OCTOBER 1949

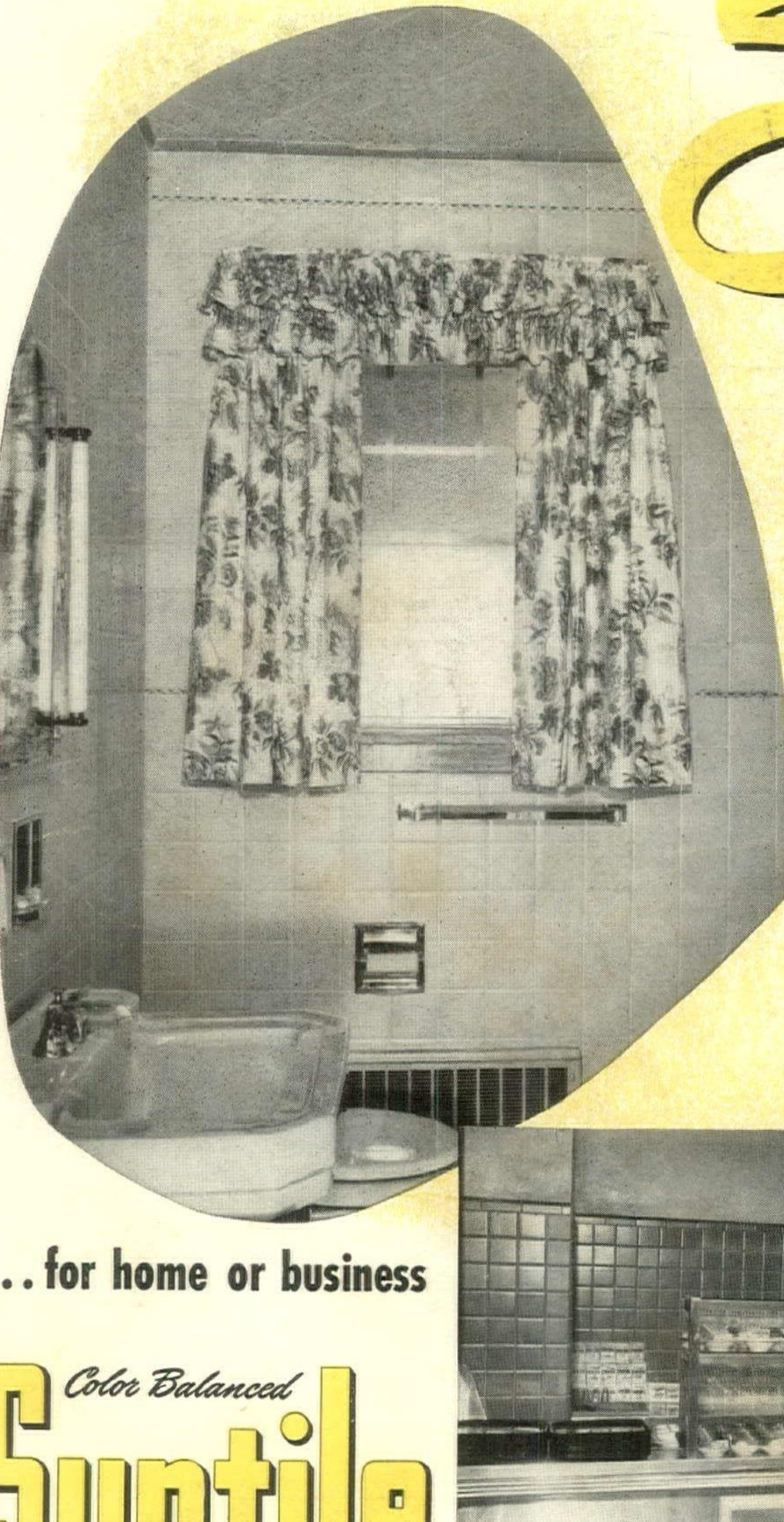
ARCHITECTURAL forum

MAGAZINE OF BUILDING

Easy to look at . . . Easy to clean . . . Hard to exce

COLOR-BALANCED

Suntile



Here are interiors that are always *easy to live with*—colorful, beauty-bright eye-pleasers of color-balanced Suntile.

These durable, clean-in-a-second interiors are *easy to work with*, too—and downright stingy with a maintenance dollar.

When you choose Suntile, you'll find your women clients falling in love with the cheerful color blends that you can attain so easily.

And notice how the men-folks take interest. Especially when you mention the way *real clay* Suntile resists chipping and cracking, the way it eliminates refinishing and repair expenses—*year after year!*

You'll hear a chorus of approval, from both sides, when your clients see how easy it is to keep Suntile clean and bright. It never needs any more attention than an occasional cleaning with soap and water or a damp cloth.

Do all these advantages apply to Suntile for industrial and commercial use, too? Indeed they do, and many other advantages as well. Suntile's guaranteed flawless installation, for example.

You'll like doing business with your Authorized Suntile Dealer. He knows tile. And he makes it his job to see that every installation reflects the excellence of his product. He can show you real clay Suntile in 23 wall colors, impervious unglazed ceramic mosaic Suntile in 20 colors, Suntile Camargos in 10 colors—in modular sizes.

Write us, Dept. AF-10, for your dealer's name and latest literature. See our Sweet's Catalog for more complete data. The Cambridge Tile Manufacturing Company, Cincinnati 15, Ohio.

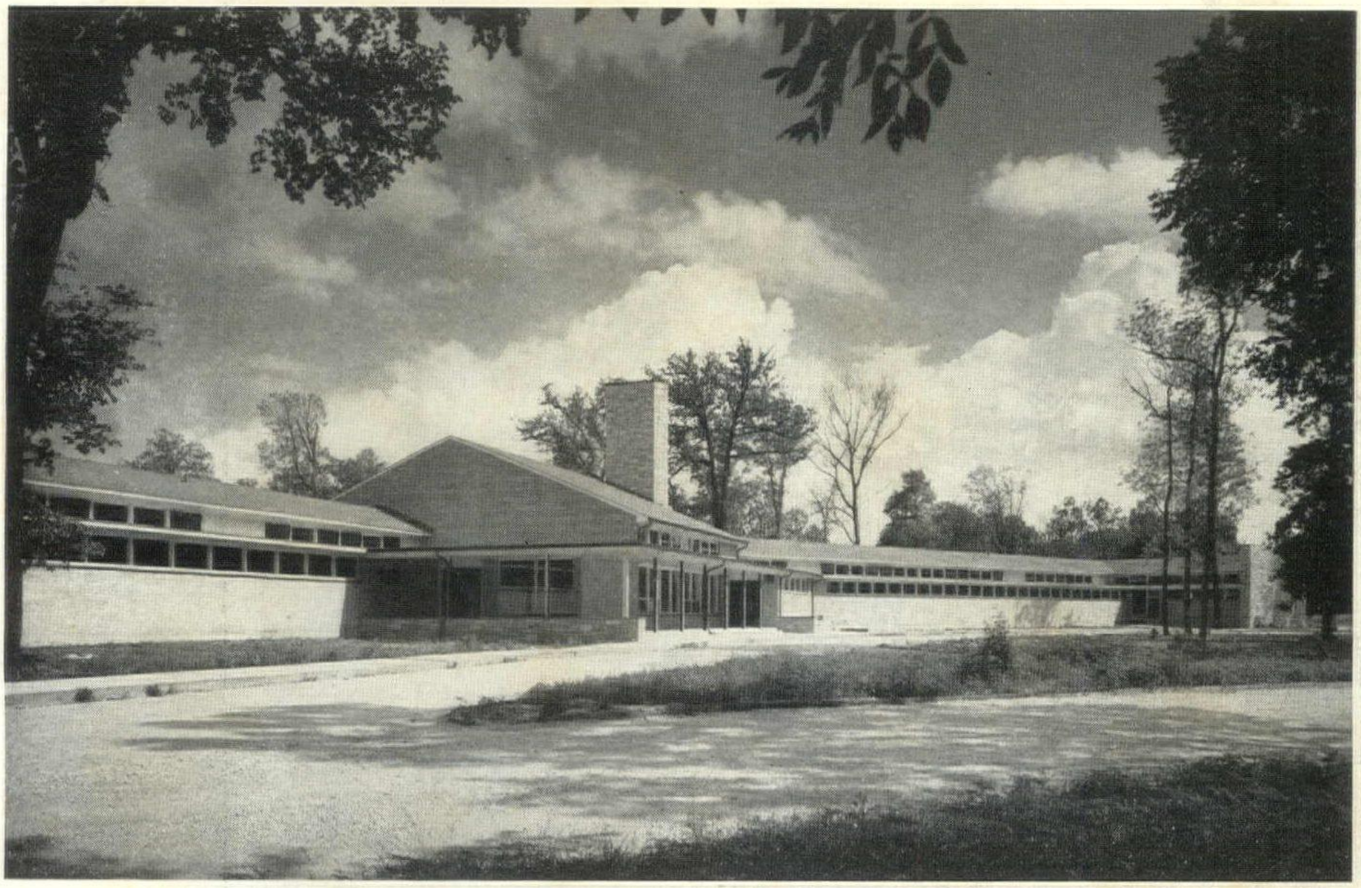
. . . for home or business

Color Balanced

Suntile

Bright with color · Right for life

SUNTILE OFFERS YOU BOTH: BETTER TILE--BETTER INSTALLATION



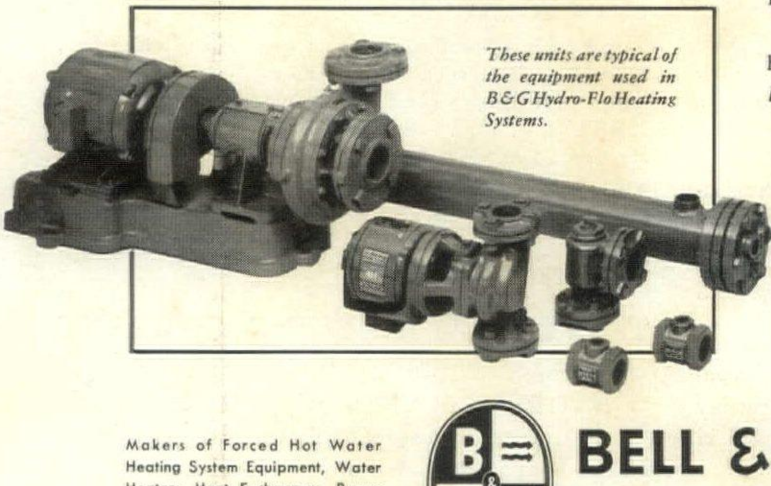
ANOTHER
B & G *Hydro-Flo** HEATING INSTALLATION

CLYDE L. LYON SCHOOL
Glenview, Illinois

PERKINS & WILL
Architects—Engineers, Chicago

E. R. GRITSCHKE
Mechanical Engineer, Chicago

The superior qualities of forced hot water as a heating medium are today receiving wide-spread recognition among designers and builders of modern schools. The Clyde L. Lyon School, Glenview, Illinois, is a typical example of the trend.



These units are typical of the equipment used in B&G Hydro-Flo Heating Systems.

In this elementary school, the heating is provided by an interesting combination of convectors and radiant floor panels, designed to produce maximum classroom comfort.

Water for the heating system is heated by a B&G Type "CSU" Steam Convertor and circulated by thermostatically controlled B&G pumps. Service hot water is provided by a B&G Water Heater connected below the water line of the steam boilers, with the recirculation lines served by a B&G Booster Pump.

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BELL & GOSSETT *Company*

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ARCHITECTURAL **forum**

MAGAZINE OF BUILDING

OCTOBER 1949

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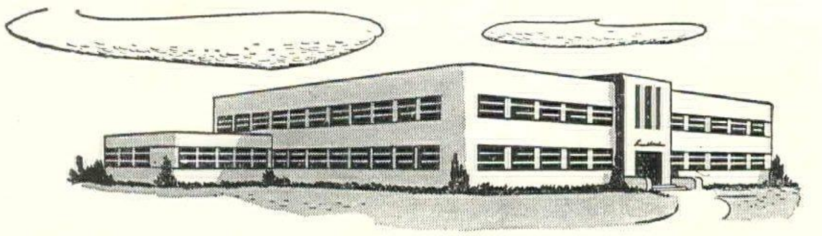
VOLUME 91, NUMBER 4
Reference Number

Cover design by Amnon Rubinstein

SCHOOLS MUST BE SAFE..

PLAY SAFE WITH TRUSCON STEEL BUILDING PRODUCTS FOR SCHOOLS



● You can meet the safety requirements of school buildings with Truscon's complete line of steel building products. They are fire-resistant and their load carrying ability provides an extra margin of safety. They also afford you an unlimited opportunity to create beautiful buildings that are in pace with modern teaching methods.

Every Truscon building product is scientifically designed and factory produced. That's why they reach your job accurate, complete, ready to be installed easily and quickly.

An experienced Truscon engineer in your community will be glad to assist you in adapting Truscon Steel Building Products to your particular requirements.

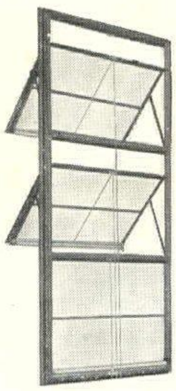
ARCHITECTURAL PROJECTED WINDOWS

Attractive in appearance and convenient to operate. Provide maximum daylight, ventilation and freedom from drafts. Heavy one piece casement type sections in ventilator assures rigidity. Hardware is solid bronze. Screens and underscreen operating hardware are available for all ventilators.

DOUBLE-HUNG WINDOWS

In Two Types—Series 138 and Series 46

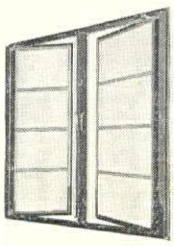
Series 138 Windows are equipped with positive action motor-spring type balances and completely weatherstripped with stainless steel. Made from electro-galvanized strip, these fabricated windows are bonderized and finished with a baked-on prime coat of paint. Available in single units or in integrally built twin, triple and panoramic window units, all are available with or without sill ventilators. Series 46 windows are of the counterweighted design. They are specially adapted for use in office and public buildings. Single or twin units may be had in either standard or special sizes and are available with or without sill ventilators. Made from new billet steel, electro-galvanized. Windows are bonderized and finished with a baked-on prime coat of paint.



DONOVAN AWNING TYPE WINDOWS

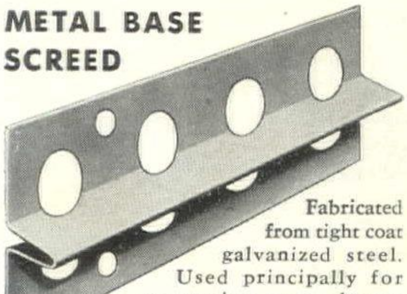
These windows are basically practical in the correct admission of light and proper ventilation without drafts. Sturdily built of unusually heavy special casement sections, they are positively and easily operated. Assure a high quality product incorporating features not available in any other window design.

INTERMEDIATE CASEMENT WINDOWS



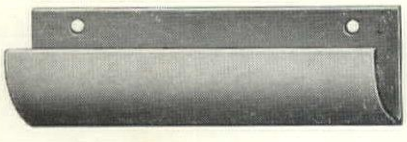
Constructed of specially designed one-piece sections throughout. Accurate weathering is assured through the final cold-rolling of sections to produce positive contacts between weathering surfaces. Hardware is solid bronze furnished in medium statuary finish.

METAL BASE SCREED



Fabricated from tight coat galvanized steel. Used principally for separating two plaster materials such as plaster walls from cement, terrazzo, or composition base, and separating a cement wainscot from ordinary plaster. Another function is to give a permanent straight edge to which both trades work.

METAL CASINGS



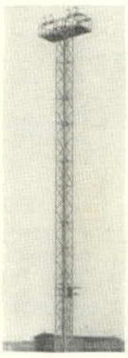
Meet a definite demand for an artistic, sanitary method of trimming around doors and windows. Afford many architectural effects. Metal casings are fire-resistant, vermin proof, easy to maintain and do not shrink or warp.

FERROBORD STEELDECK ROOFS

Truscon Ferrobord provides a fire-resistant, economical roof deck for all new construction or replacements. Covered with insulation and waterproofing, it weighs approximately 5 pounds per square foot.

FLOODLIGHT TOWERS

Made in a wide selection of heights, they offer a firm, long-lasting floodlight tower for lighting in stadiums, parking areas, etc.



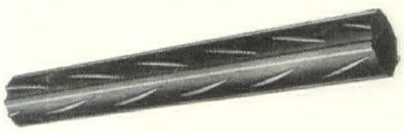
CURB BARS

Protect exposed corners of concrete curbs, walls, steps, etc. Designed to give positive anchorage into the concrete. Plate surrounds and protects the corner without splitting concrete into two portions.

WELDED WIRE FABRIC

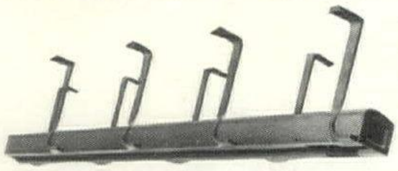
Truscon Welded Wire Fabric is made in various sizes for concrete reinforcing in all types of structures. Each joint is electrically welded for permanence.

CONCRETE REINFORCING BARS



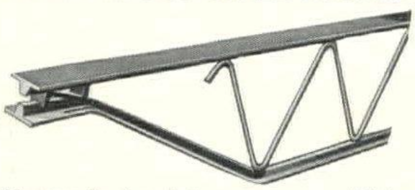
A special rolled section of high grade steel, with a series of longitudinal and diagonal ribs, so designed to provide the maximum bond with the enclosing concrete.

PRESSED STEEL INSERTS



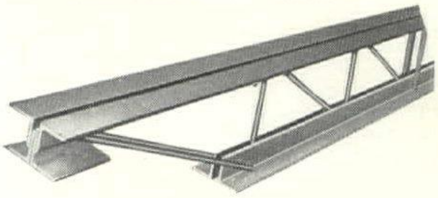
Truscon Slotted Inserts are attached to the forms and are completely imbedded in the concrete. Bolt can be moved along slot to any location, allowing wide variation in position. Used in ceilings, slabs, beams or columns.

OPEN TRUSS STEEL JOISTS



Truscon developed the open truss steel joist to meet the demand for economical, light weight, fire-resistant floors in schools, and other light-occupancy buildings. They are easy to install. Completely shop fabricated, they reach the job ready for placing.

CLERESPAN JOISTS

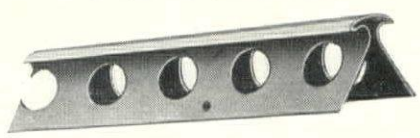


Truscon "Clerespan" Joists meet all clear span requirements up to 80 feet. They eliminate undesirable columns and provide greater unobstructed floor areas, in gymnasiums and auditoriums.

METAL LATH

There is a Truscon Metal Lath for every plastering requirement. Flat laths for ceilings and sidewalls; rib laths to reinforce concrete floors or plaster ceilings; expanded laths for stucco reinforcement; Corner Beads and Cornerite, to protect outside and inside corners.

CORNER BEADS



Recommended as an exposed corner reinforcement. The round nose is strongly reinforced by a deep groove which holds the plaster flush for a perfect bond. It can be wired, stapled or nailed to any kind of wall construction without the use of clips.

TRUSCON STEEL COMPANY
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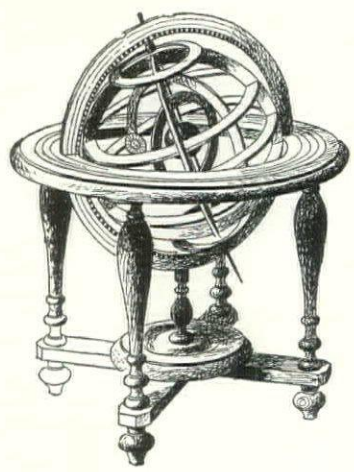
YOUNGSTOWN 1, OHIO • Subsidiary of Republic Steel Corporation

Manufacturers of a Complete Line of Steel Windows and Mechanical Operators... Steel Joists... Metal Lath ... Steeldeck Roofs... Reinforcing Steel... Industrial and Hangar Steel Doors... Bank Vault Reinforcing... Radio Towers... Bridge Floors.

House Beautiful
opens up a new area of knowledge
on how to produce a better house
with its

CLIMATE CONTROL PROJECT



A continuing program of research and editing to define scientifically our scores of American climates in terms of how they affect housing and land development. The objective? To use the house structure and its immediate surroundings as a calculated device to reduce the stresses and strains of the local climate on Man and Materials.

Operating on financial grants from House Beautiful, a panel of 8 scientists and 4 researchers has been investigating, at the level of pure science, the climate specifications of the most densely-populated areas in America. Their findings have been charted and graphed by Dr. Paul Siple for easy reference use by the building industry, and will be published regularly in the A.I.A. Bulletin. Reprints of regional analyses may be bought, by subscription, from the Climate Control Project Administrator, House Beautiful, 572 Madison Avenue, N. Y. 22, for $3 for every six regions. A 3-ring binder is included, free of charge, with each subscription. Single copies for each region may be purchased for 50¢ each.

Popularized versions of the same new information will be published monthly in House Beautiful, and will frequently be accompanied by actual houses (many of them demonstration houses open to the public) designed to cope with the stresses and strains of that regional climate.

House Beautiful's new Climate Control Project gives a new frame of reference in which manufacturers of sound building products can present their story to an educated, comfort-conscious audience of readers.

For more details on House Beautiful's Climate Control Project write

HOUSE BEAUTIFUL'S CLIMATE CONTROL PROJECT

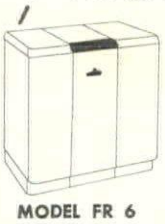
House Beautiful

572 Madison Avenue, New York 22, New York

Yes, in the same floor plan . . . put any combination of

One-width KELVINATORS!

Choose from 4 Kelvinator Ranges and Kelvinator Home Freezer . . . all 39¼" wide!



MODEL FR 6

MODEL ER 489

MODEL ER 487

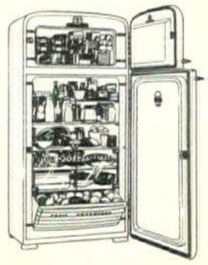
MODEL ER 483-C

MODEL ER 483

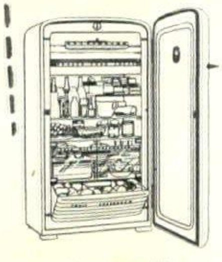
Architects and builders everywhere now enjoy an easier approach to kitchen planning. They are choosing from, literally, dozens of combinations of top-quality Kelvinator Refrigerators and Ranges . . . because any combination of these "one-width" Kelvinators fits the same floor-plan to a T! Here is simplified planning, costly changes out of the picture, time and money saved!

Exclusive! Only Kelvinator offers the flexibility of uniform-widths for easier kitchen planning. Simplify, save—by specifying Kelvinator!

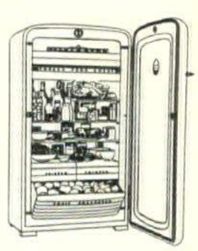
Choose from 6 Kelvinator "Space-Saver" Refrigerators . . . all 31¼" wide!



MODEL TM



MODEL MM



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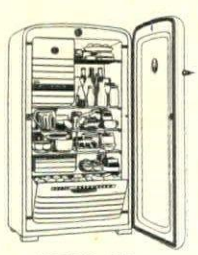
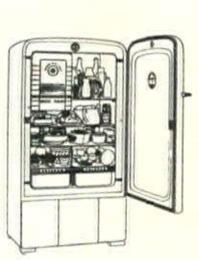


MODEL CM

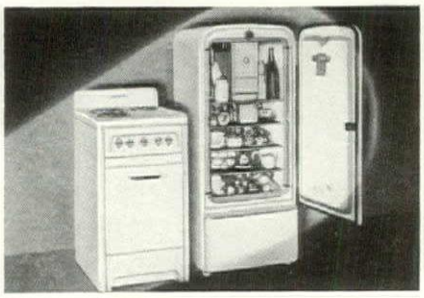


MODEL RD

MODEL RS

GET MORE . . . Get

Kelvinator



"Space-Saver" Package for apartments and low-cost homes! Get Kelvinator's 1949 "Space-Saver" Refrigerator. It is full 6 cu. ft., but only 24 in. wide. Range is only 21 in. wide, with advanced design permitting installation flush against wall. Top-of-the-line quality throughout. For information, write Kelvinator Division, Nash-Kelvinator Corporation, Detroit 32, Michigan.

CONSTRUCTION VOLUME CONTINUES HIGH — joined by rising general business, building points upward, but bumpy weather may lie ahead

For three months building had been soloing to higher altitude while the rest of the economy kept nosing into a slump. Finally general business pointed upward to rejoin it. August saw 404,000 fewer workers unemployed, the first major decline in unemployment this year. Total employment was 59,947,000, very close to Henry Wallace's dream of "60 million jobs." Business loans kept rising. In the week ended September 14 they jumped $164 million, largest weekly gain since June and sixth consecutive weekly increase since the low point early in August. Even the "depressed areas" seemed on the way to working out their own salvation. The stock market perked up in mid-September with the best day's rise since June and the highest volume of trading since March. Building men hardly looked sideways to note the first resurgence of industrial production in ten months. They were too busy piloting their own private (or was it public?) boom:

Construction stays up. For the first eight months of 1949 almost $12.2 billion was spent on new construction, more than last year for the same period. Good news came from every point of the compass. Los Angeles had the greatest peacetime industrial building month (July—$34 million) in its history. New Orleans' building volume for the first eight months of '49 topped all of 1948. Nashville cleared the way for a $20 million redevelopment of its capitol area. Brooklyn signed contracts for demolition of 24 structures, first major step toward its new civic center. Biggest news of all was Pittsburgh's embarkation on the long-awaited project to make the Golden Triangle live up to the luster of its name. Called "Gateway Center," Pittsburgh's pride will be an entire redevelopment of 23 blighted acres involving an initial outlay of $50 million (via Equitable Life) for a building group claimed to be more elaborate than Rockefeller Center's.

All this stimulating news, however, had its necessary dash of bitters. Privately-financed work was 6 per cent below last year's eight-month total. Public building was running almost 30 per cent higher.

Housing news was good, but also flavored with Angostura. Housing starts hit 98,000 in August—11,400 better than last year and 2,000 over July. Some enthusiastic observers were predicting 1949 housing starts would equal last year's total. They had grounds for optimism.

Big boom—if. Attendance at National Home Week shows hit new highs. Carl Gellert, big San Francisco builder said: "We're getting more inquiries and more buyers. I'd call it more than the usual September pick up." St. Louis' Real Estate Board President Frank Gilbert reported: "Sales are running 25 per cent above the second quarter of the year."

Crystal ball gazers and slide rule experts explained the boom with conflicting theories. Some charged the interest in home-buying to a prolonged space shortage resulting from rent controls. Others averred that demise of rent controls, actual or threatened, had brought out a rush of home-buyers seeking to escape what they feared would be certain and drastic rent increases.

The gains, however, resulted from increases in rental units and public housing projects. Private residential building in August was down 8.3 percent from August 1948. Public housing was up 200 per cent. If public housing, by bidding up the price of labor and materials, scared private builders out of the market, the result, as the U. S. Savings & Loan League expressed it, might be "less housing for the American people rather than more." Possible dangers in FHA rental housing, however, looked even more serious.

Bust after boom? Sober students of housing were crossing their fingers on the boom in rental units. To them it resembled the building finance spree of the late '20s.

There appeared to be a disregard for market considerations in the flood of commitments under section 608. Quite often the commitment seemed sufficient to cover all costs and yield substantial profits from the mortgage. Promoters' efforts to "mortgage out" were not new, of course, but their success appeared never to have been exceeded. When everyone going into FHA appeared able to make a satisfactory deal, things seemed to be going wild. Commitments were being made where the so-called "owning corporation" did not have sufficient resources even to cover the required examination fee. Such commitments were reported being peddled to builders on this basis: the builder posts the necessary cash, takes over the mortgage fund, builds the building, pockets the difference between loan and cost then turns the building back to the promoting group. Sometimes the promoting group also shares in the builder's profit.

The motives back of FHA policy were hard to fathom. Pressure to increase the housing supply played its part. But the critical fact was that 1949 commitments would cover at least twice the number of units committed in 1948 and two-thirds more than the number of units in 1947 when the pressure of demand was most desperate. FHA's 608 commitments in 1949 through August covered projects for 135,861 dwelling units—a total of $1,018,000,000. This compares with 1948 commitments of 75,616 for the full year and total commitments of 97,802 units in 1947.

But builders would build as fast as FHA would approve. And if lenders become reluctant there was always Fanny May. Rental housing seemed insulated from the corrective forces of a free market. The boom was exhilerating. Building could fly much higher before it reached dangerously thin air. First it would have to fly through bumpy weather—strikes in steel and coal.

WASHINGTON

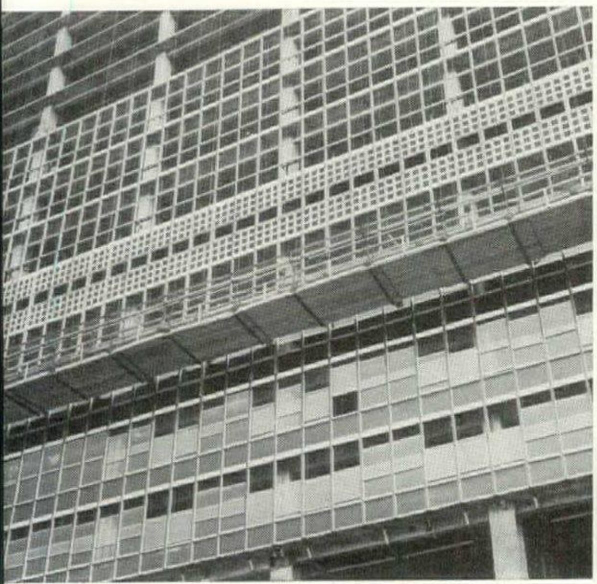
DIRECT LENDING stalls Senate action on Housing bill

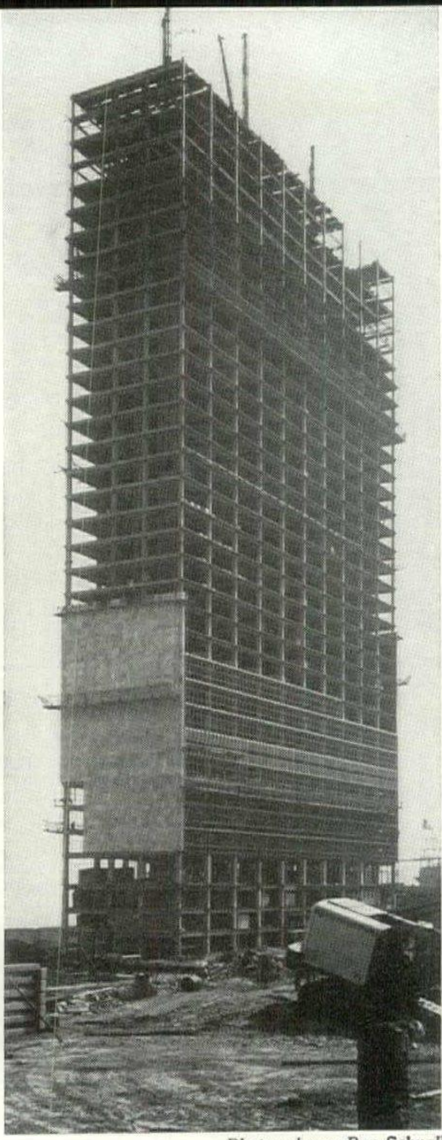
As the House dragged back to Washington for the last stretch before adjournment, it found that the Senate still had not touched its version of the "aid-to-private-enterprise" housing bill, which the House had disposed of with dispatch before vacation (FORUM, Sept. '49).

It seemed clear enough, as a matter of fact, that the Senate was not in any hurry to put itself to a vote on the controversial bill. Going along with the House on such provisions as the liberalization of FHA would be no trick. And the Senate seemed just as determined as its sister group to kiss off section 505A, over the heated opposition of the home building industry.

UN GROWS in marble and glass

Whatever its political progress, the physical plant of the United Nations was steadily rising on its East River site in Manhattan. Last month workmen were setting the steel for its 34th floor. Ten stories were enclosed with windows (note picture below.) Marble for the north and south facades covered 13 stories (right). Foundations for entire project were 80 per cent complete.

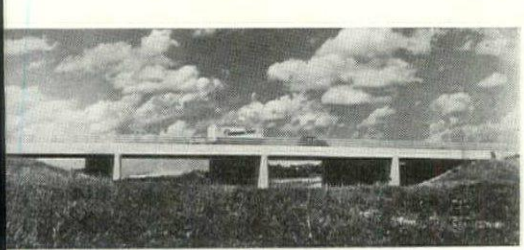


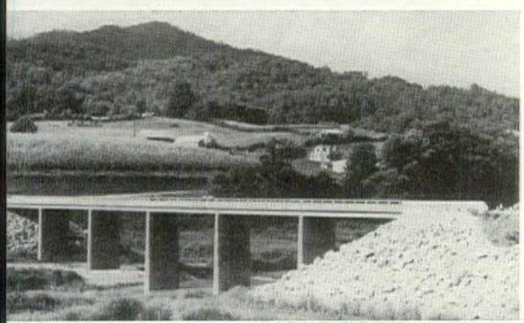


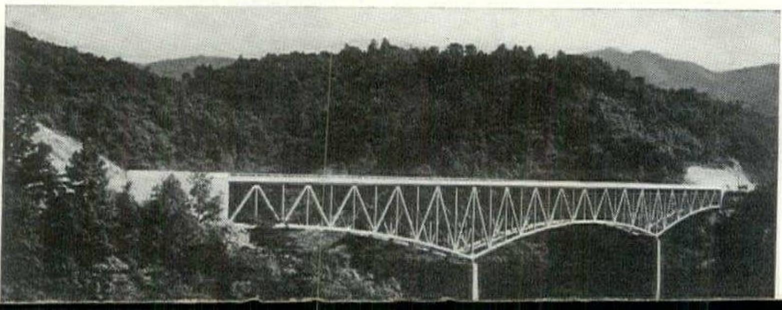
Photos above: Ben Schnall

PRIZE BRIDGES are simple, clean

In the American Institute of Steel Construction's annual contest for the most beautiful steel bridges in the U. S., first prizes were awarded the Airport Apron Overpass at New York's International Airport, by Clarke, Rapuano & Holleran, and TVA's Wautaga River Bridge (below). Two of the honorable mentions went to another TVA project, the Roan Creek Bridge (upper, left), and the 159th Street Overpass designed by the Cook County, Ill., Highway Dept. (below, left). Jury included AIA President Ralph Walker; Ernest Kump, San Francisco; Cyrus Silling, Charleston, W. Va.; Warren Raeder, University of Colorado; Nathaniel Owings, New York.







But on the issue of direct government loans (which the House had removed from its bill), the battle lines were all messed up and it was difficult for many a Senator to find his team. The Administration, impressed by the contention of the mortgage lenders that they would prefer no legislation at all to that which included direct loans, found itself pitted against the CIO and such usual senatorial stalwarts as Sparkman, Maybank and Douglas. And the American Legion, to compound the confusion, had jumped from the middle of the road to stand squarely behind the CIO.

Finally the Senate made its indecision official. On October 5 it shelved the Sparkman bill until next year, extended instead (until next March) those FHA housing insurance sections about to expire (Titles I and VI), and gave Fanny May another $1 billion.

PUBLIC HOUSING gets under way in 80 cities with 172,155 commitments

The public housing score was mounting steadily—and heavily in favor of the Public Housing Administration, which was pushing to dispose of its 270,000-unit quota for the first two years. After serving up the first two program reservations to Galveston and Norfolk (FORUM, Sept. '49), PHA started making its tentative commitments* in a rush. At month's end it had allotted 172,155 units to 80 localities; some of the public housers thought they knew where they could get rid of a lot more (see below.)

PUBLIC HOUSERS take over new role: job creation

Last month Public Housing was outfitted for a new role, the same one which private builders had feared. HHFAdministrator Raymond Foley asked "critical" cities (those where 12 per cent or more of the employable citizens are out of work) to step up their applications for public housing units.

Another WPA? Apparently, three months after Public Housing became law, no one remembered the fears expressed by the private building industry last summer that federal construction of dwellings would develop into another WPA. Even now, Foley's assurance that public housing contracts would not be awarded solely to create employment and that a community must be able to demonstrate its need, did not quiet

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*Allocations remain tentative until cities come up with plans for a definite project, the land, and such evidence of cooperation as tax exemption.

those fears. Builders thought the government was posing some fascinating questions. For one, how could a program which will take at least a year to actuate relieve present unemployment? For another, since significant unemployment in an isolated area almost invariably indicates that industry has moved away,* is not the need for housing there diminishing, too?

RFC PREFABS go at auction prices

When the FHA refused to grant mortgages on the 262 flat-topped, plywood prefabs which the American Fabricators put up in Pine Bluff, Ark., with the aid of an RFC production loan granted under the old Wyatt guaranteed market program, RFC was obliged to take over the whole batch—$1,380,000 worth. It dressed up the five which had been completed with a brick veneer and put them in a builder's development outside Washington, D. C. It kept the rest knocked down in the Government Armory at Pine Bluff.

Last month the sad story of RFC's greatest loss under the Wyatt program ended with the bang of an auctioneer's gavel. Outside the armory, Joseph P. Day, Inc., of New York, hawked the prefabs one at a time. Highest bid was for $1,800.

MILITARY HOUSING pushes ahead

FHA started the ball rolling last month by granting its first Title VIII military housing mortgage of $8,100,000 to Builder B. J. Harris, who will construct a 1,000 unit project at Fort Knox, Ky., where all the gold is buried.

LABOR

BRITISH EXPERTS study U. S. building "know-how"—and know why

"Certainly the one thing which, more than any other, strikes the visitor to the seats of industrial skill in the U.S., is the ingenuity, the indomitable energy and perserverance displayed . . . traditional methods have little hold upon the American, as compared with the British artisan." Thus, in 1853 Royal Commissioner George Wallis, "by command of Her Majesty" Queen Victoria, reported in Commons on his 11-week tour of U.S. industry.

Again, after World War I, Britain sent a commission to study American productivity and the British are still coming over to marvel at and report on American "know-how." Last month the fifth team of Britons to visit the U.S. under the sponsorship of ECA returned home. After their 45-day, seven-city tour of U.S. building projects 17 British builders, architects, surveyors and workers were:

". . . Glad to see every home provided with its own heating plant . . . intrigued with building outside walls with a brick veneer and cinder block interior . . . amazed at your speed of construction and coordination of work at the job-site."

Patting U.S. labor's back while pointedly peering over its shoulder at Britain's Trades Union Congress, British builders observed:

"American building craftsmen are 50 per cent more productive than British workers. [We] particularly liked the mixing of concrete away from the site and then delivering it ready-mixed. We found out how you can pay $3.20 an hour for labor, while we pay 60 cents. You never have to tear work out to put new work in. Gad, you put up two bloody floors a week!"

But British Labor had little to say. A careless word might have embarrassed their Labor Government. Nor did courtesy require plaudits, for U.S. Labor played host at only one of the 18 luncheons honoring the know-how seekers. In Buffalo, U.S. Labor brushed off the British, didn't even accept a local contractor's suggestion that Buffalo's Building Trades Council hold a round-table discussion with British labor delegates.

"Even so," said a British contractor, "our labor men had their eyes opened." British workers noted American journeymen owning homes, driving cars, sending children to college. They did a double-take on seeing foundations for Buffalo's Bethlehem Steel strip mill (whose excavation had been started after their landing in New York) laid down by the time they reached the site. Evidence that U.S. labor, without controlling government, lived better than labor in Britain, where it had control, stopped them cold.

British contractors, too, were wary in reporting to ECA: British building could equal American efficiency "if it had the tools." But no one explained that tools are *capital*, or asked how American know-how could help if Britain's Labor Government kept on nationalizing (i.e. confiscating) capital. Politely the British hinted at the central problem: ". . . the American state provides no feather bed for failures."

Once the bulldog spirit of Britain did break through international amenities. A burly British subcontractor clenched his scotch and soda, blurted: "Would to God I was 30 years younger. Ye'd have another Britisher to naturalize. I'm afraid for my children—afraid they'll grow up and never know the competitive spirit."

ECONOMY

PRICES are under upward pressure

Material prices, with few exceptions edged upward in September. The reason: increased manufacturers' cost for labor, raw materials and transportation. Eastern cement makers announced a 10 cent per barrel increase to $2.40, effective October 1, reflecting their higher costs for coal and other raw materials and their wage increases last spring. For weeks, cement prices had lagged behind the general building materials index. Now cement makers had to average out.

Other prices followed the same pattern, reflecting not only higher costs but also increased demand. West Coast Douglas fir (No. 2 or better) two-by-fours sold at the mill for $45.50 late in July, $48.50 in mid-August and in September were selling for $50 per thousand. Southern pine boards (one-by-eights in Boston) were up from $73 in July to $75. Lead and tin, the two commodities most affected by Britain's devaluation of the pound, ran counter to the trend. Lead dropped in New York ½ a cent to 14¼ a pound. Increased foreign offerings required the action. In the case of tin, the RFC had to cut the price from $1.03 a pound to 96 cents to meet Britain's action in lowering its tin price.

The price pattern was typified by copper, which dropped steadily from 23½ cents a pound in August last year to 16½ cents in July and is now back to 17⅝ cents. Apparently there was no way, now, for prices to go but up. Demands for wage increases and pensions, higher rail rates, and the certain inflationary force of the new minimum wage law—plus increased demand for materials stimulated in part by the government's public housing program—all might soon be reflected in higher building costs Even though costs were still down from last year, they would not stay down long unless labor productivity and managerial efficiency kept pace with inflationary pressures. What a long steel strike would do to prices, it was too early to tell.

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*In some such areas, the federal government actually helped knock the props from under the local economy by encouraging plants to move away for strategic reasons. Chance-Vought, for instance, encouraged by the government, moved its aircraft plant to Texas, which the government considered "strategically less vulnerable" than its old site of Bridgeport, Conn., which wound up on the critical list.

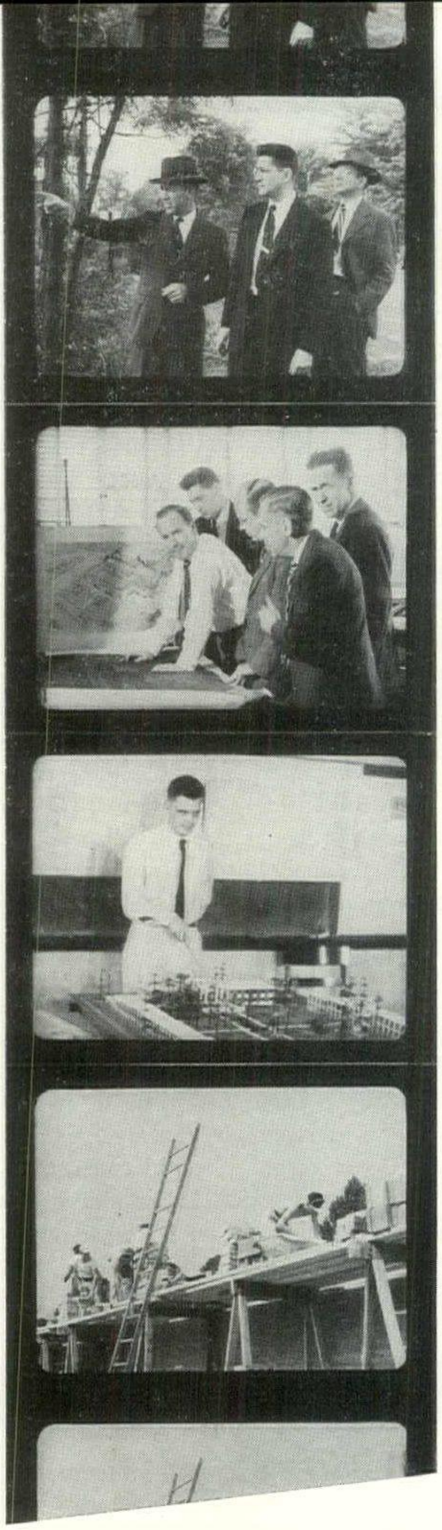
THE FIGHT FOR BETTER SCHOOLS

In the war on obsolescent school conditions, what part can the people—the taxpayers—of a specific locality play? The recent history of public education in America has largely been one of too much public indifference to that question. Only lately have there appeared isolated examples of a community facing up to it. Arlington, Va., is one such example.

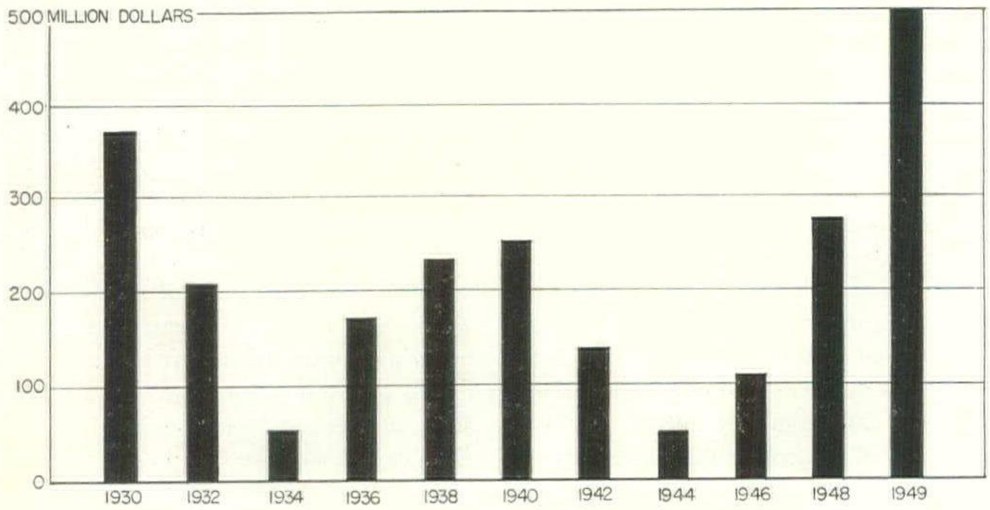
When the residents of Arlington became aware that the public school facilities in their county did not meet today's needs, they pushed a four-year program which has resulted, among other things, in the planned construction of seven new school buildings and much-needed additions to several others. The scenes at the right, from the current production of THE MARCH OF TIME ("The Fight for Better Schools"), which dramatizes the Arlington project, tell only the later part of the Arlington story.

The Arlington school system was deeply imbedded in local politics in 1946, when the aroused citizenry began to show interest. State law had always made school board positions appointive ones, out of the reach or control of the voters. For almost two years the people, organized into a Citizens Committee, fought for, and won, the right to elect their board members. Then they elected five from their own group.

The new board promptly asked for and received a $4,750,000 bond issue. The MOT film shots take it from there: the board selected the sites for their schools, hired four architectural firms in Washington and in Arlington, worked closely with them, approved their models, and a year and a half after the new board took over, got construction on four schools started. This summer a group of prominent laymen formed the National Citizens' Commission for the Public Schools, with headquarters in New York City, to stimulate a broad and active interest, like that aroused in Arlington, in school conditions in every section of the U. S.



PUBLIC SCHOOL CONSTRUCTION increased five fold in three years



History of public school construction (elementary and high schools only) for the last two decades is charted above. From low point of war years, building has risen sharply, may hit $500 million this year. Source: U. S. Office of Education. (Commerce Dept. estimate, at $800 million for 1949, is more comprehensive, includes college construction.)

SCHOOLS

COST SURVEY chronicles experience across the U. S.

How much do the various states spend on schools for their children? *Engineering News-Record* last month took a long look at that question and came up with a few answers. Investigating 29 elementary schools, 6 junior high schools, 7 high schools and 3 college buildings in 18 states and the District of Columbia, ENR found:

▶By and large, new schools south of the Ohio River and west of the Mississippi cost less than $1,000 per student, and those north and east more than $1,000.

▶The median elementary school costs $802 per student (at Washington, D. C.), $11.31 per sq. ft. (in Massachusetts), $0.80 per cu. ft. (in Torrance, Calif., and Washington, D. C.) Costs per student range from $193 (an emergency portable building in Los Angeles) to $1,995 (in Cicero, Ill.)

▶Junior high schools range, on a cost-per-student basis, from $565, in Temple City, Calif. (where six frame-and-stucco, one-story buildings serve 550 students in 10 classrooms, 7 special instruction rooms, 9 administration and teacher rooms and 11 conference rooms), to $2,044, in Baltimore, Md. (where a $1,088,000 brick and steel structure with 18 rooms, an auditorium, a gymnasium, a cafeteria and a community use room serves 525 students.)

▶Median high school cost per student is $1,081, at Norfolk, Va. Low cost-per-student school ($4.16), at Macon, Ga., is a 1,600-student structure of six brick and steel one-story buildings, of modular construction, with radiant heat and an entire window wall for each of its 32 classrooms. High ($1,801), at Euclid, Ohio, has three stories and a swimming pool.

AID TO EDUCATION takes turn toward school construction

Last month, when Rep. John Lesinski (with an able assist from Cardinal Spellman) torpedoed the Barden bill, denouncing it as "anti-Catholic" and "anti-Negro," chances for pasage of federal aid to school operation seemed slim. But federal aid for school construction was another matter. Advocates of federal aid to feed, house and teach the nation's burgeoning school population stopped their squabbling and got behind another proposal, S. 2317, a School Construction bill, engineered by Minnesota's politically-wise Senator Hubert Humphrey, with another able assist from his shrewd legislative counsel, Max Kampelman.

Humphrey, by sticking to school construction and avoiding aid to school operation, thinks he has side-stepped the racial and religious issues which have tripped up more than half a dozen education bills. His bill neatly slips the federal foot further into the door of public education by providing 1) a $5 million grant for surveys (by state educational agencies) to determine school building need and 2) grants for construction aid direct to school districts "to meet emergency needs." Size and number of grants is left open, to be determined by later appropriation. (For details see page 158).

Thus the real building bonanza, rated at $10 billion by the Office of Education, would come later, as it did in the hospital building program. The bill's proponents were certain it would come, as surely as they were that the need could be shown. (For details see page 82).

Humphrey's bill has bi-partisan sponsorship, is on the Democratic Policy Committee agenda. Its passage, this session, seems doubtful, especially to those logicians who ask why the government should not provide parochial schools with construction aid when it is providing school lunch aid to parochial as well as public schools under an $83½ million program. The answer, says the majority, is that taxpayers should not pay for parochial as well as public education, that such aid would violate America's traditional separation of church and state.

DESIGN

CLIMATE CONTROL: House Beautiful's new project holds promise for housing

After 27 months and 14,000 man-hours of research, *House Beautiful* launched its Climate Control Project, a grandiose melding of climatology, anthropology, medical geography, physiology, architecture, economics, powerful promotion and smart advertising. Climate Control, its sponsors say, will do for the home builder what Hippocrates did for the physician—help him use the facts of climate to give his patient better health.

The "patient," to *House Beautiful's* editor Elizabeth Gordon, however, is not the home owner but the home building industry itself. It needs a tonic and she has one. Says she: "Here we are with a wealth of technical opportunities, yet the majority of houses built today might as well have been built 20 years ago. Most critical of all, people living in old homes are not being enticed to discard them." Miss Gordon's tonic: 1) start tailor-making houses for the particular climates in which they will stand, 2) show home owners how climatology makes present homes obsolete —result: a new housing boom.

Under editor Gordon's program, technical data on U. S. climate zones will be published bi-monthly in the A.I.A. Bulletin. Armed with this data, fabricators, architects, builders and landscapists can develop materials, design, construction and site planning that will "reduce the stresses and strains which climate puts on both man and materials."

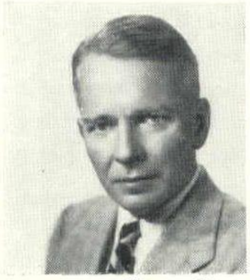
Brain-trusting Climate Control for *House Beautiful* are: Yale anthropologist Dr. Ralph Linton, Army climatologist Dr. Paul A. Siple, government micro-climatologist Dr. H. E. Landsberg, Yale physiologist Dr. L. P. Herrington, architect Walter A. Taylor, economist Miles Colean, U. S. Army's Dr. Dana Coman and aeronautical writer Wolfgang Langewiesche.

