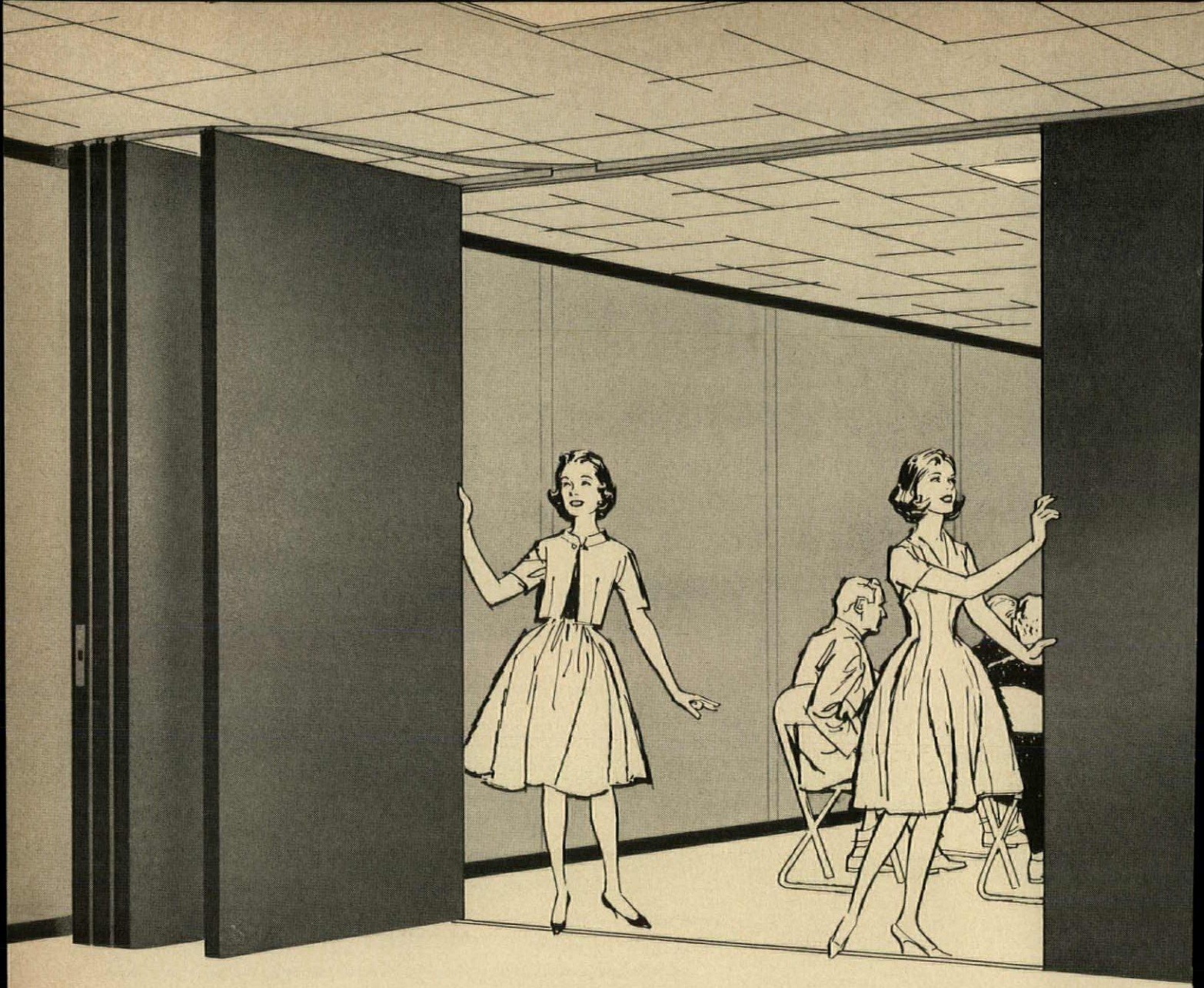
Royal Barry Wills, FAIA, designer of traditional homes, died on January 10. He was 65.

The body of 94-year-old Frank Elmer Martin, formerly of Ithaca, N.Y., was found in Sarasota Bay on January 15. He had been in ill health.



SECOND STORY MAN

Hard upon the proposal by New York Chapter AIA to create a pedestrian mall in midtown Manhattan (p. 56, DECEMBER 1961 P/A), comes a suggestion from Michael Saphier Associates, industrial designers, that we tunnel elevated north-south highways through the second and third floors of buildings in the same area. Higher floors could be utilized later when the efficacy of this plan proves itself, said Lawrence Lerner, president of the firm. It was done better by H. G. Wells.



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At Last: Contemporary Federal Architecture Has Official Blessing

By E. E. Halmos, Jr.

Government buildings will begin to provide a broader field for imaginative architects, if a "new look at architecture," now in process, has any real effect.

The "new look" is aimed at striking a balance between style and dignity, and functional uses; at fitting new buildings into their surroundings without slavishly following existing architectural styles; and at some really flashy new types of structures if the setting is right.

That's the word from Bernard L. Boutin, newly appointed Administrator of General Services Administration, who will have charge of spending as much as $750 million a year on Government building construction (including renovation).

No architect himself (he succeeded a man who had been a football coach before heading up the 30,000-employee GSA), Boutin is operator of a real estate and insurance business in Laconia, N. H.; he twice served as mayor of that community, and twice ran (as a Democrat) for governor of the state.

"GSA," said Boutin at a recent press conference, "isn't going to be tied to any architectural traditions. We are certainly not going to upset the whole plan of Washington with glaring 'modern' structures alongside the traditional Government buildings —but that's no reason why we can't modify the classic styles into something a little more modern and a lot more functional, without causing harsh clashes.

"And in other cities, where the setting permits—like New York's Foley Square—we won't hesitate to approve almost experimental-appearing structures like the 60-story courthouse already planned. It will fit into the surroundings, and it will give encouragement to architects to do a better and more imaginative job for the Government."

(Boutin, who had hardly warmed his new chair when he held the conference, immediately got into the middle of one of Washington's oldest controversies: what to do about the "temporary" buildings sprawling in ugly masses over the park areas. At his conference, Boutin said he didn't see demolition of the "tempos" before about 1967, because of continued demand for Government office space. On the same day, the Fine Arts Commission urged Congress to wipe out the "tempos" by legislative action.)

No Package Deals for AF

Architect-engineer firms which, through subsidiaries or affiliates, also have construction capabilities, may not be awarded Air Force contracts for both design (or supervision) and construction.

Only exception is a cost-plus-fixed-fee contract (specifically authorized by the Secretary of the Air Force) with a firm or group of firms for design and construction of a specialized facility.

That's the meat of new Air Force Procurement Instructions (AFPI) just amended to bring the service's policies in line with other Government agencies that purchase construction work.

Incidentally, Air Force is working on another revision of its rules, this one (Reg. 93-13) concerning "Selection of Architect-Engineers for Performance of Professional Services by Negotiated Contracts."

The revision probably won't be ready for another month, but in general outline it will: (1) establish AF policies governing the use of A-E services; (2) establish Uniform Procedures for selection of A-E's by Selection Panels and make the Air Force's Civil Engineers responsible for that operation; (3) outline procedures for requesting individual Secretarial determinations and findings; (4) and, most important of all, clarify the scope of services that are subject to the legislative 6 per cent limitation on A-E fees; (5) outline the responsibility of Air Force Civil Engineers regarding negotiation and administration of A-E contracts.

Holding the Fort

Washington's 30-year-old Fine Arts Commission has received solid support from U.S. courts in its efforts to protect the city from what it considers unsightly.

Though the Commission has been in existence since 1930, the action in the U.S. Court of Appeals was the first legal test of its powers.

At issue was the Warner Theater building, which has only a small triangular corner that touches the outer boundaries of the Commission's special preserve (Pennsylvania Avenue between the Capitol and the White House). A restaurant wanted to put in new show windows in the corner, but the Fine Arts Commission said the windows (and a large sign) would be unsightly. Owners argued that the building merely "fronts on" the area under the Commission's jurisdiction, but the court (with one dissent) agreed that anything "fronting on" the avenue would affect its appearance.

FINANCIAL

Present-day construction statistics are fine—fine, that is, for throwing light on economic problems as they were understood a couple of decades ago. But they offer little help in meeting present-day needs.

Answer to better statistics should be to ignore existing systems, using them only for historical significance and as a part of the new program; then developing a new series that would provide the insight needed to formulate public fiscal policies, establish investment programs, make long-term market research decisions, and evaluate the need for Governmental aid programs to stimulate a particular type of construction activity.

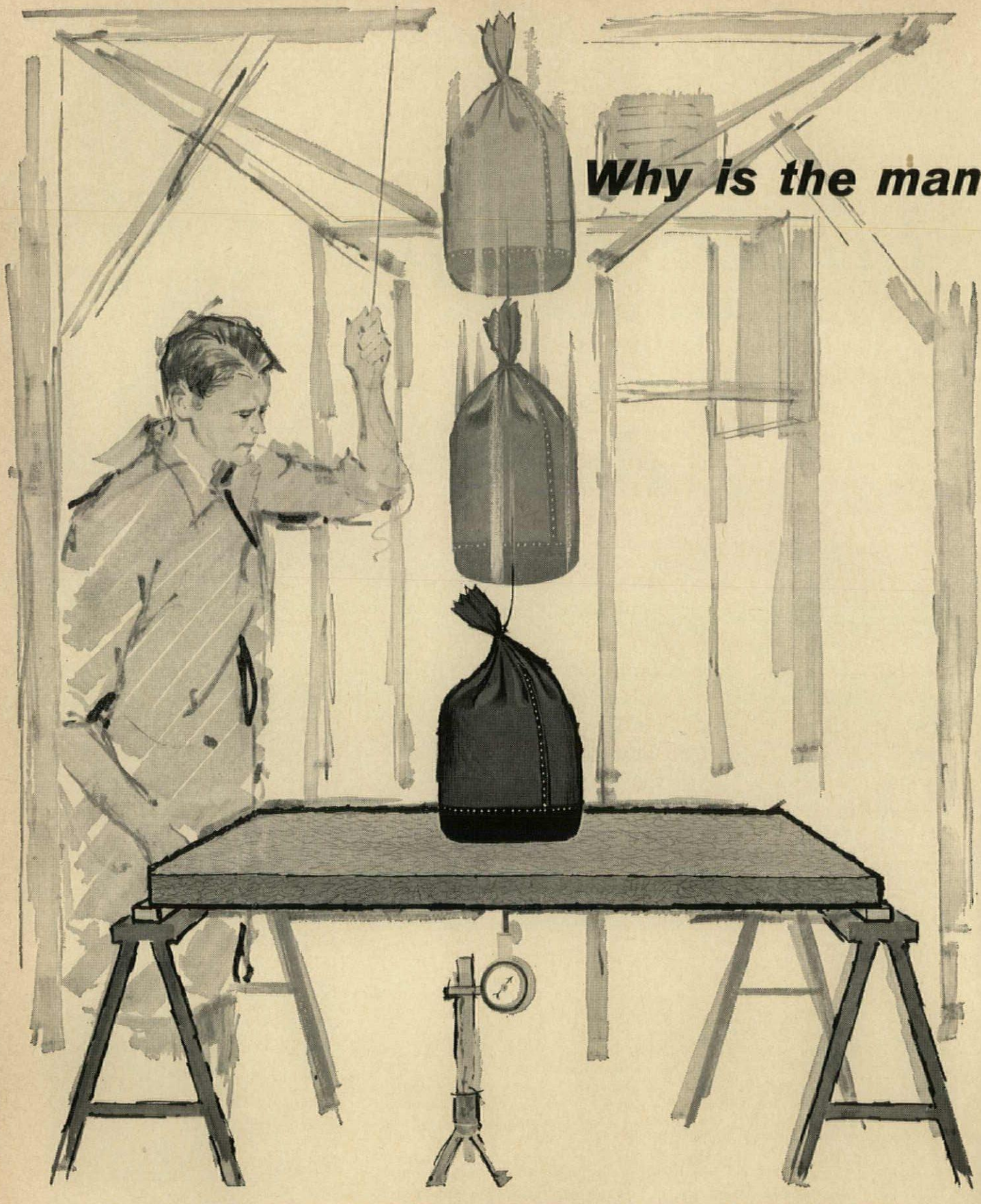
That's not such a startling conclusion to architects who follow Government statistical indexes closely, but it is startling when put forward by Benjamin D. Kaplan, director of the Building Materials and Construction Divisions of the Business and Defense Services Administration.

Said Kaplan (to the American Statistical Association): "The failing is that the necessary facts and intelligence are lacking . . . mainly analytical, not methodological . . .

"Examples of data voids include: Geographic distributions of construction-put-in-place by type of construction; rates of material consumption; statistics on demolition of nonresidential structures; the degree of acceptance of modular design; the floor area of building construction. . . ."

Whether or not the statistics are inadequate, every indicator continued to point to the validity of predictions for a record construction year in 1962.

The Investment Bankers Association reported that municipal bond issues for a total of more than $3 billion will be presented to voters during 1962; the "Value Line" investment survey saw a general rise of 3 per cent for total construction spending.

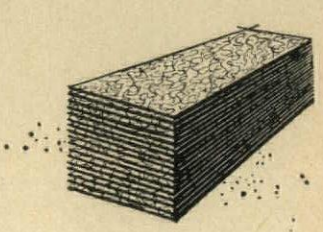


Why is the man

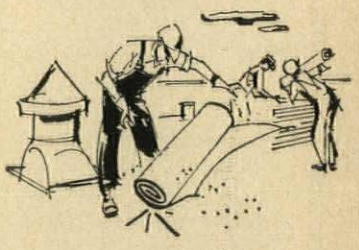
This is a laboratory set up for impact testing. 3" Tectum spaced 42" clear span. A sand bag made of canvas and weighing 60 lbs. is dropped in increments of 6" up to 48" high. At 48", drops are made repeatedly until the material fractures. After each drop, the deflection of the board is measured and permanent set figures are recorded. Tectum withstands up to 1600 foot pounds of total energy in this type of test, far more than comparable wood fiber materials. Tectum is made differently, uses an exclusive hydraulic binder giving it extra resistance to impact loading.

dropping a bag of sand on TECTUM?

Impact resistance is that capability of a material to withstand a sudden impact or application of force. The illustration depicts a typical laboratory test that measures the impact resistance of materials like Tectum..

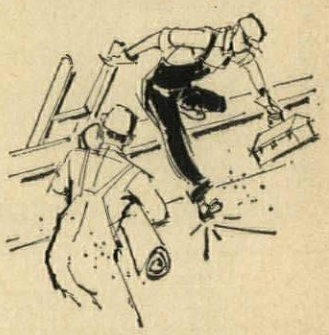


The architect and engineer must have confidence that a product is tough and strong to sustain normal loading with a generous safety factor against unforeseen dangers of overloading. The contractor, who installs the material wants to be sure that the material can take it, will be received in good shape and will not easily break if given rough handling.



That's what the man is doing in the illustration. He is measuring Tectum's ability to withstand impact—not once but repeatedly before fracture.

This means four important things to the specifier and user of Tectum roof deck materials: (1) extra safety for men and equipment on the roof deck; (2) safer too for subsequent loading by repairmen and roofers who move heavy loads across the roof in normal maintenance during the life of the building; (3) less breakage in shipping and handling. You can drop a plank of Tectum and pick it up in one piece; (4) less damage if a roll of roofing material or heavy tool is accidentally dropped during erection.



This extra margin of safety is provided by Tectum—*a material that at the same time is much lighter.* Add up the savings of less breakage, less handling cost and the advantages Tectum offers in less dead load where soil conditions are marginal, and you'll come to the conclusions that a great majority of architects, engineers and contractors have accepted. *There is no equal for Tectum . . . only alternates.*

For complete information see your Tectum representative, or Sweets Architectural and Industrial Files.

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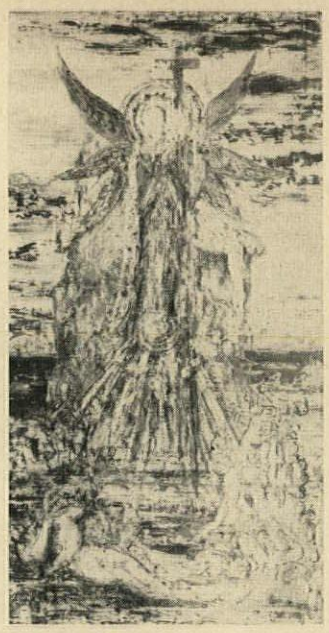
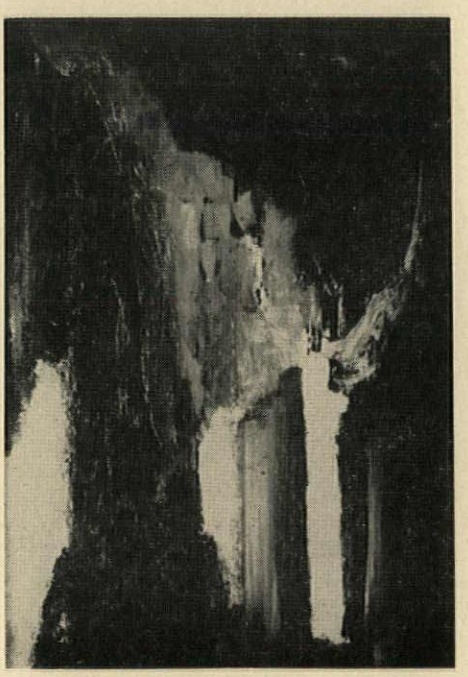
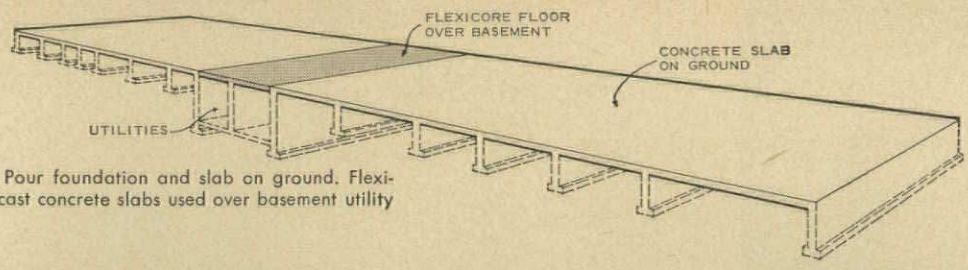


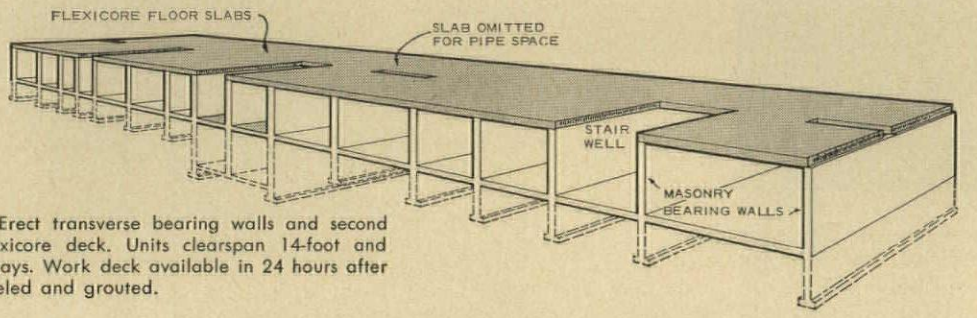
ART: THREE OLDSTERS, TWO YOUNGSTERS

The best show in town recently was the Redon - Moreau - Bresdin show at the Museum of Modern Art. These three artists, working in the late 19th and early 20th Centuries, have in common a thread of mysticism. Most people are familiar with Redon as illustrator of Poe's tales and other similar works—the creator of eerie landscapes or skyscapes dominated by gigantic eyes. Bresdin was a meticulous delineator of mythological and religious scenes. The real hit of the show, however, was Gustave Moreau, whose work ranged from illusory mysticism ("The Death of Inspiration," *above*) to abstractions superior to those one sees on Tenth Street today ("Sketch D," *below*).

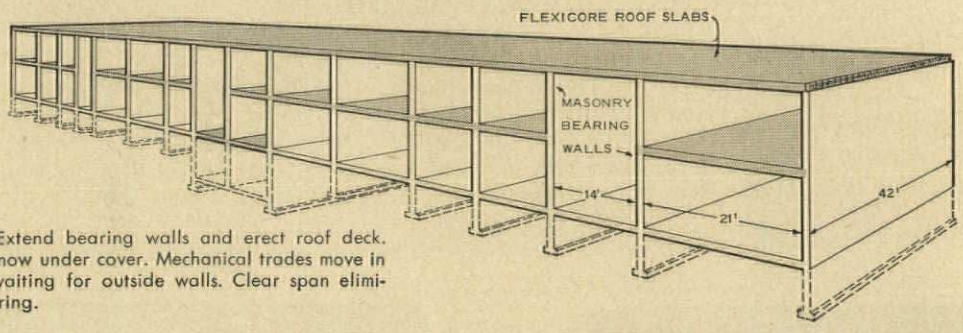




STEP 1. Pour foundation and slab on ground. Flexicore precast concrete slabs used over basement utility rooms.



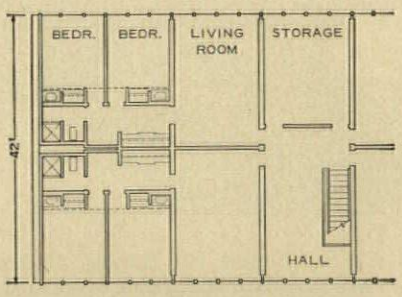
STEP 2. Erect transverse bearing walls and second floor Flexicore deck. Units clearspan 14-foot and 21-foot bays. Work deck available in 24 hours after slabs leveled and grouted.



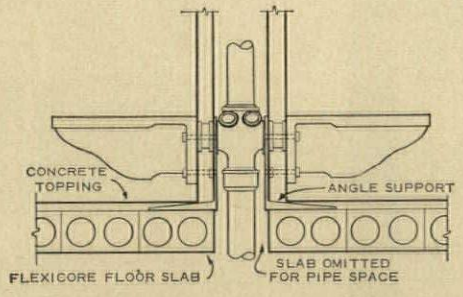
STEP 3. Extend bearing walls and erect roof deck. Building now under cover. Mechanical trades move in without waiting for outside walls. Clear span eliminates shoring.

Skidmore, Owings and Merrill, Architects—Engineers

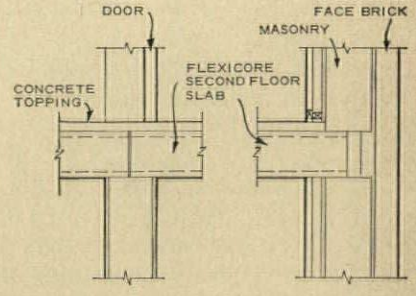
How Air Force Academy Got New Buildings Under Cover Quickly



TYPICAL PLAN SECOND FLOOR



DETAIL—PIPE SHAFT



INTERIOR BEARING WALL END BEARING WALL

The Bachelor Officers' Quarters and Visiting Officers' Quarters at the new Air Force Academy have precast Flexicore floor and roof decks because they provided fast erection, a fireproof structure and a reasonable cost.

For more information on this project, ask for Flexicore Facts 84. Write The Flexicore Co., Inc., Dayton, Ohio, Flexicore Manufacturers Association, 297 S. High St., Columbus 15, Ohio, or look under "Flexicore" in the white pages of your telephone book.

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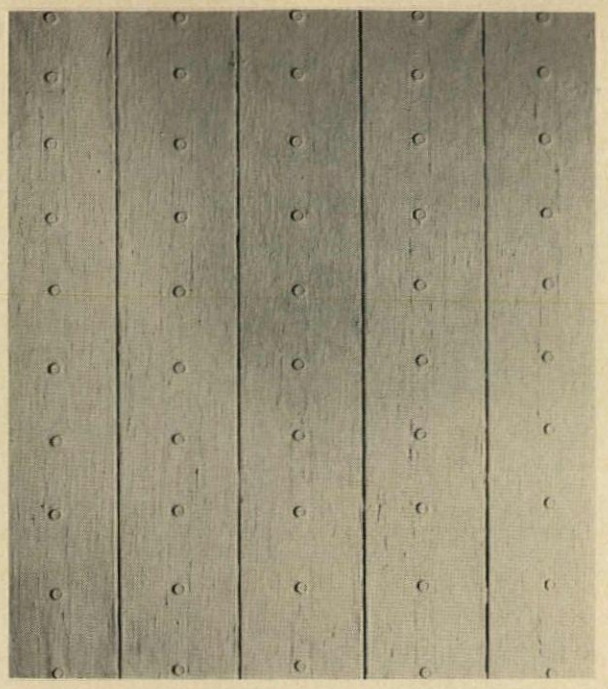
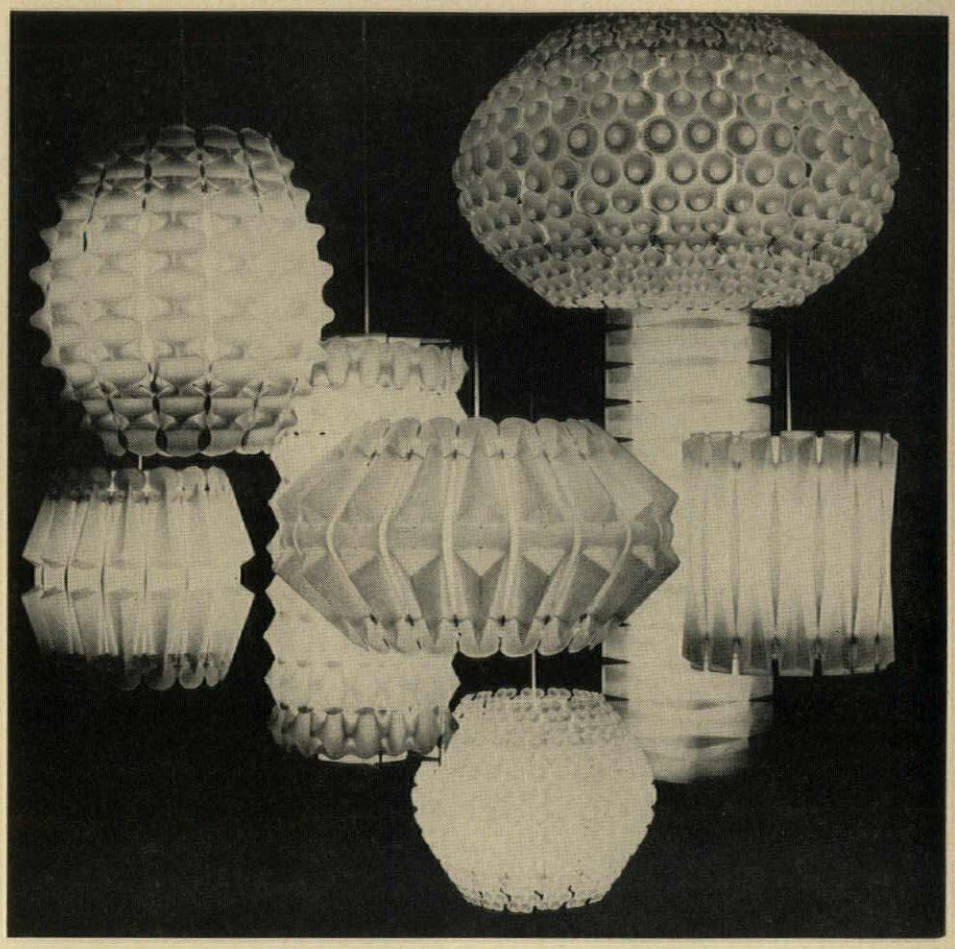


Two young artists showed amusing work in New York last month. The youngest of the two, Robert Malaval, is French and was born in 1937. He was one-third of a three-man show at The Alan Gallery, and easily walked away with the honors. Among his imaginative, and often funny, paintings and reliefs was the relief (*above*) "Le Nid d'Aliment Blanc," which, freely translated, means "The Nest of White Stuff."

At the Martha Jackson and David Anderson galleries (same building), we saw collage-paintings by Jim Dine (b. 1935). In this show, Dine has a big thing on articles of clothing, painting them or even incorporating the articles themselves into paintings in a manner which bring a prosaic object such as a tie or shirt-front into such glaring focus that the viewer must take a step back and smile. At least, that is what this viewer did. Above, "White Shirt Fronts."

VINYL VOLUPTUOUSNESS



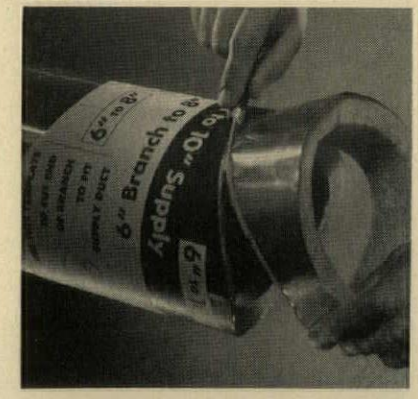
ZEELAND, MICH. "Lanterns 1962," the new lighting group designed by George Nelson & Co., brings sensualism to the lighting field.

Lanterns have three basic parts: the light source or bulb; an extruded plastic inner cylinder; and sculptured outer segments of molded vinyl. The lanterns are open both below and above, permitting downward light for such uses as above the dining table, and indirect ceiling illumination. At eye level, the diffusion created by the inner cylinder and the outer shell provides an evenly glowing, glare-free appearance. The molded vinyl components clip on at top and bottom of the fixtures to two standard, ⅛″ lampshade hoops held in place by tension wires. When attached, the wires pull the components into a shaped shade. Lantern sizes are based on lengths of the diffusers, which are 6″ in diameter. From the basic sizes of 9″ and 12½″, lengths can go up to 25½″ and 36″.

Nelson also has designed a notable line of clocks for the company. Howard Miller Clock Co., 110 W. Washington, Zeeland, Mich.

On Free Data Card, Circle **100**

DUCT PERFORMS THREE FUNCTIONS



LANCASTER, PA. New "Aluminum Encased Armaglas Duct" performs functions of air duct, thermal insulation, and sound absorber in one piece. It is used in duct systems for heating, cooling, or dual-temperature service.

The duct is constructed of a high-density glass-fiber insulation material contained in a welded casing of durable three mil aluminum. Easily fabricated, the lightweight duct can be cut with a knife and installed in one operation. Fittings at joints, etc., are easily sealed with aluminum tape. When expected air pressure exceeds 2″ water pressure, a master sealer is used. The duct is ready for installation using standard galvanized sheet metal fittings, air boots, register boxes, and other fittings regularly used with round sheet metal ducts. Its sound attenuation efficiency is comparable to 1½″ of conventional duct liners, and it meets fire requirements of NBFU 90A Standard. Tests by Bolt, Beranek & Newman have shown the sound attenuation efficiency follows theory for high-efficiency treatments. Armstrong Cork Co., Lancaster, Pa.

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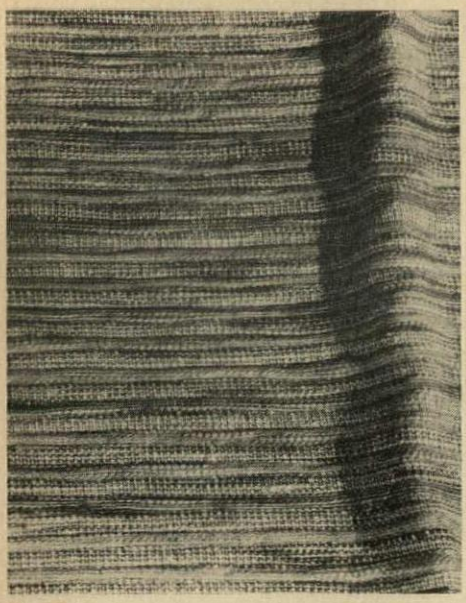


Colorful Textures and Prints

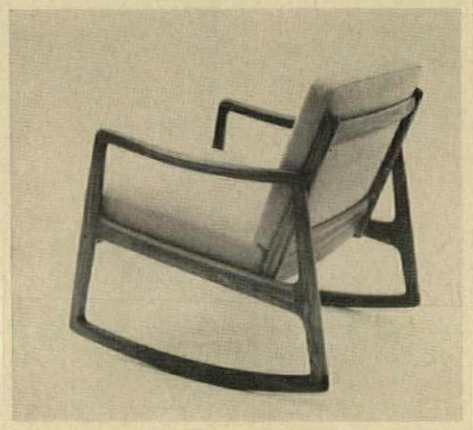
Along with the historical fabrics and cheery prints the firm is associated with, Greeff Fabrics also has a serviceable selection of textures. "Thatcher" tweed is a simple, cross-stripe weave of rayon and cotton that is alive with color variation in six colorways. It also has a sturdy rubberized backing. "Spun Sugar" is a random weave texture of rayon, linen, and acetate that comes in five monchromatic colorways. Among the geometric prints, "Calypso" chintz is shown in black, gray, and white. A color brochure is available. Greeff Fabrics, Inc., 150 Midland Ave., Port Chester, N.Y.

On Free Data Card, Circle **102**

H-P Canopy for World's Largest Bowling Center

Bowling center under construction in Willow Grove, Pennsylvania, is said to be world's largest. Center, designed by Powers, Daly & DeRosa of Long Beach, California, has as its design highlight a 7500-sq-ft hyperbolic paraboloid entrance canopy finished in a textured, medium blue to co-ordinate with glazed brick facing of the building. Color was achieved through application of "F/A Roofing," a fluid-applied weatherproofing compound which can be pigmented in a wide range of colors. The material, neoprene and Hypalon based, was applied in four coats in a total thickness of 20 dry mils, weight not exceeding 20 lb per 100 sq ft. Neoprene chips were applied on the canopy between the two pigmented Hypalon-based coats to provide the textured effect. Armstrong Cork Co., Lancaster, Pa.

On Free Data Card, Circle **103**



Rocking Trend

Among the Danish-style seating pieces in the Danish Craftsmen Collection is a jaunty rocker of Bangkok teak. It is balanced so as to eliminate protruding runners, which can be hazardous. Cushions have concealed zippers for easy removal of covers. John Stuart Inc., 470 Fourth Ave., New York, N.Y.

On Free Data Card, Circle **104**

Accessories for Built-up Roofing

New line of accessories for built-up "Fiberglas" roofing includes Fiberglas Membrane Fabric, Cant Strips, Fiberglas Roofing Mops, and asphalt accessories (including roof coat, primer, plastic cement, and roofing cement). Fiberglas Membrane Fabric is flexible, weighs .5 lb per 100 sq ft, and is used as a cohesive layer between coats of weatherproofing cements. It contours easily around surface irregularities, and may be cut with a knife. The Cant Strips are triangular-shaped lengths of wood fiber board impregnated with asphalt. The Fiberglas Roofing Mops will not burn, rot, decay, or char, are available in 5, 6, or 7 lb weight with 6′ or 8′ aluminum handles. Because they are made on nonporous, nonabsorbent fibers, the flow from the loaded mop is faster and easier. Asphalt accessories are described in Product Data Sheet #1-RW-1964. Owens-Corning Fiberglas Corp., Industrial & Commercial Construction Materials Div., 717 Fifth Ave., New York 22, N.Y.

On Free Data Card, Circle **105**

All-Flush Lock for Sliding Glass Doors

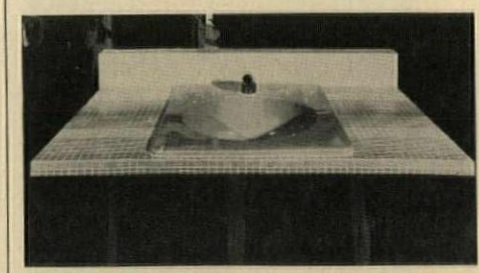
Adams-Rite Manufacturing Company's new 4190 locking unit features all-flush hardware for narrow stile doors. This allows the doors to slide past screens or other doors, permits stacking in pockets, and prevents catching on inside draperies or blinds. Outside escutcheon can be blank (#4189) or have a flush, five-pin, key-operated cylinder lock (#4190). Adams-Rite Manufacturing Co., 540 West Chevy Chase Drive, Glendale 4, Calif.

On Free Data Card, Circle **106**

Mortar for "Styrofoam" Boards and Masonry

"Styrocrete," a special latex additive for portland cement mortar, bonds Styrofoam insulation boards to masonry, cured concrete, metal, or other surfaces. It is said to make the mortar stronger, more adhesive, and more resistant to water and water vapor. A 5-gal pail (with 3 cu ft of portland cement mortar) spread $\frac{3}{16}$″ thick covers about 200 sq ft. Its use in low temperature installations has been suggested. Dow Chemical Co., Midland Mich.

On Free Data Card, Circle **107**



Wash Without Splash

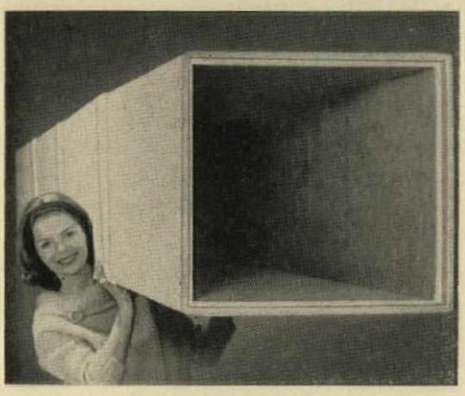
New "Celeste" lavatory of vitreous china, one of nine new products by Crane, is designed for counter-top installation and incorporates a new faucet using the "Moen" dial-set unit. The user at all times can have his

hands over the bowl of the lavatory, eliminating splashing and dripping of water. Design also includes semiconcealed twin soap receptacles and waste lever. Crane Co., Plumbing, Heating and Air Conditioning Group, P.O. Box 780, Johnstown, Pa.

On Free Data Card, Circle **108**

Four Functions in One Duct System

New "Fiberglas" duct system combines air duct, thermal insulation, acoustical liner, and a vapor barrier in one assemblage. The lightweight

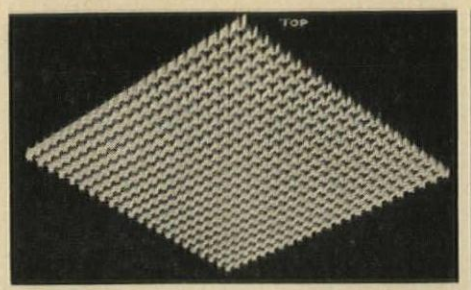


system is available in preformed rectangular and round forms as well as flat boards which can be fabricated into duct components. The formed units are shipped flat, and recover their original shape for installation. Interlocking at joints is accomplished by using a special tape. No metal connectors are needed for most duct sizes. Composition of the duct is of high-density Fiberglas thermal and acoustical insulation with a flame-retardant, puncture-resistant vapor barrier jacket. The jacket consists of laminated embossed kraft paper and aluminum foil reinforced with Fiberglas yarns for the residential line; for commercial use, a similar laminate has an easily cleaned vinyl surface. System can be used at temperatures up to 250 degrees F and to a velocity of 1500 FPM; has been approved by Underwriters' Laboratories for warm or cold air distribution; and meets NBFU Standard 90B for residences and Standard 90A for commercial use. Owens-Corning Fiberglas Corp., 717 Fifth Avenue, New York, N. Y.

On Free Data Card, Circle **109**

Louvered Ceilings on Greek Key Motif

"Textur-Cel," an aluminum louvered ceiling system, is textured in a Greek



key design and couples efficient illumination and low brightness. It is ideal for use with company's "Tee-Track" suspension system or "Intra-Cel" trackless, unbroken pattern system. Standard panel sizes are 2′ x 2′, 2′ x 4′, 3′ x 3′, and 4′ x 4′; larger sizes are available. Textur-Cel comes in baked white enamel, natural, or gold anodized finish. Neo-Ray Products, Inc., 315 E. 22 St., New York 10, N. Y.

On Free Data Card, Circle **110**

Rigid Plastic Gutter

A rigid plastic gutter, now being tested in varied geographic locations to determine performance under differing climatic conditions, offers established advantages of rigid vinyl plastic for exterior applications, including resistance to rust and corro-

sion, and inherent color, requiring no paint. Extrusion process of production permits fabrication in unlimited lengths. Mitering can be done with conventional tools. Joints, end caps, and other supplementary elements, are being developed. Crane Plastics, Inc., 2141 Fairwood Ave., Columbus, Ohio.

On Free Data Card, Circle **111**

New 35-Ton Units Have Several Advantages

New series of evaporator-blower-filter units for industrial and commercial use offers capacities of 8 through 35 tons. The new units feature versatility of installation, being designed for up-flow, down-flow, or horizontal air delivery, for indoor or outdoor applications. The Lennox-designed dual-circuit evaporator coil in the units provides several dividends: effective humidity control without expensive dampers and controls; a greatly increased latent capacity; and operating advantages of a two-stage system. Lennox Industries Inc., 200 S. 12th Ave., Marshalltown, Iowa.

On Free Data Card, Circle **112**

Sculptured Spandrels of Acrylic Plastic

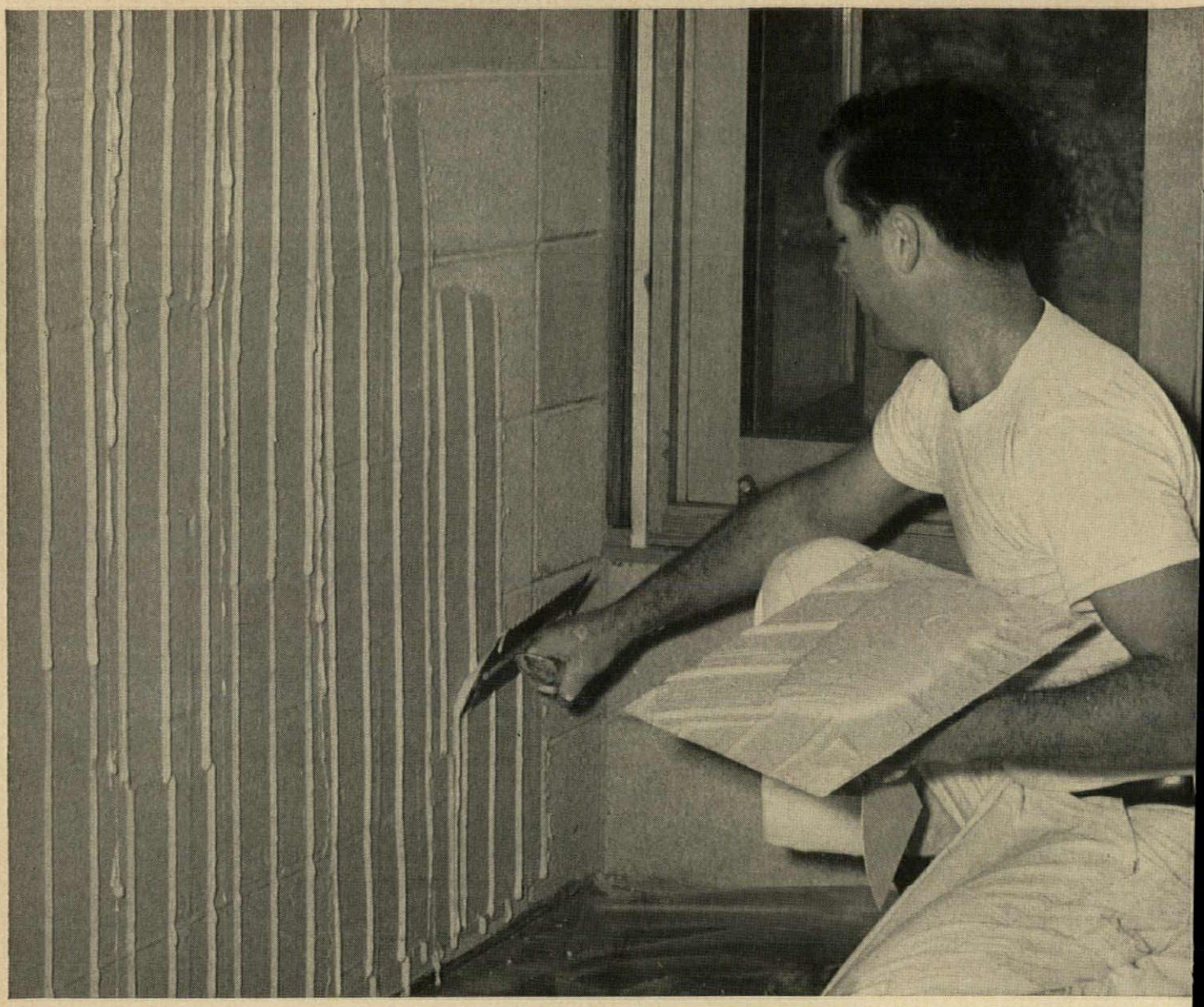
More than 5000 "Plexiglas" spandrel panels appear in the new Connecticut Post Shopping Center, Milford, Conn., designed by Architect Lathrop Douglass. The geometric panels were vacuum-formed from ⅛" sheets of the Rohm & Haas acrylic plastic, a material chosen because of its light weight, resistance to corrosion and weathering, ease of fabrication, and excellent dimensional stability. Larger of the two panel sizes measures 112" high x 30" wide. Rohm & Haas Co., 222 W. Washington Sq., Philadelphia 5, Pa.

On Free Data Card, Circle **113**

Disappearing Wall for Expandable Areas

A gliding, folding aluminum wall that operates on a single flat track, and stacks and packs in minimum space, can be used as a disappearing store front or in-store divider that may be tucked away for the creation of large spaces. "Phantom Wall" is manufactured of heavy-duty aluminum extrusions designed to take standard ¼"-thick plate glass. The track on which it glides is mounted inconspicuously in the floor and eliminates the hazards commonly associated with such tracks. Patented hardware permits unlimited stacking arrangements. System is also appropriate for arcades, swimming pools, and other areas where flexible indoor-outdoor space is desirable. The Alumiline Corp., 10 Dunnell Lane, Pawtucket, R. I.

On Free Data Card, Circle **114**



After Styrotac™ bonding cement is applied to either the wall or to Styrofoam, the insulation is pressed in place (center). After overnight setting, gypsum wallboard is either spot-coated or notch-trowelled with Styrotac and pressed in place over the Styrofoam insulation (right).

STYROFOAM®

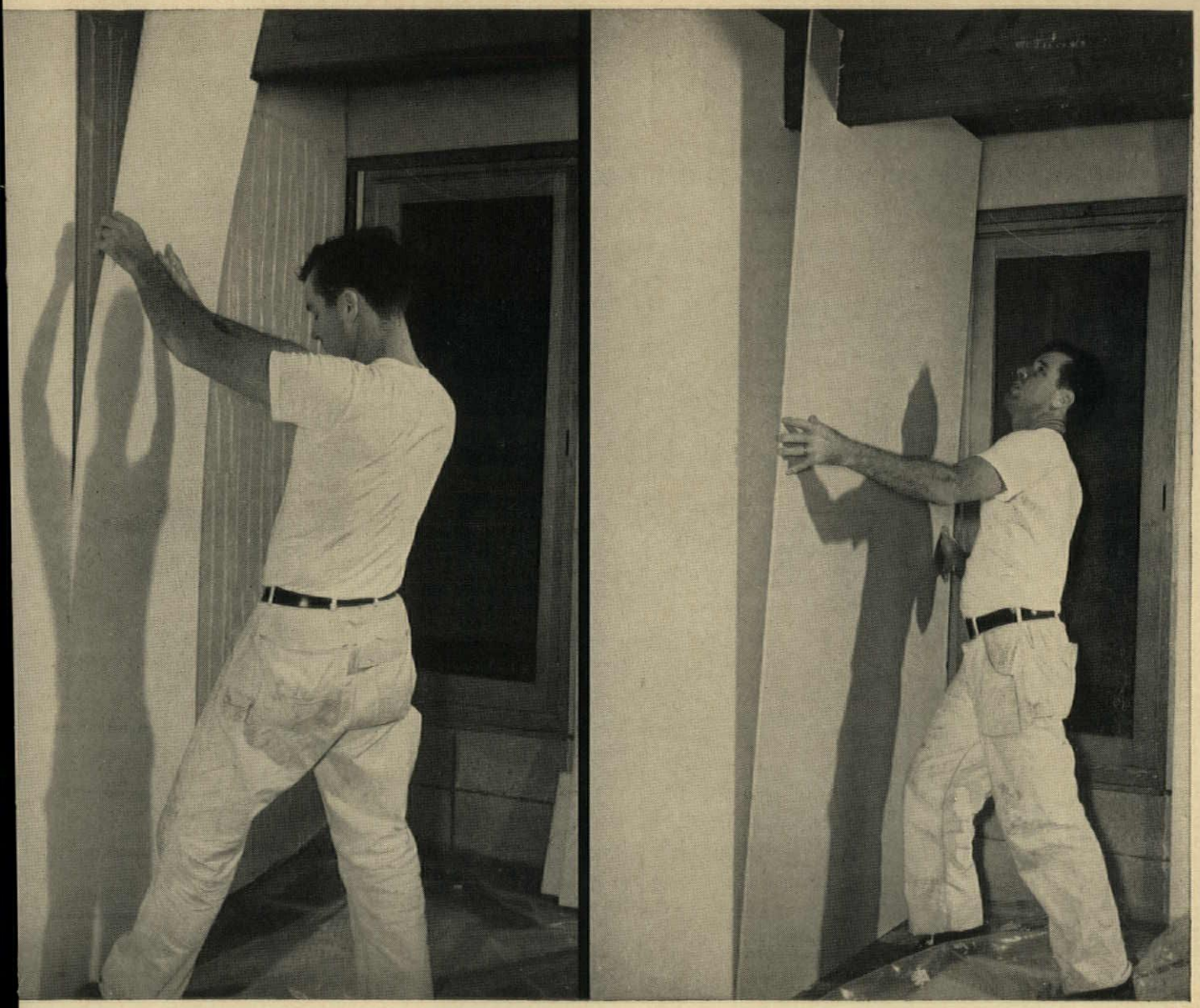
Here's a new step-saving, cost-saving method using Styrofoam insulation for insulating masonry structures which produces permanently high insulating values, provides a solid base for wallboard, and eliminates the problem of nail-popping . . . all in a single operation.

This new method makes use of Styrotac to bond Styrofoam brand insulation board directly to the inside face of the masonry wall, as illustrated. After the bonding cement has set overnight, gypsum wallboard is then adhered to the Styrofoam insulation using the same material.

Using this method, furring and lathing are eliminated, producing a solid insulated wall with no hollows. There is no wood present for insects to feed on, no nail holes to fill and "pop," and the completely-supported wallboard will not bow in or warp. This new insulating method, developed by Dow, offers architects a means of building-in the quality of double-laminate walls, using only a single thickness of wallboard.

Styrotac can be applied to dry absorbent masonry surfaces without first wetting the surface, or it can be applied to the Styrofoam. Either spot application or full coverage using a notched trowel is recommended. Only firm hand pressure against the boards of Styrofoam is required to bond them solidly to the wall.

For wet plaster installations, Styrofoam insulation is first bonded to the masonry wall with Styrocrete® or portland cement mortar. Wet plaster is then applied directly to the face of the Styrofoam. The cellular structure of Styrofoam



New insulating method saves money, saves steps in masonry construction

insulation provides positive keying action to the plaster, producing maximum bond strength.

STYROFOAM insulation board provides permanent insulating values for masonry buildings because of its high resistance to moisture, and its low "K" factor. Styrofoam rigid foam insulation contains millions of tiny non-interconnecting air cells which don't soak up water or moisture, don't rot or mildew. *No separate vapor barrier is needed!* And because Styrofoam insulation has no food value, it doesn't attract insects or vermin. In addition, the high insulating efficiency of this insulation keeps heating and cooling costs to a minimum, year in, year out.

For more information on the time-saving, cost-saving advantages of using Styrofoam insulation and this new insulating method for masonry construction, write THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Dept. 1301EB2.

Styrofoam is a registered trademark of The Dow Chemical Company. It is applied only to the homogeneous expanded polystyrene made according to an exclusive Dow process. Styrofoam brand insulation board is available only from Dow and its authorized representatives.

THE DOW CHEMICAL COMPANY DOW Midland, Michigan

Allied Architects & Engineers, Indianapolis
GENERAL CONTRACTOR:
Huber, Hunt & Nichols, Indianapolis
MASONRY CONTRACTOR:
W. E. Broady & Son, Inc., Indianapolis

KEYWALL REINFORCEMENT HELPS EACH MILLION DOLLAR FLOOR LOOK LIKE A MILLION...

Miles of tile in the new 28 story, 28 million dollar Indianapolis City-County Building is reinforced with Keywall at low cost, without impairing appearance

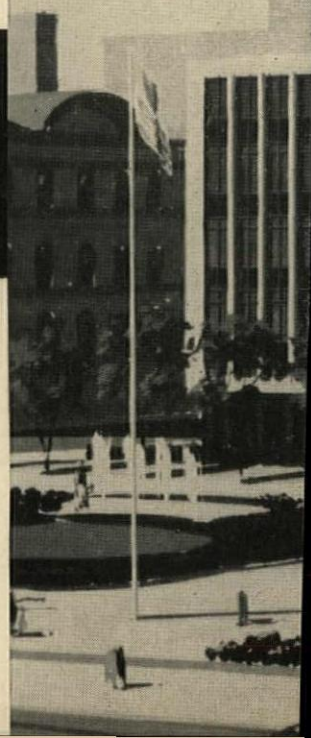
"We prefer Keywall because it can be placed so quickly and accurately. It also laps without thickening joints. That's why our tile joints always strike clean and smooth." This is the way masonry contractor Ward Broady sums up the main reason he's a staunch Keywall user. Hundreds of other contractors and architects are too. Not only because galvanized Keywall reinforcement is quick and neat. It's also surprisingly economical, extremely versatile and strong.