House Beautiful started plumping the program in its October issue, will report, over the next 22 months, data on 15 climate zones and 18 houses featuring climate control principles.

PEOPLE

Adrian Wilson, bustling president of the California council of A.I.A. prepared a grass roots campaign to get off the books a state law which prohibits private architects from contracting state works. Nearly $350 million in state projects have piled up, said Wilson, because of the "incompetence" of the state civil service architects who handle the work. Unable to get the law changed in the legislature, Wilson called for a referendum.

HHFAdministrator **Raymond Foley** last month filled the first two important posts created by the public housing law. **Berchmans T. Fitzpatrick,** HHFA general counsel since 1946, became Deputy Administrator, a position ranking with the heads of FHA, the Home Loan Bank Board, and the Public Housing Administration. **Nathaniel S. Kieth,** onetime *Wall Street Journal* writer and for the last two years special assistant to Foley, was named director of slum clearance and urban redevelopment.



Photos: Chase

Herman H. Field, director of building plans for Cleveland College of Western Reserve University, joined the list of those missing behind the Iron Curtain. He was last seen, the State Department disclosed last month, on August 20 at the airport in Warsaw.

George Howe, co-designer in 1932, with William Lescaze, of the famed Philadelphia Savings Fund Society Building, the first American building to reflect international modernism, was appointed chairman of the Yale Department of Architecture.

Gilmore D. Clarke, chairman of the Fine Arts Commission, was dropped from his post late in August, after 18 years.

Senators **John J. Sparkman** (D., Ala.) and **Ralph E. Flanders** (R., Vt.), always on the lookout for something new in housing, thought they might find it in Sweden. They made plans to take off on a junket October 6 to study cooperatives.

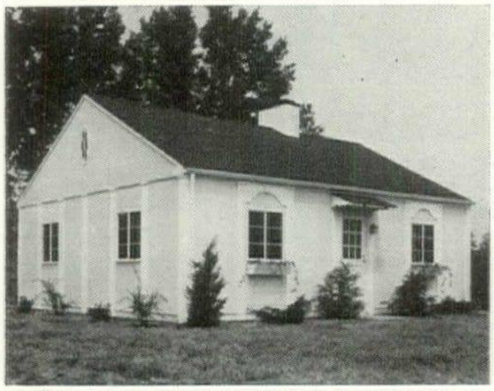
MONEY

DEALER FINANCING is offered to Lustron and Gunnison

The nation's largest two prefabricators, Gunnison and Lustron, kept vying with each other all month for headlines. The news they made together was the biggest of all, for it was the kind that each had been working at for years: dealer financing. The Galbreath Mortgage Co. of Columbus, Ohio, offered the two companies—and any other prefabers who wanted to get in the act—the kind of plan which prefabrication had been waiting for for a score of years.

Under the plan, Galbreath would pay the manufacturer the dealer's price of the house, provided the dealer had already arranged for permanent financing. The bank or lending institution would reimburse Galbreath at a specified construction point. Galbreath's charge to the dealer: 4 per cent.

"Champion" helped. After the first month of operation, it was still too early to tell whether the plan would be successful. Both Gunnison and Lustron dealers were, in the main, unfamiliar with it. There seemed to be little reason, however, why it would not materially aid the sale of Gunnison's new $6,300-or-less "Champion" house. "Champion," a four-room, 672 sq. ft.* package complete with landscaped lot, forced air heating system and streamlined kitchen, would qualify for FHA 95 per cent



Gunnison's "Champion"

mortgaging and thus, proudly claimed Gunnison Parent U. S. Steel, be available to the $40 a week income group.

Lustron questionable. More questionable was whether Lustron would be similarly aided by the new financing plan—or one like it (RFC was toying with the idea of letting Lustron set up a subsidiary mortgage company all its own.) The harrassed company's troubles were steadily piling up. It kept after RFC for the $15 million loan it had requested last month, seemed likely to get about $5 million of it, after a pair of production experts called in by RFC reported that Lustron's break-even point could be 20 units a day instead of the previously estimated 35. But RFC was getting touchier and touchier. It commissioned efficiency experts Booz, Allen and Hamilton to study further the Lustron operation. It bluntly told Lustron that it would have to take some of the padding out of its organizational set-up. (Lustron dutifully accepted the resignations of three vice presidents, transferred another. Speculation had it that President Carl Strandlund would be kicked upstairs to chairman of the board, replaced with Production Boss V. A. McKechnie.)

And one disheartened RFC official confided that the "big bug" in the Lustron experiment was not production at all, nor distribution, but just plain sales. Said he: "There's no point in producing the houses if there's no one to sell them to—particularly at a sales price averaging close to $11,000 with lot." But there were still enough Lustron rumors circulating through Washington to indicate that someone still had faith in the future of the prefab's sales. U. S. Steel, Nash, and General Motors all had made the scuttlebutt list of those rumored to be taking an interest in RFC's big baby—if and after its parent forecloses.

* Compared with Lustron's 1,083 sq. ft.

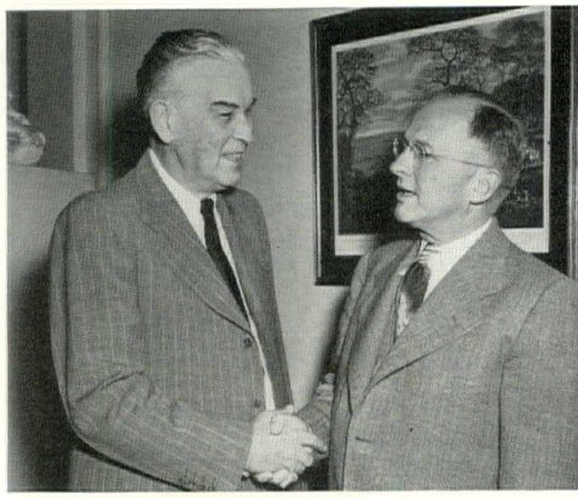
STATE LOANS will be given builders and buyers by Connecticut

The Congress, cautiously examining the policy of direct government lending, might have an example to study if it holds off its vote for a few months. Connecticut, which has been going in for fancy house-building didoes since it installed former OPAdministrator Chester Bowles as its governor last January, put a few final polishes last month on its newest scheme to lick the state's housing shortage through governmental effort. Under the plan, the state would not take over the role of the builder; apparently it was convinced that it could not improve on the job the private housebuilder was doing. It would become instead the lender.

The State Housing Authority had been authorized to raise $30 million, and use it to make loans on houses for "moderate income" families. At an "exceedingly low" (but as yet unspecified) interest rate, the state would put up the money on all kinds of FHA mortgages—even 608's, which would be cooperatively owned instead of rented. It would make 505-A's, but no straight VA 501's.

That was the bulk of the program, but there was more. The state would also make construction loans to the builder who needed it. Just how much of a loan a builder could get had not yet been determined, but Consultant Frederick A. Babcock, of Washington, who had been working on the plan with the Housing Authority, ventured the opinion that it would "not exceed 90 per cent of his total cost." A timid builder could insure his unbuilt houses (at a fee which had yet to be decided), and sell to the state any which he was not able to dispose of after construction (reclaiming only what he had lost out of his pocket.)

If Connecticut's private lenders were putting up any opposition to the state financing scheme, it was not yet very well organized, nor very vocal. Said a member of the mortgage department of one large insurance company: "We are all open minded about the thing and are waiting to see how the regulations are applied before we oppose or support it. We don't like direct lending by the state government any more than we like it by the federal government. However, it is conceivable, if kept down within its proper limits, that it may relieve a shortage."



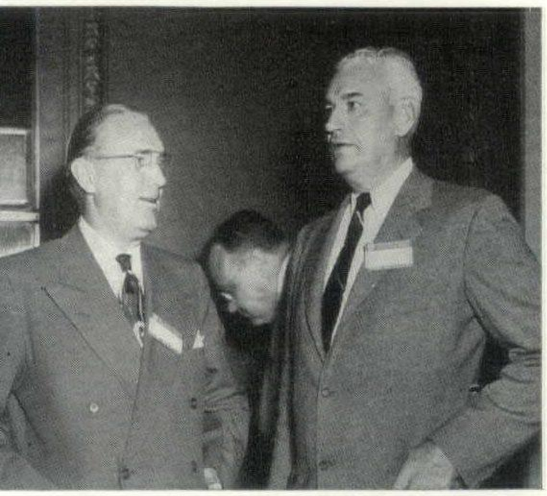
New MBA President R. O. Deming, Jr., president of the Deming Investment Co., Oswego, Kans., is congratulated by Retiring President Aksel Nielsen of Denver's Title Guaranty Co.

"Papa, Papa," cried Nell, "the cruel mortgage man is here again." With this battle cry, the wistful heroine of an 1880 thriller unloosed a series of stage actions which successfully routed a whole generation of mortgage-holding cads who were threatening the sanctity of the American home.

A lot of changes have come about in the last half century, including a new appreciation of the mortgage lender, who as much as any other man is responsible for the *existence* of the American home. If Nell were circulating now, being a virtuous woman always in favor of preserving family life, she might have got around to Chicago last month where the Mortgage Bankers Association was holding its 36th annual convention, to help the bankers sound the new alarm: "the government is here again."

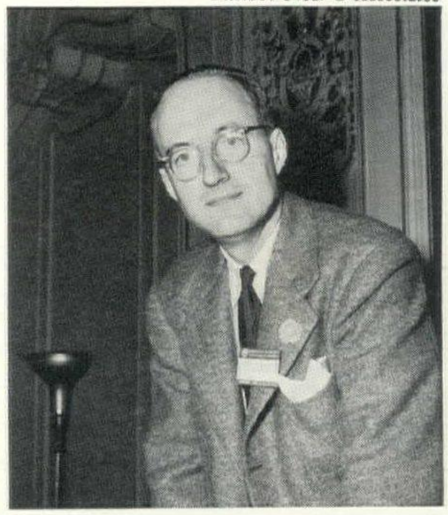
Government shadow. The picture of the future would have been a lot rosier for the 1600-odd mortgage bankers assembled inside Chicago's Loop if they could have retouched it and taken out the shadow of government encroachment. They could see in the year ahead an ample supply of money. Savings banks alone, observed President Earl. B. Schwultz, of New York's Bowery Savings Bank, will have about $1.6 billion "flowing into their hands for investment from internally generated sources." Life insurance companies and savings and loan associations were in similar positions. And, with bond prices high and yields low, mortgages offered the most attractive buy for that money.

But the bankers thought it was high time for a readjustment, time to get the mortgage market back to some kind of normal operation and braced for less enthusiastic years. With all this money competing for the 1950



MBA Secretary George H. Patterson, Chicago, talks things over with new Vice President Milton T. MacDonald, vice president of the Trust Co. of New Jersey, Jersey City.

Photos: Oscar & Associates

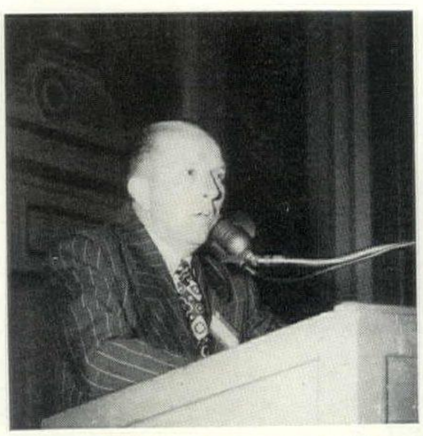


L. Douglas Meredith, executive vice president of the National Life Insurance Co., Montpelier, Vt., (right) presides at company's traditional maple syrup breakfast (below).

crop of new homes, the lenders knew that they weren't going to get any higher an interest rate. They hoped it wouldn't be any lower, but that was one of the big question marks in the picture. Against just such uncertainties, stabilization was the best defense. As Vice President Harry R. Templeton of the Cleveland Trust Co. pointed out, the "mortgage finance industry has not been, for a number of years, a free agent exercising its independent judgment as to the quality of mortgage loans." The kind of stabilization he called for, if ambitious, represented the wistful hope of every investor and lender present: "We should stand up and tell the world . . . that we will lend proper amounts on proper values . . . we will lend at proper interest rates and on proper terms . . ." Banker Schwultz, too, thought lenders should—and would—be "selective in their acquisition of loans;" he did not think mortgages should—or would—be bought "across the board without regard to intrinsic security or price." Retiring MBA President Aksel Nielsen, of Denver, foresaw the same kind of careful lending. Money would be scarce for "the speculative builder with $5,000 who wants a $25,000 construction loan;" it would also be scarce for the veteran who is a bad risk.

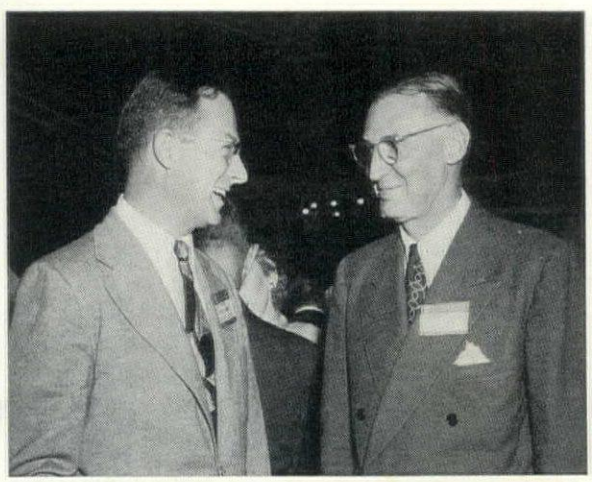
Bogeyman threat. But there again was the shadow of government. Doggedly refusing to offer lenders a "worthwhile" rate on homes for veterans, the government was going to try to stampede them into making every 4 per cent loan it suggested, by threatening to let what Templeton called the "bogeyman" do it if they would not.

How had the threat of direct government lending grown so big that it could seriously disturb a 1949 convention of mortgage



Walter C. Nelson, vice president of the Eberhardt Co., Minneapolis, gives practical tips on "how to make manual operations efficient." Servicing center sessions, such as Nelson addressed, were always filled.

Convention Chairman Ferd Kramer, president of Draper & Kramer, Chicago, with his firm's vice president, Maurice A. Pollack.



bankers? The bankers took a deep gulp and admitted that it was not without their help. Caught in a situation they had had little part in framing, they had been making the loans to veterans which the government wanted them to make—and turning them right over to the FNMA.

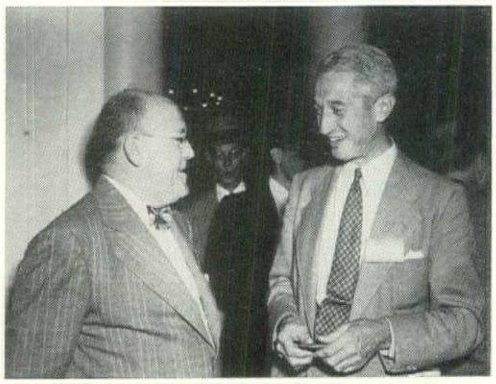
The public, however, including all the segments in favor of government loans, could see no difference between direct loans and loans made through a middleman. Samuel E. Neel, the Association's Washington counsel, saw this clearly. Warned he: "If the Association continues to rely on the use of FNMA, I think it should do so with the clear understanding that (it) will make almost inevitable the passage of some kind of direct loans . . ."

How successful the bankers would be in their opposition to government lending, the convention could not tell. They had tasted many a fundamental change in their industry in the last few turbulent years, and this might well be another which they would eventually have to swallow, like it or not. It was an era of change, as much so for them as for any other segment of business or the housebuilding industry.

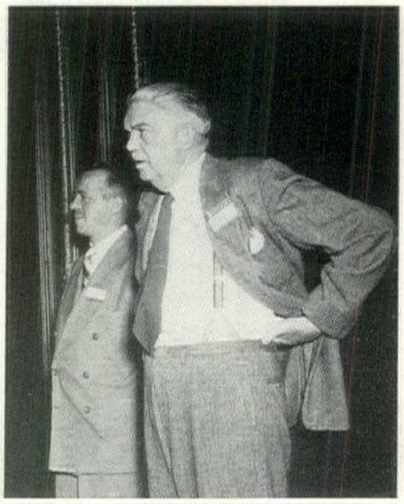
Changing concept. Here and there through the convention floor pushed a suggestion of a changing concept which conceivably could represent an important part of the lender's new market: the Economy House. Big Builder Philip Klutznick gave the suggestion definite shape. "Many of you," he told the lenders, "have rejected the small house. I predict that many of you will accept it in the months ahead." A Minneapolis man ventured the opinion that the Economy House market would be "our greatest single market." The president of a small mortgage company in Ohio called it "the answer to the public housing threat." The small companies, he observed, "are already making loans on little houses. It's the big boys who are watching what the others will do."

These were only a few of the questions which would absorb the nation's mortgage bankers during the year of change to come. They knew that they would have only a part in formulating the answers. The public, the government, the unpredictable shifts in the nation's economy and in the character of the housebuilding industry all would have their say. They knew, as certainly as did Nell back at the turn of the century, that the word "mortgage" literally meant "death grip." But they knew, too, that now they were *in* that grip, not holding it.

Photos: Oscar & Associates



T. B. O'Toole, president of T. B. O'Toole, Inc., Wilmington, Del., and Guy T. O. Hollyday, president of The Title Guaranty Co., Baltimore, get a between-session laugh in the corridor.

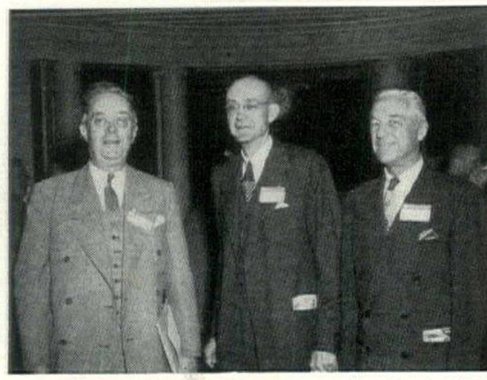


John N. Engle, president of the Insurance Funds Mortgage Co., Los Angeles, and Willis R. Bryant, assistant vice president, American Trust Co., San Francisco, listen attentively to a session speaker.

Visitor Carl J. Schroeder, Appleton, Wis., seeks advice from W. O. Murray, of Dallas' Murray Investment Co., and Norman H. Nelson, vice president of Minn. Mutual Life Insurance Co.

E. B. Drake, treasurer of the Bankers Life Insurance Co. of Nebraska, Lincoln, and Robert H. Bolton, of Rapides Bank & Trust Co., Alexandria, La., hold a mid-morning conference in the hall.

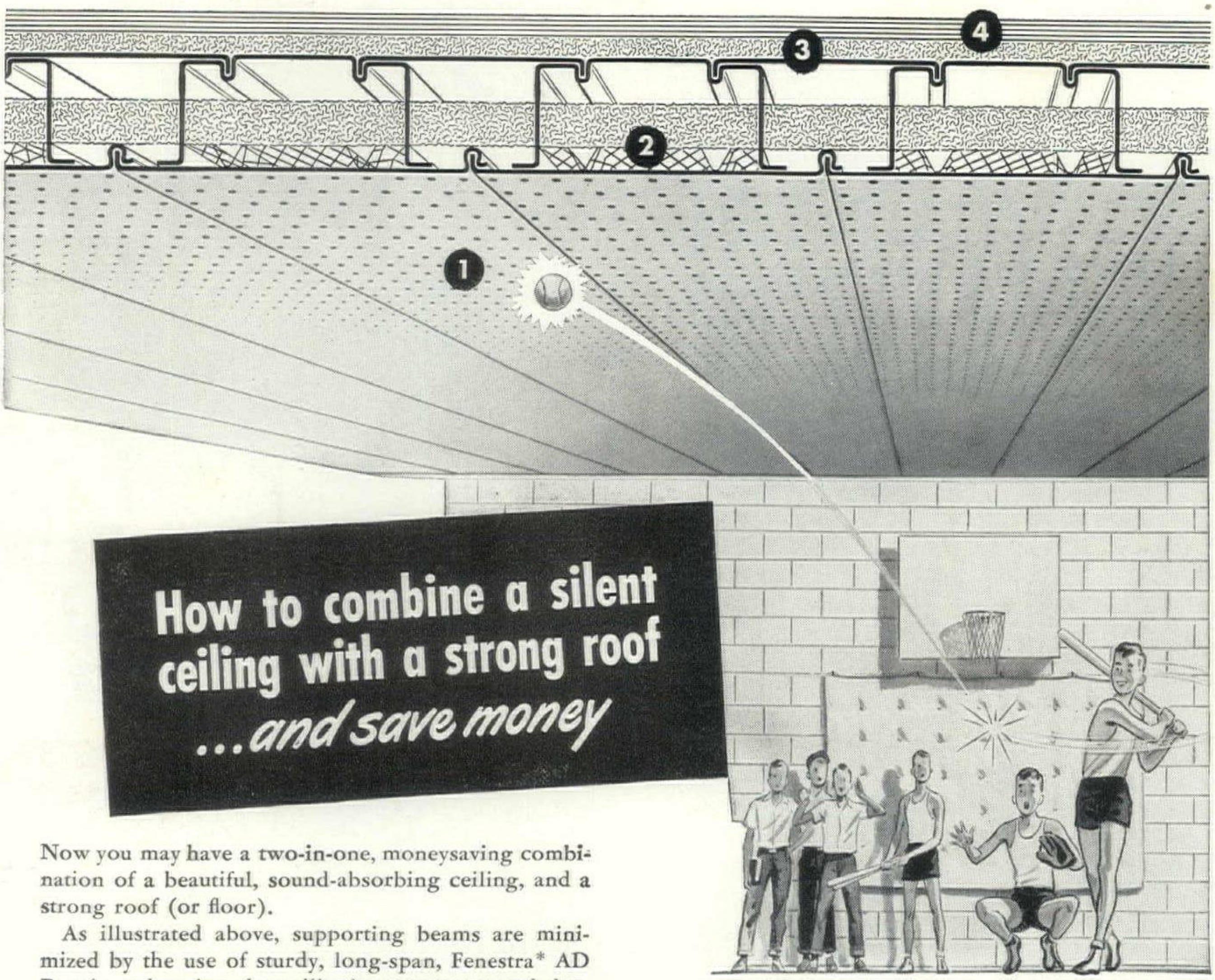
Corridor sessions searched the money market as thoroughly as podium speakers. Such groups included Earl Linn, president of the Weitz-Linn Investment Co., Des Moines; and Elliott, Frank, and Robert Waples, all from the Midland Mortgage Co., Cedar Rapids, Ia. . . .



. . . Frederick P. Champ, president of Utah Mortgage Loan Corp., Logan, Utah; Frank L. Wilkinson, president, Shryock Realty Co., Kansas City, Mo.; Albert Mager, of Mager Mortgage Co., Oklahoma City. . . .

. . . W. Braxton Ross, of Morrison & Morrison, Inc., Denver; William I. De Huszar, treasurer of Chicago's Dovenmuehle, Inc., and author of MBA's handbook of Mortgage Loan Servicing Practices; Edward N. Greenebaum, president of Greenebaum Investment Co., Chicago. . . .

. . . W. A. Clarke, of W. A. Clarke Mortgage Co., Philadelphia; O. G. Gresham, president of Gresham & Co., Birmingham, Ala.; Peter V. Cloke, mortgage secretary of the Guardian Life Insurance Co. of America, New York.



How to combine a silent ceiling with a strong roof
...and save money

Now you may have a two-in-one, moneysaving combination of a beautiful, sound-absorbing ceiling, and a strong roof (or floor).

As illustrated above, supporting beams are minimized by the use of sturdy, long-span, Fenestra* AD Panels, enhancing the ceiling's appearance and durability (flying baseballs won't dent it). Note that the Panels are steel box beams with perforated undersurface, backed by a sound-absorbing element, to provide both a strong roof (or floor) and a noise-blotting ceiling, all furnished by Fenestra.

Important savings obviously result from this unique structural combination, in time, in materials and in labor. For example, the ceiling is fully completed merely by the application of a finish coat of paint.

How the moneysaving Fenestra Ceiling and Roof (or Floor) Combination is installed:

1. Acoustically-treated AD Panels supplied by Fenestra are laid directly on supporting beams, and are interlocked into a flat ceiling. Ends of Panels are welded to the supporting steel structure.
2. Wire supports lift a two-inch sound-absorbing element above the perforated ceiling surface. Both are furnished by Fenestra.
3. The installer covers the Panels with roof insulation (or, if a floor, with concrete).
4. Roof waterproofing (or finished flooring) is applied by the installer, completing the installation.

* * * * * * * *

Result: A modern, sound-absorbing ceiling and a strong, durable roof for gymnasiums, auditoriums and other schoolrooms, at surprisingly low cost... Ask a local Fenestra engineering representative about this new method and for other information on Fenestra Panels and Holorib Steel Roof Deck, or see Sweet's—Section 3c/3. Or mail coupon.

Use our 25 years' experience in Metal Panel Engineering

*Trademark

Fenestra
METAL BUILDING PANELS
ROOFS · WALLS · FLOORS

DETROIT STEEL PRODUCTS COMPANY
Building Panels Division
Dept. AF-10, 2251 E. Grand Boulevard
Detroit 11, Michigan

☐ Please have an engineering representative call.

☐ Please send me, without obligation, information on Fenestra Building Panels.

Name ____________________

Company ____________________

Address ____________________

Something New

ARCHITECTS:
Ranch Plank Floors give your homes added style at no extra cost.

Mail coupon for new literature

E. L. BRUCE CO.
Box 397
Memphis 1, Tenn.

Tell me more about Bruce Ranch Plank Floor.
Name.............................
Firm..............................
Address...........................
City and State.....................

BRUCE
Ranch Plank
FLOOR

in Oak Floors!

Bruce Ranch Plank Floor

IT'S BEAUTIFUL! IT'S DISTINCTIVE!

YOU'LL BE AMAZED AT ITS MODERATE COST!

■ Bruce has done it again! This new Ranch Plank Floor promises to be one of the most popular and practical floor types ever developed. With alternate 2¼" and 3¼" widths, walnut pegs and beveled edges, it gives the rich, distinctive effect of a very expensive floor.

Yet, the Ranch Plank Floor is inexpensive . . . in fact, costs little more than an ordinary floor. It's so easy to install, too . . . blind nailed like a regular strip floor. And there's no sanding or finishing on the job, because Ranch Plank is pegged and finished at the factory. This flooring is packaged in end cartons, too, for complete protection and easy handling.

The beautiful new "Decorator" Finish on Ranch Plank pleases everyone and harmonizes with any interior color scheme. Architects and interior decorators praise this beautiful oak floor for all types of homes and apartments.

You'll want to see for yourself what the Ranch Plank Floor offers you. So mail the coupon below for complete information and new literature with color photographs.

E. L. BRUCE CO., MEMPHIS 1, TENN.

Look at these features!

Alternate-width oak strips with walnut pegs give Ranch Plank a "handcrafted" appearance.

The famous "Scratch Test" Finish is factory-applied in a new, mellow "Decorator" Shade.

ADAPTED TO ALL ARCHITECTURAL STYLES

Modern

Ranch

Traditional

Apartments.

FOR THE DIMINISHING FAMILY

Forum:

Why don't you just once carry an article about a house designed for a diminishing family? We have seen what are almost innumerable numbers of designs for expanding family homes. And yet every family which has expanded is more likely than not to reach eventually the problem of diminishing, and of how then to use the house built for the big family?

Isn't it about time for designers of homes for expanding families to look one step beyond that and consider whether the expanded homes should not be so laid out that they can be divided into duplex homes in a more distant future?

TALBOT PATRICK
The Evening Herald
Rock Hill, S. C.

HOW COULD YOU!

Forum:

In the August FORUM, how could you have:

1. Lauded the M.I.T. Dormitory, even mentioning it in the same breath with the Paimio Sanitarium and the Viipuri Library. We sympathize with Mr. Aalto who must have been steam-rollered by Perry, Shaw & Hepburn. "Fortress" indeed. Shall we compliment Mr. Maginot by labeling his work daring?

2. Described the Air Reduction Co's Laboratory as " . . . more engineering than architecture," indicating your editors do not understand the meaning of the word architecture. They have forgotten the story of the Kansas farmer who, when asked for an affidavit by Sears Roebuck stating that his Sears Roebuck house alone had stood fast in the path of a tornado, wrote "The building stood up fine, only trouble was the wind blew off all the architecture." Confucius say "Best engineer is almost architect, best architect is almost engineer." Let your headline writer read Weidlinger's article nine pages away. He understands.

COLLIS HARDENBERGH, *Architect*
Humphrey & Hardenbergh, Inc.
Minneapolis, Minn.

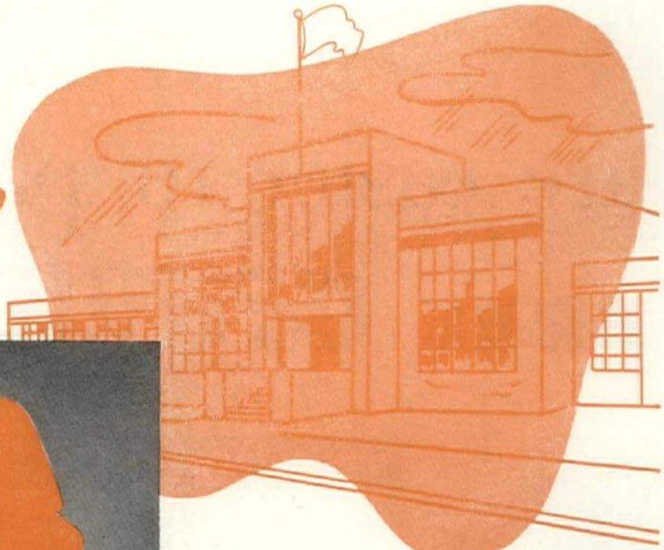
• Reader Hardenbergh's reprimand caught FORUM's misguided headline writer off base, but his sympathy for Architect Aalto is wasted —Aalto's associates kept their hands off the design of M.I.T.'s new dormitory.—ED.

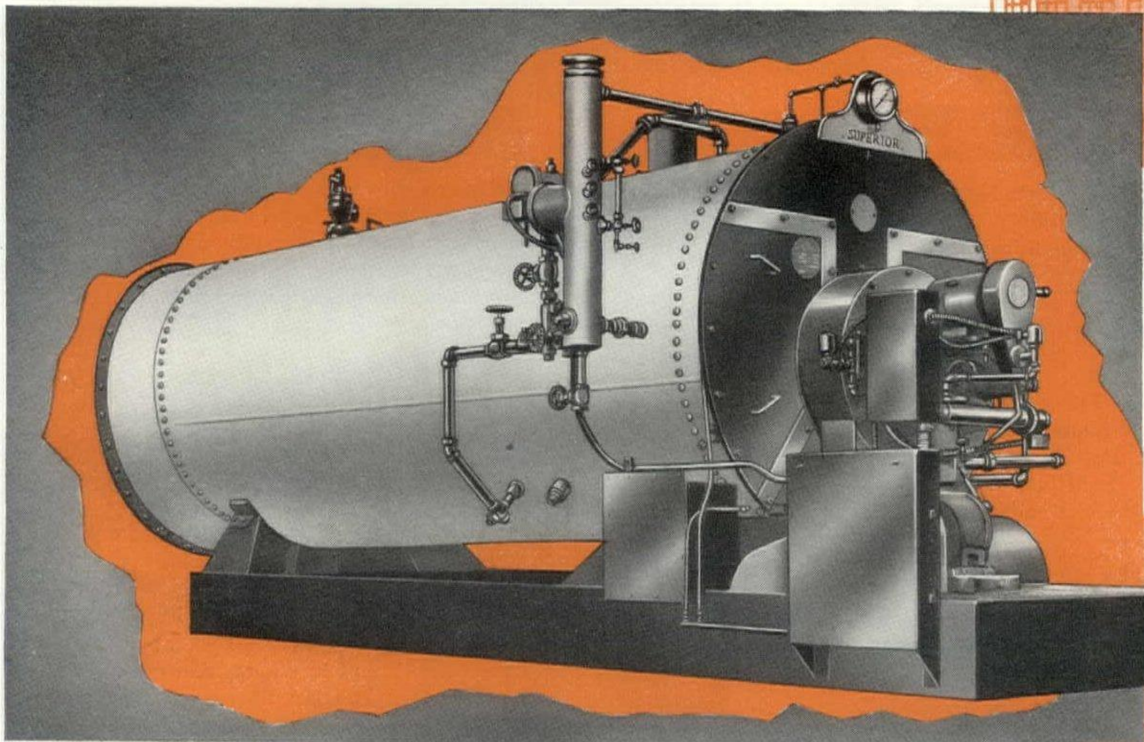
SOUND SALES LOGIC

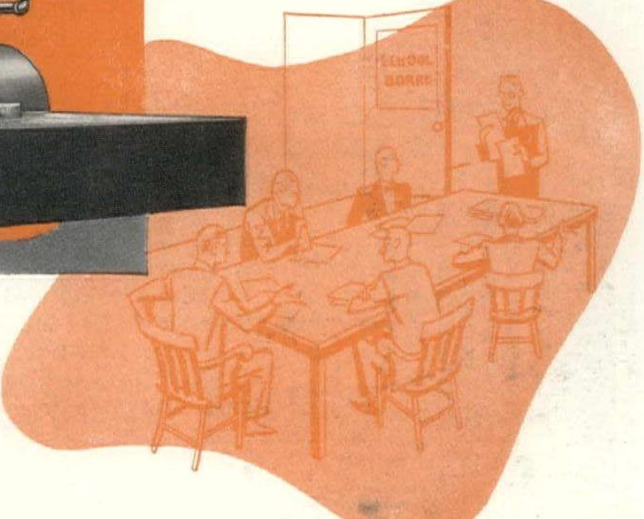
Forum:

The article in the July FORUM, "How to Sell Houses," is without question the most fundamentally sound sales logic I have read in a long, long time. To be

(Continued on page 24)

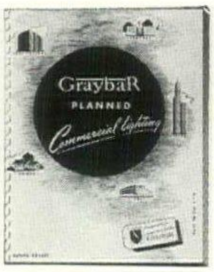



SUPERIOR



Any school's electrical needs are easier to plan with these

FREE GraybaR HELPS

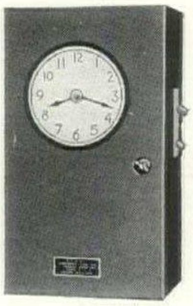


HELP ON LIGHTING

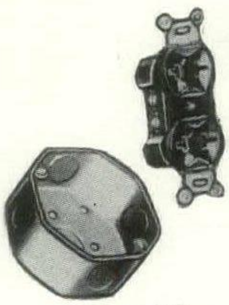
Here's a book that's a bible of modern lighting in schools and other buildings. 84 pages of illumination principles, data, and lighting-unit design—illustrations of popular fixtures made by the leading manufacturers. It's yours free, from Graybar. Just check "Planned Commercial Lighting" in the coupon.

The Latest in Lamps—The ultimate in lamps is the G-E Slimline fluorescent, distributed by Graybar. A 16-page booklet gives facts and pictures of installations. Ask for "Modernize with G-E Slimline."

HELP ON CLOCK SYSTEMS



Graybar distributes Edwards centrally controlled program clock systems — consisting of program instrument, resetting device, and Telechron-powered synchronous clocks (flush-wall, double-dial, and surface types). A Graybar Signaling Specialist will gladly help determine the best clock or signaling system for any school requirement.

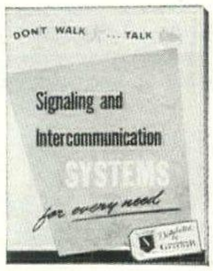


HELP ON WIRING

As distributor of thousands of different wiring materials and devices — all first-quality products of leading manufacturers — Graybar is a convenient source of accurate information and reliable recommendations concerning wiring materials for any job. For big or unusual installations especially, consultation with a Graybar Inside Construction Specialist is a good way to avoid the embarrassment of mis-matched supplies or behind-schedule deliveries.

HELP ON SOUND SYSTEMS

Essential to the operating efficiency of today's better schools is a complete program and sound distribution system. Here are publications describing two school sound systems by two leading manufacturers — Western Electric and Webster Electric. Among the illustrations is a typical layout.



HELP ON SIGNALING

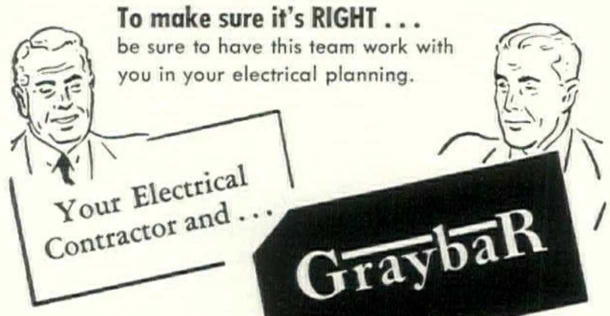
Webster Teletalk "intercoms"...Edwards Lokator paging systems . . . bells, buzzers, and horns — all these and other signaling devices are shown and described in a Graybar bulletin titled "Signaling and Intercommunication Systems." Want a copy? Just check the coupon.

HELP ON EVERYTHING ELECTRICAL

Graybar has really "gone through school" in the electrical business. It distributes more than 100,000 electrical items, made by over 200 famous manufacturers. Behind its recommendations are 80 years' experience . . . with installations of all kinds, in schools and other buildings of all types. Besides the items on this page, Graybar distributes ventilating equipment, unit heaters, motors and controls, tools and other electrical needs.

No matter what you want to know — if it's electrical — your easiest, surest way to get up-to-date facts is to call the nearest Graybar office. You'll find our people glad to help!

To make sure it's RIGHT . . .
be sure to have this team work with you in your electrical planning.



IN OVER
100 PRINCIPAL CITIES

Check your needs below:

4995

GRAYBAR ELECTRIC CO., INC.
420 Lexington Ave., New York 17, N. Y.

Please send me, free, the publications checked:

- ☐ "Planned Commercial Lighting"
- ☐ "Modernize with G-E Slimline"
- ☐ Bulletins describing School Sound Systems
- ☐ "Signaling and Intercommunication Systems"

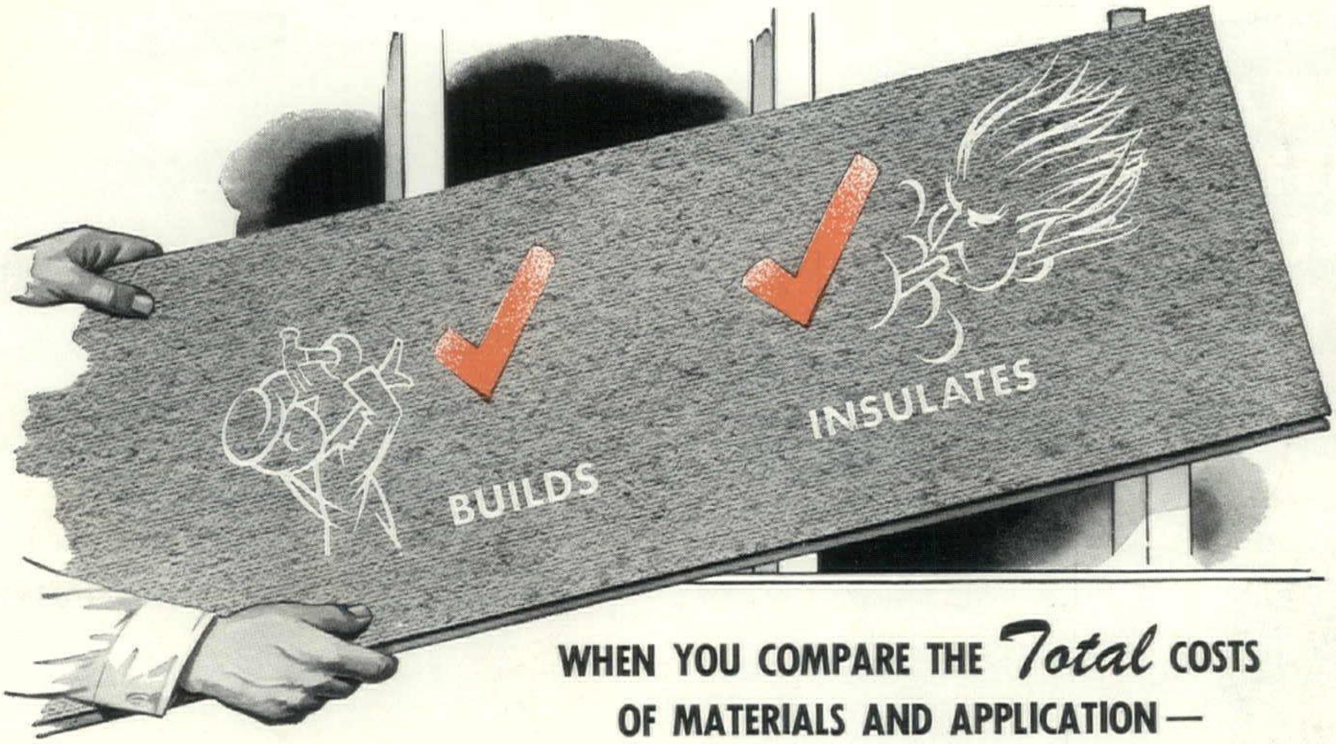
☐ Please have a Graybar Representative call to give me information about (other electrical equipment): ____________________

Name ____________________

Firm ____________________

Address ____________________

City ____________ Zone ______ State ______



WHEN YOU COMPARE THE *Total* COSTS OF MATERIALS AND APPLICATION—

Your best buy is *BILDRITE

INSULITE SHEATHING

To get the *real* story about sheathing costs you have to figure the total applied costs . . . not just the cost of materials alone. It's the *total* cost that your client pays for.

LOOK AT THESE FACTS: The things that make up the total applied cost of any sheathing are the labor scale, man hours needed for application, waste of material, insurance, and cost of materials used. You can figure these for yourself.

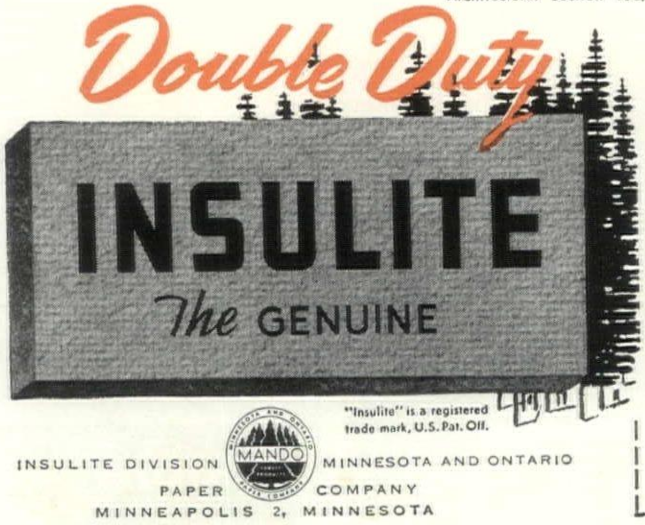
FOR EXAMPLE: Standard handbooks for estimating building construction state that—

Wood sheathing horizontally applied has a 12% waste.
But BILDRITE has less than 1% waste.

Wood sheathing requires 15 man hours to apply 1,000 feet.
But BILDRITE takes only 8 man hours per 1,000 feet.

See how these savings begin to mount up?

Refer to Sweet's File, Architectural Section 10a/9



"Insulite" is a registered trade mark, U.S. Pat. Off.

INSULITE DIVISION MINNESOTA AND ONTARIO PAPER COMPANY
MINNEAPOLIS 2, MINNESOTA

*®

FIGURE IT YOURSELF!

WOOD SHEATHING Per 1000 Sq. Ft. of Wall Area

ITEM AND QUANTITY	RATE	TOTAL
1,000 sq. ft. 8" wood sheathing (horizontal)		
Waste, 12% (120 sq. ft.)		
Carpenter labor, 15 hours		
Insurance, 10% of carpenter costs		
2.8 rolls building paper		
Carpenter helper to apply paper		
Insurance, 10% of helper costs		
TOTAL APPLIED COST, WOOD SHEATHING		

BILDRITE SHEATHING Per 1000 Sq. Ft. of Wall Area

ITEM AND QUANTITY	RATE	TOTAL
1,000 sq. ft. Bildrite Sheathing		
Waste (Practically none. Less than 1%)		0
Carpenter labor, 8 hours		
Insurance, 10% of carpenter costs		
Building paper (None needed)		0
Helper to apply paper (None)		0
Insurance on helper (None)		0
TOTAL APPLIED COST, BILDRITE SHEATHING		

That puts a different light on it...doesn't it? And in addition, BILDRITE provides 2½ times the *insulating* value and more than twice the bracing strength of wood sheathing horizontally applied! You can't get around the facts. The best buy in sheathing today is INSULITE (BILDRITE) Sheathing!

INSULITE DIVISION, MINNESOTA AND ONTARIO PAPER COMPANY
Dept. AF-109, Baker Arcade Bldg. • Minneapolis 2, Minn.

Please have your representative call and give me additional details on sheathing costs.

Name____________________

Address____________________

City__________ State__________

7-9

perfectly honest, if big business adopted some of the sales logic presented in this article, it would pay real dividends.

What I am referring to is the idea of selecting intelligent men, who have a basic knowledge of the adaptation of materials, to do the selling in the field. This type of experience not only builds good will but instills the kind of confidence in the buyer that results in increased permanent sales volume.

FORUM publishes interesting, sound selling material which is not only choice logic but very helpful to the readers.

RAY ARNDT, *Manager*
Door Division, U. S. Plywood Corp.
New York, N. Y.

NABOM IN THE MIRROR

Forum:

You did a very fine job on the Building Owners & Managers Convention at Montreal (FORUM, July '49, p. 15). Like the Chinaman, I believe a picture is worth 10,000 words!

R. E. THOMAS, *Bldg. Mgr.*
Buhl Land Co.
Detroit, Mich.

Forum:

... Concise, to the point, and interesting....

PAUL GREGG, *President*
Building Owners & Mgrs. Assn.
Fresno, Calif.

Forum:

... Very interesting ... the highlights of the convention were brought out without going into too much detail ... The candid pictures were of particular interest.

F. H. MCCLINTOCK, *Manager*
Real Estate Dept.
Standard Oil Co. of Calif.
San Francisco, Calif.

Forum:

An excellent job ... The pictures are excellent and give a good cross-section of the meeting.

FRED B. MOORE
Fred Moore Co.
Building Management
Atlanta, Ga.

Forum:

The captioned remarks were very informative and the pictures made me regret the fact that I was unable to attend.

T. A. HUNT, *Managing Partner*
Hunt Building Co.
Tulsa, Okla.

Forum:

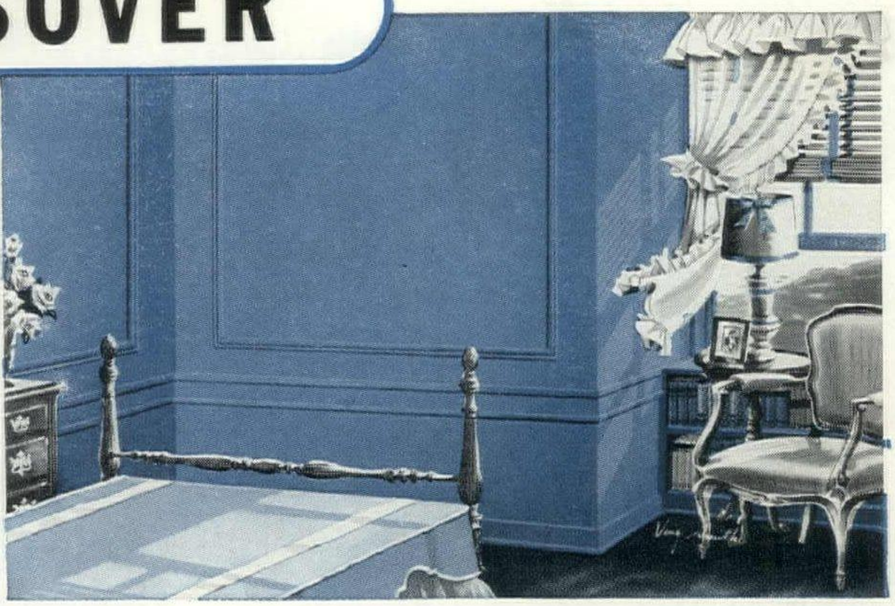
It seems to me that the convention was well covered with the exception of the photographs. In one of the current plays, *Goodbye My Fancy*, one of the characters

(Continued on page 28)

One Coat Really Covers . . . Really Washable, too!

"Dutch Boy"

WONSOVER



...the Once-Over Inside Oil Flat

"Save the Surface and You Save All"

"Dutch Boy" WONSOVER is a real one-coat interior paint . . . a real oil flat that offers your clients many real advantages.

WONSOVER for Hiding Power . . . It really covers like a blanket. Can be used on any surface where flat paint is suitable, whether plaster, wallboard, wood, brick or concrete.

WONSOVER for Smoothness . . . It levels out nicely, spreads far and dries to a rich-looking, uniform, flat finish.

WONSOVER for Speed . . . It comes ready to apply . . . brush, roller or spray. Sets dust-free in a few hours. Dries overnight and leaves no unpleasant odor. Once over and you'll be won over to WONSOVER.

WONSOVER for Washability, too! That's its extra advantage to property owners. WONSOVER can be washed over and over again. Available in White, Off-White and in the Colors your clients want. See the complete story, including actual colors, in Sweet's File, Architectural.

NATIONAL LEAD COMPANY: New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; Pittsburgh 12; St. Louis 1; San Francisco 10; Boston 6 (National Lead Co. of Mass.); Philadelphia 25 (John T. Lewis & Bros. Co.).

BRIGHT WHITE *"Blended" to Clean Itself and Stay White!*

BODY TINTS *"Blended" for Lasting, Uniform Good Looks!*

SASH & TRIM COLORS *"Blended" for Color Fastness and High Gloss!*

PORCH & FLOOR ENAMEL *"Blended" to Stand Wear and Weather!*

PRIMER-UNDERCOATER *"Blended" to Seal, Hide and Hold!*

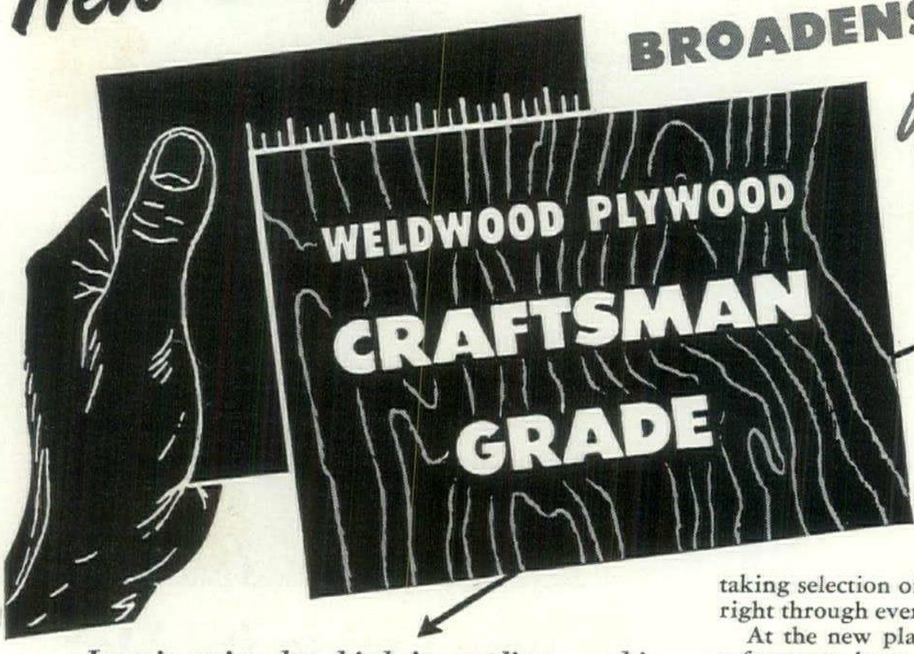
METAL PRIMER *"Blended" to Give Red Lead's Long, Dependable Protection!*

TINTING WHITE *"Blended" for Easy Mixing of Special Tints!*

Line up with The "Dutch Boy" Line

New Craftsman Grade Weldwood

BROADENS THE MARKET *for* WOOD-PANELED ROOMS



Low in price, but high in quality . . . this new Weldwood panel puts hardwood plywood within reach of new masses of people!

How many times have you heard clients say, "Of course we want a wood-paneled room. But we just can't afford it."

Next time this happens call their attention to *Craftsman Grade Weldwood.* Here is a *high quality decorative hardwood plywood* at a price almost 30% lower than we were formerly able to offer.

New Mill Makes Economies Possible

Our new mill at Orangeburg, S. C., was built with one idea in mind: to cut the cost of hardwood plywood to the consumer. With every saving that the most modern equipment can provide...with every economy that careful planning can attain...with the efficiency that straightline production offers...this new mill turns out fine plywood panels at a price within the reach of *every* client.

Differences Between CRAFTSMAN and ALGOMA Grades

From the standpoint of quality and beauty, these new Craftsman panels are surpassed by only one grade of hardwood plywood made in this country—the superlative plywood produced at our Algoma plant.

In the production of Algoma Grade Weldwood Plywood, every panel is given individual selection—from the painstaking selection of veneers, the careful matching of faces—right through every detail of manufacture.

At the new plant at Orangeburg, many of these costly refinements have purposely been eliminated. Veneers are not selected quite as carefully, although only sound, attractive flitches are used. In oak, for example, the Craftsman oak panel is made of flat sliced veneers of balanced figure; the Algoma oak panel is made of veneers of uniform color, expertly matched and free of defects.

Such differences in veneer selection, plus numerous manufacturing economies, mean greater veneer yields—lower costs—and lower selling prices for Craftsman Grade Weldwood.

Inspect Craftsman Panels Yourself

Next time you visit your local lumber dealer, ask him to show you a sample of Craftsman Grade Weldwood. Or, visit your nearest United States Plywood distributing unit and see the entire Craftsman Grade line. You'll be gratified at the quality of this low-priced plywood.

And, if you want the ultimate in decorative hardwood plywood, specify Weldwood Algoma Grade Panels, made from selected flitches of many different cabinet woods.

IMPORTANT ANNOUNCEMENT

Weldwood Moldings, with matching wood faces, are now available in a new, larger size which takes 3/4" and 13/16" Weldwood panels perfectly. These moldings, previously available only in 1/4" size, make it possible to achieve a beautiful, custom installation at minimum cost.

Write for complete information, sample and prices.

WELDWOOD Plywood

UNITED STATES PLYWOOD CORPORATION
NEW YORK 18, N. Y.

Distributing units in Albany, Baltimore, Boston, Brooklyn, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Fresno, Glendale, Hartford, High Point, Indianapolis, New Hyde Park (L. I., N. Y.), Los Angeles, Milwaukee, Newark, New York, Oakland, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, San Francisco, Seattle, St. Paul. Also U. S.—Mengel Plywoods, Inc., distributing units in Atlanta, Birmingham, Dallas, Houston, Jacksonville, Kansas City, Kans., Louisville, New Orleans, San Antonio, St. Louis, Tampa. In Canada: United States Plywood of Canada, Limited, Toronto. Send inquiries to nearest point.

Weldwood* Hardwood Plywood
Douglas Fir Weldwood
California Pine Weldwood
Weldwood Fire Doors
Weldwood Flush Doors
Douglas Fir Doors
Overhead Garage Doors

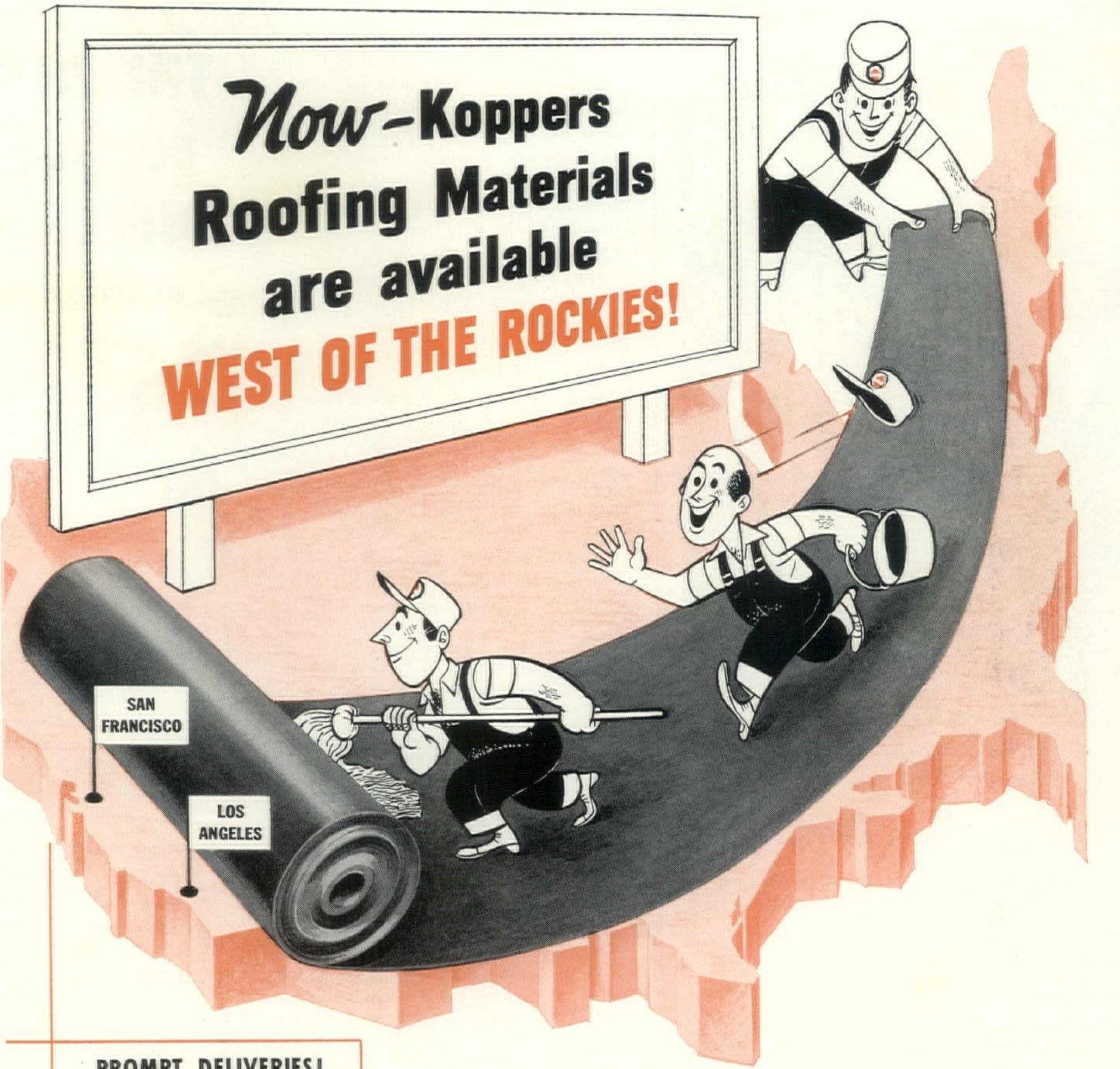
Tekwood* (paper-faced plywood)
Protekwood
Weldwood Glue* and other adhesives
Weldtex* (striated plywood)
Decorative Micarta*
Flexwood*
Firzite* and Satinlac*

*Reg. U. S. Pat. Off.

Weldwood

Plastics and Wood Welded for Good

Interior grade Weldwood Plywood is guaranteed for the life of any building in which it is installed.



PROMPT DELIVERIES!

From warehouse stocks, Koppers can make prompt shipment of its roofing materials. Get in touch with either of these Koppers Sales Offices:

SAN FRANCISCO:
390 Ninth St.
San Francisco 3, Calif.
Market 1-6005

LOS ANGELES:
659 E. Gage Ave.
Los Angeles 1, Calif.
Adams 3-6231

KOPPERS

KOPPERS COMPANY, INC., one of the great names in roofing, has recently expanded its distribution facilities. As a result, Koppers Roofing Materials are now available as far west as San Francisco and Los Angeles.

These materials, Koppers Superior Coal Tar Pitch and Approved Tarred Felt, make an unbeatable roofing combination—a combination that has established remarkable records for long-life roofing. Case histories prove that 20 years' or more cost-free service is common for Koppers Pitch and Felt Roofs.

In every way, Koppers Built-Up Roofs are *good* roofs. So remember: you can now specify Koppers Roofing Materials from coast to coast. Inquiries are invited from architects, engineers and roofing contractors.

KOPPERS COMPANY, INC., Pittsburgh 19, Pa.

• SPECIFY KOPPERS FOR LONG-LIFE ROOFING •

says he doesn't like LIFE because they always snap your picture when you are picking your nose. Photographer Dwight E. Dolan seems to have done just that to Lee Thompson Smith. I cannot say my old friend and former partner, J. Clydesdale Cushman, has been treated a great deal better. The picture of Earle Schultz makes him look more like Mr. Dooley than himself and the group picture isn't properly lighted.

Being an amateur photographer myself, I hereby offer to cover the next convention for you gratis, provided it is held East of the Hudson, South of Albany, and North of Newark.

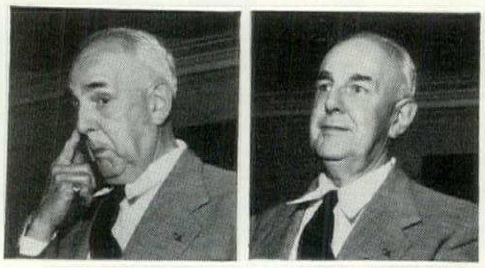
WILLIAM J. DEMOREST, *President*
Wm. A. White & Sons
New York, N. Y.

Forum:

I am in full accord with what Mr. Demorest says . . . I assure you I was rubbing the side of my face though the picture would indicate otherwise.

LEE THOMPSON SMITH
Executive Committee Chairman
Home Title Guaranty Co.
New York, N. Y.

• FORUM regrets 1) that some readers interpreted Smith's thoughtful face scratching



Dwight E. Dolan

(left) as something else, 2) that its only other convention picture of Smith shows his collar akimbo (right), 3) that it cannot accept reader Demorest's picture-taking offer. The 1950 NABOM Convention will be held slightly west of the Hudson: in Seattle. NABOM President Cushman liked his own picture, considered Shultz' picture a good likeness.—ED.

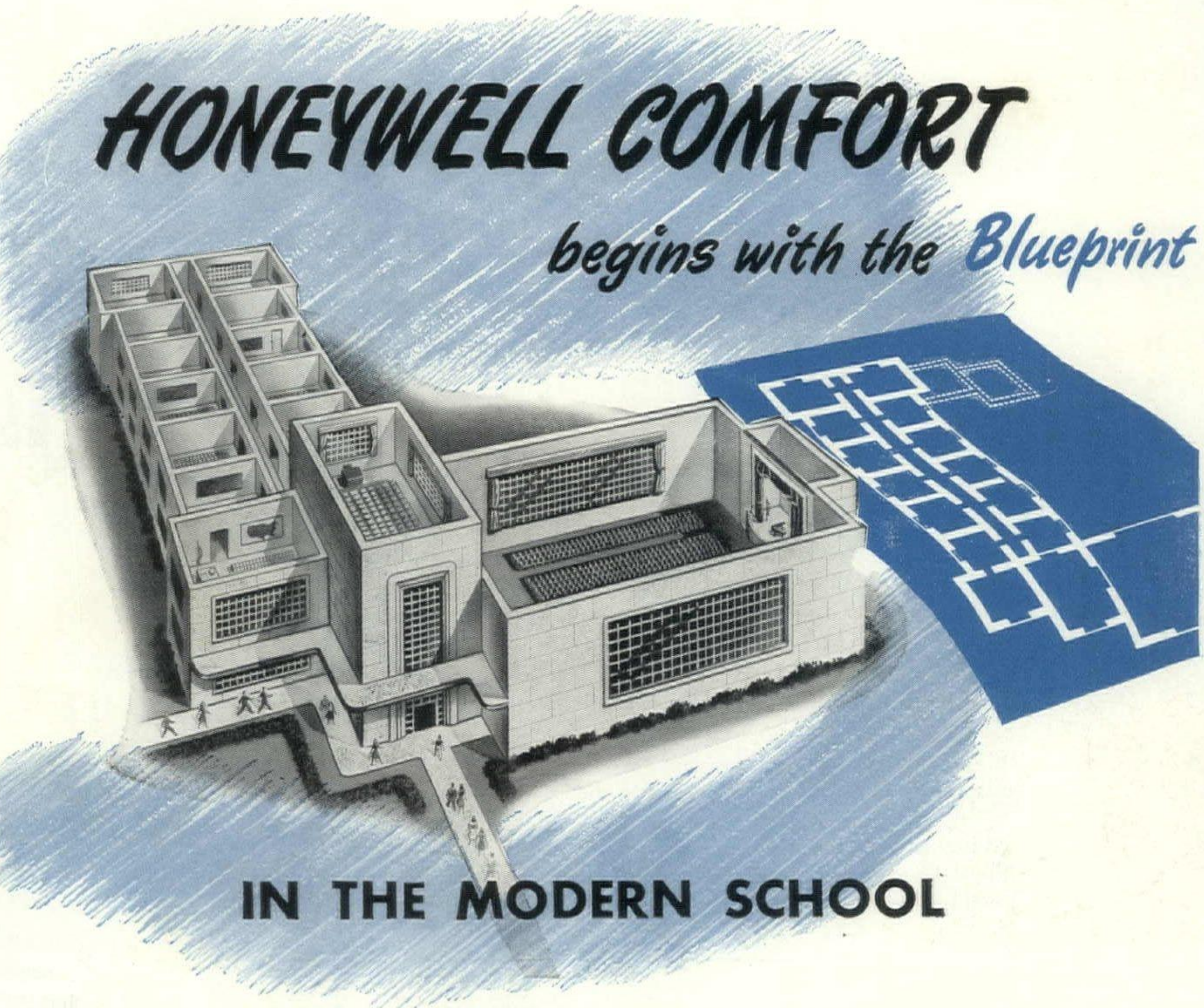
GEORGIAN VS. MODERN

Forum:

In the May 1949 issue, you discuss the modern Dryden Terrace apartments in Maine, and the Georgian apartments in New Jersey, both owned by the Prudential Insurance Company of America.

I fully agree with FORUM's opinion of these investments. Most of the amenities, making life in Dryden Terrace comfortable, are not provided in the Georgian apartments. I want to criticize two more things not mentioned by FORUM which reduce tenant appeal in the Georgian development: 1) Some living rooms face north, shutting out all sunlight. 2) Living rooms on re-entrant angles have little

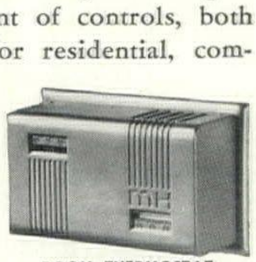
(Continued on page 32)



Nowhere is personal comfort more important than in the schoolroom. And, to maintain the highest standards of comfort, health and working efficiency, modern schools are installing the very latest developments in heating and ventilating equipment.

Whether you specialize in schools or hospitals, hotels and apartments or industrial and commercial buildings, we suggest you specify the heating and air conditioning control equipment when the building is in the blueprint stage. And remember, no heating or air conditioning plant can be better than the controls that govern it.

Since 1885, Minneapolis-Honeywell has pioneered in the development of controls, both pneumatic and electric, for residential, commercial and industrial use. Experienced Honeywell engineers are available for consultation on any automatic control problem . . . Just contact the Honeywell branch office in or near your city, or write to Minneapolis-Honeywell Regulator Company . . . Minneapolis 8, Minnesota.



ROOM THERMOSTAT
The Symbol of Modern Temperature Control

For up-to-the minute information on school heating and ventilating systems, mail the coupon for booklet "Automatic Controls for the Modern School"— just off the press.

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Please send my free copy of "Automatic Controls for the Modern School."

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Honeywell
CONTROL SYSTEMS

73 BRANCHES FROM COAST TO COAST WITH SUBSIDIARY COMPANIES IN: TORONTO • LONDON • STOCKHOLM • AMSTERDAM • BRUSSELS • ZURICH • MEXICO CITY

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Why is this

The circle tells its own story of a common classroom problem. But shadows are only one of many classroom lighting problems.

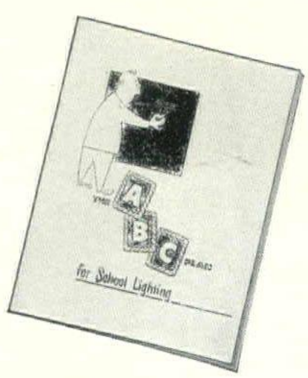
Since each classroom lighting situation is different, Westinghouse recommends you take these steps before you select any equipment:

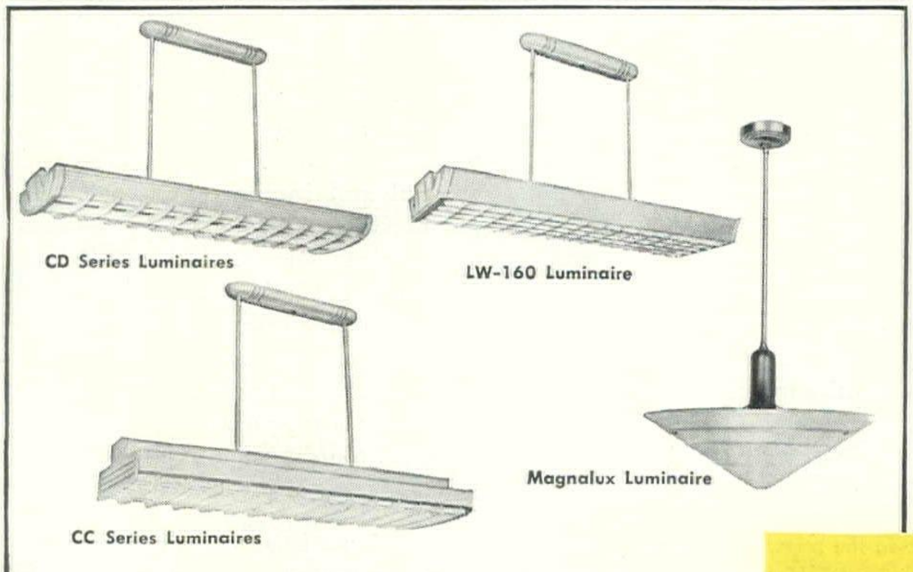
- Analyze the importance of your lighting needs.
- Carefully choose the best equipment for your needs.
- Insist on an engineered plan to fit your needs.

This complete story—a customer's approach to classroom lighting problems and their various solutions is in the "ABC Plan for School Lighting", B-4556.

Whether you plan lighting—buy lighting—or install lighting, this book should be on your desk. Ask any Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-04254





Westinghouse makes a complete line of school lighting equipment; each BEST for a different situation. Before you select any, look at them ALL!

Westinghouse

PLANNED LIGHTING PAYS

HARD TO READ?

Shadows, from an uneven distribution of light make class-room study difficult for young eyes. Close visual work seven hours every day under these conditions makes visual cripples

privacy because they face the bedroom windows of the next apartments.

Comparing both developments, I might call the Georgian apartments "jerry-built." I should always prefer to live in apartments like Dryden Terrace.

WERNER VON GUENDELL
Kassel, Germany

Forum:

In the article concerning Prudential Life Insurance Co's Orono, Me., apartment project (FORUM, May '49, p. 118), you state "major cost jump was the heating system, a baseboard arrangement costing \$63,000 as opposed to \$45,000 for the radiant floor heating recommended by the architect."

We firmly believe that if your statement is correct (which we question) it should be qualified. Inasmuch as the statement infers that the increase in cost was due to "a baseboard arrangement" we are emphatic in taking exception to this statement for the following reasons: 1) The comparison is unfair because one price is an estimate, the other an actual cost; 2) The published trade price for the complete radiation . . . was less than \$8,000—a small percent of the total cost; 3) Installation cost of "a baseboard arrangement" compares favorably with radiant heating. 4) Cost of boilers, pumps, controls, etc., would be identical regardless of the type of radiation.

T. L. ARNOLD, *Mgr.*
Vulcan Radiator Co.
Hartford, Conn.

• FORUM, whose cost figures came from the project's architect, thanks reader Arnold for clarifying and qualifying them.—ED.

MODERNISTIC MEMO

Forum:

We feel that an inter-office memo from you to the editors of FORTUNE, TIME and LIFE magazines is in order.

The continued mis-use of the word "Modernistic" as an architectural adjective by these otherwise enlightened gentlemen has grated on the nerves of our profession too long. Approval of any contemporary structure of any size has invariably been given by the tag "modernistic." If superficial decoration, by the use of corner windows, horizontal fins, etc., with little or no regard for plan, structure and design is the keynote of the structure, then definitely the adjective is "Modernistic." If the building is good enough, let us use the architectural adjective "modern" or "contemporary."

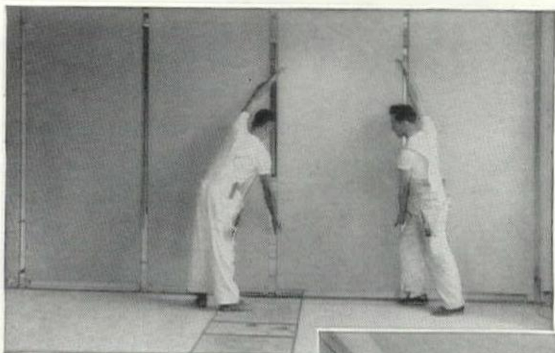
S. KENNETH JOHNSON, *Architect*
Daniel, Mann & Johnson
Los Angeles, Calif.

(Continued on page 36)

Move the Walls to Fit the Need

quickly—easily—at very low cost

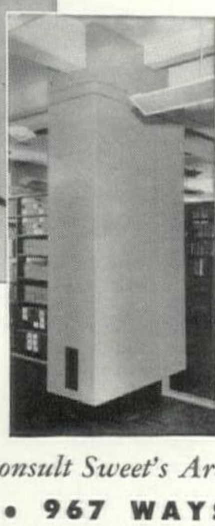
FLEXIBILITY of space within the modern school building is today generally recognized as an essential requisite of a structure that must keep pace with ever changing educational needs. For more than twenty-eight years The Mills Company has devoted itself exclusively to the design and manufacture of movable metal partitions that meet this need perfectly by providing walls that can be adapted to changes in space requirements quickly, easily and at very low cost.



Walls are erected, dismantled, moved, rearranged—quickly, easily, with minimum of labor and at very low cost.

Corridor—Flush Pilaster Partitions and Wall Lining, showing window embrasures, doors and transoms.

Laboratory—Flush Pilaster Partitions and Wall Lining. Can be subdivided into smaller rooms overnight.



Library—no dust, debris or disturbance, no loss in material, when Mills Movable Metal Walls are rearranged.

The Mills Company's concentration of engineering skill, craftsmanship and production facilities upon this single purpose has developed many exclusive features and advantages which have made Mills Movable Metal Partitions *the demonstrably superior system for flexible division of interior space.* This unexcelled quality is reflected in thousands of Mills Partitions now in service in buildings of every type throughout America.

MOVABILITY—involving a minimum of time, labor, cost and trouble

Mills Partitions are easily erected, dismantled and relocated. Panels are interchangeable, whole sections may be moved without dis-assembly, doors and other accessories inserted where desired without disturbing other panels. They are designed for easy electrical wiring. With their complete line of skillfully engineered accessory units they are adaptable to any educational space requirement. Changes in layout can often be made overnight without disruption of school routine, material loss, debris or dust usually associated with changes in other types of walls.

PERMANENCE—in appearance, in function and in structural stability

Mills Partitions provide ideal enclosures for educational work. Scientifically insulated with solidly packed glass wool, they are more soundproof than a tile and plaster wall of twice their thickness. Wide panels form perfectly flush walls, solid and permanent in appearance. They are available in a wide variety of pleasing soft colors or wood grains, in baked-on enamel finishes that permanently retain their attractive appearance. They are specially treated by an exclusive Mills process to eliminate all harsh light reflection. They provide an additional safety factor in fireproof construction.

ECONOMY—through mobility and low maintenance requirements

Mills Partitions, prefabricated and factory finished for speedy erection, may be used over and over again throughout the lifetime of a building. When layout changes are made there is no loss in material; all parts are reused. Because they are made of metal with baked-on enamel finish they do not chip or crack. Their smooth flush surfaces are easily cleaned and their fresh new look restored by simple, ordinary washing.

EXCLUSIVE MILLS FEATURES

ALL-WELDED PANEL CONSTRUCTION assures greater structural stability, maximum movability, superior architectural design, simplicity, refinement and distinctive appearance.

PRECISION SOUNDPROOFING AND INSULATION provide four times the thermal insulating qualities of a clay tile wall plastered on both sides.

GLARELESS FINISHES through special treating of baked-on enamel surfaces eliminate all harsh light reflection.

A complete line of Flush Pilaster, Semi-Flush, Executive and Commercial types of Mills Movable Metal Partitions is available to meet every school building space requirement.

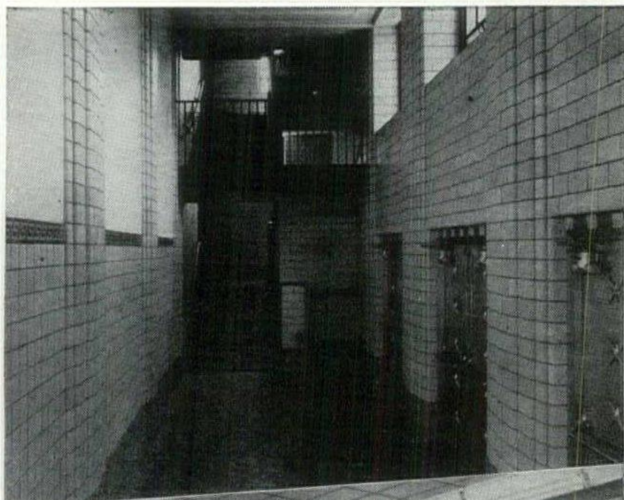
For complete information, consult Sweet's Architectural File or write for Mills Catalog 49-C.

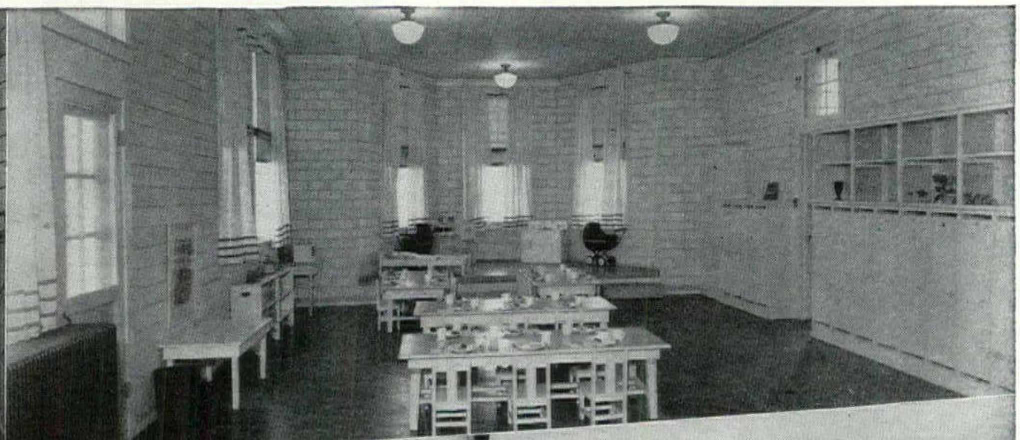
THE MILLS COMPANY • 967 WAYSIDE ROAD • CLEVELAND 10, OHIO

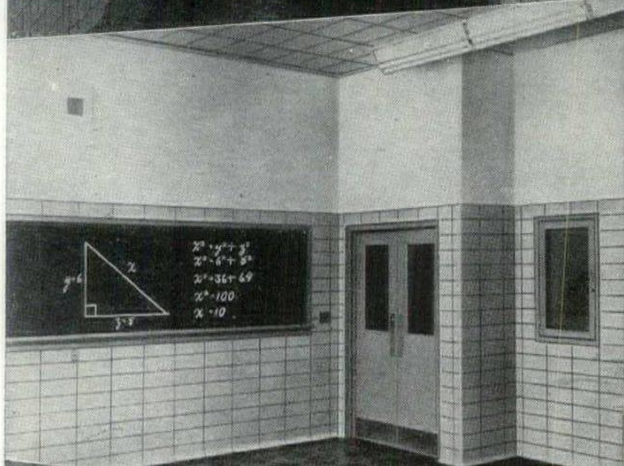
★ MILLS *Movable* METAL WALLS ★

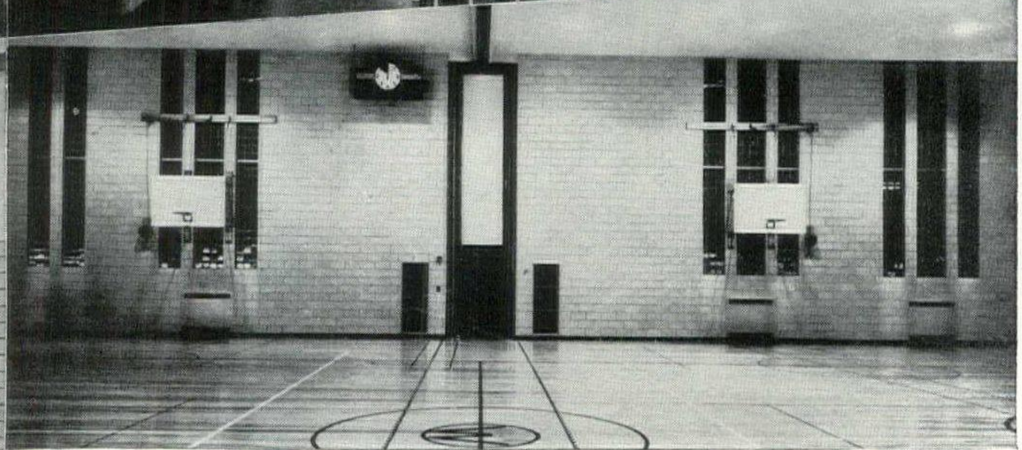
For school interiors with a high "Eye Q"

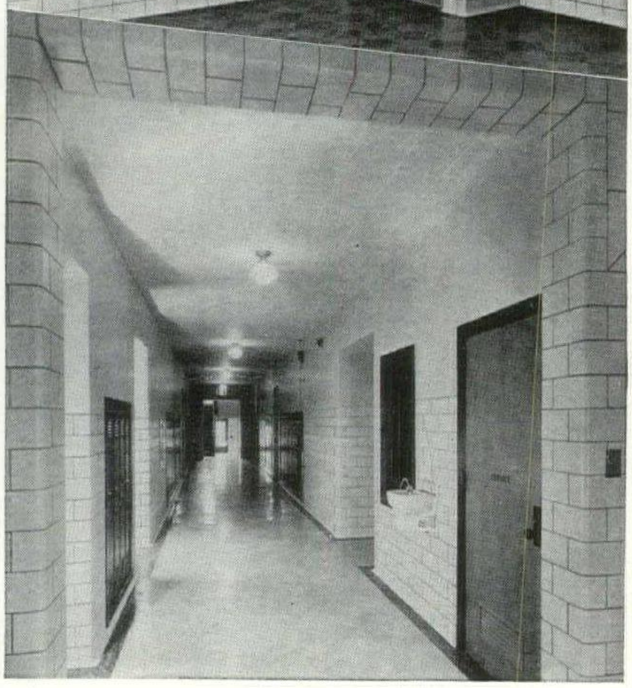
select beautiful, colorful *Facing tile*











Glazed Facing Tile

Yes, it's easy on the eye, this Structural Clay Facing Tile.

A definite aid to better lighting and vision—and always pleasing to look at!

Look at the wonderful range of Facing Tile colors, finishes and textures. They'll make it easy for you to control light reflection and diffusion—easy to make school a light, bright, cheerful place.

The colors are permanently fadeless. They'll *keep* a lustrous, new look.

The walls will sparkle with cleanliness with a minimum of care.

The surfaces will never become scarred or worn looking. No cracks, scratches or decay, even after years of hard wear!

Now look at Facing Tile's many structural advantages—great load-bearing strength, fire safety, durability, dual purpose utility as a wall *and* finish. Using them you can make school a safe and economical-to-operate place.

The finish is impervious to every unsanitary trouble-maker. It washes *clean,* quickly, thoroughly and easily, with plain soap and water. No other maintenance, no painting or periodic repairs, is ever needed.

All this in one material, at one cost!

Remember Facing Tile. Its high "Eye Q" makes it a most intelligent choice for any school interior. It is made in efficient modular sizes, glazed and unglazed. For more complete information write the Institute, contact any of its members, or see Sweet's Catalog 4d/5.

FACING TILE INSTITUTE

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INSTITUTE MEMBERS Belden Brick Company, Canton, Ohio ★ Continental Clay Products Co., Kittanning, Pennsylvania ★ Charleston Clay Products Co., Charleston 22, West Virginia ★ Hanley Company, New York 17, N. Y. ★ Hydraulic Press Brick Co., Indianapolis, Indiana ★ Mapleton Clay Products Company, Canton, Ohio ★ Metropolitan Brick, Inc., Canton, Ohio ★ National Fireproofing Corporation, Pittsburgh 12, Pa. ★ Stark Brick Co., Canton, Ohio ★ West Virginia Brick Company, Charleston, West Virginia

SHADES OF VAN der ROHE AT G.M.

FORUM:

At first glance through your excellent article on Saarinen's GM Technical Center in the July FORUM, I could not help feeling the influence of Van der Rohe's work. After more careful study of the project and text, I was pleased to read FORUM's footnote "there has been . . . some influence by Mies van der Rohe."

What interests me most, however, is that we hear so little of this great pioneer, yet his influence is having tremendous impact on U. S. architecture. By this statement, I do not mean to suggest that there is any similarity between the Saarinens' excellent planning to any particular works of Van der Rohe, but that there is evident the same principle of carrying the theory of structural honesty to its logical extreme.

ANTHONY C. LEWIS, *Architect*
Bridgetown, Barbados, B.W.I.

GARY COOPER'S JACK HAMMER

Forum:

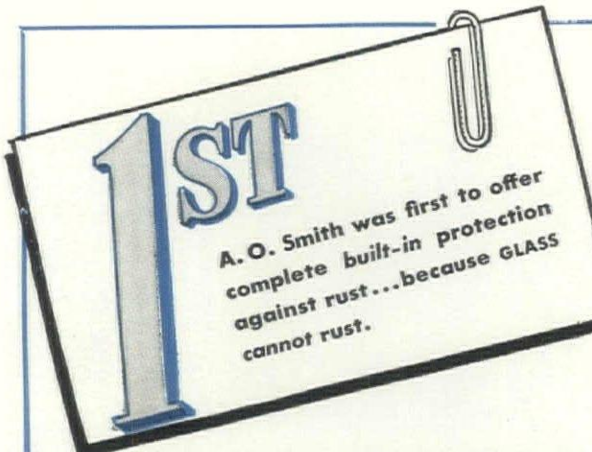
The hopeful housing exhibit at Chicago's '33 Fair indicated to me, an industrial engineer, that low cost homes must be functional in conception. By '38 I had FHA encouragement and commitments, but a new FHA management in '39 repudiated unfinished commitments. That broke and stopped me. The abortions and hybrids at New York's '39 Fair should have taught me, but I still felt I might be at fault. As time passed I learned that no one in these United States built low cost homes after '39. And we had such a good start! Then came six years of war activities and '46. A bank and the VA proved encouraging enough with their commitments to start me off. Then FHA gained full control of VA policies, so I am again broke and stopped.

As I haven't the fortitude of Gary Cooper in *The Fountainhead*, I cannot go on studying FORUM and realizing how right I am without being able to work at it. So please stop my subscription. I still believe low cost modern homes can only come through functional design. I am on my way to the quarry to get Gary Cooper's job on his jack hammer. If, at any time during the next century, I shall need reference matter on small home design and building, my 11 years file of FORUM will still be ahead of the organized real estate financing of the U. S.

One discouraged American,

HARRY W. MILLER
Modern Age Homes
Kenmore, N. Y.

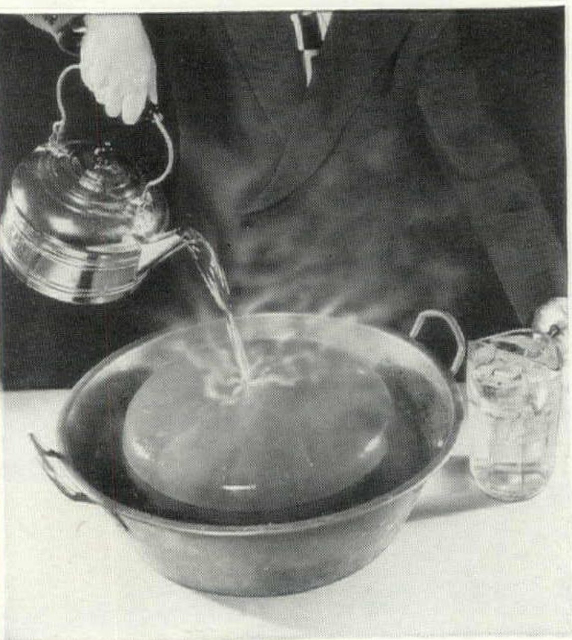
(Continued on page 40)



Extreme Thermal Shock Will Not Crack or Chip This Glass-Surfaced Water Heater Tank

The Thermal Shock Test, pictured here, the Multiple Flex Test, and other conclusive demonstrations prove the durability and resilient toughness of the glass-surfaced heavy steel tanks of *Permaglas* Automatic Water Heaters. The fact that the diamond-tough inner glass surface will not crack or chip under even extreme shipping, installation, and operating conditions is also proved by the performance record of hundreds of thousands of installed units.

This dependable, built-in protection against rust forming in the tank is a major reason why *Permaglas* Water Heaters provide completely satisfactory automatic hot water service, at the lowest actual cost. For ALL the reasons why "*Permaglas*" means complete satisfaction, send the coupon today.



Extreme Thermal Shock—far more severe than ever encountered in actual service—has no effect upon the glass surface on the inside of a "*Permaglas*" steel tank. Alternately pouring scalding water and ice water on the head from a *Permaglas* Water Heater tank is dramatic proof that the glass will not crack or chip.

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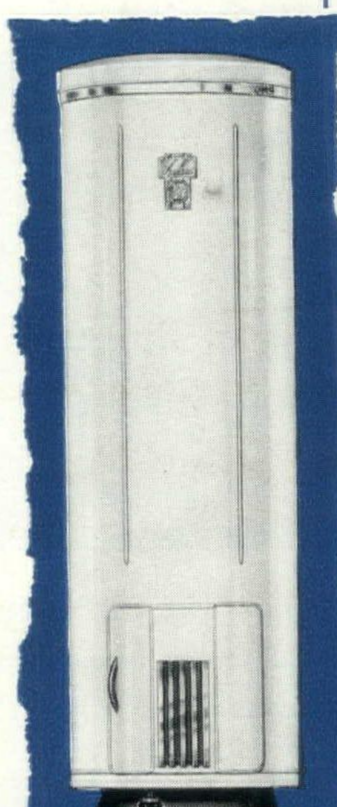
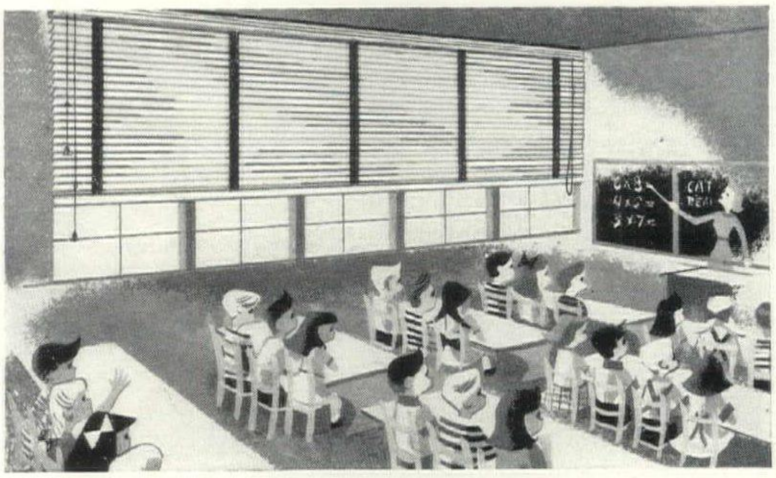
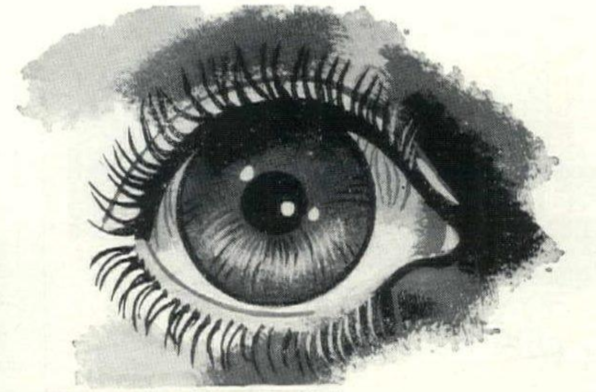


Electric and gas models...new electric table-top...in sizes for all home needs.

EYES CAN RUIN YOUR SCHOOL'S HEALTH!



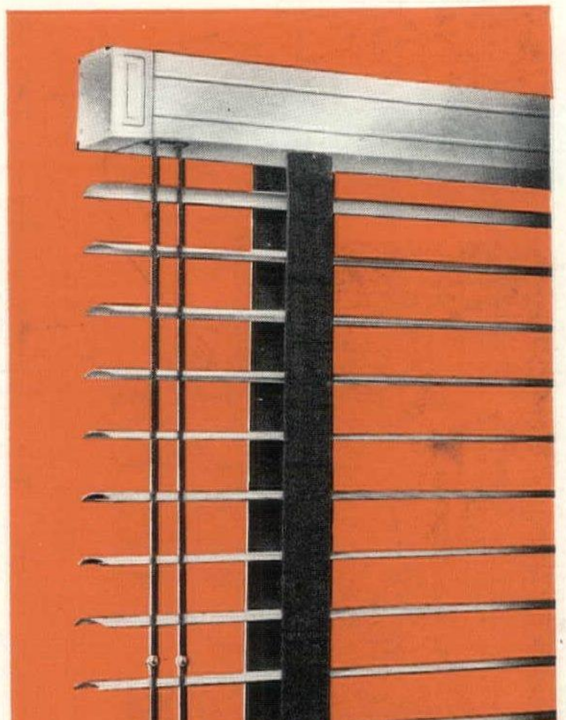


The eye affects the entire body.

If seeing isn't done with ease and comfort, more energy is expended . . . there's more fatigue . . . health is generally much poorer.

Outstanding proof of the effect of poor lighting on the body is furnished in a series of tests taken in Texas Elementary Schools by Dr. D. B. Harmon, nationally-recognized authority on school lighting. His experiments prove that when the eye suffers, the body does, too. But when correct lighting is applied to a school, there is definite improvement in the health of students.

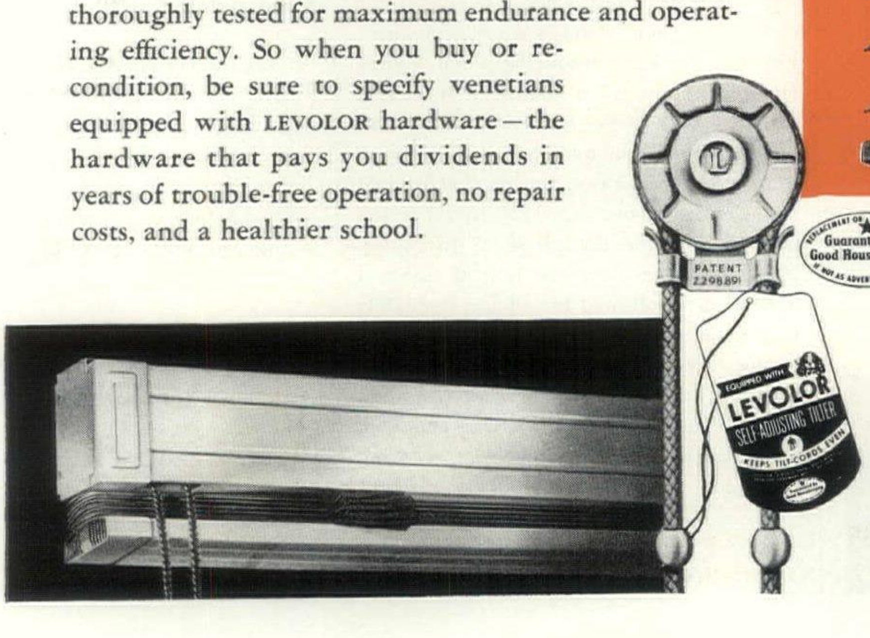
How LEVOLOR-Equipped Venetians improve daylight and ventilation control . . .



Venetian blinds equipped with LEVOLOR hardware soften the harmful glare of direct sunlight and reflect much-desired diffused light to classroom ceilings.

LEVOLOR-equipped venetians can be regulated to catch breezes, and direct them for healthy circulation without drafts. LEVOLOR self-adjusting tilters correct tilt cord creep. Limit beads on the cords always keep tassels within easy reach. Attractive LEVOLOR Blendow all-metal heads with LEVOLOR self-adjusting tilters, as component parts, are ideal for schools . . . make venetians seem like built-in elements of windows.

Another advantage — LEVOLOR hardware has been thoroughly tested for maximum endurance and operating efficiency. So when you buy or recondition, be sure to specify venetians equipped with LEVOLOR hardware — the hardware that pays you dividends in years of trouble-free operation, no repair costs, and a healthier school.



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LETTERS

ARCHITECT'S WIRY EARS

Forum:

There an old saying that you can judge the wheels in a man's head by the spokes that come out of his mouth. In my case I not only have spokes coming out of my mouth but a wire coming out of my ear. This is confusing to people.

The question of why there is a larger percentage of deaf architects than of lawyers, doctors, olive-stuffers and other professional groups is one that I have been thinking about for some years, on my own time.

I have figured out that, here in Grand Rapids, three out of 20 registered architects wear earphones. This is 15 per cent, I think. You might assume that the other two earphone wearers were deafened by listening to me, but this is not the case, as neither of them listens to me if it is at all possible to avoid it. It seems to me that 15 per cent is a high average.

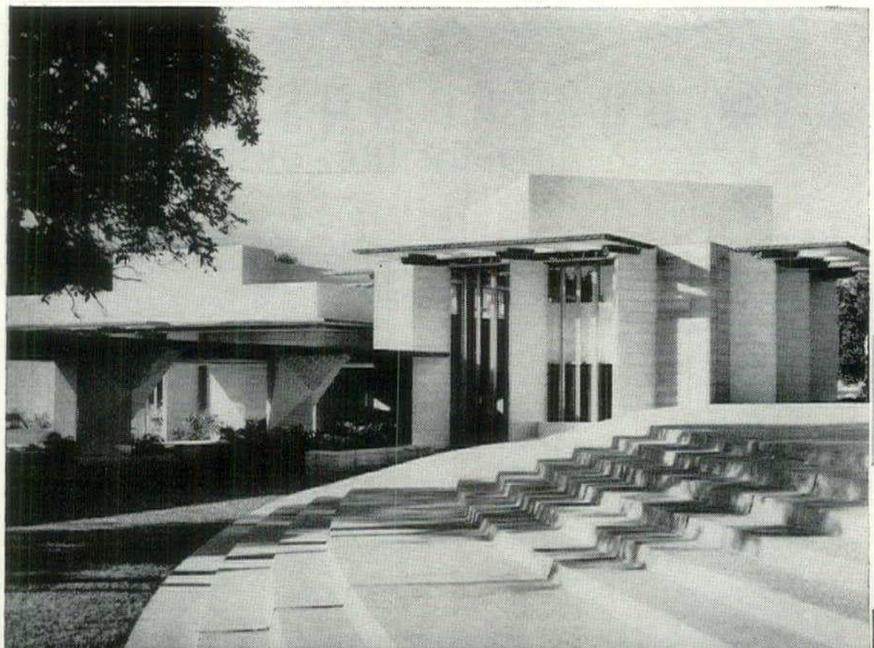
I have made an exhaustive investigation all over the country, and I am convinced that there are more deaf architects than deaf lawyers or doctors. When I say "exhaustive investigation" I mean I get exhausted just thinking about making such an investigation, but nevertheless an informal check of audiences around the country indicates that this is true. And these people were deaf before I started talking to them, too.

It would be interesting to check the figures for architects in other localities, because if something is deafening our colleagues, she better quit doing it. Possibly this is an injustice to women; perhaps clients talk too loudly. My own clients are welcome to shriek if they like, as I can turn the volume control down.

When I first started to wear an earphone, I was given some good advice by a friend of mine who is a psychologist. (A psychologist is a man who, when a beautiful girl enters the room, watches everybody else.) Few architects are practicing psychologists. He warned me, when making a speech, to start off with some reference to my earphone; he said the audience would look at it and then look away, fearing that I might be sensitive about it. This would cause them to lose the thread of my discourse, which knots easily at the best of times. I have always followed his advice, but lately I have been thinking that this may be the wrong thing to do. There is always the possibility that the members of the audience are sensitive about having me look at them, because they are *not* wearing earphones.

Roger Allen, *Architect*
Grand Rapids, Mich.

(Continued on page 44)



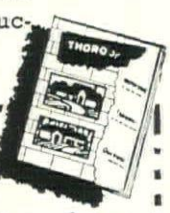
Above Surface

ON THIS BEAUTIFUL BUILDING, WORLD-FAMOUS ARCHITECT FRANK LLOYD WRIGHT HAS DEMONSTRATED WITH NEW DESIGNS WHAT CAN BE DONE WITH THOROSEAL AS A PROTECTIVE COATING FOR STRUCTURAL CONCRETE AND MANUFACTURED BLOCK MASONRY, "ABOVE THE SURFACE."

Below Surface

THE WATERPLUG CREW AT WORK IN ONE OF THE LARGEST TUNNELS, IN NEW YORK CITY. THE WORKMEN WILL SEAL OVER TWO MILES OF TUNNEL, 86 FEET BELOW POOL LEVEL OF THE EAST RIVER, SHOWING "HOW TO DO IT", BELOW THE SURFACE.

Today, the architectural and engineering profession realize the importance of substantial materials to co-ordinate, seal and beautify their general construction plans; THOROSEAL, to fill, seal and beautify any type masonry, above or below the surface; WATERPLUG, to prevent and correct every type of water problem, no matter how great the pressure. The THORO System products give to the architect and engineer, materials of sufficient structural strength with which they can plan with confidence and satisfaction.



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FORM, FUNCTION & BEAUTY

Forum:

Each month I receive FORUM with enthusiasm and admire your beautiful photographs and brief but comprehensive articles on the work of contemporary architects. Their point of view is clearly demonstrated. As in all the arts, so few of the examples are truly beautiful and really distinguished. So much of the effort is lacking in *balance*, or perhaps I should say, neglect of *beauty*. When a modern building is ugly we hear it justified in terms of efficiency, usability, and "machine for living" arguments. Or that it is a new style and therefore difficult to design.

It seems to be generally accepted that if *form* is made to follow *function* then *beauty* must necessarily follow also. Actually *function* has nothing to do with *beauty*. To prove this contention it is only necessary to examine the past and to visit a museum to see many beautiful objects that function poorly. Or on the other hand to find extremely well designed machines and buildings that look like hell. Beauty does not automatically follow in a perfectly functioning tool, machine or house. To suppose that it does leads, I think, to the many instances we have today of well engineered but ugly structures.

Everyone agrees that a perfectly functioning machine that is also *beautiful* is truly a work of genius and a marvelous thing. *Beauty* appeals only to the eye and the emotions and obeys such universal laws as *balance, rhythm, harmony,* in order to create a satisfying arrangement of *lines, spots* and *colors,* regardless of how they function mechanically. Order and ceremony are emotionally thrilling and esthetically satisfying but have nothing whatsoever (in themselves) to do with function. I feel that the young architect today is neglecting the study of esthetics and concentrating too much on engineering. The great architect is always *both* the artist and the engineer.

The truly great work of contemporary architects reveals that the masters are greatly concerned with *beauty* and are unique in their ability to weld *function* and *beauty* together. So many men are easily satisfied with a good plan and let the elevation take care of itself. The great architects of today are the great creative artists.

Formerly just good taste and a well illustrated library was all that was necessary. Now the architect must create beauty like the painter and sculptor.