The photos demonstrate why W. E. Broady & Sons, Inc. insisted on Keywall reinforcement for all tile work on their Indianapolis project. Elsewhere, on cement block and other types of masonry work, galvanized Keywall keeps buildings looking young and strong by lapping at corners without thickening joints . . . by assuring full embedment and a complete bond . . . by curving to form a *continuous* reinforcement throughout unusual contours. There are few reinforcement jobs Keywall can't do—at bid-winning cost. Prove it to yourself on the next project.

Keywall gives you more locks to the block. Because of the tight-woven pattern, it is impossible for any one strand of Keywall to be subject to the strain of more than two square inches of a block's thermal movement or shrinkage. By dividing the strain into such small segments, Keywall provides greater crack resistance.

Fine tile work demands uniform mortar joints. Only Keywall can be lapped without lumping in mortar joints. That's why W. E. Broady & Sons found Keywall the neatest solution for reinforcing all tile work in the new Indianapolis City-County Building.

Keywall "tails" to be tied-in later. You can appreciate this advantage when continuous reinforcement is needed, even though some wall sections must be left unfinished for other work. Only Keywall is flexible enough to accommodate variations in mortar joint levels.



KEYSTONE STEEL & WIRE COMPANY
Peoria, Illinois

For more information, turn to Reader Service card, circle No. 390

AIR/TEMPERATURE

New Air-Handling Line

Engineering manual, 52 pages, presents extensive data on newly introduced line of central-station, air-handling equipment. The 37 different units —horizontal, vertical, and multizone models—are designed to meet any air-conditioning requirement, from simple air circulation to heating, cooling, removing dirt, humidifying, and dehumidifying. Manual gives mechanical specifications, capacity information, selection procedure, and performance data. Acme Industries, Inc., 600 N. Mechanic St., Jackson, Mich.

On Free Data Card, Circle **200**

Whisper-Quiet

New air-conditioning unit or heat pump, the economical "WhispAir," is described in 8-page brochure. The unit is only 1′ thin, installs against an outside wall, can be used with or without ductwork. Quiet and efficient operation is provided at little more than the installed cost of room units—with year-round benefits previously available only from deluxe systems. Brochure gives specifications and dimensions. Westinghouse Air Conditioning Division, P.O. Box 510, Staunton, Va.

On Free Data Card, Circle **201**

CONSTRUCTION

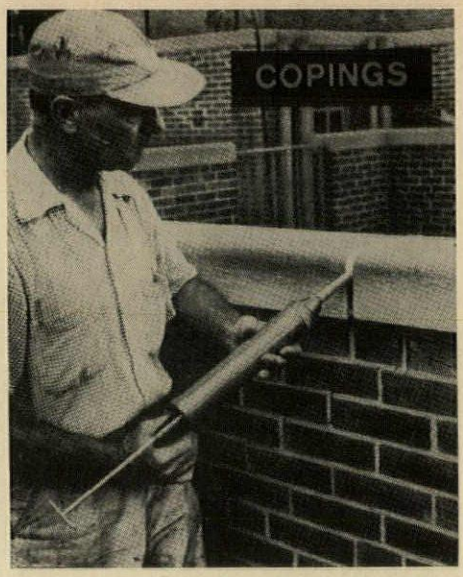
Color-in-the-Glass Block

Glass blocks where color is either added to the glass itself (in daylight-controlling "Shade Green" and decorative "Shade Aqua" units), or fused to the exterior (in ceramic-faced accent units), are presented in new 16-page catalog. The various surface designs are illustrated; complete dimensional and installation data are provided. Booklet includes construction details for walls, panels, and openings. Kimble Glass Co., Subsidiary of Owens-Illinois, Ohio Bank Bldg., Toledo 1, Ohio.

On Free Data Card, Circle **202**

Joint Sealing

Techniques for sealing joints with polysulfide-base compounds are detailed in new 12-page brochure. Entitled *Joints*, it describes the properties of polysulfide-base sealants—adhesion, flexibility, and crack-free durability—that make them suitable for joining a variety of structural



materials. Methods of joint sealing are illustrated; basic information on mixing, surface preparation, and application is also included. Chart compares such factors as expected life, tolerance requirements, and cost for plysulfide-base and other sealants. Thiokol Chemical Corp., 980 N. Clinton Ave., Trenton 7, N.J.

On Free Data Card, Circle **203**

Into the Woodwork

Quality Standards of the Architectural Woodwork Industry, 75 pages, is available to architects and specifications writers. The standards set forth definitive tests and prescribed joinery tolerances for the three classes of woodwork. Also included is a table for allowable natural and seasoning defects of lumber. Objectives of the standards are to define in precise terminology the three grades of millwork quality available, and to provide tests whereby the work delivered to the job can be measured against that called for in the specifications; to word the tests and standards in such a way as to eliminate all chance of disagreement; and to require equal quality and competence of all bidders on a job. Write to: Architectural Woodwork Institute, 332 S. Michigan Ave., Chicago 4, Ill.

New Metal Combines Five

"Hydro-T-Metal-200," recently developed, lightweight alloy "of particular interest to architects," is described in new 12-page bulletin. The combination of five key elements—zinc, copper, titanium, manganese, and chromium—gives properties previously considered impossible in a zinc-based metal. Among the material's advantages: durability, resistance to corrosion, hardness and rigidity, high tensile strength, low-cost installation, and ability to be color-finished. Bulletin illustrates its "unparalleled performance" in various applications (roofs, fascias, flashing), and provides specifications and design recommendations. Hydrometals, Inc., 405 Lexington Ave., New York 17, N.Y.

On Free Data Card, Circle **204**

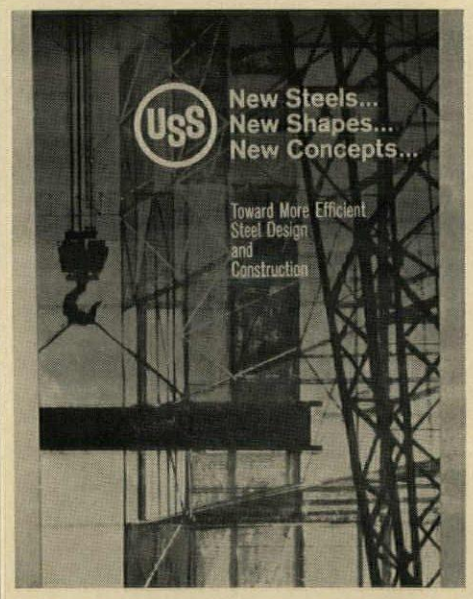
Epoxies in Concrete

Epoxy Alloys, 4 pages, discusses the uses of epoxies for new concrete as well as for general maintenance of older structures and surfaces. Epoxies described in booklet are for floor surfacing, bonding agents, structural adhesives, coating adhesives, coating compounds, and nonskid materials. Folder contains information on application methods and general properties. Coast Pro-Seal & Manufacturing Co., 2235 Beverly Blvd., Los Angeles 57, Calif.

On Free Data Card, Circle **205**

The Newest in Steel

New Steels, New Shapes, New Concepts, 28 pages, summarizes the more significant developments in constructional steels, and newest design con-



cepts for their most effective and efficient use. The booklet gives key facts on the structural carbon steels A7, A373, and A36; the high-strength and high-strength low alloy steels A242, A440, and A441; and the heat-treated constructional alloy steels USS "T-1" and USS "T-1 type A." Eleven new wide-flange sections recently made available are described. Also discussed are new design and construction con-

cepts for obtaining weight and cost savings: combination steel construction, prestressed steel, composite construction with dissimilar materials, and plastic design. United States Steel Corp., Market Development Div., Room 2809, 525 William Penn Place, Pittsburgh 30, Pa.

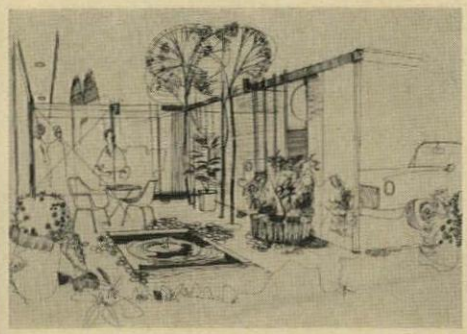
On Free Data Card, Circle **206**

Handbook on Aluminum

Latest information on the properties of aluminum and its many alloys, wrought and cast, is presented in new *Aluminum Data Book*. The 194-page handbook contains 207 tables of data covering the entire subject; general sections discuss heat-treatable and nonheat-treatable alloys, thermal practices, alloy selection, fabrication, joining, and surface finishing. General properties and available forms are itemized. Write to: Reynolds Metals Co., Dept. PRD-62, Richmond 18, Va.

"Master Plan" for Carports

While designing a project for Western Pine Association for the best approach to carport planning, Donald Blair and Saul Zaik concluded that this residen-



tial element must be integrated into the "master plan" for the entire project. In this manner, they believe, the carport can become more than merely a shelter for vehicles; properly planned it can create interesting outdoor-activity areas and also enhance property values. Design research of the team has resulted in a booklet showing six carports by Blair & Zaik. Although slanted mainly to the consumer market, the publication will be a handy idea reference for the professional working on houses. Western Pine Assn., Product Information Div., 526 American Bank Building, Portland 5, Ore.

On Free Data Card, Circle **207**

Plaster Systems

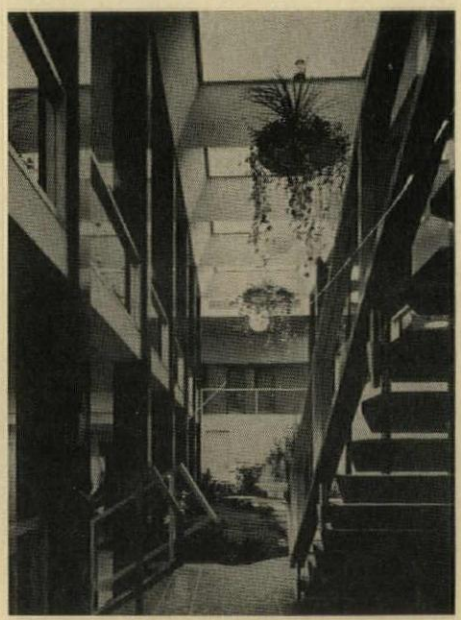
New 8-page brochure gives complete technical data on Zonolite's vermiculite plaster, fireproofing, and acoustical systems. Products featured are plaster aggregate, "Mono-Kote" direct-to-steel or concrete fireproofing, "Zono-Coustic" acoustical plaster, and "Spra-Insulation" for metal-building interiors. Sectional drawings and specs are included, along with full data on noise reduction, insulating values, and other properties. Zonolite Co., Dept. PA-60, 135 S. La Salle St., Chicago 3, Ill.

On Free Data Card, Circle **208**

DOORS/WINDOWS

Skydomes for Controlled Daylighting

"Skydomes" for "packaged daylighting"—both custom-engineered and standard units—are fully documented in Wasco's new 16-page booklet. Photo, sectional drawing, dimensions, and specs are given for each of 20 units,



ranging from the new self-flashing "Twin Dome" to the "Pyrodome," which combines skylighting with fire venting. Wide selection of densities permits unique interior lighting effects while controlling light diffusion and heat gain. The company offers a standard line of over 300 standard shapes and sizes, plus facilities for engineering custom units of any shape, color, and density. Wasco Products Dept., American Cyanamid Co., 5 Bay State Rd., Cambridge 38, Mass.

On Free Data Card, Circle **209**

ELECTRICAL EQUIPMENT

Incandescent Innovations

Recently introduced "Illumiline" collection of recessed incandescent fixtures by Marco is fully presented in 42-page catalog. The several exclusive features of the series are thoroughly explained in diagrams. Among the innovations are "Ampliflector," a spherical reflecting element positioned under the main reflector to redirect all normally baffled light into useful zones; "Adjustomatic Hub," which permits lamps of different sizes to be accurately located; and "Plastoveil Trimplate," whereby the fixture cavity can be finished with the same material as the ceiling. Marvin Electric Manufacturing Co., Division of Progress Manufacturing Co., Inc., 648 Santa Fe Ave., Los Angeles 21, Calif.

On Free Data Card, Circle **210**

Residential Lighting

Symphony of Lighting Styles, 72-page catalog, depicts complete line of decorative residential lighting fixtures. Presented for the first time are "Vista-Lite" illuminated ceilings, electronic dimmer systems, and colorful "Fantasy" line. Other fixtures include pendants, pulldowns, chandeliers, post lanterns, utility fixtures, wall brackets, and recessed lights. Moe Light Division, Thomas Industries, Inc., 207 E. Broadway, Louisville 2, Ky.

On Free Data Card, Circle **211**

FINISHERS/PROTECTORS

Paint Systems for Variety of Exposures

Recommended paint formulations and paint systems for a wide variety of exposures are published in new 32-page booklet, *Red Lead Based Paint Systems*. This report, subtitled "Lead Pigments Technical Letter No. 15," is the result of almost 20 years of field-testing by the Lead Pigments Technical Committee, and supercedes all previous Technical Letters issued by the committee. Among the exposure

Continued on page 75

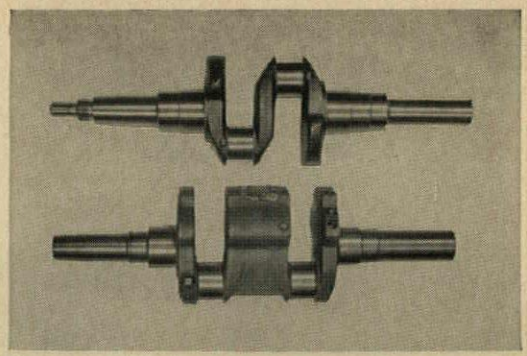
Here's why you can always bet your life

Standby power that isn't 100% dependable . . . and capable of delivering 100% of the power promised by its nameplate, offers false security that can be dangerous. That's why Onan bends over backward to make sure every Onan Plant will perform at 100% efficiency.

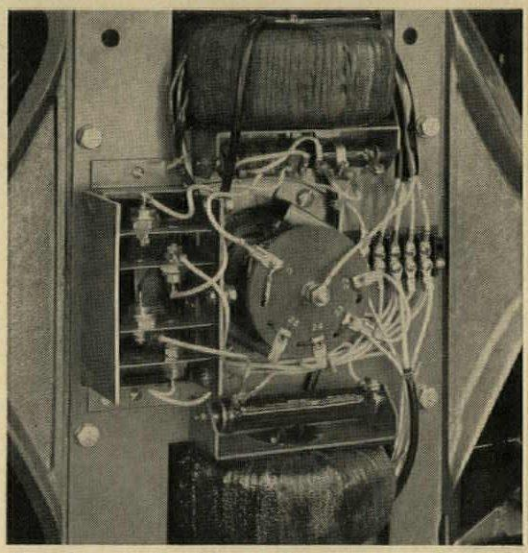
Illustrated above is Onan's testing facility—largest by far in the industry. *Every* Onan is run-in and tested for hours under full load conditions, your assurance that you're getting the most dependable Plant made.

One-source Responsibility

Onan offers another valuable exclusive: *complete, one-source responsibility*. Full time Onan specialists will help you determine how much standby power you need . . . and they'll recommend the *minimum*. They'll help you decide Plant *location*, the most efficient *cooling system*, the most inexpensive *fuel system*. They'll help you select—and supply—*all necessary accessories* including line transfer control and fuel lines and tanks.



Onan's bigger, stronger crankshaft, compared to typical competitive part, typifies the extra ruggedness Onan builds into all Electric Plants.



Onan's exclusive Magneciter generator is static excited to eliminate rotating exciter and mechanical regulator. Moving parts are eliminated in *both* exciter and regulator. Voltage recovery is five times faster than brushless type generators.

on an Onan plant

Factory Service Available Locally

More than 100 authorized distributors are located in all major cities. Any distributor can supply an Onan Plant gasoline, gas or diesel driven. *Sizes to 230 kw.* Call your local distributor today. He's listed in the Yellow Pages. Or write for literature.

PERFORMANCE CERTIFIED

We certify that when properly installed and operated this Onan electric plant will deliver the full power and the voltage and frequency regulation promised by its nameplate and published specifications. This plant has undergone several hours of running-in and testing under realistic load conditions, in accordance with procedures certified by an independent testing laboratory.

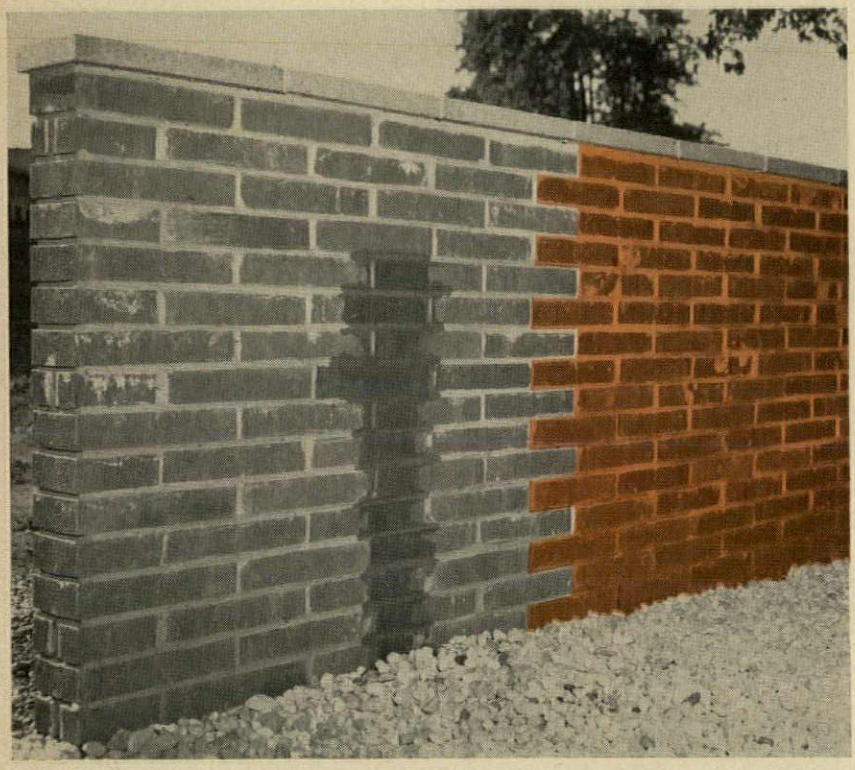
Only Onan gives you Performance Certification

ONAN Division, Studebaker-Packard Corp., 2545 University Ave. S.E., Minneapolis 14.

For more information, turn to Reader Service card, circle No. 376

NEWS from Dow Corning

How to keep water out



Silaneal strengthens mortar bond; helps prevent leaky walls

See what happens when a brick wall is laid dry with high suction rate brick. That dark area indicates severe leakage. Now, look further along the wall to the right. No wetness here. Why? Because that half of the wall was built of the same brick, plant-treated with Silaneal®. Here's the story.

The wall was built of high suction brick — a 6″ SCR brick with a 31 gram suction rate. The brick used in the right hand half had been treated with Silaneal, the sodium siliconate treatment that controls suction rate. In this instance, suction rate for the treated brick was reduced to below 20 grams. The brick in the left half were left untreated.

Here's the test. After brick was laid up and mortar properly cured, two streams of water — simulating wind-driven rain — were directed against the wall, one against each half. *In only two minutes*, water had penetrated the untreated section and was soon trickling down the other side. But after seven hours of this continuous soaking, the Silaneal treated section still showed no sign of leaking!

Walls are stronger. How well mortar does its job depends on its quality and how it cures. And to cure correctly and bond securely, mortar must hydrate slowly, thoroughly. A high suction brick, laid on fresh mortar, immediately draws much of the moisture from the mortar, which results in shrinkage cracks at the brick-mortar interface. But Silaneal controls this suction, slows it, allows mortar to cure properly and bond as it should. In the test above, for example, untreated sections gave a wall strength of 63 lb./sq. ft., while Silaneal treated sections reached a strength of 83 lb./sq. ft.

Brick stays clean. Dirt that falls on high absorption brick is pulled into the brick with the first rain. Silaneal makes the brick surface water repellent so dirt washes away with rain. And when water can't get into the brick, efflorescence is minimized. Clean-up after brick is laid seldom requires more than just simple brushing. And maintenance is reduced because mortar doesn't crumble. Equally important: brick are left free to "breathe" because Silaneal does not fill the pores in the brick and obstruct passage of air.

You can be sure your designs will be stronger, leak-resistant and more attractive by *specifying* that high suction brick be plant-treated with Silaneal to reduce suction rate to the 10 - 20 gram level. For more information about this new building aid and a list of manufacturers now supplying Silaneal-treated brick — write Department 6802.

SILANEAL®
keeps brick clean

Dow Corning CORPORATION
MIDLAND, MICHIGAN

Continued from page 71

conditions discussed are highway structural steel, hydraulic structures, industrial and marine environments, sea-water immersion, and rusted or new galvanized steel. Because of the importance of surface preparation of steel, a large portion of the text is devoted to this subject. Lead Industries Assn., 292 Madison Ave., New York 17, N. Y.

On Free Data Card, Circle 212

SANITATION/PLUMBING

New Preassembled Support for Wall Closets

Pamphlet, 4 pages, describes new "Swiftee" residential wall-closet support. According to manufacturer (the original developer of supports for off-the floor fixtures), the Swiftee's preassembly permits rapid roughing-in in a fraction of the time required by other units. In addition, the support assures positive closet location, and adjustability from the front even after the wall is finished. Swiftee fits any 2 x 6 stud wall and accommodates any manufacturer's wall closet. Installation photos and detail drawings are given. Hydromechanics Div., Zurn Industries, Inc., 2214 West 8th St., Erie, Pa.

On Free Data Card, Circle 213

Waterproof Walls for Bath and Shower

Booklet, 8 pages, describes the new "Micarta" bath and shower wall, a plastic-laminate/styrene-foam sandwich providing a tub-to-ceiling wall that is durable, waterproof, attractive, and easily cleaned. Complete installa-

tion can be made by one man, using ordinary tools, in less than half a day. Matching standard Micarta wall panels can then be applied to remaining wall areas for a continuous maintenance-free surface. Plans and sections, plus installation photos, are presented. Micarta Div., Westinghouse Electric Corp., Hampton, S.C.

On Free Data Card, Circle 214

Emergency Showers

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Continued on page 80

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Continued from page 76

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PROGRESSIVE ARCHITECTURE
NEWS REPORT

REINHOLD PUBLISHING CORPORATION
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Publisher.....D. Bradford Wilkin
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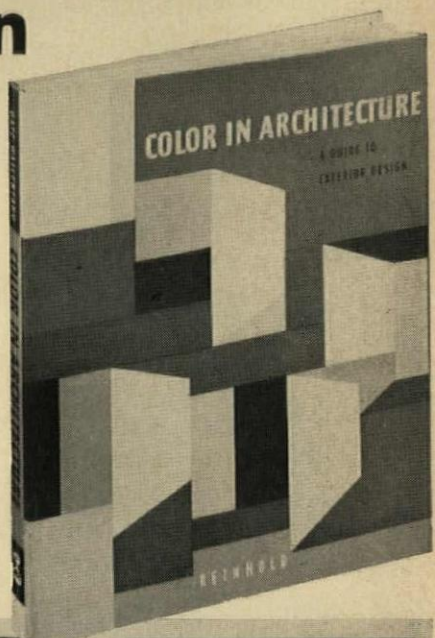

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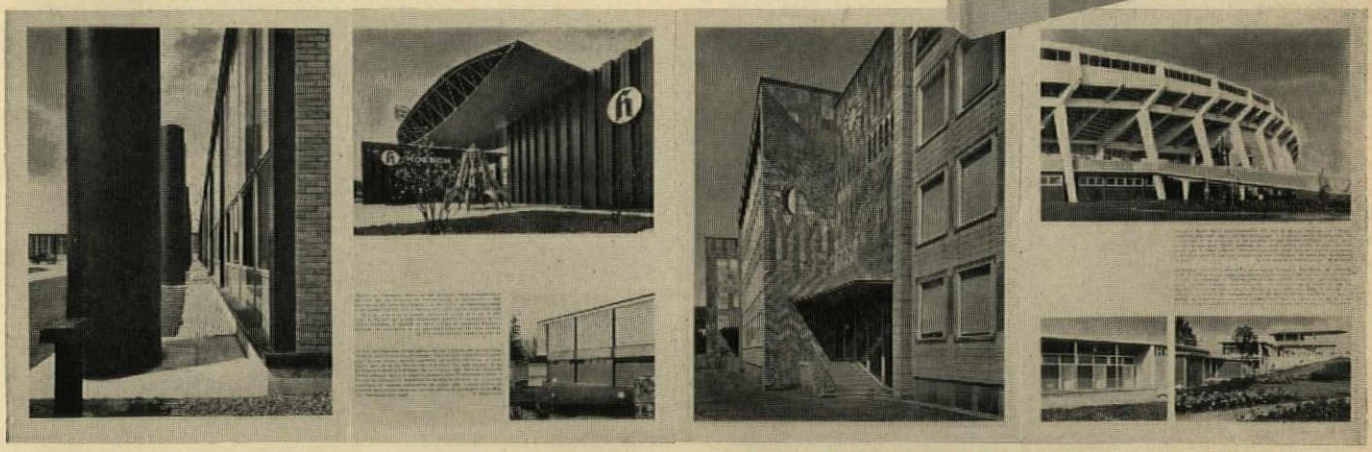

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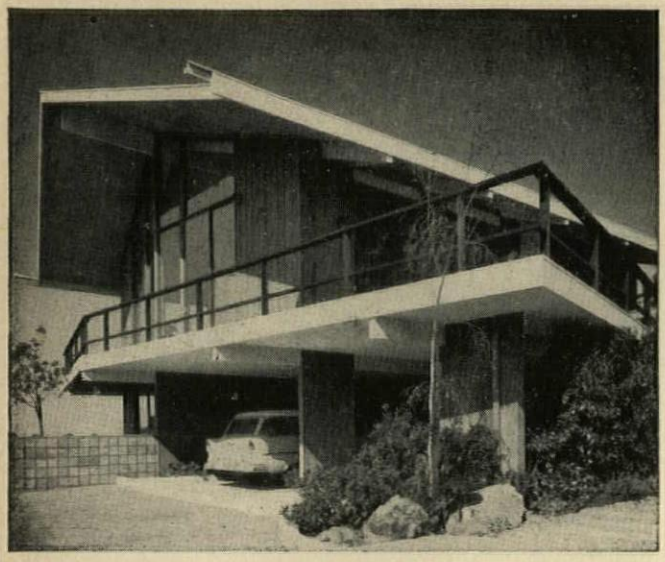

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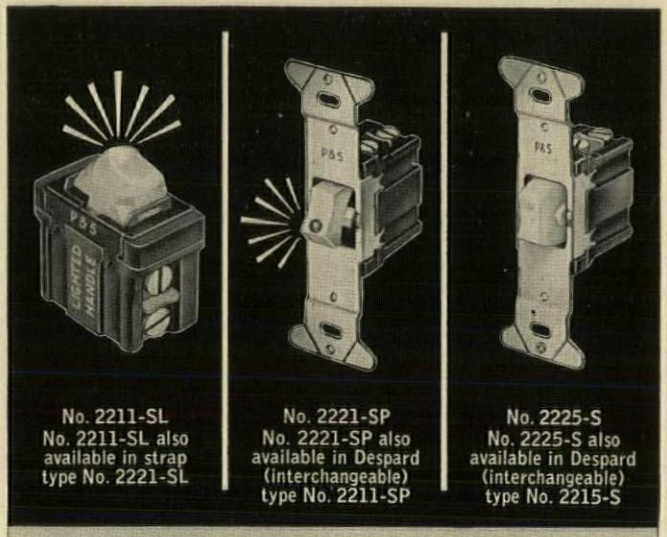

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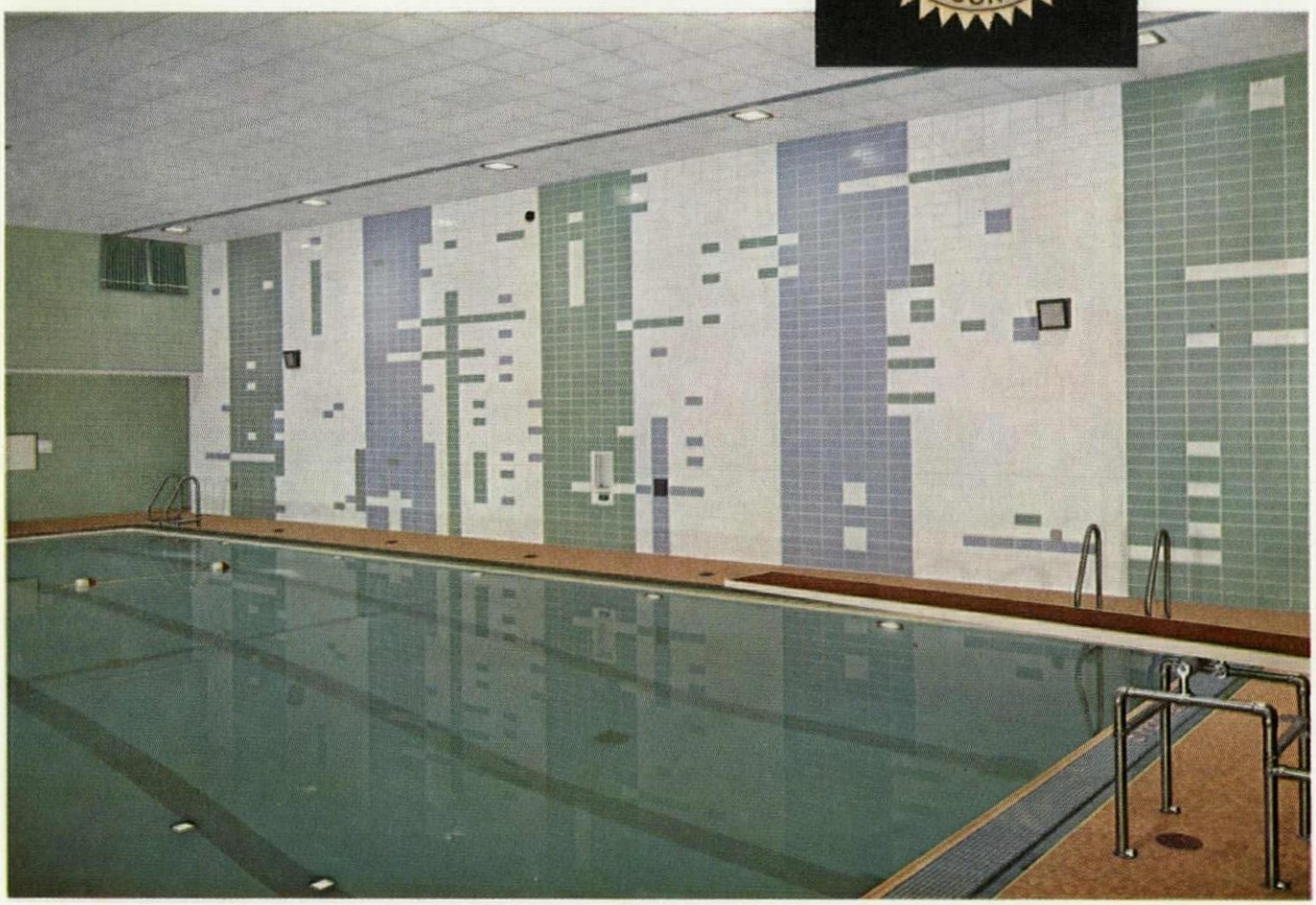

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(At left) View of the pool

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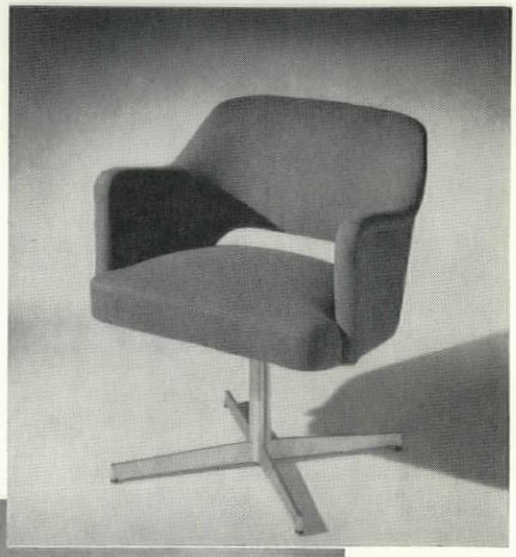

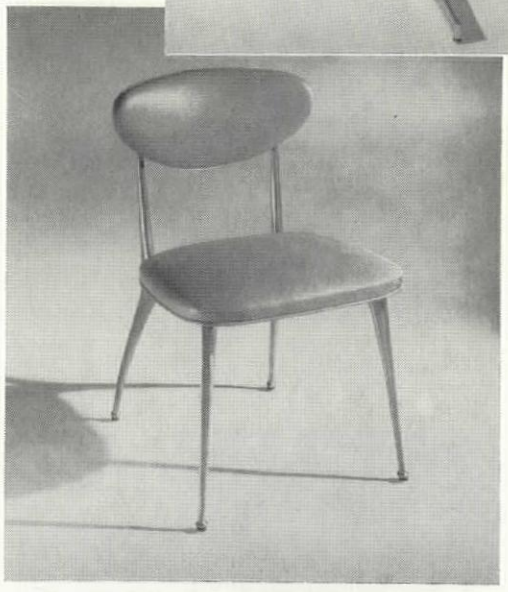

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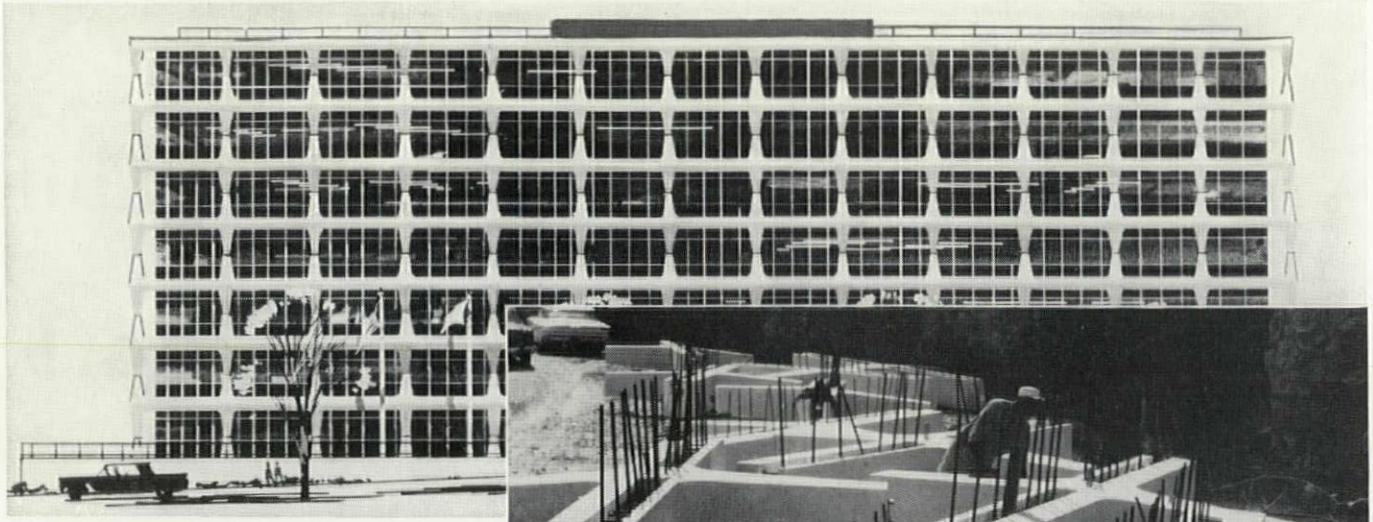

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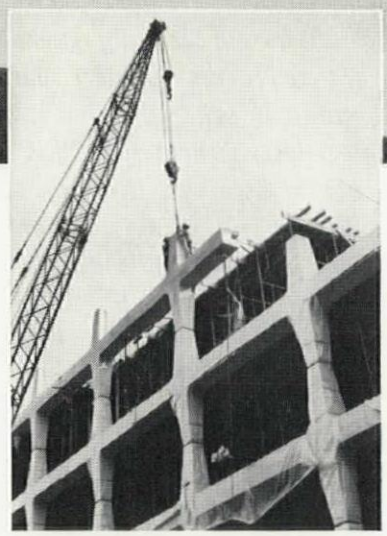

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EDITORIAL FEATURES

REHOUSING THE

BY C. RAY SMITH

Theater historian Allardyce Nicoll has observed that "Almost always, the great playwrights have appeared shortly after the creation of some new kind of stage or after some readjustment of the relationship between actors and audience." In the midst of a renewed activity in theater building, architects as well as theater people may have this goal in mind, for there has recently been an undeniable dissatisfaction with the theater plan that has been predominant for the past three hundred years. The implication is that a new theater form will be forthcoming, but what this new form might be has not been agreed upon: theater people maintain that architects do not have adequate experience in the theater to create a valid new form; architects can see only that theater people as a group are confused and without any consistent approach, and that they themselves do not know what they need. This article presents an analysis of the current thinking on American theater design, attempts a clarification of some of the confusions, and indicates several means by which architects can learn enough about the current directions in the theater to be able to establish a program for a new theater building.

Two basic theater types can be distinguished: the large assembly hall, which accommodates many performers and large numbers of spectators (over 2000); and the intimate theater, which has a smaller seating capacity in order to bring the audience into close proximity with individual performers. (By current standards, intimate theaters should seat not more than 1500 persons, the farthest no more than 65 ft from the stage.) The large hall is appropriate only for spectacles in which the observation of small details is not essential. But wherever facial expression is important to a performance, a smaller theater, which brings the audience nearer the performer, is mandatory.

A theater, as Louis Kahn says, is "a realm of spaces where a performance can come about." A dramatic performance can "come about" only in a place where people can both see it as well as hear it properly. Modern technology has found ways of making acoustical adjustments so that the large size of an auditorium will not impair audibility, but, as Jean Rosenthal states, it has found "no solution to the human problem of seeing just so far." To house all of the performing arts adequately, therefore, a community needs, as a minimum, one theater of each type—a large auditorium, and an intimate drama theater.

In this country, because of the impoverished status of the performing arts, communities will very frequently refuse to invest in more than one theater. They decide on a single structure which they think will be suitable for all presentations. Such a structure, which can accommodate all of the performing arts as well as exhibitions and sports events, is called a "multi-purpose" auditorium. The selection of this type of auditorium is motivated by two additional economic considerations: a commercial building cannot be permitted to stand idle for any appreciable time, and it must accommodate as large a paying clientele as possible.

One of the attempts at combining the two basic theater types in one building is the inclusion in a large hall of sliding panels or screens that can reduce the seating capacity to about half. Such an attempt, many maintain, is at best makeshift. "Making dogmatic statements is a dangerous thing," says Jo Mielziner, "but if a town wants an auditorium large enough for spectacles, they might as well give up the idea that it will ever be a chamber intimate enough, or suitable, even in a minimum way, for living drama."

In each of the two basic theater types, however, a cross-use by several art forms is possible. For instance, an opera requiring only a small orchestra, such as a Mozart opera, can be housed in the intimate drama theater, so long as acoustical adjustments are made.

The most recent solution to this acoustics problem is to introduce two ceilings into the auditorium: a higher one, which provides the longer reverberation time required for music, and a lower one of either fixed or mechanically adjustable panels, which produces the shorter reverberation time required for speech intelligibility.

The drama theater itself presents a complex problem in the choice of stage form. The critical factor in theater design, indeed the place where theater design must begin, is the relationship of the performing area to the audience area. Two basic relationships, diametrically opposed to each other, have been used for centuries: one is the axial, end-stage plan, in which the performer is at one end and the audience faces him; the second is the radial, center-stage plan, in which the audience surrounds the performer. The stage forms in current use, which derive from these prototypes, can be briefly described as follows:

Proscenium. The contemporary proscenium stage is a performing area at one end of the theater, which the audience watches through the picture frame of the proscenium arch. The

DRAMA

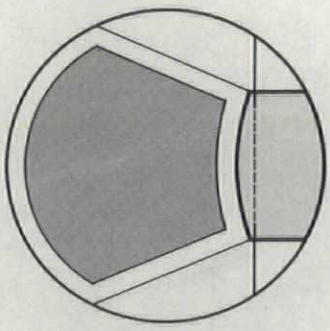
difference in lighting intensities emphasizes this separation between the performing area and the audience area, which, in effect, are housed in separate rooms. However effective in achieving illusion, this form is in no way conducive to an intimate performer-audience relationship.

Arena. The arena form has a central acting area surrounded on all sides by the audience. In contrast to the proscenium form, nothing separates the two areas: both audience and performer are in the same room. Based on the radial plan of the early amphitheater, this arrangement accommodates the greatest number of people in closest proximity to the performer. On the other hand, some people find the absence of all scenic background and the substituted wall of faces disturbing.

Apron. The pure apron stage is a combination of the axial and radial plans. The main performing area projects into the audience, which surrounds it on three sides and permits the performer to come into intimate proximity with the spectators. Behind the performing area there is a scenic or architectural background. The entire performing area is open: no pierced wall separates it from the audience; both are housed in the same room. Used in the greatest periods of the drama (Greek, medieval, and Shakespearean), this stage form not only brings the audience close to the stage but also presents the performer against a scenic background rather than against a wall of faces.

Caliper. One stage form, which seems to be a product of the modern theater, reverses the arena concept of the audience surrounding the stage. It has side stages, which extend out to surround the audience. Used most daringly in Kiesler's 1923 Endless Theater project (see book review, page 166), the caliper concert has been recently employed in the Kleines Haus in Mannheim, Germany, and in the Waco (Texas) Civic Theater. Frank Lloyd Wright used the caliper in modified form in his Kalita Humphreys Theater, Dallas, and Oskar Strnad designed a remarkable early example in which the caliper was mechanized to revolve about the audience, bringing the stage into view a segment at a time. Other caliper plans are shown on the following two pages. As L. Moholy-Nagy described it, such a stage establishes "by means of a more or less caliper-like embrace—a close connection with the audience." In this article, Moholy-Nagy's apt analogy (caliper) is used to describe this stage form.

Current theater terminology, unfortunately, is as yet still without a set of simple, objective descriptions of the basic stage forms. Nearly every theater is based upon one of these



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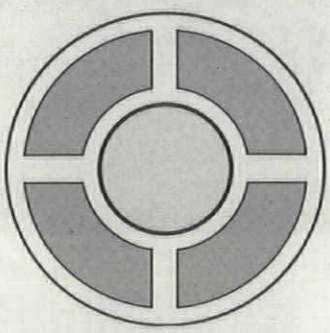
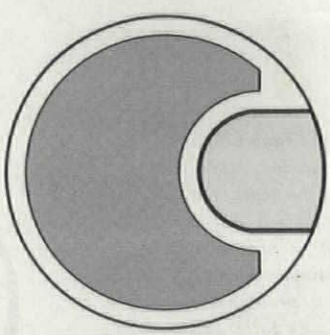
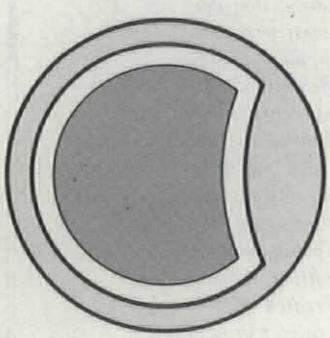


2 Arena



3 Apron



4 Caliper

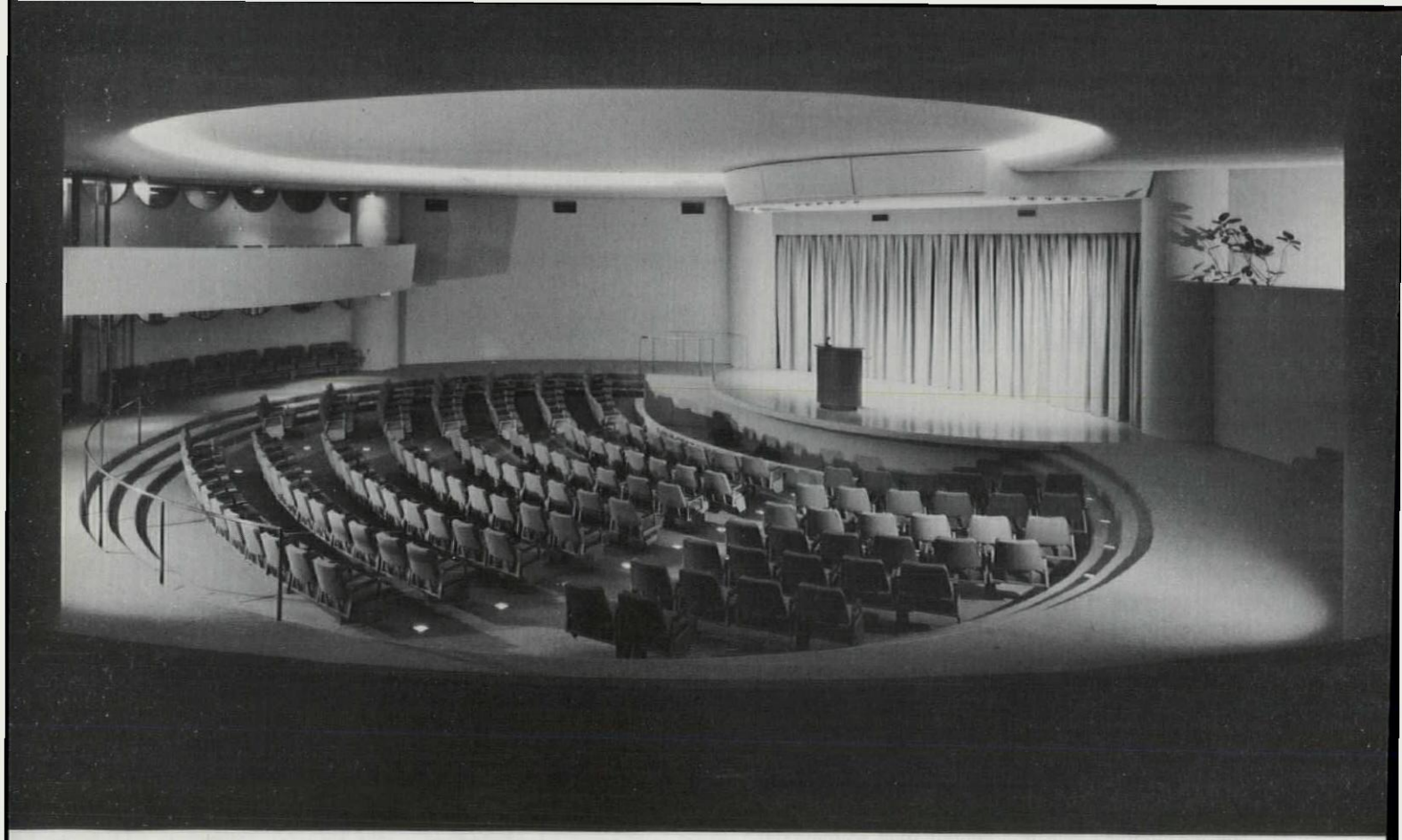
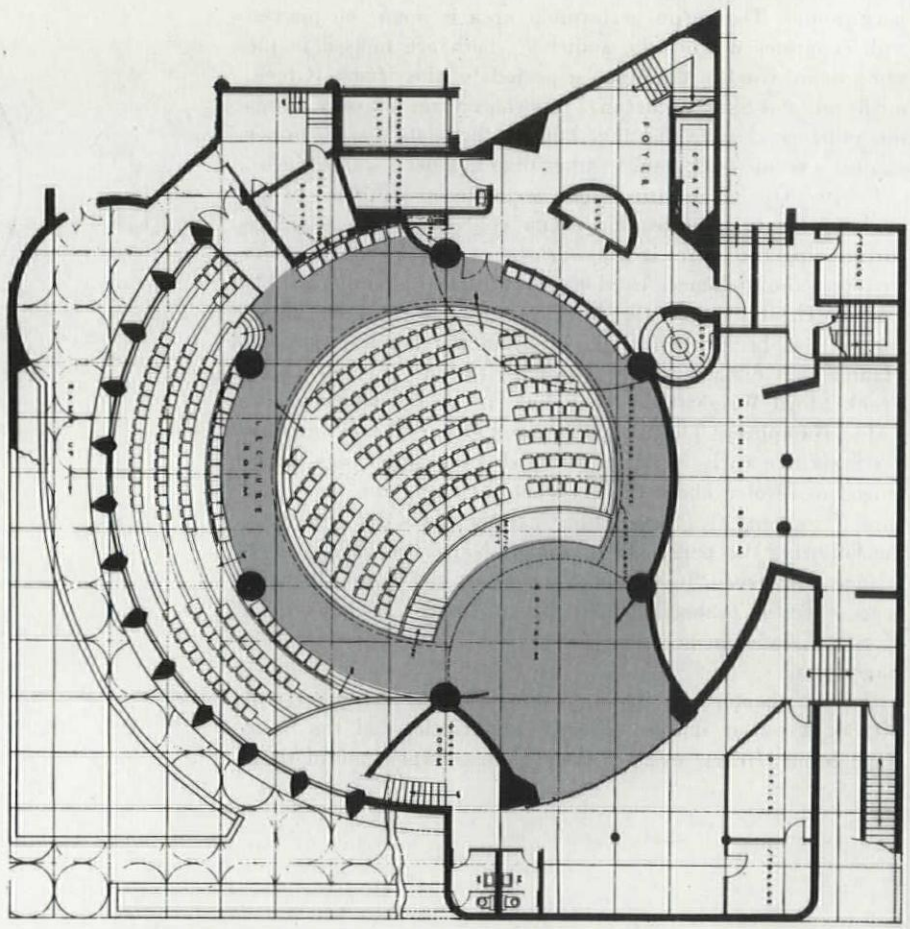


Photo: Louis Reens



The auditorium of Frank Lloyd Wright's Guggenheim Museum is located underneath the exhibition area. Used as a lecture hall, it could also serve as an intimate drama theater: it has a proscenium stage (without a fly loft) and a deep apron; there is also a caliper surrounding the majority of the audience that could be used to give the stage an effect of flexibility. Although important scenes would not be played behind the audience, the caliper could be used for a variety of exits and entrances. By removing the center seats and using portable seating on the caliper, a small arena could be created. Walter Gropius used a caliper around the larger turntable in his Total Theater project, and Frederick Kiesler adapted his earlier caliper designs and incorporated the idea in his Universal Theater project (facing page).

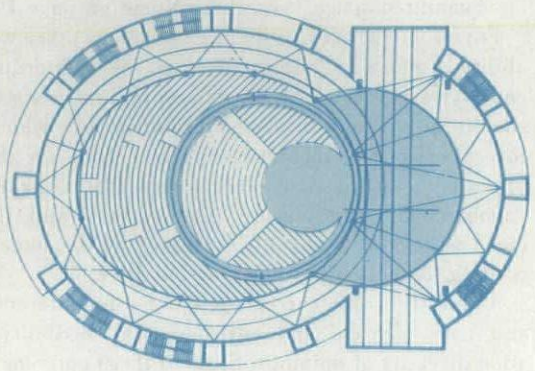
forms; however, the variations that have been introduced as time progressed have assumed the names of their antecedents, as a living language grows and changes. The proscenium stage, for instance, bears only a slight resemblance to the "proskena" from which it developed; still, the term persists. The apron stage is so called because it is seen as an outgrowth of the small apron of proscenium stages, which is the space between the proscenium arch and the footlights. But it is also called an Elizabethan apron, an open stage, an open-apron, a three-quarter arena, and a thrust stage. One current definition of an apron stage is "one that is partially surrounded by the audience or partially surrounds the audience." Clearly, these are two different conditions, and architects who must ask for clarification can hardly be blamed for questioning the professed authority of theater practitioners.

At the risk of adding to the confusion, it might be suggested that a geographical analogy could be useful in describing stage forms. Since an arena performing area is surrounded by the audience on all sides, it might be termed an Island Stage. Similarly, an apron stage is generally surrounded on three sides and might, therefore, be called a Peninsula Stage. The U.S. Institute for Theater Technology, an organization that assists in the interchange of knowledge in the field, is currently engaged in a project to formulate a list of simple and clear descriptive theater terms. Such a list, plainly, will be welcomed.

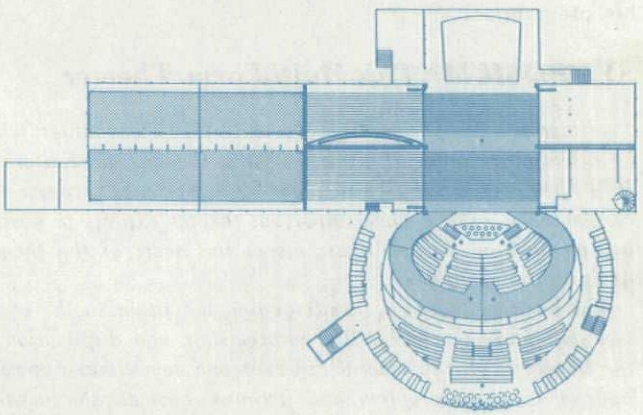
The directions in theater design today in using these stage forms are several. The commercial "Broadway theater" has been restricted to the proscenium stage, which until recently has been preferred for most productions and which meets the requirements of fire codes. Paradoxically, the commercial theater, which insists on the largest possible audience capacity for economic reasons, persists in a dedication to the stage form that, because of sight-line requirements, permits the least number of persons to be in close proximity to the performer. The dedication, therefore, seems to be more to the conventional trappings of "picture-frame" production technique than to the economic advantages of the stage form itself. Since the end of the last century, however, there has been an increasing recognition that the intimate relationship between the performer and the audience must be restored. That intimacy was destroyed in the 19th Century when the play retreated into another room to be viewed through the picture frame of the proscenium arch. Resident companies and community theaters have shown an appreciation of this thinking and a desire to accommodate the largest audience in closest proximity to the performer, and have adopted apron and caliper stages, though many have continued to use the proscenium form. Until recently, the arena was used exclusively for large assemblies; today, this form is being utilized for the intimate drama as well. There is also an attempt to go beyond the known stages and to achieve a new form.