T. LOFTIN JOHNSON
Bedford, N. Y.

(Continued on page 46)

for essential *FLEXIBILITY* in school kitchen design ...specify *St. Charles*

CUSTOM BUILT OF STEEL

Two of the six kitchen arrangements in the recently installed Home Economics Laboratory of St. Charles Community High School, St. Charles, Illinois. An interesting feature is the sloping soffit eliminating the necessity of furring down from the high ceiling.

● School kitchens, whether Home Economics Laboratories, cafeteria kitchens, or both, present unique planning problems. Floor plan and internal equipment must remain flexible, within fixed spatial and budgetary boundaries. Designs for maximum use of kitchen facilities must also recognise the possibility of minimum use, since both factors are dependent upon semi-annual rise or fall in enrollment.

St. Charles has long experience in the solution of these specific problems. We invite your use of this experience and suggest consultation with the St. Charles dealer in your area. A factory-trained specialist in kitchen design, he is fully aware of your professional responsibility and anxious to assist you in augmenting your service to your clients. Detailed floor plans, elevation sketches, and perspective drawings, as well as carefully computed cost analyses are available, through him, for integration in your overall submission.

If a St. Charles dealer is not listed in your local directory, please write to us, at the address below.

Another St. Charles unit-kitchen application, within a large laboratory for Home Economics designed for Proviso Township High School, Maywood, Illinois.

In this St. Charles multiple-kitchen arrangement of the new 3-room Home Economics Laboratory at J. Sterling Morton High School, Cicero, Illinois, ninety-six pupils can cook at once. The breakdown of large rooms into small units allows for utmost flexibility in adjusting to class size and curriculum, while simplifying the individual student's transition from school training to home application.

For more completely detailed information on St. Charles Kitchens, please see our 8-page Architects File in Sweet's Catalog.

May We Send You . . . ? A list of the many schools whose architects have already selected St. Charles. Typical is the Gratiot High School, Wayne County, Michigan, designed by Eberle M. Smith Associates, Inc., featured in this issue of *Architectural Forum.*

A Technical Manual of Dimensional Details, including roughing-in diagrams of the various St. Charles elements.

A 16-page booklet illustrating St. Charles special units and accessories and showing completed St. Charles installations *in color.* This is of particular interest since *all* St. Charles kitchens are available in your choice of white or any of the four standard St. Charles pastels.

A penny postcard with your name and address will bring all of this material promptly.

StC

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U.N.'S SECRETARIAT

Forum:

The following is respectfully submitted in hopes it will fan the "violent discussion" you so correctly prophesied would arise over the U. N. Secretariat (FORUM, July '49).

There seems to be an American phobia for minimum sizes wherever modern plumbing is concerned: the toilet facilities on each floor are unbelievably inadequate. It should be borne in mind that to many visitors from beyond our shores our plumbing installations, especially those of the good, old, hundred-penny-dollar days, are our most outstanding achievement—next to the elevator and its steel-frame confreré. Quite aside from this is the fact that of all the unnecessary annoyances of congested urban existence, there is only one thing worse than having to wait and wait and wait; that is having to hurry because you know someone else in waiting, waiting.

The west window is an outstanding violation of the fundamental principle which strives to meet the challenge of the change in our physical environment occasioned by its inevitable post-meridian relation to the sun. Given the fenestration on the east side of the building, the repetition of the same treatment on the opposite side bespeaks a lack of imagination quite out of harmony with the esthetically dramatic contrast of light and dark, plane and enclosure, solid and void which has gradually evolved as a dominant theme throughout the counterpoint of contemporary design. The opportunity was there to create something of value both functional and esthetic—a pierced screening, vertical fins, horizontal louver-shades which could have stepped down to form marquee covered walk and free-standing forms reaching through the garden-park to the Assembly Building, repeating an orderly motif to tie the whole together on a human scale—an attempt to accentuate the friendliness of the world community's greatest hope of self-preservation. It was lost in the perpetuation of the ante-diluvian desire to dominate.

The most unfortunate aspect of the design, or lack of it, is that, in the "politics" involved in creating an entirety from the composite effort of many minds, the end-result lacks the virility and force which each one of the internationally famous architects must have contributed. It seems to have been foreordained that from the union of the U. N. site committee and the East River—New York City property, no issue could be other than still-born.

R. B. CUTLER
Staten Island, N. Y.

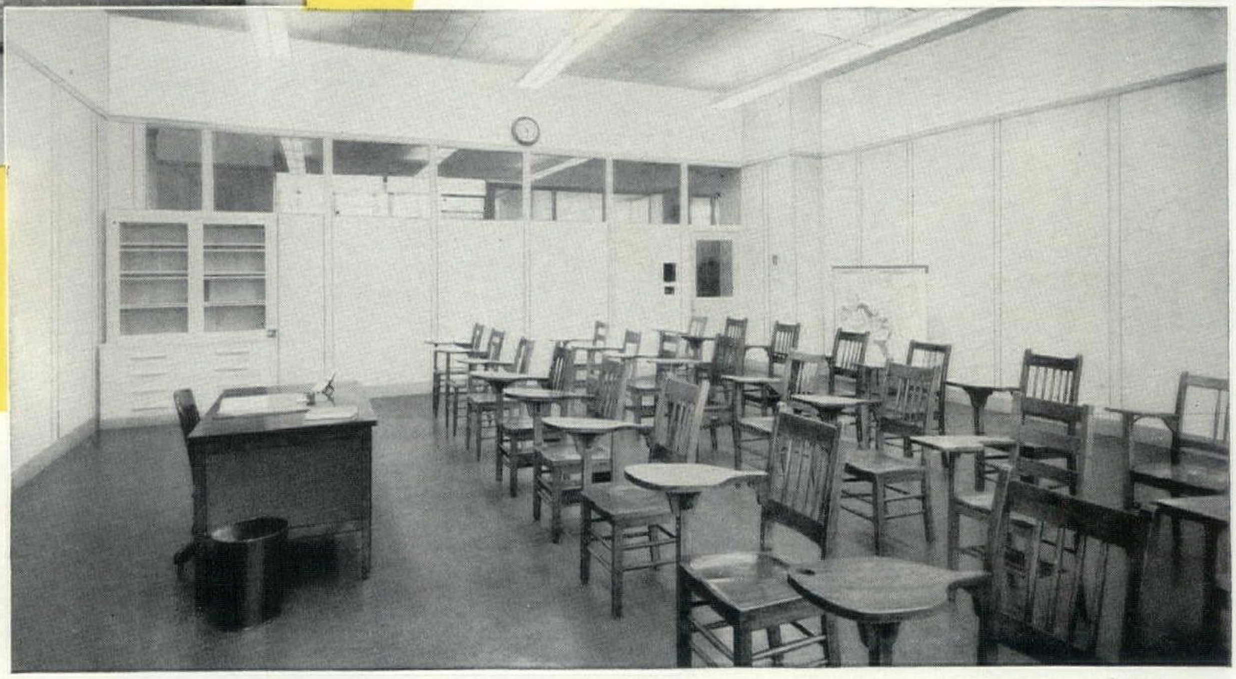
(Continued on page 52)

NEWTON TECHNICAL HIGH SCHOOL
Newton, Massachusetts

MAINTENANCE DOLLARS GO FARTHER

. . . much farther

WITH HAUSERMAN MOVABLE STEEL INTERIORS



MAINTENANCE dollars go farther . . . *much farther* . . . in schools that have Hauserman *Movable* Steel Interiors. These solid, rigid walls with their baked-on finishes won't chip, crack, warp, or scale. This eliminates frequent patching and re-painting. It means that a janitor can easily perform all the normal maintenance required . . . occasional soap-and-water washing.

Hauserman *Movable* Steel Interiors also assure efficient school operation for the life of the building. Hauserman Steel Walls can be easily moved whenever population changes or new teaching methods make new floor layouts necessary. And all Hauserman units can be re-used again and again.

A Hauserman representative will be glad to discuss these and the many other advantages of Hauserman *Movable* Steel Interiors with you, your architect, and your builder. Write or call the Hauserman office or representative nearby, or contact *The E. F. Hauserman Company, 6716 Grant Avenue, Cleveland 5, Ohio.*

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NESBITT

NESBITT *Syncretizer*

THE UNIT VENTILATOR THAT SETS A NEW STANDARD OF CLASSROOM COMFORT

With today's most attractive unit ventilator being at once the most satisfactory guardian of comfort in the classroom, the problem of ventilation in your schoolhouse planning deserves a straight, sure answer: NESBITT.

Appealing as the beauty and the convenience of The Nesbitt Package are, the paramount reason for going Nesbitt exists in the performance characteristics of the Series 500 unit ventilator.

All that you KNOW about the fine points of thermal balance is comprehended in the advanced features of this unit. For instance, you know that the real threat to classroom comfort lies in the cold walls and exposed surfaces—especially in the large window area—which rob the occupants of body heat on cold days, even when the room thermostat registers 70 degrees.

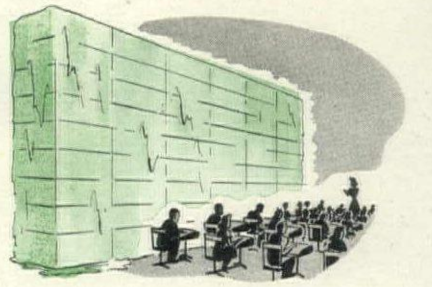
The built-in Comfort Control of the Nesbitt Syncretizer answers this problem by constantly sampling the outdoor air and automatically adjusting the minimum temperature of the ventilating air-stream: warmer as the outside temperature falls, cooler as the outside temperature rises.

Besides, there is the Nesbitt Outdoor Air Volume Stabilizer. Two pivoted vanes located within the unit at the outdoor air inlet gradually restrict the opening as wind velocities increase, preventing excessive quantities of cold air from entering the unit. This plus feature accounts for much of the unit's added economy and satisfaction.

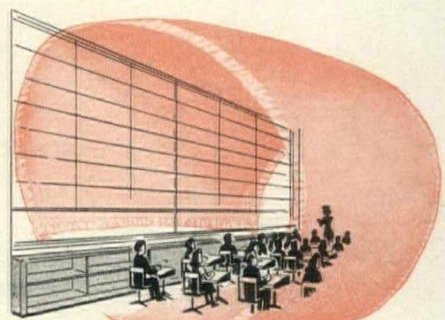
Moreover, the Nesbitt Directed Flow Adjustable Outlet: A series of adjustable vanes below the discharge grille permits the direction of the airstream to be varied over a wide range. This makes possible the selection of a discharge pattern best suited to a particular classroom installation, and makes optimum use of the uniformly tempered air-stream created by the Nesbitt radiator with its dual steam-distributing tubes.

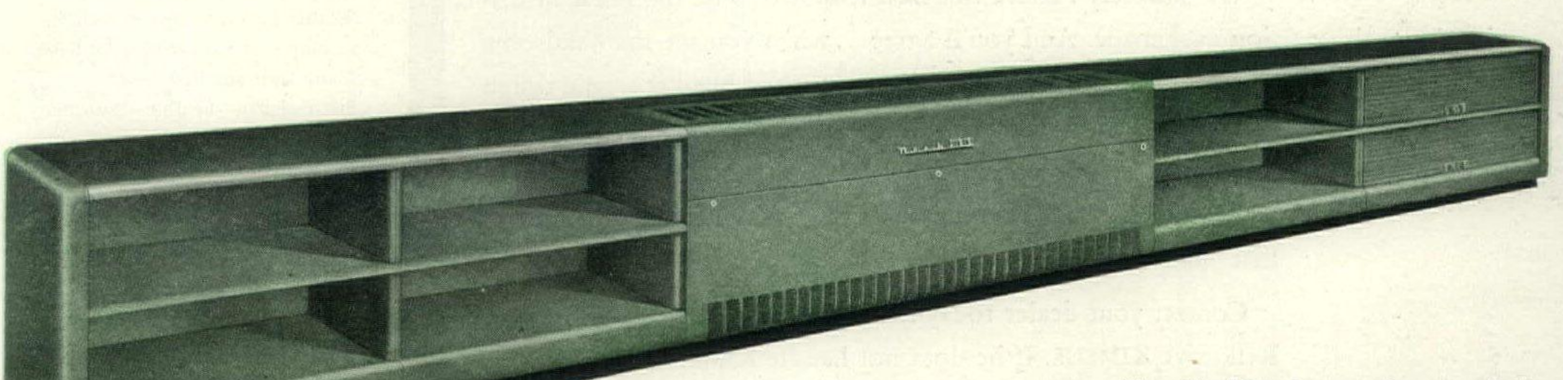
These exclusive features—and many others proved in more than 85,000 installations—provide a new standard of classroom comfort which a representative of John J. Nesbitt, Inc., or American Blower Corporation will be glad to discuss with you.

IN YOUR SCHOOLROOMS



A WALL OF ICE? . . . OR A NESBITT THERMAL BLANKET?





The Nesbitt Package with Syncretizer and open and closed storage cabinets.

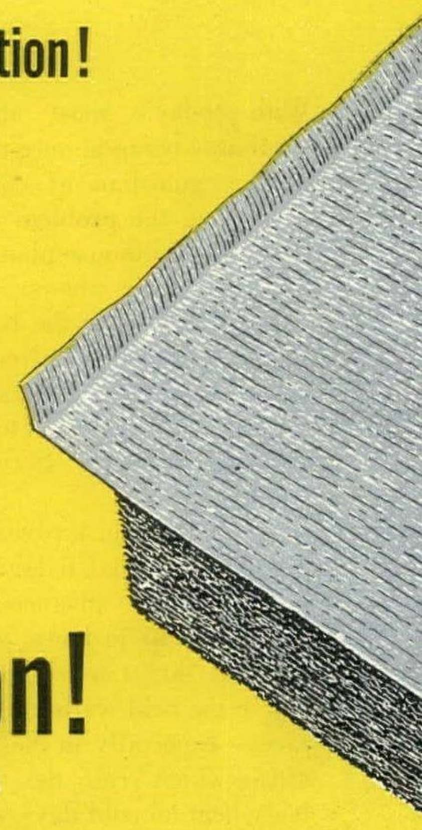
The Nesbitt Syncretizer and the Nesbitt Package are made and sold by John J. Nesbitt, Inc., Philadelphia 36, Pa. Sold also by American Blower Corporation.

Kimberly-Clark announces a great new insulation!

New Kimsul*

reflects heat...

shuts out condensation!



Now—from the research laboratories of Kimberly-Clark Corporation—comes a great new KIMSUL*.

An insulation combining the principles of heat-reflection and heat-resistance—the most effective barrier to heat loss ever devised. An insulation made far easier to handle . . . far easier to install. An insulation with *reflective vaporseal cover* . . . meeting all FHA requirements.

We sincerely believe this new KIMSUL to be the finest insulation ever made. And you'll agree... when you see the handsome aluminum foil cover... many-layer stitched blanket... the tough reflective tacking flanges . . . the smaller package and lighter weight . . . of this great new KIMSUL. For it also provides the same high thermal efficiency and the many original advantages that made KIMSUL America's fastest-selling blanket insulation.

Contact your dealer today for full information about the new Reflective KIMSUL. If he does not handle KIMSUL, write directly to Kimberly-Clark Corporation.

Look at all these features!

- Reflective aluminum vaporseal
- Tough reflective tacking flanges
- Smaller package—lighter weight
- Compressed to save 80% on handling
- Many-layer stitched design
- Fire-resistant—flexible—caulkable
- Easy to install
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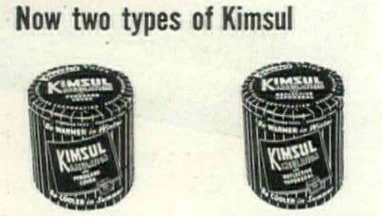
- Meets FHA vaporseal requirements
- Non-irritating—non-settling
- Resistant to insects, vermin, mold
- Over-framing compressibility

Now two types of Kimsul



REGULAR KIMSUL (Red Package) — REFLECTIVE KIMSUL (Gray Package)

Send me complete information about KIMSUL Insulation with Reflective Vaporseal.

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A PRODUCT OF Kimberly Clark RESEARCH

WITH REFLECTIVE VAPORSEAL

*T. M. REG. U. S. & CAN. PAT. OFF.

DEAD BUILDING

Forum:

So we are going to remodel the White House. Why?

This building is now dead. It has served us well. Let us give it an honorable burial.

Tradition is fine. We should learn from it and be guided by it, but not restricted by it!

Now we are rebuilding the White House the same as it is today, but to last 500 years! Again I ask—Why? Why can't we be as capable, honest and sincere as the architects who designed the original White House? Are we so impotent and reactionary that we cannot improve upon our forefathers?

We are supposed to be the most progressive nation on the earth in almost every field of endeavor. Why can't we incorporate this progressiveness into the new presidential mansion so it will sincerely fulfill the needs of the future as best as we know how to do it?

Instead of just being proud of our forefathers, let us make them proud of us!

Roland K. Kuechle, *Architect*
Oakland, Calif.

• Reader Kuechle's plea comes too late. Last summer the Commission on Renovation of the Executive Mansion decided to preserve the White House's exterior and modernize the interior to the tune of $5.4 million.—Ed.

BASTARDIZED CHICKEN COOPS

Forum:

Have you considered that possibly many American citizens, and many architects, do not really like so-called "modern" residential design?

Some architects seem to have done well by a happy compromise, and I expect my next home to be of such a nature. Personally, I deplore the appearance of most of the "modern" houses being featured today, many of them as "prize-winners." I also deplore the judgment of those who consider them thus.

Functionally, these "modern" houses do have advantages. But they don't seem "homey." They lack the grace and character of time-tested, popular designs. They appear to me too much like bastardized chicken coops.

John H. Dykstra
Rocky River, Ohio

• From the presentation of new Colonials, Tudors, Georgians, Forum readers could learn little; from the presentation of modern houses, Forum readers can learn much. Without the presentation of good modern houses, Reader Dykstra would have nothing fresh to mix with traditional ingredients to obtain his "happy compromise."—Ed.

(Continued on page 56)

FOR GREATER "BUY APPEAL"

Complete HOTPOINT

With Today's Home Buyers

THE KITCHEN IS THE MEASURE OF VALUE

Brilliant Hotpoint Appliances scientifically arranged around Hotpoint's three work-saving centers attract more interest than any other feature in new homes today. Hotpoint offers builders *complete* kitchens—all appliances and custom-matched cabinets from a single, world-famous source!

AND EXTRA PROFITS FOR YOU, INSTALL

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Values Go Up, Prices Seem Lower, Homes Sell Faster
When Equipped with HOTPOINT Custom-matched Equipment

Every builder knows that *the features sell the house.* And the most successful builders report that a Hotpoint All-Electric Kitchen is the greatest selling feature of all! It means extra profits for you, because it accelerates your turnover and makes possible *more sales per year.*

This famous work-saving center—complete with Hotpoint Range, Refrigerator, Dishwasher-Sink and matching metal cabinets—adds "buy appeal" to any house, makes the total price seem lower and often *clinches your sale.* Yet the little extra cost is rarely noticed, for it now can be included in a "package mortgage" on the house. When financed over a period of years, the Hotpoint Kitchen adds *less than $5 per month* to the mortgage payments!

As selling gets tougher, you'll want every sales advantage you can muster. Be sure that Hotpoint's year-round advertising and reputation as America's Foremost Kitchen Planners work for *you*—not for your competitors. Send for all the sales-making facts today. Hotpoint Inc. *(A General Electric Affiliate),* 5600 W. Taylor Street, Chicago 44, Illinois.

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The First Name in All-Electric Kitchens

RANGES • REFRIGERATORS • FREEZERS • WATER HEATERS • DISHWASHERS
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How HOTPOINT Can Help You Save Money on Installation Procedure!

You can enjoy important savings of time, money and materials by following installation procedures recommended by Hotpoint. Full facts will be hurried to you free on request. Also, you will receive information about Hotpoint's helpful Kitchen and Home-Laundry Planning Service. Simply fill out the coupon at right and mail it at once.

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5600 W. Taylor Street, Chicago 44, Illinois

Gentlemen: Without cost or obligation to me, please send full information about the most efficient methods of installing modern kitchens and home laundries.

I build________houses a year for________
(Number) (Rent or Sale)

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ADDRESS________

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LUSTRON RESIDENT

Forum:

My wife and I will move this week into a new, gray Lustron. Highly pleased by FORUM's May article on Lustron, we were infuriated by TIME's treatment a few weeks ago—the cracks about it resembling a bathtub and a hot dog stand made me want to start heaving panels. In high dungeon, I wrote TIME suggesting that it, Senator Fulbright and RFC's Gunderson read TIME's sister publication. Needless to say, the letter never saw print.

MORTON MINTZ
St. Louis, Mo.

F.LL.W's BOOK

Forum:

Your review of Frank Lloyd Wright's book, (Aug. '49) is full of understanding.

OTTO T. MALLERY
Franconia, N. H.

COST-WEIGHT CREED

Forum:

The article in the August FORUM about Nat Owings' solution of the ideal office building is a real contribution to building progress. Here is an example of realism in dealing with the question of buildings erected at today's costs competing with structures built prior to the war.

This is a first-class example of the workings of our creed that the "cost of a building is largely a function of the weight of the building."

JOHN W. MOORHEAD
Manager, Architectural Sales
Great Lakes Carbon Corp.
New York City.

KUDOS

Forum:

. . . My warm compliments to the staff of FORUM. In my much shared opinion, it is the finest piece of literature of its kind on the market today.

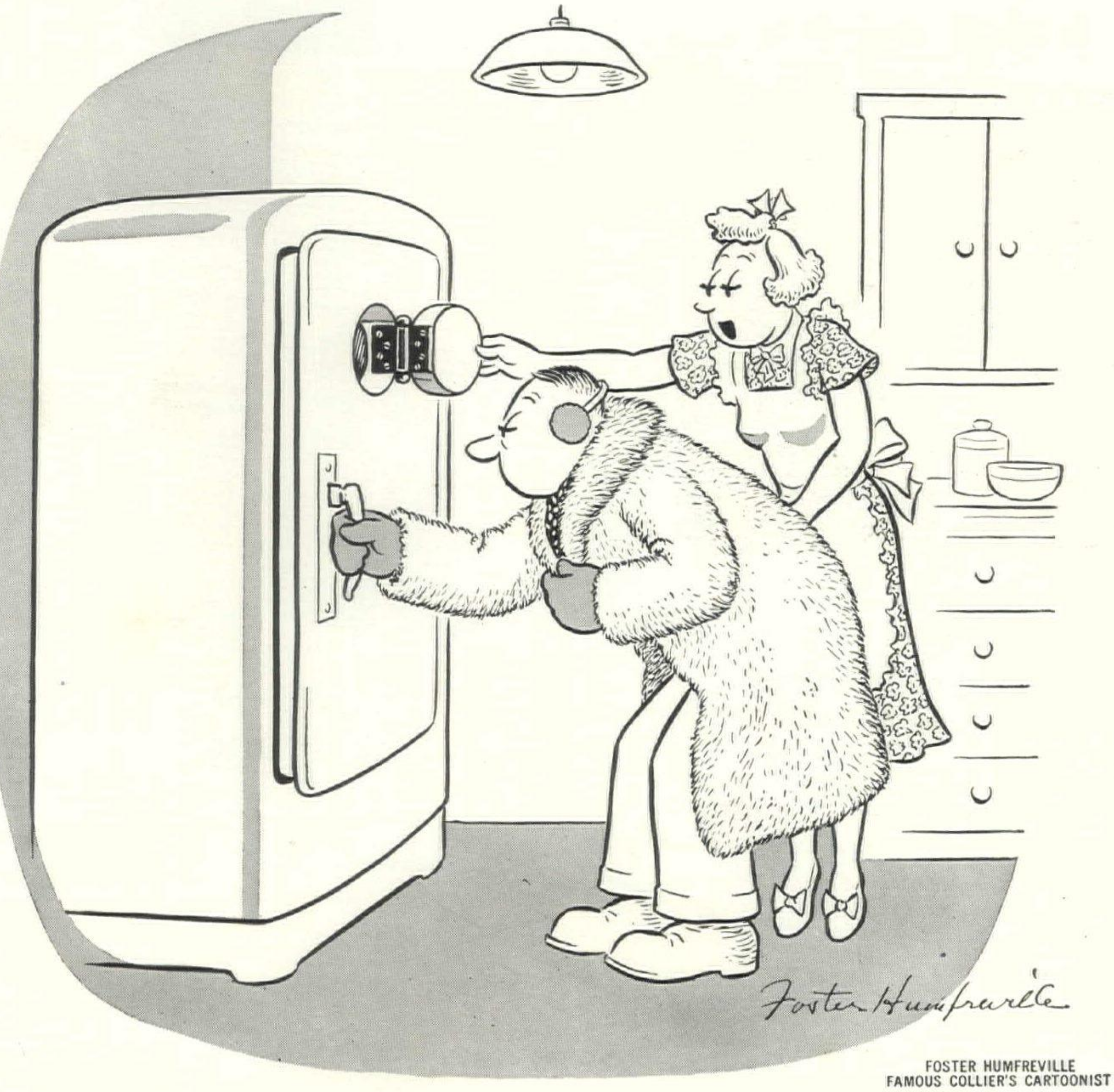
MERRITT W. YEARSLEY
Milwaukee, Wis.

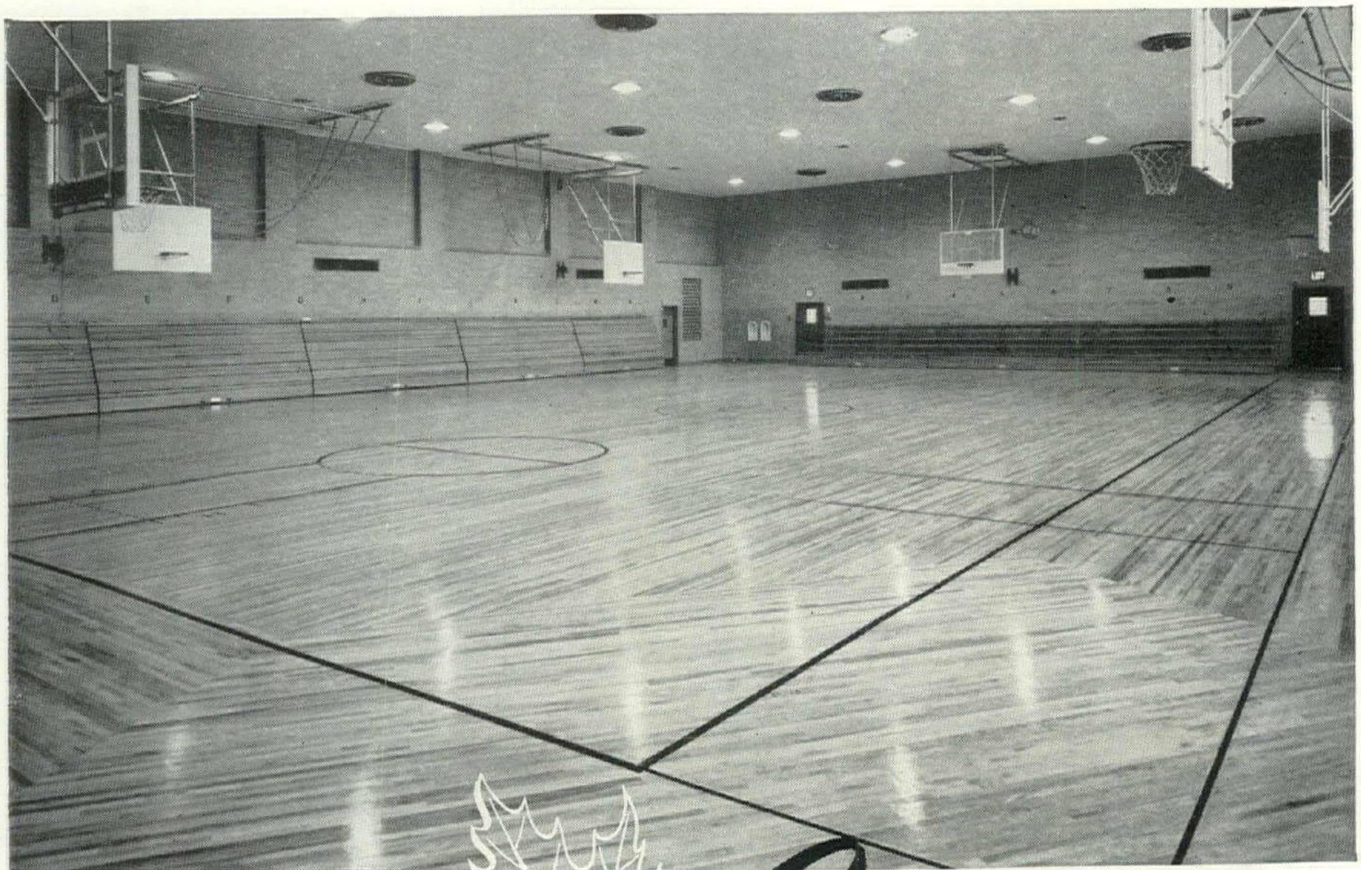
ERRATA:

• FORUM regrets that the design of the Medical and Surgical Building at Hudson River State Hospital (FORUM, Jul. '49, p. 50) was credited erroneously to the office of the New York State Architect rather than to Architect John B. Peterkin.—Ed.

• In a serious mistake—particularly for tall people—FORUM in July (p. 130) inadvertently cut 8 in. off the 6 ft. 8 in. height of Franz Mfg. Co's new garage door unit.—Ed.

(Continued on page 62)


Foster Humfreville



Floor of Northern Hard Maple, 80 x 100 feet, a dual-purpose innovation which combines gymnasium and roller-skating rink, at Archbishop Stepinac High School, White Plains, N. Y.—an interesting development in supervised recreation. Eggers & Higgins, Architects, New York, N. Y.

Reflecting
Good Judgment
in the bright beauty, endurance and economy of
NORTHERN HARD MAPLE

Formed to conserve the natural supply and to raise and stabilize the mill standards of genuine Northern Hard Maple Flooring, the **MFMA** has, naturally, watched and recorded for many years the performance of the thousands of fine Maple Floors in American school and college classrooms, corridors, gymnasiums and offices.

MFMA records *prove* that true economy and thorough satisfaction are assured by a well-laid, properly-finished floor of Northern Hard Maple. *It reflects good judgment.* Northern Hard Maple is close-grained, tough, strong, rigid. It is truly resilient. It is amazingly resistant to denting by pointed impact or pressure, and to abrasion by scuffing. It is non-splintering. It is readily stained to many varied tones, and it is brightly beautiful without any stain.

Second Grade, Second-and-Better Grade and Third Grade Northern Hard Maple, **MFMA**-marked, provide very appreciable economies, too, at no sacrifice of performance characteristics. Ask your school architect to show and explain these simple **MFMA** grading specifications to you.

For full data, see Sweet's, Arch., 13/g/6—Eng., 4/5/22. Write for latest listing of **MFMA**-approved finishing products and processes. Address—

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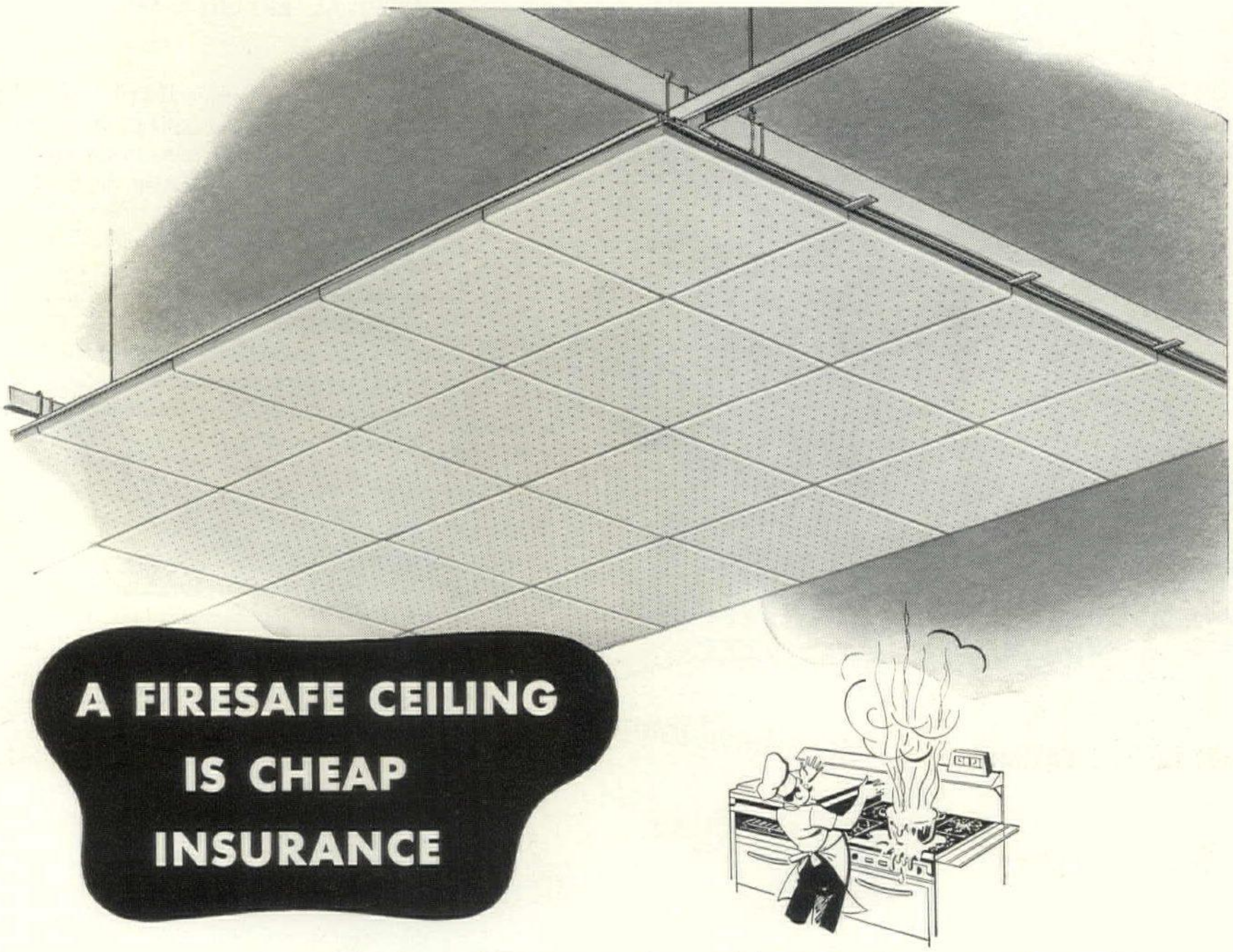
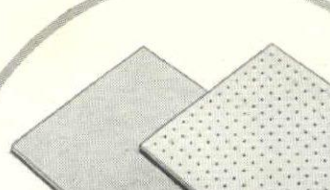
BEECH AND BIRCH



A FIRESAFE CEILING IS CHEAP INSURANCE

...your clients will appreciate Fiberglas* Acoustical Tile



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- **Plain Tile**
- **Perforated Tile**
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Available in standard sizes.

Owners value the added protection and possible insurance savings they realize with firesafe Fiberglas acoustical ceilings. You may specify them with complete confidence.

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Fiberglas Tile and Board are the lowest-priced incombustible acoustical materials on the market.

In adhesive applications, the cost of a Fiberglas ceiling installed is only a few pennies per foot more than that of ordinary materials. In many suspended ceilings, its installed cost is actually less.

For specification information, write today for our new manual: "Fiberglas Acoustical Materials" . . . Standards AC6.C1.

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LETTERS

HOSPITAL EXPERTS debate the minimal room w

Forum:

The "Minimal Private Hospital Room" (FORUM, July '49, p. 92) is . . . very interesting. However, there are three potential objections that come to my mind: 1) Will the 2 in. solid plaster walls separating the head of one patient from the head of the patient in the adjoining room be sufficiently sound-proof? 2) The fixed installation of fixtures would make it difficult to use an oxygen tent properly, even though oxygen is piped to the room, and to move a patient from a litter to the bed or vice versa. 3) The fixed position of the bed with permanently installed equipment on each side would, in many cases, make the administration of medications and treatment or examinations of the upper part of the body most difficult.

C. N. BAGANZ, M. D., *Manager*
Veterans Administration Hospital
Lyons, N. J.

Forum:

The thing that appealed to me particularly about this room was the lavatory available for a patient's use without his getting out of bed. This, in itself, will reduce materially the nursing and attendant service to the patient, and thus cut down on labor costs which now comprise about 60 per cent of our hospital budget.

FRANK L. JENNINGS, *M. D.*
Supt. and Medical Director
Sunnyside Sanatorium
Indianapolis, Ind.

Forum:

On paper it seems to be an excellent plan and I am unable to pick any difficulties . . . There will be many alterations and changes in minor details which will make it of value to all hospitals in the future.

E. REID CADDY, *Director*
St. John's Episcopal Hospital
Brooklyn, N. Y.

Forum:

My experience has been that, as corridor space and room space are reduced in hospital services, the confusion and noise ratio increases. In your minimal room, I note also that the partition between rooms is cut to 2 in., and I suspect that if this does not increase the transmission of noise it certainly does not tend to reduce it.

As I estimate the distances in this room, I fear that one might experience difficulty in using an oxygen tent or some similar piece of equipment. The reduction of space in hospital facilities is pretty much like the confining of a family in a relatively small apartment instead of a house. The space is very heavily used and it is my feeling that the comfort of the patient is greatly reduced.

R. R. GRIFFITH, *Director*
The Delaware Hospital
Wilmington, Del.

Forum:

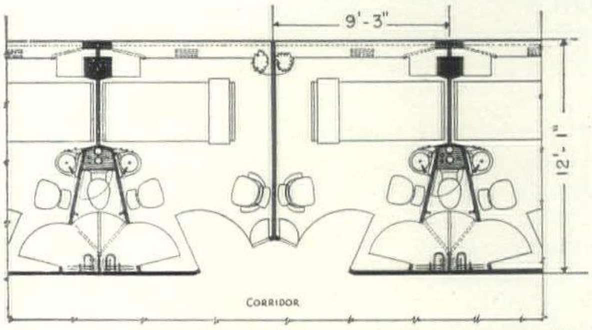
For many years past part of the hospital-using public has asked for low cost facilities. What they have meant is a room for single occupancy with the privacy and convenience of the "first class" room and the lower costs of the "second class" or "tourist class" semi-private room or ward. But this has not been accomplished to any appreciable degree either in construction or in maintenance and professional service after construction. The reasons for this are not far to seek. Even if a cheap private room were built, this would be but a

signers Markus and Nocka

single one-time element of the total cost. More important are the greater and continuing costs of maintaining and serving patients in one-bed rooms when compared to the costs in multi-bed rooms.

Dr. Wilhelm and Messrs. Markus and Nocka have tackled this problem anew with an ingenious plan that aims to affect both elements of the cost.

The plan suggests at once the conditions in a modern Pullman car in which much is provided within the limited space of small roomettes, compartments, etc. Comparisons, however, of those who use and how they use Pullmans and hospitals bring out differences. The Pullman is for the well person, actively ambulant, and occupying the accommodation



Designed by Frederick E. Markus and Paul F. Nocka, this experimental scheme for small hospital rooms in Boston's Peter Bent Brigham Hospital saves 30 per cent in floor space over the typical room by combining the closet and toilet facilities and by reducing over-all dimensions to 9 ft. 3 in. x 12 ft. 1 in. The 5 ft. corridor, made feasible by splayed doors, saves 37 per cent of the space occupied by the usual 8 ft. corridor.

generally for one night, occasionally two, and rarely three. Except for making the berth (without the occupant in it), practically no service is required by the occupant after going to bed. The hospital patient, on the other hand, averages ten to 12 or more days for use, much of it in bed, with need for many personal and intimate services sometimes given by two and more attendants simultaneously in the room. Many of these services are given to the patient in the bed, and from either or both sides of it. The room is at various times, and sometimes simultaneously, the occupant's bedroom, dining room, living room where guests are received and entertained, office, library, bath and toilet, and also a treatment room requiring occasionally bulky diagnostic and therapeutic equipment and highly technical professional services, and sometimes in a great hurry.

I am glad to offer these comments that occur to me on a quick examination of your article and a recollection of my recent visit to the full size mock-up of the minimal rooms in the offices of Designers Markus & Nocka:

1. The "minimal" measurements are perhaps too minimal. Some patients feel uncomfortable with walls so close to them.

2. The hanging closet space seems inadequate especially in winter with a heavy coat, suit or dress, bathrobe, and other items to be stored.

3. The space between the foot of the bed and the bath equipment cabinet is too narrow for circulation by nurses, maids and others. If the 9 ft. 3 in. dimension were increased, say to 10 ft., these few extra inches would correct this shortcoming and help in other ways. For example, orthopedists sometimes need more length in order to provide for Balkan

(Continued on page 66)

Modern Flooring Techniques:

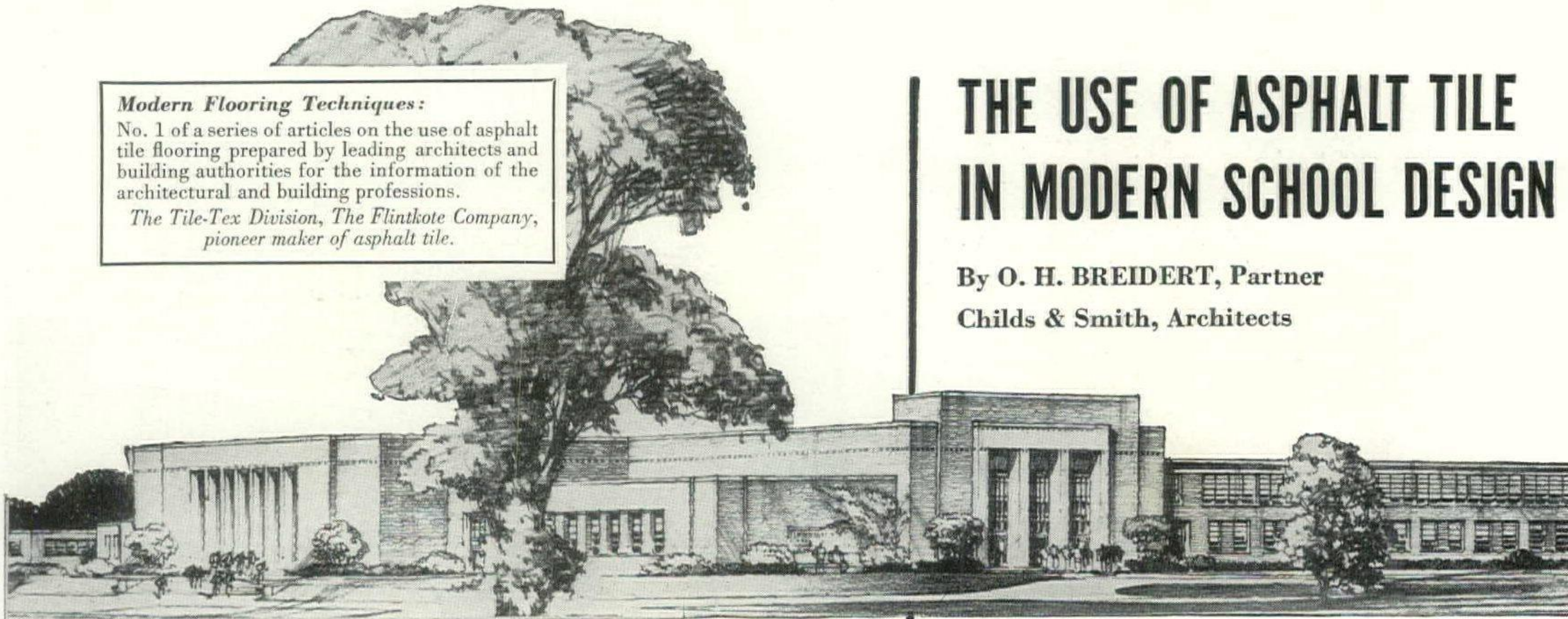
No. 1 of a series of articles on the use of asphalt tile flooring prepared by leading architects and building authorities for the information of the architectural and building professions.

The Tile-Tex Division, The Flintkote Company, pioneer maker of asphalt tile.

THE USE OF ASPHALT TILE IN MODERN SCHOOL DESIGN

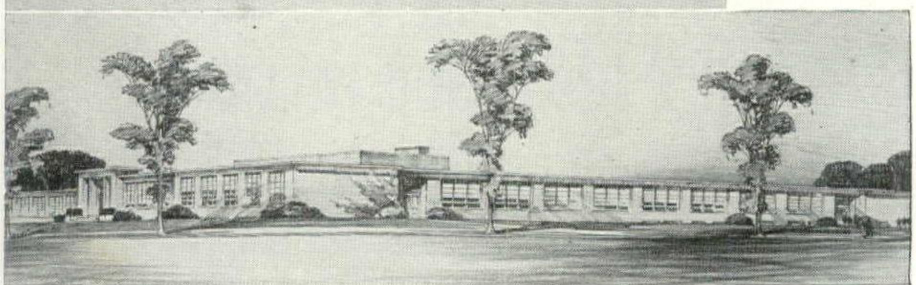
By O. H. BREIDERT, Partner

Childs & Smith, Architects

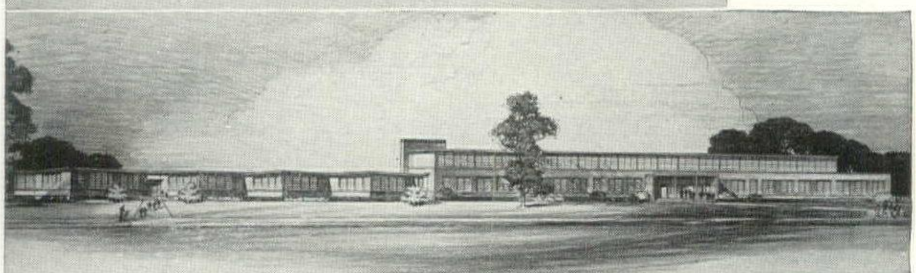


In a senior high school, as illustrated above, we find that asphalt tile floor covering and base is most practical and economical throughout *all* rooms and corridors, with the exception of the gymnasium, shower, locker and toilet rooms and industrial arts department.

Postwar school model. Asphalt tile to be used here in all except general toilet areas. Where community activities require constant use of the combination gymnasium-auditorium, an asphalt tile floor is recommended.



Our plans for a junior high school call for asphalt tile in all rooms and areas except the gymnasium and general toilet and locker rooms where ceramic or terrazzo floors will be specified.



In elementary buildings (kindergarten through sixth grade) asphalt tile can be used throughout all rooms with the exception of general toilet rooms, where ceramic or terrazzo floors are recommended.

In a continuous practice of architecture over a period of 35 years, we have found that a floor and base of asphalt tile is the most practical and economical type of floor covering for new educational buildings both from the standpoint of initial *and* maintenance costs.

Asphalt tile floors, if properly cleaned, waxed and buffed after installation, require a minimum amount of maintenance throughout the year to keep them clean and bright in appearance. Thorough cleaning and waxing by an efficient janitorial staff several times a year along with regular daily sweeping, will keep an asphalt tile floor in excellent condition for many years.

With the proper handling of design and color combinations, the architect may use asphalt tile to design school floors to fit any decorative requirement. Asphalt tile can be obtained in a variety of colors and sizes. This makes it possible to use simple designs employing one marbleized color throughout the classroom or more complex decorative design in entrance lobbies, foyers, corridors and special rooms.

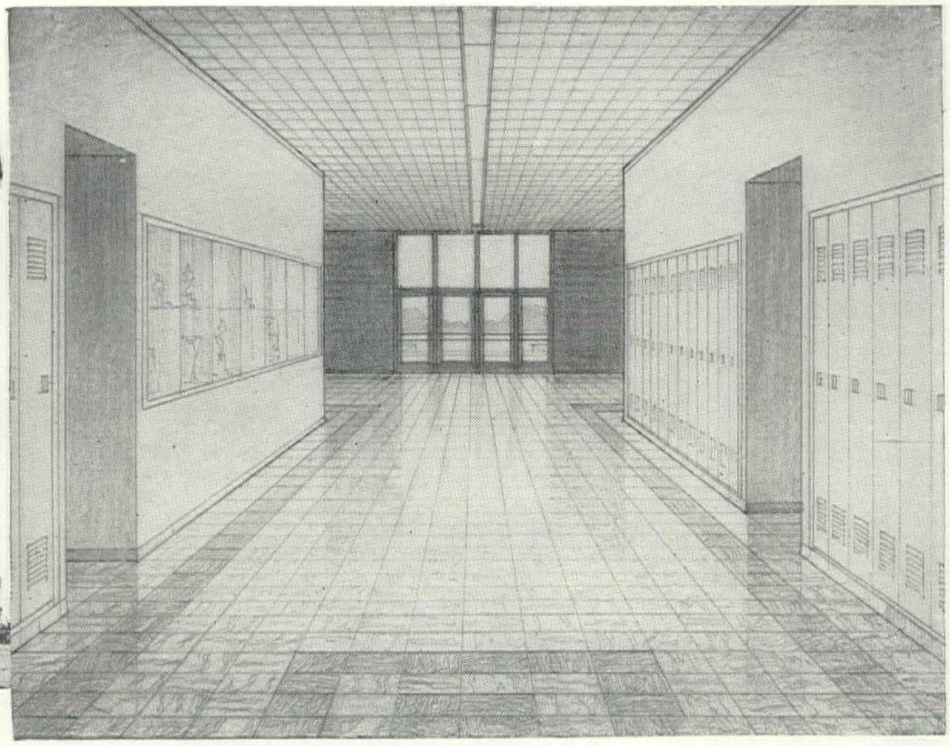
Asphalt tile is the only type of resilient flooring which can be installed safely over concrete sub-floors in direct contact with the earth. Its performance is not affected by normal moisture and dampness.

Recommended uses of Asphalt Tile in specific areas

Corridors • Asphalt tile is a most practical flooring for corridor and stair hall use because of its long wearing qualities. Attractive pattern and pleasing color combinations may be devised to add color and interest to these areas. Where corridors must necessarily be narrow, asphalt tile floors can be laid out to give the effect of greater width. Recommended, too, is the use of directional lines to indicate student traffic.

Classrooms • An asphalt tile floor laid over concrete and with a set-on base is ideal for all classrooms in elementary through junior college buildings. In the classroom sketched at right, light colored marbleized tile in 1/8 inch thickness in standard 9 x 9 or 12 x 12 inch sizes is indicated. Light colored asphalt tile provides needed light reflection and conforms to the modern trend in classroom color schemes, namely, natural colored furniture and light wall and ceiling decoration.

The architectural firm of Childs & Smith, Chicago, Illinois, has been in constant touch with problems of school design for 35 years. Its current school work consists, in part, of elementary, vocational, junior and senior high schools and junior colleges plus other special school buildings for these and other communities: Hinsdale, Ill., Shelbyville, Ill., Watseka, Ill. Wilmette, Ill., Kankakee, Ill., Flossmoor, Ill., Cedar Rapids Iowa, Clinton, Iowa and Wisconsin Rapids, Wis.,



A marbleized floor in one color is recommended because it doesn't distract pupils and is easiest to maintain.

Lunchroom, Cafeteria and Kitchen • A greaseproof 3/16 inch asphalt tile is advised for all food serving or dining areas. An interesting floor pattern is important because these, like all rooms under the modern school plan, should be designed for a dual function. The cafeteria dining area shown at right below can be converted quickly into a room for school parties and dancing. A properly treated asphalt tile floor is an excellent surface for dancing.

Kindergarten or Play Rooms • Asphalt tile floors have many advantages in elementary (kindergarten through sixth grade) schools, especially in play room areas where game and court lines are required. These lines can be set in a plain, light colored asphalt tile in a field of medium colored marbleized tile, thus eliminating constant repairing and repainting of the lines. Attractive floor designs are particularly important in modern educational programs for younger children.

Toilets and Lavatories • Asphalt tile is an excellent floor covering for small toilet rooms and lavatories in connection with kindergarten and lower grade rooms, toilets in administration and health departments and teachers' rest rooms. For large general toilet rooms, showers and locker rooms, ceramic tile, terrazzo, art marble or marble are more practical materials.

Renovating and Rehabilitation • In addition to new educational structures asphalt tile is being used in the rehabilitation of existing schools to reduce floor maintenance costs—to solve the problem of floor repair economically—to provide a more comfortable floor—and to change the purpose and character of specific rooms.

• • •

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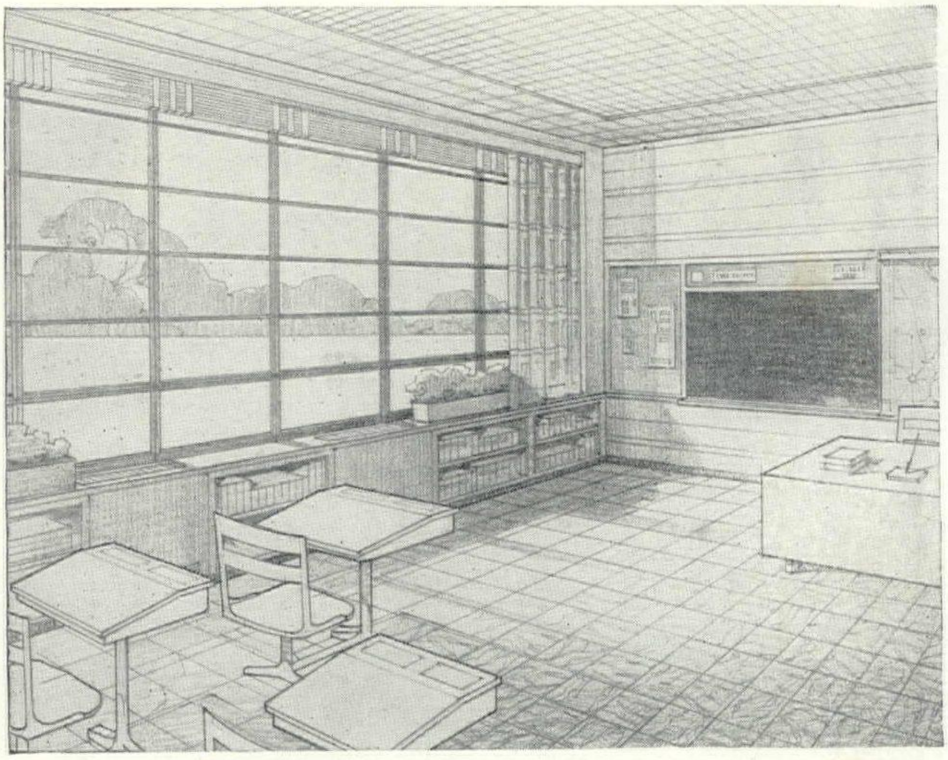

AND WALLS

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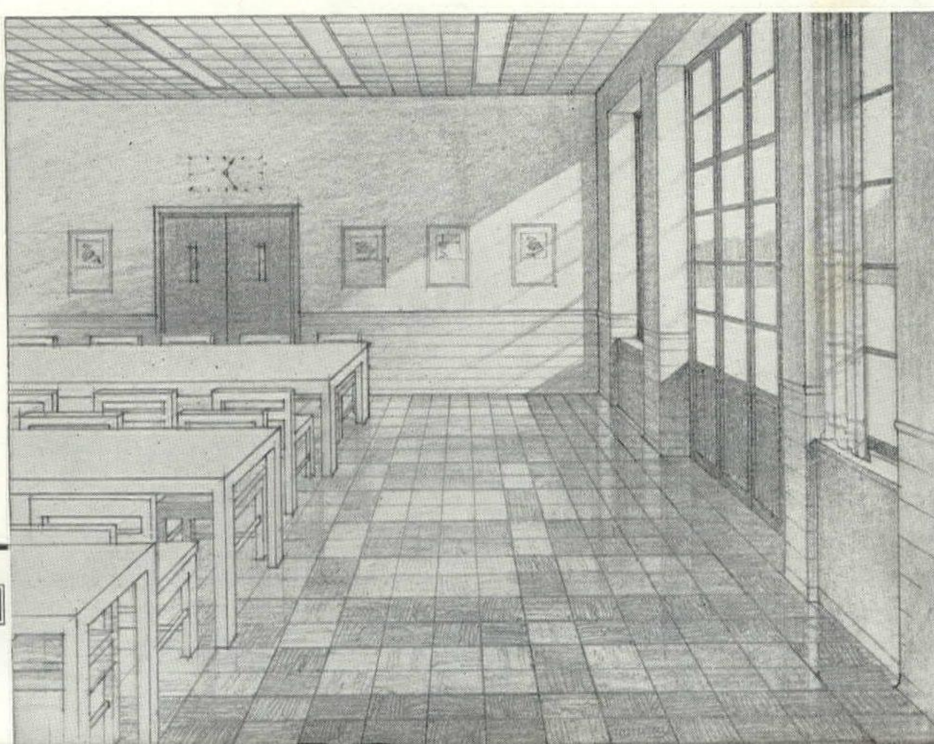


frames and other contraptions. Also the average height of the newer generations is greater and the proportion of six footers is increasing. Hospitals need more extra-length beds.

4. The utilities about the head of the bed are naturally close by for the patient's convenience, yet this can cut both ways and be an obstacle to nurses and doctors who may need to give service to the head and chest of the patient. To overcome this the bed must be moved, and here the extra width mentioned before would help.

5. The cleaning of the floor in this alcove will be awkward and more difficult because of the corners, and is likely to be skimped.

6. The jointly-used toilet is close to the heads of patients in the adjoining rooms. Its flushing noise can be disturbing to an acutely ill or sleeping patient in the next room. And the design of most wall hung toilets bring them too close to the floor for effective cleaning beneath.

7. The double-acting toilet door may not be found adequate in use, and the small space may handicap a nurse trying to help a feeble patient.

8. The complete dependence on mechanical ventilation is not without risk. I have seen mechanical ventilation fail too often to rely solely upon it. Although there are benefits in not having to worry about heat loss, drafts, window rattles, etc., it would seem the better part of wisdom to provide at least one window opening near the foot end of the bed. Some patients are unhappy without an open window, or its possibility.

9. I have used 2 in. solid plaster partitions before but not to separate patients in adjoining rooms. I wonder whether it provides enough acoustical insulation in case of a noisy patient on one side and an acutely ill or sleeping patient on the other.

10. The number of visitors who can be seated, particularly if the patient is ambulant and occuping one chair, is limited; but this may be an advantage.

On the other hand many features are intriguing. The provision of so many utilities within easy reach of the conscious patient is commendable. With the possible exception of the lavatory, this is now accomplished conventionally by other satisfactory means.

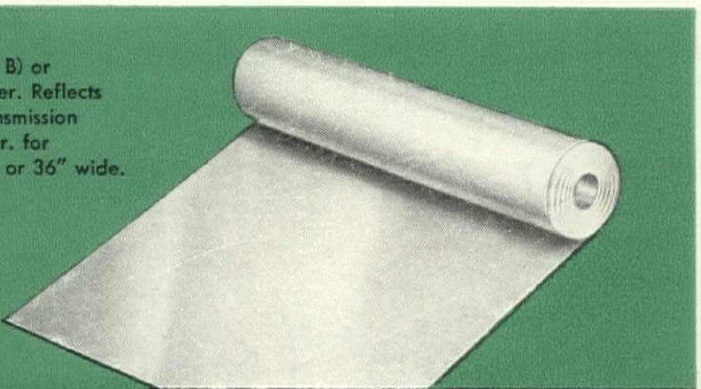
The wide window shelf adds a useful and convenient facility and the window pane on the outside line of the building adds room size without extra cost.

It will be interesting to observe the operation of the narrow 5 ft. corridor even with patients' rooms on only one side of it. Corridor space is generally the least costly space to build and maintain in a hospital, but if in this plan rooms were also built on the other side of the corridor, there would be the possibility of economy in the cost of a narrow building, probably 30 ft., permitting a span from wall to wall without interior columns. But this very narrowness of the building could be a disadvantage in later years if new needs and conditions should call for a change in the function of the building and the use of its interior for other hospital purposes.

The double doors of unequal size have been used before. We have used them at Mount Sinai under special conditions, and we have also used the angular offset doors in planning certain operating and X-ray rooms. But its use here for patients' rooms on a narrow corridor serves other purposes and suggests again certain corridor-passing practices in Pullman cars. Two-way traffic of wheeled equipment in this narrow corridor should be interesting in practice, but perhaps not troublesome in a short corridor with seven rooms on one side.

(Continued on page 70)

Reynolds Aluminum laminated to both sides (Type B) or one side (Type C) of tough kraft paper. Reflects up to 95% of radiant heat. Moisture vapor transmission practically nil (0.10 grains sq. ft. hr. for Type B). In rolls of 250 sq. ft., 25", 33" or 36" wide.



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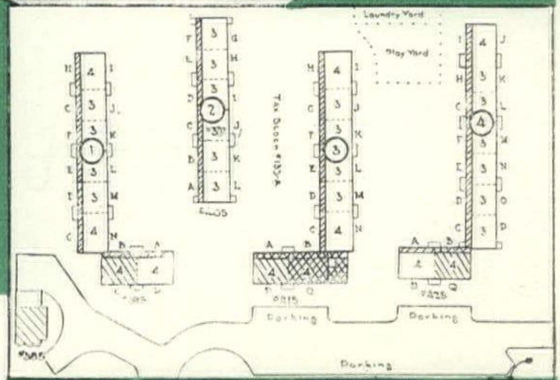

CRAWL SPACE: Between floor joists over unheated areas, shown unshaded in ground plan above, this is the only practical, economical insulation and vapor barrier. One layer of Type B meets FHA requirements in most areas. Approximate conductance coefficient 0.10. The accepted specification. (Above Garden Apartments, only a small part shown, insulated by The Fireproof Products Co., Inc., N. Y.)

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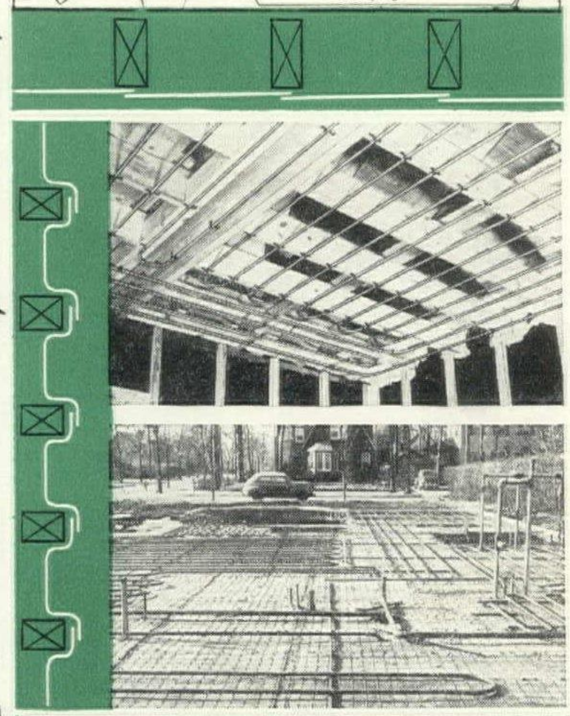
CEILINGS, RAFTERS: Two layers of Type B, with intervening air space, meets FHA requirements in most areas. Conductance 0.14. Single-faced Type C with blanket insulation laid above is a superior installation. Conductance 0.07. Single layer of Type B, while not sufficient for winter FHA standards in northern areas, is excellent to take off summer sun load.



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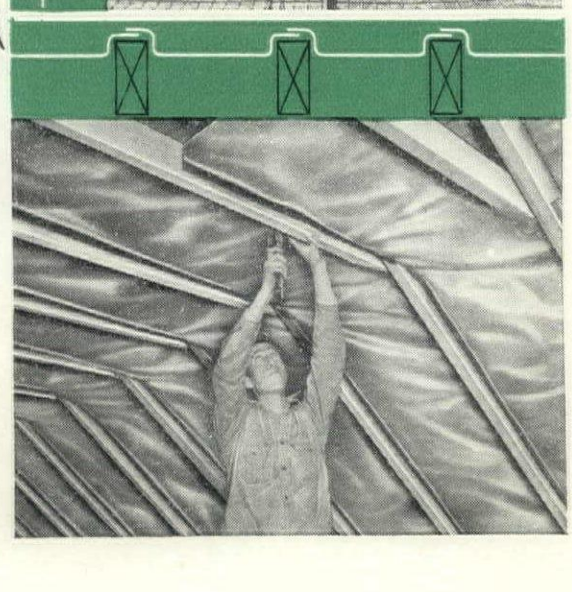

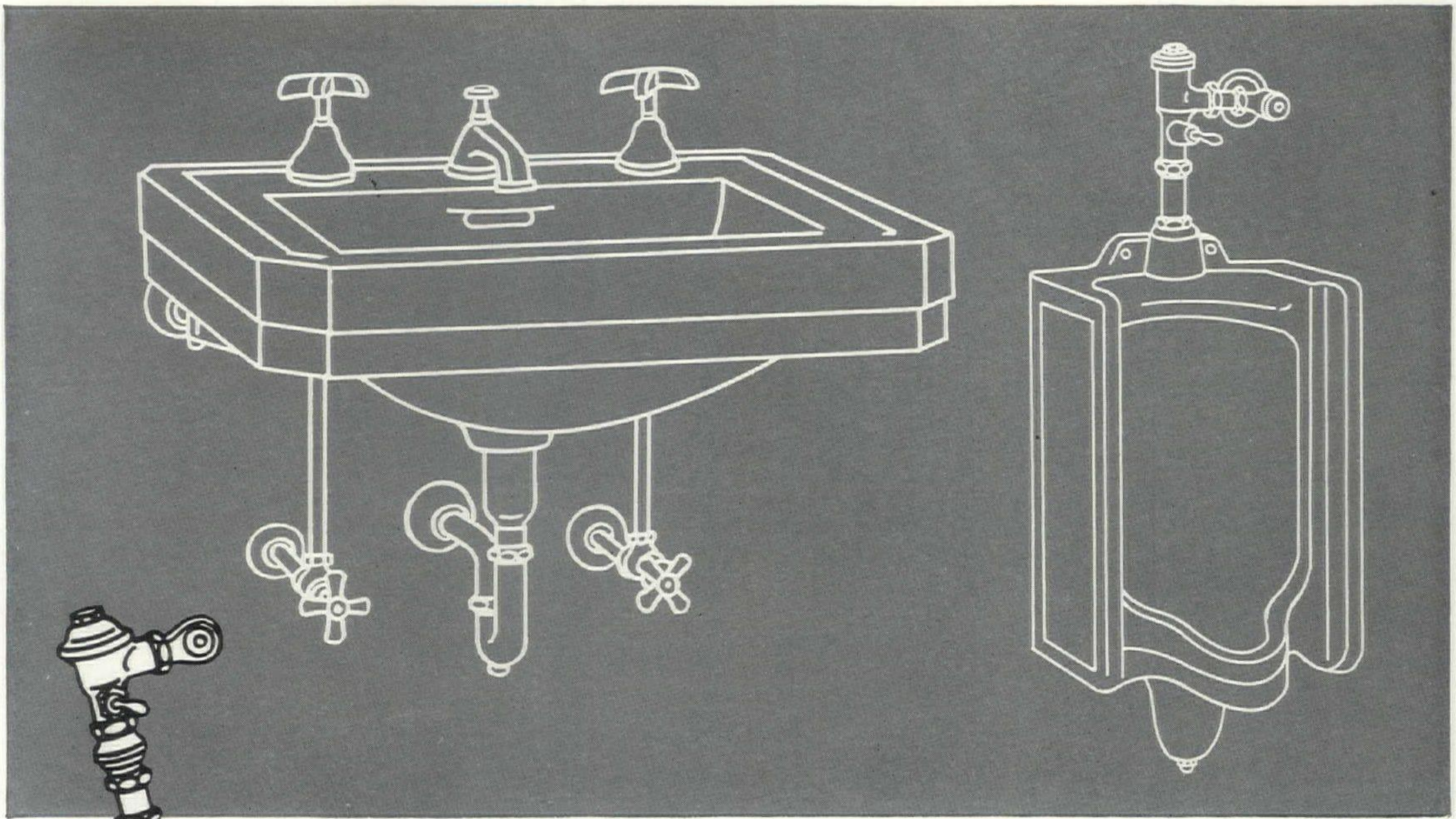

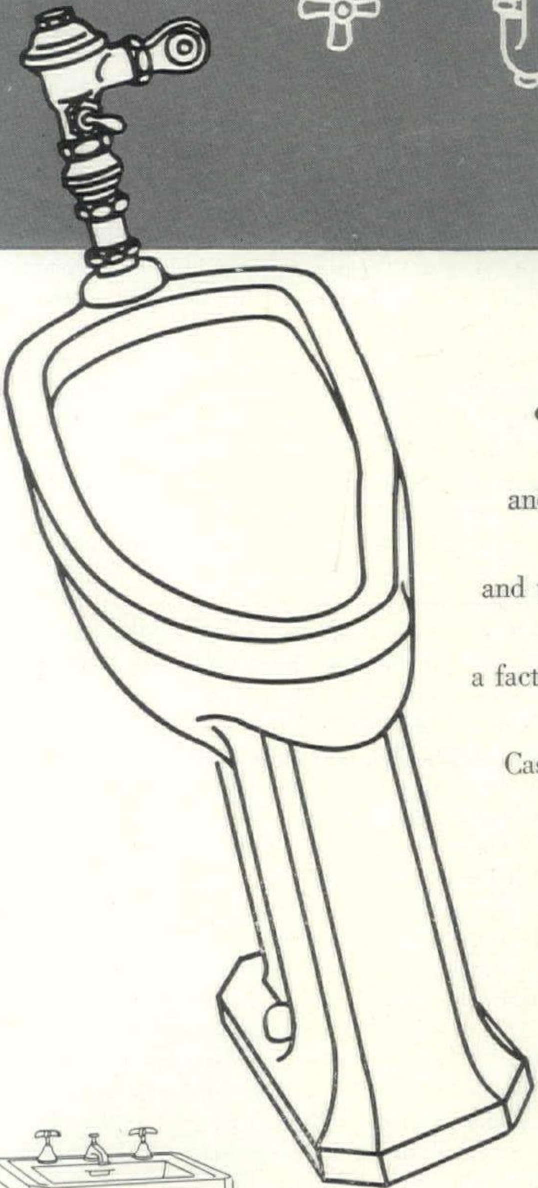

Its two-way use will probably be minimal and the angular door offsets will permit one of two passing persons with equipment moved into the offset in order to allow the other to pass.

The real test will be the experience of patients, doctors, and nurses with it and their acceptance of it under varying conditions of diagnosis and therapy.

Dr. Wilhelm and Messrs. Markus and Nocka deserve much credit for approaching this problem with free minds and willingness to make this experiment. It will be watched with interest by many.

JOSEPH TURNER, *M. D.*
Consultant to Board of Trustees
Mount Sinai Hospital
New York, N. Y.

Forum:

We thoroughly agree with Dr. Turner that the real test will be in actual usage. It might be added that all debateable issues have been checked with key personnel of Peter Bent Brigham Hospital representing all phases of plant operation, and their opinions have largely guided us in formulating decisions. Therefore, the following comments numbered in accordance with those in Dr. Turner's letter may clarify the design reasoning:

1. When conditions permit, we also believe a few inches added to the width of the room would be desirable. A 10 ft. center-to-center spacing of partitions would be our recommendation. This width also permits tying in with the trend in modular standardization.

2. The room has been designed for the average person who usually comes to the hospital wearing all the clothing to be closeted. Complete winter outfits, both male and female, including a bathrobe, have been hung without difficulty.

3. The increase in width referred to in Item No. 1 would provide more space at the foot of the bed.

4. The utilities problem was one of the most difficult, and we are working for further improvement.

5. Internal corners are a cleaning problem, yet the Minimal Room has no more than its conventional prototype.

6. The pipe shaft has been insulated for sound transmission and sound must pass two doors to the adjacent patient's room. We hope, therefore, to have made a slight gain over conventional design. The closeness of wall-hung water closets to the floor has been a vexing problem. We have gone so far as to design an entirely new type of water closet to eliminate this and certain other objections. However, there is little chance of it becoming available as a stock item.

7. The space, shape, and arrangement of the toilet, while limiting in some respects also was considered by nurses to have compensating features, as for example, easier body positioning by the tapered walls and convenient grab bars.

8. The complete dependence on mechanical ventilation was much debated. The issue evolved around low maintenance, possible mechanical failure, and patient desires. Actually the hazard of mechanical failure is no greater than in the generally accepted sealed buildings such as theaters, factories, office buildings, and stores.

9. The partitions between rooms are $2\frac{1}{2}$ in. thick which tests have shown to be equal in sound reduction to the usual 3 in. terra cotta or gypsum block plastered both sides.

10. No comment (regarding visitor seating capacity).

We greatly appreciate the sincere interest and criticism of Dr. Turner, and we look forward to his and other comments upon the room in actual usage.

PAUL NOCKA
Markus & Nocka, Architects
Boston, Mass.

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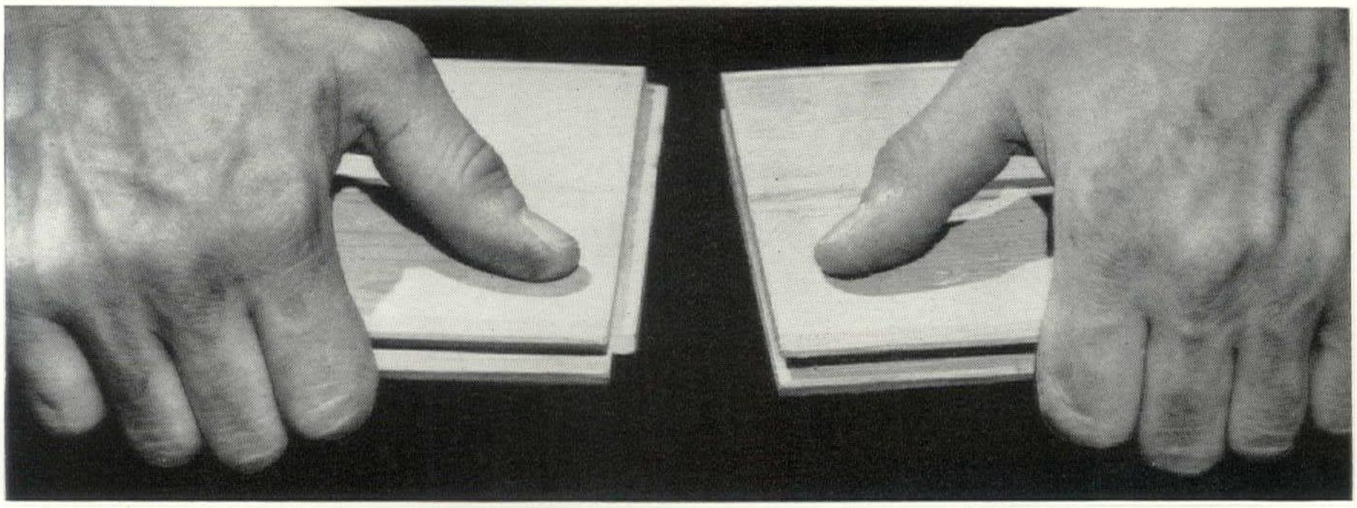

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LUMBER AND SERVICES

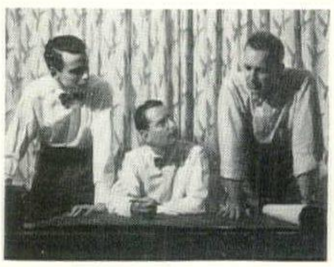
ERNEST J. KUMP and **MARK FALK** are partners in a distinguished San Francisco practice that has produced prize-winning designs for several schools, a city hall, (p. 104), an air lines terminal, and a naval ordnance building. Kump, *bon vivant* and architect par excellence, is a native Californian with architectural degrees from his state university and from Harvard's Graduate School of Design. Mark Falk is the structural engineer of the firm and a recognized authority on "lateral stresses."

SIDNEY F. BAMBERGER and **JOHN LYON REID** (photo) were partners for two years in a practice largely devoted to California public school work (p. 110) until Bamberger's untimely death last year at the age of 36. Bamberger, a civil engineer with a degree from Cal. Tech, had worked as structural engineer for Mark Falk, then Ernest J. Kump (see above). Reid is a Seattle-born architect with masters' degrees from the University of California and M.I.T. He spent eight years on the teaching staff of M.I.T., leaving with the rank of Associate Professor of Architecture.

Albany architect **HENRY L. BLATNER's** four-year old post-war practice (p. 115) is largely concentrated around the sleepy Hudson River Valley. Trained in architecture at the University of Pennsylvania and M.I.T., Blatner gave up a two-year old partnership in 1942 to become a naval lieutenant in the Special Devices Division. A civilian again, he established the present office in December 1945. Their credo: ". . . free evaluation of ideas for their intrinsic worth without regard for any period (particularly this one)."

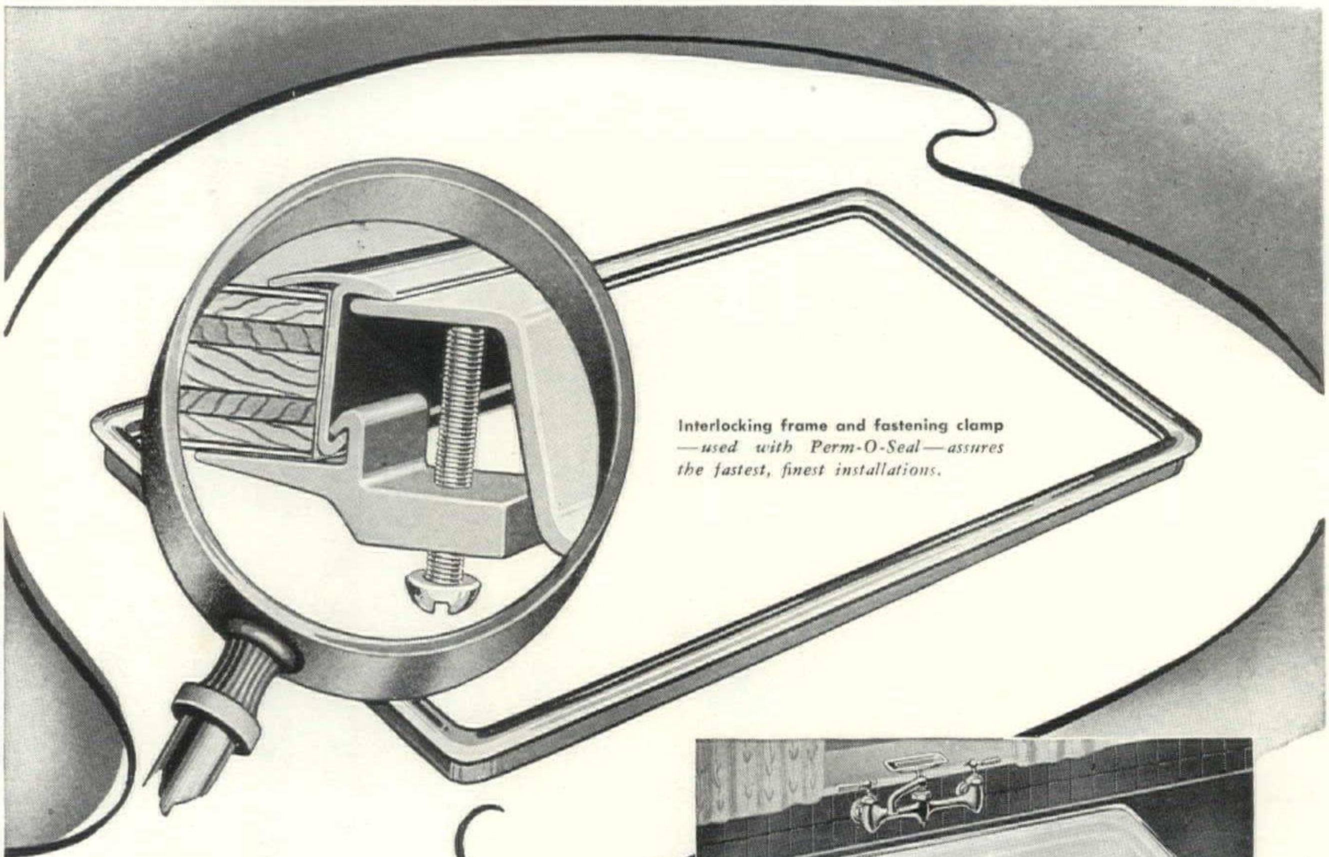
PERKINS & WILL, Chicago architects and engineers, have received a cool $38 million worth of school design (p. 118) commissions since World War II. The young organization (all four partners are barely past 40) has received national recognition for more than one of the 80 schools it has planned since **LAWRENCE B. PERKINS** and **PHILIP WILL, JR.** formed the firm in 1935. Managerial responsibilities are shared by these Cornell-trained architects with Mechanical Engineer **JOHN E. STARRETT,** for 19 years construction superintendent with Starrett Bros., Chicago, and Attorney **JOHN C. GOODALL,** banker and building manager for 17 years before he and Starrett joined the firm in 1946.

R. FRANKLIN OUTCALT and **CARL F. GUENTHER** are Cleveland architects with $2 million worth of schools currently rising from their drawing boards (p. 126). Outcalt was educated at the Art Academy of Cincinnati and the University of Michigan, has been practicing architecture in Cleveland since 1930, with Guenther since 1945. Guenther taught and studied architecture at Western Reserve University, was also trained at Fontainbleau and *L'Ecole des Beaux Arts,* holds the latter's 24th Paris Prize in Architecture.



The Toronto firm of **JOHN B. PARKIN ASSOCIATES,** though widely known for its schools (p. 128), has designed everything else from hospitals to gas ranges. Partner **JOHN BURNET PARKIN** (center) started his studies with a degree from the University of Toronto, continued them in England and on the Continent, pioneered in the design of modern, one-floor schools in Canada. His two partners, **EDMUND THORNTON PARKIN** (right) and **JOHN CRESSWELL PARKIN** (left), hold degrees from the Harvard Graduate School of Design.

EBERLE M. SMITH & ASSOCIATES is a 35-man Detroit design team headed by Smith and his four associates: Jonathan A. Taylor, Stewart S. Kissinger, Linn Smith and Arthur T. Bersey. Smith is a native Michigander, born and bred, educated (University of Michigan) and trained in his home state. Since 1935 he has directed his own architectural practice, first as Lyndon & Smith (1935-1940), now under his own name. He is a prominent Midwest school planner (129).



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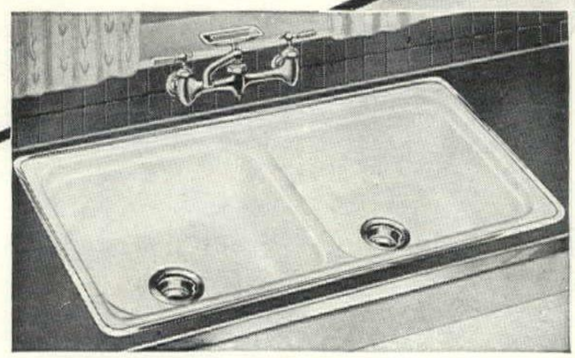

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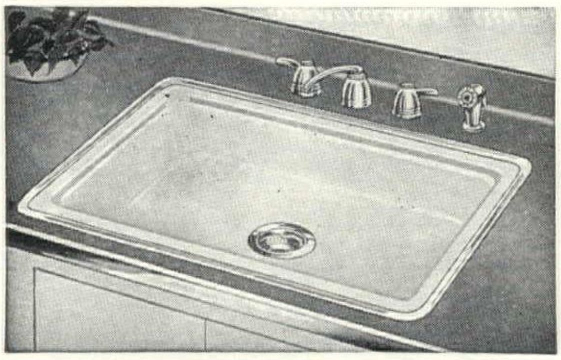

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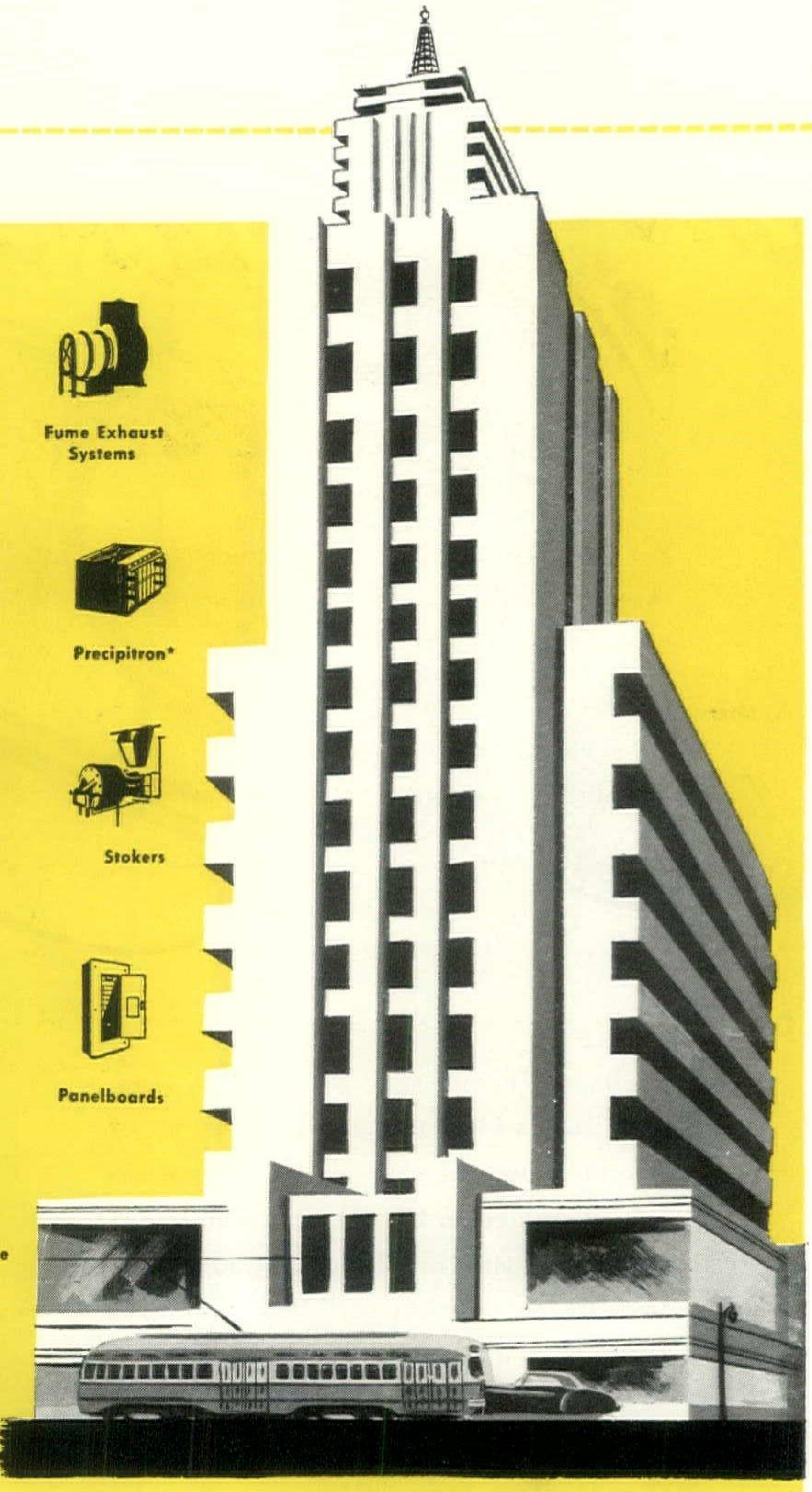

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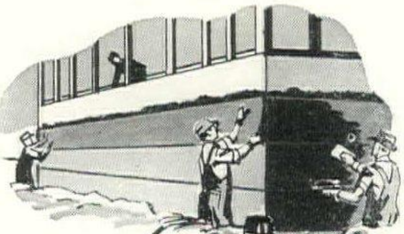

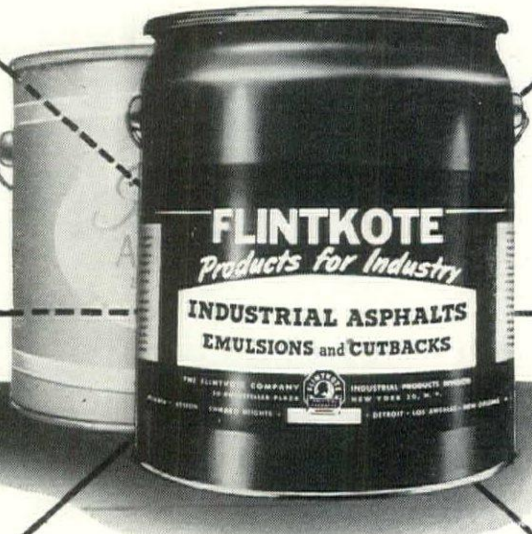

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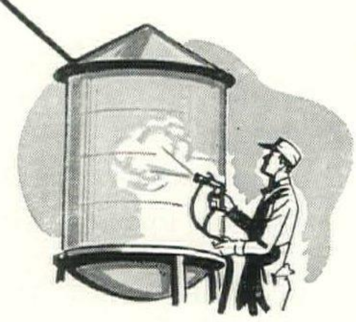

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Products for Industry

Children not tanks, planes or bombs—were the greatest output of the U. S. during World War II. These war babies, seven million of them, began hitting the first grade last year, have taxed every school facility, are giving school men, parents and taxpayers alike a major problem concerned with the future of America.

Ten billion dollars, so the experts believe, must be spent for new school construction during the next 11 years. Already, the increasing number of school children is being matched in many communities by increasing appropriations for school construction. But just matching increased funds to increased classes is not enough, for the construction dollar—like all other dollars—now buys less and less new school facilities. Further complicating the problem is the fact that school building standards have risen steeply during the past decade, outmoding the 1940 classroom. *The Need, page 82*

schools

This need bespeaks the spending of four times as much money as went into school buildings during the last 11 years. To assure full value for money spent, these billions of taxpayers' money must be stretched as far as possible through efficient school design and construction. Even for small communities, with undeveloped acreage available for school sites, this assignment is not easily accomplished. For large urban communities, where the problem is more critical, the solution is still more difficult. *Today's Schools, page 85*

The builders of these new schools must heed the research which the specialists have been quietly conducting during the past ten years—research on the basic elements required for better schools. It calls for long-range programming, building code revision, integration of architecture and engineering and, most important, modification of the shape, size and appointments of the basic classroom. *Toward Better Schools, page 94*

In the hands of competent architects, such research has already helped produce some excellent schools—case studies available today, pointing the way to even better schools tomorrow. Dotting the country from coast to coast, these pioneering schools demonstrate how communities may get economical buildings designed to promote the better education of their children. *Case Studies, page 103*

These schools, as must those of tomorrow, reflect the recent advances in the technique of building and equipping schools—the technical aspects of a school which promote construction economy, child health and educational efficiency: structure, heating, ventilating, lighting, acoustical control, visual-audio equipment and the integration of such special facilities as cafeterias and gymnasiums. *Technique, page 142*

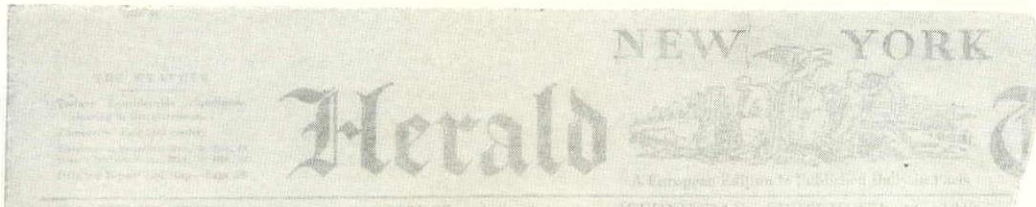
Such, in brief outline, is the school building problem faced by most every U. S. community and signalized by the recent formation of the National Citizens' Commission for the Public Schools. Such, too, is the outline of this month's FORUM which, at the suggestion of the Commission, is devoted exclusively to the school building problem. It is a reference manual of new school building ideas, designs, techniques, materials and equipment—a yardstick against which tomorrow's schools will be measured.

THE NEED —a war-boomed birth rate now demands an 11-year boom in school construction and

With its war babies coming of school age, the U. S. faces a thumping need for new schools. In the next eleven years, public school enrollments will jump one-third from today's 21 million to a high of 28 million in 1960. To handle this new enrollment and replace obsolete buildings, 400,000 new classrooms must be added to the million now in use. Cost of this 11-year program: ten billion dollars, or four times as much as has ever before been spent in a comparable period.

What is being done to meet these needs? Since the end of the war, school building has increased rapidly. In terms of money appropriated for school construction, the record is impressive. Appropriations have jumped from $111 million in 1946 to an estimated $500 million this year. However, a more realistic picture is presented when this increased expenditure is related to the amount of new school facilities being provided. As can be seen from the chart below, U. S. school boards are getting only a relatively small increase in space for the large amounts of money they are spending. The main reason for this, of course, is the inflated construction dollar. There is another significant if less obvious reason: schools built to 1949's higher standards are from 15 to 20 per cent more expensive than schools built 20 years ago, over and above the rise in construction costs. Education today is a more expensive commodity than ever before.

With an education dollar that will buy less, U. S. school officials must buy more schoolhouses, each with more expensive equipment in them than ever before. Although a running start has been made in getting a postwar program under way, it is not much more than a start. A program for 40,000 additional units per year to accommodate the increasing school enrollment means that the current production rate of 18,000 classrooms per year must be more than doubled in the next



NEW YORK Herald

Overcrowding Forces Queens Elementary Schools Into Staggered Sessions

2 Shifts, Shorter Hours Forced On 28 Queens Primary Schools

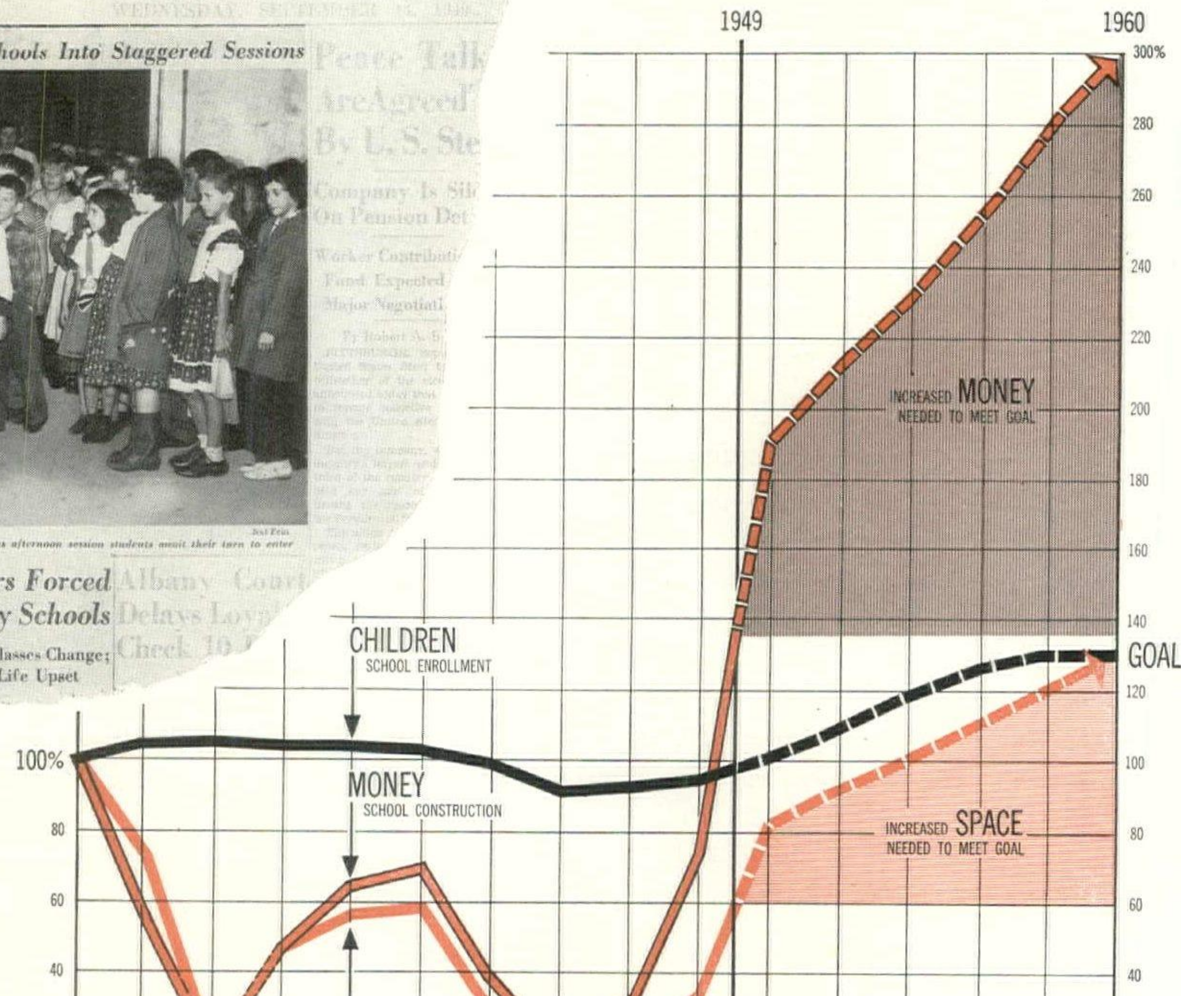
Overcrowding Brings 'Bedlam' as Classes Change; Working Parents and Family Life Upset

Court Holds Up Give-Away Ban In Radio Shows

Albany Court Delays Loy... Check 10 ...

Peace Talk Are Agreed By U. S. Ste...

Company Is Sil... On Pension De...



Already front page news, the need for new school space will become more acute as enrollment of children reaches its 28 million peak in 1958. Based on 1930, when the rate of construction was sufficient to maintain adequate school facilities, the chart dramatizes the increasing spread between the needed space and the needed money.

year and then sustained at this rate for ten full years. The result: a construction program that will build more classrooms in one decade than we have built in the last two. To finance this program, school boards must double this year's $500 million building budget to average about a billion a year.

More important, U. S. schools must get as much for their billion-a-year as they possibly can.

Most school boards are now scraping the bottom of the till to pay for schools already underway. To justify any more money they may appropriate, the present trend of getting less schoolroom space per dollar (as shown in the chart opposite) must be reversed. This means a long, hard look at the problem of lowering costs-per-classroom.

This is a big order. Certainly, it is a challenging one. And in view of the fact that the U. S. has never had to spend so much money to build so many school buildings in so short a time, these questions naturally arise: Who is going to fill the need? Where are the schools needed? What kind of schools are needed? And, finally, the $64 question: how will the needed buildings be financed?

Who is going to fill the need?

Some idea of the length and breadth of the problem is had merely by studying the question, who is going to direct the school building program? The answer is that the responsibility lies with the 103,000 independent school districts that make up the U. S. public education system. Typical of this sprawled-out system, which developed during the last century as a hedge against centralized government control of education, is the fact that 15,000 school districts have no schools of their own. So decentralized is the administrative set-up of most school districts that five states actually have more school board members than teachers.

School officials generally agree that adequate school building programs will be more difficult to carry out as a result of this administrative chaos. The plain fact is that the average U. S. school district is so small that it cannot draw upon enough economic resources to erect and support the school buildings it needs. Some states have tried to minimize this through consolidation of school districts. However, there are still over 75,000 one-room schoolhouses throughout the country, an indication that the U. S. education system is far from streamlined.

Where are the schools needed?

The school building needs of U. S. school districts are almost as varied as their number. They range from acute to normal to non-existent. The acute need is found principally in areas which have received large migrations of new families. These include particularly the suburbs of large towns, also districts located near new defense or industrial installations. Other areas, principally on the West Coast, have jumped in population because of migrations from other parts of the country. A less acute need is found in school districts where the population has remained relatively stable but where the birth rate has risen with the national average. In a few other areas, there is actually an over-supply of school housing because of an out-migration. This condition is uncommon, however, and is limited mainly to Mid-Western rural districts, which have lost families to the West Coast, and to near-by industrial areas.

Most school boards, on the other hand, report overcrowding now, even before the first heavy wave of the war-baby enrollment cycle has begun. A nation-wide survey of urban school systems by the National Education Association shows that city schools last year were filled 31 per cent beyond their rated capacity. NEA officials point out that the situation is equally bad or worse in most rural areas. Thus, in most school districts, there is no margin for safety as far as increased enrollments are concerned. The new enrollment cycle will merely compound a shortage that already exists.

In addition to providing schoolhousing facilities for the new enrollment, most school districts are also faced with the need for replacing many present school buildings. It is already evident that the replacement programs in most districts will receive short shrift during the enrollment crisis because of the acute need for all available facilities, no matter how old or outworn. This policy will be limited however by the sheer decrepitude of many of the older buildings which dot the American landscape. (In New Hampshire, half the school buildings are of Civil War vintage.) It is conservatively estimated that about 150,000 of the 400,000 classrooms needed in the next decade will be used to replace outworn facilities. This is 100,000 less than the 25,000-a-year normal replacement need. The net result of putting off the day of judgment for these older buildings is to build up a backlog of buildings to be replaced when the enrollment peak levels off after 1960. Meanwhile a lot of nineteenth century schoolhouses will be used during the 1950's for the education of atomic-age children, a job for which they are ill-adapted.

What kind of schools are needed?

During the past 20 years, the old rules of discipline and learning by rote have given way to educational ideas more in line with democratic living. With it has come a corresponding shift in the type of schoolbuilding required. The modern educator's revolt against regimented learning is reflected in an informal and flexible approach to school design. The new emphasis on learning by *doing* rather than by being told requires, among other things, more room in a classroom. Twenty years ago 16 sq. ft. per child was considered adequate. The present requirement is 30 sq. ft. In addition to more space, classrooms contain more equipment—work tables, individual libraries, wash-up sinks and other accessories. Administrators are now specifying as standard equipment for schools such items as medical and dental clinics, lunchrooms, even special classrooms for slow learners. These facilities were rare 20 years ago.

The size of the schools themselves is also undergoing significant change. Thirty years ago, many school officials were convinced that the large school was the most efficient educational unit. Their reaction against the small schoolhouse which had dominated the scene until that time resulted in the construction of a lot of big schools, many of which were conscious imitations—with some Gothic or Colonial trimmings—of factories. Since 1940, however, educators have had some second thoughts about the relation of bigness and efficiency as far as education is concerned.

From both an educational and an administrative view, the evidence had been accumulating that the most efficient educational unit is the medium-sized school. This can be defined as a school having at least one classroom, and no more than three, per grade. Pedagogically, this "child-sized" unit provides the best balance between the personal and communal needs of students. To the small child in the lower grades, it has the important effect of presenting a world that is big and full of variety but not overwhelming as it often seems in larger schools. From an administrative viewpoint, the medium-sized school supports enough students (usually between 200 and 800) to make practicable the installation of expensive teaching equipment which smaller schools cannot afford. Educators also find that the medium-sized unit is administratively more efficient than larger schools, especially with regard to such high fixed charges as school bus service, maintenance and supervision. The medium-sized school is also better-adapted to serve as a neighborhood center, a function that is being assigned more and more to school buildings.

Although school officials are generally convinced of the desirability of medium-sized schools, their thinking is not fully reflected in the boards of education which make the final decisions on new school building. Surveys indicate that construction of large schools will continue, although at a slower pace than heretofore. In its postwar building program New York City's Board of Education has labeled "impractical" any plans for elementary schools of less than 1,000-student capacity. Although many other school districts are equally unwilling to eliminate big schools from their programs, there will definitely be a decrease in the construction of very small schools. This is due largely to the success of school-district consolidation programs in lowering the number of small rural districts.

How will the needed buildings be financed?

It is one thing to plan for buildings and another to pay for them. The plain fact is that most school boards cannot afford the building programs they need, and, to make matters worse, those that need schools the most can least afford them. Most school districts still have to pay their own bills as far as school construction goes. Only nine states* actively assist local districts in paying school building costs. The other districts do their schoolhouse financing through local bond issues, with the limits of their bonded indebtedness set by state legislatures years ago when construction costs were considerably lower. With every subsequent increase in construction costs, the school district's construction potential has been decreased. Raising the bond limit, in most cases, would not bring much relief. Smaller districts—whose schoolhousing is often the worst—do not have the economic resources to make new bond issues attractive to banking and investment houses. This problem is particularly acute in the South which has one-third of the school-age population of the country but only one-eighth of its wealth. However, the problem is not limited to so-called "poor" areas. Even in states with high incomes, many school boards assert that they alone cannot fully finance their building needs.