The interest that has been shown in plays of various periods has brought about another development, mainly in educational institutions where there is a desire to present performances which are replicas of the plays' original production styles. Since most of these institutions can afford only one theater, there has been a movement toward building a single structure whose interior can be altered to achieve several of the historical stage forms—usually proscenium, apron, and arena. These "multi-form" theaters, a product of the 20th Century, also offer each production a variety of presentation techniques that need not be consistent with the technique for which the play was intended.

Two means of achieving the multi-form theater are employed at present: the first is to mechanize the stage and seating so



Walter Gropius: Total Theater project, 1927



Frederick J. Kiesler: The Universal Theater project, 1932

that they can be changed by equipment that takes advantage of today's technology; the second is to build a box room that is not committed to any stage forms, either by fixed or mechanized stage and seating, but is provided with portable platforms and seats, which can be arranged to approximate any of the historical stage forms or to achieve new arrangements. This second concept, often referred to as "uncommitted space," has been employed where sight-lines, labor, and fire laws make it possible, which is usually true for small theaters only. No matter how it is achieved, the significance of the multi-form theater is its physical flexibility, or convertibility. For one opinion about "uncommitted space," see P.S. column on page 192.

Environmental flexibility in a theater, in other words, changeability of mood or "atmosphere" in the auditorium, is another controversial issue. There are those who maintain that a theater should have a built-in personality of its own which will add to the experience of theater-going; and there are those, with an opposing point of view, who believe that a theater should be "anonymous," its enclosure "painted out," and, if any specific mood is desired, it should be created by the stage designer according to instructions given by the director.

About all of this current thinking—the different stage forms and both physical and environmental flexibility—there is a wide diversity of opinions. Some of these opinions are stated in the symposium below. The theater architect will want to be aware of this diversity of opinion before he begins to formulate his program.

SYMPOSIUM: The Multi-Form Theater

To illustrate the problems the architect will encounter when he attempts to plan his program for a theater, the Editors of P/A have conducted a quasi planning conference through correspondence, asking some important theater experts to answer or comment on several questions at the heart of the theater design problem today.

The answers indicate, in microcosm, the situation the architect will find—the ambiguity, imprecision, and duplication of the terminology, the several different and sometimes opposing approaches to the problem, and, perhaps above all, the fact that aesthetic theory is not always consistent with artistic practice.

The questions were framed in two broad areas:

1. Because of economic considerations, there is a tendency to believe that "multi-form" theaters are the answer to the stage problem in the United States. Do you believe the multi-form theater really works, or does it impose a severe compromise on each type of production technique? Would multi-form theaters stimulate new directions, or would they hamper them?

2. If you could forget the existence of Broadway and existing theaters, would you always prefer a single type of stage? Which one—proscenium, apron, arena, or some other? What might that other form be?

Several persons offered comments on the larger problem of the use or purpose of theaters.

THORNTON WILDER (Playwright): There should be no necessity to discuss a multi-form theater.

There are only two forms of theaters: the pageant-spectacle-masque-opera and the drama of human life at the human scale: the public edifice (city hall and temple) and the living room and private garden.

The spectacle-masque-scenery theater may be fairly small—though usually large. The arena-non-scenery theater may be large—even very large, like the Greek theater. The former will lack intimacy because the visual aspect will be so predominant. The latter will have intimacy enough because the audience will be concentrating on the action from (at least) three sides. The element that separates the two types is not size but (1) décor and (2) absence of proscenium, curtain, and illusionist scenery.

The only reason that you have to consider a third form of theater is because a bastard mistaken entertainment flourished in the 19th Century: a theater which had all the visual installation of spectacle-masque and claimed to have the human immediacy of drama.

It is much to be regretted that in the 19th Century of mistaken theater two great dramatists arose and wrote plays for that kind of presentation: Ibsen and Chekhov. They had never seen any other kind of theater, and they were so intent on their thematic content that they had no energy left over with which to break out of the constricting mold in which they worked. Perhaps for a few more years we should present them in the kind of stage they envisaged.

In all great ages of drama . . . there was almost nothing to arrest the eye except the actor. Scenery is the enemy of the spoken word.

All that nonsense of the box-set is on its way out—that applause of the audience because the curtain goes up on a beautiful picture of a street scene in Havana or a millionaire's penthouse or an opium den. From that moment we know we're in the realm of the magazine story, of the ephemeral anecdote.

No wonder the theater has dwindled to a minor art—an after-dinner diversion forgotten the next day. But the theater is the most conservative, sluggish-moving of all the arts. It is precisely because the theater is such a great art-form that even its trivialized manifestations can appear to be worthy of sober consideration.

I prophecy that within 25 years there will be very few theaters in the center of New York of the type of the Plymouth-Booth-Morosco [i.e., proscenium].

So there will be two types of theater. Your multiple stage is a transition phenomenon.

JEAN ROSENTHAL (Lighting Designer and Theater Consultant): In general, the multi-purpose theater falls into three categories.

The first, the utility gathering place that has been, until recently, arbitrarily imposed on most high schools and small colleges. The compromises inherent in this type of building are obvious to all concerned. It has a reasonable expectation of flexibility when the seating capacity is limited to 750 or less, and this possibility is contingent on carefully arranging the different department activities.

The second is the large commercial multi-purpose auditorium theater that is principally represented, at the moment, by the McCormick Theater Auditorium in Chicago, the O'Keefe Theater in Toronto, the Fisher Theater in Detroit, and the Los Angeles Music Center in Los Angeles. These theaters are conceived as multi-purpose because they are making an effort to meet the commercial musical comedy, opera, ballet, and dramatic production problems on an economically sound basis, i.e., large audience capacity.

JOHN GUTMAN (Assistant Manager, Metropolitan Opera): There is no doubt whatsoever in my mind that multi-form theaters must be the answer to the stage problem in this country. I do not mean to say that the multi-purpose theater is an ideal solution, but there seems to be no other solution. I am not aware of any city or town in this country outside of New York where a single-purpose theater could find enough activity to make it pay its own way. To build a new theater which was destined

and therefore useful for opera only would appear to be sheer economic folly.

HERBERT GRAF (Opera Director; Director, Stadttheater Zürich): Multi-form theaters will be useful and even necessary, particularly for communities which cannot afford separate buildings for the various theatrical and concert forms. I believe that this type of theater will stimulate new directions rather than hamper them.

JEAN ROSENTHAL: The third type of multi-purpose theater is a theater designed to fulfill many dramatic functions within fixed theatrical limitations [multi-form]. This type of theater is chiefly concerned with all styles of dramatic production and is staffed with personnel trained in the theater and dedicated to a creative aesthetic. The designers within this group are principally concerned with a search to present exactly the "right" background for the presentation of each play.

Generally, I have found there is a difficulty in understanding that the words "arena," "forestage," and "proscenium" do not only mean a fixed architectural shape. They are a way of describing different styles of production. A theater building will be used by many theater workers, and it is incumbent upon it to meet the varied demands of this personnel and of the audience that will support it.

JOAN LITTLEWOOD (Director and Producer; formerly of Theatre Royal, Stratford, London, England): I believe "production technique" to be an anachronism. Theater is the play, the actors, the audience, not the direction or the lighting and such trickery, nor is it some idea of presentation taken from the indifferent and minority art theories of this century. . . . The present theater stages are built for illusion and gaslight; they prohibit any idea of functional theater.

HERBERT GRAF: I would not use a single type of stage to produce various styles of opera if I were not forced to do so by the existing—and partly outdated—type of opera-theaters. This rigid stage form limits the scope of modern operatic production, which ought to be as flexible as the various operatic styles. . . . To satisfy the demands of the various operatic tasks, we would need an opera theater flexible enough to make possible performances in the proscenium, apron, and (at least to a certain extent) arena style.

HENRY W. BUTLER (Opera Librettist and Director): Everyone so obviously violates the rigidity of the proscenium arch these days that it is evident the proscenium should exist only when the writer or composer chooses to use its particular confinement for artistic purpose.

In my experience, no composer or writer is interested in writing for a particular style of theater architecture. A dramatic idea evolves; it does not spring fully grown from the head of the creator. For that reason, he is bound to welcome the idea of a physical house which can change shape to suit the demands of the work.

A theater is meant to house a living idea, changing frequently in its purpose and its demands. No single form will serve. The best theater will be designed by someone who goes often to the theater, attends rehearsals, observes backstage routines—in short, learns the true use to which his building will be put. To the best of my knowledge, no practicing architect has ever conducted such practical research.

JOHN GUTMAN: I believe that in opera we shall continue to consider the proscenium-type theater as the correct solution. I, personally, have never yet seen an arena type of operatic production that I found satisfactory (quite apart from the difficulty of achieving contact between singers and conductor). But I wonder whether new theaters could not be built in such a fashion that a substantial apron might be added if and when desired. . .

An essential question to be considered in this context is: Can new theaters be built in such a fashion that the size of the auditorium can be varied? I know that in some houses this is done by closing off the balcony and the rear part of the orchestra. I have never seen this in action, but I cannot believe that it is an ideal solution.

I do feel particularly strongly about this last point. Mozart in a 5000-seat house is just not right, and "Aida" in a 1000-seat house is as wrong.

DOUGLAS MOORE (Opera Composer): I am still convinced that, for opera, the proscenium type is the best. I had a production of "The Ballad of Baby Doe" on an arena stage. The crowd scenes were fine, but when it came to set pieces like arias, where it is vital that the singer face the entire audience for sonority and intelligibility, the result was disappointing.

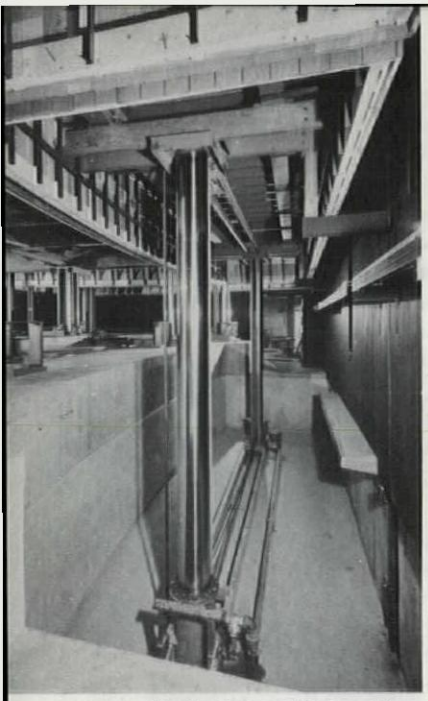
One thing I hope you will stress is the need for the moderate size auditorium for contemporary opera. I doubt if there is a single opera being written today by an American composer that could suitably be produced in theaters the size of the Metropolitan or Chicago Opera House. Any text communication or dramatic subtlety is impossible under such conditions.

DONALD OENSLAGER (Scene Designer and Theater Consultant): I do not believe that the present popular interest in the use of multi-form theater is entirely due to economic considerations. It is due to the interest of playwrights, directors, and designers in experimenting with new forms of space stages and convertible theaters. . .

There exists a general belief that all the variable forms of theater-audience relationship can be successfully incorporated within a single comprehensive structure. This theory is false. The characteristics peculiar to each individual type of theater are lost in the single composite theater plan. No one multi-purpose [i.e., multi-form] stage can fill all the requirements or serve all the best purposes of the classic, Elizabethan, platform, space stage, proscenium, and arena theater. . . For many practical reasons, it is not a feasible form of professional theater. However, I do believe a small multi-purpose [i.e., multi-form] stage attached to a university or civic theater is very useful for experimental work as well as a valuable training aid in education.

JOSEPH PAPP (Director; Producer, New York Shakespeare Festival): If I were to suggest a stage for a university, I would recommend one that is essentially proscenium, with the proscenium very inconspicuous and with an apron that can be extended into the house. The Elizabethan stage has its limitations if you decide to present plays of other periods, but for Shakespeare there is none other.

RALPH ALSWANG (Scene Designer and Theater Consultant): I do not at all believe in multi-form if, by that, you mean a form which is supposed to accommodate all kinds of possible production methods—proscenium, round, square, or whatever. I think one ends up with "no-form." I do believe that a maxim for ideal theater design might be utmost flexibility within a limited multi-form idea. And I think it is possible to achieve such flexibility even within a proscenium or three-quarter orien-



Photos: Clemens Kalischer

Mechanized multi-form theater: Loeb Drama Center, Harvard University; Hugh Stubbins & Associates, Architects; G. C. Izenour, Consultant.

tation. With flexibility, one can create a fluid imagery which would allow drama to escape its architectural confines. It is not possible, however, to mix proscenium, three-quarter, and round all in one building. It simply does not work and certainly would not seem conducive to stimulating new directions. Separate structures, expertly designed to fulfill extreme and well-defined forms, would encourage fuller development of each form.

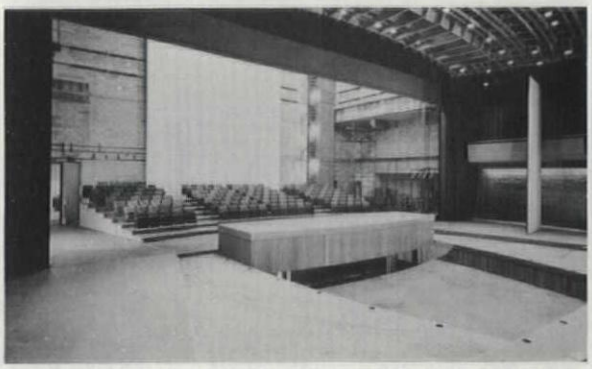
George C. Izenour (Theater Consultant and Engineer): There are really two types of multi-form theater: (1) The moderate-sized playhouse that seats from 300 to 1200 and that converts from a proscenium (picture-frame) stage to a three-quarter-apron (classical or Shakespearian) stage to a more or less "in-the-round" relationship between actors and audience. (2) The large theater-concert hall which is proscenium-oriented, but which converts from a concert hall of from 2200–3000 seats, with large volume and a reverberation time of 1.5–1.9 seconds, to a theater of 1200–1800 seats with a reduced volume and a reverberation time of from .9–1.4 seconds. Both of these pose enormous structural and mechanical problems that can be solved only by co-ordination at the outset of the design by the client, architect, and the theater design engineer or consultant. The latter must have a grasp of the structural, mechanical, and control problems and be able to design for them in a way that facilitates the architecture and the use of the building for the performed arts.

I believe they are both valid forms and, with our economy being what it is and the sociological forces that underlie it, that this is going to become the rule rather than the exception.

Jack Landau (Director, Scene Designer; formerly Artistic Manager, Stratford Festival Theater, Stratford, Connecticut): First of all, I suppose that multi-form means a fairly neutral-looking structure, equipped with the mechanics and electronic devices designed to transform the space into almost any imaginable architectural theater style. The few I have seen were pretty terrifying. The building was cleverer than the play and certainly beat anything any actor or director could think up.

I was impressed with the inventiveness and the expense! All of the devices, from the electronic, preset switchboard to the remote-control grid system, seemed to me to be enormously intimidating, since the cost of the installation was obviously so great. It would be unthinkable not to use everything at least once or twice an evening. I couldn't help feeling (on each visit) that someone was trying to out-guess every playwright that ever lived or would live. This ability to change form at the flick of a switch is pretty unnerving. I doubt if a building can do this without being overly concerned with its own ingenuity. In designing these buildings, everyone seems to lose sight of the fact that "the play's the thing," not the playhouse. . . . This kind of theater is very difficult to work in because it is ultimately formless, and there is almost no point of reference as far as style goes. Since any of its multiple forms is as good and complete as any other, there seems to be no personality to any form. The result is a compromise of the worst sort. One cannot help but begin by asking, "Shall we put the audience at one end or move them around for the fifth act?" or "Let's put the whole play in the basement!" New ideas die of a surfeit. Among other things, touring is out because you can't always rely on the other man's basement.

Arthur C. Risser (Theater Consultant): There are serious doubts as to the effectiveness of multi-form theaters because of the following difficulties: (1) expensive construction; (2) costly and elaborate electrical and mechanical equipment, much of which is still in the experimental stage; (3) high maintenance costs; (4) the necessity of employing well-trained and competent technicians; and (5) the time involved in changing from one form of audience-actor relationship to another. Because of these limitations, it is doubtful that multi-form theaters will stimulate new directions in dramatic forms and production techniques in the immediate future.



Nonmechanized multi-form theater: Experimental Theater in Loeb Center.

JAMES HULL MILLER (Scene Designer and Theater Consultant): Multi-form theaters are not inexpensive, since large segments of stage and audience must be capable of being rearranged. Where such rearrangements are mechanized, the flexibility of these theaters cannot exceed lines of development conceived by the original theater engineer, so that the flexibility is strictly limited.

Furthermore, the multi-form theaters that have been built have not managed with equal success all styles of production for which they were intended.

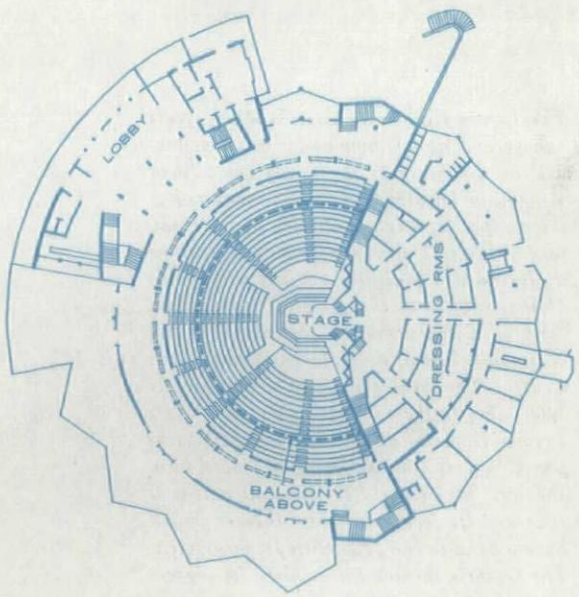
Unless the multi-form theater is completely flexible—and no practical and economical solution for this sort of design has been forthcoming—the physical shapes of the adaptable theater invariably serve established stagecrafts.

JACK LANDAU: If by multi-form I am to suppose a structure free of most conventional theater trappings, in which an area is provided at one end or in the center for the actors, this then is an entirely different matter. In short, if a multiplicity of theatrical forms is implicit in the simple neutrality of the space and the variety of style is to be created by the play, the actors, and the production without the use of any architectural or even scenic changes, then "you're cooking."

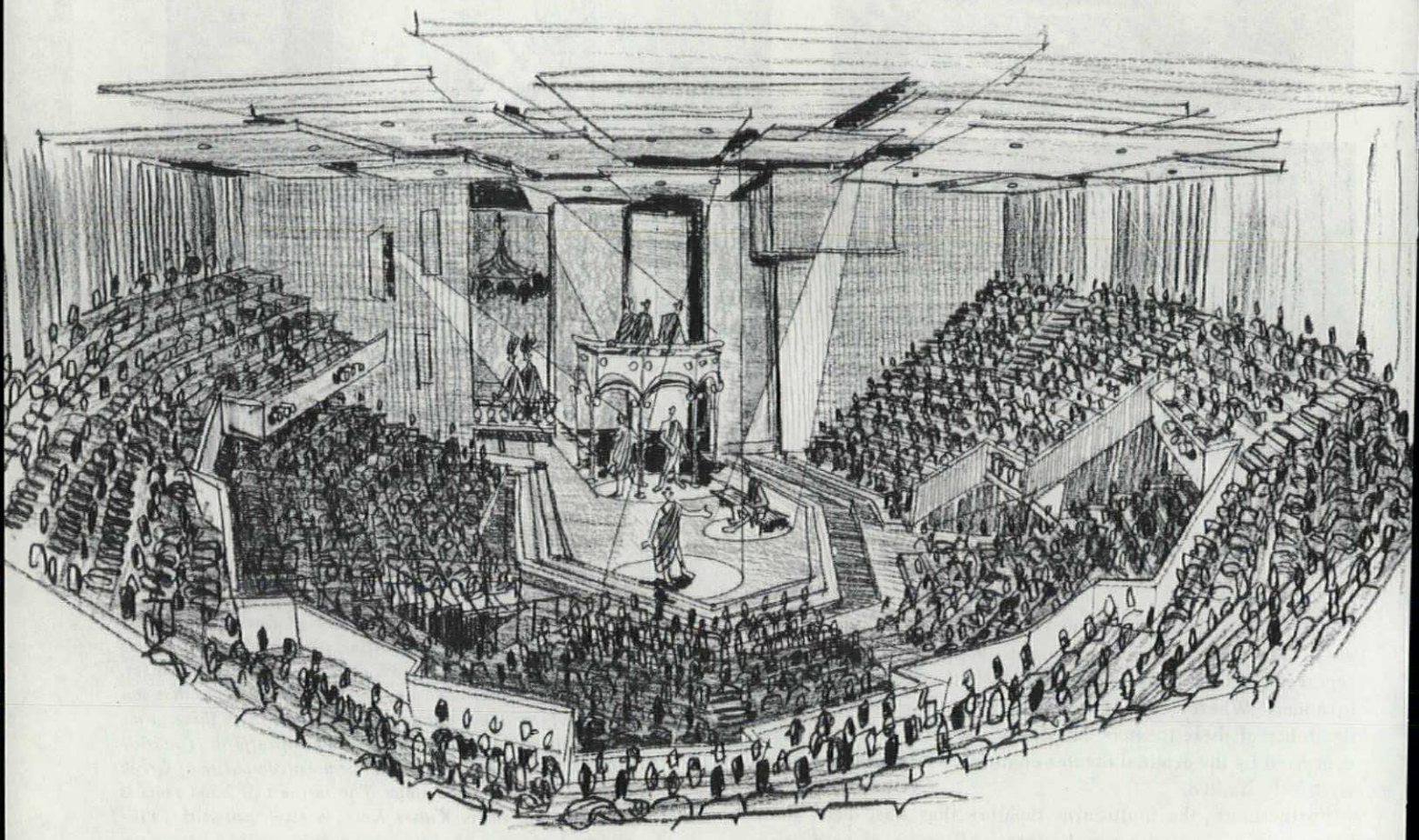
RALPH ALSWANG: If I could forget the existence of Broadway, I think the ideal theater form would be a variation of the open theater, the best example of which is the Stratford Shakespeare Festival Theater in Canada.

T. EDWARD HAMBLETON (Producer; Managing Director, Phoenix Theater, New York City): Probably the most successful theater in North America is the Stratford Shakespeare Festival Theater in Ontario. It sharply limits the productions that may be presented, but because it so admirably achieves its purpose—to provide a stage for Shakespeare—the resulting productions have ranged from adequate to excellent. At Strat-

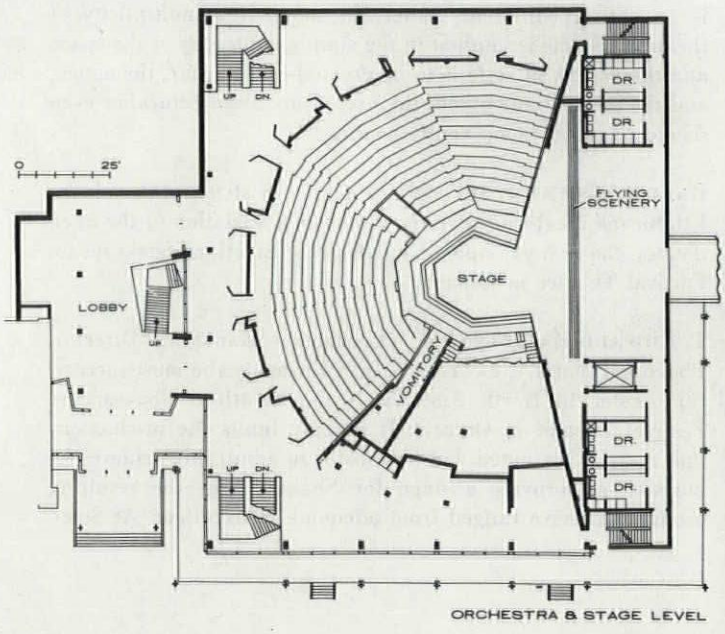
Hydraulic jacks in the large theater at Loeb operate sections of the center stage, permitting seating groups on wheels to be arranged for open-apron, arena, or proscenium stages. Loeb's small theater is an uncommitted, black room that can be manually arranged either to approximate these three forms or to achieve a variety of others. The Stratford (Ontario) theater is committed to a single form—a composite of Greek seating and Elizabethan stage. The farthest of 2,254 seats is 70 ft from the stage. Walter Kerr, in 1959, called this "the only *new theater of any consequence on the American continent."*



Stratford Shakespearean Festival Theater, Ontario, Canada. Tyrone Guthrie and Tanya Moiseiwitsch, Designers, Rounthwaite & Fairfield, architects of the enclosing structure.



The Tyrone Guthrie Theater in Minneapolis (above and right), *now under construction, will be the home of the newly established Minnesota Theater Company. Committed to the composite, single-form plan of the Stratford (Ontario) theater, it adds a shallow fly loft, which indicates a slight acceptance of the validity of the pictorial background (and is a concession to the needs of the community and of the adjacent Walker Arts Center). The theater will seat approximately 1400, the farthest 54 ft from the stage. Tyrone Guthrie, director of the new company, rejects the mechanized multi-form theater, preferring "to run in narrower courses." He feels also that a theater should have a definite (i.e., committed) personality. The Guthrie theater will achieve its personality through assymmetry: the open apron is to one side of the end stage background; the shallow balcony extends down to the orchestra level on the right side only. Ralph Rapson is the architect, with Tyrone Guthrie and Tanya Moiseiwitsch as consultants; the original design won a Citation in the P/A Design Awards Program in 1960.*



ORCHESTRA & STAGE LEVEL

ford, Connecticut, the aim was to provide a theater suitable for proscenium and open stage, opera and straight play. The compromise did not adequately solve the problem of the relation of actor to audience that was so admirably achieved in Canada, and there has always been the need on the part of the director to adapt this compromise to a scheme of his own. The effect has been not to achieve the perfect supplement to the production on stage that the theater must have.

Let us suppose that we are building a theater for a company with a wide repertory of classic and contemporary plays. We would not want as inflexible a solution as Stratford, Ontario, nor the poor compromise of Stratford, Connecticut. Rather, beginning with the optimum relation of audience to actor, we would require a stage which could be open and suitable to productions like Jean Vilar's for the Théâtre Nationale Populaire, as well as to effective and imaginative productions of O'Neill and Arthur Miller. We would, then, fit our productions to the artistic concept which was present in our stage. The result, if our artistic concept was sound, should be strengthened by the personality of our theater.

Joseph Papp: I would say, at this time, that the multi-form theater—neither fish now fowl—is not a good idea. Mind you, there may be instances and situations when it is desirable, but as a director and producer I would prefer a permanent stage with some flexibility. It takes a long time to master a particular kind of stage, setting aside the problem of coping with more than one. The Stratford (Connecticut) Theater is a case in point. The stage was constructed to accommodate concerts and recitals, as well as productions of Shakespeare. Essentially proscenium in style, it failed to function properly for the free-wheeling plays of the bard. Many changes and additions were required to compensate for this lack.

I cannot see how the multi-form theater would stimulate or hamper new directions. The style of the play should determine the style of the theater.

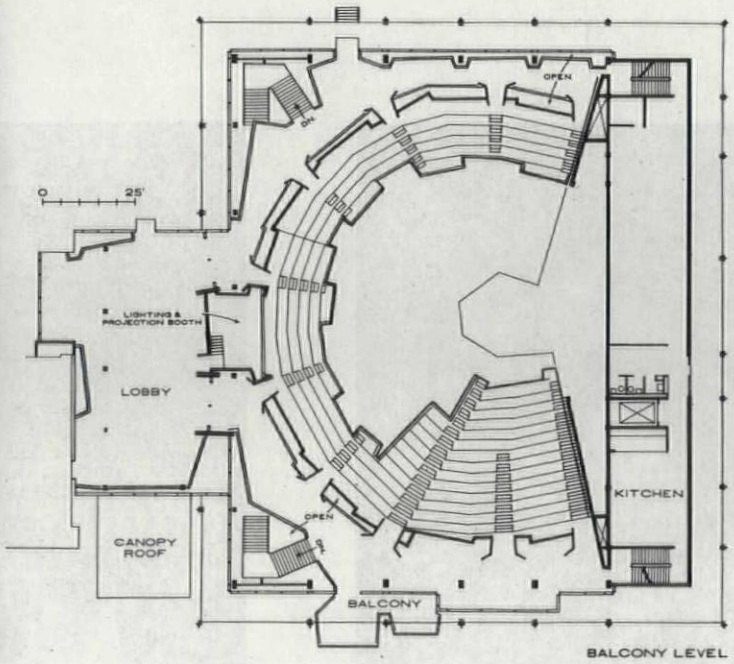
Sir Tyrone Guthrie (Director and Theater Consultant; Artistic Director, Minnesota Theater Company): I think that in so far as a theater is multi-form, it achieves no particular form wholeheartedly. Multi-form theaters tend to muddled compromising direction.

Multi-form theaters may sometimes be an economic necessity, just as is the all-purpose hall—which one can use for political rallies, roller-skating, badminton, church teas, as well as for producing plays. Although just possible for most purposes, it is really well adapted for none.

The spice of theater, as of life, is variety. It seems to me as silly to want to do Sheridan on an open stage as to attempt Shakespeare in a proscenium. I generally prefer an open and nonillusionary stage to a proscenium, but I do not want to work all the time in any single type of theater, or on any single type of play.

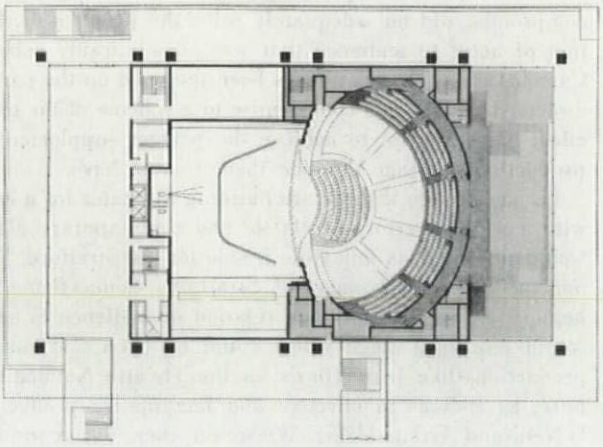
Oliver Rea (Producer; Administrative Director, Minnesota Theater Company Foundation): Multi-form theaters may indeed become the answer to our stage problems; however, I have my doubts—perhaps because I have never seen designs for a multi-form theater that were much more than a grabbag of compromises. New directions in theater will be stimulated, I believe, by new audiences in intimate connection with the players. America must discover and develop a style. Limitation is often the parent of style. Multi-form, by very definition, could easily become an enemy of style. Because of this, I feel that a single type of stage for each theater is imperative. Communities should have several theaters, each with a different stage form. I would naturally always prefer an apron stage; for, to me, theater is vapid without the intimate connection that the apron achieves.

Robert Whitehead (Producer; Co-Producing Director, Lincoln Center Repertory Theater): The multi-form theater, or for that matter any kind of theater, can stimulate new direc-

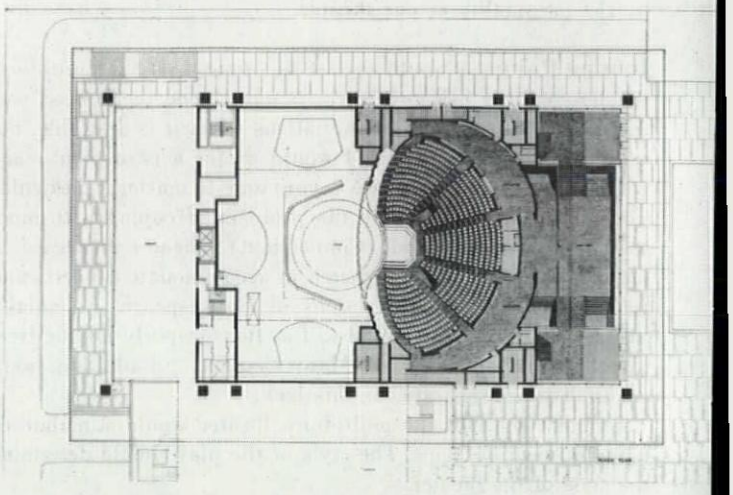


BALCONY LEVEL

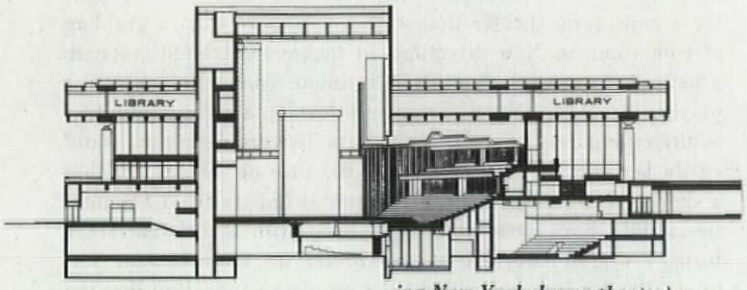
The Beaumont Theater (right and below), *future home of the Lincoln Center Repertory Company in New York, will be mechanized to accommodate proscenium or open-apron productions, or a combination of the two. A lift will lower the front seven rows of seats, and a turntable will substitute an apron stage surrounded by three rows of seats* (below, right). *The seating plan, which accommodates 1100, is basically semicircular but eliminates the side seats that would be out of vision of a proscenium production. The furthermost seat is 65 ft from the stage. The stage area is enormous (11,000 sq ft as against 2,914 sq ft in the largest existing New York drama theater); the 58-ft width of the proscenium opening can be narrowed by a folding screen. A second auditorium in the building, which will be used by visiting companies, will be called "The Forum" (not a magazine!). The theaters were designed by Eero Saarinen & Associates with Jo Mielziner; a theater library above the auditorium and surrounding the fly loft was designed by Skidmore, Owings & Merrill.*



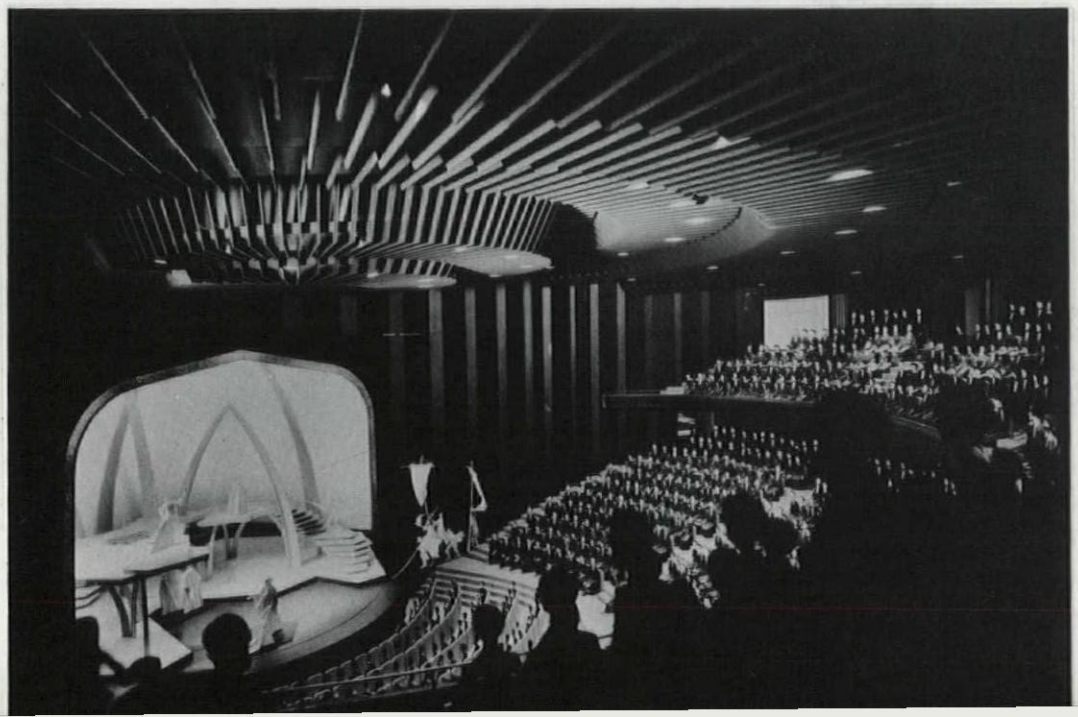
LEVEL A: BALCONY



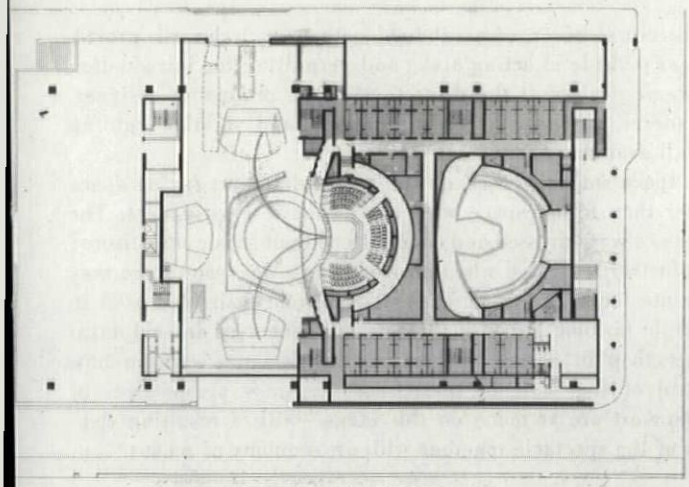
LEVEL B: ORCHESTRA SEATING



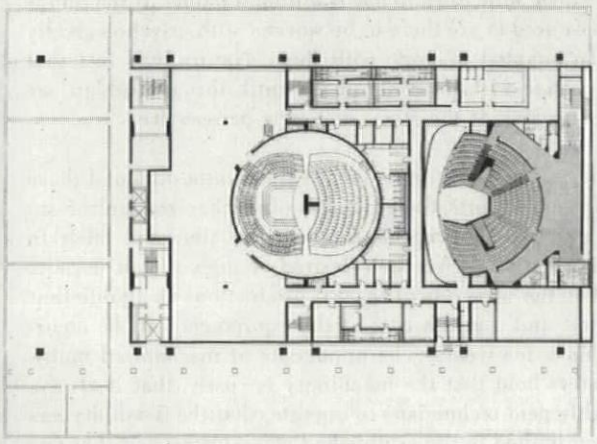
LONGITUDINAL SECTION



Photos: Ezra Stoller Associates, Courtesy of Lincoln Center



LEVEL C: STAGE & DRESSING ROOMS



LEVEL D: SHOPS, TURNTABLE, STORAGE, REHEARSAL, & SECOND AUDITORIUM

tions if the work done inside it is original, meaningful, and exciting. However, from a purely architectural standpoint, I feel the theater should possess a specific character. That specific character is in a sense a limitation, yet that limitation should become its strength. Therefore, I am inclined to feel that an all-purpose theater is apt to become a confused-purpose theater.

The stage form I prefer is best illustrated by the design for the theater at Lincoln Center, which I have been working on for two years. The stage largely eliminates the proscenium as we know it in its 18th-Century style—that is to say, the picture-frame stage. The stage we have designed has both depth and thrust. It's probably most closely related to the style of the Roman theater, though the seats on either side of the auditorium circle are cut back in such a way as to open up sight-lines that will permit a full view of the deep stage as well as of the thrust (i.e., forestage) area.

Elia Kazan (Director of Stage and Film; Co-Producing Director, Lincoln Center Repertory Theater): I believe the multi-form theater can work if it is very cleverly designed. I have no absolute feeling about it one way or the other. I don't believe in only one answer to any problem. Concerning my choice of a single stage form: again, I don't like absolutes. It depends on the people and the style of production I choose for the particular play.

Jo Mielziner (Scene Designer and Theater Consultant; Collaborator with Eero Saarinen on the Theater for the Lincoln Center Repertory Company): I believe that a room which is designed for one purpose, if successfully done, has a unity and single-mindedness which is almost impossible to achieve when the design problem involves dual-use or multi-use . . . when the means of transforming an auditorium or a stage are complex, they may succeed mechanically, but the very elements used to solve this problem become far too important in themselves. In short, I do not really believe in multi-form theater. I do, however, feel that some concessions can be made and some flexibility achieved that perhaps allows for dual-form versus the all-purpose chamber.

I do not believe in a rigid stage. Flexibility in lighting and stage facilities is certainly most desirable. When it comes to sight-lines, this is a much more difficult problem. It can be achieved in a limited way, such as providing for a small proscenium opening, as well as a medium-sized one. But the moment you ask for a small proscenium-sized opening for one occasion and an overscaled one for another, you are going to end up with a hotch-potch where the tail wags the dog. All these things are a matter of degree, but certainly I am opposed in general to the all-purpose theater.

Jean Rosenthal: I firmly believe that the theater of tomorrow will represent a synthesis of the study and the thought and the experience that has been going on in these past 30 years. It will be a theater capable of adjusting from one production style to another. I believe that this multi-form theater is not only practical but advisable. But I do not believe that a building of this nature will be cheap to build.

Jack Landau: At this point in my thinking, I would always prefer the same stage for any plays I do and I would want it to be as simple a stage as possible. It should be curtainless and

project into the audience in the manner of the Elizabethan stage; it should be provided with many means of access to the acting area and have the possibility of using, in a limited way, architectural scenery.

Most present stages waste a great deal of space—and it is all devoted to scenery, not to the play. There continues to be a movement away from literal realism in modern theater and a great and sustained desire for themes, ideas, and techniques of a poetic nature. . . . It seems to require a simple, basic architectural form: a platform for the actors, with a minimum of architectural scenery on it, a reasonable amount of good lighting equipment for it, and the maximum of imagination behind it.

George Izenour: As far as the theater itself is concerned, I do not believe that a building per se can be of decisive influence in determining a new force or direction to the drama, but that the new direction or directions have been determined by the poets; and the architects and the engineers haven't in very many instances followed their lead. The urge and need for a proscenium-less theater has been with us for a long time, but this is not a mutually exclusive thing but rather a mutually inclusive thing, which to my notion makes a multi-form desirable.

It is my belief that we are headed toward a theater in which the actor and playwright will be in the ascendency, and that this will require buildings with flexible playing spaces, where modification of the playing area is not only indicated but required. The only problem for the architect and the engineer is to do this in such a way that the artist is not confronted with a building and a production machine that is impossible to operate. This rules out manual labor due to the weights involved; further, our economy would not stand the expense in terms of operating budget. What is required is a fusion of structure, mechanical design and control—all three, which is what contemporary technology is all about. You cannot design a 20th-Century theater using 19th-Century methods.

Arthur C. Risser: My personal choice for a theater form would be one in which there is a large stage with adequate off-stage areas; a loft over the stage; an apron or forestage on a mechanical (or hydraulic) lift so it could be used at stage level, auditorium floor level, pit level, or at any elevation between; a wide proscenium opening with side stages; and a fan-shaped audience seating plan. In such an arrangement, it is possible to play entirely on the apron in front of the proscenium act curtain (which may be replaced with an architectural façade or a cyclorama for projected scenery) and on the side stages, or to play entirely behind the proscenium, or to play on all the areas.

James Hull Miller: Television and motion pictures have made the "scene-at-a-time" frame theater seem awkward. I do not think the sharply forethrust acting platform is the answer either, for dramatic backgrounds lose forceful positioning. The most interesting theaters are being built about new stagecraft ideas, as in the past where each age produced a theater in harmony with its architectural ideas. This theater in turn produced a stagecraft in harmony with the artistic ideas of that age. My work has been with the space stage. Envision a large stage area, in a room containing both actor and audience. The architectural décor, of a subdued nature, encircles all, providing for multi-level acting areas and permitting the introduction of scenic devices at the discretion of the producing designer. Set pieces, curtains, scenic projections, and variable lighting are all available to him.

A space stage is based on the principle of occupying space rather than filling space with the dramatic environment. The stage is always dressed and complete without scenic investiture; it is further redressed when desired. Since the space stage may be quite large, it can be dressed simultaneously and used in multiple fashion. Because the sets are conceived in sculptural rather than in perimeter fashion, the designer gains a new control of the scale of these sets—the new perspectives of modern art are at home on this stage—with a resulting richness of the spectacle together with an economy of means.

Walter Kerr (Drama Critic and Playwright): In general, I am opposed to the multi-form notion because I do think it leaves the door wide open to our traditional habits. If the things we are most used to are there to be worked with, psychologically we will be tempted to work with them. Naturally. I feel that the real change will not come about until, through design, we are forced to look at the stage in a new perspective.

To summarize the views expressed in this symposium and those of other theater experts, the advocates of mechanized multi-form theaters maintain that mechanization saves time and labor in rearranging the stage for each desired change, that it permits rehearsal on the same day of several productions using different stage forms, and that the cost of the equipment will be amortized within a few years. The opponents of mechanized multi-form theaters hold that the machinery is costly, that it always needs highly paid technicians to operate, that the flexibility has so far been limited to the established stage forms, and that one cannot achieve any new arrangement.

Advocates of the nonmechanized multi-form theater believe that it is less costly to build and permits a greater variety of stage arrangements; opponents insist that it is expensive in time and labor, looks temporary, and generally has too amorphous a character.

Most of the experts agree that they would like to be able to use a great variety of stage forms, but many think the multi-form theater intimidating and an unsuccessful compromise; they further imply that communities with several theaters should ensure a different kind of stage in each. Also, the suggestion that the multi-form theater is a transitional theater preceding a new stage development is implicit in many of the comments.

Several distinctly new stages, which are composites of the known forms, have already been illustrated: the Tyrone Guthrie Theater in Minneapolis combines an apron stage with a shallow proscenium stage; the multi-form Beaumont Theater in Lincoln Center will have, as one of its arrangements, an apron stage in combination with a full proscenium stage; the new theater at Swarthmore College (illustrated on page 122) combines a frameless end stage with the suggestion of an apron and has a full caliper. All three theaters strive for intimacy by making it possible to place the audience and performer in the same room. These theaters may be the beginning of some new kind of stage that will be a product of our own age and that can accommodate the great plays of the future.

THE PROGRAM: Planning and Procedures

How, then, does the architect go about planning a program for a new theater? In the words of one architect, who recently received a theater commission and does not yet consider himself an authority on this building type, his first task is "not to write a program, but to learn enough about theater to be able to write a program." To accomplish this, he needs to know the people who have been designing theaters, and since there has been an almost complete hiatus in the building of commercial theaters in this country for more than 35 years, he has to learn about the more recently constructed institutional theaters. The U.S. Institute for Theater Technology (USITT) is currently working on a list of theaters and presents in its periodical "Newsletter" a bibliography of articles pertaining to new developments. Architects interested in this information should apply to the USITT at P.O. Box 291, Cathedral Station, New York 25, N.Y. The National Theater Service of ANTA (American National Theater and Academy) at 1545 Broadway, New York 35, N.Y., also circulates a bibliography pertaining to theater architecture, which was prepared by the American Educational Theater Association (AETA). "Arena, Auditorium & Stadium Guide," a directory published annually by The Billboard Publishing Co., 2160 Patterson Street, Cincinnati 14, Ohio, contains basic data on many of the larger auditoriums.

Because of the complexity of this building type, architects may find that they would like to work with someone who can give them practical advice about current theater problems. But where does the architect go to find such a consultant? Until recently, lack of theater construction prevented anyone from becoming a full-time specialist in this field. The architect will not be able, therefore, to find a firm of "theater consultants." He can investigate the consultants who have worked on recent theaters; most of them are directors, scene designers, or other specialists in the commercial or educational theater. The only list of consultants available is a short one published by the AETA and available from the chairman of their "Theater Architecture Project," Donald B. Crabs, Douglass College, New Brunswick, N.J. This list, which contains the names and addresses of AETA qualified consultants, the majority of whom are associated with educational institutions, will be supplemented with résumés of their work if requested.

At what stage in the planning will an architect need to call in a consultant? If he is presented with an established program—as he may be when the theater is for a resident company or when there is a resident director—the architect may decide to call in specialists only in some areas, such as stage lighting and machinery. If the entire program must be determined, theater specialists urge that a consultant be included in the discussions from the very beginning. When the client does not engage a theater consultant, the architect should be aware that his own choice of consultant will decidedly influence the program; he should, therefore, ensure in advance that the person he selects will be in sympathy with the objectives of the client.

The theater consultant himself may not be a specialist in every area of theater design—a scenery-moving engineer may have to be consulted if the program requires elaborate moving of scenery, for instance—but the consultant will have a breadth of experience that makes him aware of the disciplines and areas where special advice may be needed.

Theater specialists also strongly advocate that the architect and his team confer not only with the client but with the people who will actually use the theater. This would seem obvious, but it is a procedure that has not always been observed. Theaters have been built, they remind us, without dressing rooms, without box offices, and without toilets. Some of the persons who should be consulted, especially when the entire program is to be established, are: the client or producer—to determine market analysis, particularly when there will be a paying audience; the director—to determine the audience-performer relationships he may wish to achieve; and the theater consultant. The latter should be able to advise about the following: the auditorium—seating and sight-lines, acoustics and noise control; the stage presentation disciplines—rigging and the mechanics of scenery moving, lighting design and execution, scene design and execution and moving; facilities for performers; house management—circulation and access to foyer, lobby, coat rooms and other audience facilities; and administrative facilities. It is also recommended that before estimates are solicited, the advice of suppliers of the major elements might be invited so that estimates will not exceed the budget, which would require a redesign of the building. If a general theater consultant is not engaged, the architect may have to enlist the services of a specialist in each of the above-listed areas.

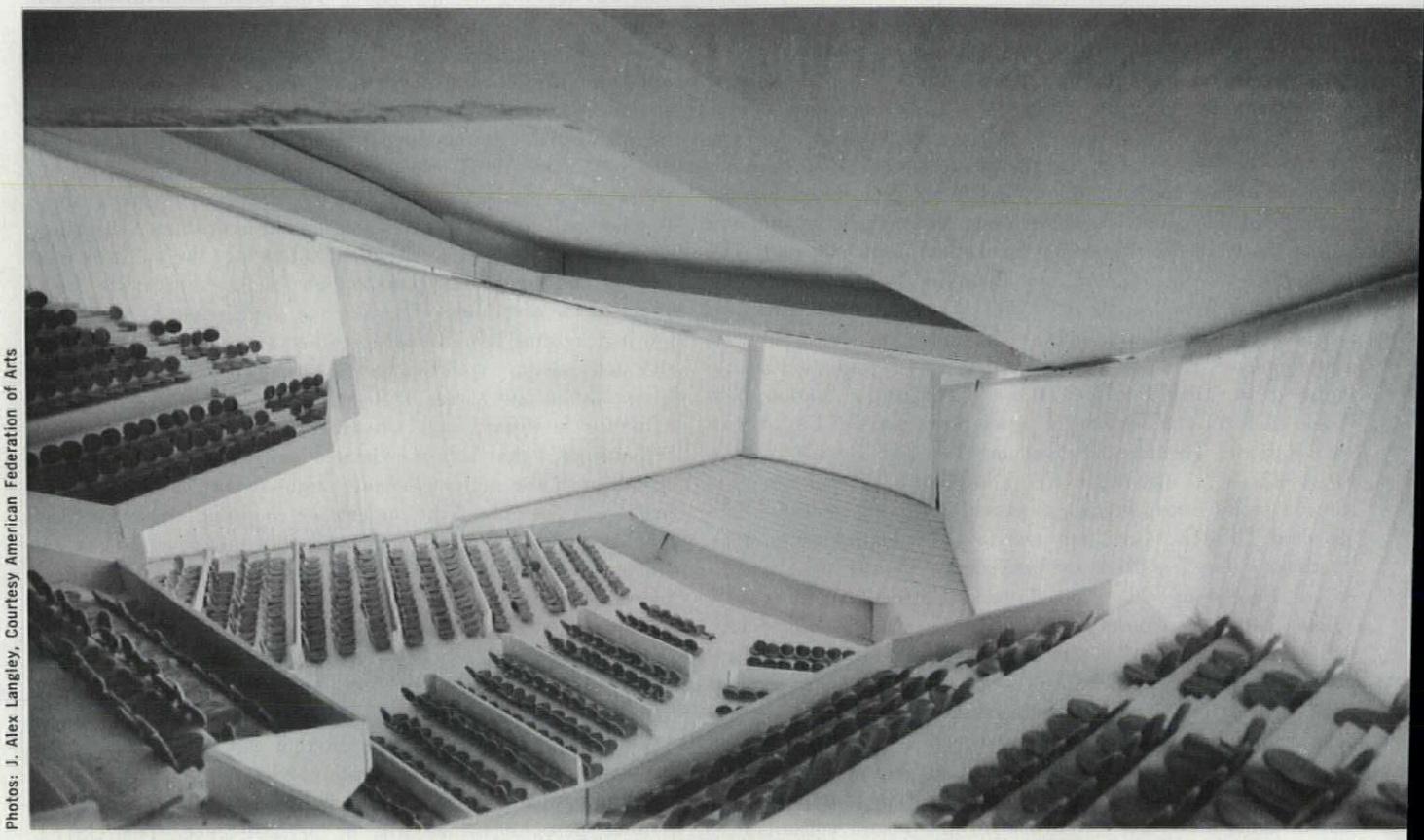
This list, not presented as all-inclusive, indicates only the range of consultation necessary in theater design. Many of the areas will more than likely be different for each theater and, therefore, cannot accurately be determined from previous guides.