These economic inequalities have resulted in severe educational inequalities throughout the nation for many years. The differences in the quality of education between states is so great that there is, in reality, no "typical American education." While some American children are getting a good education, most of them get only a fair education, and the rest get totally inadequate education. The average annual expenditure per U. S. school child ($178.71 in the school year 1947-48) covers up the enormous inequality between Mississippi's average ($66) and New York's ($250).

Although schoolhousing inequalities between states are most usually cited to show the extent of education inequality in America, there is an equally disturbing situation in the schoolhousing facilities *within* each state. Only in the nine states where schoolhousing costs are partially financed by the state is there any attempt to equalize the building needs between poor and rich districts. And, to date, these state programs have far from closed the gap between good and bad schools. In the South, the inequalities between districts is aggravated by further inequalities in each district between Negro and white schools.

Since the end of the war, school boards in all states have increased their budgets considerably, but two-thirds of them have failed to keep pace with the general inflationary rise. The result is that they now have less purchasing power per pupil than before the war. Another important factor is that less of the educational dollar is being devoted to new building than before the war.

Most school officials feel that the need for some sort of outside financial aid with provision for overall equalization of school facilities is urgent. Such a program could be directed, they point out, from only two sources—the states or the Federal government. Although state equalization programs are being pushed in some states, progress has been slow. As a result, most educational officials have plumped for the passage of a Federal aid bill for school construction such as the one now before the Senate. (For a full description of the bill see supplement, page 158. It should be noted that this school construction bill is separate and distinct from the Federal aid bill for general education which has recently been embroiled in religious controversy.) A $500 million annual Federal appropriation for schoolhouse construction, as has been proposed by Senator Hubert Humphreys (D. Minn.) would provide approximately 20,000 classrooms a year, roughly half the units needed each year for the next eleven years if our school housing needs are to be met.

With this review of the educational and administrative problems involved in a large scale school building program, the strategy for carrying out such a program is put into clear perspective. It is obvious that there can be no snap solution to such a complex need. Securing enough money for the school building program is dependent largely on the development of a realistic formula, whether by the Federal or state governments, for assuming overall responsibility in closing the gap between the limited financing ability of local school districts and their needs. Getting more classroom space for this money is a problem to be solved jointly by school administrators, architects and builders. The way is pointed on the pages which follow.

* Ala., Calif., Del., Fla., Md., Mass., Miss., Tenn., Wash.

Life: Alfred Eisenstaedt

Barbara Morgan

TODAY'S SCHOOLS—the bigger the city, the tougher the problem

A comparison of school building in New York City and little Clarksville proves that the big city has much to learn from its pioneering country cousins—including more enlightened politics, the use of competent architects, even one-story schools in mid-Manhattan.

Only yesterday many a rural U. S. family tried to scrape together enough money to take the kids out of the little red schoolhouse and send them to the big new school in the city. Nowadays the very reverse is true. As prosperous taxpayers have fled to the suburbs, as the consolidated school system has spread up and down the land and the state education departments have spread the gospel of progressive education, the little red schoolhouse has all but disappeared. In its place stands a commodious and simple building whose exterior will probably speak both of considerable research in daylighting and of considerable effort to welcome the children who use it. This building will much more likely have cinder block walls than marble pilasters. The floors will more likely be asphalt tile than terrazzo. The desks won't be fixed to the floor, but easy to move around for reading circles and story corners. There will probably be window seats where a child can curl a foot under him as he reads. There will be doors that open out of classrooms into play yards and class gardens—and color, color, color everywhere.

Back in the urban wilderness, whence the families of these more fortunate children have fled, the school picture is a very different one. It is a picture of crumbling plaster and naked electric bulbs, of stinking toilets and leaking roofs—relieved here and there by the great shining masses of limestone and steel which represent the current building program. It is a picture in which every aspect of the crisis of cities comes sharply into focus.

Thanks to the racket the school men have been making, almost everybody knows by now that the great postwar increase in school enrollment has found most cities with an obsolete and totally inadequate school plant. But not even the school men themselves know that, in the great majority of city neighborhoods, not one new school building worth its cost has been built in the last decade. It is a sad—and little recognized—fact that the pitifully inadequate supply of taxpayer's dollars is, in most big U. S. cities, being spent for the wrong kind of schools.

Nowhere did all this show more plainly than in the world's richest city. In New York, where the cost of public school operation ($252 million last year) is the city's biggest financial load, there are less classrooms, teachers and books per pupil than in most other communities in the state. New York City already has 900 school buildings valued at $600 million to take care of its 850,000 school children—but one-third of these are at least 50 years old, 280 not fire-safe, and 250 lack adequate plumbing. New York is building new schools as fast as it can get its hands on the money (since the war $120 million has been appropriated for new building and modernization)—but 28 elementary schools in that mushrooming suburban borough, Queens, were this year running double sessions. New York is building schools at the rate of 13 a year. But to keep pace with the 215,000 additional enrollment expected by 1954 it should be building schools twice as fast.

Big city school problems

Back of the frantic pace at which New York is putting up its giant new school buildings, looms a disturbing question. How permanent would the school need be in these new communities now pressing urgently at the school door? Would the peak enrollment due in 1954 last for the 50 year life expectancy of the costly new schools now being built? Or would school enrollment recede sharply as families and housing matured?

The question of school need is nowadays shaped by a new factor. This is the dramatic change in the tempo of residential building over the last decade. It used to take 30 years to build a new neighborhood—plenty of time to figure out where to put a new school and how big to build it. But now, at New York's suburban rim, the big merchant housebuilders are creating whole new communities overnight. These attract families of a startingly uniform age. As their young children grow up, school need is acute and instantaneous. At the blighted heart of the city, housebuilding is proceeding with the same giant steps. In Manhattan, a borough which has seen relatively little new residential building since the turn of the century, Metropolitan Life within three years created housing for more than 12,000 families. In the same period, public projects provided housing for another 6,000.

What happens when these big building wallops hit a neighborhood is plain in Manhattan's lower East Side. When Metropolitan Life went in after the war to clear slums and build Stuyvesant Town and Peter Cooper Village, this was an area of boarded up tenements and vacant school rooms. Rapid transit had long since carried everybody who could afford it out to the Bronx and Queens. Now these decrepit classrooms are packed with children once more—many of them from middle-income families. In October 1948 the district's ten school buildings had an enrollment of 3,589 children. By 1954 there will be 11,731 children. The Board of Education figures that five new schools and one replacement must be built.

The cyclical school need

As the Board rushed its plans to build the $11 million worth of schools it thinks are required in the Stuyvesant district, board member James Marshall raised the big question of how permanent this acute need would be. Although Marshall's question was backed up by a precise and thorough study called *Impact of the Increased Birth Rate on New York Public Schools,* it has so far had little noticeable effect on Board of Education programming.

Mr. Marshall, whose service on the Board dates back to LaGuardia and Fusion, is a lawyer of both independent means and an independent turn of mind. His recognition of the cyclical nature of school need is not the first of his activities to discomfit the Board—an earnest body innocent of the more sordid aspects of Tammany Hall politics but almost equally innocent of a capacity for original thought. Marshall's study simply pointed out that children, after all, grow up and that the need for schools in a given neighborhood recedes as they do so. Metropolitan Life's 12,000-family Parkchester development, which presented the Board with its first acute prewar school problem, seems to bear this out. Parkchester families have not—as some believed they would —moved out as they aged to be replaced by other families with young children. While the New York City birth rate as a whole has risen spectacularly since 1942, the birth rate in Parkchester—once called Storkchester—has declined.

Marshall researchers figured that peak school enrollment occurs some 10 to 12 years after a big housing development is finished. By another 10 years, school enrollment is likely to be down one-third to one-half. Marshall also pointed out another useful fact which had previously escaped attention: the ratio of school enrollment to population is not constant over the whole city, but varies markedly from neighborhood to neighborhood, even from one housing development to another.

The only member of the Board noticeably impressed by the Marshall studies was Anthony Campagna, who at that time was chairman of the building committee. Campagna, also appointed by the late Mayor LaGuardia, is a well-known builder whose 40 years of work in the city is visible in imposing rows of Park and Fifth Avenue apartment buildings. A man with great reverence for the taxpayer's dollar. Campagna immediately devised a scheme for demountable and auxiliary schools, the latter to serve as temporary extensions of existing buildings. Campagna recalls that he even got assurance from the Building Commissioner that a code exception would be made to permit these one-story buildings to be of wood frame construction. He figured they would last for 20 years and cost one-third what the city was paying for permanent buildings.

The very words "temporary" and "demountable" raised hackles on the ancient educators of the Board of Education staff, while the politicians immediately recognized that this kind of thing would be less appealing as a backdrop for the ground-breaking ceremony. Campagna's proposal got nowhere, and last spring, after, five years in which he had given more than half his time to the school building job ("New York gave a lot to me—I was glad to give something back"), he was unceremoniously dropped from the school board. The new building chairman is an automobile dealer.

The reason why Campagna was dropped from the board in the middle of a job for which he had demonstrated unusual competence is part of the reason why New York City is not getting better schools for its money. This is the familiar dilemma of democracy, visible in its most exaggerated form in the million faces of the big cities. The New York Board of Education's chief function is not, as we still wishfully like to pretend, public service but politics. Campagna's mistake was not to recognize this.

Politics vs. public service

To say that the Board is a political body is not to imply that there is anything dishonest in its administration of the vast school operating and capital budgets. Although some Republican at Albany occasionally shouts for an investigation of its expenditures, the Board is generally acknowledged to be above reproach as far as the gross graft of money is concerned. There is only graft in its respectable form: the traffic in votes for which patronage is currency. In New York, the contest for votes has its roots in that much greater contest—at once the terror and pride of America—between the national, racial, religious and economic groups who together have built the power and wealth of the city.

Thus there is no whisper that the Board of Education has ever been susceptible in recent years to anybody who wanted to make a buck out of a site chosen for school location, but it is generally recognized that the Board is acutely susceptible to the pressure of the various national and religious groups in its decisions on school location. Few voters see anything wrong with this; they are merely preoccupied with seeing that the particular group to which they belong gets its innings, too. Thus it is generally understood that Mayor O'Dwyer dropped Campagna in order to take decisive control of the school board; it is less generally known that the number of teachers transferred under the O'Dwyer administration reaches thousands—but neither of these facts is likely to cut down the O'Dwyer vote.

Since most Board members have enough to do watchdogging the interests of whatever special group they have been picked to represent, it is not surprising that many activities which might bring considerable benefit to the taxpayers as a whole go by on the fly. Example: the matter of site acquisition. The Marshall report pointed out that large scale house building also means that scattered vacant lots are not left lying around. By the time the Board gets around to looking for a school site to serve the new housing, the vacant or lower-priced land is all gone and property—sometimes expensive—has to be demolished to provide the site. They are still looking for a place in the Stuyvesant Town district to put a badly needed elementary school replacement, P. S. 19, a 1,200 pupil, $3 million job announced in 1947. The two sites now under consideration are ten blocks away from Stuyvesant Town which means that elementary school children will have to cross streets whose traffic hazard has been increased by the development's 8,500 automobiles. Both sites are crowded with occupied residential property, constituting an eviction problem that may delay building for years. Cost would average $8 a sq. ft. as compared with the $5 per sq. ft. Metropolitan Life paid for its Stuyvesant Town land.

Fortunately this mistake was not repeated in the Fresh Meadows project, where New York Life did set land aside for a school. But the Board itself is still far behind in its land buying job. For the 161 new buildings (not additions) listed on the 1950-1955 building program, the Board now owns 16 sites. This can be contrasted with the situation for San Francisco, where urban land values are also high, which now owns enough sites to last for the next 20 years of school building.

Big city bureaucracy

The nine-man Board of Education is not, of course, the only participant in the bankruptcy of the new school building program. Under the general supervision of the Board is the Division of Housing, composed of professional school men, and under it the Construction Bureau, composed of staff architects and draftsmen. The Division of Housing's job is to say what kind of buildings they need, and the Construction Bureau's job is to give it to them. Since the Construction Bureau is the sole master of the skills which get the plans down on paper and the buildings up, the Division of Housing is often in the helpless position of an elderly teacher who has broken her spectacles. Above Board, Bureau, and Division alike is the inexorable city Budget Bureau, whose notions of planning economy are executed with an axe. These notions vary from year to year—the former Budget Director thought evening facilities for community use unnecessary; the present Budget Director is against auditoriums and gymnasiums.

Division of Housing staff members talk a great deal about "relation of the school to the community." But in the Bureau of Construction there is a tendency to feel that this means if the buildings adjacent to the site are brick, the new school should be brick, too. An architect who was once employed by the Bureau recalls: "When a program for a new school came through, we used to riffle through the drawers, find something that looked suitable, and accomplish the tremendous design job of changing the numbers on the old plan."

For a while, the commissioning of private architects to do school planning threatened to interrupt the peaceful atmosphere of the Construction Bureau. But by now almost everybody involved (including the architects, some of whom lost thousands of dollars on their contracts) has been convinced that this whole affair was a disastrous mistake.

In the last years of the war, with the aid of federal planning dollars, the Board of Education contracted with some 24 architects for plans for postwar schools. Of the 50 schools built or now under construction, not more than 8 are from plans prepared under these contracts. In all other cases, plans were prepared by the Construction Bureau.

Architects: too expensive, or cheaper?

The official account of this debacle is that the plans prepared by the private architects proved too expensive at high postwar building costs. But not one of the architects whose plans have been shelved was invited to trim down or adapt his plans to the reduced space and other requirements which were approved by the Board to meet the cost situation.

The architects themselves believe that the functional design introduced in their work frightened both the Construction Bureau and the contractors who bid on school work. These contractors, the architects say, are not the ones most likely to be at home with new construction methods. In spite of the Division of Housing's avowed intention of "recruiting as much new competition as possible," the same names appear over and over again on the bidding lists. Few of the city's leading contracting firms have ever appeared there. Contractors who do not bid on school work point out that no surety bond is required—only the posting of a certified check amounting to 2 per cent of bid—and believe this tends to attract inadequately organized firms.

The official view of retaining private architects is that this is no longer necessary since the Bureau of Construction is now adequately staffed to take care of all planning. Says Campagna: "The use of private architects is the only way to take advantage of the new ideas in school design. This would be cheaper in the end."

The cost of planning by the Construction Bureau has run as high as 18 per cent in some cases, according to N. L. Engelhardt, who retired in 1948 after five years as Associate Superintendent in charge of the Division of Housing. "The Bureau has never been required to account for its operating budget," he said.

The Construction Bureau seems to like its buildings to look nice, and relies heavily on the monumental facade, with an occasional cupola thrown in. It is also fond of marble and limestone. In an economy drive after the war, Campagna reduced average expenditure for limestone per school from $140,000 to $45,000. He also minimized the use of marble, eliminated plaster on concrete columns, and made similar cost reductions on a total of 81 items, saving an estimated $5 million on the current building program. There is no record that any of these suggestions came from the Construction Bureau, although this is the kind of service to client ordinarily performed by the architect.

Higher standards—not higher schools

Engelhardt, who joined the Board of Education staff after 25 years as professor in Columbia University's Teachers College, seems to have been responsible in his day for what progressive practices have been introduced in New York City school building, although these progressive steps will seem small to many architects. He managed to get a sink, work bench and library corner built in every elementary classroom, and a playroom in every elementary school. He also got

Damora

toilets placed on each floor (they had previously been massed so that small children sometimes had to go three floors to the toilet). During his term, the official standard of classroom size was increased from 644 sq. ft. to 805 sq. ft., though lack of funds prevented execution at the full larger size.

Like practically all educators, Engelhardt believes that to put 1,000 small children into a single giant elementary school is a pretty dreadful thing to do. He introduced what he called the Home School Unit, a building intended to house not more than 300 children and to have a more domestic appearance. Although the Construction Bureau prepared a plan for this type of unit and proposed modification of standard construction to the extent of lightening the steel frame and using a slab foundation, this progressive proposal, which was strongly backed by Campagna, met the fate of other new ideas. Only one such unit is even "tentatively" scheduled for 1950.

Meanwhile, New York is putting millions of dollars into 1,000-pupil elementary schools — many of them in areas where the Marshall report raises serious doubt as to permanancy of need. They are all built to last at least 50 years, but they show scarcely a trace of the design revolution of the last two decades. The new research in daylighting—even in suburban schools where it would be particularly feasible—has been virtually ignored, as has the one-story plan, the modular design and the notion that a school building should be inviting to the children who will use it.

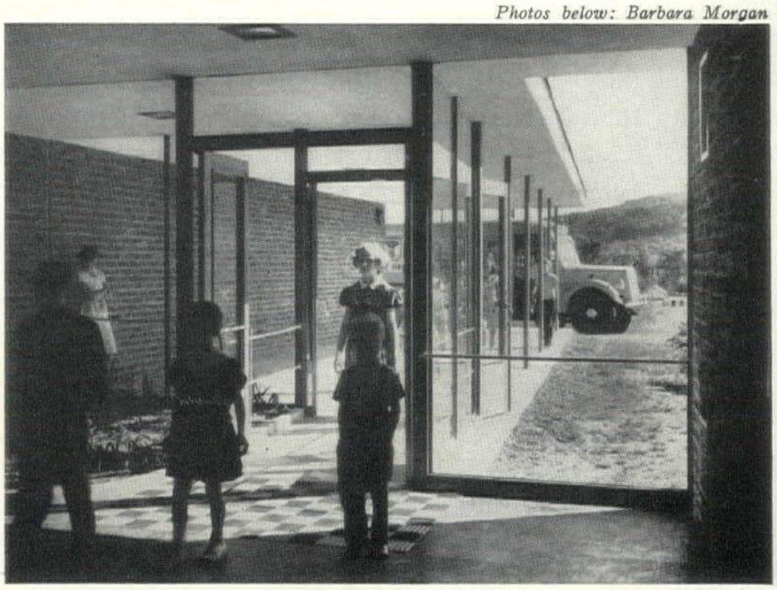
"... a school yard that stretched away for 14 acres."

Photos below: Barbara Morgan

In Clarksville: a different story

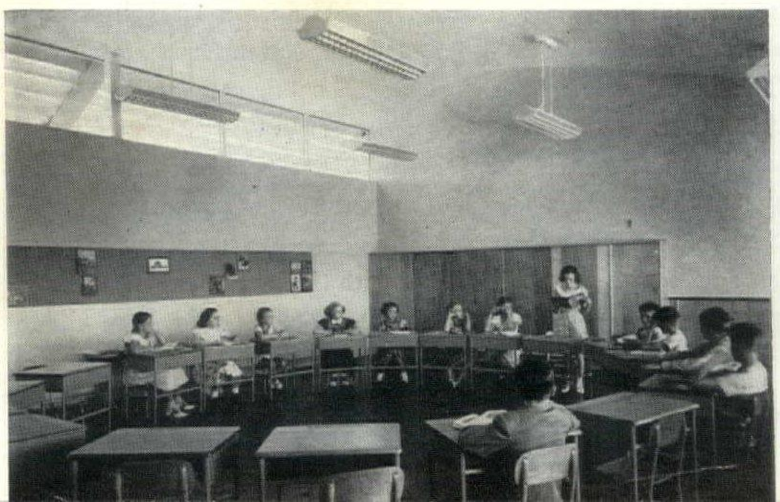
Some 150 miles away from the blare and the smoke and the whizzing automobiles of New York City, 180 more fortunate children found a new building when they went back to school this fall. When they got out of the school bus under a sheltered entry, they saw a long, low building whose big windows and red brick walls looked nothing like any school building they had ever seen before. Yet there was nothing about its simple lines and plentiful colors to intimidate even a kindergartener. Inside, the first graders would find their room by the red door, the second graders by the blue door, the third graders by the green door, etc. Most of them had never seen anything like the green glass chalk boards —or school rooms painted in yellow, coral, light green. Seated at their desks, they could easily see out the big north windows, because the wide window sills had been pulled down to their size. And at "recess" they could open the door of their classroom and step out into a school yard that stretched away for 14 acres. One first grader paid the architect what may well be his greatest tribute: "It's almost nicer than home."

This $210,000 building for kindergarten through sixth grade replaces five one-room country schoolhouses — the kind where toilets were outdoors and water had to be carried. It is the pride of centralized school district No. 6 outside Albany, New York—a district where farm holdings dating



"... out of the school bus under a sheltered entry."

"... it's almost nicer than home."



back to pre-Revolutionary times elbow the trim suburban towns of Elsmere, Clarksville, Delmar. It is the happy result of the coincidence of intense public interest, a progressive and open-minded school board, and a first-rate architect.

The school board of District No. 6 is an elected group of five men, all of whom work in Albany and drive back to suburban homes every night. The president is a leading Albany lawyer; other members are a heating engineer, a telephone company executive, a state employee and a banker. Heating engineer George Teeling lives in the rural section which the new elementary school serves. As soon as the Board decided it was time to ask the voters to approve a bond issue to build this school, engineer Teeling started selling them on a modern, functional plan. He had worked on several jobs with architect Henry Blatner, also a resident of the school district, and he proposed that the Board ask Blatner to come to a meeting and explain the benefits of functional design.

The Board wasn't hard to sell. "We wanted an up-to-date building," president John E. Glenn said, "just the same as we'd buy an up-to-date car instead of a 1930 model. We learned a lot of things—why they put up chicken windows and call them clerestories, what louvers are for, why architects go to all this extravagance called bilateral daylighting instead of using artificial light. It all made sense."

A new school is sold to the voters

It made sense to the voters, too. Remembering how a bond issue for new building had been licked by one vote in 1938, the schoolmen put on a professional advertising campaign—posters, throwaways, radio time—to sell the new school. Blatner's functional plan was the heart of the campaign. At the request of the Board, he toured the district with a sheaf of plans and charts. The voters were invited to firehouse and lodge hall meetings—in groups carefully kept small enough so that everybody had a chance to ask questions. Blatner explained how the new methods of bilateral lighting mean that the child seated on the inside of the classroom would have as much light on his desk and no more eye strain than the child by the window. He told them how planning for use pays more dividends than planning merely for looks.

School Board members campaigned night and day for the new building, nailed their fellow citizens in bars to point out that—"You'll drink away tonight what the new schools will cost you a year." (This argument had impressive statistical backing: As a nation, we spend 1.5 per cent of our income on public schools; 6 per cent for liquor and tobacco.)

School District No. 6 is entirely composed of farm and residential property. There are no large industrial or commercial real estate holdings to help bear the cost of schools. The bond issue meant a rise in the tax rate of $2.30 per $1,000. Since the average assessment in this district of small suburban homes is $4,000-4,500, the new school building meant that the taxpayer had to dig into his pockets for about $10 more a year. The bond issue—which skillfully linked an addition to a village school with the new rural building—passed by a large majority. "The voters," said John Glenn "were convinced that they were getting their money's worth."

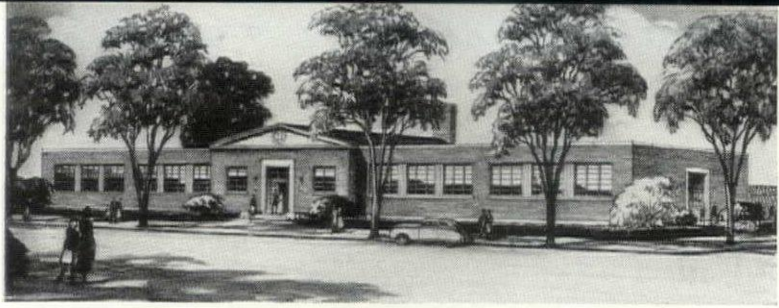
Some of the voters had wanted to enlarge an existing elementary school in one of the villages and transport children by bus from the rural Clarksville section. This met with stiff resistance from the district's progressive Supervising Principal, Hamilton Bookhout. "We are sold on the small community school for small children," Bookhout said. "It means more interest on the part of parents, and it makes it much easier for the parent to participate in school affairs. You have to have an understanding of the home and parent if you're going to teach the child." The new school functions as a real center for this rural-suburban community. As in all modern schools, the auditoriun and kitchen facilities are located for independent use in after-school hours by such groups as the Home Bureau, the American Legion Auxiliary, the Scouts and the 4-H clubs. (For further details, see p. 115.)

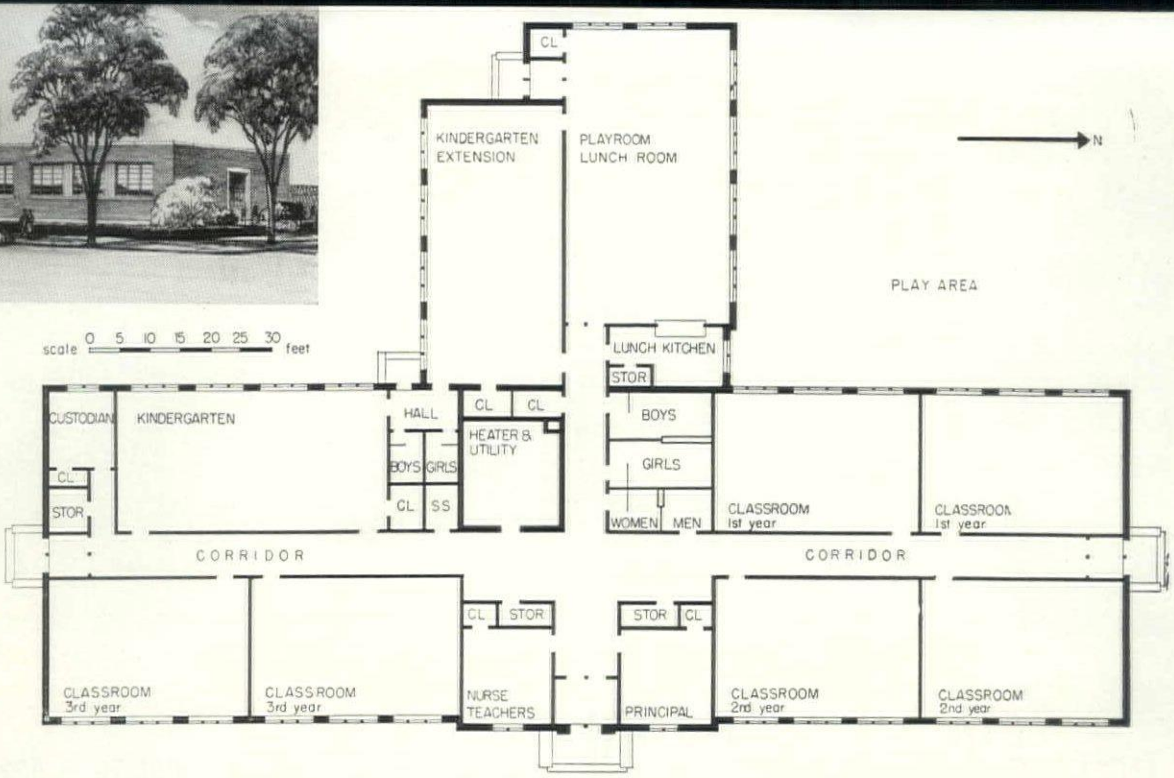
Clarksville schools for New York City

Big New York City needs small, cheerful schools like this Clarksville building—and it needs them six times as much. In the Clarksville district, almost all children have comfortable houses and a big yard to play in. Almost all of them have a sense of neighborhood and community, a secure sense of knowing their playmates, of belonging. The suburban community itself, made up largely of Standard Oil, telephone company, or state employees, the majority of them college graduates, has an economic and social unity with none of the conflicts which have to be met in New York City.

Most of the things that are wrong with New York schools can be summed up by saying that they are just too big. The problem itself is just too big for the ancient and unwieldy municipal machinery which is trying to deal with it. What is needed is a complete new view of the function of the city school building. If cities are to be rebuilt as livable, integrated neighborhoods, what could be a better place to start than in planning the elementary school building? Here is a logical center of neighborhood life, a place where New York's diverse groups can find a basic mutuality in the interests of their children. But the school has to be planned from the beginning, not just as a plant for the educational process, but as a real community center. This means that public interest in the school project must be aroused at the earliest planning stages; it means that the best available planning talent must be put to work to devise ways of meeting this wider function with available dollars. Above all, it means that the school building itself must be kept small enough so that both the children and neighborhood will have a sense of belonging to it.

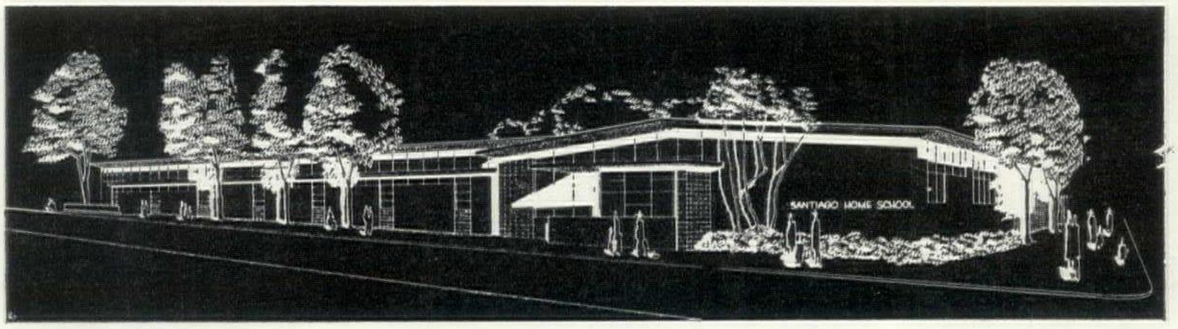
Does this sound fantastic for a city which cannot even "afford" to buy soap and towels so school children can wash their hands? Actually, it might turn out to be cheaper than the massive elementary schools New York is building now. The cost of a large auditorium and gymnasium, of a heating plant and other utilities is, of course, less when allocated among 1,000 pupils than among 300. But elementary school children do not need large, completely equipped auditoriums and gymnasiums. A single multi-purpose room will do for





"*. . . The 300-pupil Home School Unit . . . fits into the 200 ft. width and half the length of an average city block.*"

Of good size, New York City's proposed unit (plan and above elevation) is unfortunately hampered by a straight-jacket of traditional, symmetrical design. On the other hand, San Francisco's home school unit of similar size (lower elevation) benefits from freedom of design. Six such small units are on San Francisco's building program.



auditorium, playroom, cafeteria, and evening adult functions. There is no doubt that it is cheaper to supply heating and plumbing to one group of 1,000 than to three groups of 300. But the small, one-story building, with direct exit from each classroom, would present the possibility of light, nonfireproof construction. Experience in suburban districts, where the one-story, nonfireproof building is rapidly becoming universal, indicates that such a structure, properly planned, offers far more real protection to children than the massive "fireproof" buildings now going up in New York.

One-story schools are feasible everywhere

As a sample calculation, a ten-classroom two-story school building with all necessary equipment and no extras would occupy about 16,200 sq. ft. and would cost $292,000 at the average New York City school building cost of $18 per sq. ft. The same ten rooms on one floor would occupy only 13,600 sq. ft. (omission of stairs and extra toilets). Taking the Michigan rate of $9 per sq. ft. for nonfireproof single story building, and adding 20 per cent for New York's high prices, this nice little painted cinder block schoolhouse would cost New York City only $147,000—a saving of $145,000. The building all on one floor would require 5,500 sq. ft. more land than the two story building, but the saving of $145,000 on building cost would permit the New York Board of Education to pay $8 per sq. ft. for this land, the top price ever contemplated for a school site in New York. This would still leave better than $100,000 either as a clear saving to the taxpayers or as money available for extra playground space. In other words, hard figures demonstrate that a one-story school might be far and away the best investment for big cities—even for the most congested Manhattan districts of a city like New York.

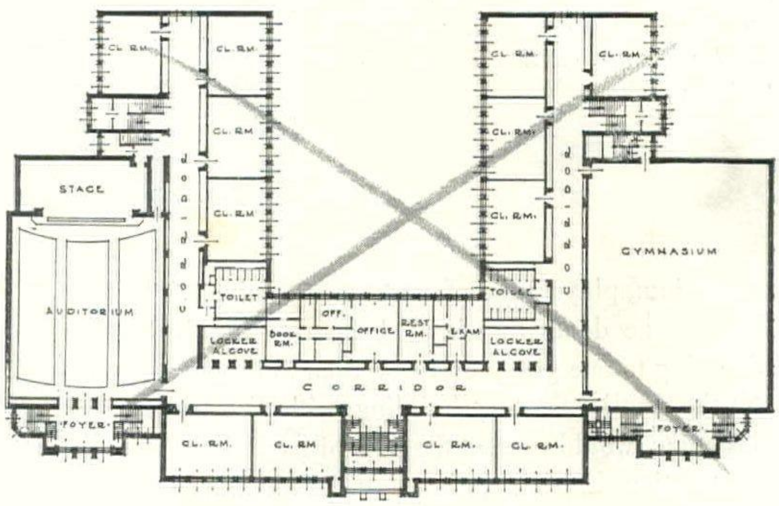
If the one-story school buildings were kept small, sites of the necessary size would be much easier to find than the large sites required for the massive two- and three-story buildings now being built. The plan for the 300-pupil Home School Unit already prepared by the Construction Bureau fits into the 200 ft. width and half the length of an average city block. This includes minimum play space of 35 sq. ft. per student.

The small elementary school, of light construction intended for 25 or 30 years of use, would meet the changing pattern of community need much better than the heavy buildings whose physical life span of 50 years will probably far outlast their useful life. This is not only because school need is likely to recede, it is also because today's rapid developments in design and technology mean a more rapid rate of building obsolescence—a matter which has not yet been given adequate consideration by all types of building investors. If school need does recede, the small school building can easily find a continued useful life as a community center.

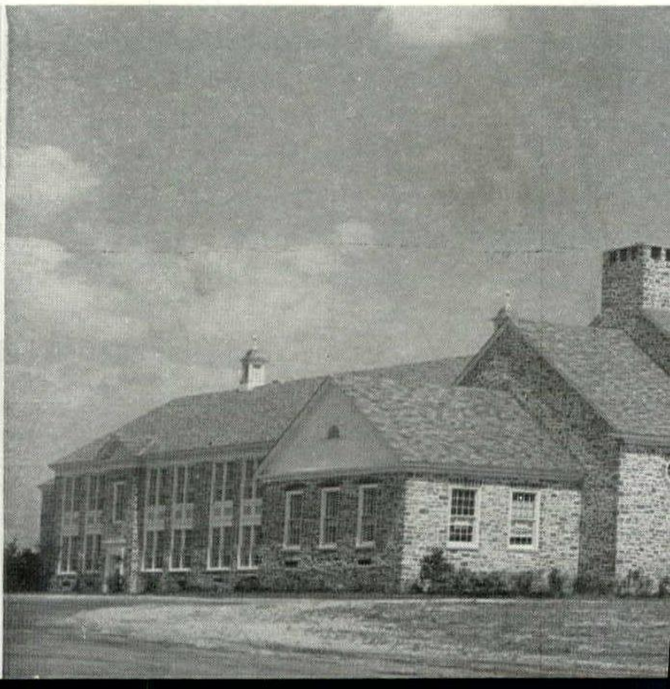
While the case for smaller elementary schools can probably be made on a dollar-and-cents basis, this is not the best argument. If the social cost of disorganized neighborhoods and of school plants of nightmare size could be measured, we would ask "can we afford *not* to build better schools for our city children?"

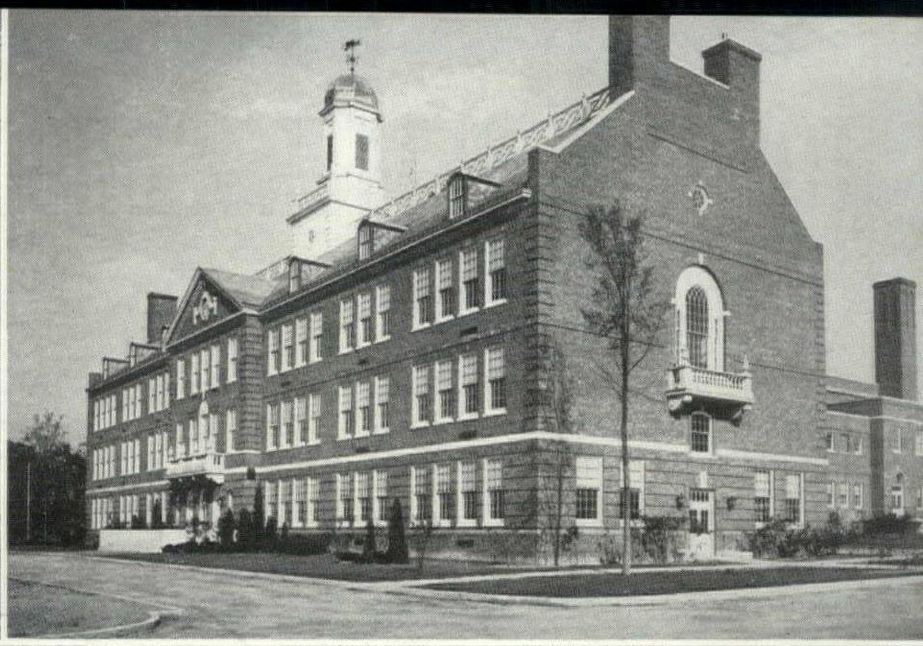
Today's AVERAGE SCHOOL is an extravagant monument to a dead past

It is logical, if unfortunate, that when the average community, average school board and average architect get together, the result is only an average school—like those illustrated on these two pages. Their misguided sponsors undoubtedly think such a building represents the last word in design—despite the fact that their new school's empty belfry, Greek columns, fake chimney and dummy dormers probably wasted the cost of several additional classrooms; that its interior decoration relies on extravagant applied ornamentation, rather than on the simple natural beauty of structural materials; that its lighting system is based more on the number and wattage of bulbs than on the more basic considerations of contrast, brightness and glare; that its room arrangement pays more attention to the preservation of a traditional symetrical axis (which may make a pretty picture on paper but makes no sense in wood and concrete) than to the requirements of adequate daylight, noise isolation, easy traffic circulation and minimum square footage; that, by pretending to be something that it isn't (whether a gable-roofed residence, county court house or limestone mausoleum), it isn't what it is supposed to be—an economical and efficient schoolhouse.

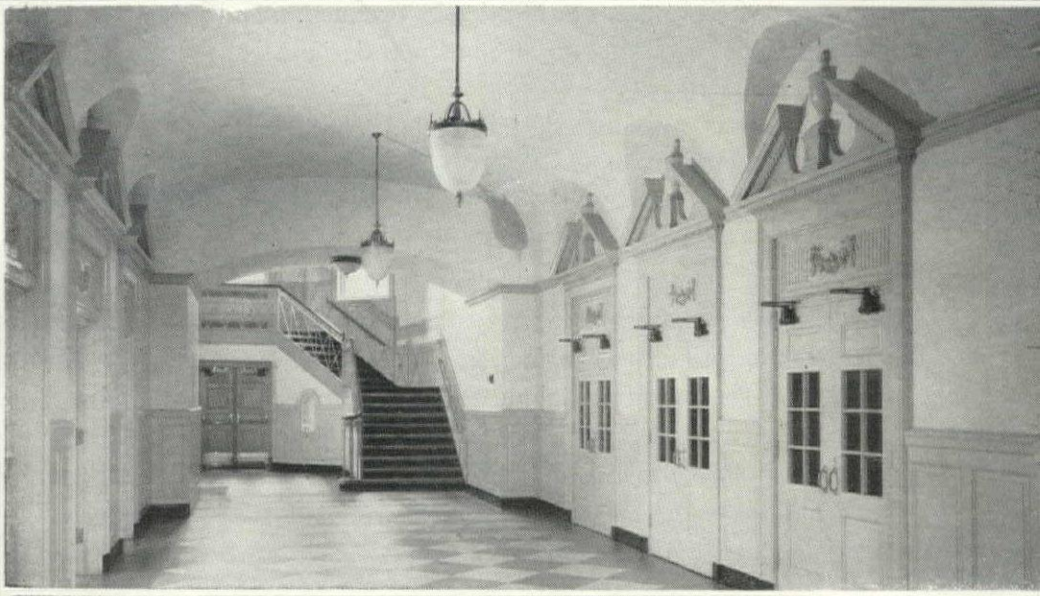


Small schools (below) show dissipation of dollars on small circular windows, big bay windows, arched openings, empty niches and costly gables—most of them carved out of expensive masonry walls. Walls are frequently broken (at considerable cost) only for the sake of exterior appearance.



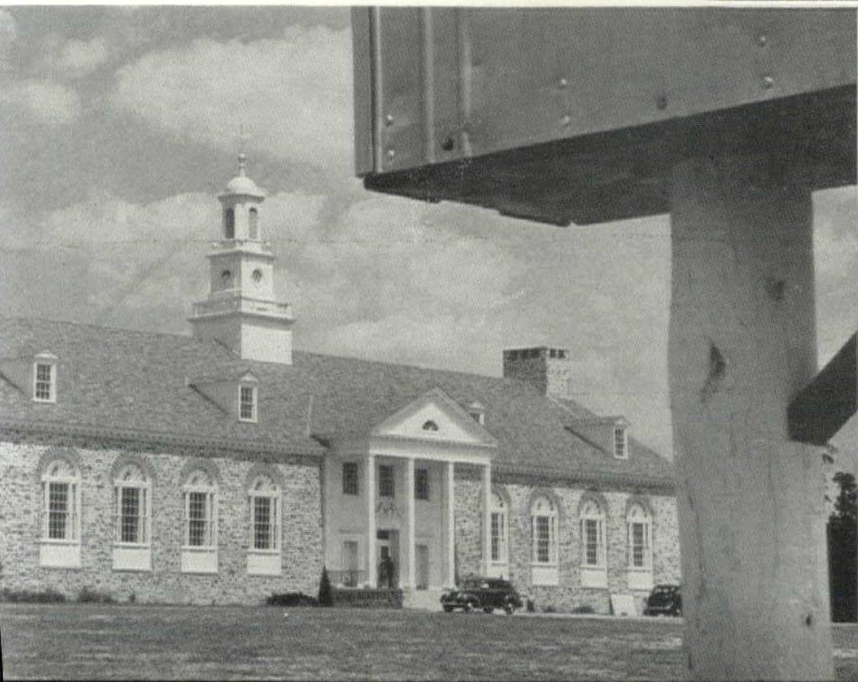


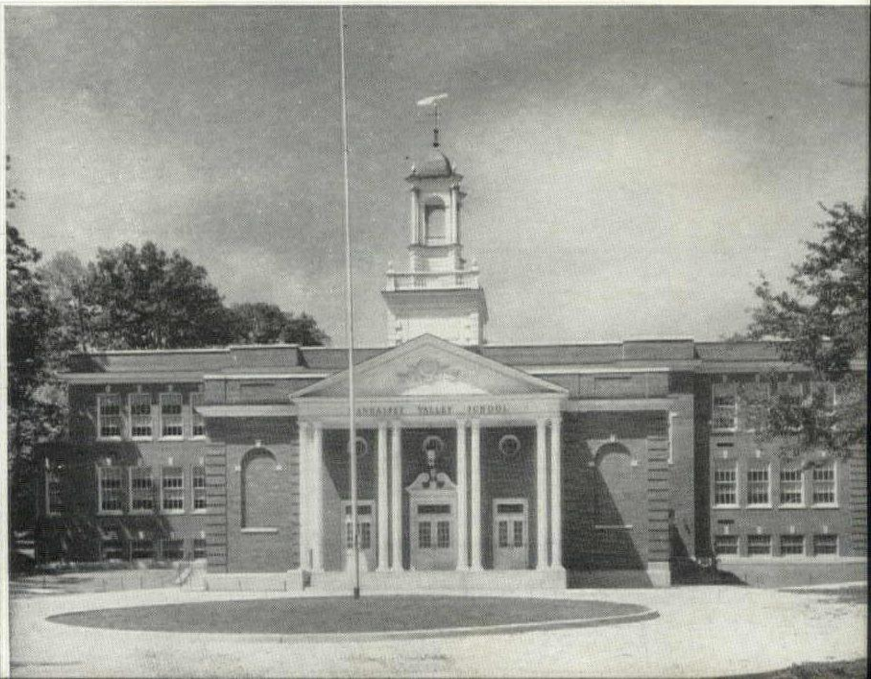
Big schools (above) demonstrate the limitations imposed by the axis-plan straight jacket which requires the unnecessary duplication of big expensive parts to achieve a symmetrical exterior appearance. Note useless outcroppings such as fake chimneys, belfries, dormers, porticos, balconies and towers.



Photos: Wurts Bros., Life: A. Eisenstaedt, Sam Shere, Otto Hagel and Hansel Mieth

Wasted dollars were spent on the arched openings in the kindergarten (above) and on the heavily carved doorways in the corridor (right above) to simulate domesticity, while not enough money and thought was devoted to the lighting of the classroom (right).





TOWARD BETTER SCHOOLS

Back in January 1935, when FORUM did a full-dress reference number on schools, there existed not one fully developed example which the editors felt they could point to as an up-to-date model. Skilled architects had to be called in to translate the educators' fresh ideas into imaginary prototype buildings. It was a great success. Three out of four of those designs have become dominant types of new U. S. schools.

Today the situation is totally different. Our "automobile" has been invented; it is up to us to Fordize its production and get roads laid for it. We are less in need of new designs than of efficient procedures.

What are the means, we must ask, by which a school board can make sure that it gets good schools not just once in a while but regularly? And economically?

Detailed on the following pages are the five basic requirements for obtaining an up-to-date school:

1. *School boards and their architects must fit their immediate construction into well considered, well mapped long-range programs.* The broad technique for making up these programs is outlined by W. W. Caudill.

2. *Classrooms must be brought up to the new standards, and then simplified for the sake of the economy to be derived from repeating a very short number of basic types.* In these rooms, structure and mechanics must be sorted out and rearranged for flexibility. Laymen are inclined to look to miracle materials and miracle equipment for cost reduction. Despite striking advances, the crux of the matter does not lie there. A much more important step, both for construction and maintenance, is to get schools designed so that, for example, partitions can be moved without inserting beams or leaving festoons of wires, and so that wires and pipes can be reached without random digging through the plaster—in short, architecture and engineering are interrelated. In this connection, there has been much talk of savings through "modular" design. This article acquaints laymen with the basically simple idea of the module; it also aims to persuade architects that they are freshmen today if they cannot handle two or three series of modules in interrelation.

3. *Prefabricated and mobile structures must be further developed* to serve what has become a perpetual emergency.

4. *Codes must be converted from nuisances into useful instruments.* Two top-rank code executives, one of them an architect, tell how. (Wilfred F. Clapp, and John C. Nichols.)

5. *Finally, there are some important new trends in the overall school plan*—but that comes out in the succeeding section dealing with case studies.

. . . through LONG RANGE PROGRAMMING, covering education, architecture and finance

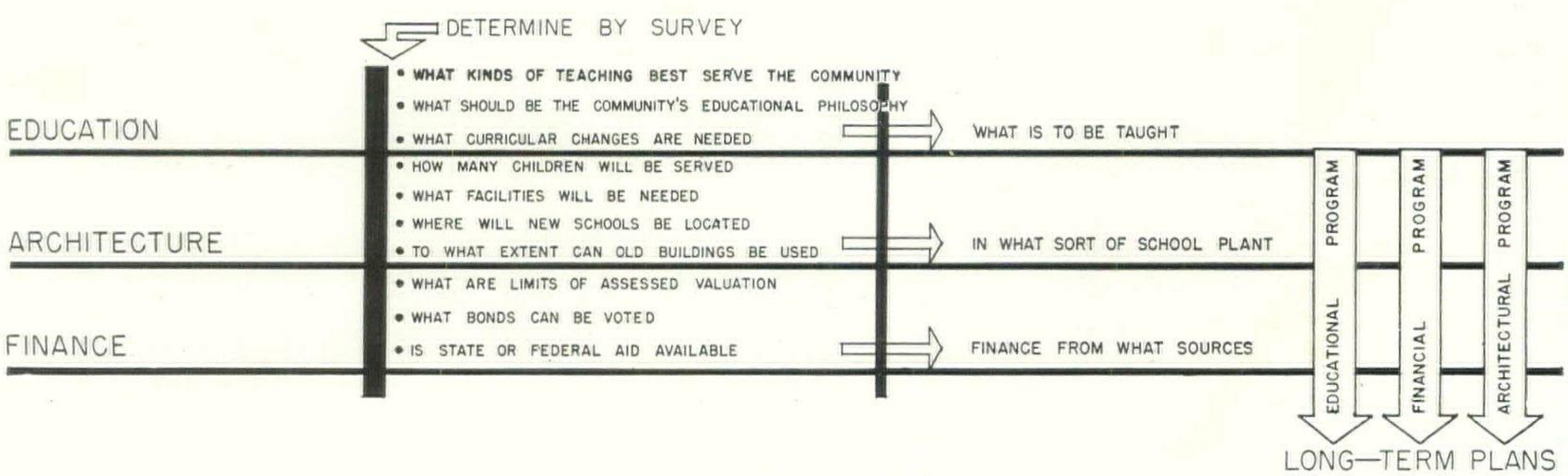
—by W. W. Caudill, A.I.A.*

Why have long-term plans? Planning for the future is a gamble, but refusing to plan is a certain loss. Too many communities are realizing only now that they are paying for mistakes made years ago. And at what a price! Their school sites are too small, but adjacent land is too expensive to buy. Their buildings are too cramped and too inflexible, but they cannot be expanded or adapted to fit the needs of a modern teaching program without unreasonable expense. Must taxpayers pay for yesterday's mistakes? Not if they project school needs into long-term school plans.

What is a long-term plan? A long-term plan is simply an inclusive program which anticipates both immediate and long range school needs so that these needs can be met as they arise. Such a plan considers and answers these three questions:

1. What and how will we be teaching during the next 5 years? During the next 15 years? During the next 20 years? (Education.)
2. What sort of a school plant will be needed? (Architecture.)
3. How will we raise money? (Finance.)

* Research architect, Texas Engineering Experiment Station.



How to develop a long-term plan? There is no standard procedure for developing a long-term plan. The necessary latitude in planning is too great. School administrations differ. Situations differ. Communities differ. But whatever the plan, it cannot avoid the preceding three questions which can be answered in three major steps:

First step: educational

In developing a long-term plan, one of the first things that must be done is to find out *"what will we be teaching"* over a period of years. But before an answer can be found to that question, we will have to find answers to a few more, such as: 1) What method of teaching best serves the community? 2) What purposes should the community's educational program serve? 3) What curricular changes are needed?

Second step: architectural

The next step in developing a long-term plan will answer this question: "What sort of a school plant will be needed over a period of years?" This question, too, depends on others, such as: 1) How many children will be served? 2) What facilities will be needed? 3) Where will new schools be located? 4) To what extent can old buildings be used? The following are some methods of answering these questions:

1. *How many children will be served?*

Many factors influence school enrollment—national, state and local population trends, depressions and boom years, emigration and immigration. Forecasting enrollment is not all guesswork. If the forecast is backed with sound surveys, fairly accurate results can be obtained. The following procedure is suggested:

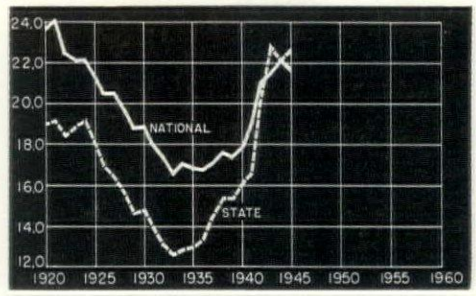
a. *Make a population survey: national, state, local.* The Bureau of the Census is the chief source. At state and local level, study emigration, immigration, birth rates. Locally, consider the possibility of new industries coming, old ones leaving. The local Chamber of Commerce may be able to furnish reliable figures.

b. *Make an enrollment survey: national, state, local.* (National forecast is printed on page 82.) Again, the Bureau of the Census is the chief source. Locally, plot the curve of past growth and extend for future growth. By this graphic method, figures can be applied directly to a long-term plan for 5 years, 10 years, or 15 years.