Literature is available, however, that can serve to point out the many areas needing investigation. Besides the basic books on theater architecture, several information agencies of the theater publish pamphlets that will be of assistance. The USITT provides its members an outline for planning a theater program for opera and drama theaters that lists basic requirements and alternate solutions. The National Theater Service of ANTA offers a pamphlet on "Initial Factors in Theater Planning." A report on a seminar that considered the planning of "The College and University Fine Arts Center" is available in limited supply from George Hutchinson at the Chicago office of Perkins & Will, Architects; the seminar was sponsored by Perkins & Will and by *College and University Business Magazine*. The Board of Standards and Planning for the Living Theater, a committee of the New York Chapter of ANTA, publishes checklists for the proscenium theater, for the open-stage theater, and pamphlets on backstage facilities and permanent lighting. (The Board of Standards asks for a contribution to help defray the expense of these publications.)

All of these lists, it should be noted, concern the requirements of known theater forms; in departing from the known toward the invention of a new stage form, the architect and consultant will be on their own—both in dependence on available guides and in the eyes of convention-bound people of the theater.

"In examining the problems facing the architect of tomorrow's theater," says Jack Landau, "one cannot help but feel that the people who will use them need educating first." Perhaps what the architect most needs to bear in mind as he works toward a new stage development is an idea stated by Norman Bel Geddes: "The theater takes its place among the arts when the audience . . . takes part in an experience that does not exist anywhere outside a theater."

The following four theater projects are part of a Ford Foundation program to give architects and designers "an opportunity to design completely an ideal theater, with all the devices necessary to it." The projects are presently being circulated by the American Federation of Arts in an exhibition, called "The Ideal Theater: Eight Concepts," which was designed by Peter Larkin.



Photos: J. Alex Langley, Courtesy American Federation of Arts

Open Stage with Film Projection

THEATER PROJECT FOR THE FORD FOUNDATION • PAUL RUDOLPH, ARCHITECT • RALPH ALSWANG, THEATER CONSULTANT

Film projections have been used as an adjunct to scene design since the early days of expressionist theater. In 1929, Robert Edmond Jones wrote prophetically that someone "will presently set a motion-picture screen . . . behind his living actors and will reveal the two worlds that together make up the world we live in—the outer world of actuality and the inner world of dream."

This project makes possible a new theatrical expression by providing for a synthesis of these two media. It has a single-form stage with a proscenium-oriented seating arrangement, which is considered best for film viewing. But the stage itself has no frame; instead, it is open, and has side-stage screens, which are a continuation of the walls of the auditorium. Film can be projected on these side-screens as well as on the center-stage screen and on the floor and ceiling.

The designers anticipate new equipment to make this possible: high intensity projectors employing wide-screen techniques; controlled point lighting that eliminates spill; and a screen that can be both opaque and translucent. This new screen material, which would be used on both the side- and center-stage screens, could be lighted from behind to change the mood of the auditorium; it could also receive rear-projected images.

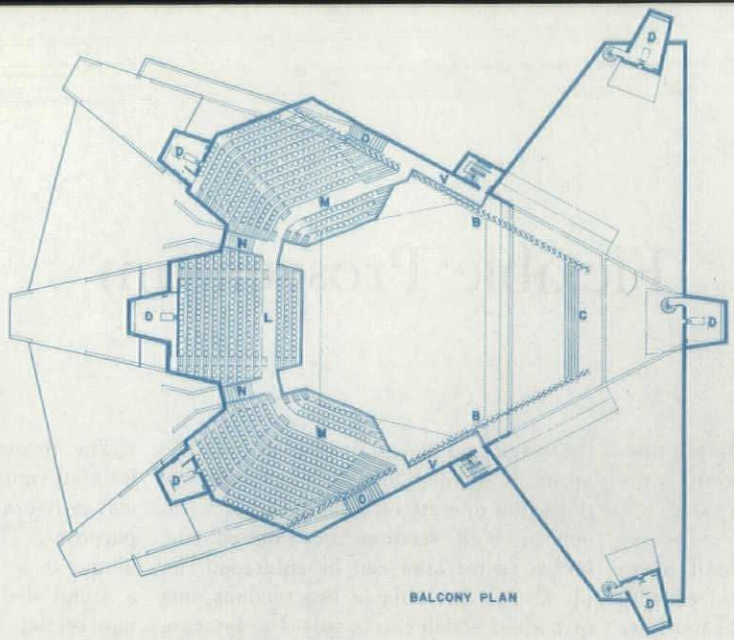
The side-stage screens are composed of 2-ft-wide, vertical panels that swivel like louvers to afford entrances for actors and permit side lighting of the stage.

Above the stage, there is a raked grid that permits center-stage screens to be tracked easily up or down stage. These screens could be of diverse sizes: stretched from side screen to side screen or free-standing like sculpture.

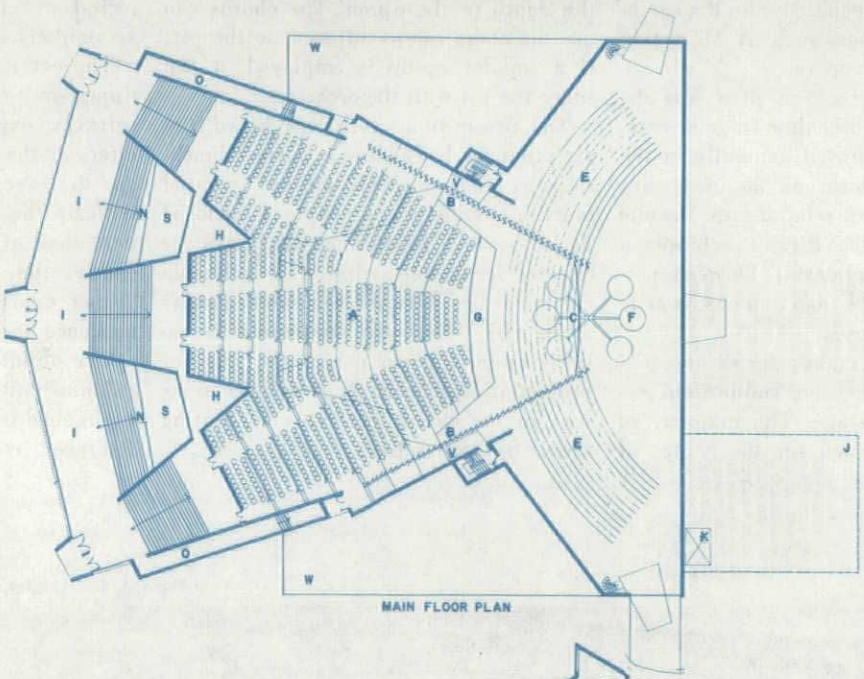
The stage itself, which slopes down toward the auditorium, has sliding sections that give actors a possibility of movement compatible with changes in film scenery. Also, circular platforms cantilevered off rotating arms permit actors to "flow" out of the projected image through openings in the screens. The openings would be designed to blend with the projected background.

Since the productions envisioned are more spectacular or epic in scope than introspective, the auditorium has been designed to accommodate 2000 seats, the farthest of which is 80 ft to 100 ft from the stage. Yet the seating arrangement aims at intimacy by using 30-in.-high rails to subdivide the audience into small groups; the rails, it is thought, would be sensed but inconspicuous.

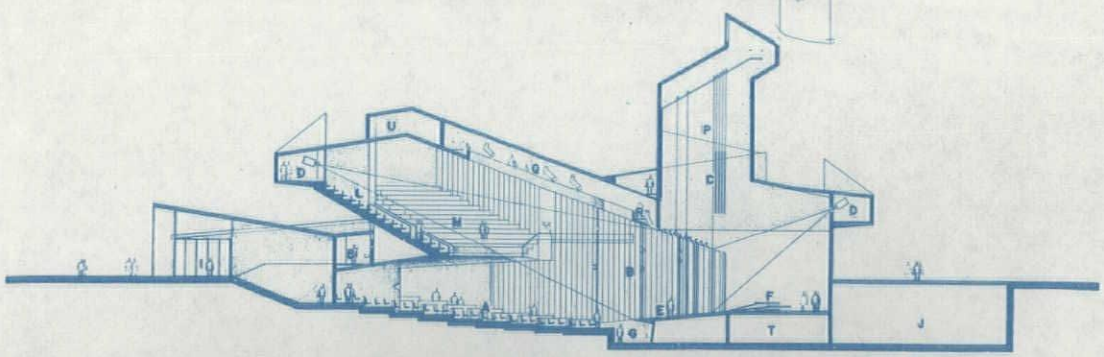
The external form of the building, conceived as a monolithic concrete entity, expresses the interior functions, including even minor elements like the six projection booths.



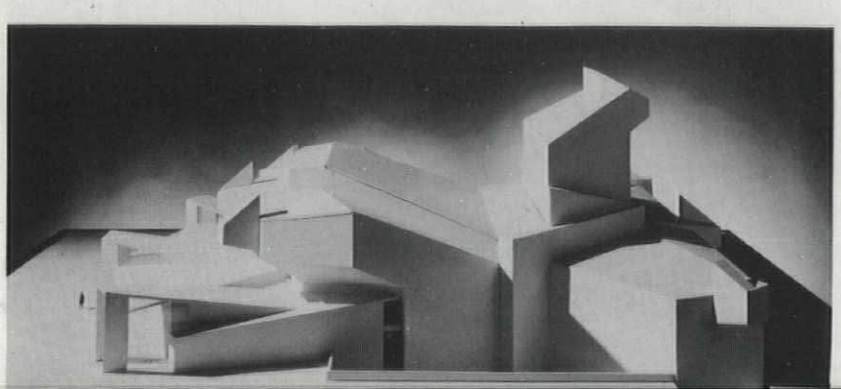
BALCONY PLAN



MAIN FLOOR PLAN



A SEATS IN GROUPS SEPARATED BY UPHOLSTERED RAILS
B TRANSLUCENT SCREENS ADJUSTABLE FOR STAGE, AUDITORIUM LIGHTING AND MOVIE PROJECTION
C A COMBINATION OF 3 DIMENSIONAL ELEMENTS FLOWN FROM FLY-TOWER USED WITH LIGHTING AND MOVIE PROJECTION
D SIX PROJECTION BOOTHS LOCATED TO GIVE MAXIMUM FLEXIBILITY
E SLOPING FLOORS ON RAMPED STAGE
F REVOLVING CANTILEVERED PLATFORMS
G ORCHESTRA SHELL
H SOUND AND LIGHTING CONTROL CENTERS
I FOYER-AUDIENCE ENTRY BETWEEN THE MAIN FLOOR AND BALCONY LEVELS
J WORKSHOPS
K FREIGHT ELEVATOR
L BALCONY SEATING BETWEEN MAIN STRUCTURAL PIERS
M SIDE TIERS BRINGING AUDIENCE NEARER STAGE
N MAIN ACCESS TO BALCONY DIRECTLY FROM FOYER
O SIDE ACCESS TO BALCONY DIRECTLY FROM FOYER
P FLY TOWER WITH GRIDIRON FOR FLYING SCREENS AND FLATS
Q LIGHTING GALLERY
R FRONT LIGHT BRIDGE
S TOILETS
T DRESSING ROOMS
U AIR CONDITIONING
V CAT WALK SPACE
W COURTYARD



Flexible Proscenium

THEATER PROJECT FOR THE FORD FOUNDATION • EDWARD L. BARNES, ARCHITECT • JO MIELZINER, THEATER CONSULTANT

To answer the need for a small opera house—a need that is being voiced with increasing frequency—this theater has been designed specifically to house intimate music-dramas, such as Mozartian and other chamber operas.

The fan-shaped seating plan was determined by the proscenium-stage orientation, which is approved generally in the lyric theater because of the necessary conductor-performer relationship. Despite this orientation, the theater achieves a more intimate relationship between performer and audience than that customarily found in opera houses.

The accoustical ceiling forms one continuous plane over the auditorium, orchestra, and forestage. The majority of the action is planned for the center of the stage and the projecting apron. The apron is divided into quarter-circle sections that operate on separate lifts; when one or both sections are lowered, the orchestra pit area can be enlarged. The pit also is operable in two sections, one or both of which can be raised to increase the depth of the apron. The chorus can use the stage ramps adjacent to the pit; if a smaller group is employed, it can share the pit with the orchestra.

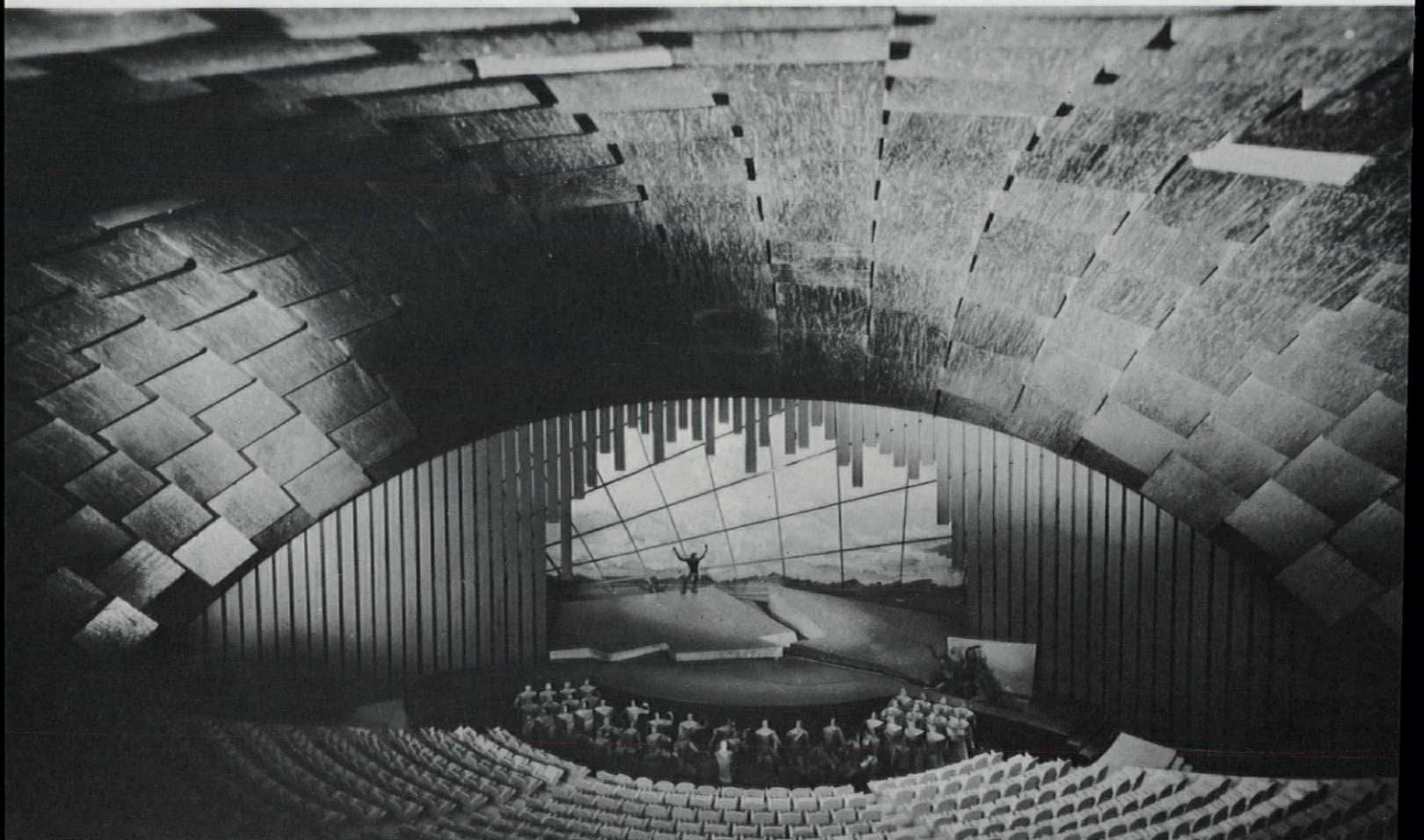
The proscenium itself is a broad, flat arch that can be reduced to narrow dimensions by vertical panels that are operated individually. A picture-box set enclosed by a narrow proscenium **(a)** can be effected for larger scenes; the cyclorama can be rolled forward for smaller stage areas **(b)**. When the proscenium is entirely open, a performer on the stage or projecting apron can be seen from every seat in the house against a supporting scenic background.

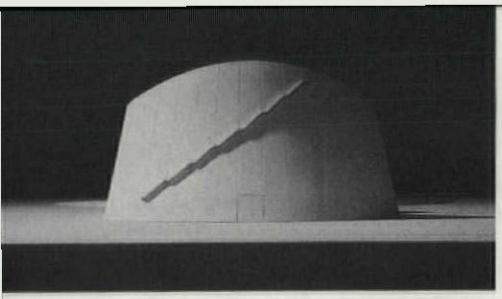
The theater is intended primarily for intimate music-drama, but its flexibility makes it usable for a number of musical purposes. The concave, flexible proscenium can be closed completely to provide a sound shell for a recital performed on one section of the apron **(c)**, or for a recital or chamber performance on an assymmetrical apron **(d)**.

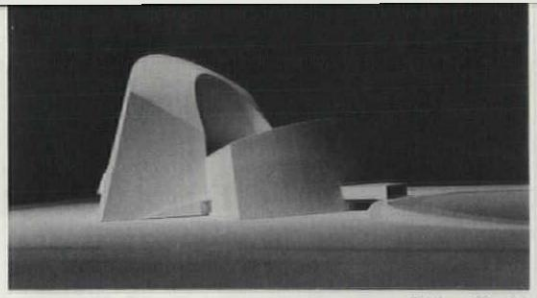
The exterior form of the building, two tipped-over cones intersecting near their vertexes, expresses the functions of the interior: the plan reveals the sight-lines and the sweep of the stage; the elevations indicate the stepped grid and the acoustical shell of the auditorium; and significantly, the intersection of two similar shapes expresses the interrelationship of audience and performer.

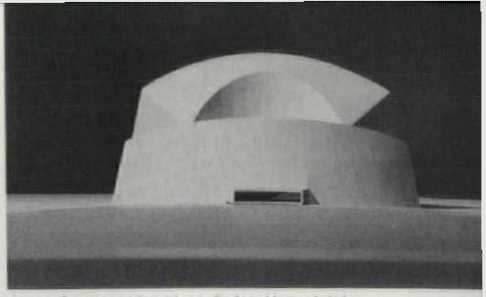
The building is constructed of battered columns with a precast concrete skin. Light steel trusses support the roof, which is braced by the proscenium beam.

Photo: J. Alex Langley, Courtesy American Federation of Arts

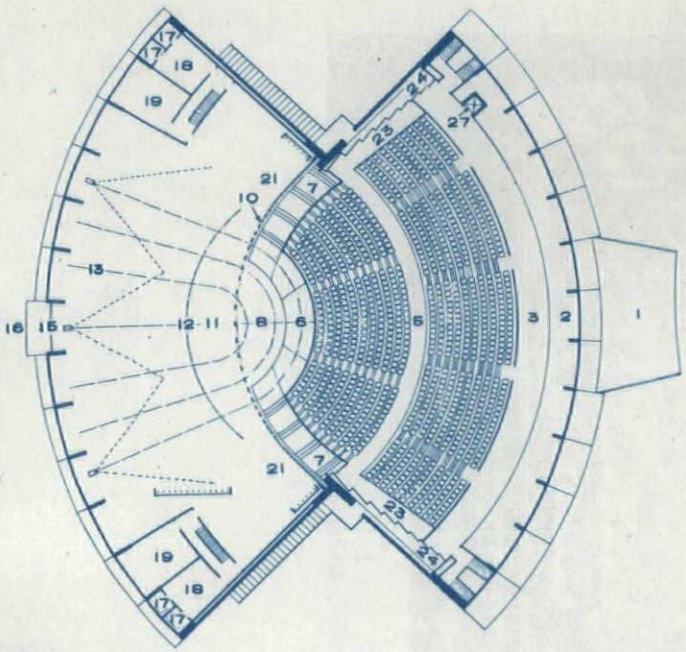


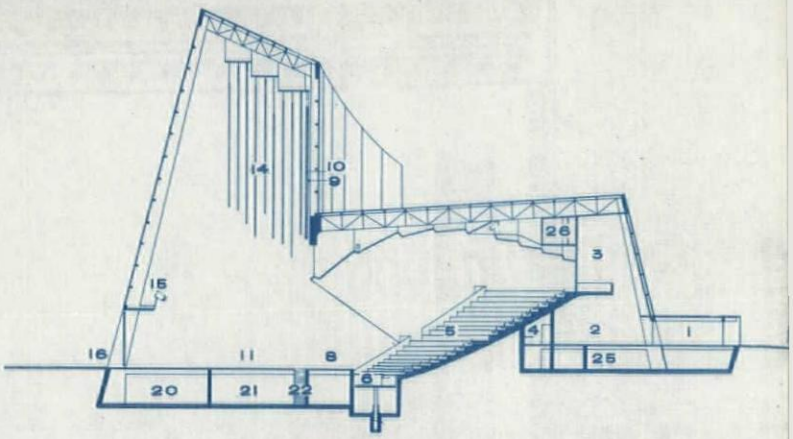


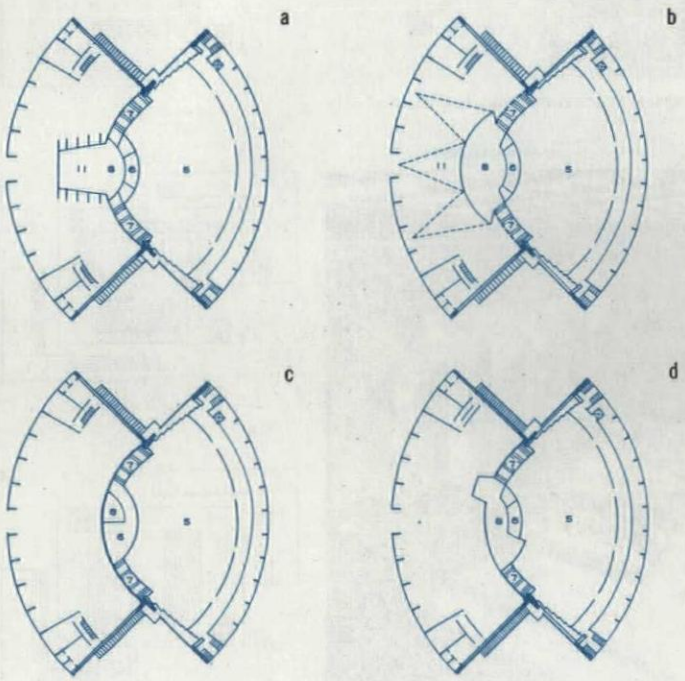




Photos: Charles Forberg, Courtesy American Federation of Arts



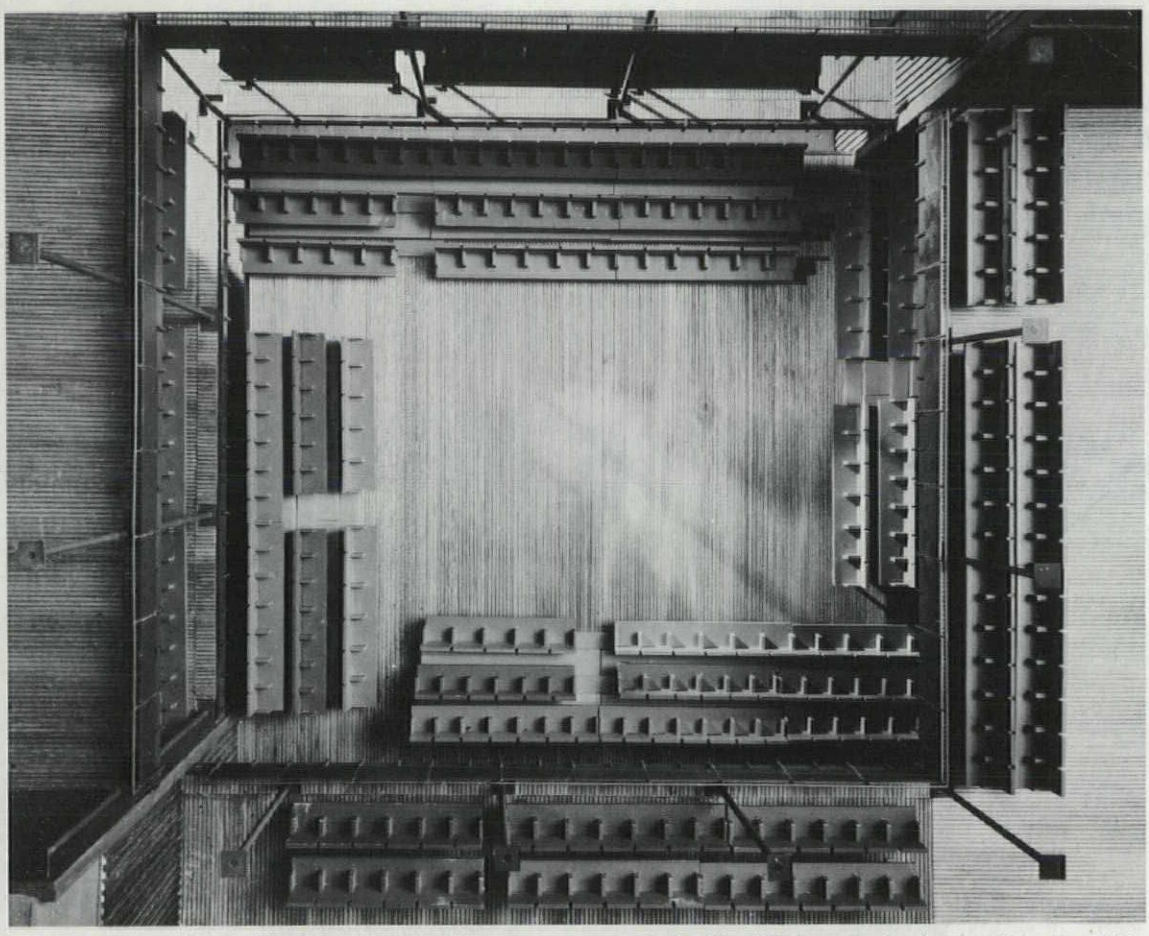




LEGEND

1 *Vestibule*
2 *Lobby/lounge*
3 *Upper level of lounge*
4 *Coats/rest rooms*
5 *Auditorium (1000 seats)*
6 *Orchestra pit*
7 *Entry ramps or chorus*
8 *Apron*
9 *Fire curtain*
10 *Flexible proscenium panels*
11 *Stage*
12 *Cyclorama*
13 *Wagon tracks*
14 *Flying scenery*
15 *Rear projection*
16 *Service entrance*
17 *Toilets*
18 *Quick change*
19 *Prop room*
20 *Rehearsal/storage*
21 *Dressing rooms*
22 *Trap*
23 *Ramp from lobby*
24 *Duct space*
25 *Ushers/storage/janitor/equipment*
26 *Offices/television*
27 *Elevator*

Nonmechanized Multi-Form



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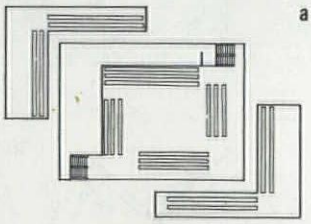
Photos: Lionel Friedman, Courtesy American Federation of Arts



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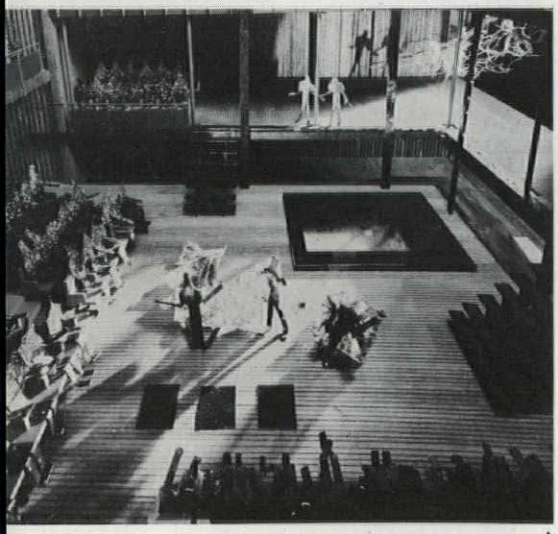

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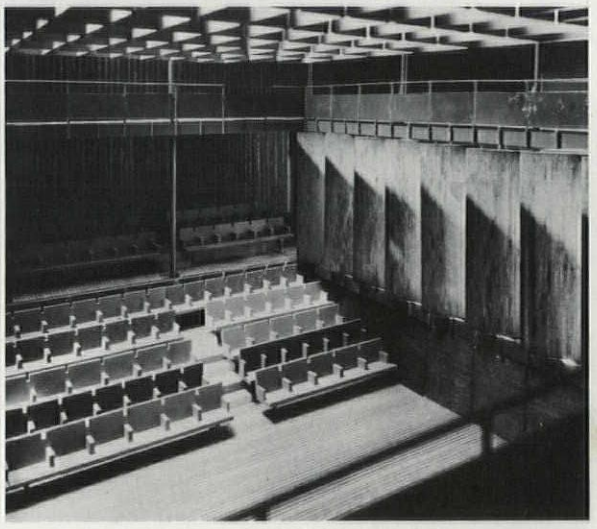

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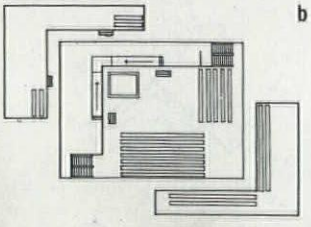

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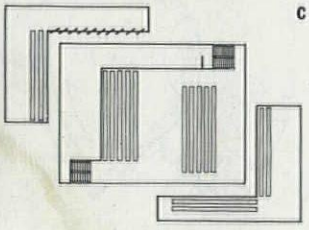

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THEATER PROJECT FOR THE FORD FOUNDATION • PETER BLAKE, ARCHITECT • DAVID HAYS, THEATER CONSULTANT

Flexibility in this 299-seat theater is achieved not by elaborate mechanization of stage and seating areas but by means of an "uncommitted space" in which all seating banks and stage platforms are portable so as to permit a variety of stage forms.

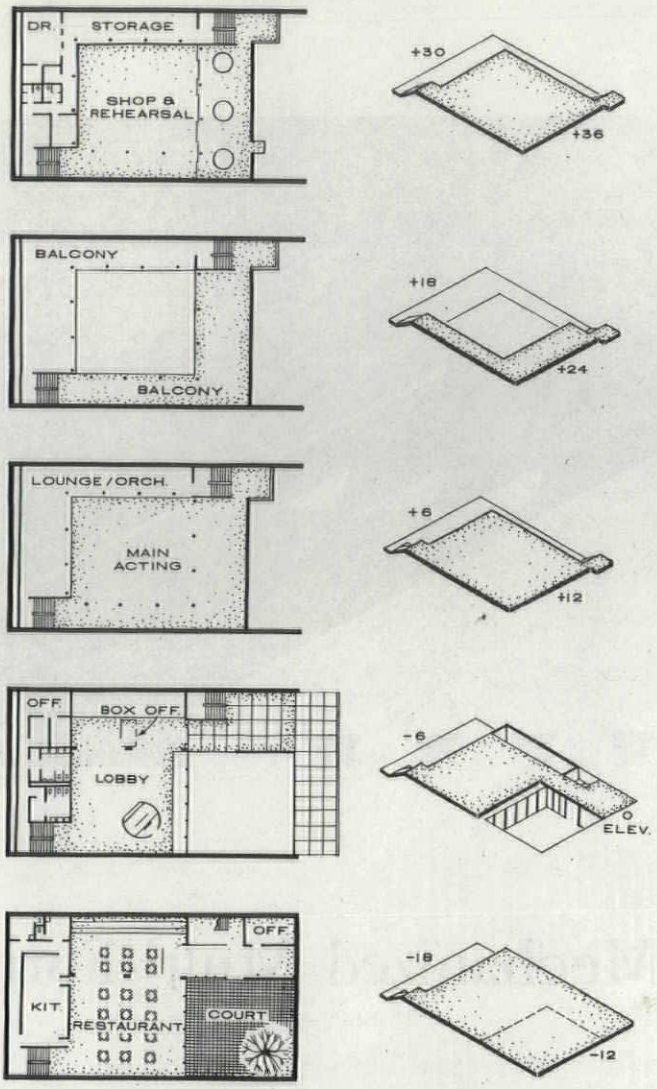
Tiered galleries surround a central court. The plan is similar to that of the courtyard theaters of Elizabethan inns, but the focus here is on production flexibility. No area of the auditorium is committed to either audience or performer, as it was in the Elizabethan inns: the central court can be used for audience seating; the galleries can be used as performing areas, thus extending the concept of "uncommitted space" vertically into several additional planes.

Several of the possible stage forms have been illustrated by the designers: **(a)** arena staging, in which the performers use the central island area and are surrounded by the audience, both on the same level and on the galleries above; **(b)** an approximation of the open-apron stage, in which the theater is divided diagonally, with performers using one half and spectators the other; and **(c)** parallel seating, in which actors use a stage that is sandwiched, like a causeway, between facing banks of spectators.

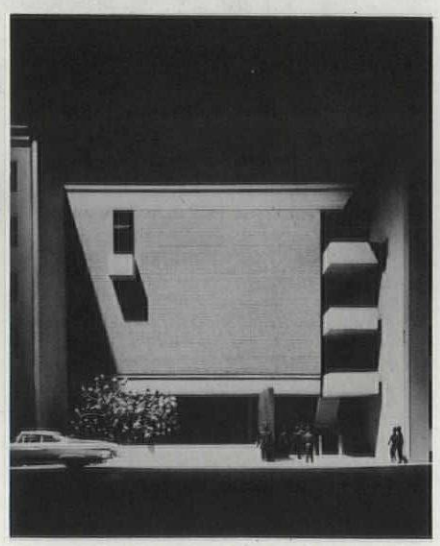
Other arrangements are possible: the columns supporting the galleries have sockets that can receive panels or screens so as to simulate a curtain. When the "curtain" is installed on only one side and the audience fills the remaining space, a proscenium effect is approximated. In addition, an Elizabethan arrangement can be readily reproduced, or the entire first gallery used as a caliper.

The theater space has five different levels: half of each gallery, divided diagonally into an L, is 6 ft above the other. This principle of "related half levels" could also be applied in a circular or polygonal plan. The top level is planned for dressing rooms and as a lighting and projection bridge; however, any of the levels can be used for several functions simultaneously. A minimum of scenery is envisioned: the space itself is intended to act as scenic background.

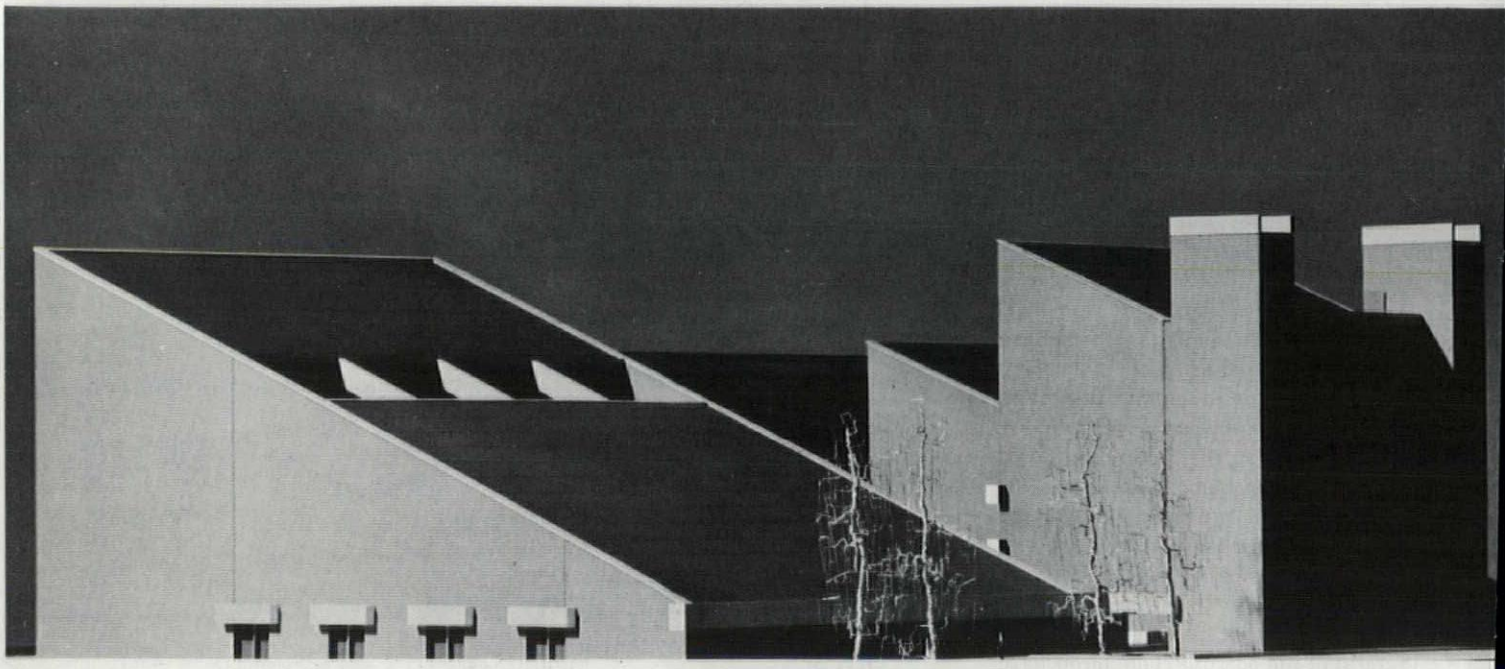
The variety of stage forms this theater can assume is limited more by the imagination of the producing company and the stamina of the crew than by the theater itself.



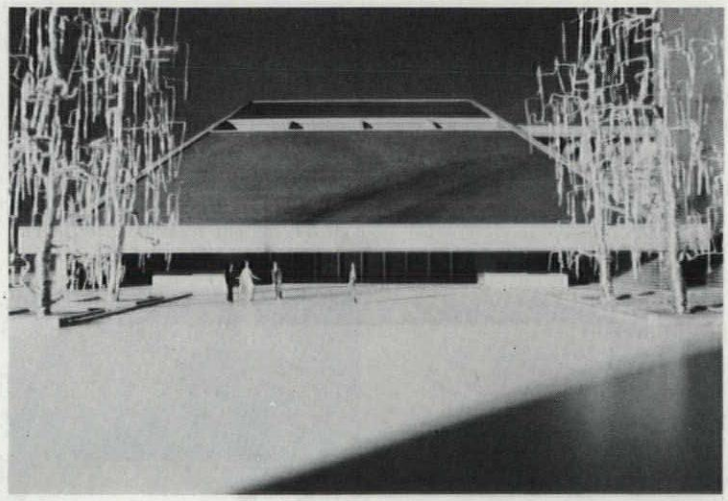
The theater is planned for a site composed of three average city lots (each 20 ft by 100 ft). To provide an additional source of income, it incorporates a restaurant-bar, located on the lower level, which has a separate entrance. The lobby of the theater is reached by a street-level bridge. Loading platforms are cantilevered out from the stairway to receive materials raised by the hoist.

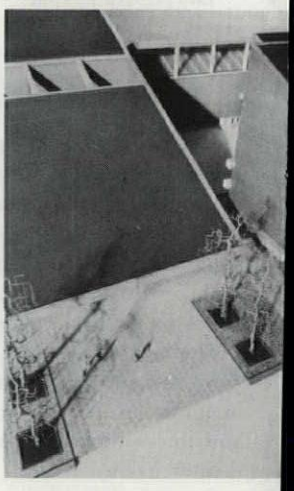


Photos, except as noted: James H. Cook, Courtesy Paul Schweikher



Mechanized Multi-Form





THEATER DESIGN PROJECT FOR THE FORD FOUNDATION • PAUL SCHWEIKHER, ARCHITECT • GEORGE C. IZENOUR, THEATER CONSULTANT

Of the eight Ford Foundation projects, this proposal for new drama school facilities at the Carnegie Institute of Technology was the only one with an actual program and site. Theodore Hoffman, present chairman of the drama department, based his statement of the program on studies that had been prepared over a period of years. Izenour had long been associated with the project; Schweikher, head of the Carnegie Tech architecture department, was chosen to collaborate with him on the design.

Hoffman characterized the school as a place where "the student learns to submit himself to a working discipline which enables him to manipulate . . . precise techniques . . . into a complex, imaginatively ordered, and clearly understandable act of art." There is no place in it for those "who believe in the primary value of instinct, intuition, or genius."

His architecture requirements are as definite as his educational principles. "The building," he says, "is a teaching instrument." It should, therefore, "display structural clarity and reflect its basic function. The component parts should be clearly perceived for what they are." He goes on to spell out the specific requirements:

a 500-seat main public theater, adaptable to proscenium, arena, or "three-quarter arena" forms;

a 200-seat studio theater of proscenium form for students only;

an experimental theater, which, though not an integral part of the school, will serve an educational example and provide places in its resident company for advanced students;

a workshop, with its auxiliary special shops;

academic facilities, including faculty and administrative offices, classrooms, rehearsal rooms, and laboratories.

One of the basic decisions of the designers was to replace the single building envisaged in the program with a complex of four buildings housing distinct functions of the school. The fifth element, the experimental theater, was placed under the court at the center of the group. The necessary acoustical isolation between facilities was thus achieved without resort to special structural techniques.

Although Schweikher's stated objective was to house the functions of the school "in a plain, direct way," his buildings seem to express, in their solid walls and dramatic silhouettes, the nature of the activities they shelter.

The main theater, though public, is intended primarily as an experimental instrument. Hoffman's statement insists that the auditorium design be "free of anything that suggests the 'magic of the theater.'" The primary requirement was a degree of flexibility that would permit works of all periods to be presented, in adaptations of their original form or in experimental forms.

Izenour's principal role in the project was to develop a mechanized system by which this requirement could be met without diverting vast amounts of student effort from creative work. The system he designed is the product of over two decades of research. The basic plan for this theater is similar to his scheme for the Loeb Drama Center (see page 102); it introduces a new concept, however, in the modular design of its adjustable elements.

The adjustable sections will be slightly less than 8 ft square, the precise size depending on the dimensions of the two movable blocks of seating (see illustrations). Each one can be adjusted independently to create the modeling of the stage floor that is especially desirable in the arena forms. All of the hydraulic lifts that support these sections and the movable seating will be controlled by a "logic system" similar in principle to the computer. Such a system is required to synchronize the movement of the various elements in prearranged sequences. The same control equipment can be used for the hanging scenery and lighting without additional cost.

The inner lobby is an extension of the theater itself. There is a separate outer lobby, which provides access to the exhibit-lounge, toilets, and cloakroom on the level below. Dressing rooms are below the stagehouse and communicate with it by way

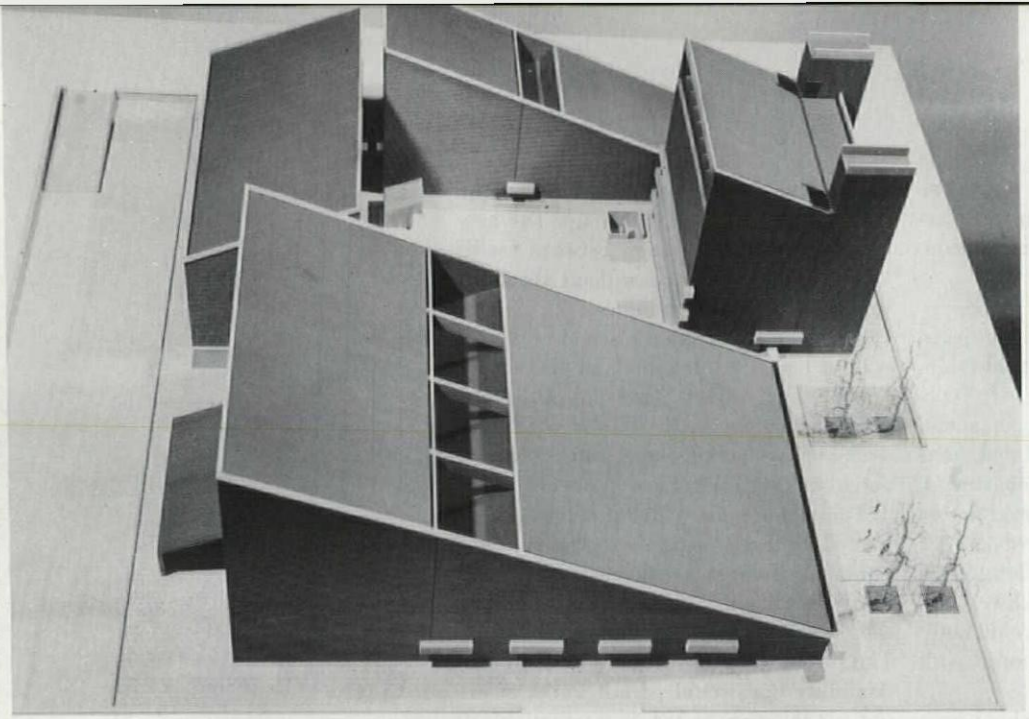
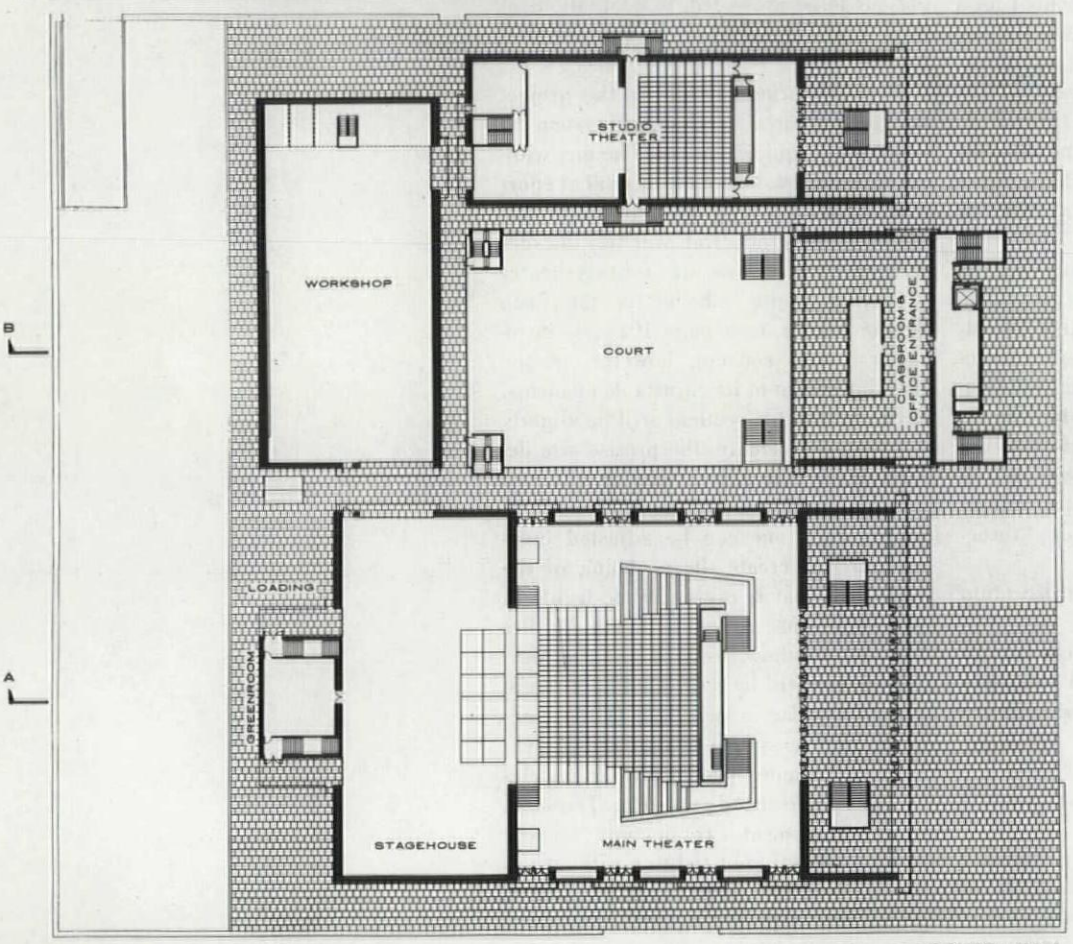
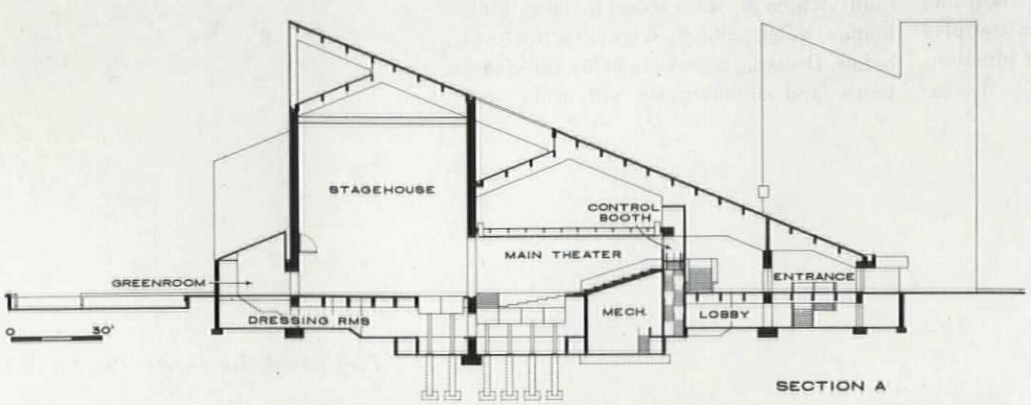


Photo: J. Alex Langley, Courtesy American Federation of Arts



COURT LEVEL



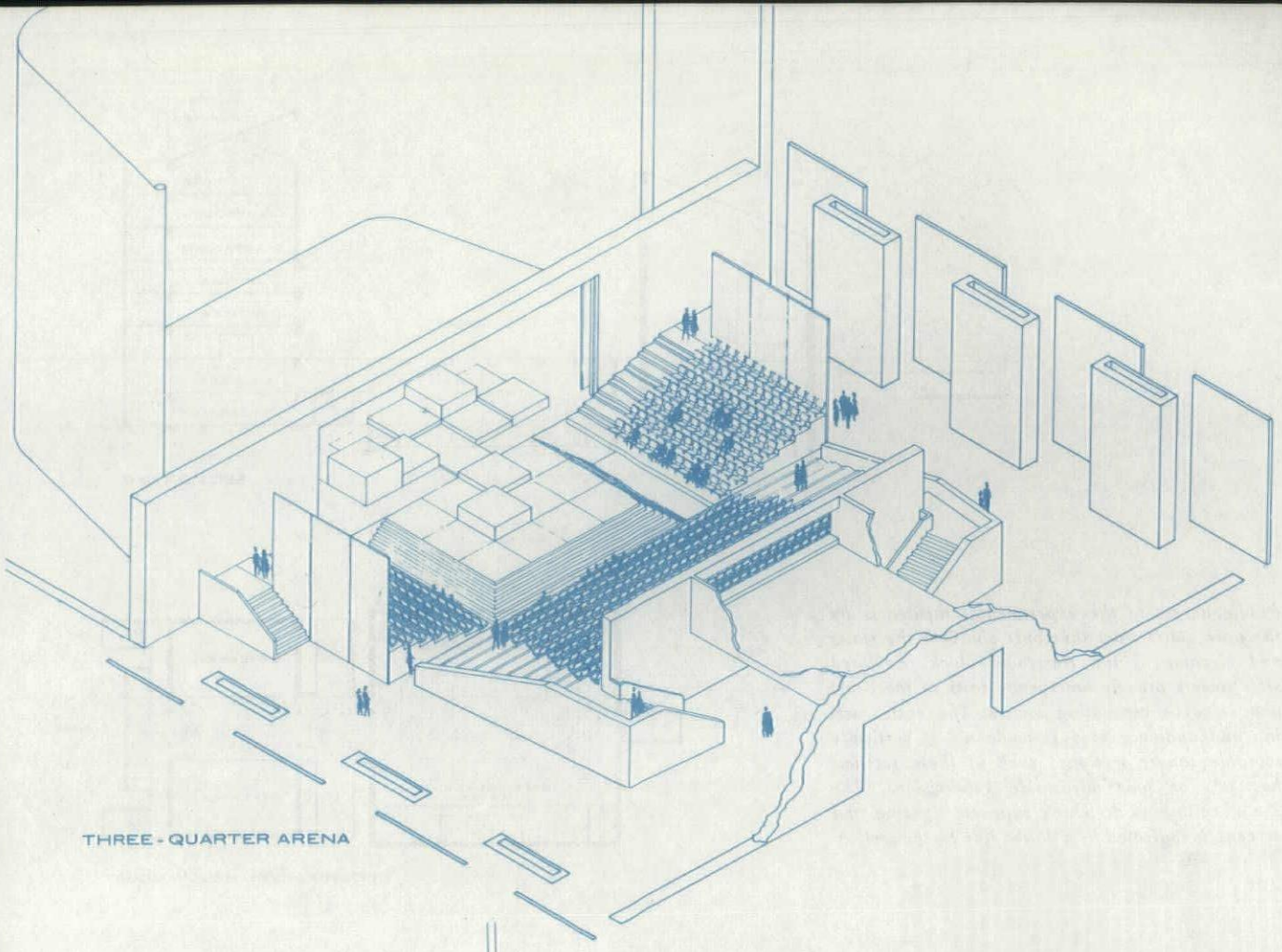
SECTION A

The four buildings of the complex (plans and model photo, left) *are organized around a central court, which can itself serve as an outdoor theater, with the open ground floor and balconies of the classroom block as part of its acting area.*

A section through the main theater (below, left) *shows how its spaces are enclosed under a single-pitch roof. Voids between the structural bents and the roof plane conceal air intake and exhaust.*

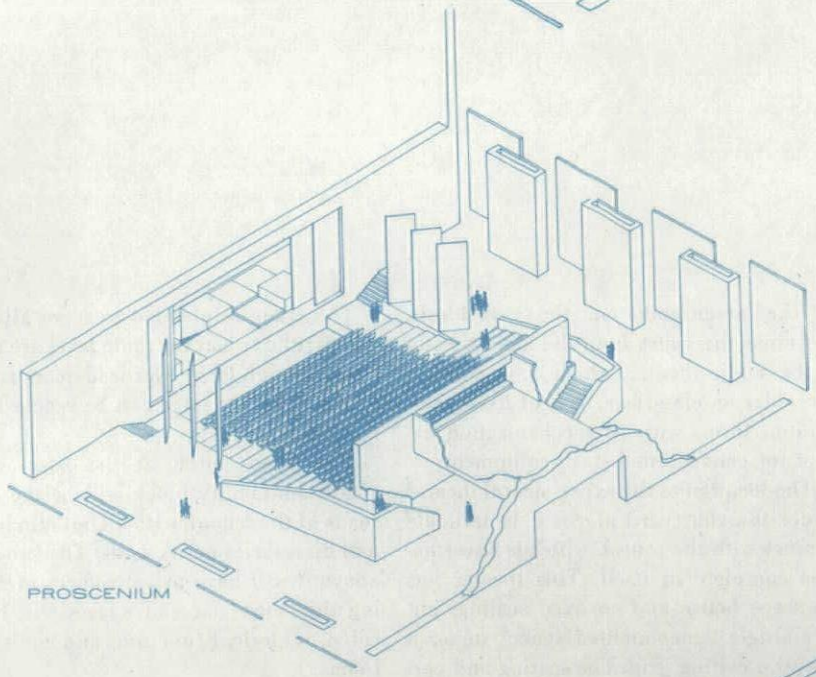
Izenour's system of mechanized flexibility is illustrated in the various forms of the main theater (facing page). *The ten rows at the rear of the theater are fixed. The other seven rows are divided in two sections (including aisles), which can be mechanically elevated, rotated, and moved into two basic arrangements. The difference of levels between rows can be adjusted from 6 in., for the proscenium form, to 1 ft, for the arena. To complete the arena, additional seats can be added beyond the extended proscenium opening.*

The entire design is based on modular sections slightly less than 8 ft square. They can be raised or lowered to modulate the stage floor, to provide for stage entrances from the lower floor, or to form an orchestra pit. Two additional sections serve as landings for the side aisles in the arena forms. The control and observation booth at the rear of the theater can be reached without passing through public areas; the plan at the left shows its final design.

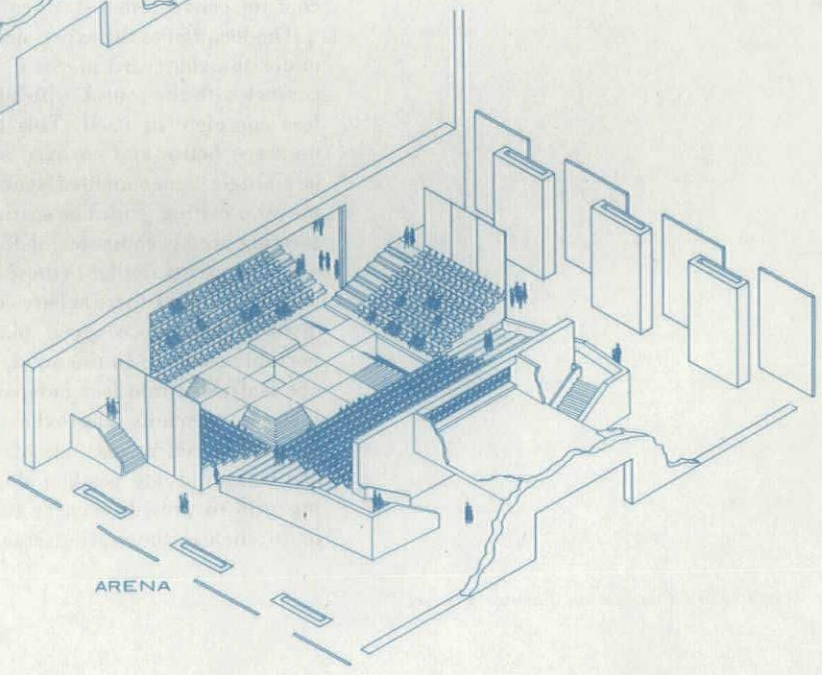


THREE-QUARTER ARENA

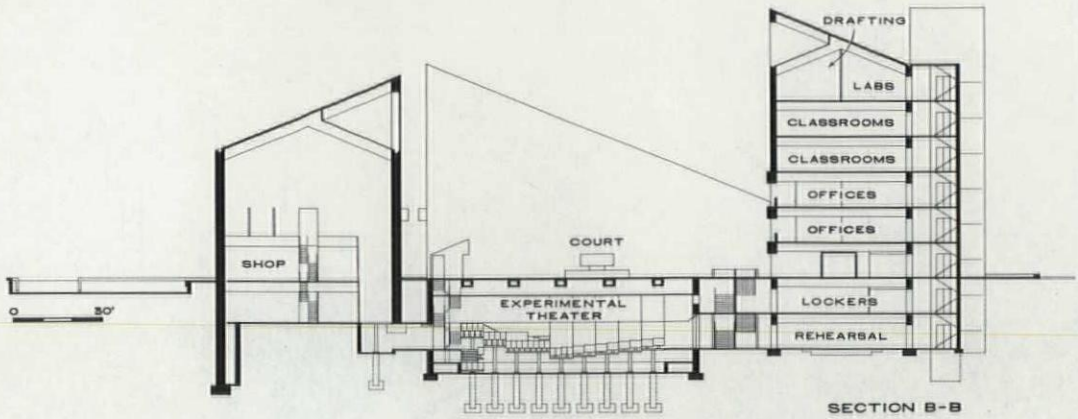
MAIN THEATER



PROSCENIUM

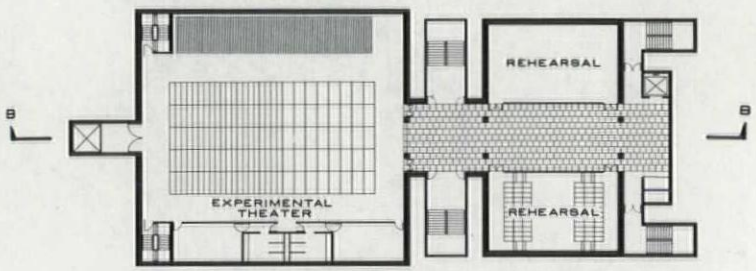


ARENA



SECTION B-B

Public access to the experimental theater is by the open stairs from the court above or the stairs and elevator of the classroom block. Enclosed stair towers provide emergency exits to the court and serve as ventilating towers. The entire acting and audience area is made up of vertically movable square sections; each of these sections has two or four adjustable subdivisions. The 2' x 2' ceiling grid, which supports lighting and screens, is indicated by a dotted line on the section.



SECOND LEVEL BELOW COURT

of the greenrooms on the two levels.

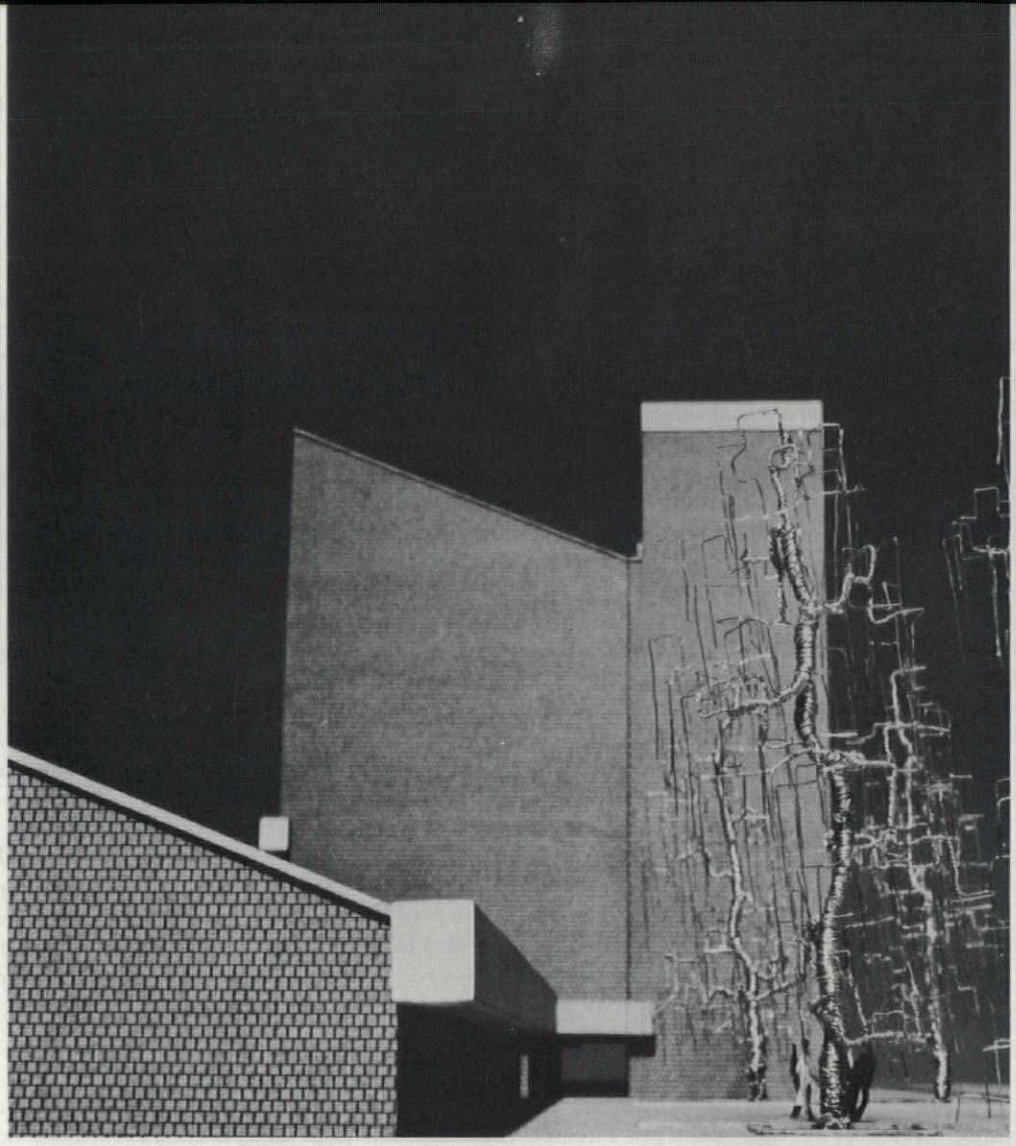
Across the court from the main theater is the studio theater, which is, in effect, a large drama classroom. It is of fixed proscenium form, with no mechanization except for conventional stage equipment.

The location of the experimental theater under the courtyard places it in intimate contact with the school, which is nevertheless complete in itself. This theater has no stage house and no fixed seating, but is a single "uncommitted space" under a uniform ceiling grid. The seating and performing area is composed of 45 adjustable square sections similar to those of the main theater. Each of these squares can be subdivided into two stepped platforms for portable seating. In the acting area each one is divided into four independently adjustable elements approximately 2' x 8'. Screens stored at one side of the theater can be moved into position along the ceiling grid to provide scenery for the stage or to enclose the seating area.

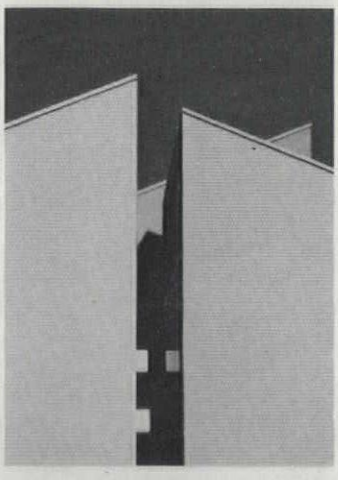
The shop is intended to serve all three stages; the two at the main level are accessible through large overhead doors and the experimental theater can be reached by a freight elevator.

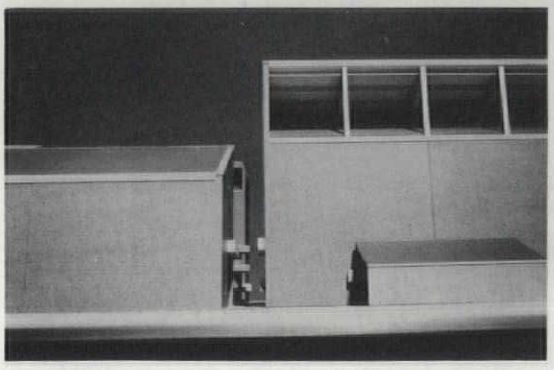
The open porch at the base of the classroom-faculty block will be the crossroads of the school, with all bulletin boards and directories on its walls. The two floors above it will have private offices overlooking the court; interior spaces will be devoted to clerical functions and conference rooms.

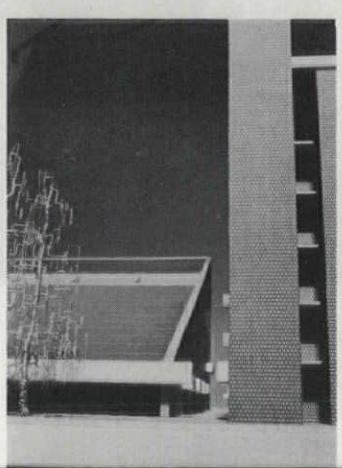
The entire complex will be constructed of precast concrete and specially cast 8" x 8" masonry units. Except for the main theater and the workshop, which are spanned by precast post-stressed bents, the structures will be wall-bearing. Roofs and floors will be constructed of precast channels. Similar channels will form the core of the bearing walls, with layers of masonry on either side; the voids will house mechanical and electrical risers.



The close juxtaposition of building masses reflects their functional relationship while maintaining essential acoustical isolation. Solid walls of special 8" x 8" masonry units define narrow chasms between the buildings, across which the hollow precast lintels almost meet.







Composite Stage for a College

PAUL M. PEARSON THEATER • SWARTHMORE COLLEGE, SWARTHMORE, PENNSYLVANIA • VINCENT G. KLING, ARCHITECT • JAMES HULL MILLER, THEATER CONSULTANT

When Swarthmore's chemistry department moved into the new DuPont Science Building designed by Vincent G. Kling, (JUNE 1961 P/A), it left vacant a 50-year-old classroom structure. The college decided to convert this old building into a Student Activities Building. Swarthmore already had one theater—a 1000-seat auditorium with a proscenium stage—but decided to add another one in the Activities Building where experimental student productions could be presented with intimacy and with an economy of effort and money. Because of his sympathy with these objectives, James Hull Miller was commissioned to design the new theater.

Exterior alterations were limited to painting the brick to harmonize with adjacent stone structures and to constructing an entrance terrace that provides the building a platform.

On the interior, existing partitions were retained wherever possible. Three columns were removed to open the stage area, and the beams were reinforced with steel channels to accommodate the new span. The exposed construction was painted a neutral sand color.

The stage is an assymmetrically shaped open stage that projects slightly into the V-shaped audience area, which accommodates 140 seats. It has extensive side stages that form a complete caliper embracing the audience. On the left, the caliper broadens to provide an intermission lounge; it can also be used to exhibit student art works or to accommodate musicians. From the outside terrace, the doors lead directly onto the caliper at the rear of the auditorium; the absence of an outer lobby gives the arriving audience a feeling of immediate involvement.

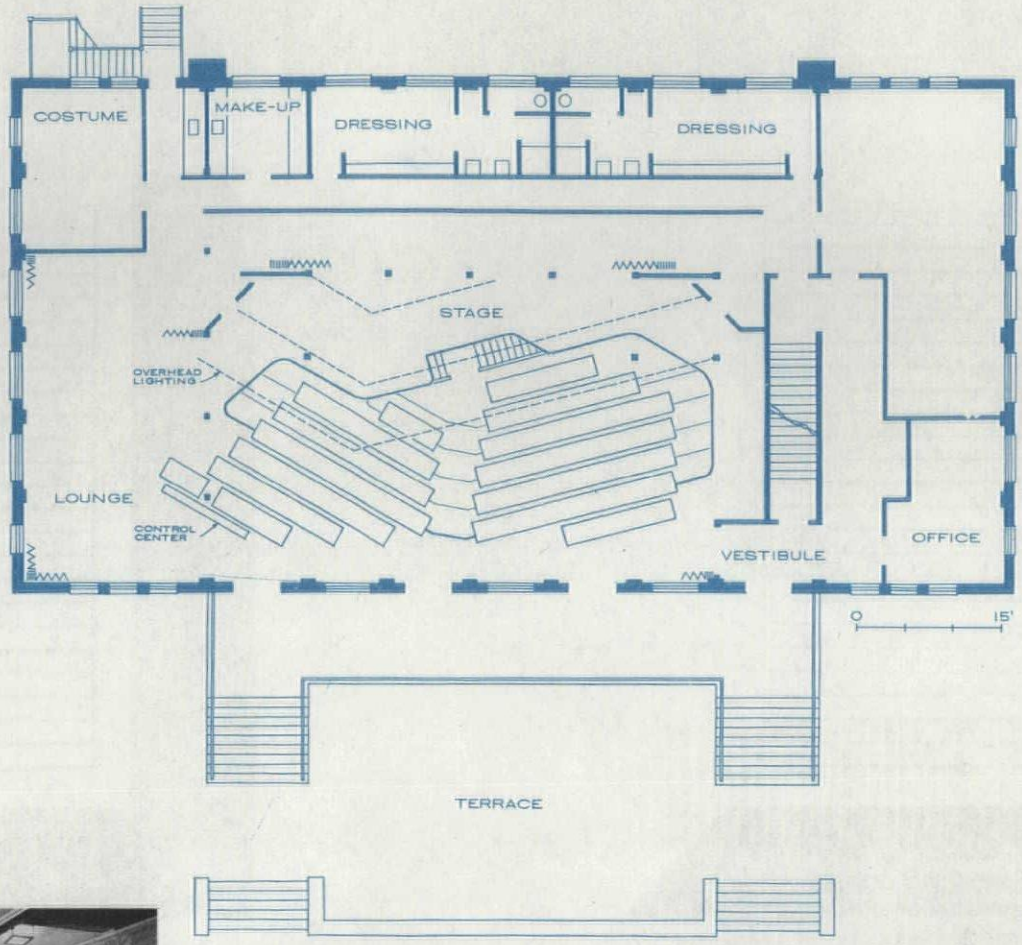
The stage is shallow and broad. There is no grid for flying scenery; however, the possibility of variation in scenic presentation is considerable. Columns that could not be removed run across the stage, but they are used to advantage and have been found unobtrusive: the bays between them can be set as different areas simultaneously (to indicate time in space) or as a unit with curtains or with screens that permit rear-projection.

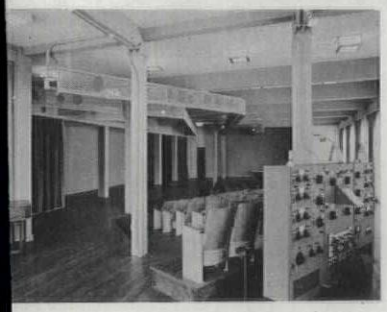
The stage has no enclosing curtain, with the result that all the activities that comprise a dramatic production, including "backstage" operations, are exposed: scenes are set in full view; front overhead lighting is only barely concealed behind perforated screens that follow the line of the V-shaped stage; and the lighting switchboard is unenclosed at the rear of the auditorium. The college's drama department believes that the exposure of these operations makes theater-production a more comprehensible activity and thereby increases the involvement of the audience in the total theatrical operation.

This theater is not committed to any known stage form or to a collection of historical forms achieved by mechanization or other devices; rather, it is a new, single-form stage that is a composite of several currently popular stages. It can be used in a variety of ways, which gives it an impression of physical flexibility.

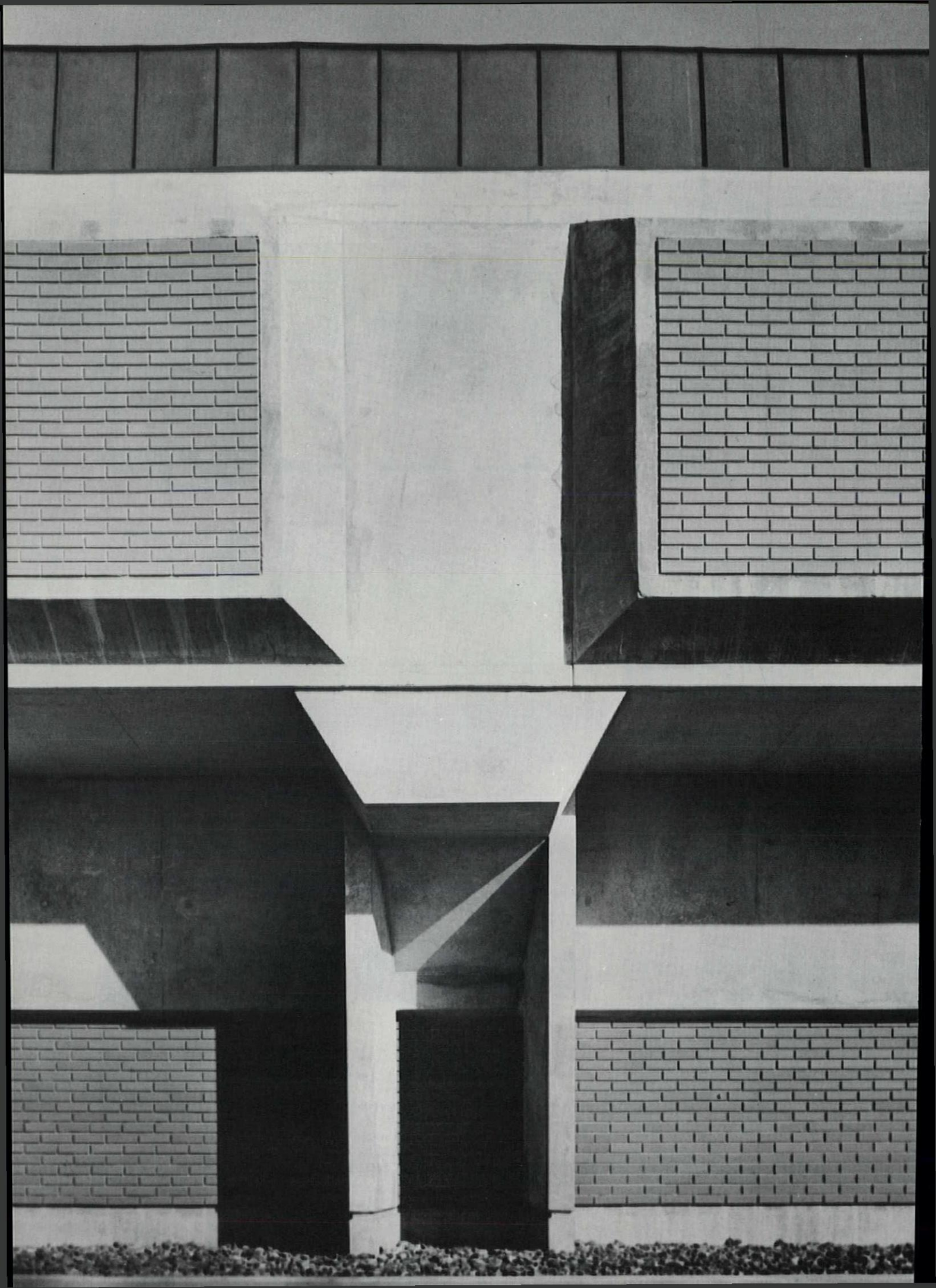
Photos: Courtesy Swarthmore College

Before remodeling (above); *after remodeling* (left).





Angled seating permits spectators to see each others' reactions (above, left). *The operator of the light-control board and the musicians have full view of the stage* (left). *Three different scenes can be depicted simultaneously* (above), *or a single set can be mounted* (above, right). *A stairway permits entrances from below* (bottom, right).



Arena for a Resident Company

ARENA STAGE • WASHINGTON, D. C. • HARRY WEESE & ASSOCIATES, ARCHITECTS AND ENGINEERS

Since 1895, when the Lafayette Square Opera House opened its doors to the public, not one theater has been built in Washington on a new site. And since 1922, when the fifth consecutive National Theater building was completed, no new theater construction of any kind has taken place. The recent opening of the Arena Stage—a new building on a new site—was, therefore, an event the capital has not experienced for 66 years.

The theater was designed for a resident, professional, repertory company organized eleven years ago to fill a vacuum in the city's theatrical life. The company, one of the pioneers in America of the theater-in-the-round, started its productions in an old movie house, and later moved into the recreation hall of a brewery. Their new home is a clear statement of purpose and function.

To separate the auditorium from everything secondary to the dramatic event, the building is composed of two distinct elements: the stage and audience are housed in a polygonal structure; all supporting facilities are housed in an elongated administration wing (1). The spectators enter via a marquee-like, glazed bay located at one end of the wing (2), pass through the lobby (3), and go up a wide stair into the lounge (4); from the lounge, a tight passage (5) leads directly to the

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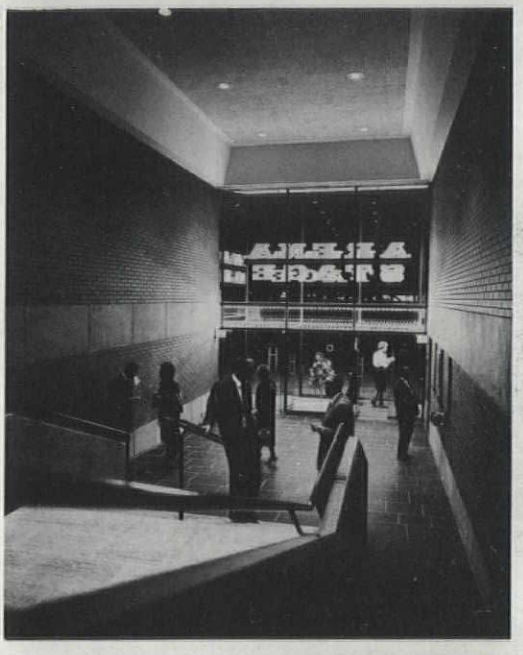

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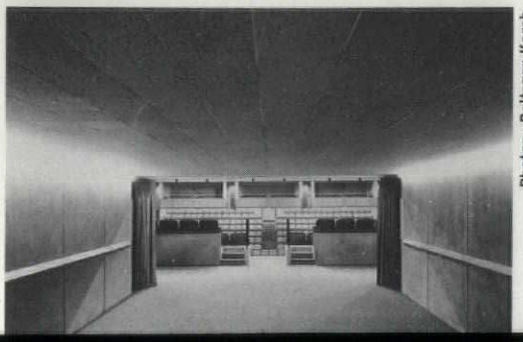
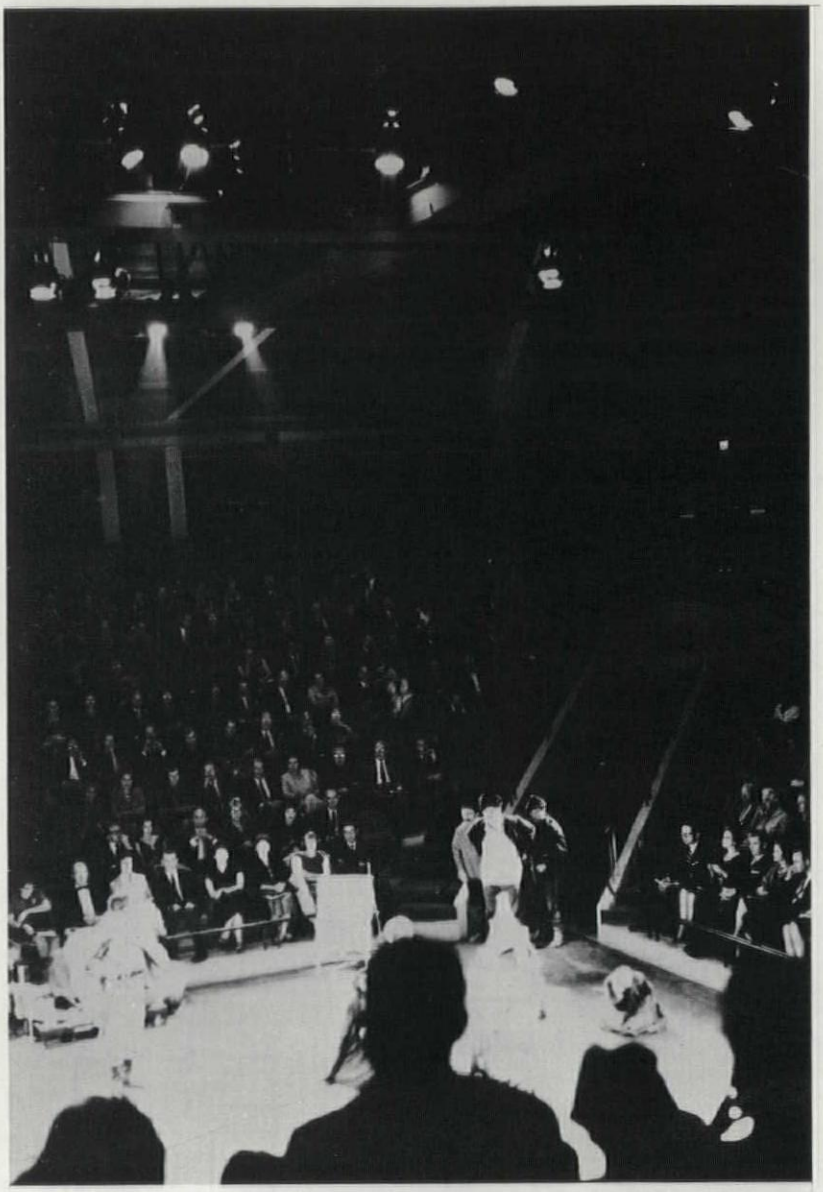


Photos: Baltazar Korab

Auditorium's interior is "neutralized" by subdued décor. Stage is set for Brecht's "The Caucasian Chalk Circle."



View of the auditorium during performance of Brecht's play.

auditorium. This clear-cut solution resulted from close collaboration between client and architect.

Although today there are many theaters-in-the-round, hardly any have been built as a permanent form. The architect, who had never designed a theater before, leaned heavily on the experience built up by the client, who tried to embody "everything [the company] learned over its eleven-year history about the artistic possibilities of the arena staging form, the total experience of theater-going from the point of view of the audience, and the work requirements of staff, acting company, and technical personnel. The overall design of the building, as well as the design of various stage and administrative facilities, are in no way abstract or accidental; they derive directly from the pooled knowledge of people who have worked in—and pioneered in—the development of the arena form and the creation of a permanent, community-rooted theater institution."

In most makeshift arena theaters, actors and audience share the stage for access and circulation. This creates problems in seating latecomers, in scenery changes during intermissions, and other conflicts in the circulation pattern. There is also a "violation by irrelevant traffic of acting area reserved for the art." It was felt that such an arrangement could not be condoned in a building specially designed for an arena stage.

Although there is a close proximity between stage and audience, a subtle separation was introduced by setting the level of the stage floor 6 in. below the first row of seats and by surrounding the stage with a 14-in. high railing.

The four stage entrances, which can be closed off by fire doors and baffle curtains, are for actors and the movement of scenery only. They are articulated by concrete curbs, which also act as visual lines directing the eye to the stage.

A rectangular, 30 ft x 36 ft stage was chosen because "a square or round stage has no dominant axis, a round stage has no orientation, and an elliptical stage engenders an elliptical seating plan which creates baroque connotations and acoustical difficulties."

The floor of the stage is composed of 3 ft x 6 ft removable sections supported by a pipe column scaffold over a 7-ft-deep pit. This way, additional stage access, changes in levels, an orchestra pit, and other special effects can be accomplished.

The shape of the auditorium derives

from the shape of the stage. From each side of the stage, four tiers of seats rise steeply up. Each tier has 8 rows of seats 36 in. on center with a 16½-in. rise per row. The steep seating provides good sight-lines and brings the audience into close contact with the play.

In one of the tiers, the seats can be dismounted and the lower six rows of treads and risers, which are divided into ten sections mounted on rollers, can be telescoped underneath the platform that holds the upper two rows. This makes possible the staging of plays in three-quarter arena form or in other variants of the pure arena form.

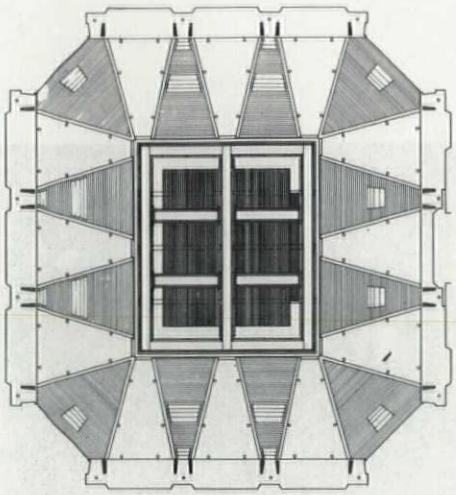
The tiers are surrounded by a circulation aisle, which, in turn, is ringed by 11 boxes seating 8 persons each. Thus total seating capacity is 752. The audience enters the aisle from the main lounge via the low, acoustically treated link and proceeds down to the tier seats, or up a few steps, set between the double columns, to the box seats. Smoking balconies and fire exits are at the four corners of the aisle.

Above the stage is suspended a 40 ft x 46 ft catwalk lighting bridge. Its height can be adjusted from 19 ft to 27 ft 4 in. above the stage level. No attempt was made to conceal the equipment, since it is considered a part of the total theatrical form. Additional lighting ports with hinged flaps are located between the roof beams for a 45-degree throw and also at the lowest part of the ceiling for a flatter angle. The portholes can be reached by rolling collapsible scaffold; the catwalk is accessible through a crawl space in the dropped ceiling above the control booth.

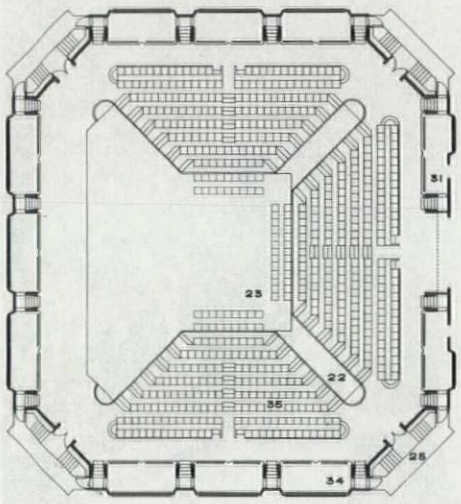
The control booth, located above the entrance to the auditorium, is equipped with a light switchboard consisting of an infinite-preset, punch-card control console, interconnection for 342 separate light circuits, and 33 dimmers with provision for an additional 17. Lighting cues are recorded on punch-cards during rehearsals and reproduced automatically during performances. The sound system, which includes eight hi-fidelity speakers, is also controlled from the booth.

Above the light bridge, 37 feet from the stage floor, is a steel grid used for flying the scenery in and out during the performance.

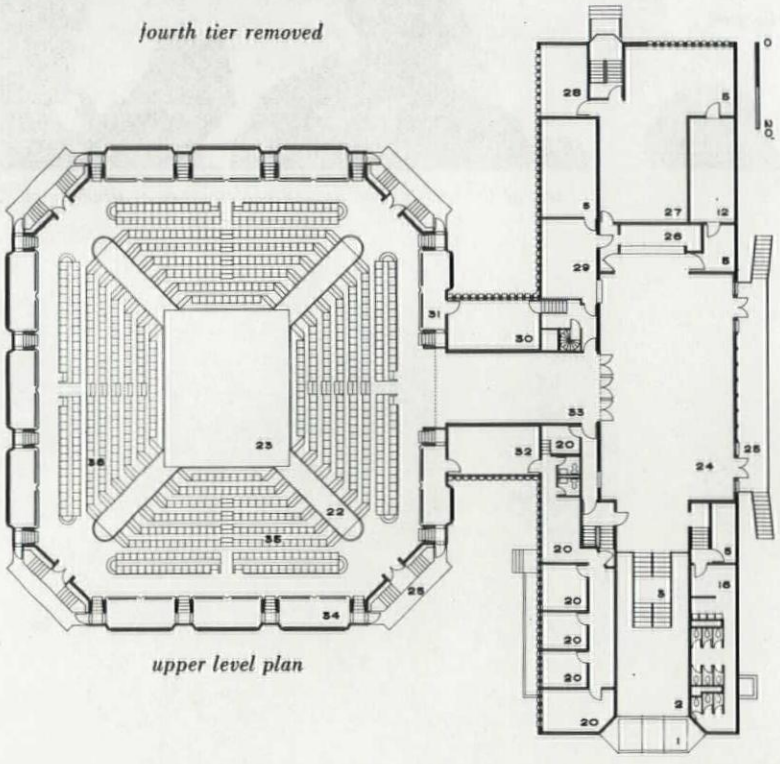
The spaces between splayed beams that rise from the double columns surrounding the aisle are alternately filled in: the covered sections are used to house light ports, crawl space, fly lines, and ducts; the



reflected ceiling plan



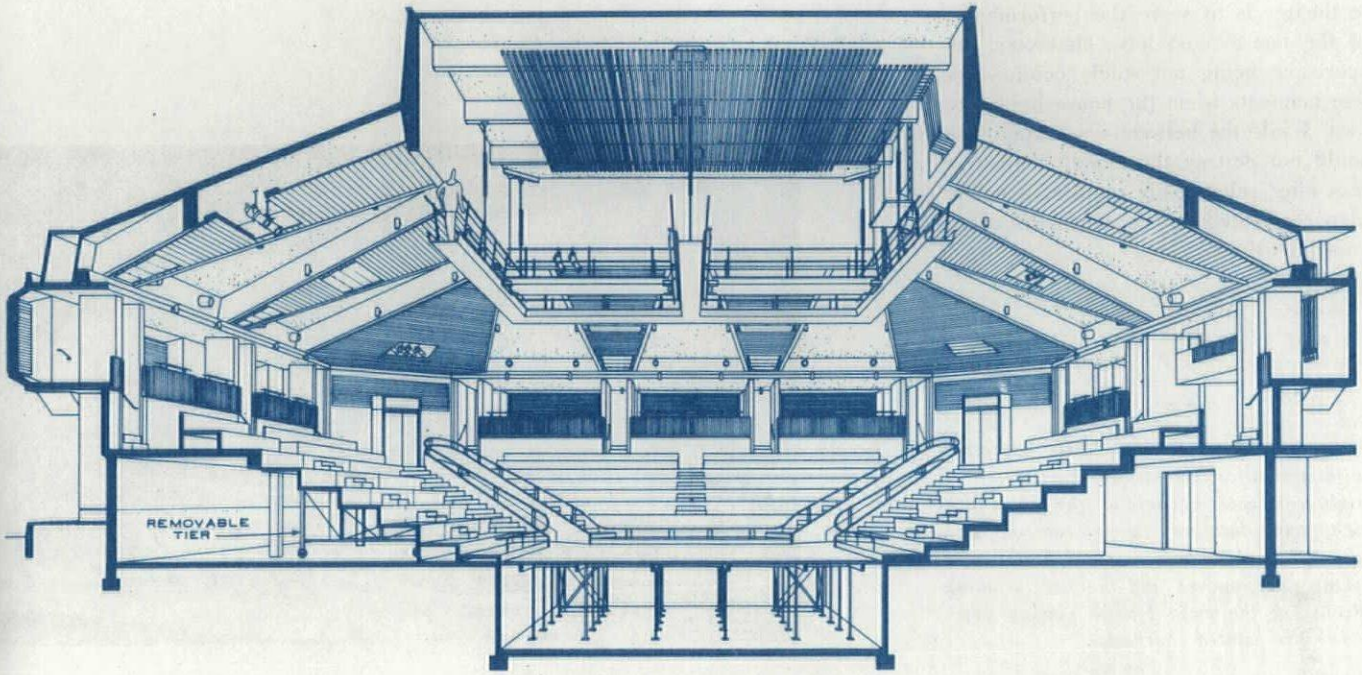
fourth tier removed



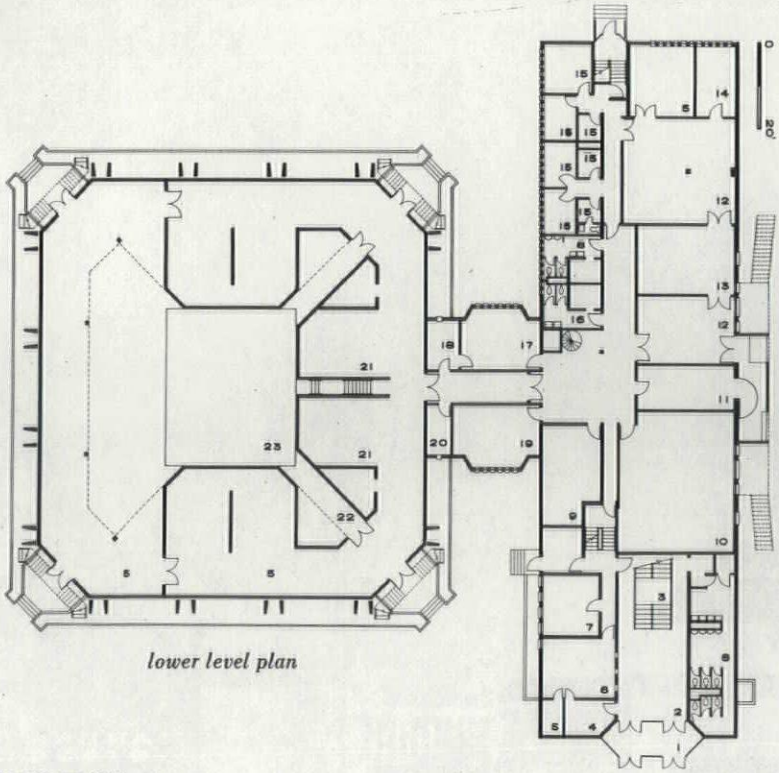
upper level plan

LEGEND

1 *Vestibule*
2 *Lobby (rehearsal room below)*
3 *Stairs to lounge*
4 *Supply*
5 *Storage*
6 *Box office*
7 *Conference room*
8 *Men's toilet*
9 *Laundry*
10 *Costumes*
11 *Receiving*
12 *Shop*
13 *Carpenter shop*
14 *Designer*
15 *Dressing room*
16 *Women's toilet*
17 *Lunchroom*
18 *Pantry*
19 *Green room*
20 *Office*
21 *Property room*
22 *Vomitory*
23 *Stage*
24 *Lounge*
25 *Smoking balcony*
26 *Snack bar*
27 *Mechanical equipment*
28 *Cooling tower*
29 *Cloak room*
30 *Party room*
31 *President's box*
32 *Director's office*
33 *Foyer (light booth above)*
34 *Box*
35 *Tiers*
36 *Removable tier*



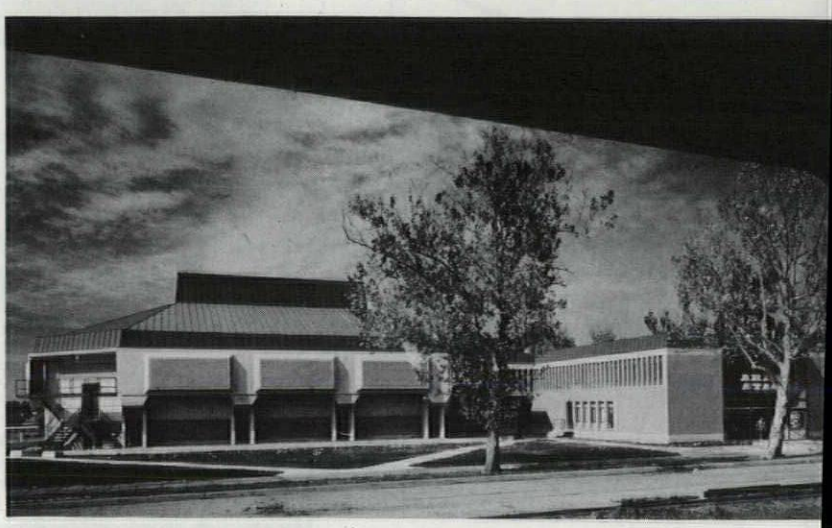
section through auditorium



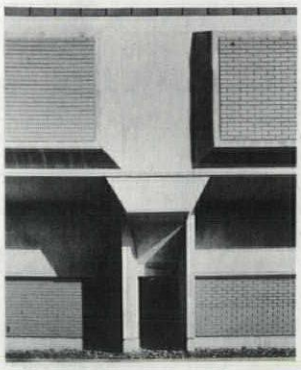
lower level plan

uncovered sections have the concrete roof slab exposed to view.

The building's structure, restrained use of natural materials, subdued color scheme, and the quality of space itself, were the elements used in the auditorium's interior décor. This treatment results from the architect's belief that "the function of the theater is to serve the performance, but the house must have character, the experience being not solely confined to these moments when the house lights are down. While the between-acts experience should not destroy the mood, it must at times offer relief. This requires a subtle balance of treatment in which the décor is not intrusive."



The auditorium's exterior clearly expresses the interior arrangement. Major exterior materials are: exposed concrete, gray-brown face brick, and dark-gray terne roofing. The four steel smoking balconies and fire escapes (facing page, above) *and the steel smoking balcony off the main lounge* (facing page, below) *are painted charcoal.*



ARENA STAGE: Washington, D.C. HARRY WEESE & ASSOCIATES, Architects and Engineers	SELECTED DETAIL WALL SECTION

Tomorrow's Drafting Room

BY HANS W. MEIER

An electronic drafting machine now being designed, which could radically alter today's drafting procedures, is discussed by the Projects Manager for Daniel, Mann, Johnson & Mendenhall, Architects-Engineers of Los Angeles.

Will push-botton machines be drawing the plans in tomorrow's drafting room? Will drafting join the ranks of a hundred other hand skills replaced by fast, accurate machines?

The answer may be yes—and it might be sooner than we think. Being designed right now is a totally new concept of how to make drawings. The concept goes even further and sets up some startling new ideas on what to put into a drawing. To implement these concepts, an electronic device is being considered that would cut today's drafting time by as much as 75 per cent. The machine, "Electrostatic Signal Display and Recorder System" (called "ELSIDIR" for short and referred to as "Elsie Dear" by its inventors), may be the forerunner of a new generation of automated equipment that will substantially change drafting-room practice as we know it, and make some dramatic new thinking necessary in the field of construction drafting.

Let us look for a moment at what tomorrow's drafting room will be like if "Elsie Dear" proves as popular as its inventors anticipate. Picture, if you will, the draftsman of tomorrow. He sits in a comfortable chair at the inside of a U-shaped console table. In front of him is a slanted screen approximately the size of today's 27-inch TV. There are no pencils, scales, triangles, or T-squares. On the face of the screen is a small "target plate" mounted on a thin pantograph arm. In the center of the target plate is a hole into which a stylus is inserted. At the draftsman's left hand is a control cluster that he manipulates to guide the target plate in making straight lines in any direction, for making curves, for changing the weight of line, and—since a man will still be operating the machine—a control for erasing. As the stylus is moved across the face of the screen, a black line appears on the back. But the line is not an ink or graphite one; it is the trail of an electrostatic charge placed by pantographic action of moving the stylus-controlled target plate. Next to the screen is a typewriter keyboard; notes and dimensions are typewritten instead of hand-lettered. A zoom lens can enlarge any area of the drawing. As long as "Elsie Dear" is turned on, the image remains projected on the screen; when the machine is turned off, everything on the screen is photographed. In a few moments, the film is ready to project—either back onto the screen for resumption of work, or onto normal-size blueprints for use in construction.

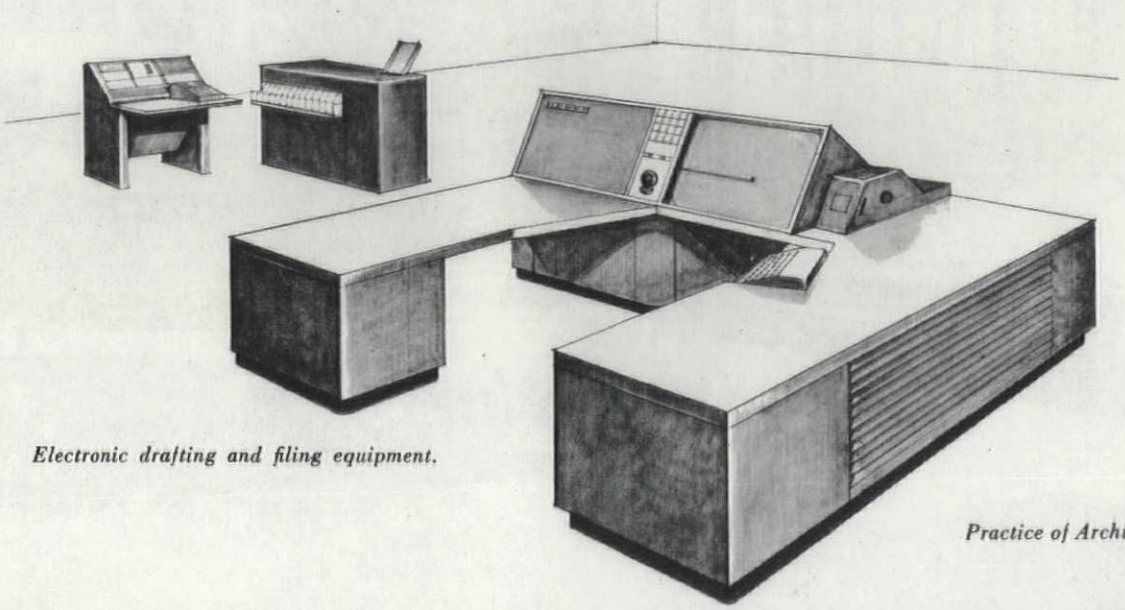
Instead of tracings, "Elsie Dear" turns out 70-mm films mounted on punched cards. Twenty-five thousand of these cards (the equivalent of over seven-hundred man-years of drafting at today's speed) fit easily into a normal five-drawer filing cabinet. Fed into a sorting machine, the cards (with their microfilm attached) can be swiftly sorted into any combination or classification desired. Do you want to assemble all drawings on a certain project? In less than five minutes, they can be in one group ready for printing or for examining on a microfilm reader. Do you want to look at all stairways you have designed in the last ten years? Program the sorter to pick out only those drawings on which stairs are shown, or stairs with pipe railings, or stairs with pipe railings and carborundum treads. Do you want to copy two-thirds of a drawing and add some new details? Insert the old microfilm and project it on the screen, erase the unwanted part, add the new, and rephotograph. It is as simple as that.

Coupled with "Elsie Dear's" drafting ability is its skill in looking up research material and catalogue data. A catalogue file can easily be converted to microfilm and punch-indexed for a rapid retrieving of whatever information is desired. Magazine pictures, building codes, design handbooks—all are capable of being rapidly and economically converted to the standard 70-mm films mounted on punched cards. "Fine," you say, "but how does all this change *what* we draw? Can't we still use the same details we are familiar with, the same reference symbols, the same construction language?"

"Elsie Dear" could make today's drawings, if that is what you want. But it would be like riding an airplane from New York to San Francisco and trying to taxi all the way instead of flying.

"Elsie Dear," in pioneering a new way to make drawings, also causes us to take a serious look at what drawings are and what they are intended to do. Bell Laboratories and MIT have done a lot of work on what they call "Information Theory." Although primarily concerned with concentrating more communications into a smaller space, such as permitting more messages to cross the Atlantic on a particular telegraph cable, researchers probed into what they call "signal-to-noise" ratio. This concerns the amount of static, or

Continued on page 164



Electronic drafting and filing equipment.

OFFICES AROUND A CANOPIED GARDEN

Photos: Roland Chatham

DOW CENTER • HOUSTON, TEXAS • CAUDILL, ROWLETT & SCOTT, ARCHITECTS & ENGINEERS • CHARLES LAWRENCE, PARTNER IN CHARGE OF DESIGN

Commenting on his firm's studious attention to functional requirements, Bill Caudill says that it tends to produce "pretty much 'inside' buildings." When CRS undertook the design of a suburban office development to house its own main office, along with offices of the Dow Chemical Company and other tenants, functional considerations were certainly not slighted. The exterior enclosure is clearly intended as a barrier against the patchy commercial growth around it. In this case, however, the principal interest is centered neither inside nor outside, but in between.

The canopied garden that constitutes the core of the project was created to meet four major objectives:

(1) It affords a tempered transition between the extremes of Texas weather and the fully air-conditioned interior.