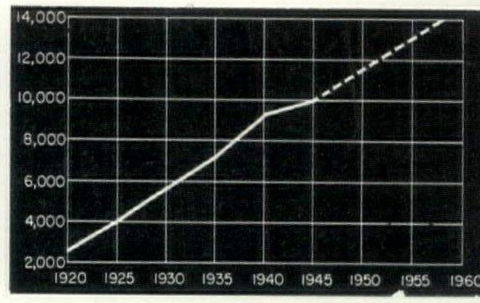
2. *What facilities will be needed?*

If we know what is to be taught and how it is to be taught and the number of students, involved, then it is a relatively simple job to determine the facilities needed. Accordingly, our procedure is:

a. *What kind?* By a careful study of the *curriculum*, develop a *program* which lists the types of

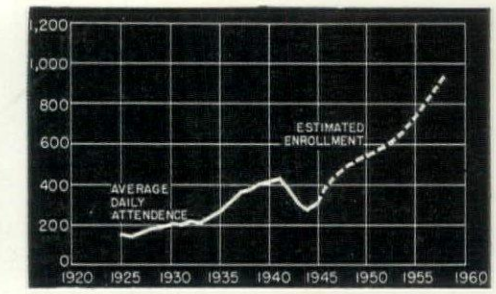


MAKING TREND SURVEYS: Comparing state with national birth rates shows deviations between the two, helps fit local trends into the larger picture.

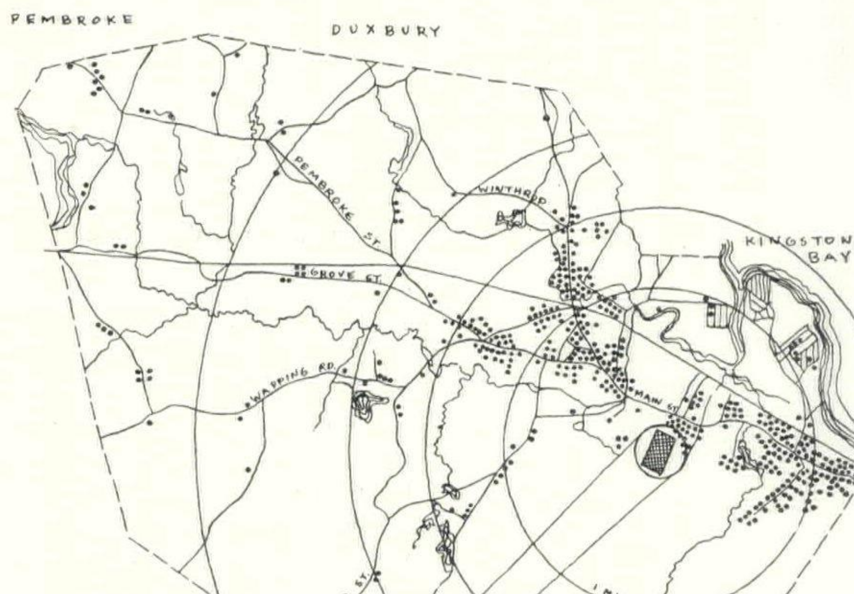


LOCAL POPULATION growth may far exceed the national rate, as in this California county, quintupled in 25 years. Here a continuation at the same rate is expected.

LOCAL BIRTHS registered in the county show the effect of the high post-1935 birth rate. With population mushrooming, it multiplied children 2½ times in 10 years.

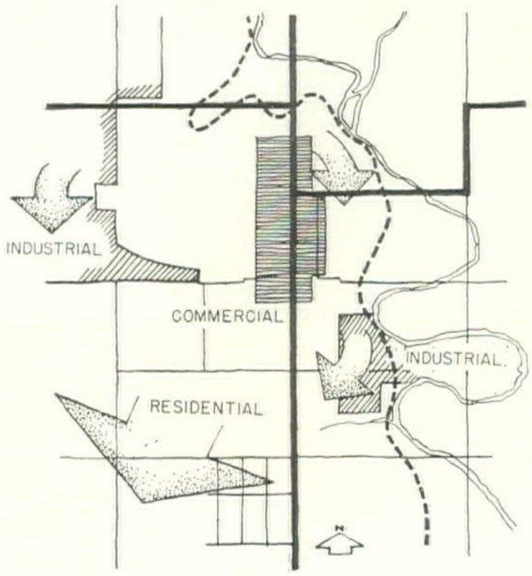


ESTIMATED ENROLLMENT is based on population trends, birth rates, births, and attendance which reflects births of previous years. From a survey by Ernest J. Kump Co.

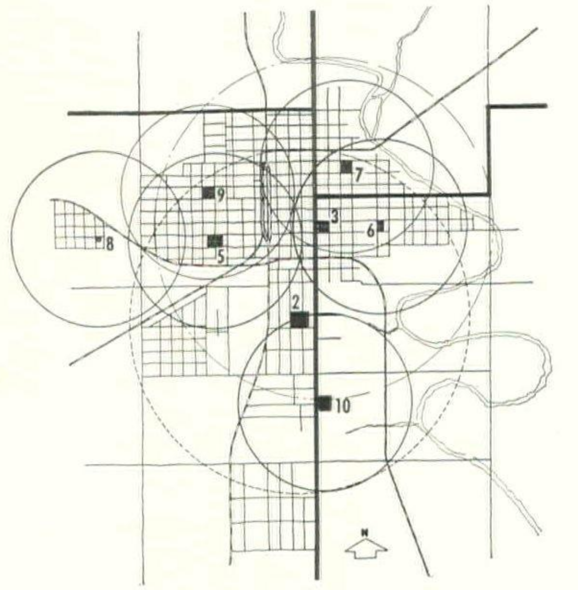


WHERE TO BUILD is shown by this kind of pupil location map, prepared by Bogner, Cotton, McLeary for Kingston, Mass. Each dot is the home of a prospective pupil.

A long-term program by the author for Blackwell, Oklahoma (in collaboration with John F. Bender of Oklahoma U.) shows methods of procedure applicable anywhere. By plotting natural boundaries and population trends, surveying existing schools, and planning shrewd conversions, skilled school planners can make fairly reliable plans for 5, 10, and 15 year stages.



COMMUNITY of Blackwell has zinc plant at west end of the city, river and railroad to the north and east, and an industrial area to the southeast. The entire city must expand toward the southwest, and especially the residential areas. The school system must shift with it.



EXISTING SCHOOLS are poorly located as indicated by the overlapping of their ½-mile drawing radii. Dash-dot radius of one mile belongs to a junior high school, dotted radius to a senior high school. The majority of the schools (3, 5, 6, 7, 8, 9, 10) are structurally unfit.

teaching spaces needed such as classrooms, laboratories, auditoriums, recreational spaces, indoor and outdoor, and special rooms such as libraries and spaces for visual aids.

b. *Amount?* Making use of the *enrollment data*, find out how many students will use the school plant for the next 5, 10 and 15 years and so on; then calculate the space needed. This of course should be done by grades so that a breakdown can be made for elementary schools and secondary schools.

Accurately translating the school program into building needs requires much skill and deliberation. The architect and the educator should collaborate in this phase of the work.

3. *Where will new schools be located?*

One of the most important problems of long-term planning is selecting new school sites. It is probably the most difficult one to solve since so many factors are involved such as shifting population, land values, street development, residential growth, zoning ordinances, and physical and social boundaries. A populated area which needs a school now may not need a school ten years from now. An area which is uninhabitated now may require a school in ten years from now. Many taxpayers' dollars can be wasted if poor selections of new sites are made. In order to eliminate the possibility of selecting poor sites, the following surveys are suggested:

a. *Pupil distribution:* Find out where each pupil lives so that the selection of the site may be related to his home. If each location is plotted on a map, quite often the geographic center suggests a possible site. Of course, before final selection is made, many other factors should be considered.

b. *Land use and land values:* Find out what sites are available for schools and how much they will cost. The usual procedure is to prepare a land-use map of the community. This map should show areas for residential development, commercial development, and industrial development. Information necessary for such a map may be obtained from city or county offices. Comparative land values may be superimposed upon the map; these values may be obtained from the tax assessor.

c. *Zoning:* Before final selection of the site is made, make sure that the area is not in a zone where commercial or industrial buildings are to be built. A boiler works across the street from a school is not conducive to study. Contact city offices for zoning ordinances and maps.

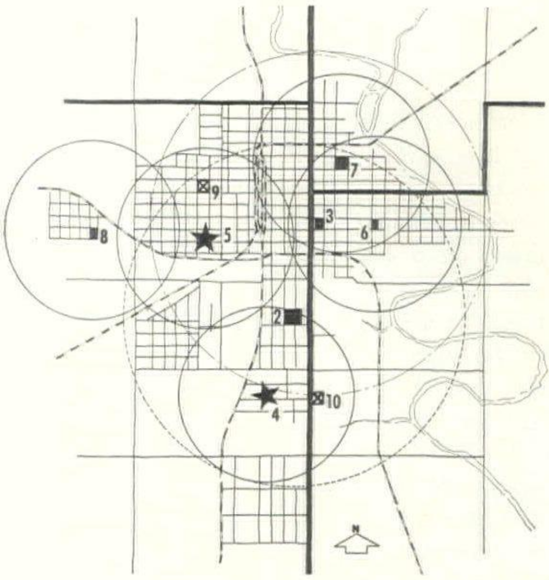
d. *Boundaries:* Survey the area to determine boundaries that may hinder residential expansion such as rivers and lakes, railroad tracks and truck lines, and racial settlements.

e. *Circulation:* Study traffic and street patterns from home to school. Because large numbers of school sites are located on major traffic arteries, the taxpayers pay thousands of dollars each year in salaries to men whose sole duty is to escort children across streets.

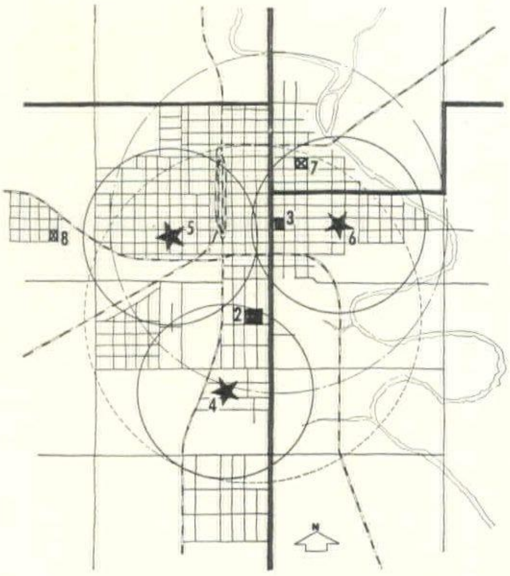
f. *Directional growth of the community:* One of the most important things to do in locating schools is to find out which way the town is moving. Money can be saved by anticipating direction growth. There are many signs that will indicate residential development. A study of building permits of past years will show in what direction the town is being built. A study of the records of telephone installations will indicate a trend. Check these records with the survey of *boundaries* and a fairly accurate prediction may be obtained.

The selection of school sites is often a ticklish business. Sometimes a reluctant property owner,

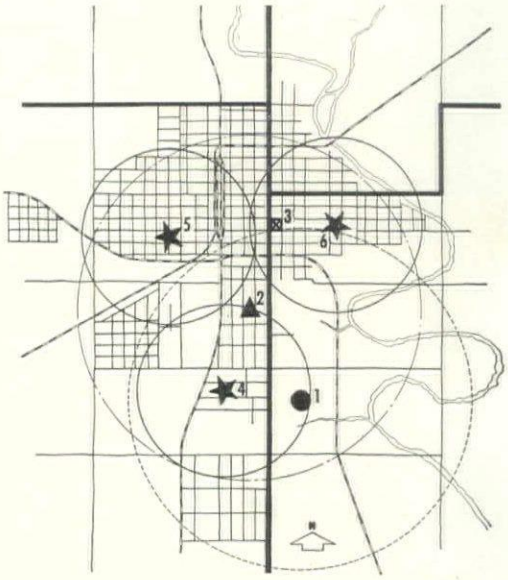
(Continued on page 164)



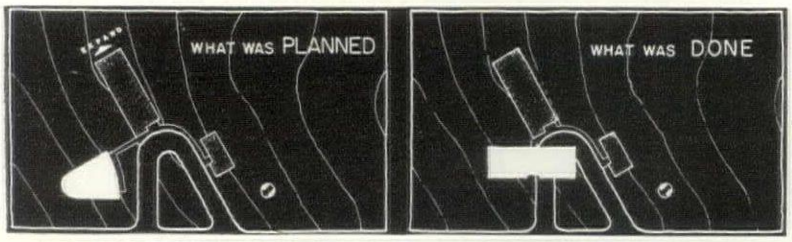
5-YEAR PLAN involves tearing down school (5) and abandoning (9) and (10)—the latter was conveniently liquidated by a tornado. A new 8-room school on site (4) and a 10-room school on site (5) include enough space for the pupils out of abandoned schools at (9) and (10).



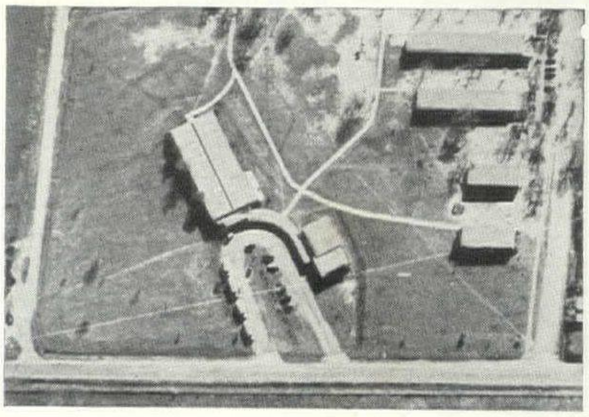
10-YEAR PLAN involves abandoning schools (7) and (8), increasing the number of classrooms to 15 at school (4), tearing down the present school at (6) and replacing it with a 15-classroom elementary school at the same location but on a larger site for adequate recreation space.

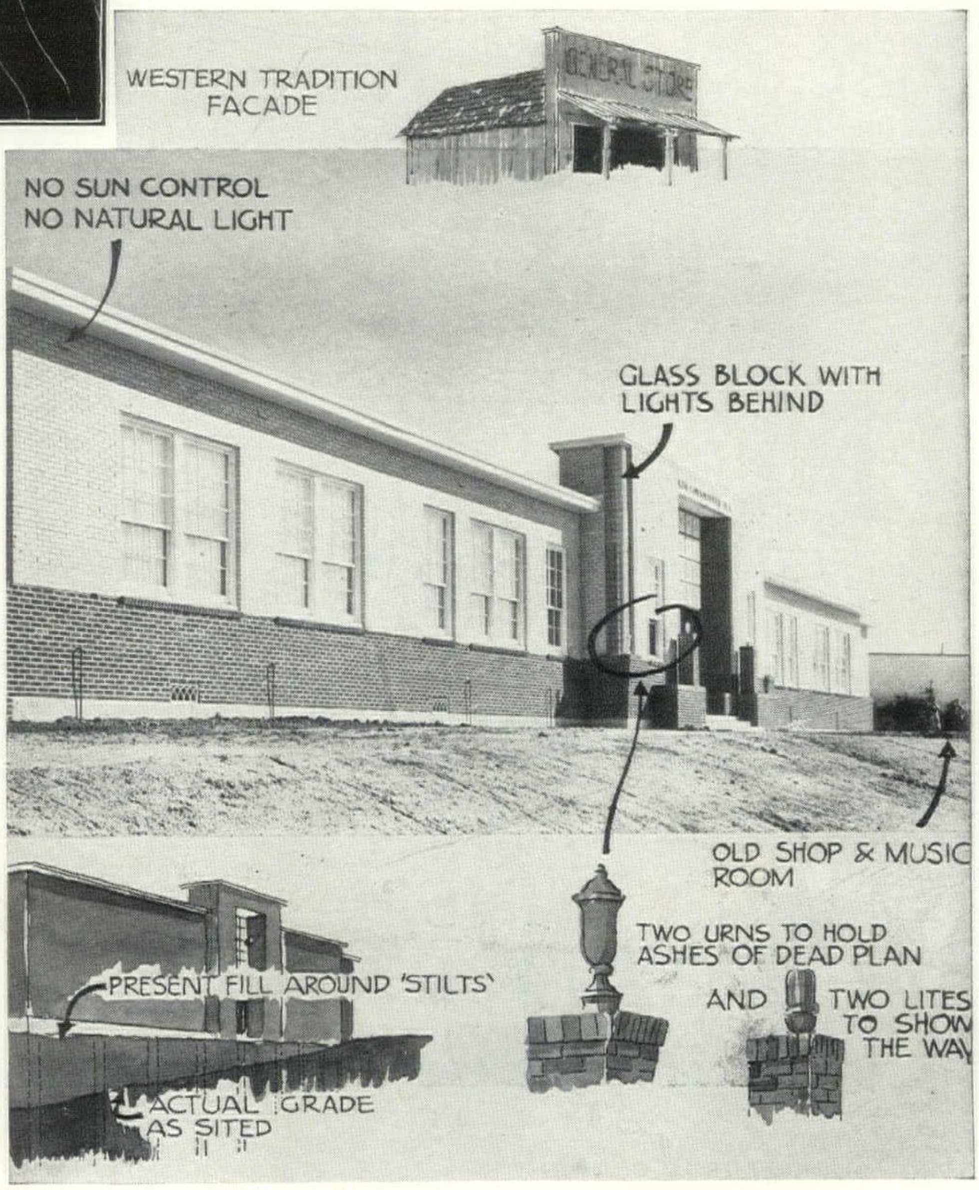


15-YEAR PLAN gets around finally to the junior high and senior high level, to which growing pupils will by then have advanced. Junior high at (3) to be abandoned; senior high at (2) to be converted to a junior high; and a new 25-room senior high school to be built at (1).



A LONG-RANGE PROGRAM must be fully understood and accepted or it will fail





Here's what happens when progress is not successfully explained to the citizens. In 1940, with love and care, architects Finney & Langford created one of the country's finest little model schools for College Station, Texas, to be proud of. Instead, College Station was ashamed of the school's stripped-for-action simplicity, its inexpensiveness; has tried hard to hide it with this 1910-model addition. Belligerently blocking the access drive, spoiling the nice curved bus shelter, the "new" building has hole-in-the-wall windows, unshaded, instead of scientific daylighting; a fancy false-front but no flexible classroom; imitation urns unfueled by wisdom. The cross-contour thumb-to-the-nose position of the building has cost the citizens money for invisible stilts and fill, yet the children cannot run freely from classrooms out of doors. Ignorance has invaded College Station, seat of learning. Pathetically anxious for the very best, the people needed something more than that fine first building program which they have failed to develop: along with it they needed guidance.

TOWARD BETTER SCHOOLS...

... through INTEGRATION OF DESIGN AND ENGINEERING to make life easier for management, teacher and child

"A pleasant classroom depends in the end on the skill of the architect as an artist. He knows the color of the leaves and just where there is a tree."

Ultimately the test of a school lies in its gay, straight-habited and fast-learning children; and they get that way in bright, spacious, orderly classrooms. And the smart principal of more than one school seen in these pages has hired himself better teachers by showing them a plant they "would just love to teach in."

To produce such rooms is an art possible only for the architect with an artist's knack for doing better than he knows how. Trends and principles are merely useful tools or starting points.

First of all there has been a strong U. S. trend toward setting a high standard and then upping every classroom to it, rather than setting out on the path of specialization. A recent English book speaks of "art" rooms, "geography" rooms, "English" rooms and the like. But it has seemed easier here to produce a typical room with enough light for art, enough storage for geography, an atmosphere warm enough for English. Not only are the uses of such a room interchangeable but the high standard can be built into a whole string of them at less cost than diddling with changes.

First requirement, and by far the most important in such a room, is space, space, and more space. The formerly advanced standard was 15 sq. ft. per pupil; it is now 30 sq. ft. After fussing for over ten years with special alcoves and annexes attached to the old minimal rooms, educators and architects stumbled on a major discovery. If they would simply create a big ample space, the necessary recitation or workshop or activity areas would virtually form themselves with no need for extra construction. Hence the 30-30-30 square room of current favor: 30 x 30 ft., producing 30 sq. ft. per child for 30 children.

Though this square is not sacred, it has the shortest periphery of any straight-line geometrical shape, subdividing itself neatly into a main recitation area of rectangular shape up forward and near the windows, plus a side and a rear rectangle (both narrower) for activity spaces. And in a square room the day's walking may be several miles shorter for the teacher.

The next discovery was that subdivision would be aided by storage furniture, interchangeable like the old sectional bookcase, and movable as well. In a school so equipped, every room among 12 was found to have been arranged differently by its teacher, and next year they will differ again.

Skelton Studios

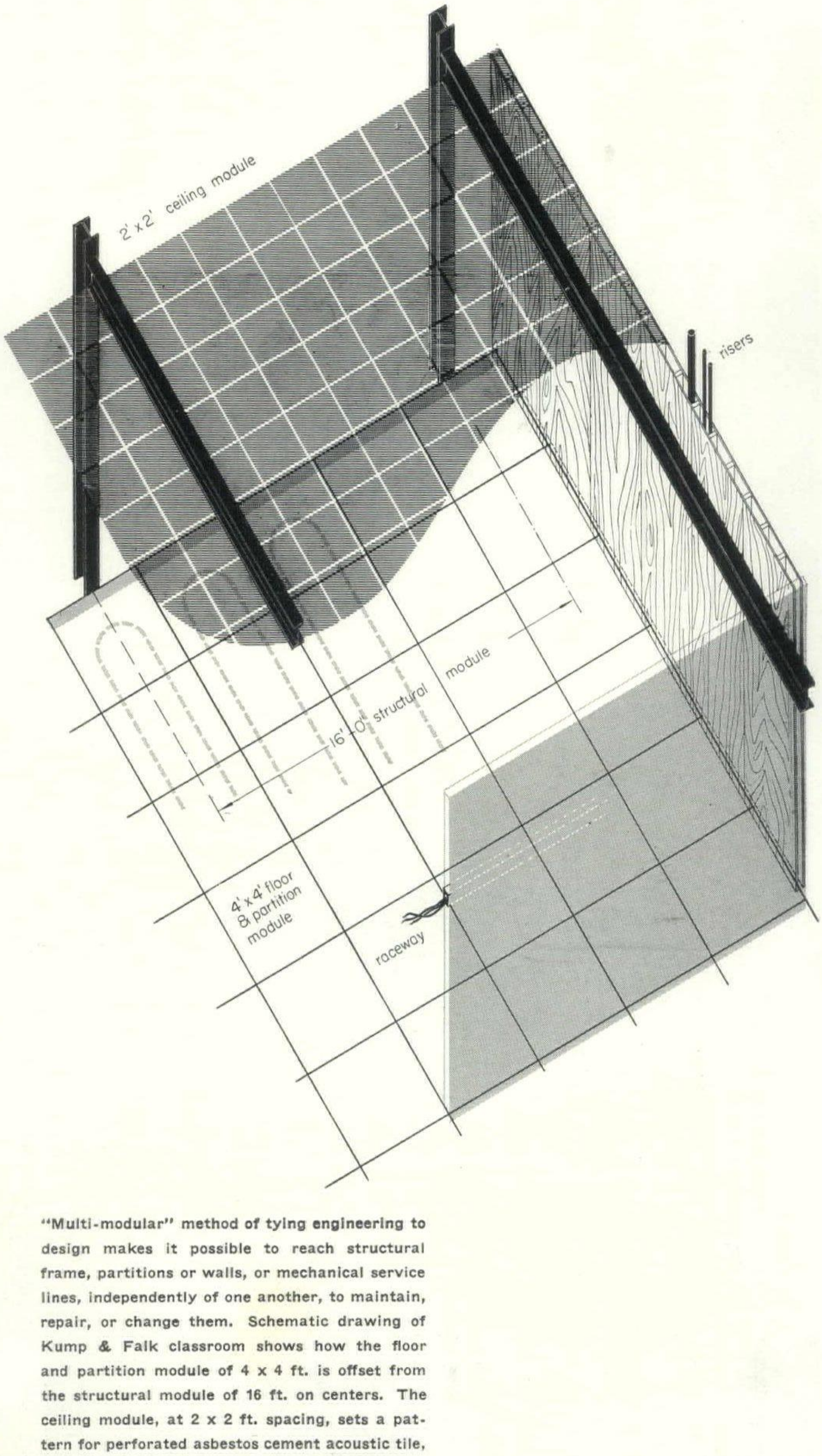
After spaciousness and flexibility on the list of desirable qualities comes an administrative requirement of easy maintenance and change. This requires integration of design and engineering. The object is to arrange things so that every structural element, every mechanical or space element, can be reached, repaired, or rearranged independently of any other—and without need of tearing down structure, blocking outlets, or leaving messes of pipes and wire.

The tool for this has been "modular design." But, unobserved by all except top architects, this has swung over into the concept of *multi-modular* design. The piece is now played with more than one finger! The drawing (right) shows how.

In this drawing of a room by Ernest J. Kump, the steel columns are at 16 ft. spacing, in other words on a 16 ft. module. But they are placed *outside* the outer wall line. Moreover, the partition seen at the right is not in line with the columns and beams. It is pushed over 2 ft. to one side. The modular network for the floor, on which it is placed, is on 4 ft. intervals in each direction, and these lines come *between* the lines of the structural columns. This means that a partition can be placed —or shifted—to any line of its modular grid on the floor, without need for drilling into steel beams. And pipes and conduits can be run up in partitions without the nuisance of bending them around steel beams top or bottom. The radiant heating coils in the floor have modular spacing too, again so spaced as to come *between* the lines of the floor grid. If a partition were to be moved to a new line on its own modular network, it would be embarrassing to drive a nail into the floor and get a squirt of water from a heating pipe. Again, electric conduit for lights runs in straight lines all the way through the building, *between* the 2 ft. modular lines of the ceiling squares (perforated asbestos cement tile) and these squares can be easily removed for access to wires at any point whatever. Wires for electric clocks, sound systems, and the like, run in a raceway along the corridor wall.

If new design keeps structure independent of partitions, partitions independent of storage furniture, and all of them independent of services, there is another requirement: that none of them depend on the teacher. Lighting should work with no need for her to move shades, turn switches; ventilation with no need for her to open windows; heat with no attention from her. (For all these aspects of design, see *Techniques*, page 142.)

But above all, no matter how much is said about integration of engineering with design, the last decision must be made by the designer. The woods are full of peddlers of "Systems" or "Techniques." But children respond less to efficiency than to delight, which depends on just what is the color of the leaves and just where there is a tree.

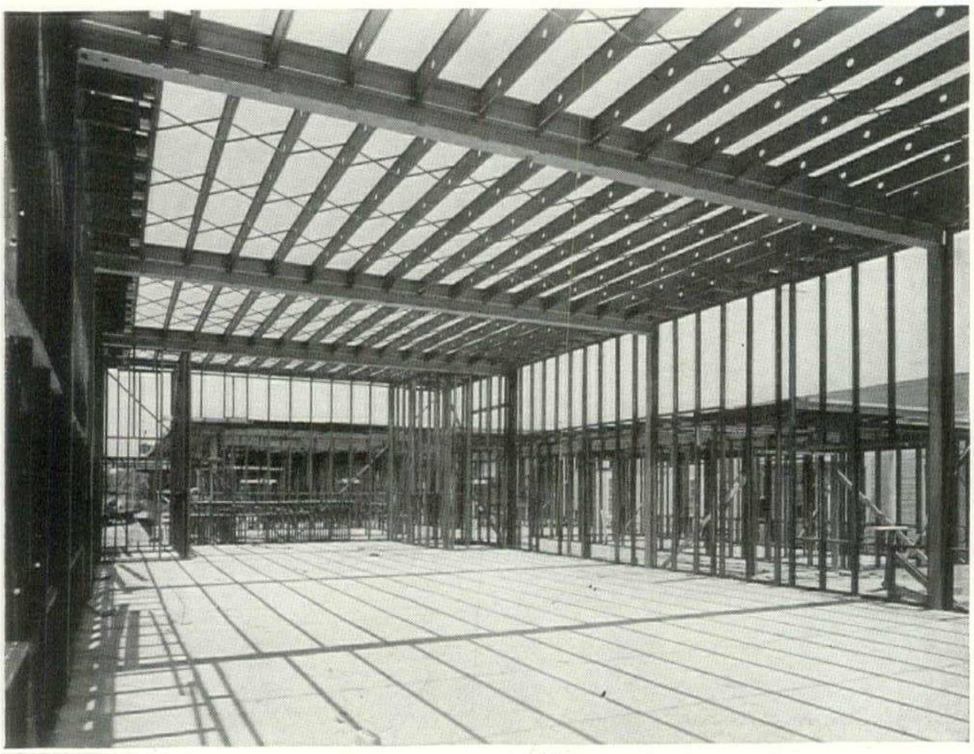


"Multi-modular" method of tying engineering to design makes it possible to reach structural frame, partitions or walls, or mechanical service lines, independently of one another, to maintain, repair, or change them. Schematic drawing of Kump & Falk classroom shows how the floor and partition module of 4 x 4 ft. is offset from the structural module of 16 ft. on centers. The ceiling module, at 2 x 2 ft. spacing, sets a pattern for perforated asbestos cement acoustic tile, which is easily demountable to give access to lighting conduits above. These run straight through the building.

TOWARD BETTER SCHOOLS...

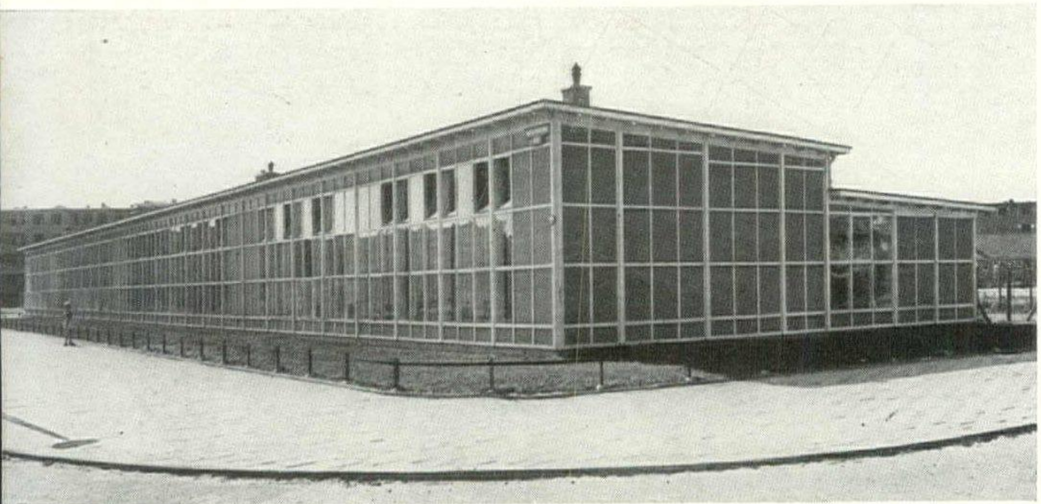
... through INDUSTRIALIZED BUILDING to meet a perpetual emergency

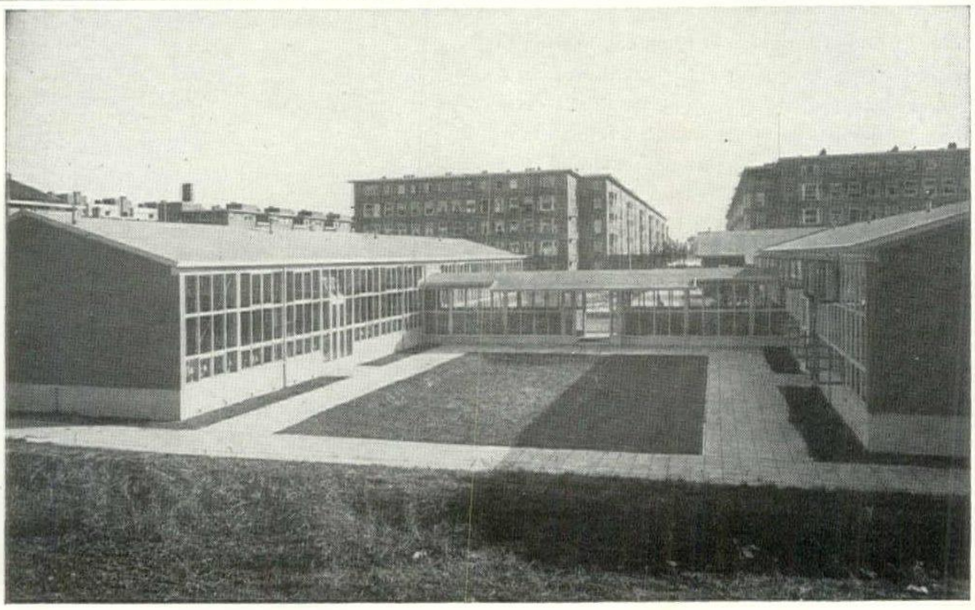
Harvey Patterson & Son



Prefab system of steel framing made light work of this San Antonio school by B. K. Wyatt. Such structures yield high salvage when dismantled.

Program of "temporary schools of top quality" is illustrated by this well designed school by the Town Architect of Amsterdam to plans by J. Leupen.





The way schools are still being built, all over the U. S., for a life expectancy of 50 years, should rank as the classical example of the disregard of the obvious. The most obvious thing about schools is that they are tied to homes. The most obvious thing about homes is the way whole new towns full of them are created overnight by modern large scale developers. The people who swarm into the new developments are young married people; the next phenomenon is a swarm of children. But apparently as families grow the parents do not move away making room for other young married couples and future swarms of children. Instead, the inhabitants stay where they are. When the first great wave of youth has worked through high school, the neighborhood quiets down to a humdrum existence. (For Seattle's experience, see page 138; for New York's, page 85.)

Translated into school demands, the new quick habits of residential building mean a sudden overwhelming demand for grade schools, and after that a somewhat lessened demand for high schools. And a few years after that, many of both kinds of schools stand empty.

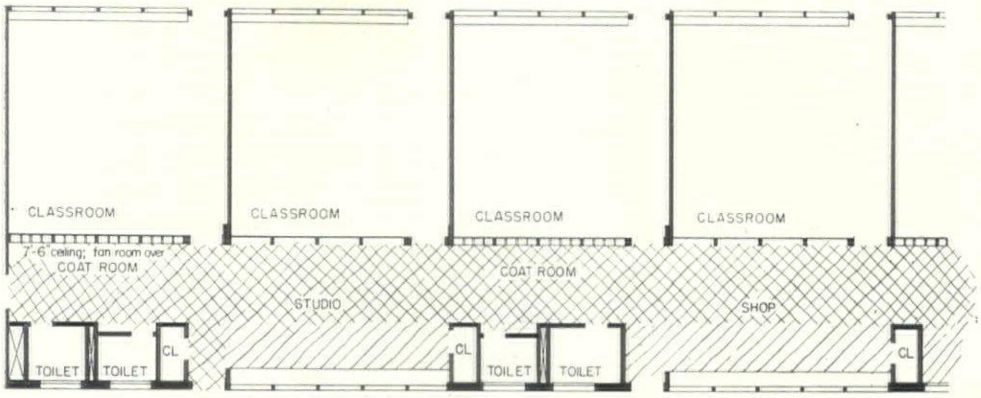
If school boards were ruled by prescient logic, they would do their best to build grade schools that could be converted into high schools, and they would build many school units of a sort that could be written off in 10 to 20 years when they would be dismantled, moved, or sold for other purposes. What prevents this is rut thinking.

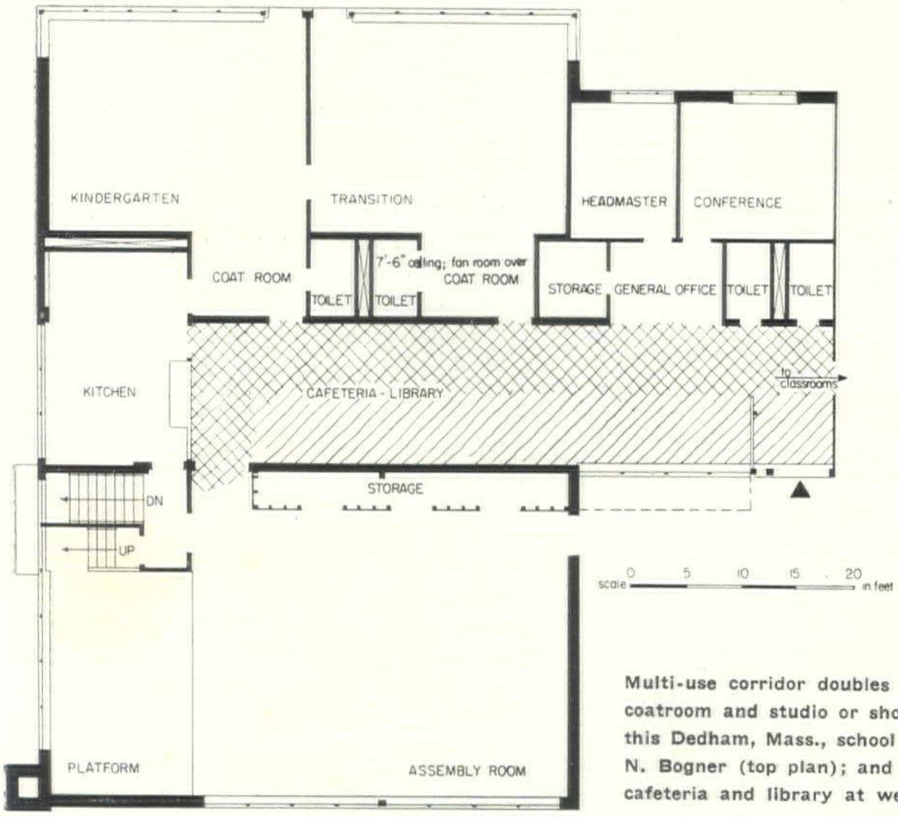
American industrial techniques could provide the remedy, and a start was actually made under the sobering impact of the war emergency. Schools were built that represented a minimum investment, could be written off and reconverted. What is needed now is a realistic mental attitude which acknowledges that the school emergency is perpetual, and that there is no shame in so treating it. Instead of handling "temporary" schools as poor cousins, so badly built and maintained that the children rightfully hate to go to them, we should set out to produce temporary schools of top quality and performance.

Fortunately research has been inaugurated at schools such as the University of Michigan, on demountable structures of high salvage value. Another open question is whether school space has not been too highly specialized, whether the same standards of space, light, access, etc., could not be so designed as to be convertible to office or industrial use without loss.

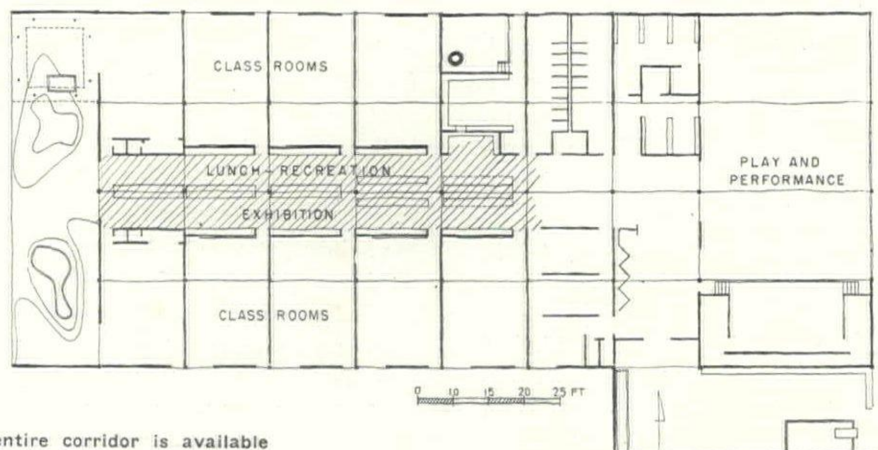
And although American prefab units and structural elements are beyond challenge, design is too often third-rate compared to Europe. American industrialists, stinting nothing in Pullman cars, have yet to entrust school design for their own children regularly to the most thoroughly capable hands.

. . through MULTI-USE OF SPACE to multiply the school dollar's buying power





Multi-use corridor doubles as part of coatroom and studio or shop space in this Dedham, Mass., school by Walter N. Bogner (top plan); and becomes a cafeteria and library at western end.



Here the entire corridor is available as lunch, recreation, and exhibition space. Because school is top-lighted, this "extra room" needs no windows. —By Matthew Nowicki. See also p. 135.

The latest news about multipurpose school planning relates to rooms other than that old standby, the "multipurpose room," which, like the living room at home, is often a combined cafeteria and gymnasium, or partakes of both combined with an auditorium. During the past year school planners have shifted their main attack to the circulation areas, trying to squeeze extra use out of these. Again if school is compared with home, few indeed are the domestic living rooms which do not lend at least one little corner to extra service as passageways. But in school, hitherto, such doubling has been virtually illegal. No part of the school has been so sacredly inviolate as the corridor. And none has served a more limited use, in exchange for the cost of building it, than the corridor—simply getting pupils from here to there.

Among schools recently completed or under construction, the one at Dedham, Mass. by Harvard architect Walter N. Bolger makes an almost perfect score for multi-use corridors. (See top plan, left.) One corridor wall is, in effect, omitted. In other words, the passageway used by students is widened to include a workroom alcove opposite every class. These workrooms would be noisy areas in any case, so a few intruders during classes make no serious disturbance.

At the west end of the building the wide passage becomes the cafeteria. (See middle plan left.) The fact that classrooms in this private school are relatively small has helped the architect. Yet the same idea is being used by others for full-sized public schools.

Bogner and his fellow architects have been limited, however, in their design of multi-use corridors by the traditional habit of giving every "real room" in a school some side windows. Architect Matthew Nowicki has escaped this limitation by assuming that minor use areas of schools need not have a view out, and can get their light from above, as interior areas of industrial plants do. (See bottom plan.) Nowicki's school plan for the 1950's drawn especially for FORUM, shows a widened *interior* corridor used either for cafeteria use, display, or lounging space, in accordance with the time of day. It has artificial ventilation and gets its daylight or electric light through the top. Nowicki thus gets an equivalent of Bogner's multi-use corridor with the added economy that his corridor is to be *"double-loaded"* —with classrooms on both sides instead of one. (A further unique detail is that the corridor has nonbearing walls which do not break the structural rhythm of the building with its economical repitition of identical bays.)

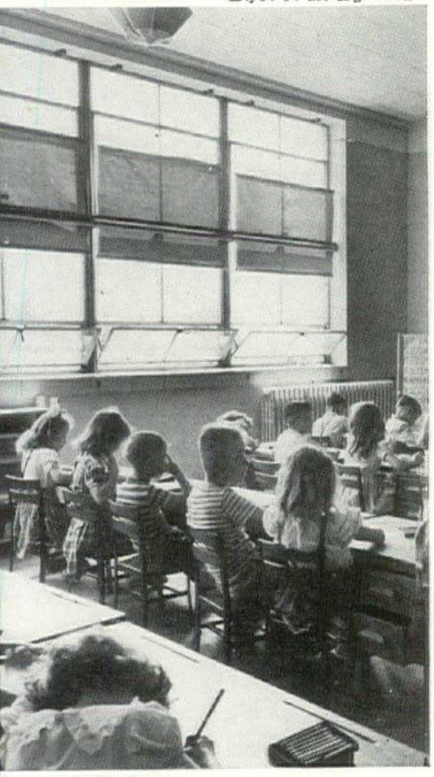
Still another version, with multi-use room and corridor at the center of a circular plan, is shown on page 137. Other applications, in fresh fields, of the principle of multi-use planning, will be found on page 154 of the Section on *Techniques*.

TOWARD BETTER SCHOOLS...

. . . through BUILDING CODE MODERNIZATION to permit desirable progress in school design and construction

—by Wilfred F. Clapp*

Life: J. R. Eyerman



A window sill height of 40 in. off the floor, as required by some state codes, gives small children a jail-like confinement. Such uniform requirements ignore variations in children's height, their work, their exterior surroundings. . . . In Connecticut a fire marshal required a level exit passage from an auditorium to an outside door. To build it required steps down, then up again, in the intervening corridor. The steps introduced a genuine daily hazard in seeking to correct an imaginary remote one. And it was one man's judgment, not backed by written code . . . Despite such nuisances we need codes, declare the authors. But they outline methods of writing and administering codes that will make useful instruments out of them.

A major block to better school design is often the school code, either state or local. All too often short-sighted administration of these codes furnishes another deterrent.

Some state codes require that schoolroom windows be located on one side only. Others set specific dimensions for ceiling heights and windows. The ceiling height requirement is at least partially predicated on ventilating theories proved erroneous in 1863. The unilateral window requirement, which originally did bring an improvement over former design, is now in direct conflict with what is known about the principles of providing good seeing conditions. Many other rigid restrictions found in local and state codes hamper or prevent desirable developments in design, and some are absurd in this day and age.

The good reasons that lay behind these regulations when they were made have disappeared. Building materials, building methods, educational methods have all changed. Furthermore, such change will continue. Young architects, engineers, educators now starting their careers will certainly develop new forms and methods beyond our present imagination. Stupid regulations and administration must not straddle the road.

The one-story school

At present there are well defined trends toward the design of school buildings which are informal, friendly to children, and less monumental than the mass block type of buildings of the last 30 years. The one-story school is finding wide acceptance. And, for good reasons: 1) It is safe. All rooms are at grade and children can be evacuated quickly from each room directly out of doors. Horizontal traffic is safer than vertical traffic. Stairways, no matter how well designed, are danger sources, especially when large groups try to move over them rapidly in a panic. 2) The one-story school is economical. Present experience demonstrates its lower cost, especially where full advantage can be taken of lighter construction methods. 3) In spread-out one-story buildings it is easy to isolate noisy and odorous activities (shops, band rooms, kitchens, etc.) and concentrate certain sections for easy community use. 4) Adequate daylight is easier to introduce, and when it is admitted from more than one direction and properly controlled, classroom widths are no longer tied to 22 ft. Wider spans can be used, releasing the designer from a rigid pattern and permitting the space to be fitted to the kind of activity to be housed. Yet in some localities, because of state or local codes, design is practically frozen to the multiple story, formal, institutional, "come in if you dare" sort of building.

In many cases one-story building may be penalized by a code requirement for fireproof construction. In the interest of common safety a two-story school requires a concrete slab for the upper floor, and a fireproof roof. But a one-story school with direct exit at ground level from every classroom does not really need fireproof roof or floor for pupil safety, and thus two fireproof slabs are eliminated at a considerable saving.

Fire protection experts seem occasionally to get confused between the problem of protecting the lives of occupants of a building, and protecting the property. In all cases lives are of paramount importance. The protection of property from destruction is also important but decisions should be made locally by local administrative units as to whether buildings need be made completely fireproof when the safety of occupants does not require it.

In Michigan the school building law requires all buildings of more than one story (a basement is legally defined as a story) to be of practically class "A" construction. One-story buildings need not be fire-resisting, however, although the law does wisely require that the heating plant room shall not be under the building, and that it must be adequately fireproofed and separated from the rest of the building by a fire door. As a result, some architects in this state have recently been able to build one-story buildings with fairly adequate equipment and with advanced standards of space and lighting, for approximately $9 per sq. ft.

Despite their defects, codes are needed to protect the public against unsafe structures, against the shyster, the incompetent designer or builder. Lessons learned at great cost cannot be thrown overboard. Then what kind of a code should we have, and how administered?

The kind of code

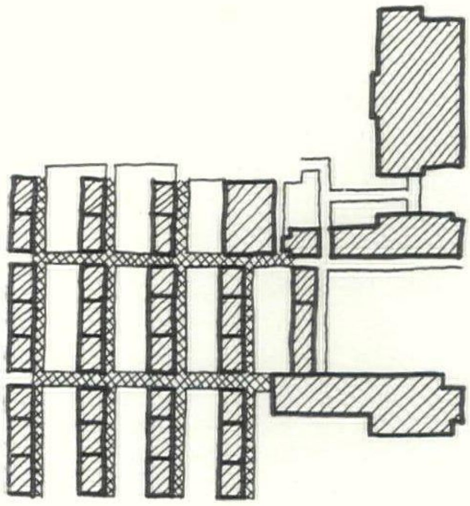
First of all, the state office should operate as a place of information and advice, not as an ogre that must be appeased in order to get plans approved. And the state's building code, beyond requiring certain minima of procedure, should be informative rather than rigid—a manual, a guide designed to stimulate better design rather than to freeze school buildings into any one pattern.

Many states are saddled with detailed school building codes in statutory form. It is often impossible, because of commercial and political pressures, to remove from these statutes requirements long since outmoded. A good example is the ventilating requirement of 30 cu. ft. of air per child per minute which some states still have. Any attempt to remove this from the state law brings feverish lobbying activities by those who stand to profit from installing the elaborate equipment necessary for compliance. The Michigan law requires for buildings of more than one story that "all walls, floors, partitions and roofs shall be constructed of fire-resisting materials such as stone, brick, tile, concrete, gypsum, steel, or similar fire-resisting

(Continued on page 170)

* *Code official, Michigan's Dept. of Public Instruction.*

CASE STUDIES



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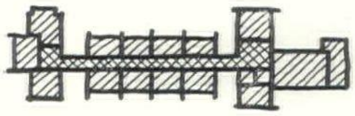

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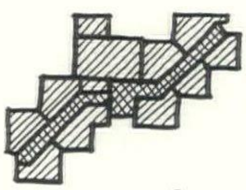

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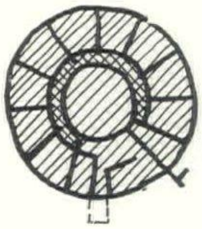

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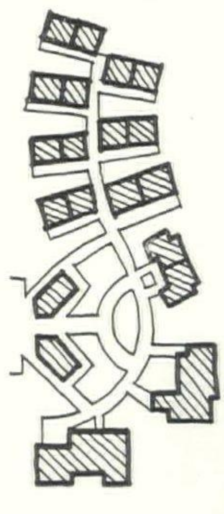


5.

The last major step in acquiring good schools is to organize up-to-date building plans. In the past fifteen years the trend has been to play the game like dominoes, stringing up unit rooms on straight circulation lines, rather than the old way of making a building outline first and then jig-sawing the rooms to fit. Modern units require service lines so much more complicated, and the program demands so much more flexibility, that the added complication of interlocking room shapes becomes intolerable. This major change came from the West.

Plan **1** is a pure example of the western "finger plan," now ten years old. The finger plan is really a tree plan, based on a trunk corridor with side branches. It rests on radical standardization of classrooms; on absolute insistence that all classrooms share the best (north) orientation to sun and air; daylight for all of them from the open-corridor side as well as the main window side. This plan is not only flexibly interchangeable within itself, but extensible indefinitely outward like a tree, by growing at branch-ends and by sprouting new branches. Its defect is its overextended lines of communication. (Page 104.)

Plan **2** shows how the Middle West eventually overcame this overextension by "double-loading" the corridors, depending on later technological developments to get adequate daylighting into all classrooms just the same. (Page 122.)

Plan **3** is an alternate with zig-zag outline increasing the area of the window wall. Although a plan of type 2 could be extended almost as easily as type 1 (with dominoes in double line instead of single line) our example is self-contained, based on the idea that new school facilities should be provided by multiplication of schools—on the precedent of the human race—rather than by accretion—like the tree. (Page 126.)

Plan **4** shows self-containedness carried to its ultimate. This round school profits by the shortest possible outside wall, the least exposure to weather, and by what strategists call "interior lines of communication:" and even these are put to multiple use. It was drawn for FORUM as a radically economical plan type for the 1950's to explore. (Page 134.)

Plan **5** (not discussed on the following pages) shows the opposite extreme, the "campus plan" of New England private schools that dispense with long enclosed corridors simply by letting pupils get a nip of invigorating air between classes.

These case studies are not the cheapest schools of recent production, most of them ranking above the national average of approximately $11 per sq. ft. But they are the best thought out models carried to full completion. For impecunious school districts in Michigan, Architect Walter Anicka has done schools of type 1 for less than $8 a sq. ft., containing ample space and every essential, short only on equipment and finish (some of it added later). In Arkansas, State Commissioner Bonds and Supervisor Hill have found lower price levels, reduced the cost to $7.

PIONEER SCHOOL has proved the value of its scientific design in eight years of orderly growth

LOCATION: Lafayette, Calif.
KUMP & FALK, Architects and Engineers
FRANK A. PAYNE & SON, General Contractor

When Acalanes High School was planned, just ten years ago, and the first units completed in 1940, it was the first large scale school which could serve as a complete demonstration of principles which amounted to a schoolhouse revolution—the revolution of the thirties. Since then, the Acalanes type of school, with its wide ranging, one-story classrooms arranged according to the "finger" plan, has swept the West Coast, is sweeping rapidly across the Midwest on its way to the East Coast.

Possibly because California's balmy climate ventilates educators' minds as well as their houses, California schools have been less tradition-bound than most. As one of the fastest growing states in the union, California has had plenty of chance to experiment in school design. Architects, moreover, have been given a reasonably free hand in creating a radically new audio-visual-climatic environment for their pupils.