(2) It permits generous lobby and circulation spaces without the expense of air-conditioning them.

(3) It offers protection against sun and wind for large areas of glass wall.

(4) It provides an intensively landscaped area where it is most effective, since most people using the buildings will have to pass through it.

In contrast to the hospitable aspect of the garden, the buildings turn large expanses of dark-brown brick, interrupted only by narrow slits of glare-reducing glass, toward the surrounding neighborhood. The treatment of these windows and the emphatic lines of the exposed concrete structure, with its two-story height and 24-ft bays, makes the apparent scale of the buildings deceptive.

Adaptable Interior Spaces

The interiors were planned for utmost flexibility in the assignment of office space. In the two buildings flanking the garden, there are eight distinct locations for entrances. The only fixed elements are the mechanical and toilet facilities.

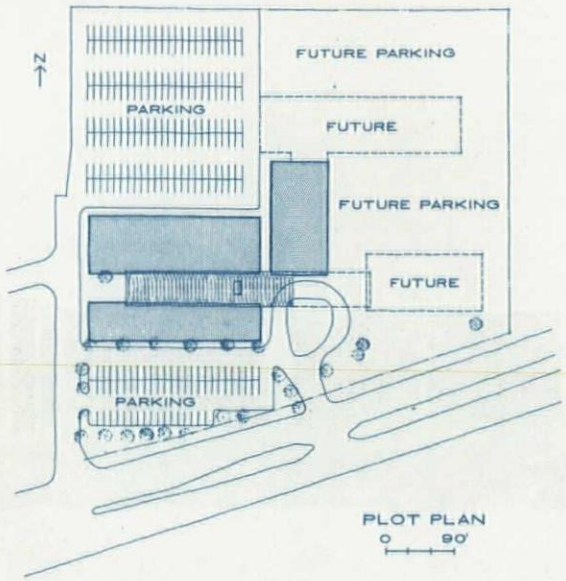
The removable interior partitions are based on a 3'-0" module, which is maintained in the lighting, fenestration, and mechanical installations. Permanent interior walls are generally painted "warm white"; for contrast, felt in black and brilliant colors is applied generously to the removable partition panels.

Interiors for most of the offices were designed by members of the CRS staff. Following an established "team concept," members of the firm handled structural, mechanical, and electrical engineering as well. Landscape architect James Dalrymple was called in to design the garden court.

Expansion by increments of whole buildings is planned. One building has already been added to the original pair and another will soon be constructed. The canopy will be extended across the automobile turn-around to meet the fourth building. Parking areas will have to be extended as the center expands and will eventually cover a large percentage of the site; carefully placed landscaped areas are planned to soften the visual effect.

Development of Canopy

Having established the concept of a canopied garden, the architects were logically led to a roof solution comprising one material which would simultaneously provide the characteristics necessary for structure, cover against weather, and translucency.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FUTURE PARKING
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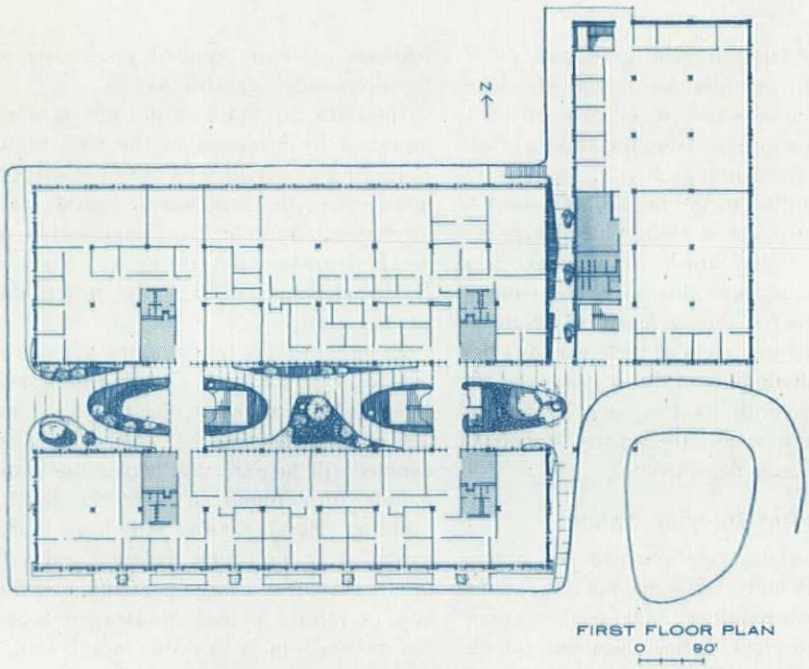
PLOT PLAN
0 90'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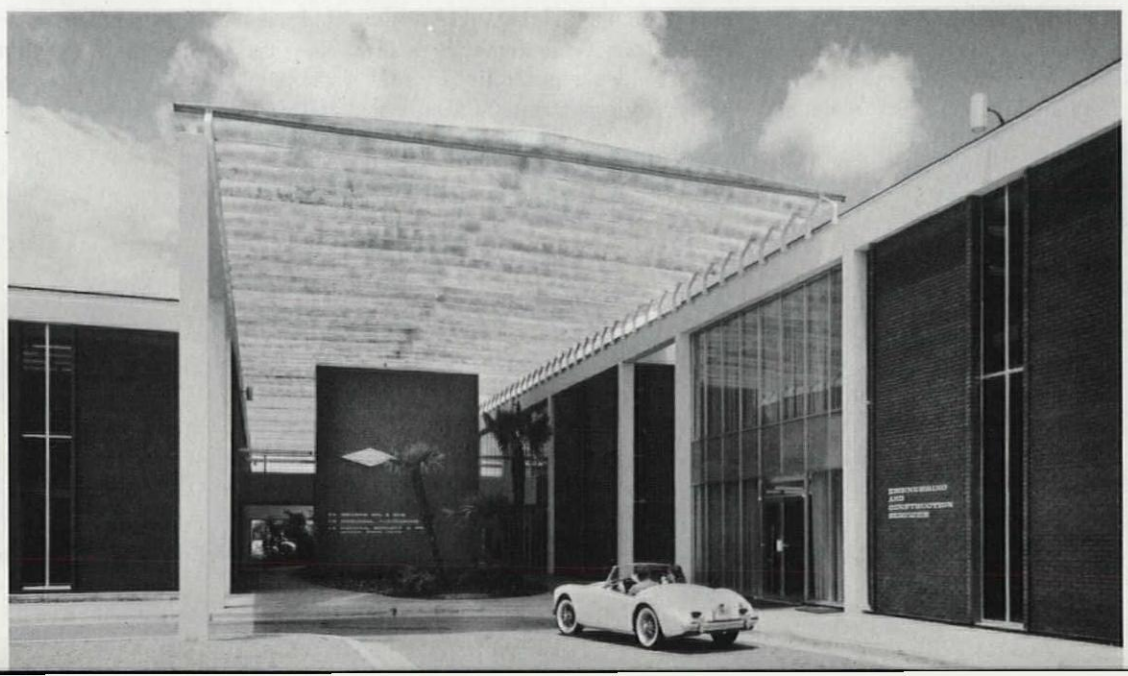
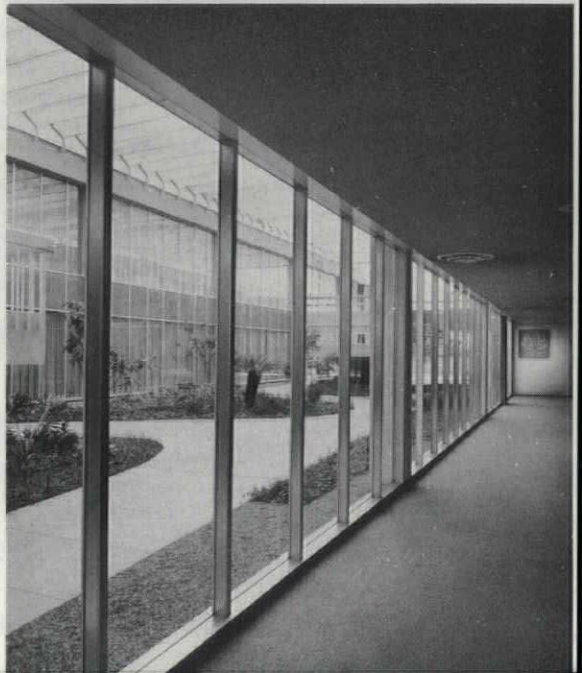
FIRST FLOOR PLAN
0 90'



The site plan (facing page, top) *shows location of two additional buildings planned for the center. The first floor plan illustrates the concept of flexible loft space, with a minimum of fixed elements, that is applied throughout. The all-plastic canopy extends out over the entrance drive* (below, left). *The form and composition of the individual units produce a mottled effect that is accentuated in photographs. The typical 12-ft-wide exterior office* (above, right) *has a useful solid wall behind the desk and view slits to either side, which require no blinds. A conference room and corridor of the CRS office overlook the garden* (right, below right, and below).



A reinforced plastic seemed to offer the most promise in satisfying each of these demands. Collaborating with Buck Winn, a muralist and intuitive designer who had been experimenting with new structural techniques at his ranch at Wimberely, Texas, prerequisites for the canopy were established.

Initial Design Decisions

Since the fenestration and plan module of the buildings had been established at 3 ft, it was decided that the canopy should be built of 3-ft wide repetitive units; in order to span the garden, a length of 38 ft would be necessary. For aesthetic reasons, it was decided that the canopy units should be designed as structural beams rather than as arches. Conceived as membranes stiffened by shape, their configuration should reflect the phenomenon that greatest bending moment occurs at mid span. An upturned gutter section along the edge of each unit, with proper camber, would direct rain water to roofs of buildings adjacent to the garden lobby. White color was preferred; titanium oxide could be used to control light transmission and to impart color. A 20 psf live load was considered adequate and a glass-fiber reinforced polyester resin would be the basic material to resist this loading. The glass-fiber and resin would be sprayed through a pressure gun, developed by Winn, onto a re-useable mold surfaced with a parting compound.

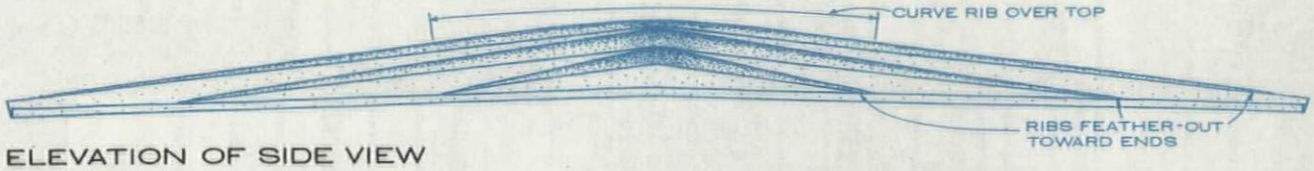
Fabrication and Testing

After testing a small-scale model, applying empirical engineering, and performing membrane studies, it was decided that the first unit to be fabricated would be ⅛ in. thick. Using boat-building techniques, a full-size male mold was constructed of wood. After the first unit was sprayed, cured, popped off the mold, and set on saw horses, tests revealed that when subjected to compression the broad flat skin areas began to buckle at less than one-half the design load.

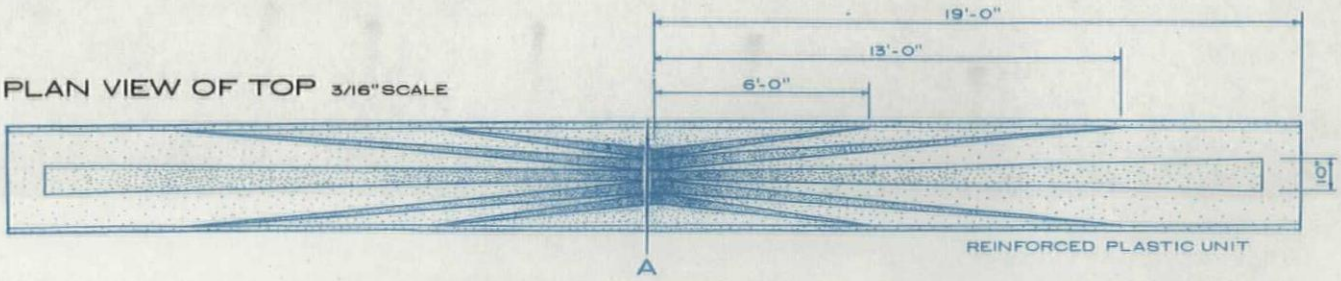
Final design involved two modifications: a pattern of stiffening contours to resist the buckling tendency of the compressive skin loads; and over-all increase in the thickness to ¼ in. Ribs were applied by using split cardboard tubing coated with glass-fiber and a hot-mix polyester. With the increase in thickness, however, it became impossible to use enough titanium oxide to achieve the desired white color and still maintain a 20 per cent light-transmission factor. The color of the finished units, therefore, is a natural result of the materials used in the proportions necessary to impart the required strength, stability, and light-transmission characteristics. The designers now refer to the final color as "built-in patina," since the hue is in the yellow-green range. A second full-scale unit was sprayed on the revised mold and satisfactorily tested for 20 psf. Total weight is approximately 220 lb. During erection, workmen were able to walk on the canopy units in performing their tasks.

Performance

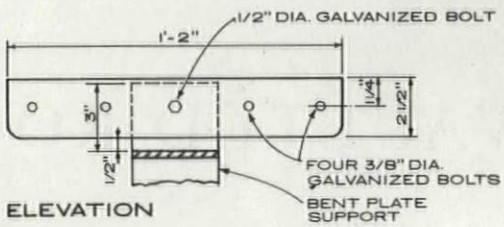
Last fall, the destructive forces of hurricane Carla ripped off 22 units of the canopy. Initial cause was determined to be a rhythmic flutter of the extended lip of the leading edge of the end unit. Originally, the lip was built-in to resist a tendency of the units to dip laterally toward the center. Flutter eventually tore the end unit loose and, once free to flop in the full force of the wind, it pulled succeeding units from their brackets by peeling the canopy back upon itself. Three modifications for both the existing in-place units and the new replacements were initiated: reduction in size of the stiffening lip on the end units; a steel tension tie sealed in the leading edge of each unit; and steel reinforcing plates at the point of connection between each canopy and its steel supporting bracket. Actual load tests indicate that the revised connection will now take an up-lift equivalent to 45 psf.



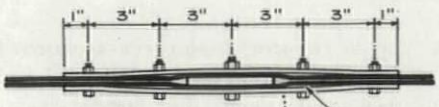
ELEVATION OF SIDE VIEW



PLAN VIEW OF TOP 3/16"SCALE

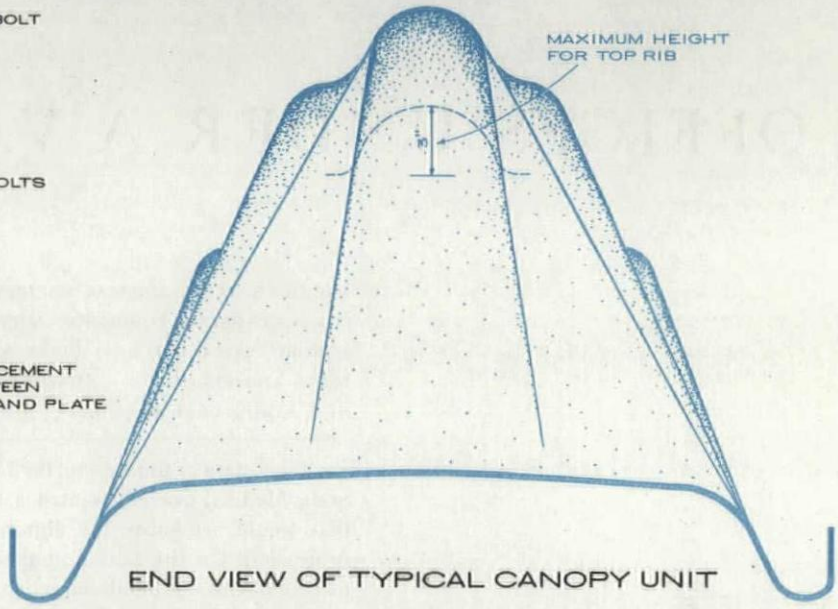


ELEVATION

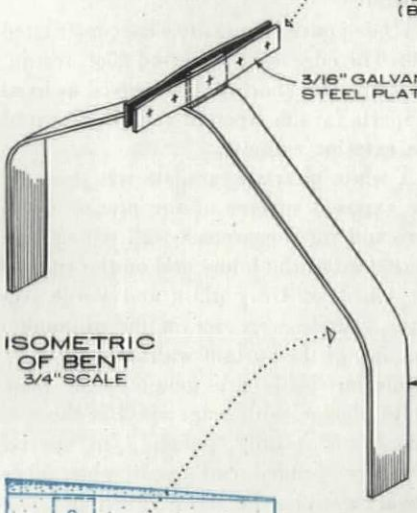


PLAN 1 1/2"SCALE

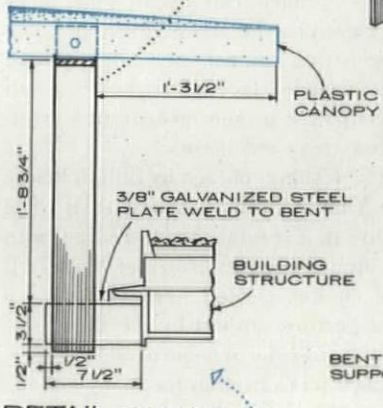
EPOXY RESIN CEMENT APPLIED BETWEEN PLASTIC UNIT AND PLATE (BOTH SIDES)



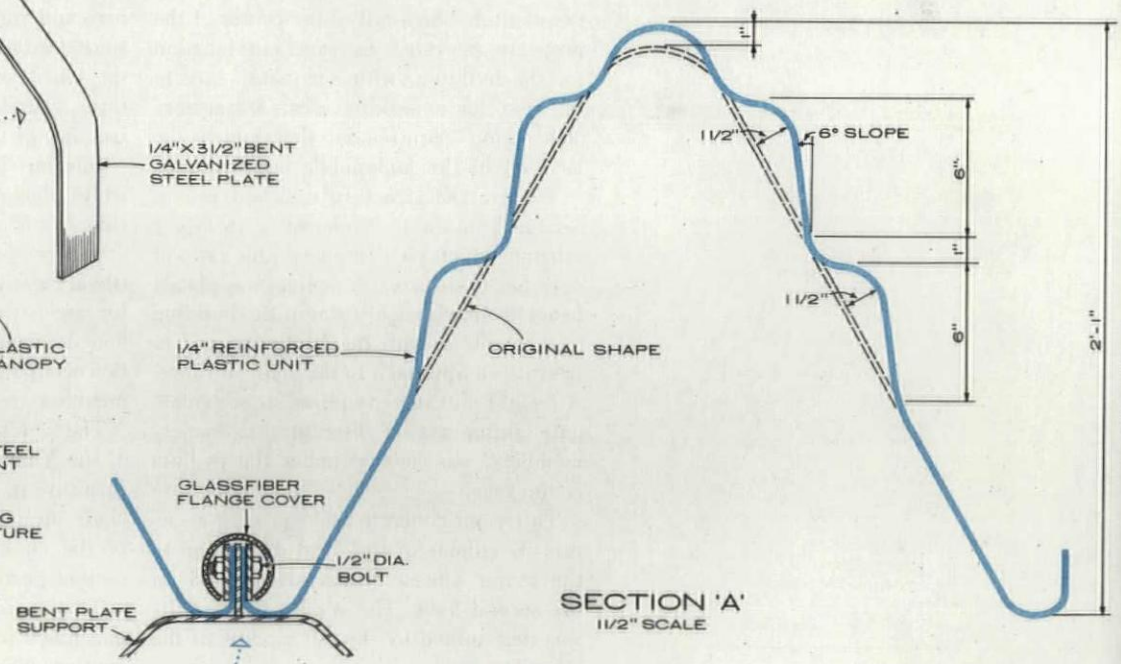
END VIEW OF TYPICAL CANOPY UNIT



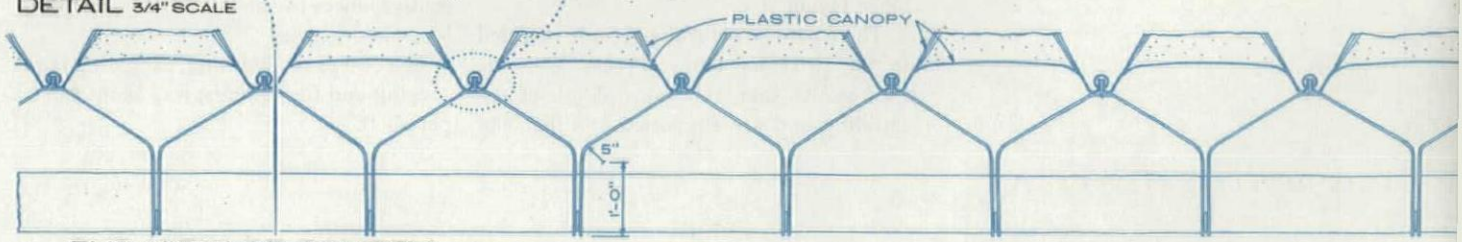
ISOMETRIC OF BENT 3/4"SCALE



DETAIL 3/4"SCALE



SECTION 'A' 1 1/2" SCALE



END VIEW OF CANOPY 3/8" SCALE

Photos: Baltazar Korab

OFFICES UNDER A VAULTED ROOF

MICHIGAN STATE MEDICAL SOCIETY BUILDING • LANSING TOWNSHIP, MICHIGAN • MINORU YAMASAKI & ASSOCIATES, ARCHITECTS AND ENGINEERS • AMMANN & WHITNEY, STRUCTURAL ENGINEERS

For their state headquarters, the Michigan State Medical Society wanted a building that would symbolize the dignity of the profession. On the advice of their architect, they chose a handsomely landscaped site, overlooking one of the main roads into the capital. The knoll at the center of the property provided an excellent location for the building, with adequate space to the rear for a parking area. A statutory clear-vision requirement determined the location of the automobile entrances.

To give the structure sufficient prominence, Yamasaki developed a two-story scheme, which yielded a desirable ratio of coverage to site area. A podium was placed beneath the classical form of the building to reconcile it with the landscape and to provide an approach to the main entrance. A freight entrance, required to accommodate shipments of literature to society members, was located under the podium at the rear.

Thirty-one concrete vaults give the structure its silhouette and lend distinction to the major offices, which are located on the second floor. The width of the vaults was determined by the 5-ft module of the office layout.

The entire structural system is revealed in the two-story lobby. Precast concrete roof vaults span the entire depth of the building and are supported at either end by the two-story-high precast columns that frame the front and rear façades. The floor slabs and the interior columns that support them are of poured-in-place concrete.

These poured elements were constructed first. The edges of the second floor, resting on temporary shoring, then served as fixed supports for the erection and alignment of the exterior columns.

A white quartz aggregate was used for the exposed surface of the precast members and for the precast wall panels that were used in the lobby and on the ends of the building. Gray glass and Verde Antique marble were set in the aluminum framing of the curtain walls.

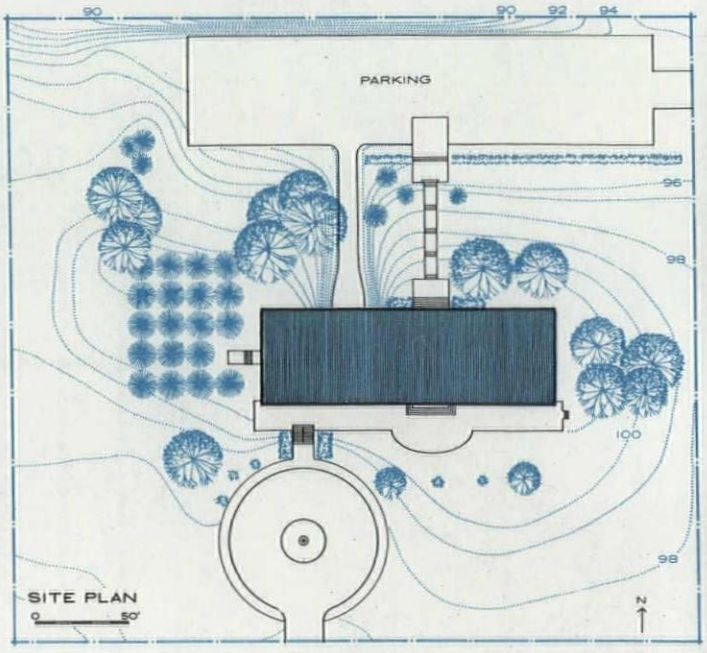
Interior walls are generally of bone white plaster, with beige vinyl in the corridors and walnut paneling in special areas. Suspended ceilings of glass fiber tile are used on the first and second floors for acoustical control. Since the second floor is carpeted throughout and has limited occupancy, no special acoustical treatment was required there.

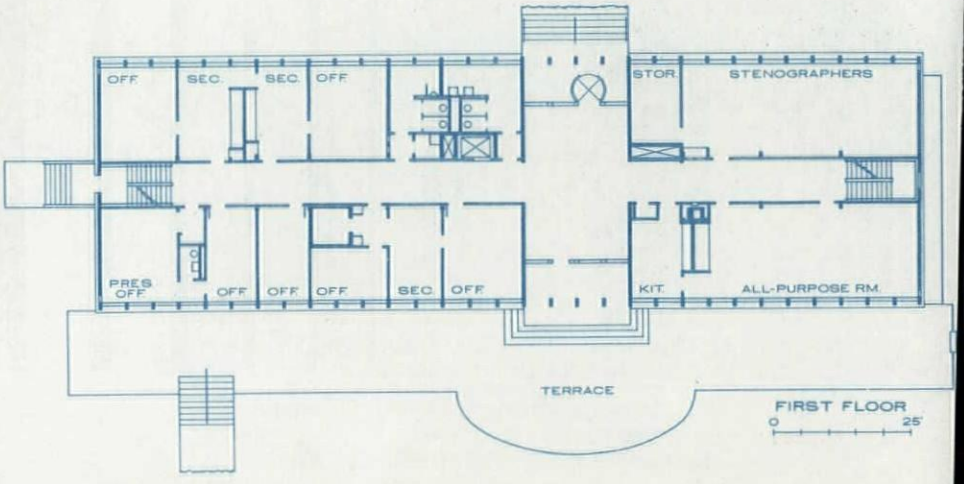
The furnishings chosen by Lillian Pierce of the Yamasaki office include steel office furniture in a special shade of beige, with chairs upholstered in brown or black. All of the chairs selected were checked for correct posture support by the client.

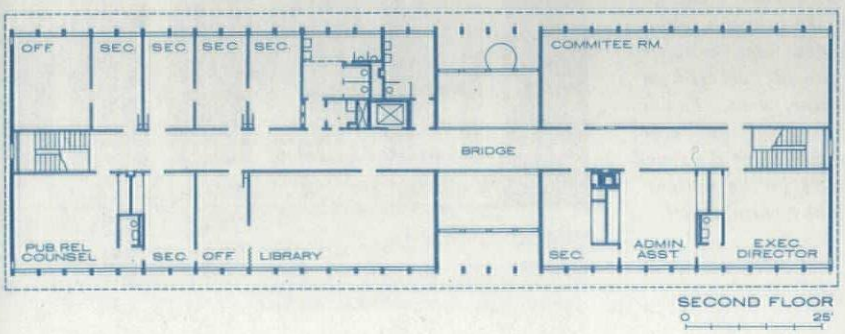
The muted color scheme of white, beige, and black was varied in the lobby and executive offices by the introduction of strong blues and greens.

The cost of the building, excluding landscaping and furnishings, was about $25.00 per sq ft.

Concrete panel walls in the lobby (left) *are similar to the end walls of the building. The custom-designed lobby carpet is in shades of blue and green. The underside of the second-floor bridge is a luminous canopy* (below, left) ; *recessed fluorescent strips can be seen in the corridor beyond. The second-floor committee room* (facing page) *shows the exposed concrete vaults and special suspended lighting fixtures; the architect now feels that they obscure the effect of the vaulting. The sectional walnut table is one of several pieces designed for the building by Hugh Acton. The site plan* (below) *shows how the parking area is shielded from the highway by the contours of the property.*



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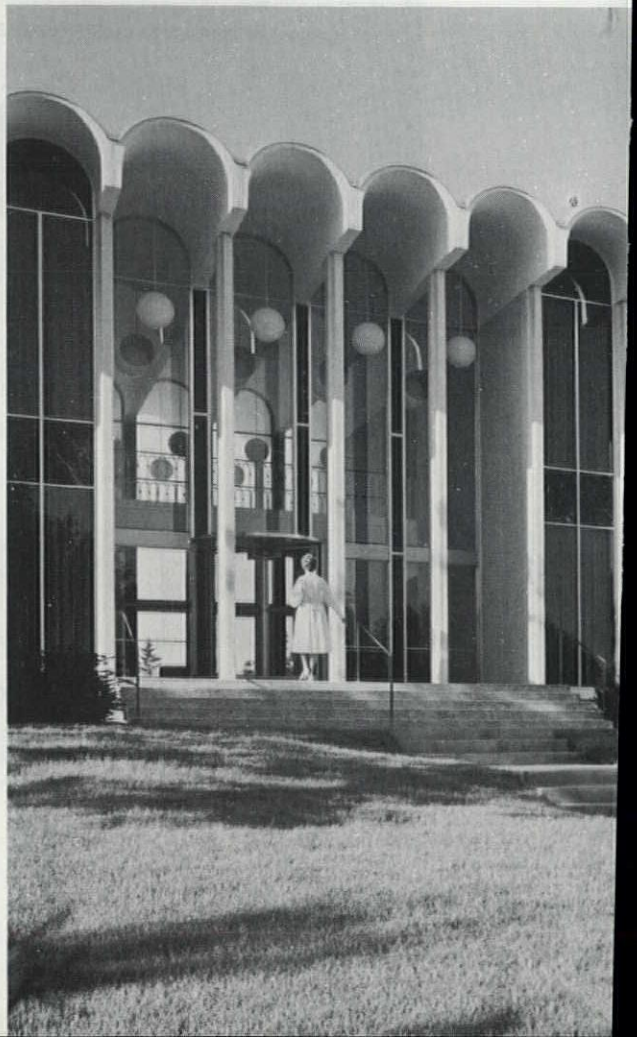


Twenty-inch white globes illuminate the two-story lobby. The shaded rear entrance (right) *provides access from the parking area. Photos show the use of the Verde Antique marble of the spandrel panels in the uprights of the lobby curtain wall.*

VINYL WALL COVERINGS

BY FRANK J. BLANK

*Since no accepted standards of value exist among vinyl wall covering manufacturers, there have been disappointments and failures in the service of this material. The President of Frederic Blank & Company, by means of questions and answers, presents useful information concerning vinyl wall coverings that will be of importance to both the designer and specifications writer.**

Vinyl wall coverings have become a product of major importance; because of their many demonstrated advantages, they are today being produced and used in an ever-increasing volume. At the same time, they are probably the least understood of contemporary decorative materials, and this lack of knowledge has led to many disappointments and failures. Users make costly errors in selection, and even those whose positions require that they assume the responsibility of recommending or writing the specifications for vinyl wall coverings find it difficult to avoid serious mistakes.

Errors are in large part excusable. No accepted standards of value exist among vinyl wall covering manufacturers. Also, the comparative newness of the materials limits the user and specifications writer in evaluating the various brands, and in determining how these will behave in service. Currently, the principal available sources of information are promotional pamphlets with little or no technical data, and the presentation by sales personnel, which is naturally slanted to favor the brands they represent.

Questions and answers that follow were prepared to help guide the user and the specifications writer in this confused situation. Unfortunately, it is a situation that shows every sign of continuing indefinitely. One reason is the reluctance on the part of some major manufacturers to consider the question of quality standards for the industry; this is the result either of company policies or a lack of wall covering experience pointing to the need of standards to protect their own interests and those of their customers. This negative condition in the industry will probably continue as long as users feel that by simply purchasing vinyl wall coverings they are assured of satisfactory performance. The increasing number of performance failures of coverings so carelessly selected has had a harmful effect on the entire industry.

The questions most frequently asked about vinyl wall coverings will be answered here with complete objectivity; in this way, we hope to provide users and architects with background information that will help them judge the materials and obtain essential facts about different brands so they can make a sound evaluation and comparison.

What is vinyl and what are the reasons for its use in wall coverings?

As the term is used in the wall covering industry, vinyl is the commonly accepted name for plasticized polyvinyl chloride polymers and copolymers. In quality formulations, it is an ideal material for wall coverings, far more efficient and more versatile in performance and appearance than the decorative surfacing materials which it is very frequently called upon to replace.

What causes the current increase in demand for vinyl wall coverings?

The realization that they combine beauty, durability, ease of maintenance, fire safety, the advantages that come from the strength of the wall coverings in providing permanent protection against plaster cracks or similar defects in the base wall, the simplicity with which damaged areas can be repaired, and the long-term economy of the wall coverings.

How is vinyl applied or used in manufacturing wall coverings?

Three methods: (1) coating a vinyl "melt" on a base or supporting material; (2) laminating calendered vinyl films to the base material; and (3) using the calendered films without any support.

Which is the method most commonly used by the industry?

The coating method, also called the plastisol method. This is done by guiding the viscous vinyl melt to a fixed coating knife, which spreads a layer of this melt on the moving base material.

What is the laminating method?

It is the one in which heat and pressure are used to fuse a calendered vinyl film to the base material.

How about the unsupported film method?

This method produces a wall covering consisting of a film which has no supporting element except a cellulose spray on the underside of the film.

Are all the base materials alike?

Woven fabrics account, by far, for the greatest share of the national production. Nonwoven cotton fiber and impregnated paper compositions play a minor part in the general production. Woven fabric has proved to be the most stable element of all and explains why it has been adopted by the majority of manufacturers.

Is there a difference in performance between a knife-coated and a calendered film wall covering?

In the opinion of vinyl producers, a hard-tempered, calendered film offers greater resistance to impact damage than a knife-coated surface.

The claim is made that vinyl coverings are more economical than traditional wall treatments. Can this be substantiated?

In installations where careful cost records have been kept, it has been repeatedly demonstrated that the long-term economies offered by quality vinyl wall coverings result in major savings over even such low-cost wall treatments as painting. Redecorating costs and maintenance charges generally are sharply reduced.

What type of users demand durability?

Mostly the industrial, the commercial, and, particularly, the institutional buyer. He strives to prevent future repair costs and must buy wisely to the end that every dollar becomes a long-term investment.

* Believing in the merit of this discussion, the publisher has agreed to the author's wish for simultaneous publication in *Hospital Progress*, a journal reaching an entirely different audience.

Has the durability of vinyls in any way affected the approach to interior decorating?

The long-term service of these materials makes it inadvisable, especially in institutional work, to indulge in "way-out" effects that may look contemporary now, but are out of fashion in a few years. It is prudent to avoid "dating" vinyl decoration; do not cater to fads that tend toward rapid obsolescence.

Are there vinyl wall covering lines that are more decorative than others?

Yes. There are manufacturers who cater to the demand of those primarily concerned with "high style" and to whom durability and maintenance advantages are of secondary importance. Prices quoted are in such cases influenced more by eye value than by performance.

Does embossing affect maintenance?

Virtually all vinyl wall coverings are given some kind of embossing effect to add to their attractiveness. Deep, three-dimensional embossings are often appealing, but they present great difficulties in cleaning. When a striking embossing effect is considered, its practicality should first be tested from a cleaning standpoint. Better yet, rely on printing to obtain the desired texture effect.

What are the elements that actually determine the performance behavior of a vinyl wall covering?

Ability to resist damage depends primarily on the thickness and purity of the vinyl layer (not on the over-all thickness of the product). Maintenance performance depends principally on: (1) whether the surface embossing is of a type that facilitates cleaning and other maintenance; and (2) on the protection provided in manufacturing for the printed colors and designs.

Is there a method for classifying the degree of damage protection offered by vinyl wall coverings?

Three classifications have been crystallized as a result of trade practices, Government purchasing, and general experience. There are: Group A, which calls for a light-weight wall covering for walls and ceilings subject to ordinary wear and traditionally finished by such means as painting; Group B, which calls for heavy-duty (medium-weight) materials for walls requiring greater protection than afforded by the lighter-weight materials; and Group C, where the need is for a heavy-weight or super-duty product for protection when the wall is subject to greater than average abuse, as in the case of the lower wall areas in corridors.

What vinyl thickness should each group have to perform satisfactorily?

Group A requires a vinyl coat of 4 to 5 mils in thickness. Group B should range between 9 to 14 mils and Group C between 15 and 22 mils. These are vinyl thicknesses as measured before embossing.

What happens if the relationship of vinyl thickness to the individual needs is disregarded?

It is almost certain to lead to trouble. *Suitable strength* (vinyl thickness) is the deciding factor. Unless a material is selected that will suit the purpose, the user will either be paying too much for unnecessary and unrequired strength, or he will be acquiring a sub-par gage too weak for the protection needed and only too readily subject to costly damage. An intelligent appraisal of the specific wall needs in their relation to vinyl performance is necessary for maximum satisfaction.

Why do some specifications refer to over-all thickness instead of vinyl thickness in describing a wall covering?

This can be traced to the guidance of salesmen who sponsor products with comparatively little vinyl and a bulky base material. Thus, the "thickness" of the material simulates strength and appears impressive to the uninitiated—in addition to being lower in cost. To repeat: *the thickness and the purity of the vinyl are the factors that provide damage resistance—not the base material.*

How does purity of vinyl affect the performance of a wall covering?

A pure vinyl compound provides maximum strength. Extenders weaken strength in the same ratio as their percentage in the vinyl melt. Clay seems to be the commonest extender used.

Why are extenders mixed in with the vinyl?

Primarily because they help to lower cost. This watering-down produces the product that "has the vinyl thickness called for in the specification—but costs less."

How can the presence of extenders be determined?

A Taber Abrasion Test is generally used for the purpose. To provide assurance of the proper performance of the vinyl in service, the test results should not register a loss greater than 18 mg per 1000 revolutions on CS10 wheels, and 1000 gm weights on each wheel. Higher figures imply dilution.

How can the user protect himself against adulteration?

His best protection against an adulterated product is to insist on seeing the manufacturer's laboratory data reports. These should cover the abrasion test data, as well as data obtained from such standard tests as tear strength, fire resistance, etc.

How about the element of surface protection?

Many vinyl wall coverings are surface-printed, with the result that the decorative finish is likely to be superficial and subject to rapid deterioration from exposure and, commonly, maintenance abuse. This nullifies one of the principal advantages of vinyl wall coverings, the durable character of their beauty.

How can unprotected surface-printing be established?

Rubbing with cloth and acetone (nail-polish remover) will remove surface-printing with comparative ease.

Is there any positive protection against this deterioration?

Some manufacturers roll or spray vinyl over surface color and print. Such protection is "skin deep" and only as good as the thickness of the spray deposit. Other wall coverings are laminated with a top clear vinyl film of 2 mils minimum, which insures protection extending over the physical life of the wall covering.

What other factors should be considered when selecting a vinyl wall covering?

These are varied and depend upon the purpose of the wall covering and, more so, on its location. In institutional, commercial, and industrial installations, such factors as fire resistance, toxicity, color stability, tear strength, glasslike washability, mildew resistance, and stain reaction are at the top of the list.

Are there any tests that substantiate quality claims?

Every manufacturer of repute will gladly submit his product's laboratory data upon request. Make sure that results of *established* tests are compared, lest they prove useless or misleading. Readings which replace figures with "good" or "satisfactory" are, of course, meaningless.

Which should rate priority: performance or decoration?

It should be remembered that vinyls owe their place today to the need for durability, easy maintenance, and economy. Their decorative function, to be sure, is very important. To make selections, however, that are based primarily on eye-appeal without first establishing qualitative values, would defeat the main purpose of the wall covering.

What, then, is the logical thinking sequence in selecting a vinyl wall covering?

The user must first establish the strength classification into which his requirements fall. He then assembles the materials that belong to the right group and selects from among them the ones that possess the vital qualifications. Only then should the decorative selection follow.

To sum up, what are the essentials of a vinyl wall covering specification?

(a) Purity of vinyl; (b) weight of vinyl or thickness of vinyl coating (before embossing); (c) abrasion (Taber test); (d) color fastness; (e) long-term protection of surface print or color; (f) dimensional stability.

Is there any need for obtaining data on other properties?

There are a number of individual circumstances and regulations that call for test figures on flame spread, on toxicity (animal inhalation test), on mildew resistance, on tear strength (Trapezoid method), on adhesion of vinyl to base material, on resistance to heat, on reaction to solvents and chemicals, etc.

Briefly, when considering vinyl wall coverings, the following suggestions seem to be in order: examine and compare laboratory data carefully; draw specifications that are guided only by facts and figures and that replace generalities with pinpointed demands important to performance. This will help in having materials submitted with the properties you need, and will tend to eliminate marginal products that strive for eligibility through the medium of low cost and at the sacrifice of performance. Select intelligently, and before you ask, "What sells for less?" ask first, "Will it stand up?" This will go a long way in helping to upgrade quality standards of laggard manufacturers and in bringing the vinyl wall covering industry closer to accepting quality standards for the benefit of everyone.

CENTRIFUGAL

BY HENRY M. POLLAK

This article discusses the characteristics and capabilities of centrifugal pumps with which the architect should be basically familiar. The principal points of discussion are: pump comparisons; selection of right impeller; pump hardware; pump size; and location. The author is Development Engineer, Commercial Pump Department, Ingersoll-Rand Company.

A major problem facing the architect is to select the "one" best pump out of a maze of types, sizes, and features offered by various pump manufacturers. Centrifugal pumps will handle the vast majority of liquid-moving problems that face an architect. Centrifugals are less expensive initially, more efficient, less costly to operate, less costly to maintain, and can pump liquids that are impossible to handle with rotary or reciprocating pumps. Liquids handled by centrifugals can be clean and clear, dirty and abrasive, or even contain high percentages of solids.

Comparing Pumps

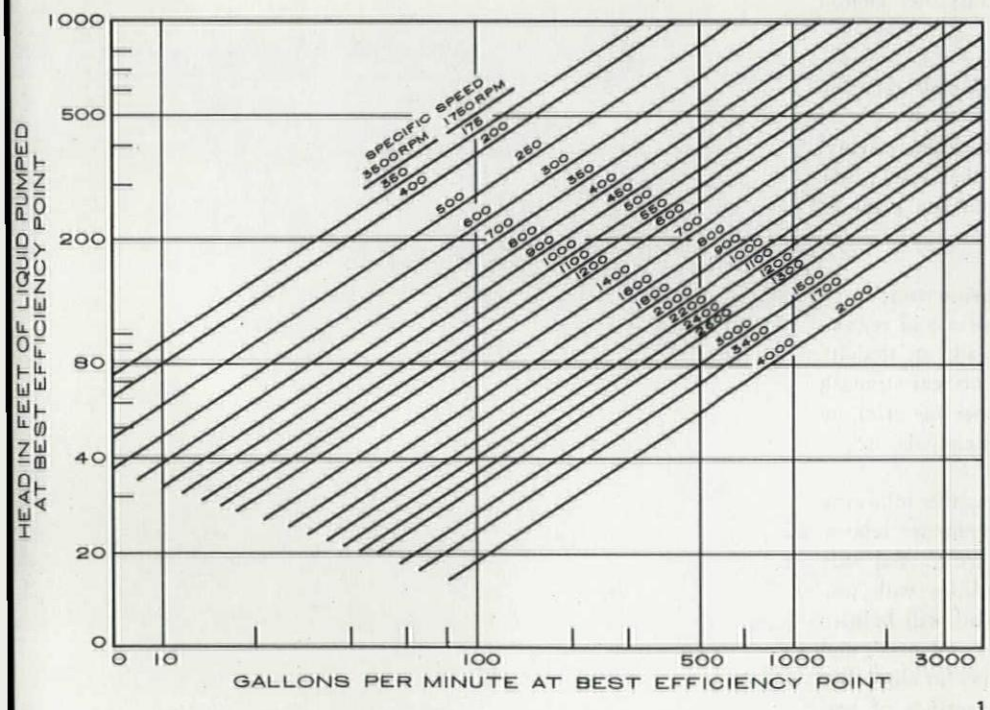
Hydraulically, pumps can be reduced to certain fundamentals for a basis of comparison: (1) specific speed; (2) efficiency; (3) driven speed; and (4) suction conditions.

Specific Speed. Hydraulically, centrifugal pumps are classified according to specific speed. Centrifugal pumps can be compared on this basis regardless of the relative sizes of the individual pumps. The specific speed of a pump is the factor that allows the designer to relate the capacity to the head of a pump at its most efficient point.

Specific speed of a pump is not normally supplied by the pump manufacturer, but can be determined with the aid of a chart **(1)**. First, determine the pump capacity and the head at its *most* efficient point. Locate capacity on bottom horizontal scale and the head on the vertical scale. Read up, and then over, to determine the point of intersection. The number on the diagonal line at the point of intersection is the specific speed.

Efficiency. In addition to the obvious effect of efficiency on operating cost, there is still another important reason why architects should be concerned with efficiency—noise level. Flow patterns in a hydraulically noisy pump contain eddies, separations, vortices, mismatched hydraulic passages, etc. These conditions also describe the most common culprits of low efficiency. Efficiency, then, is frequently indicative of the comparative noise levels that can be expected.

An indication of pump efficiencies that can be expected can be determined **(2)**. Locate the rated capacity in gpm on the bottom scale. Read vertically to the intersection of the specific speed curve of the



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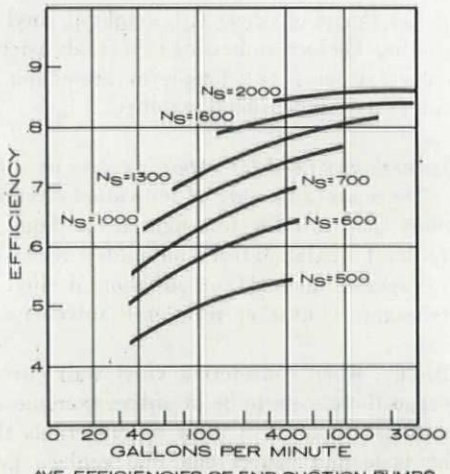


AVE. EFFICIENCIES OF END SUCTION PUMPS OFFERED BY (3) MAJOR MANUFACTURERS

2

PUMP SELECTION

pump. Read horizontally to the vertical scale on the left to obtain an average peak efficiency accurate to ± 5 per cent. This chart is based on vertically-split, end-suction pumps. Efficiencies for horizontally-split, double-suction pumps will tend to be slightly higher in large, high-specific-speed units, and slightly lower for smaller, low-specific-speed pumps.

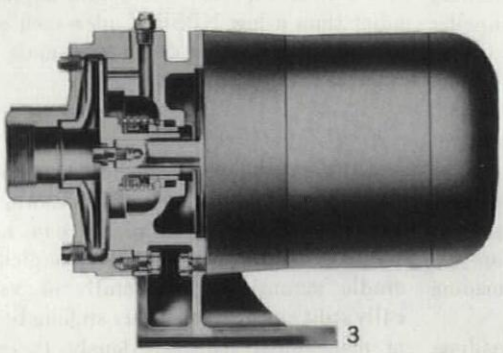
Driven Speed. Three speeds are commercially available with 60-cycle AC induction motors supplied by pump manufacturers. It is almost always wise to select the highest synchronous speed available. Commercially available single-stage centrifugal pumps generally have specific speeds under 3000 rpm. Motor speed of 3450 rpm will inherently provide the most efficient unit, since efficiency increases with specific speed up to 3000 and the specific speed varies directly with the motor speed. In addition, the higher the speed of the pump, the smaller and more compact the unit becomes. Most pump manufacturers reflect this by reducing the cost of the unit on a dollar/gpm basis.

However, efficiency is not the only criterion in the selection of pump speed. There are at least two other factors that may enter into selection. When they do, a lower-speed unit is often required.

First, acceptable noise level might be such as to dictate the use of slow-speed units. Noise can be reduced in higher-speed units by isolating the pump on its mounting, at its piping connections, and in the space in which it is mounted. Although hydraulic noises are of little importance in a well-designed and well-built pump, driver noises, bearing noises, and other mechanical noises can be reduced substantially by using a slower-speed unit.

Second, when difficult suction conditions are an important consideration, the basically required lower suction pressures of low-speed units can be used with advantage. There are other methods, such as relocating the pump, changing the system design, etc., that will achieve the same end, and these should be investigated before specifying lower-speed units.

Suction Conditions. Suction conditions are probably the source of more pump troubles and more improperly applied units than any other single problem connected with pumps. *All pumps must be supplied with some positive pressure (absolute, not gage) on the fluid at the entrance to the impeller.* Without sufficient pressure in centrifugals, cavitation occurs in the form of vapor bubbles, formed at the intake, that collapse against the impeller. This collapse creates considerable noise, as well as mechanical action, and can result in serious pitting and erosion of the impeller. Trouble can be prevented by specifying the suction head (pressure) required by the pump



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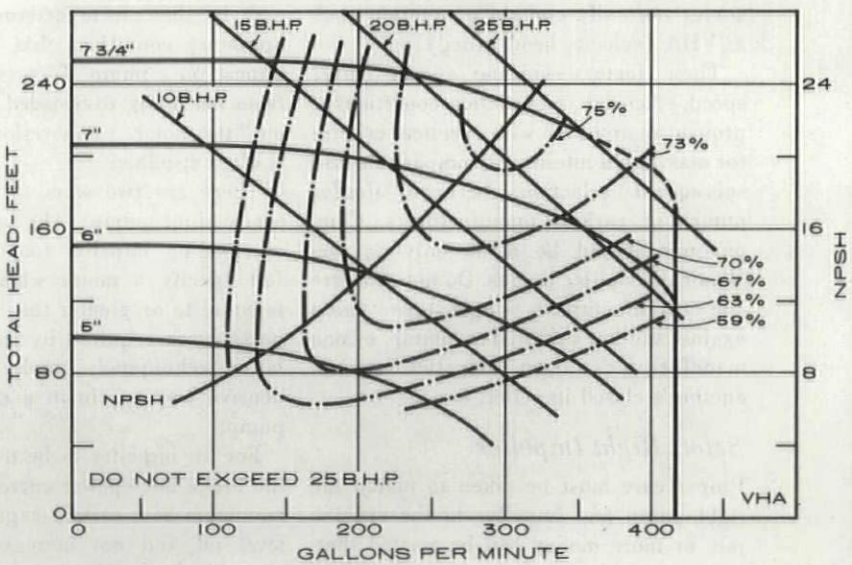

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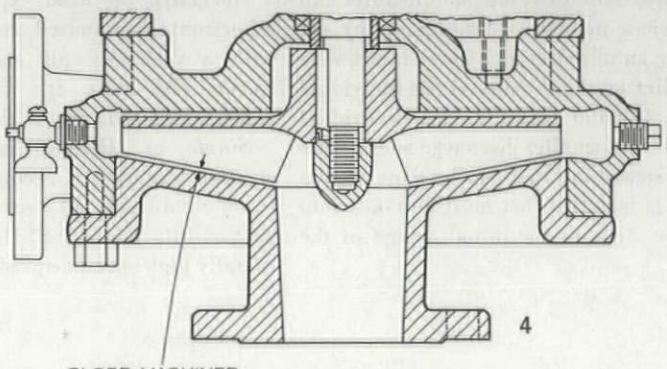

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CLOSE MACHINED CLEARANCE

impeller equal to or slightly smaller (lower) than the available system suction head.

Suction head is described by pump manufacturers by a term called Net Positive Suction Head, NPSH. There are *two* NPSH's to consider for the analysis of a system: (1) the NPSH *available* in the system; and (2) the NPSH *required* by the pump to prevent cavitation.

Required NPSH is a function of the pump design and is obtainable only from the manufacturer of the pump. Available NPSH is a function of system layout and the fluid being pumped, and can be easily calculated for a system.

For the system: available NPSH = absolute pressure measured at the pump intake—that is, vapor pressure of the liquid being pumped.

For the pump: required NPSH $\leq$ available NPSH.

As long as the available NPSH is equal to or slightly greater than required NPSH, there should be no danger of cavitation. Absolute pressure measured at the pump intake does not include the velocity head. Be sure that the manufacturer's curve showing the required NPSH has taken this quantity into account, or make the correction before comparing with available NPSH. Some manufacturers do not include the velocity head in their curves, and on the surface these pumps would appear to have very low required NPSH. When velocity head is included, pump curves normally contain a notation such as VHA (velocity head added).

These factors—specific speed, driver speed, efficiency, and suction conditions—provide an architect with excellent criteria for making an intelligent comparison, and subsequent selection, between *similar* pumps of various manufacturers. Comparisons should be made only on mechanically similar pumps. Do not compare one manufacturer's single-stage pump against another's multistage pump, or one manufacturer's open impeller against another's closed impeller, etc.

Select Right Impeller

Proper care must be taken to match the right pump and impeller to the specific job, or more money can be wasted than is saved with centrifugal pumps. The pump impeller must be matched to the specific set of conditions in the system for best service and lowest pumping costs. Mechanically, there are three areas involved in selecting the right impeller: (1) open or closed impellers; (2) overloading or nonoverloading impellers; and (3) high efficiency or low NPSH.

Open or Closed Impellers. In the closed impeller, the head is generated between two confined walls rotating with the shaft **(3)**. In the open impeller, the head is generated between one wall rotating with the shaft and one stationary wall, usually the casing **(4)**.

Closed impellers should be preferred in the great majority of applications facing architects. A closed impeller requires little maintenance or service during its life. Its wearing surfaces are less critical than those of an open impeller and, with nominal maintenance, it retains its original efficiencies over a greater portion of its total life. Although the closed impeller is normally a more expensive one, the initial savings in the over-all pump cost can more than compensate for this. Running fits and clearances increase with use, but efficiencies do not drop off as rapidly as with the open impeller.

The efficiency of an open impeller is dependent upon maintaining close clearance between the unshrouded side of the vane and the stationary wall that forms the other side of the head generating passage. Any increased clearances result in large leakage losses and hence lower efficiencies. In addition, these close clearances must be maintained at the periphery of the impeller, where erosion and wear are accelerated due to the high surface speeds. Leakage on a closed impeller, on the other hand, is controlled closer to the impeller hub.

Nonoverloading Impellers. At times, it may be difficult to determine the exact operating conditions that a system will impose on a pump. To prevent the pump from becoming overloaded and "burning out" the motor, a nonoverloading impeller is often specified.

There are two ways to obtain a nonoverloading pump: (1) specify a nonoverloading impeller for the pump; or (2) specify a motor whose horsepower is equal to or greater than the maximum horsepower required by the pump. This latter technique is usually the more expensive way to obtain a nonoverloading pump.

For an impeller to be nonoverloading, the brake horsepower curve must reach a maximum at a certain capacity and then level off and not increase with added capacity. Generally, the manufacturer can produce a nonoverloading pump by designing an impeller with fewer vanes, with a smaller angle of outlet of the individual vanes (greater wrap to the individual vanes), or a smaller discharge width. This is not something that can be done after a pump is installed, but must be taken into consideration in the initial design of the unit.

By initially specifying a nonoverloading impeller, the pump manufacturer can supply a pump with a smaller motor so that the entire unit is less expensive initially and less expensive to operate. For example, the pump diagramed, with the 7" impeller, would be nonoverloading with a 25 hp motor **(5)**. For a condition of 170 gpm—200', selection of the same pump with nonoverloading performance could dictate a 7¼"-diameter impeller but a maximum of only 15-brake horsepower.

High Efficiency or Low NPSH. It was previously mentioned that, in matching a system with low NPSH, it was generally necessary to buy a slower-speed, larger, and more expensive pump. But, sooner or later, someone will offer an impeller with a low NPSH in a nice, neat package operating at 3450 rpm. Would it work? It would. But, it would also mean paying for this nice, neat package every minute the pump is running.

Low required NPSH is obtained (for a given diameter impeller) by opening the impeller eye to reduce the inlet velocity, among other things. On a given diameter impeller, opening the eye results in shortening the flow path. As the flow path is shortened, efficiency often drops, the head can be reduced, and the capacity can drop off.

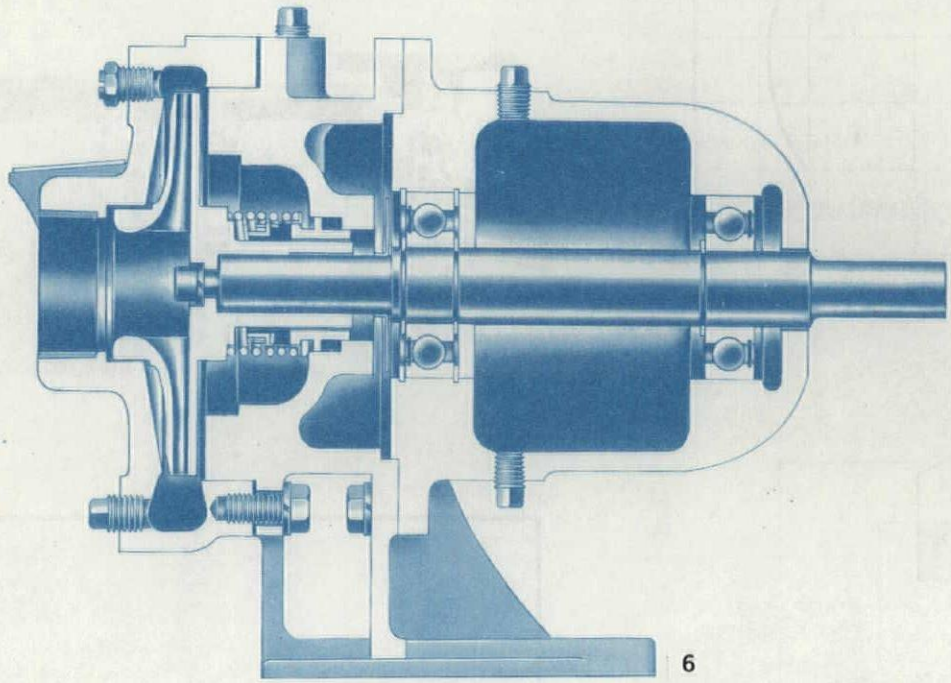
Low NPSH and high efficiency are usually incompatible. It is frequently much less expensive, in the long run, to alter the system to provide greater available NPSH than to require low NPSH for the impeller. Of course, there are some conditions, such as condensate return, where it is impossible to obtain anything other than a low NPSH. Under such conditions, the loss in efficiency must be tolerated.

Pump Hardware

One has a choice of mounting a pump right-side-up, sideways, upside-down, or any position in between. He can have single or double suction; close-coupled or cradle mounting; horizontally or vertically split casing; and either stuffing boxes or mechanical seals. Obviously, there is wide variation in the functioning and in initial cost as well as operating costs of the many designs.

Normally, the least expensive pump is a horizontally-mounted, end-suction pump with a vertically-split casing **(6)**. Unfortunately, there are times when this construction will not do the job.

Single vs. Double Suction. Double-suction pumps are recommended under three conditions: (1) exceptionally high suction-lifts (low NPSH); (2) exceptionally high specific-speed areas; and (3)



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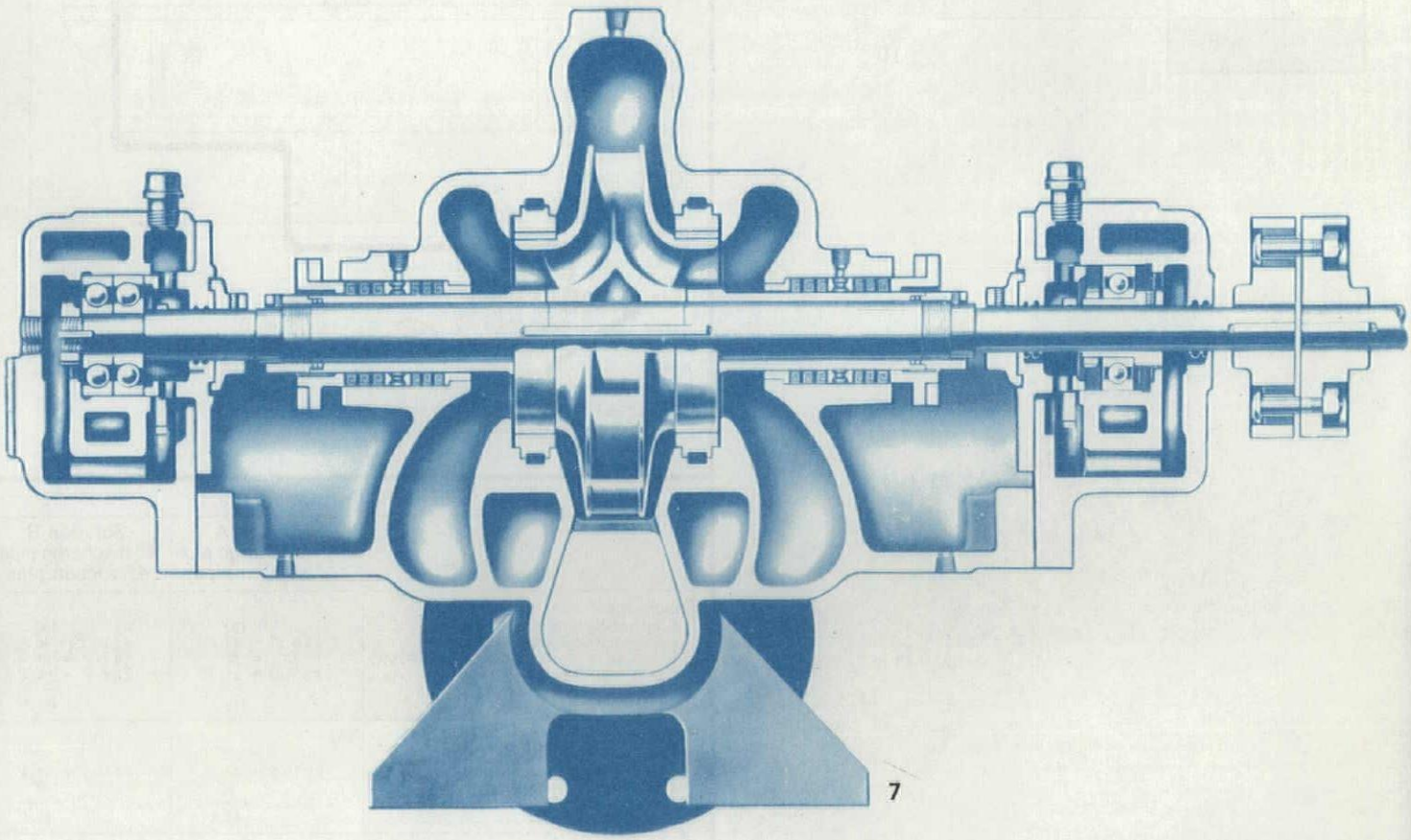

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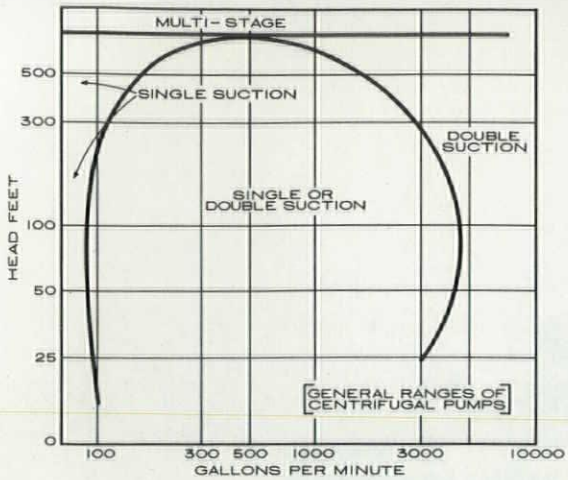

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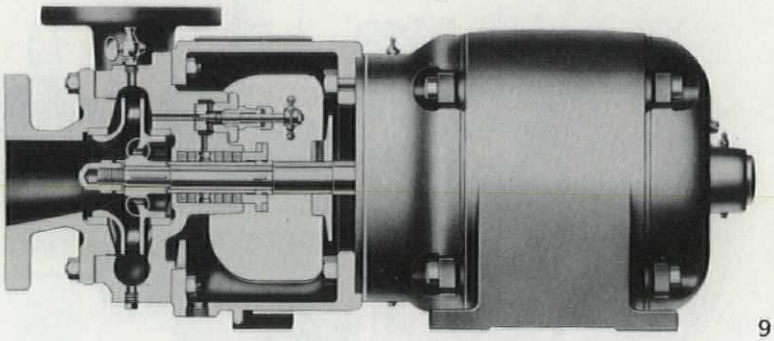

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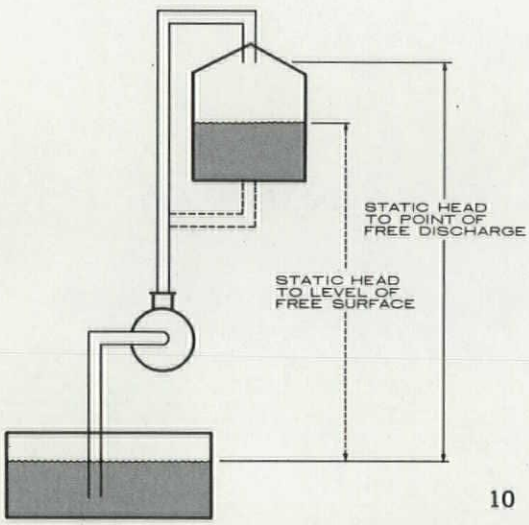

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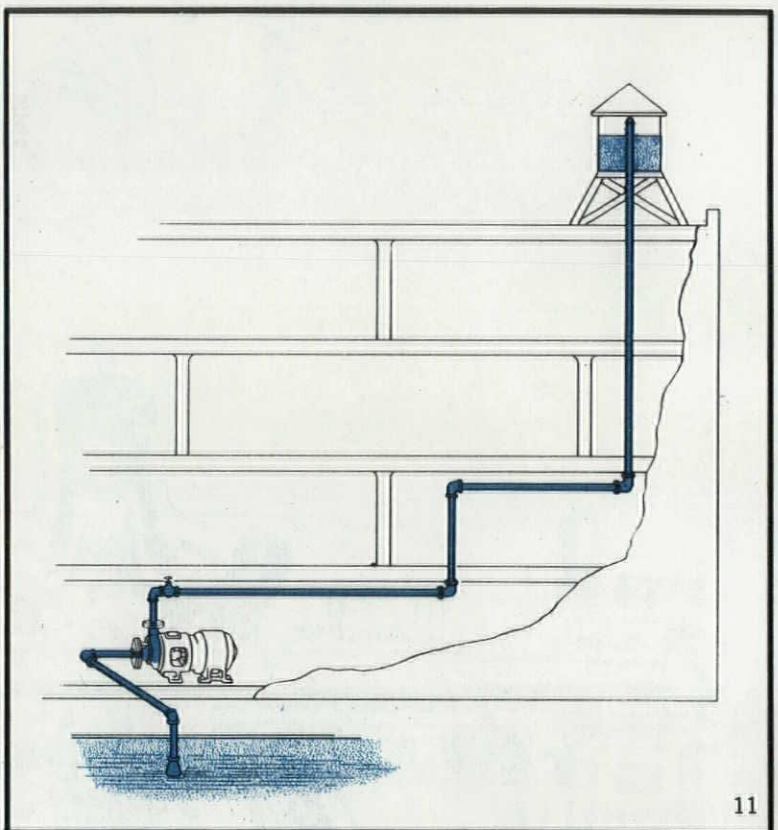

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FRICTION LOSSES

	Solution A 2½" discharge pipe 4" suction pipe	Solution B 4" discharge pipe 4" suction pipe
Discharge		
Length of discharge pipe	400′	400′
4 ells—equivalent length of pipe	4 x 6.2′ = 24.8′	4 x 10.2′ = 40.8′
1 check valve—equivalent length of pipe	1 x 22′ = 22′	1 x 41′ = 41′
1 valve—equivalent length of pipe	1 x 1.32′ = 1.3′	1 x 2.1′ = 2.1′
Discharge epl	448.1′	483.9′
Suction Lift		
Length of suction pipe	25′	25′
2 ells—equivalent length of pipe	2 x 10.2′ = 20.4′	2 x 10.2′ = 20.4′
Foot valve—equivalent length in feet	0′	0′
Suction epl	45.4′	45.4′
Static Head		
Static discharge head—Pump to tank	58′	58′
—Tank pressure	10 x 2.31′ = 23.1′	23.1′
Static suction lift	4′	4′

selected conditions of high-suction pressures (7).

Where high-suction lifts are necessary, the double-suction unit, providing suction from both sides of the impeller, allows lower fluid velocities at the impeller eye. Therefore, it inherently operates at high-suction lifts, since suction losses due to the velocity head are substantially reduced. A good guide showing the general areas of manufacture of the basic types is shown (8).

Horizontally vs. Vertically-Split Casings. For all practical purposes, this is still a discussion between single-suction pumps with vertically-split casings and double-suction pumps with horizontally-split casings. The fact is not discounted that single-suction pumps are sometimes designed with horizontally-split casings; however, they are not common.

Some writers claim that pumps with horizontally-split casings are easier to maintain, pointing out that there are no nozzles connected to the top cover and that only a mechanic is required to open the pump for inspection. This is true if the pump requires inspection only. However, double-suction pumps are generally more difficult to assemble and disassemble; require highly skilled labor; and have an extra set of bearings, stuffing boxes, and packing or mechanical seals to maintain. Although the end-suction units may require a pipe fitter (and an electrician if it is close-coupled), the units can be serviced by relatively unskilled labor.

Close-coupled vs. Cradle Mounting. Close-coupled pumps are the most compact and versatile units that can be specified. They can operate in any position, or at whatever angle provides the simplest piping arrangement and most economical installation. Cradle-mounted units with oil-lubricated bearings are limited to horizontal installation. Close-coupled pumps require no base plate; they have no alignment problems; and no couplings are required. Cradle-mounted units require flexible couplings between the pump and the motor shaft. Incidentally, close-coupled units are less expensive than comparable cradle-mounted pumps.

There are temperature limitations in the use of close-coupled pumps. On the high end of the temperature range, 200 F represents a practical limit on this type of unit unless other means are provided to keep the heat from reaching the motor bearings.

On the low end of the temperature scale, there is only one limitation of interest. Pumping cooled, or chilled, liquid can cause condensation on the outside of the pump casing. If the back cover of the casing also forms the end cover of the motor, condensate will form inside the driver and run into the bearings and motor windings, eventually causing failure. The solution to this problem is a design that provides separate end plates for the pump and motor, thereby providing for air circulation between them. This construction is also recommended for higher temperature applications (above 160 F) to reduce the heat that reaches the motor bearings.

Mechanical Seals vs. Stuffing Boxes. The architect should recommend mechanical seals whenever possible. The reason has nothing to do with relative merits of packing vs. mechanical seals for any particular application. Packing requires liquid leakage through the seal. Unless this seepage is collected or channeled properly, it runs down over the pump housing, the mounting, and the floor. From an appearance standpoint, this arrangement is poor. Specification of the proper type of seal is influenced by two major factors—temperature and suction conditions.

Critical temperature range is between 200 and 212 F. This is the borderline area where water will flash into steam. Both mechanical seals and stuffing boxes need lubrication. If water normally used for lubrication flashes into steam, all lubricating action is essentially lost. Although mechanical seals are designed to run dry (or without lubrication) for limited periods of time, extended periods of running dry will almost certainly reduce the seal life considerably. In the case of packing, an unlubricated stuffing box may result in scoring the shaft or shaft sleeve. Additional heat build-up can even cause fire in the stuffing box.

Seals are often limited by the suction conditions. Standard-packed stuffing-box arrangements are normally suitable from approximately flooded suction to as much as 50 to 75 psi in commercially available units. Suction lifts require external injection to prevent air from leaking through the packing, thereby causing the pump to become air-bound and lose its prime.

Standard mechanical seals can be used from pressures of 5 to 75 psig *in the stuffing box* without special consideration. Suction pressures below 5 psi normally entail some arrangement whereby discharge pressures are utilized in the stuffing box (9). This then makes the pressure in the stuffing box equal to the suction pressure plus a percentage of discharge pressure and provides for circulation through the box. This applies only to designs (generally single suction) where the stuffing box is on the opposite side of the impeller from the suction. Where the stuffing box is on the suction side (as with standard double-suction pumps) or where the impeller is vented to provide hydraulic balance, pressure in the box approximates suction pressure (9).

At times, it may be necessary to have a stuffing-box pressure in excess of 150 psi, as when two pumps are used in series. There are two methods commonly employed to prevent the pressure in the stuffing box from rising above an acceptable level. A special impeller with vanes —usually radial—on the stuffing-box side of the impeller can keep the stuffing-box pressure below discharge pressure. This method is somewhat limited. Or, higher pressure can be handled by "balanced" mechanical seals. Neither of these designs is normally offered as standard equipment on commercially available units.

What Size Pump?

Most systems have a basic system head—that is, the vertical distance between where the liquid is and where it is going. This head, called a static head, exerts a constant load on the pump for every gallon pumped, regardless of the rest of the system. To be precise, static head can be described as the vertical distance between the free level of the source of supply and the point of free discharge, or the level of the free surface of the discharge liquid. This distinction is illustrated (10).

Added to the static head in each system are friction losses, sometimes called dynamic losses, that vary with the flow. These losses depend on the liquid being pumped and its viscosity; pipe size, length, and material; the number and type of fittings, flanges, and connections; and, most important, rate of flow. These losses also vary with time. Pipes become clogged with sediment, rust, etc. Friction losses can be closely calculated and plotted into what is known as a system curve. This curve, added to the static head, produces a system-head curve that helps determine the size of pump required.

Perhaps an example (11) will best serve to illustrate the method of determining the system-head curve shown (12). At the same time, this problem can be used to point out the significance of properly sized piping.

An industrial plant needs a pump to lift 200 gpm of water at 72 F from a sump to a tank on the roof. The tank has 10 psi air pressure in it to provide better flow throughout the distribution system. The tank is 58′ above the pump and the pump

is 4′ above the water level in the sump. The discharge pipe is 400′ long and contains 4 standard elbows, 1 check valve, and 1 gate valve. The suction pipe is 25′ long, containing 2 elbows and a foot valve.

A substantial amount of 2½″ pipe is being purchased for use elsewhere on the job. If this pipe can be used for the discharge line, savings can be realized by taking advantage of quantity discount.

Step 1: Calculate equivalent pipe length (epl) in both discharge and suction sides of the system. Calculate separately, as it is common to use different size piping on the two sides. This makes it convenient to compare the effects of various sizes of discharge piping. Equivalent pipe length for various connections can be obtained (*see Table*).

Step 2: Multiply total epl times head loss per foot in the particular size pipe (2½″ and 4″) at the required delivery rate—200 gpm. Obtain head loss **(13)**. Read up from the flow until the curve for the size pipe in question is intersected and read the head loss on vertical scale.

Friction Losses = Total epl × head loss/ft

	2½″	4″
Discharge	448.1 × .463 = 207.5	483.9 × .043 = 20.8
Suction	45.4 × .043 = 2.0	45.4 × .043 = 2.0
Total Friction Losses	209.5	22.8

Step 3: Add total friction losses to static head. Result is total head to be overcome by pump.

Total Friction Losses	209.5	22.8
Static Head	85.1	85.1
Total Head	294.6	107.9

Armed with the total head figures of 294.6 and 107.9 and the required delivery of 200 gpm, enter either a checkerboard selection chart or an area coverage chart to select the proper pump to operate *at these precise conditions*. Either listing will show that a 7½-hp unit will supply 200 gpm through the system with 4″ piping. A 25-hp unit is required, however, if 2½″ discharge piping is specified. Obviously, the latter is not a wise selection. Not only would the initial pump cost much more, but operating expenses would be substantially increased throughout the entire life of the unit.

How was the decision made to use 4″ discharge piping? Why not 3″, 3½″, or even 5″? There is a rule of thumb that quickly determines this. A good flow for water for pipe sizes of 5″ and less is obtained at velocities between 6 and 8 ft/sec. The system will have less noise, less head loss, etc. The proper size piping can be selected **(14)** by reading up from the desired flow rate to 6 to 8 ft/sec velocity and then right until a pipe line-curve is intersected. This size pipe will yield a good flow condition for the least investment in piping costs.

System Curve

Pump selection is not yet complete for the system **(11)**. Although the 7½-hp unit will supply the system under ideal conditions, we still do not know what will happen under less than ideal conditions. What happens when someone shuts off the discharge valve part way; or the compressor breaks down and the 10-psi pressure is removed from the tank; or the lines become partially clogged?

All of these factors can be determined by plotting the system curve and superimposing the head-capacity curve and the brake-horsepower curve of the proposed pump **(12)**.

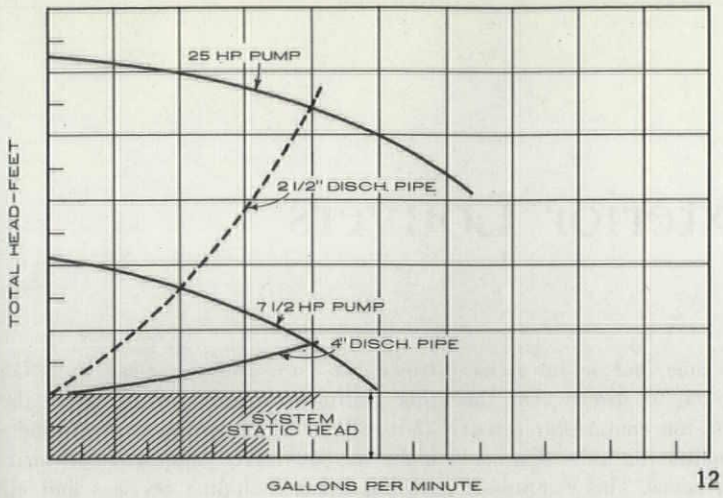
This is a relatively flat-system curve. Flat-system curves lose capacity much more rapidly than steep curves as the pump impeller wears. There is also substantially greater change in capacity as changes occur in the static head. For example, if the air pressure on the tank is lost, the static head will drop and the new operating point could be beyond 7½-hp. This will seriously overload the drive and possibly cause it to burn out.

This does not mean that the system should be redesigned with smaller piping merely to obtain a steeper system-head curve. Rather, be certain that a drop-off in capacity is not critical, and that the driver is large enough to handle the excess load created by reduced static head.

Where to Put the Pump

This is not much of a problem when the architect is dealing with an open-end system, but there can be quite a problem with closed systems such as air-conditioning units. An open-end system is limited by how much any pump can lift. Placing the pump at or near the lowest point in the system is usually necessary. In a completely closed system, the discharge static head will be balanced by the return static head. Therefore, the only head in the system is dynamic losses.

A good rule of thumb to follow when there is leeway in placing the pump in either open or closed system, is to locate the pump where there are more than adequate suction pressures available. This should not be carried to extremes, as the pressures that the casing can withstand are limited. It is unwise to place the pump at a point in the system where overly high suction pressures will dictate a special pump casing.



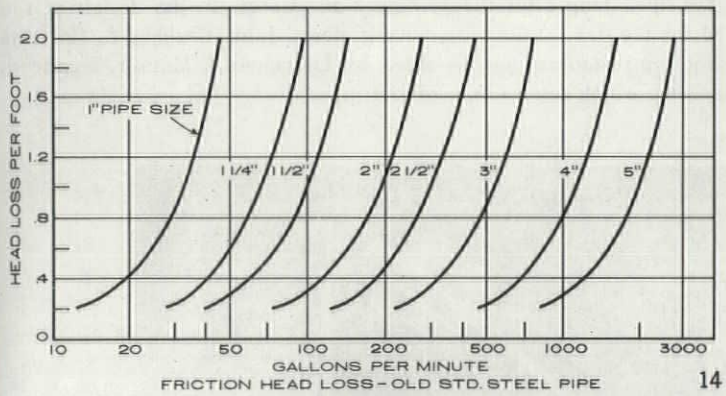
12

Friction Losses Through Screw Pipe Fittings in Terms of Equivalent Lengths of Standard Pipe

Nominal Pipe Size, Inches	Actual Inside Diameter, Inches	Gate Valve Full Open	Long-Sweep Elbow or on Run of Standard Tee	Medium-Sweep Elbow or on Run of Tee Reduced in Size ¼	Standard Elbow or on Run of Tee Reduced in Size ½	Angle Valve Full Open	Close Return Bend	Tee Through Side Outlet	Globe Valve Full Open	Check Valve (Approx.) varies with type & make
Factor of Resistance		0.19	0.6	0.8	0.9	0.5	2.2	1.8	10.0	
½	0.662	0.35	1.1	1.5	1.7	9.3	4.1	3.3	18.6	4.0
¾	0.824	0.44	1.4	1.8	2.1	11.5	5.1	4.2	23.1	5.7
1	1.049	0.56	1.8	2.4	2.6	14.7	6.5	5.3	29.4	7.7
1¼	1.38	0.74	2.3	3.1	3.5	19.3	8.5	7.0	38.6	11.0
1½	1.61	0.86	2.7	3.6	4.1	22.6	9.9	8.1	45.2	13.0
2	2.06	1.10	3.5	4.6	5.2	29	12.8	10.4	58	18.0
2½	2.46	1.32	4.2	5.5	6.2	35	15.2	12.4	69	22.0
3	3.06	1.6	5.2	6.9	7.7	43	18.9	15.5	86	30.0
4	4.026	2.1	6.8	9.0	10.2	57	24.8	20.3	113.00	41.0
5	5.047	2.7	8.5	11.4	12.7	71	31	25.4	142.00	55.0
6	6.065	3.2	10.2	13.6	15.3	85	37	31	170.00	65.0

Foot valve loss is zero, provided foot valve has area of 150% of suction pipe.

13



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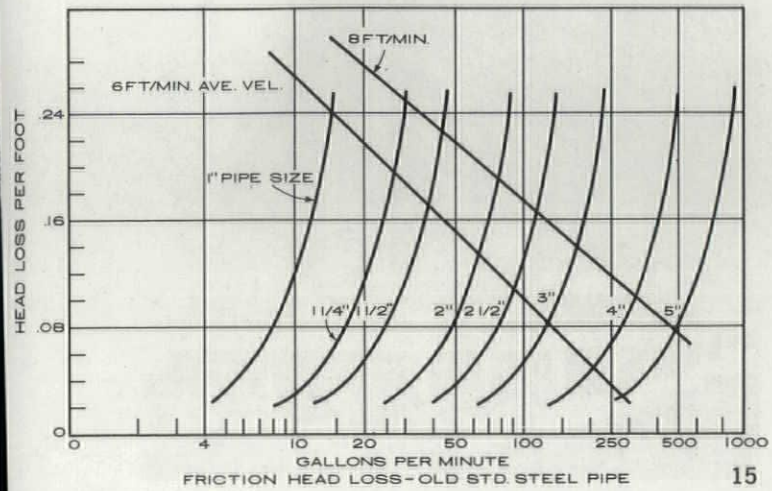

15

Automatic Exterior Louvers

BY WILLIAM J. McGUINNESS

First high-rise office building in Honolulu to have automatically operated exterior louvers and a rotating circular restaurant, is described by a practicing mechanical engineer.

The Ala Moana Office Building in Honolulu, Hawaii, which opened in November 1961, achieves a 25 per cent (170 ton) saving in heat-gain due to automatically movable exterior louvers surrounding the entire building. These baffles move in unison on each façade to prevent direct entry of the sun's rays through the glass. The louvers are of a natural aluminum color on one side and an anodized pale gold on the other. The 2-ft space between glass and louvers makes it possible for cleaners to step outside to wash the windows.

Architect John Graham of Seattle and New York designed this building as part of the Ala Moana Shopping Center, one of the many centers designed by his office. It is a 25-story structure with 184,000 sq ft of rentable area.

The mild Hawaiian climate obviates the need for heat, and the design standards for air conditioning are less demanding than for such regions as New York City, for instance. Outside conditions of 85 deg dry bulb and 76 deg wet bulb are assumed, and an indoor climate of 76 deg and 55 per cent relative humidity is maintained.

Air-conditioning problems were solved in several ways. The cooling tower on the twenty-first floor (the top, open story) furnishes condenser water for an adjacent pair of centrifugal compressors totaling 702 tons of refrigeration. This provides cooling for all of the office floors except the lower banking level. The dual-duct, high-velocity method was used with high-velocity mixing boxes in the ceilings. Air is downfed from fans on the twenty-first, thirteenth, and seventh floors. The seventh-floor air handling is equipped with an electrostatic precipitator, because the zone comprises medical and dental offices. Provision has been made for activated charcoal to cope with a possible odor problem in this zone, but so far it has not been necessary to use it. On the second floor, a 65-ton compressor serves multizone air-conditioning units that cool the banking floor below. This compressor uses condenser water from the twenty-first floor.

The air conditioning for the rooftop, circular restaurant is handled from above. Atop the restaurant there is a "hat," which is not visible in the photograph. The crown of the hat encloses a 40-ton system utilizing four separate air-handling units, one for each zone. These blow air across the ceiling toward the sloping heat-absorbing glass. Air is taken back to this overhead system through the ceiling of the central core. Air-cooled condensers at the topmost roof surface complete this separate installation. Its independence from the rest of the building is essential, because the restaurant stays open long after the offices have closed for the day.

This dramatic rooftop restaurant has a 16-ft-wide circular strip which rotates between the core and the glass wall. On this platform, turning slowly within the 72-ft-wide fixed enclosure, the 162 diners make a 360-degree circuit each hour. All facilities, including services and air handling, are in stationary parts of the structure, but diners and staff pass from stationary to moving floor with no perception of relative motion except the occasional realization that the view (which takes in Diamond Head and Waikiki) has changed.

This prestressed-concrete structure is the first high-rise office building in Honolulu. Its concrete structure changes to steel for the 38 ft cantilevers supporting the restaurant floor. The steel proved to be lighter and provided more space to house the equipment for rotation. The moving structure rotates on 48 twelve-in. diameter wheels and is powered by a single 3 hp motor. In the design of the moving floor, John Graham & Co. was aided by Laucomer & Manser, engineers of Detroit.

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Problems of New Materials

BY HAROLD J. ROSEN

Since architectural design does not remain static, there can be no insistence on the use of only tried and proven materials and assemblies. New product developments, however, do on occasion present problems. Some of these are discussed by the Chief Specifications Writer of Kelly & Gruzen, Architects-Engineers.

The number of new building materials being introduced by manufacturers is legion; the ways in which they are used in conjunction with assemblies of other materials are likewise innumerable. In many instances, new materials are placed on the market with relatively little field testing and the architect and owner become the guinea pigs. In other circumstances, assemblies of new materials with old materials create new problems because of the interaction between them.

However, we cannot remain stationary and insist on only tried and proven materials and assemblies. Many of the new materials are far superior to the old, and hold promise for even better future results. In addition, some new architectural concepts can be achieved only with new product developments.

As an illustration of the foregoing, there is a trend today toward the use of architectural concrete. Smooth, cast-in-place concrete, without any covering material and unpainted is being used more frequently as a finish material. However, what is sorely needed are new ideas in form material. At present, the only form which can develop a smooth surface and which can be re-used a number of times, is a high-density overlaid plywood. Upon use of this material, it has been observed that a pink staining of the concrete sometimes occurs. Upon investigation, it has been determined that the phenolic resin used in the paper overlay has reacted with the cement in the concrete to cause this staining phenomenon. This may occur on the second re-use of the form, but the reactive agents present in the overlay are by that time gone and no more staining takes place in further re-uses of the form. Fortunately, the stain will disappear in time. Direct sunlight bleaches the stain in a matter of days or a week. However, in shaded areas the stain may persist for weeks and months. Where the stain must be removed immediately, it has been found that an ordinary laundry bleach, such as a 5-per-cent solution of sodium hypochlorite applied to the stain and flushed with water, will remove the stain.

Some enterprising manufacturer should investigate the concrete form field and come up with a form that can be molded to almost any shape, that has many re-uses, and has no adverse affect on concrete.

In another area, we find that the use of wet-mix roof decks (excluding structural concrete) and mineralized, shredded wood-fiber roof decks have created certain problems in the application of built-up roofing membranes.

Wet-mix fills such as poured gypsum, perlite and vermiculite concrete, and foamed and lightweight aggregate materials retain a high residual moisture content for substantial periods beyond the "drying out" time. Built-up roofing membranes applied directly over these wet-mix fills may fail prematurely as a result of blister growth, wrinkles, buckles, or other effects of moisture.

The Asphalt Industry Roofing Bureau recommends that four basic steps be taken to minimize such problems in connection with wet-mix roof decks:

(1) Such wet-mix materials should not be used as fills over monolithic structural concrete, unvented metal, vapor barriers, or other surfaces which do not permit thorough evaporation of the moisture from the underside of the fill.

(2) Before application of the built-up roof begins, the deck should be permitted to dry for at least the minimum period recommended by the manufacturer of the deck materials.

(3) A coated base sheet should be used as the initial course of the built-up roofing membrane, attached to the deck in strict accordance with the recommendations of the manufacturer of the materials.

(4) Subsequent courses of the roofing membrane should be applied in strict accordance with the recommendations of the manufacturer of the roofing materials.

Mineralized, shredded wood-fiber roof decks have a high porosity and a high ratio of open joints per square foot of deck surface. These may contribute to formation of wrinkles resulting from the accumulation of condensation in the open joints of the deck; to the possibility of bitumen drippage through the joints or the main body of the deck unit; and to the penetration of objectionable odors into the building.

Here again, the Asphalt Industry Roofing Bureau recommends that the following steps be taken to minimize such problems:

(1) An unsaturated paper and a coated base sheet should be applied as the initial course over all such decks immediately after installation of the deck material.

(2) The coated base sheet should be attached to the deck using the Felt-Fast E.S. nail through suitable caps, the nails spaced according to the roofing manufacturer's recommendations. Where a mineralized, shredded wood-fiber deck is provided with a factory-applied nailable cement finish, a 5-penny cut nail through suitable caps is recommended.

(3) Subsequent courses of the roofing membrane should be applied in strict accordance with the recommendations of the manufacturer of the roofing materials.

Manufacturers of building materials and equipment cannot create new products in a vacuum. Their chemists and engineers are not fully cognizant of the architect's problems or his aspirations. If manufacturers want to overcome the "bugs" in new materials, and if manufacturers want to creat new products to remain in the forefront of a developing architecture, they must work more closely with architects.

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Architect's Role Defined: Part 3

BY BERNARD TOMSON AND NORMAN COPLAN

P/A's legal team concludes a series of three articles on the effects on the practice of architecture of inadequate legal definitions of the architect's role.

The architectural and engineering professions of Virginia, through their professional societies, have become involved in a conflict with homebuilders' associations in that state as the result of their efforts to secure an amendment of the Virginia Registration Law that would define the practices of architecture and engineering. The Virginia statute presently provides that "it shall be unlawful for any person to practice or to offer to practice the profession of engineering, architecture, or land surveying in this state or to use in connection with his name, or otherwise assume, use, or advertise any title or description tending to convey the impression that he is a professional engineer, architect, or land surveyor unless such person has been duly registered. . . ." The need to amend this statute arises out of the following circumstances.

In 1959, as the result of a complaint relating to the preparation of plans and specifications by a contractor for the construction of a building, the Virginia State Board for the Examination and Certification of Architects, Professional Engineers, and Land Surveyors appointed a committee to investigate what action could be taken under the registration law to prevent the practice of architecture by unlicensed persons. This committee consulted with the office of the attorney general of Virginia to obtain an opinion as to the legality of a contractor preparing and furnishing to his client plans and specifications.

It was the opinion of the office of the attorney general that it was not mandatory for a person who was to erect a public building to employ the services of an architect to prepare plans and specifications. It was stated, incidentally, that anyone could employ the services of a first-class carpenter to erect a public building if he so chose, and that he could prepare the necessary plans for the erection of a building and not be in violation of the registration statute, providing he did not hold himself out to the public or convey in any manner that he was an architect. Thus what appeared to be a strong and effective licensing statute was interpreted as limiting only the use of the title "architect" and permitting the practice of architecture by unlicensed persons.

Following that opinion, the Virginia Registration Board undertook to secure legislation that would expressly define the practice of architecture and engineering, and thereby prevent the practice of architecture and engineering by unlicensed persons. The Virginia Advisory Legislative Council was authorized to study the question and to make recommendations to the legislature.

At public hearings which were held, the Virginia Chapter of the American Institute of Architects and the Virginia Society of Professional Engineers recommended definitions of the practice of architecture and engineering. The Homebuilders' Association contended that although it had no objection to definitions of the practices of architecture and engineering as suggested by the professional societies, it was necessary to provide for certain significant exceptions to these definitions to permit builders and contractors to prepare plans for certain types of structures. The Homebuilders' Association argued that no definition should be adopted that required the services of an architect for homes and similar buildings. The argument was made by counsel for the Homebuilders' Association that the architect's function was concerned only with aesthetics, and that since his client's customers were not concerned with this subject, there should be no requirement in the law which necessitated an architect's services for homes and similar buildings.

The Homebuilders' Association recommended that, as an exception to the registration law, it should be lawful for anyone to prepare plans not only for single-family residences and multi-family residences not exceeding two stories in height, but, more significantly, for all commercial and industrial buildings unless the public health or safety were involved.

The representatives of the architectural profession contended that the public health and safety were indeed involved in all buildings, whether public or private, and regardless of size. However, by way of compromise, they suggested that single-family residences and similar buildings, and commercial and industrial buildings that are less than 2,000 square feet in area, be excluded from the prohibition against the practice of architecture by any person not so licensed.

As of the writing of this column, this conflict has not been finally resolved. The matter may come before the Virginia Legislature in 1962. Whether the registration law will be amended, and what the nature of that amendment will be, undoubtedly depends upon the knowledge and understanding of the members of that legislature as to the appropriate function and importance of the trained architect and engineer in the construction process.

Is the public health, safety and welfare secure in the hands of builders who produce their own plans and specifications where the project involved is a one-family residence? The complaints of purchasers of new homes concerning shoddy heating systems, token insulation, poor waterproofing, skimpy electric wiring, and cheap plumbing, and so on, are not so uncommon as to suggest an affirmative answer to this question. The Virginia Chapter of the American Institute of Architects, through seminar programs and related procedures, has commendably sought to educate its members as to the issues at stake here, and through them to inform the public as to the proper role of the licensed architect and professional engineer. In the last analysis, security of the public in this field rests upon its understanding of the role the competent architect and engineer should play in the construction industry.

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P/A Congratulated

Dear Editor: I don't write often, but I found the DECEMBER 1961 P/A very impressive for its format, its substance, and its clarity of thought.

In addition, your "P.S." on "The Nature of Cities" is one of the most thoughtful and balanced statements related to the problem and the interest developed in it since the appearance of Jane Jacob's book.

MAX ABRAMOVITZ
Harrison & Abramovitz
New York, N. Y.

Stimulating Urban Housing

Dear Editor: Your comprehensive presentation, "Thoughts on Urban Housing" (OCTOBER 1961 P/A), stimulated in me a particular line of thought.

Except, perhaps, for the two circular apartment towers in Chicago (which, significantly, were blessed with the advantage of a relatively large site), just about every building you presented as having design merit or as being worthy of emulation was involved with a large-scale, publicly-assisted urban redevelopment undertaking.

Even if this was not intended to create the impression that piecemeal or small-scale housing construction, of the type customary in larger cities in the first half of the century, has been ineffectual or markedly lacking in design distinction in the era since World War II, at least your presentation must be considered as some sort of compliment to the nation's publicly-assisted urban redevelopment program.

The next time critics or opponents attack that program again, let's hope its defenders will remember to cite this salute from P/A on the design merit of such an increasing number of its products.

Your total presentation was a commendable contribution to both the architect and the dedicated builder; through its inherent challenge to both to do better, it should help produce additional progress in urban housing design for the benefit of all concerned.

WILLIAM ZECKENDORF
New York, N. Y.

Clearing up Credits

Dear Editor: On page 56 of the DECEMBER 1961 P/A, there is the headline "Single Saarinen Structure Houses Theater, Library, Museum." This is a misrepresentation of the project development that we believe you should correct in fairness to the architects involved.

The official title for the project as adopted by the several parties is as follows: Repertory Theater for the Drama and Library-Museum, Lincoln Center for the Performing Arts, New York, New York; Eero Saarinen and Associates, Skidmore, Owings and Merrill, Associated Architects; Jo Mielziner, Collaborating Designer for the Repertory Theater.

MAURICE B. ALLEN, JR.
Eero Saarinen and Associates
Hamden, Conn.

Small Problem into Big Problem

Dear Editor: Your article entitled "Tower on Arches," which appeared in the OCTOBER 1961 P/A, was very well done. We have, however, encountered a small problem. We now find that some of our architect clients would like us to become ever more daring by supporting 10-story buildings on 1′ x 3″ columns instead of the more conservative 1′ x 7″ columns indicated in the article.

Since the engineers made the model analysis, we feel that it would be only fitting to correct the statement regarding the design of the slabs for wind shears. The columns cantilevered from the arches and thus deflected as cantilevered beams. Since the slabs are rigidly connected to the column, the rotation of the cantilevered columns will also rotate the slabs and thus induce secondary bending stresses in them. In other words, a portal analysis of slabs or columns would not be correct for a building with wide columns and flat slabs.

R. M. GENSERT
Cleveland, Ohio

How to Treat a Window

Dear Editor: I thought the article on "Domesticating Glass Walls" [OCTOBER 1961 P/A] was first-rate. The most satisfying thing about it was seeing it in an architectural magazine; I have often thought that failing to include pieces on interiors in architectural magazines is like not mentioning salt in a cookbook.

The point at issue, I think, is something quite different from well done or poorly done window treatments. Let's assume that Pei designed a window treatment that he thought was the ideal solution for these vexsome windows. It would be so perfect, that, upon seeing it, every professional working in modern design would immediately say, "Of course, that's it!" But what should be done with this perfect solution? Should it be installed in every single one of those apartments with variations in color and texture? Or in 20, perhaps; or in 30? In the thirty-first, though, the woman tenant would tear it down with her bare hands, even if the treatment came free with the apartment. Don't be misled into thinking that she wants to be different for the sake of being different (although that is what she might tell you if you were to ask her). Actually, she instinctively knows that her apartment is an extension of herself, and that although her floor plan may be like hundreds of others, she is not.

That is why I think we have to be careful about saying, "This window treatment is not good," and relate the judgment only to the building. The one criticism that is useful, it seems to me, is: "This window treatment is not good for you, the tenant; it does not do the best by the building, either."

Given a choice, the tenant comes first and last, and the devil take the building. If the tenant wants "an overstuffed, lambrequined, Victorian parlor," on what grounds that are not presumptuous can the choice be challenged? On the contrary, it seems to me that the architect should be delighted that he has created a structure that can be suited so easily to different ways of life and different tastes. (In the same way, an old building of good design can take modern interiors.)

Let everyone take what the architect has given and make it suit *themselves*, not some abstract principle of design now in vogue. Architecture is surely the mother of all the arts, but only a foolish mother tries to fit all her children into the same mold.

Resen's is a straight wall of transverse draperies; anything could be behind it. But in each of the other treatments, you know there are three large windows, three strong design elements. My own view is that the three women decorators at Kips Bay met your test very well and came up with "solutions that really do answer the needs of those who are to live behind glass walls." In your remarks about these successful window treatments, though, there is the implication that a decorator's office is a classroom in which the client is taught, or ought to be taught, what is good modern design; that when some other type of interior results, it is a failure and the failure is the designer's. This is not the case, of course.

Let me close by adding that nothing I have said here is intended to suggest that the article is anything less than practical and original.

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Continued from page 133

confusion, being transmitted as compared to actual information. Obviously, if non-essential information (the "noise") can be reduced, there is more room to transmit essential information (the "signal"). This "Information Theory" provides the basis for most communication today, both in the technical sense of electrical impulses transmitted over wires and in the broader sense of choice of words in a communication to provide maximum clarity of meaning and minimum confusion.

Since a drawing is simply one means of communication, this overlaps into drafting practice. Instead of being limited to the 26 letters of the alphabet and the 10 Arabic numerals used in the English language, drafting language employs all the lines and symbols involved in that complex ability known as "blueprint reading." What design drawings are intended to do, whether or not they always achieve that purpose, is to communicate a designer's idea of how he wants something built. No matter what he has designed, be it dresses or skyscrapers, airplanes or bridges, microscopes or battleships, the designer's only purpose in making a drawing is to communicate an idea to someone else. The designer relies on the recipient's ability to read and understand the communication just as he would expect that a letter he might write, or a telephone call he might make, would be understood. Thus in establishing communication as the purpose of any drawing, the need to prevent confusion becomes apparent.

"Elsie Dear's" inventors point out that a drawing is composed of a finite number of lines. Since a finished drawing costs some calculable amount of money, each line costs some pro-rata portion of that amount. Eliminate 25 per cent of the lines, and, at least theoretically, you eliminate 25 per cent of the cost. Although we may not all agree on the percentages, most of us would agree that some saving should result.

But can we eliminate 25 per cent of our communication and still get across a clear message? "Elsie Dear's" inventors think it can be done. They point out that aside from the machine's faster drafting time, its ability to project drawings to be recopied, and its use of typewritten notes and figures (which together would cut normal drafting time in half), many of the drawings made today are full of redundant information. If some of the useless dimensions and the puerile "shall's" and "to be's" were eliminated, the 25 per cent thus saved would never be missed except by those who are steeped in an unreasoning tradition of making drawings in a certain way.

Is this argument valid? Again, we might not agree on the percentage, but most of us have to admit there is some basis to the statement. Perhaps the greatest fault in today's drafting is a tendency by draftsmen to consider drawing an end in itself. A conscientious draftsman tries to tie up all the loose ends—and he should; an experienced draftsman develops a sort of sixth sense about where trouble may arise in construction and he plugs loopholes where he sees them or senses them to be. Yet, on the whole, a good part of our drafting time is undoubtedly consumed by a tendency to shoot at goblins that may or may not exist.

What happens to the draftsmen thrown out of work by "Elsie Dear"? The question, of course, is asked every time automated equipment comes into use. Blacksmiths asked it when the horseless carriage began replacing Old Dobbin. But there are more blacksmiths today than there were in 1890; there are more newspapers sold today than before the advent of news broadcasting on radio and television; there are more men at sea than before airplanes started carrying freight and passengers across the ocean. And, more than likely, there will be more draftsmen tomorrow than there are today, although, it is safe to say, they will be of a different type: they will be more highly trained; they will know the operation of electronic machines and the principles of communication, as well as the new construction technology that tomorrow will bring; and they will be more highly paid.

When I was a boy, we used a lot of "tracers" in the drafting room. The designer would work in pencil on buff-colored detail paper and the tracer would laboriously copy the drawing in ink on linen. Better blueprint machines made it possible to work with pencil on vellum, and tracers were put out of work overnight. Many of them stayed on to become some of our best draftsmen today. Similarly, there is every reason to believe that today's draftsmen will be the ones most easily trained to handle "Elsie Dear" and become the draftsmen of tomorrow.

"ELSIDIR" will probably not be on the market for several years. Even when it is, the initial cost of the change-over will slow down the machine's acceptance; perhaps a generation will pass before it is widely used. In the meantime, are there any lessons in it applicable to drafting practice today? Is a new direction being taken from which we can benefit in the next few years?

Like the shoemaker's children (who, traditionally, are without shoes), a great many drafting rooms are blind spots in their owner's vision. I can personally call to mind the drafting room of one world-famous industrial designer, a man who has created some of America's most functional office equipment. His draftsmen work in poor light, hunched over linoleum-covered slab doors resting on wooden saw horses. By the end of the day, their backs are stiff and their eyes are sore. His labor turnover is phenomenal.

We should, then, as a first point, take a good look at our traditional drafting-room furniture. Do our drafting rooms provide everything needed for the most efficient production of drawings? In a strict, dollars-and-cents analysis, are we losing money due to the use of obsolete equipment?

As a second point, we should look at drafting content. What can be eliminated from a set of drawings to make it tell the story more clearly and with less confusion? Since drafting costs money, how much duplication can be avoided, how many dimensions are unnecessary? How many details are superfluous? Habit is our greatest enemy when it comes to a change in drafting content. An old-time builder once told me, "If you want to cut construction cost, make your drawings so the builder's estimator is convinced it will be cheap to build; don't scare him with details of every door knob." Most of us would agree that separating useless details from needed details can do more than anything else to lower the drafting cost, as well as lowering the construction cost.

As a third point, we should look at draftsmen's capabilities. Solving construction problems in advance takes knowledge; separating the important from the unimportant takes experience. Well-trained and properly supervised draftsmen more than pay for themselves. If there is one single factor that applies as basically to today's draftsmen as to the draftsmen of tomorrow, it is that the success or failure of important projects will always hinge on how well and efficiently, or how poorly and inefficiently, they have been drawn.

It seems obvious that if we are to be ready for the technology of tomorrow, we who design the projects must turn a little more of our atttention to the tools with which we work.

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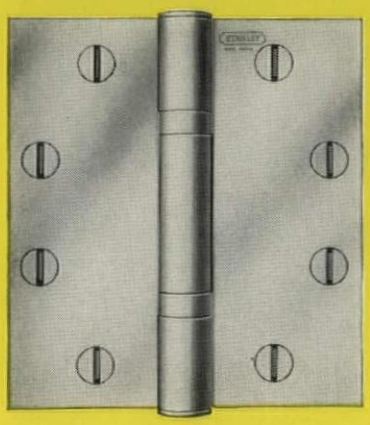

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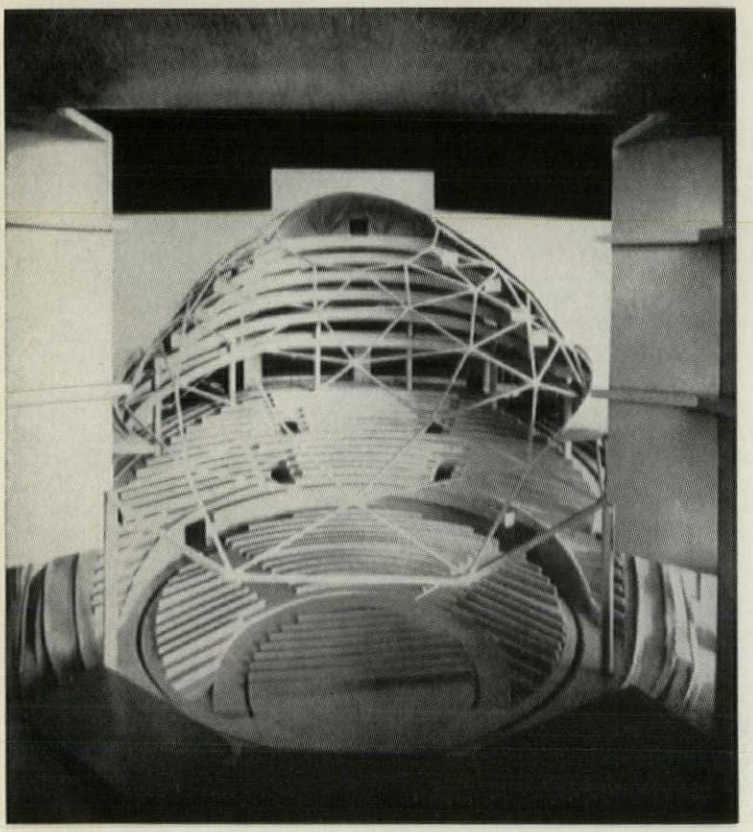

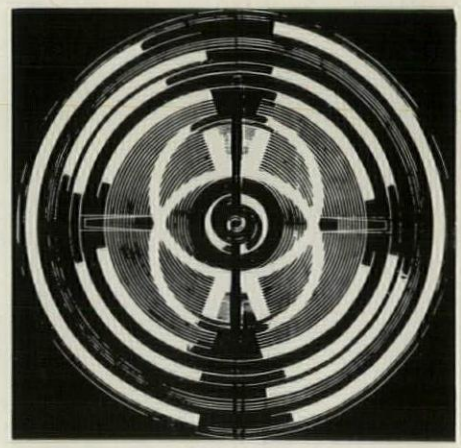

Kiesler: Endless Theater, 1923.

Gropius: model, Total Theater, 1927.

A THEATER FLEXIBLE AND SPACIOUS

BY THOMAS DeGAETANI

THE THEATER OF THE BAUHAUS, *by Oskar Schlemmer, Laszlo Moholy-Nagy, and Farkas Molnar. Edited and with introduction by Walter Gropius. Published by Wesleyan University Press, Box 360, Middletown, Conn. (1961, 109 pp., illus. $7.50) Reviewer is Director of the Stage Department at Juilliard School, and President of the United States Institute for Theater Technology.*

The Theater of the Bauhaus is made up of six sections, of which two, the Gropius introduction and the "Translator's Note" are new; three, Schlemmer's "Man and Art Figure," Moholy-Nagy's "Theater, Circus Variety," and Molnar's "U-Theater" appeared in the 1924 *Die Bühne im Bauhaus;* and one, Schlemmer's "Theater (Bühne)," is a 1927 lecture which preceded a Bauhaus theater demonstration. The net result is as vital a theater book as one is likely to find for some time, and much of it is, surprisingly enough in view of its age, as pertinent to certain aspects of the contemporary American scene as it was to the turmoil of post-World-War-I Germany. One can only sincerely regret that the four sections dating from the 20's have been largely unavailable to an American readership until now.

The theater of the Bauhaus was three things: the first, an attempt to "literally discover," examine, and experiment with the primary meanings and components of theater; the second, examination of and experimentation with the facility within which theater is performed; the third, practically by definition, an attempt to demolish still another "arrogant barrier," in this case the physical and psychological one which separates a performance from its audience in traditional theaters and presentational styles.

In terms of immediate applicability, the introduction by Gropius, and the Schlemmer "Theater (Bühne)" are most pertinent, dealing as they do with the architectural facility within which "theater" occurs.

The text of the Gropius introduction is dated June 1961, which serves to point up the fact that after 35 years it is still his own Total Theater of 1927, a co-project with the eminent German stage director Erwin Piscator, which is dearest to his heart. Gropius, elsewhere, might be said to have first defined his Total Theater, when in 1927 he maintained that

". . . the fundamental task of the modern theater architect is to create an instrument

Continued on page 168

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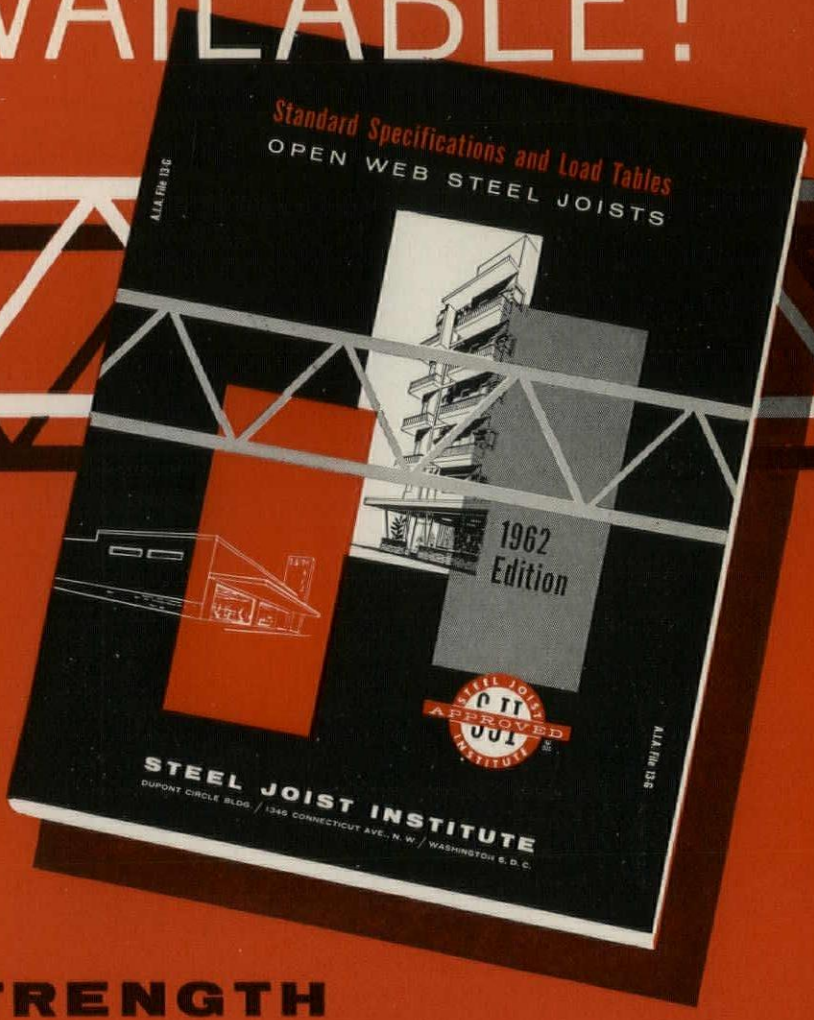

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Continued from page 166

of light and spaciousness so objective and flexible that it belongs to no one form, but unites the ideals of all theater craft."

In the introduction to this volume, however, Gropius chooses his presentation to the Rome Volta Congress, 1934, on "Teatro Dramatico" to introduce the reader to his project, and its potential, as follows:

"In my Total Theater . . . I have tried to create an instrument so flexible that a director can employ any one of the three [basic] stage forms by the use of simple, ingenious mechanisms. The expenditure for such an interchangeable stage mechanism would be fully compensated for by the diversity of purposes to which such a building would lend itself: for presentation of drama, opera, film, and dance; for choral or instrumental music; for sports events or assemblies. Conventional plays could be just as easily accommodated as the most fantastic experimental creations of a stage director of the future."

That the latter quote could be lifted bodily from the program of a number of contemporary American theaters, contemplated or built in the last ten years, would seem, indeed, to vindicate Gropius, but it might be less than accurate to consider the concept of the Total Theater as *the* innovator on behalf of flexibility and convertibility, without reference being made to Frederick Kiesler's "Endless Theater," which predates it by three years and must certainly have exerted some influence on the Gropius-Piscator project. It is known, for instance, that at Gropius' request six Bauhaus students attended the Vienna Theater Festival, 1924, and saw the full-scale "Space Stage" which had been erected in the Konzerthal—the "Space Stage," of course, being the central core of the "Endless Theater."

In any event, both the Gropius and Kiesler projects were prevented from being realized, and not until 1957, with the opening of Gerhard Weber's National Theater in Mannheim, do we pick up the threads again. In 1959, in an address by Erwin Piscator to the German Society for Theater Technic, assembled in the Mannheim Kleines Haus, we find the following:

"For auditorium and stage the architect must provide only a suitable large single space; it is then the function of the director in collaboration with his designer and technician to rearrange the mass and composition and even texture of this space to suit the demands of the production."

The Kleines Haus in 1959 *was* the high-water mark of flexible, adaptable theater. But it had already proven to be unsatisfactory (in a repertory situation) because it does not have enough of the "ingenious mechanisms" to facilitate the manipulation of the theater form; and it is a sad fact, but true, that in its five years of operation the Kleines Haus has been used in nonproscenium form only twice, and on both occasions by Piscator!

November of 1960 saw the opening at Harvard of the Stubbins-Izenour Loeb Drama Center, which is admittedly indebted to Kiesler's earliest concepts. Its program reads in part:

"We see this building as an opportunity, not a fixed definition, as a working instrument, and not as a separate institute. We see a theater flexible and spacious, so constructed that it can adapt itself to future techniques while at the same time maintaining its role as a place of meeting and community for the two colleges [Harvard and Radcliffe]. The building should not be so architecturally exciting and excited, as building, that the plays produced will be overshadowed by their frame."

Although the Loeb is still too young to have proven or disproven itself fully, whatever its shortcomings might be, whatever its lack of aesthetic or architectural objectivity, it does provide the stage director the opportunity to "em-

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Construction Details on Opposite Page

Continued from page 168

ploy any one of the three [basic] stage forms" through the application and use of "ingenious mechanisms."

Farkas Molnar's section on the U-Theater is, naturally, overshadowed by the Gropius introduction, and, perhaps, justly so. For Molnar's concept was not so much innovation as it was an interesting novelty, in that it advocated the stacking of two theaters, one upon the other, within a single volume, with no separation between.

The fifth section, Schlemmer's "Theater (Bühne)," in its explanation of the theater activity at the Bauhaus-Dessau, serves to elaborate on both the creative-interpretive aspects of the theater, and the housing of performance. The rather spatially limited lecture platform-stage at their disposal was inadequate, to be sure, but was brilliantly adapted to the group's experimental needs. The illustrations of the Gropius-designed "theater" accompanying this section bear an almost disconcerting resemblance to the two-year-old facility in the Institute for Advanced Studies in the Theater Arts, located in New York. Walther Unruh, the noted German technician, advised on the Institute's theater. Threads again.

It would be quite easy to lose patience with the seemingly dated, esoteric metaphysics, the vaulting aesthetics frequently standing on the quicksand of gross assumption, and the occasional, but cloying, social consciousness reflected in the Schlemmer "Man and Art Figure," and the Moholy-Nagy "Theater, Circus Variety." It would be quite easy to think of the entire book as an historical document, except that with frightening frequency an individual sentence or paragraph will remind the reader of quite recently seen experiments and "innovations," which he had not hitherto linked with any precedent in theory or practice, or of instances of what could only have been earlier, parallel activity. In January 1922, for instance, two years before Schlemmer promulgated, in print, the primacy of light and color as aspects of theater capable of standing alone, Thomas Wilfred gave his first Clavilux recital in New York, the "performance" consisting solely of abstract, moving, colored light patterns played upon a screen. Within the context of Schlemmer's promulgations, the abstract sound and projection, "Poème Electronique" of Le Corbusier and composer Edgar Varese, presented at the Brussels Fair in 1958, takes on new meaning.

It is comforting to note that the iconoclasm, first voiced by Craig and here championed by Schlemmer and Moholy-Nagy, which called for substitution of the live actor by an "Uebermarionette," has not, after half a century, made much headway. In point of fact, with the exception of their constantly reiterated cry for the abolition of the "peep-show" proscenium stage, the concepts submitted by Schlemmer and Moholy-Nagy have less to offer to—and have been less reflected in—the spoken drama than they have in the dance, a qualification at least inferred by the authors, and one certainly to be expected when one considers their almost overwhelming preoccupation with stage-movement, color, shape, and sound as abstract factors. By the time the typical reader has finished the Schlemmer and Moholy-Nagy sections, he will have been reminded of a spectrum of performance concepts ranging from Mary Wigman to Cinerama, with the resulting inference that there is not anything really new, only variation.

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The illustrations for this edition are, almost in themselves, worth the price of admission, and someone should be congratulated for the absence of a single picture of "the gang" or "the boss" until the final page of the book, where "the gang" surrounding "the boss" is seen dressed for one of their Bauhaus parties. Special kudos to Arthur Wensinger for the translation and his "Translator's Note," which also contains a listing of those who helped make this volume a reality.

The book's timeliness (or universality) is reflected in part by the following quote, from Schlemmer's "Man and Art Figure":

"This materialistic and practical age has in fact lost the genuine feeling for play and for the miraculous. Utilitarianism has gone a long way in killing it. Amazed at the flood of technological advance, we accept these wonders of utility as being already perfected art form, while actually they are only prerequisites for its creation. 'Art is without purpose' insofar as the imaginary needs of the soul can be said to be without purpose. In this time of crumbling religion, which kills the sublime, and of a decaying society, which is able to enjoy only play that is drastically erotic or artistically *outré*, all profound artistic tendencies take on the character of exclusiveness or of sectarianism. And so there remain only three possibilities for the artist in the theater today! *He may seek realization within the confines of the given situation . . . or he may seek realization under conditions of the greatest possible freedom . . . Or he may isolate himself altogether from the existing theater* and cast his anchor far out into the sea of fantasy and distant possibilities. In this case, his projects remain paper and model, materials for demonstration lectures and exhibitions of theater art. His plans founder on the impossibility of materialization. In the final analysis, this is unimportant to him. His idea has been demonstrated, and its realization is a question of time, material, and technology. This realization will come with the construction of the new theater of glass, metal, and the inventions of tomorrow."

Whatever its roots in traditionalism or iconoclasm, professionalism or amateurism, the proliferation of the performing arts in America has prompted a theater-building program in the 60's that is unparalleled anywhere in the world. If the Ford Foundation projects in theater design can be used (as has been suggested) as touchstones for the American trend, they should also serve to show to what extent Gropius and Kiesler, in their own lifetimes, have affected the modern concept of architecture for the theater.

Guide for Planning Theaters

OPEN STAGE THEATER CHECK LIST. *Published by The Board of Standards and Planning for the Living Theater (A Committee of Theater Specialists Organized by the Greater New York Chapter of ANTA, Jo Mielziner, Chairman). Room 505, 1545 Broadway, New York 36, N.Y. (1961. 34 pp., illus. paperbound)*

This booklet is a compilation of items to be considered in the planning of theaters. Even though it is essentially a check list of items "not to be forgotten," there is additional useful data: optimum dimensions, minimum sight-lines, various methods of seating arrangements, and so on.

In the check list are many obvious items, and it is valuable to have included those that are so mundane as to be sometimes neglected. One important procedure—mentioned but not emphasized enough—are regular conferences between the commissioning and operating parties and the architects and consultants.

The most important aspect of theater design, however, is all but neglected. Although it is not a check-list item, the

Continued on page 174

North Attleboro (Mass.) Jr. High School. Architects: Haldeman & Jacoby, Brockton, Mass.

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creation of an atmosphere for the theater-going public is a paramount consideration. Attending the theater should be a magical and delightful experience. The pleasure of the theater-goer can be heightened by the architectural solution of spaces; and the auditorium should be such as to please the imagination by releasing it, not captivating it.

It is regrettable that the format and layout do not enhance this pamphlet, which is otherwise a useful aid in planning theaters.

HUGH STUBBINS, FAIA
Architect
Cambridge, Mass.

South of the Border

MODERN ARCHITECTURE IN MEXICO, *by Max L. Cetto. Frederick A. Praeger, Inc., 64 University Place, New York 3, N.Y. (1961. 224 pp., illus. $12.50)*

This attractive and useful volume, printed in Germany, presents practically the whole range of Mexican architecture since 1930 in the work of 86 architects. Plans, sections, and black-and-white photographs of about 110 buildings and group designs are presented with incisive paragraphs of criticism. Cetto's opinions are unsentimental and frank. Faults of design and failures of construction are discussed. Cetto regards the present as a mannerist age; he criticizes recent Mexican fads and slogans such as "integrationism" and "emotional" architecture, as well as "disembodied houses" of tubing and glass, the general abuse of glass in the hard highland light of Mexico City, and various excesses in the use of curtain-wall construction.

The introductory text provides a brief history of ancient Mexican building from the most remote antiquity to the present, attempting to define its position in the general perspectives of world architecture. One section of the text entitled "The Sad Story of Mexico City's Water Supply," deals with the need for decentralization by a "wide circle of healthy towns on a sound subsoil" in the Valley of Mexico to house the ten million city dwellers of the next generation.

Max Cetto, trained under Hans Poelzig, is a German-born architect, naturalized and practicing in Mexico. His own work is represented in this survey by one small office building and three houses in which his own intermediate position is apparent. Cetto's designs seek out the nature of materials with more variety than usual in Mexico today, and with

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tious. WTIC Broadcast House lobby, The Travelers Broadcasting Service Corp., Hartford, Conn., paneled in Weldwood Algoma-made Architectural Blueprint-Matched Brazilian rosewood. *Architect:* Raymond Bowers, Fulmer & Bowers, Princeton, N. J. *Designer:* Alice Fenner, Inc.

Murals sliced from rosewood flitches

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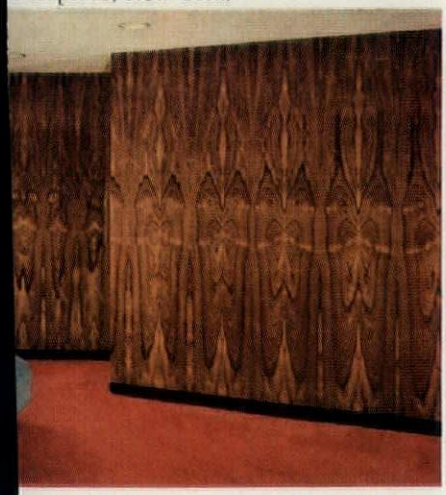

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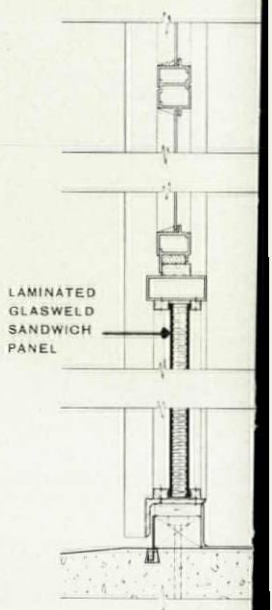
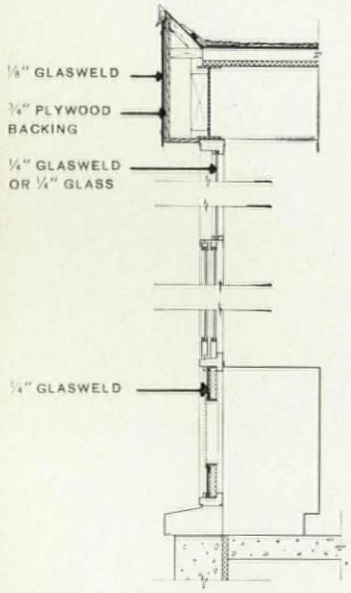
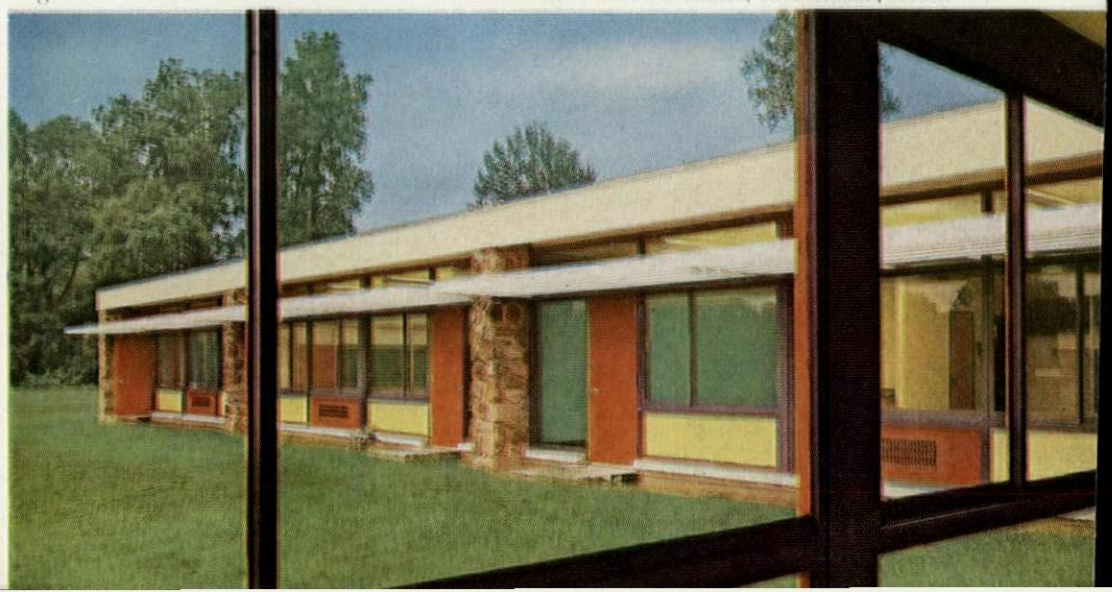


SECTION THROUGH EXTERIOR WALL



SECTION THROUGH EXTERIOR WALL

Glasweld® colors selected for Beecher Road Elementary School, town of Woodbridge, Conn., harmonize w large areas of fieldstone. Detail at left. *Architects:* Davis, Cochran & Miller, New Haven, Conn.



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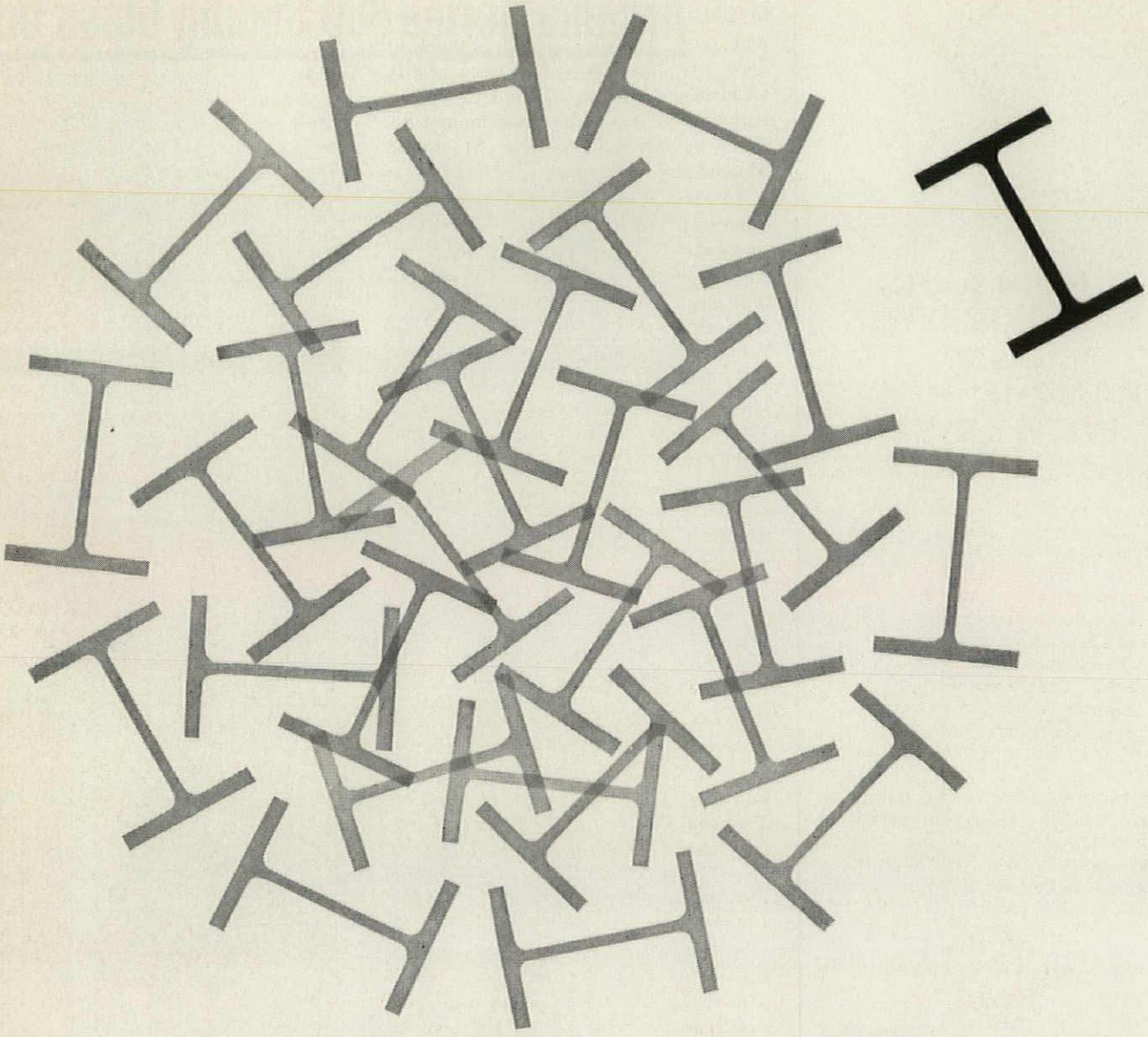

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Continued from page 174

less abandon than the Gaudí-like fantasies of Juan O'Gorman's grotto house.

For this reviewer, several of the buildings stand out as important monuments of 20th-Century architecture: the small and pure Spanish Hospital chapel of 1956 by Juan Sordo Madaleno; Felix Candela's concrete shells called *cascarones;* and the powerful if uneven designs by Enrique del Moral for the Merced market halls.

The relationship of views to plans is sometimes unclear, and it is regrettable that exact street addresses are not given. The translations from Cetto's German text into English and Spanish are excellent, although they do not always correspond in meaning.

A double purpose is served by the book: it is a survey of recent Mexican achievements, as well as a chart and history of the modern movement in a national setting where special circumstances differ greatly from those of other American republics.

GEORGE A. KUBLER
Professor of the History of Art
Yale University
New Haven, Conn.

A Massive Undertaking

GENERAL HOSPITALS: FUNCTIONAL STUDIES ON THE MAIN DEPARTMENTS. *Selected by Bouwcentrum, Rotterdam. Elsevier Publishing Co. Distributed by D. Van Nostrand Co., Inc., 126 Alexander St., Princeton, N.J. (1961. 301 pp., illus. $20)*

The American architect should be warned at the outset that this book will be of little practical or inspirational value to him. Contrary to the publisher's expectations, this volume—in America at least—will not serve as a standard text on hospital design.

Nevertheless, hospital architects will find a study of this book to be an engrossing experience, for here is a massive undertaking comparable in scope to the original establishment of hospital standards by the U.S. Public Health Service. The remarkable thing is that these standards for the Netherlands of today resemble so closely our planning of a decade or more ago.

Of course, one does not expect inspiration from official and semiofficial committees, but the dead hand of conservatism is not the only element at work here. Rather, one sees a careful evaluation of hospital needs in terms of a more restricted building technology and a less experimental spirit. The succinct text reveals that the Dutch are not unaware

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of many of the innovations made in America in recent years but have reasons of their own for rejecting them. They, too, have their nursing-traffic surveys and patient-preference polls, but they simply come up with different answers. And no one can say that their buildings cost more or that they provide inferior medical service or nursing care.

The time may come when we, too, reject single and double patient rooms, abandon the nursing station, give up patient room toilets, drop our race-track plans, eliminate interior spaces, grow to distrust mechanization, learn to avoid reliance on mechanical ventilation, shun the centralization of services, and look to the creation of more humanistic hospitals. But the time has not yet arrived.

ROBERT HYDE JACOBS, Jr., AIA
Architect
Director, Office of Hospital Research
of New York Chapter of the AIA

Reed Hopes Eternal

ARCHITECTURE IN AMERICA: A BATTLE OF STYLES, *edited by William A. Coles and Henry Hope Reed, Jr. Appleton-Century-Crofts, Inc., 35 W. 32 St., New York 1, N.Y. (1961. 412 pp., illus. $2.40, paperbound)*

Henry Hope Reed, Jr., who scorns no podium from which to pronounce his atavistic view of architecture, has made his most recent appearance in a paperback intended for use by English composition students who have the assignment: "Write a theme on architecture." Aside from Reed's pitifully inept approach to the task, discussed below, one is repelled by the use intended for such a book. In a day when American education *vis à vis* that of the Soviet Union is such a bone of contention, it is shocking to see college students provided with such a patent crutch against real research, particularly on a topic which cannot help but affect them all. To paraphrase Amy Lowell, "Christ, what are libraries for?"

The book (which was co-edited by William A. Coles of the University of North Carolina) is divided into two sections: "Aims of Architecture" and "Five Controversies of Modern American Architecture." "Aims of Architecture" is a rather catholic collection of essays and excerpts on architecture distinguished mainly by the exclusion of Viollet-le-Duc (instead, Van Brunt's introduction to his *Discourses* is given) and the inclusion of a section from Reed's piece of egregious pamphleteering, *The Golden City*. Among

Continued on page 182

The offices and publishing facilities of the American Baptist Convention's new national center are combined in an enormous–yet graceful–circular building. *Architect*–Vincent G. Kling, FAIA; *Contractor*–Turner Construction Company. Windows by General Bronze have been skillfully detailed to enhance the design's serenity. GB has long been recognized for its ability to translate architectural needs into efficient, trouble-free window systems.

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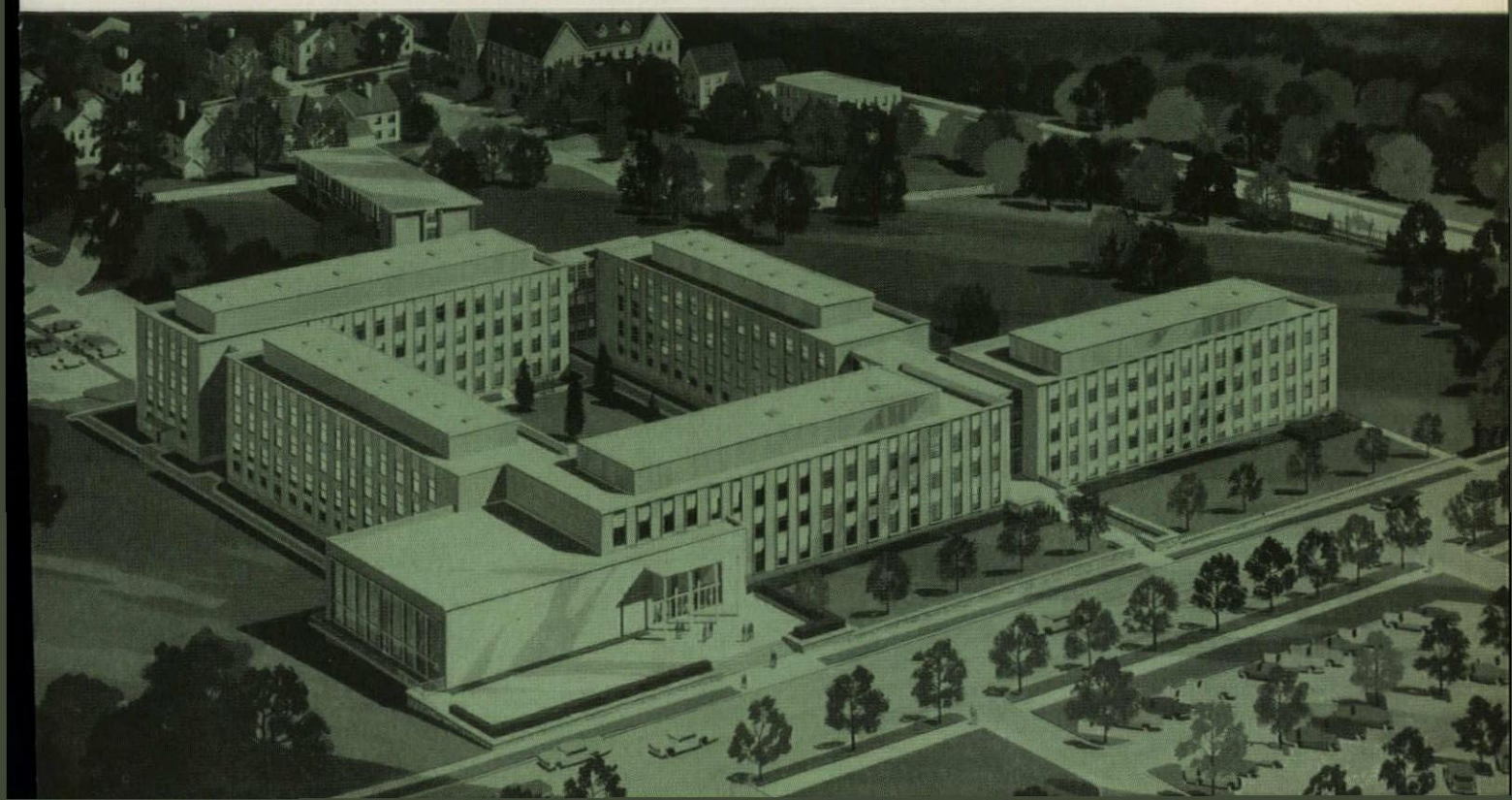
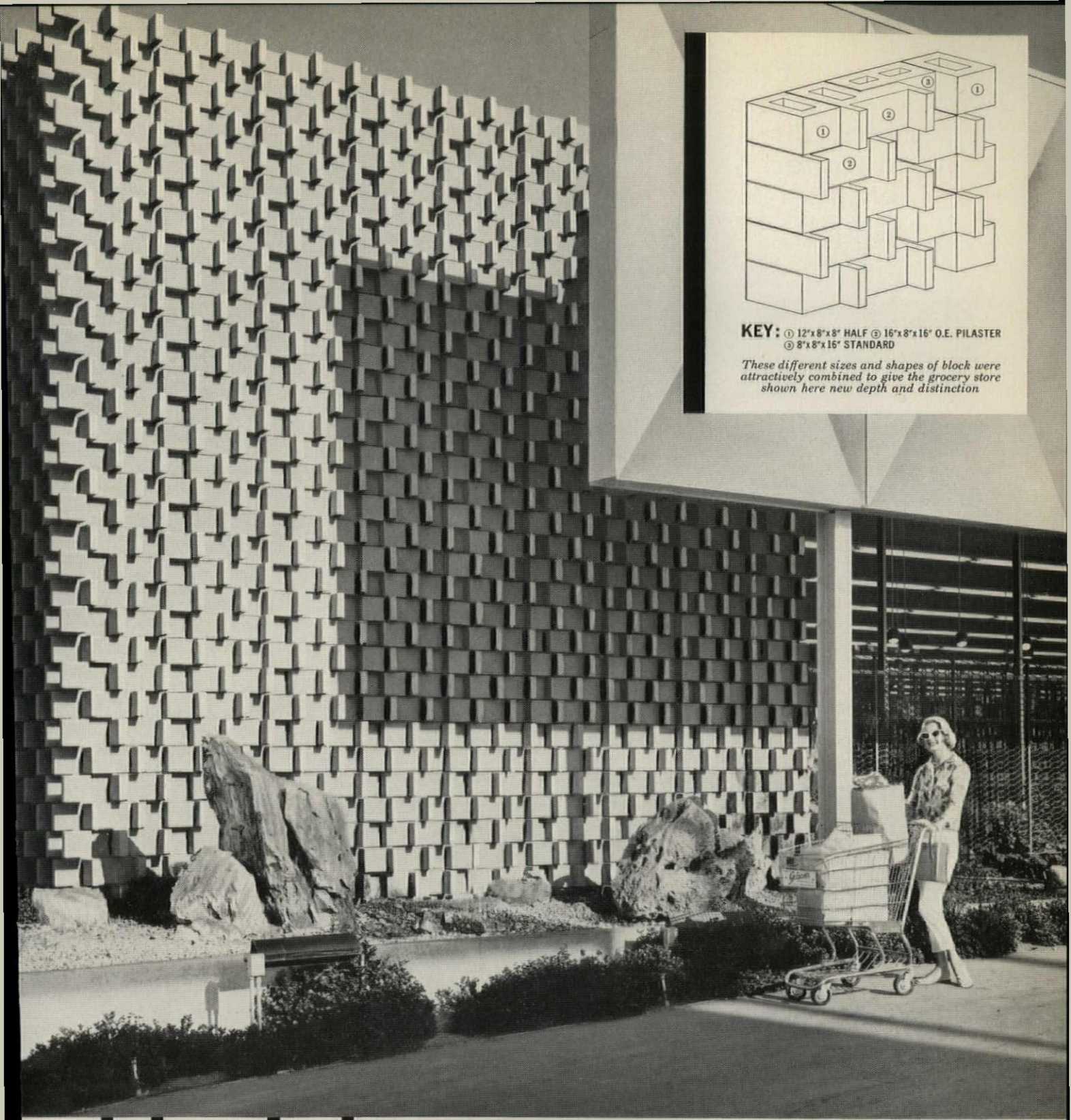


Continued from page 180

those architects and critics excluded who come immediately to mind are Mies (whose pronouncements, though rare, are enormously important to such a collection) and Joseph Hudnut. At least in one instance, the excerpt from Sibyl Moholy-Nagy's article, "Frank Lloyd Wright and the Ageing of Modern Architecture" (pp. 136-142, MAY 1959 P/A), editing has been so slanted as to make what was a seriously considered treatment of the subject appear nothing more than a petty diatribe against the contemporary movement in architecture. Misleading is the only word which applies here.

The second section, "Five Controversies of Modern American Architecture," reprints articles and excerpts, mostly contemporaneous, concerning Chicago's World's Columbian Exposition of 1893, Washington's National Gallery of Art, the United Nations Building, Lever House, and Wright's Price Tower. Not to exhaust the reader with a report on each "controversy," this reviewer will comment only on the first two. One is not surprised at Reed's turning to the World's Columbian Exposition for material, representing, as it does (or did), the apotheosis of his most bloodcurdling desires for American architecture. As if Reed is not completely aware that to most serious observers today the Exposition represents a greater setback for architecture than the forthcoming New York World's Fair is likely to be, he gives us not less than 69 pages by 13 writers of rarely stinting praise of the fair, followed by four and a half pages of *ex post facto* condemnation by poor Louis Sullivan. Balanced reporting, what? In dignifying the National Gallery of Art (Eggers & Higgins, 1941) with the status of a significant design controversy, Reed and his collaborator committed to print an excerpt which is at once careless and—again—misleading. In using part of an article by Lorimer Rich on Washington monumental architecture, the editors credit the source as PROGRESSIVE ARCHITECTURE, a name which was not to become official for some years. The magazine was then *Pencil Points*, and Mr. Reed, with his necrophilic architectural leanings, should have known it. Once again, in the editing, a completely erroneous impression is given of the piece in question. What was an article comparing the National Gallery of Art with the proposed design by the Saarinens and Swanson for the Smithsonian Gallery of Art, to the *disadvantage* of

Continued on page 184



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Continued from page 182

the former, becomes, with lavish use of elisions, a piece *in praise* of the National Gallery! Almost unbelievable.

Enough of a tempest in a teapot. It is only to be hoped that this book will not find a wide currency in our schools, since it can only lead to misconceptions and misapprehensions about architecture.

J. T. B., Jr.

OTHER BOOKS TO BE NOTED

The Architecture of H. H. Richardson and His Times. Henry-Russell Hitchcock. The Shoe String Press, Inc., 965 Dixwell Ave., Hamden, Conn., 1961. 344 pp., illus. $10.50

A reissue of the important work first published in 1936. Many illustrations are new, and an extensive system of new notes (referenced from the margins of the text) brings various aspects of the subject up to date.

The Darkening Glass: A Portrait of Ruskin's Genius. John D. Rosenberg. Columbia University Press, 2960 Broadway, New York 27, N.Y., 1961. 274 pp., illus. $5

Penetrating study of the brilliance and tragedy of John Ruskin, author of The Stones of Venice *and* The Seven Lamps of Architecture.

Exhibitions: A Survey of International Designs. Klaus Franck. Frederick A. Praeger, Inc., 64 University Place, New York 3, N.Y., 1961. 252 pp., illus. $17.50

To be reviewed.

Futurism: The Story of a Modern Art Movement, A New Appraisal. Rosa Trillo Clough. Philosophical Library, Inc., 15 E. 40 St., New York 16, N.Y., 1961. 294 pp., illus. $6

An investigation of the writings of the Futurists: their aims, methods, and theories in literature, painting, sculpture, architecture, and music.

New Frontiers in Architecture. Oscar Newman. (Volume 1, Documents of Modern Architecture, edited by Jürgen Joedicke.) Universe Books, 381 Park Ave. S., New York 16, N.Y., 1961. 224 pp., illus. $15

To be reviewed.

Sculpture on Buildings. Urs Boeck. Universe Books, 381 Park Ave. South, New York 16, N.Y., 1961. 208 pp., illus. $12

To be reviewed.

Sign Language for Buildings and Landscape. Mildred Constantine and Egbert Jacobson. Reinhold Publishing Corp., 430 Park Ave., New York 22, N.Y., 1961. 212 pp., illus. $15

To be reviewed.

Transverse Vibration Theory: Application of Equivalent Systems. Demeter G. Fertis and Edward C. Zobel. The Ronald Press Co., 15 E. 26 St., New York 10, N.Y., 1961. 301 pp., illus. $10

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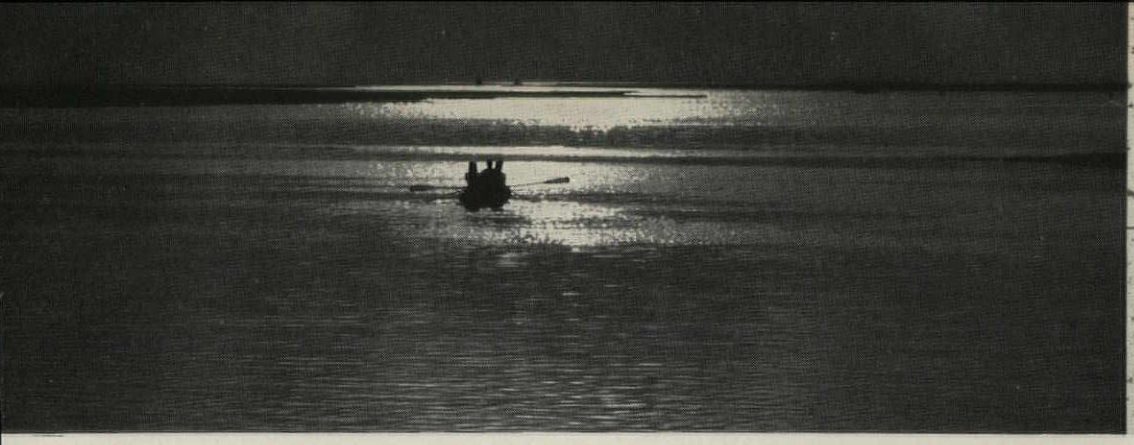

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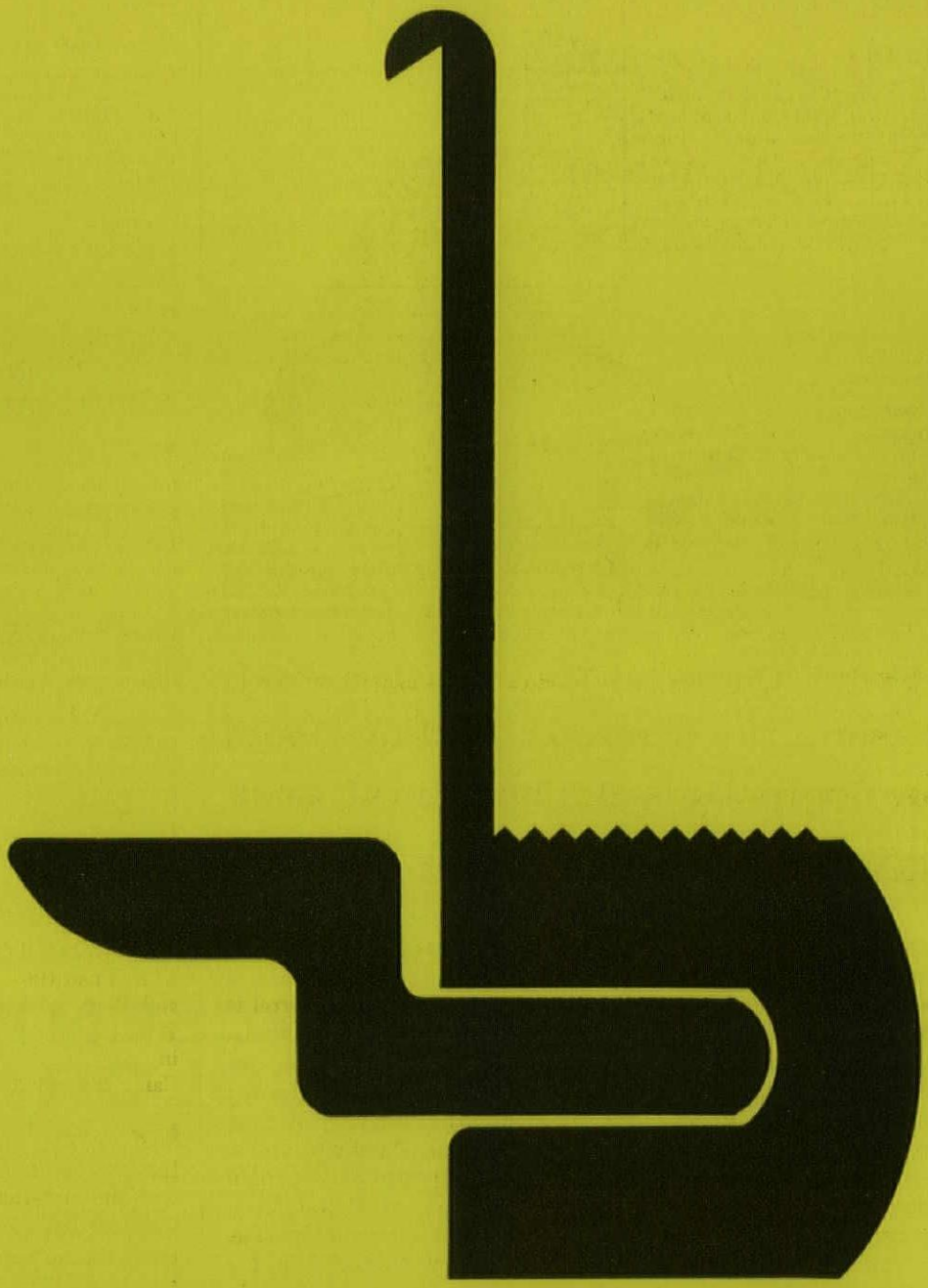

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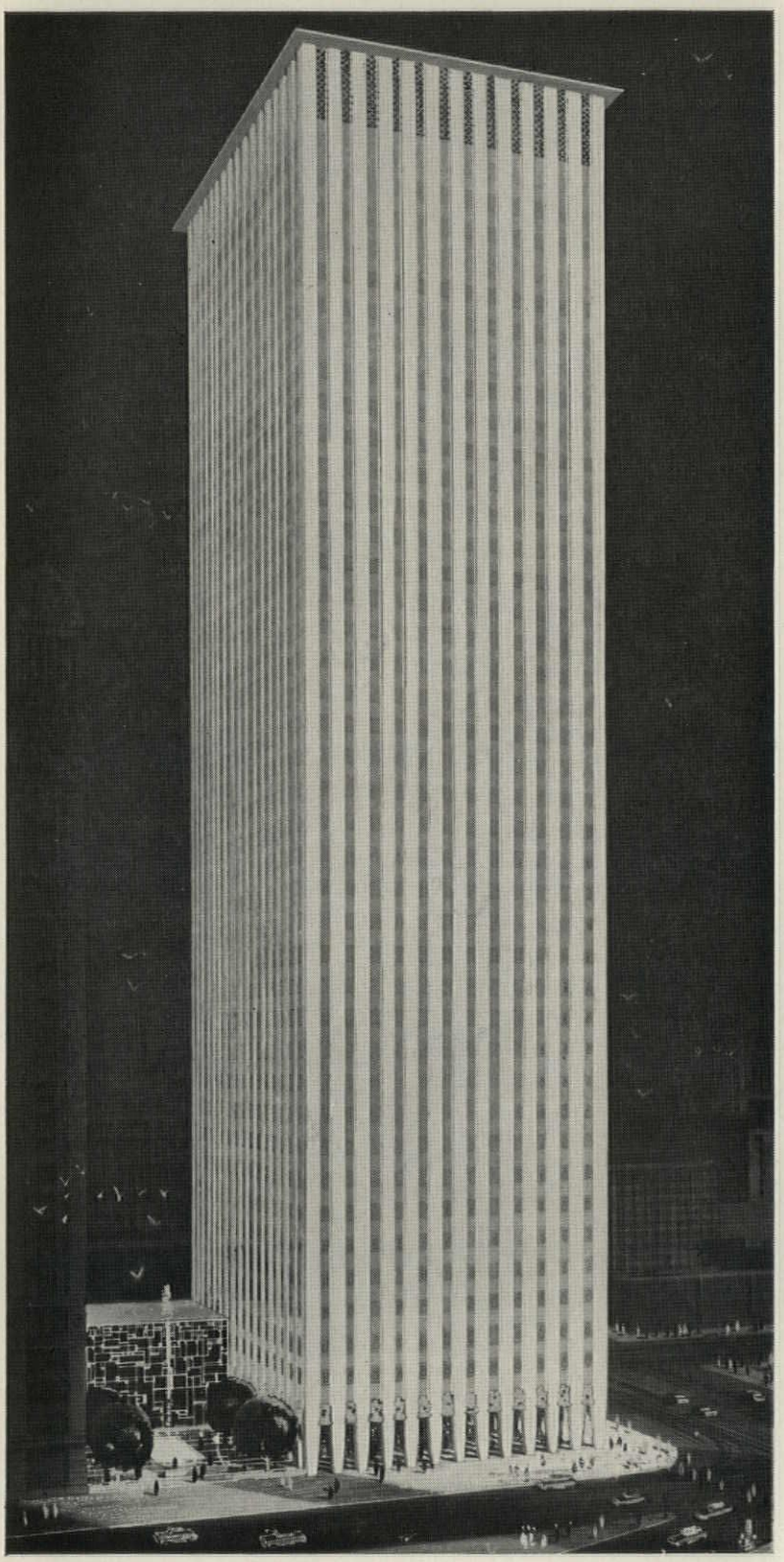

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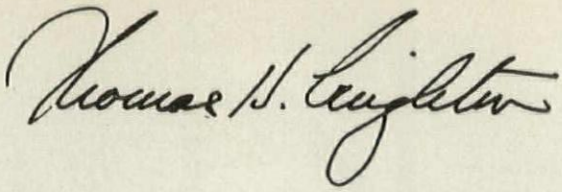

P.S.

Uncommitted Space in architecture would seem to imply an indecisive attitude. Lack of commitment is difficult to explain at this stage in our development, but one keeps running up against the term. Some of the solutions to the problem of the contemporary playhouse that are suggested in this issue call for uncommitted space. Gatherings of educators and architects interested in school design are likely to end up suggesting uncommitted space—or what is sometimes called, in these circles, malleable space.

This concept is very different from flexible space. Don Barthelme has said that *flexible* in this context is just "a big, fat, meaningless word," and I think he is largely right. However, in some buildings flexibility of space does seem warranted, does not imply indecision, but is a provision for varying requirements. For instance, the progressive patient care hospital, with rooms designed for specific degrees of illness, can never be sure what the patient load will be in any category at any time, and there must be "gray areas" where rooms could be used in any one of several specific ways. The multi-purpose room so popular in house design is another instance of flexible space; it might be used in a number of ways, but all of those ways are known and can be planned for.

Uncommitted space, however, lacks consignment because no one knows how it may be used. It is precisely in those areas of human activity where aims and purposes—and the means to achieve them—are in a state of flux that space cannot be committed to a specific use. In education, for instance, the indecision among educators at this moment makes it almost necessary to provide space that can be made useful at any given time—when the educators have decided how they want to teach. Attempts to be *flexible* in such a situation are unsuccessful: one school superintendent told me that his new, well-known, flexible school which allows everything from group teaching to private conferences, from mechanical teaching aids to psychiatric interviews, is impossibly rigid in its layout. "We should have had just great open space which we could use any way we wanted to as curriculum developed," he said.

In theater design, somewhat the same situation seems to obtain. No one—playwright, director, actor, or educator—knows the direction in which drama may move in the period ahead. The indecision, it seems to me, is caused not so much by the need to present material which has already been written for various sorts of stages, from the framed picture to the living room floor, as it is by lack of knowledge of what *will* be written. Again, flexibility as an answer to this seems inadequate. The multi-form theater, as I have come to understand it during the discussions we have had in preparing this issue, is an attempt to provide space which can be used in various known ways. Largely through mechanical devices that allow things to be moved around, it becomes a large multi-purpose room. On the other hand, the idea of uncommitted space, useful in the future for each development as it may arrive, is very appealing to the more progressive theater people.

Perhaps we are in a period of uncommitted architecture. There does seem to be a great deal of indecision about where we are going and why. Rigid city patterns seem dangerous; we have come to know that a city is dynamic, and must be allowed to grow as urban society develops. Flexibility, in planning or in zoning, doesn't seem to be a good answer here either; it is even more a nice, meaningless word. How about acres of uncommitted open space, in which buildings could be moved about as needs and desires change, in the way a dramatic presentation is moved about to suit the purpose of the play? Or is this a concept that begins to appear absurd in its ultimate application, and that makes it clear that it's time to commit ourselves, to develop intentions and aims, and to design space that will help us find purposeful directions?