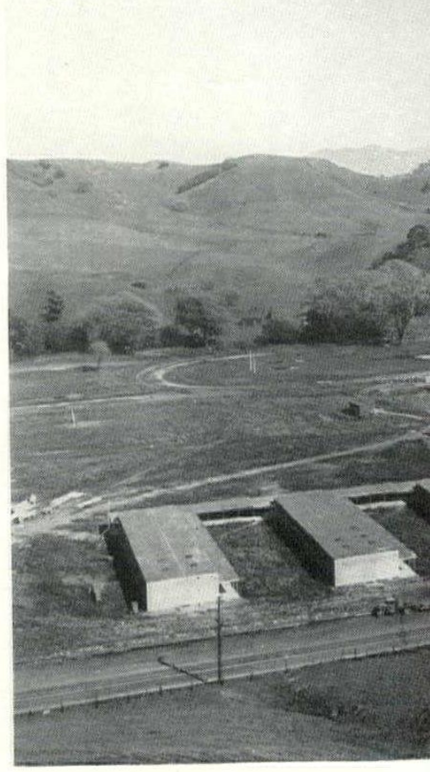
Now is a good time to revisit Acalanes, to see how it has really worked, how it has grown, how the teachers, pupils, administrators who have lived with it really like it.

Architects Kump & Falk designed Acalanes after first beheading that sacred cow of school boards—the idea that the structure should be a big, imposing edifice denoting solid virtue and civic pride. That old style of building was unncessarily expensive and, from an educational point of view, nonfunctional. Before Acalanes, most schools were either a rectangular block of masonry or else peripheral to a central courtyard. Multistory structures were dominant; classrooms were of all shapes and sizes, and faced in all directions. Daylighting was spotty, depending upon room orientation and where the pupil happened to be sitting. Structurally, the buildings were as difficult to modify or expand as the pyramids. To install a new blackboard—let alone build a new wing—was often a major operation.

Kump's plans rejected this pattern entirely. Fortunately, Acalanes posed problems that could not have been adequately met through the traditional approach. A rural district school, it would serve a completely vehicular-borne student body. Expansion was envisaged from an enrollment of 300, at the time of construction, to over 800 within eight years; thus, the plant had to be capable of easy and inexpensive enlargement. Ground space was no problem, and sunlight was plentiful, so that the open, dispersed arrangement fitted logically into the site. Educationally, the buildings would house a progressive curriculum, and they would be used for adult community activities, both during and after school hours. Moreover, school authorities had no money to spend on statues and Greek inscriptions.

To meet these conditions, the architects worked out six main principles, four of which deal with the critical factor of windows and daylight. 1) A one-story plan replaced the conventional multistory plans, eliminating stairs, heavy foundations, and fireproofing. It also opened the way to having windows on both sides of the room. In later development, the one-story type was to prove capable of admitting still more light through the top of the roof—see Carmel School, p. 107. 2) A long corridor, flanked by classroom wings—a "backbone with ribs"—supplanted the quadrangle plans commonly in use. At Acalanes, these wings have open side-corridors—merely a canopy roof on steel posts—so that each classroom has direct access on both sides to the out-of-doors. Cross ventilation as well as two-sided lighting is thus facilitated. Quick escape of all pupils, in less than a minute in case of fire or emergency, is possible without the hazard of stairs or the cost of fireproofing the building. 3) Orientation of all rooms is uniform, so that all alike face in the best direction for light and sun—an arrangement not possible with the "closed" plan, with its meandering corridors and random orientation of rooms. It also permits the addition of new units with a minimum of structural alteration to the existing plant.

4) Multisource daylight is provided to insure good visibility throughout all parts of the room. The corridor canopy is dropped from the roof level to permit the classrooms to have dormer windows above it on the south, while larger windows facing the opposite direction gain unobstructed north daylight. In the old fashioned school, the pupil at a desk near the corridor receives perhaps one-one hundredths as much daylight on his desk as the pupil next the window wall. At Acalanes, the light for both is ample, and very nearly equal. 5) Classrooms are standard in size and shape and easily interchangeable in terms of the school's activity programs. To enlarge or decrease the size of the rooms, interior partitions of plywood-covered framing can be easily moved and remounted. 6) Complete separation of the different systems—structural, partitional, storage, heating, and lighting—from each other makes all of them easy to get at for repair and maintenance, and for quick changes when there is a shift of program. Acalanes classrooms have, as a matter of record, been enlarged or made smaller by shifting partitions in half an hour, with no upset whatsoever to lighting, heating, or wiring.

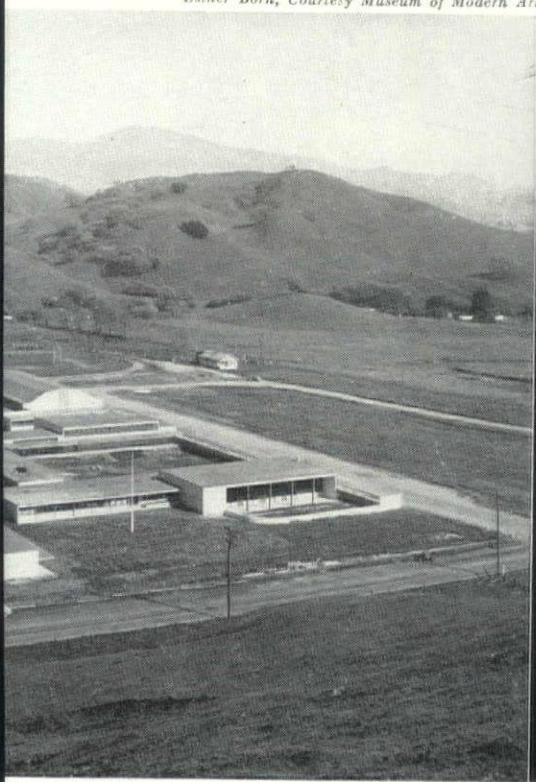


Fifth step in expansion may include girls' gymnasium and shop extension, plus buildings at extreme right.

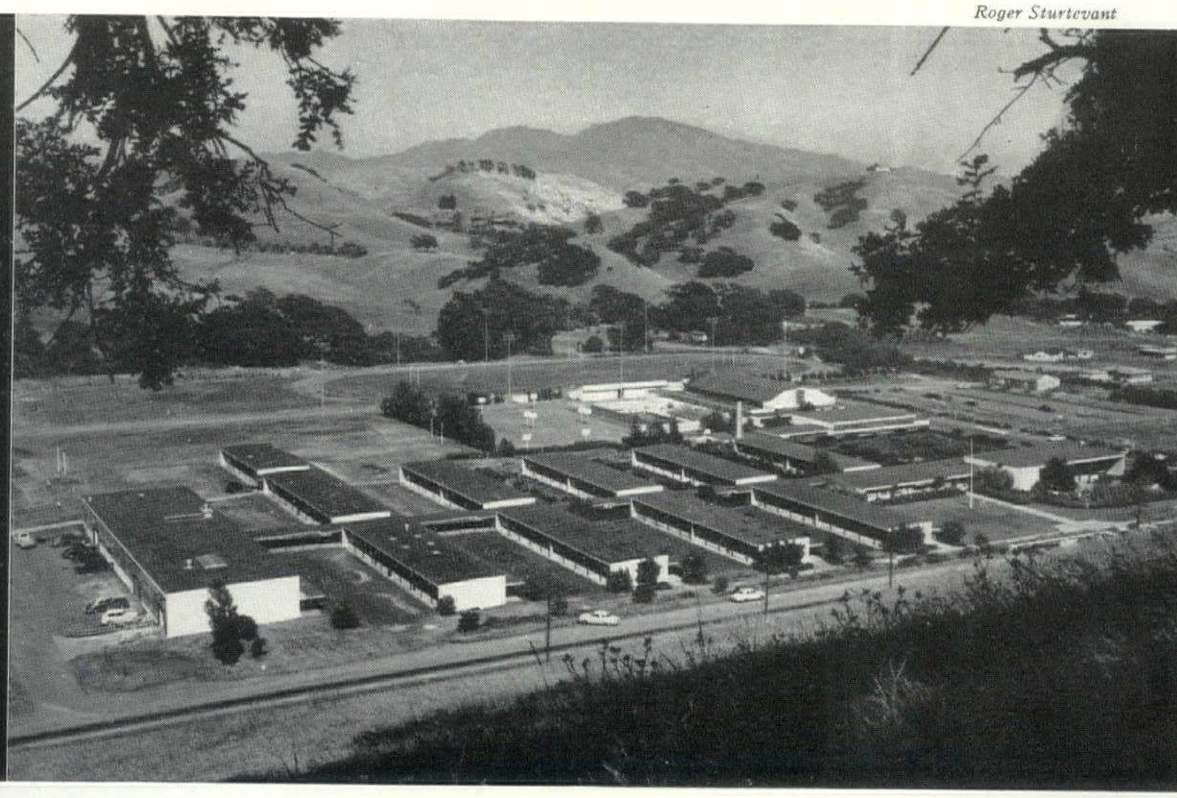
Third group, completed in 1948, added another set of vertebrae (classrooms) and a pelvis (shop) to finish the original spinal column, begun eight years before.

and educational progress

Esther Born, Courtesy Museum of Modern Art



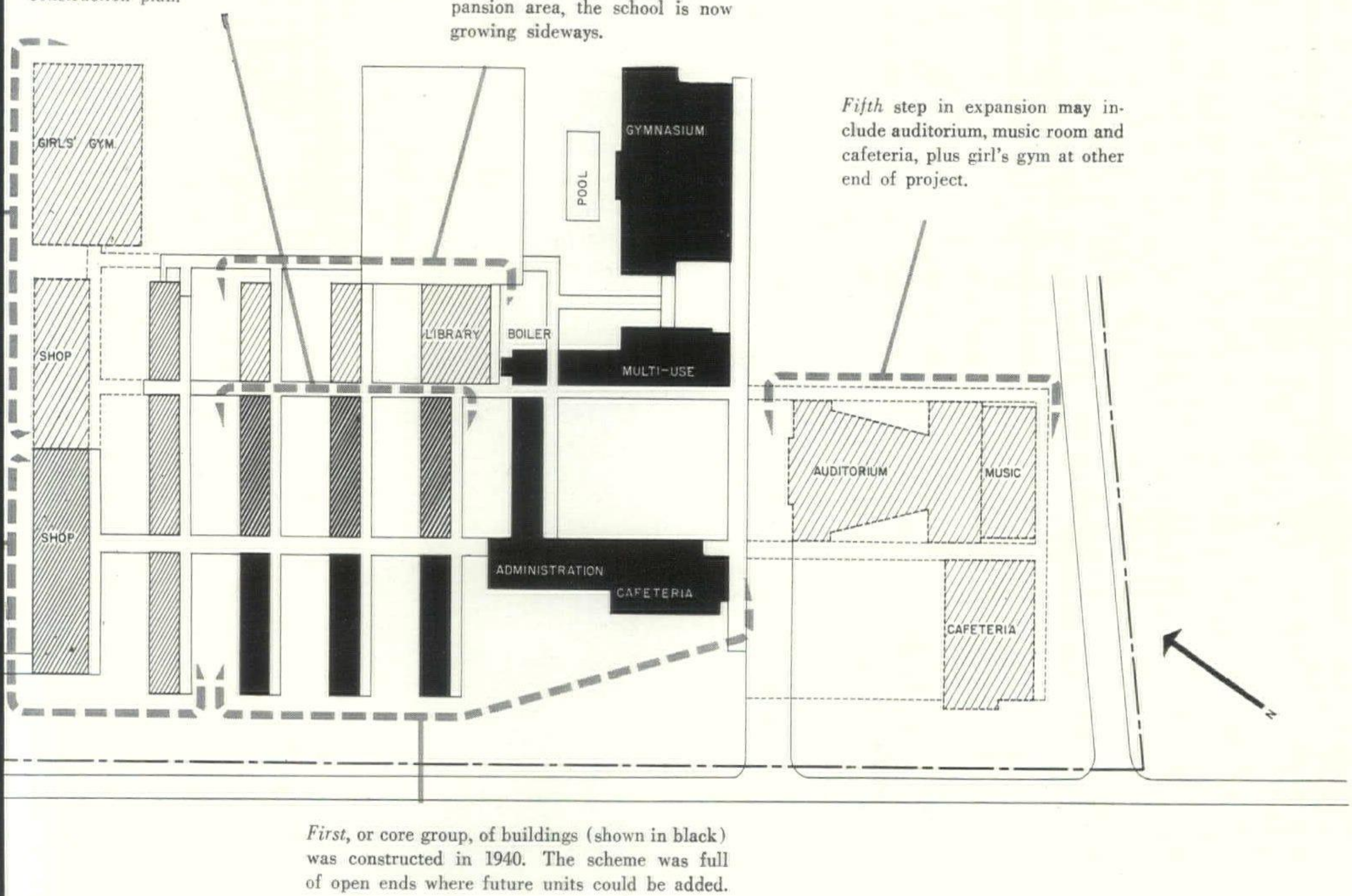
Roger Sturtevant



1940 | 1949

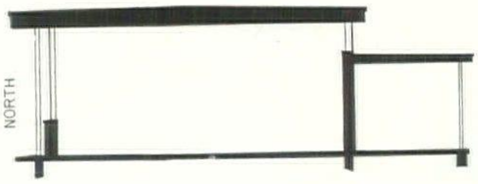
Second group consisted of three new classroom wings added in 1941. Like missing "vertebrae," they paired off existing units, completing first phase of school construction plan.

Fourth group of additions, now under construction, will provide three more units off new corridor. At the end of its lengthwise expansion area, the school is now growing sideways.



Fifth step in expansion may include auditorium, music room and cafeteria, plus girl's gym at other end of project.

First, or core group, of buildings (shown in black) was constructed in 1940. The scheme was full of open ends where future units could be added.



Last month a FORUM representative visited Acalanes to find out how the teachers like their school. Most of their criticism was minor: inadequate storage space in the classrooms; heating control dials too easily manipulated by students; corridors that were crowded in rainy weather, etc.

But teachers were wholly enthusiastic about the architectural design and dispersal of the buildings. "Every room has a garden," a young history teacher said. The key word, used spontaneously by several persons, was "freedom." Said Superintendent Neil M. Parsons: "The youngsters don't have a feeling of being in prison." Teachers noted that pupils are "happier," less "inhibited" than in many other schools. The prevailing atmosphere is "informal" and "casual." Morale is high and fatigue low, and the general level of interest good.

Most of this, teachers agreed, could be traced to the plentiful light, clear cut design ("soothing" rather than "exciting") and interpenetration between indoors and outdoors. Other factors mentioned were safety (one-story construction, concrete floors, etc.) quiet, low maintenance cost, and classroom flexibility. The fact that the plant has been twice expanded without greatly interfering with the school routine was cited. One man thought that a little ornament might not have been amiss, but the opinion of most teachers was summed up in the remark: "Simplicity is beauty."

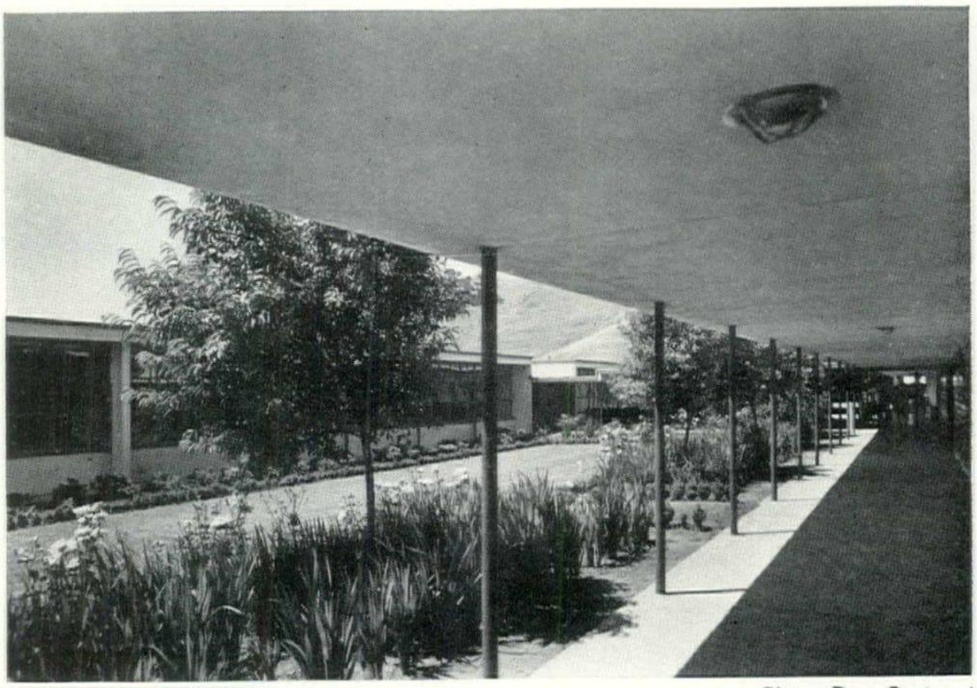
In terms of its ten years' results, Acalanes has amply proved its value.

COST DATA: Original cost of the school was $3.72 per sq. ft.—far below that of any California school plant of similar size constructed in 1940.

CONSTRUCTION OUTLINE: Roofing—asbestos built-up, Johns-Manville Corp. INSULATION: Walls—Fiberglas, Owens-Corning Corp. Roofs—Red Top blanket, U. S. Gypsum Co. WINDOWS: Sash—Ariston steel, Michel & Pfeffer Iron Works. Glass—Mississippi Glass Co., Pittsburgh Plate Glass Co. and Blue Ridge Glass Co. FLOOR COVERINGS: Classrooms—linoleum, Armstrong Cork Co. FURNISHINGS: Lab equipment—Hamilton Mfg. Co. Fume hood—Alberene stone, Hamilton Mfg. Co. DOORS (shop)—The Kinnear Mfg. Co. HARDWARE—McKinney Mfg. Co., Yale & Towne Mfg. Co. and LCN Closers, Inc. ELECTRICAL INSTALLATION: Wiring—General Cable Corp. Switches—General Electric Co. Fixtures—Smoot Holman Co. and Benjamin Electric Co. Special equipment—General Electric Co., Square D. Co., Standard Electric Time Clock Co. and Edwards & Co. PLUMBING FIXTURES—American Radiator-Standard Sanitary Corp. HEATING: Boilers—Kewanee Boiler Corp. and American Radiator-Standard Sanitary Corp. Grilles and convectors—Young Radiator Corp. Regulators—Minneapolis-Honeywell Regulator Corp. Valves—Crane Co. and Pratt & Cady. Circulators—Bell & Gossett Co. Fans—American Blower Co. and Binks Mfg. Co. Kerrick cleaner—Clayton Mfg. Co.

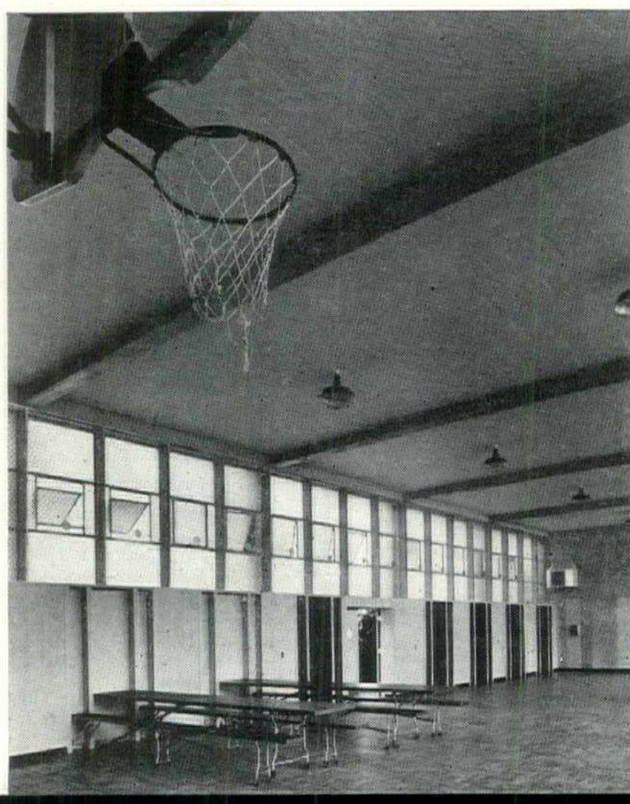
Interior of library shows continuous fenestration along north wall, with tilt-out panels for ventilation. Daylight is also admitted from strip of windows over bookshelves. All parts of room are evenly illuminated.

Esther Born, Courtesy Museum of Modern Art



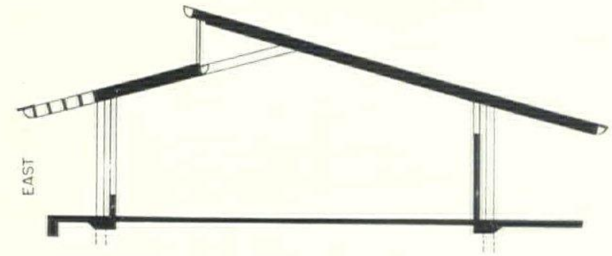
Canopied exterior corridors serve all classroom wings and shade south side of buildings. View here shows lawn area and plantings that provide classrooms with an open, garden-like setting.

Photos: Roger Sturtevant



Shop building, now girls' auxiliary gymnasium, also serves as a lunchroom during the noon hour. Tables and benches fold quickly into storage slots along the walls.

TOP-LIGHTED SCHOOL brings pioneering up-to-date with modular design and construction, large square classrooms and sumptious finishes



LOCATION: Carmel, Calif.

KUMP & FALK, Architects and Engineers

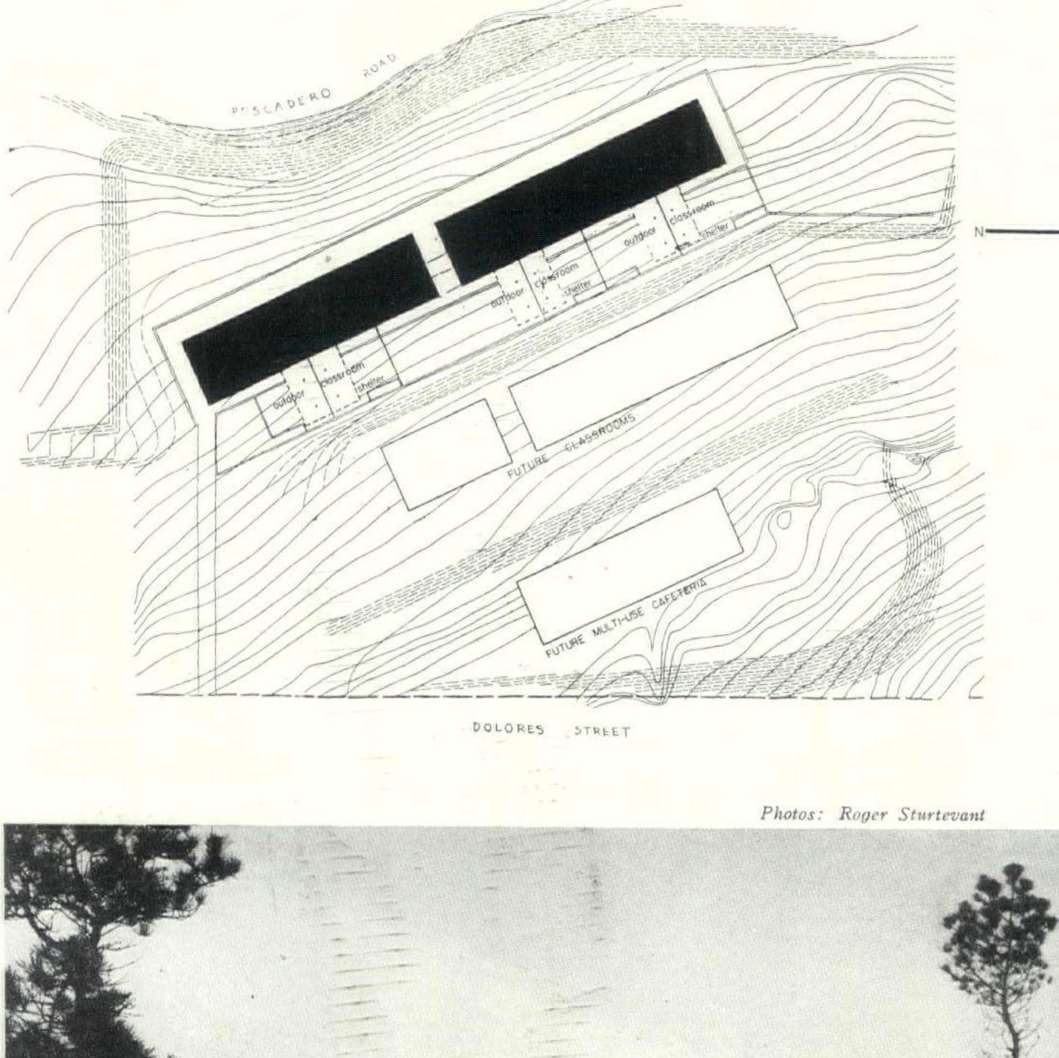
HAROLD C. GEYER, General Contractor

At Carmel the same architects have brought the ten year old Acalanes type of plan up-to-date (see previous pages). Accommodating 300 pupils, classes averaging 30 each, the Carmel School differs basically from Acalanes High by being an elementary school, and one in which progressive teaching methods require considerable equipment and added "activity" space. Square classrooms have been found to provide this extra usable space in a good arrangement with an absolute minimum of added construction. So Carmel's classrooms, giving every child the luxury of 30 sq. ft. of space, are up to the minute.

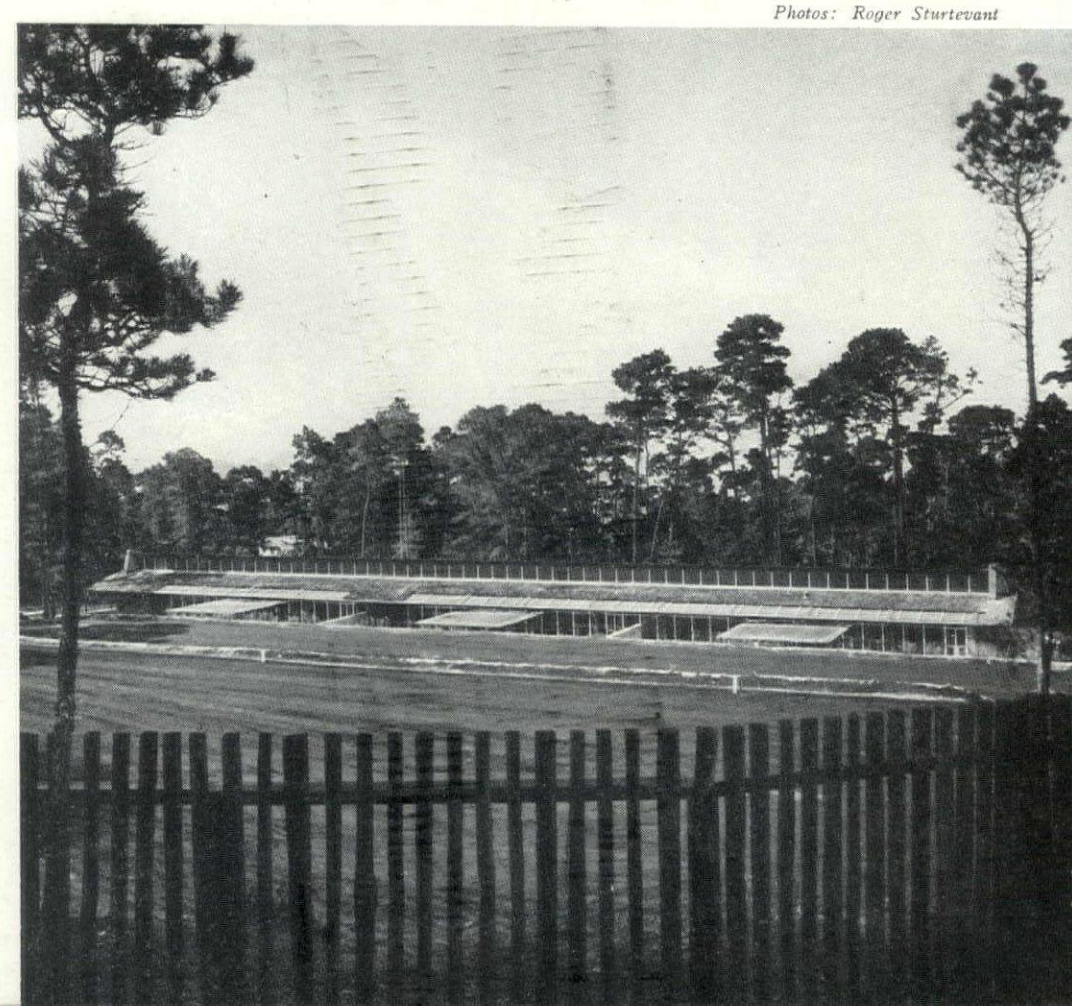
Compared to a rectangular room, a square room imposes a new daylighting problem, because of the greater distance between the two outside walls. To meet this requirement, the architects introduced a clever overhead dormer admitting extra light into the middle of the room. (See vertical section at head of page.) Added to the two window walls (both shielded by wide overhangs) this continous dormer gives the room a third source of light, yet avoids the maintenance expense of some other schools in which "trilateral lighting" is achieved by means of a ridged skylight. Moreover, the dormer beats the skylight because the ceiling behind it serves as a reflector for diffused daylight just as it serves as a reflector for the indirect electric lights. And because the dormer is high up above the *middle* of the room it is out of the pupils' ordinary line of vision while at work. It requires no shielding by louvers or egg-crates—nothing beyond its glare reducing glass—to keep it from being an annoying source of glare.

In some previous schools of the same type, Kump & Falk relied entirely on this kind of a dormer and on windows on the *same* side of the room, omitting any windows on the opposite side along the corridor. But this prevented the children next to the corridor from obtaining their full share daylight. The objections of purists to having light enter from more than one side of the room are overcome in practice by the careful shielding of the window walls so as to eliminate cross shadows, keep light even, diffused, and plentiful even on dark days.

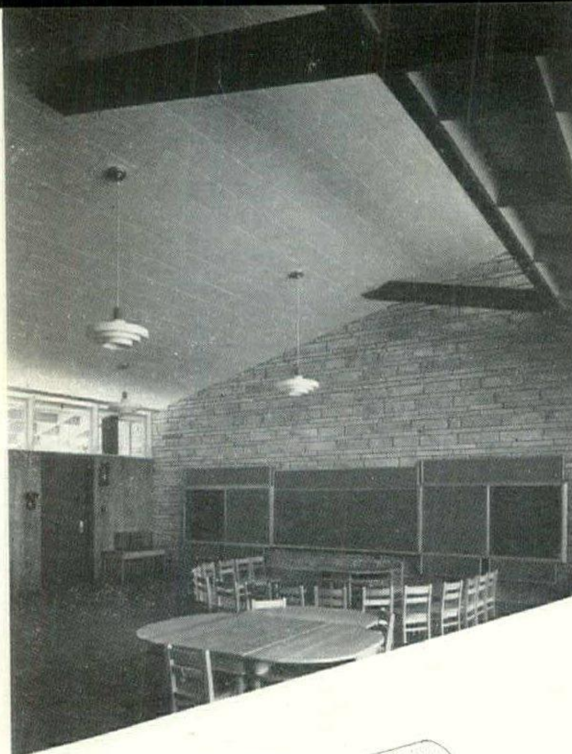
In its shapes, materials, finishes, the sumptuous school at Carmel is a far cry from simple Acalanes. Low-slung, with raking pitched roofs, it is consciously child-scaled; cedar shakes, copper facings, stone end walls make its colors and textures luscious. The artfully shaped end walls suggest that an architect who departs from directness has a job imposing his fantasy. The effect is charming in the long overall view, where the building shows its essentials.



Photos: Roger Sturtevant

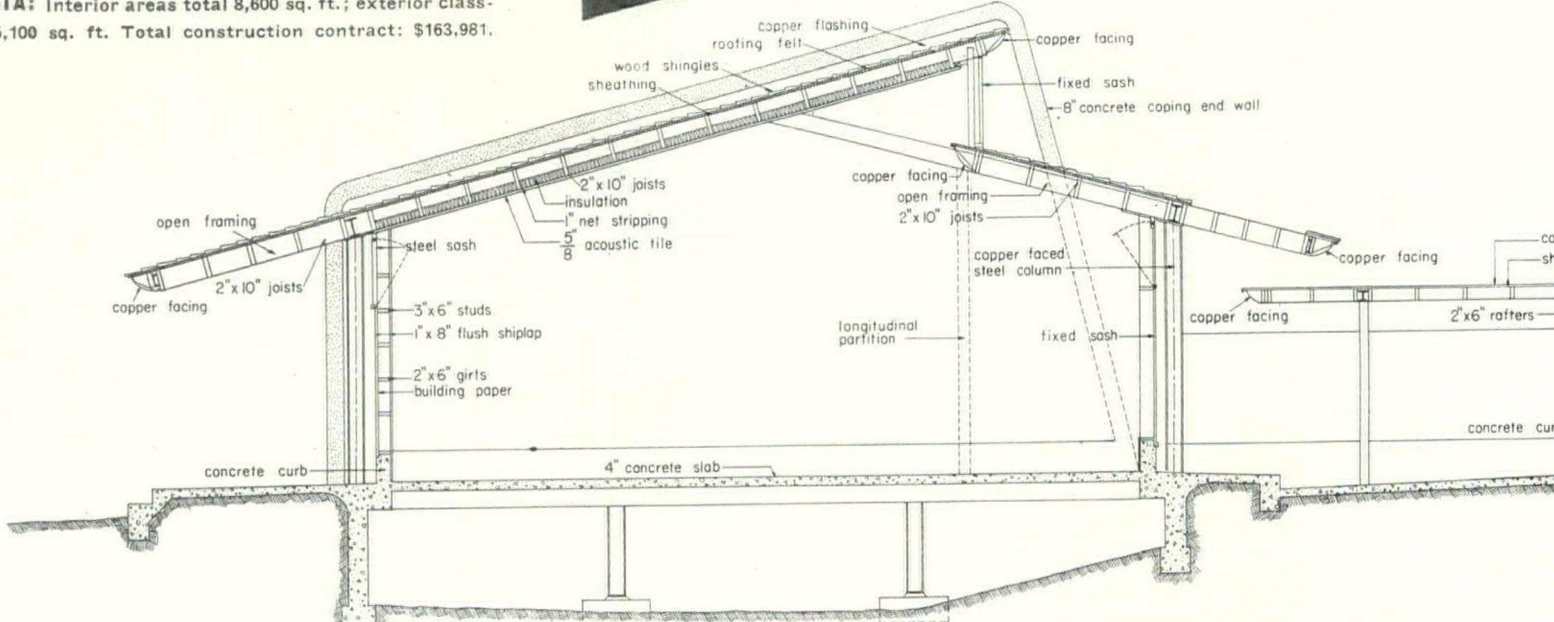


This school is an example of Kump & Falk's use of standard modular construction, whereby rooms can be modified in size, and equipment and furnishings taken down and remounted on the module. The building is constructed as a long, narrow shed, divided into square classrooms by movable stud partitions. It represents an advance in environmental flexibility over the firm's early work, both in its trilateral lighting and its full utilization of outdoor areas for classroom space. Adjacent to the building and separated from each other by stone walls, these outdoor classrooms comprise 42 per cent of the total teaching space. An esthetic accomplishment is the way in which such conventional elements of style as a gabled roof and stone end walls, are used to unite the building with its residential environment without spoiling the integrity of the plan.

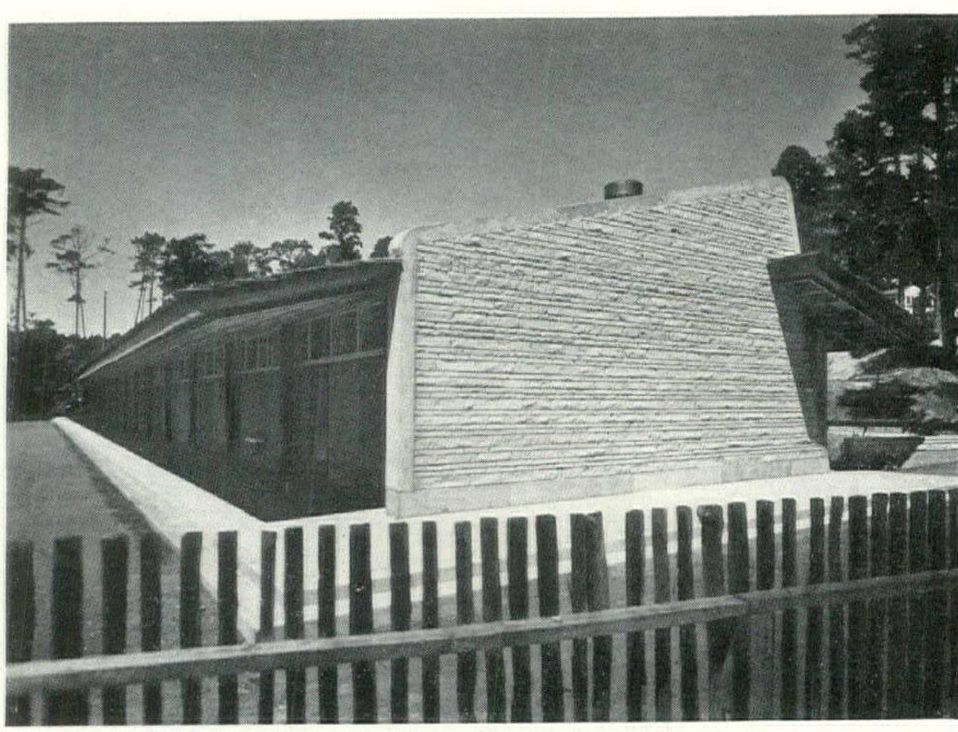


Recitation corner at one end of room is example of how informal groupings of children are made possible by the room's square layout. Note acoustic tile ceiling.

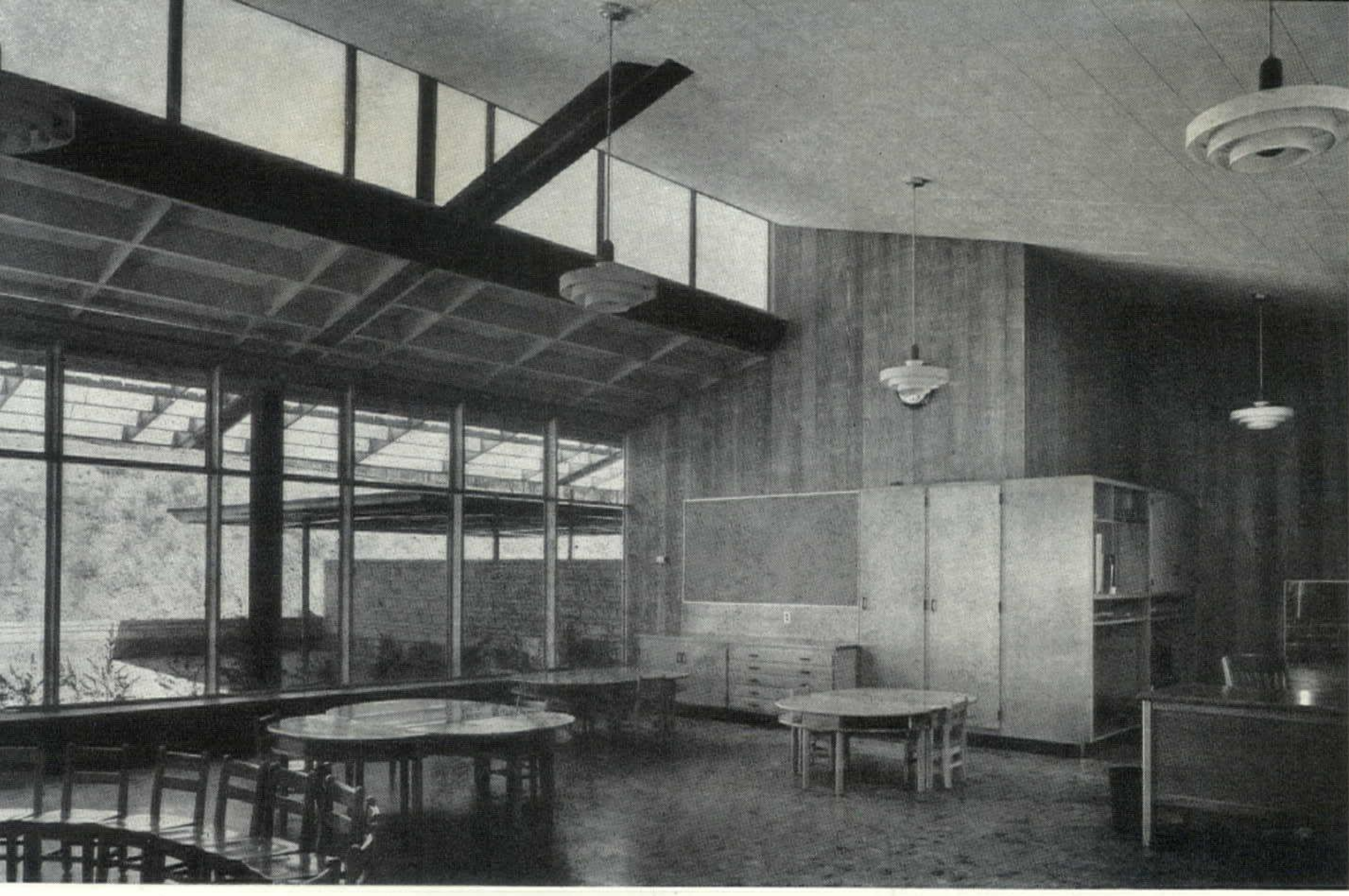
COST DATA: Interior areas total 8,600 sq. ft.; exterior classrooms, 5,100 sq. ft. Total construction contract: $163,981.



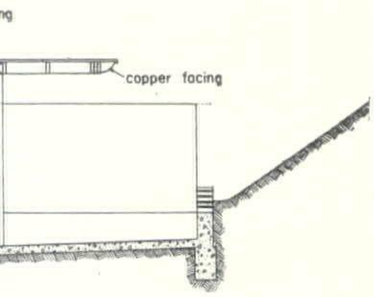
CONSTRUCTION OUTLINE: Foundations — concrete. STRUCTURE: Exterior walls—redwood shiplap, building paper, studs and interior vertical redwood. Floors—cement with asphalt tile finish. ROOFING—built-up, Johns-Manville Corp. INSULATION: Roofs—mineral wool batts, U. S. Gypsum Co. Windows: Sash—projected steel, Soule Steel Co. Glass—heat absorbing and crystal plate, Libbey-Owens-Ford Glass Co.; obscure, Mississippi Glass Co. FLOOR COVERINGS—Cushiontone, Armstrong Cork Co. STORAGE CABINETS—Hamilton Mfg. Co. HARDWARE—McKinney Mfg. Co., Yale & Towne Mfg. Co. and Glynn-Johnson Co. PAINTS—Samuel Cabot, Inc. ELECTRICAL INSTALLATION: Wiring—American Brass Co., U. S. Rubber Co. Switches—Westinghouse Electric Corp. Fixtures—Smoot Holman Co., California Electric Co., Day Brite Lighting Co. Fan—Pryne & Co. Clocks—Standard Electric Time Co. PLUMBING FIXTURES—American Radiater-Standard Sanitary Corp. Drinking fountains—Haws Faucet Co. HEATING—radiant system. Boiler—American Radiator-Standard Sanitary Corp. Regulators—Minneapolis-Honeywell Regulator Co. Valves—Crane Co. and Hoffman Specialty Co. Pump—Bell & Gossett Co.

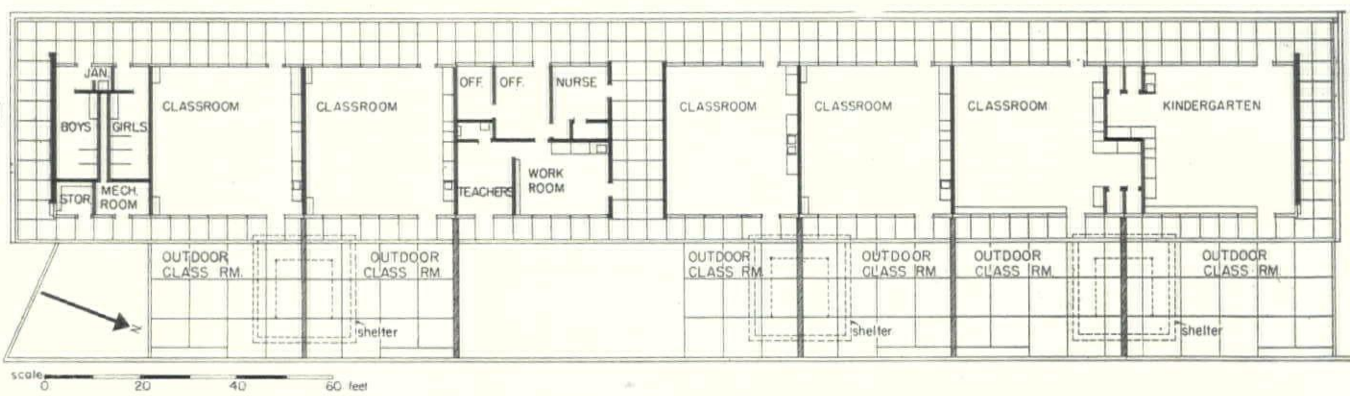


Deep overhang on south wall continues slope of gabled roof and shades south side of the building from direct sunlight.

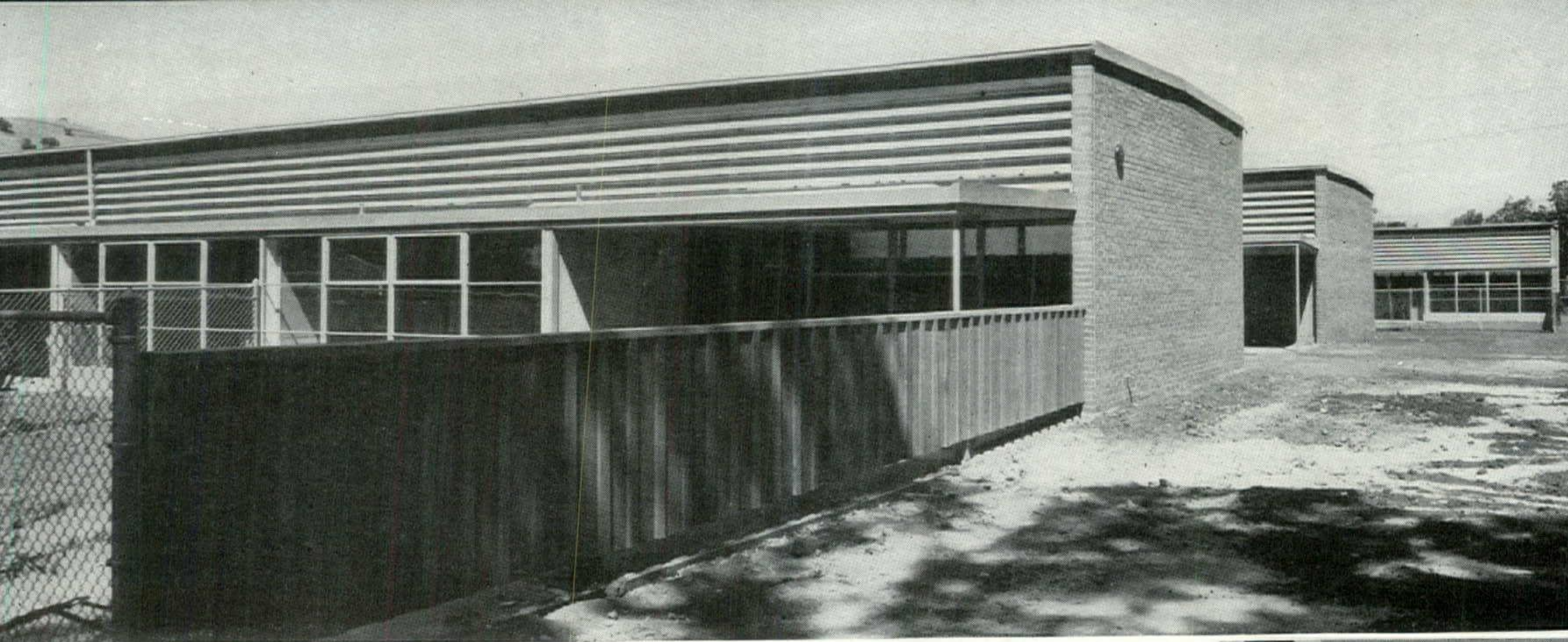


Sloping ceiling reflects daylight entering room at top. Steel column seen outside room is copper-sheathed to save recurrent painting. Storage furniture stands free, can be completely rearranged to suit teachers' needs.

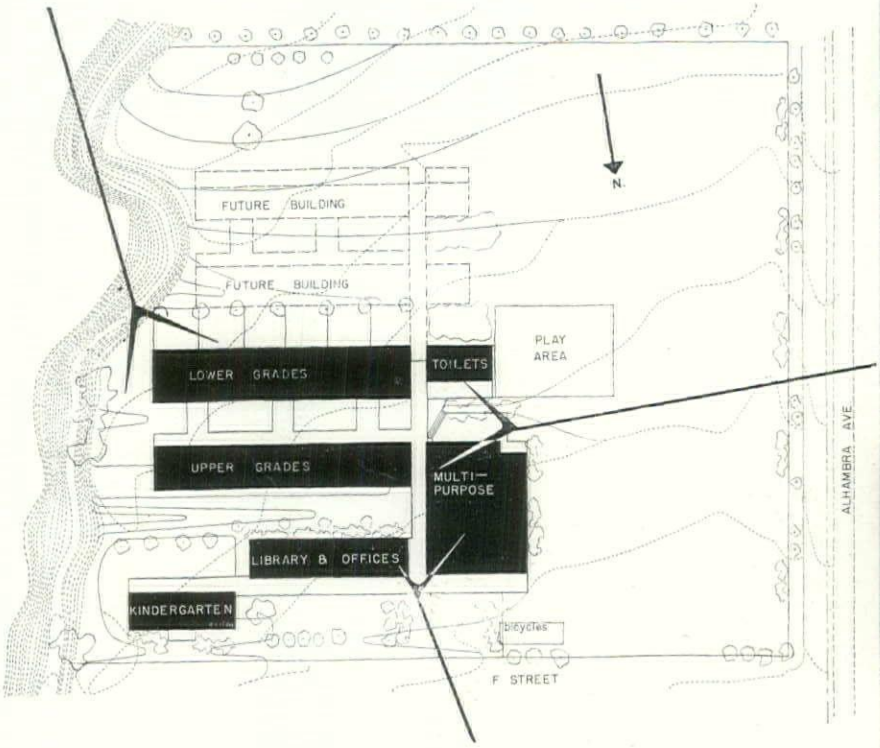


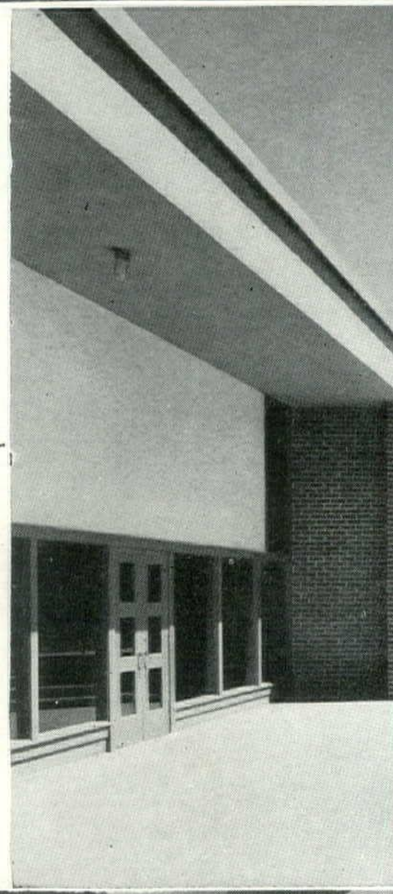


Exterior views shows the same outdoor classrooms that are seen through windows in view above. Concrete pavements are pigmented to the soft buff color of Carmel stone to reduce glare. They bounce light into rooms.

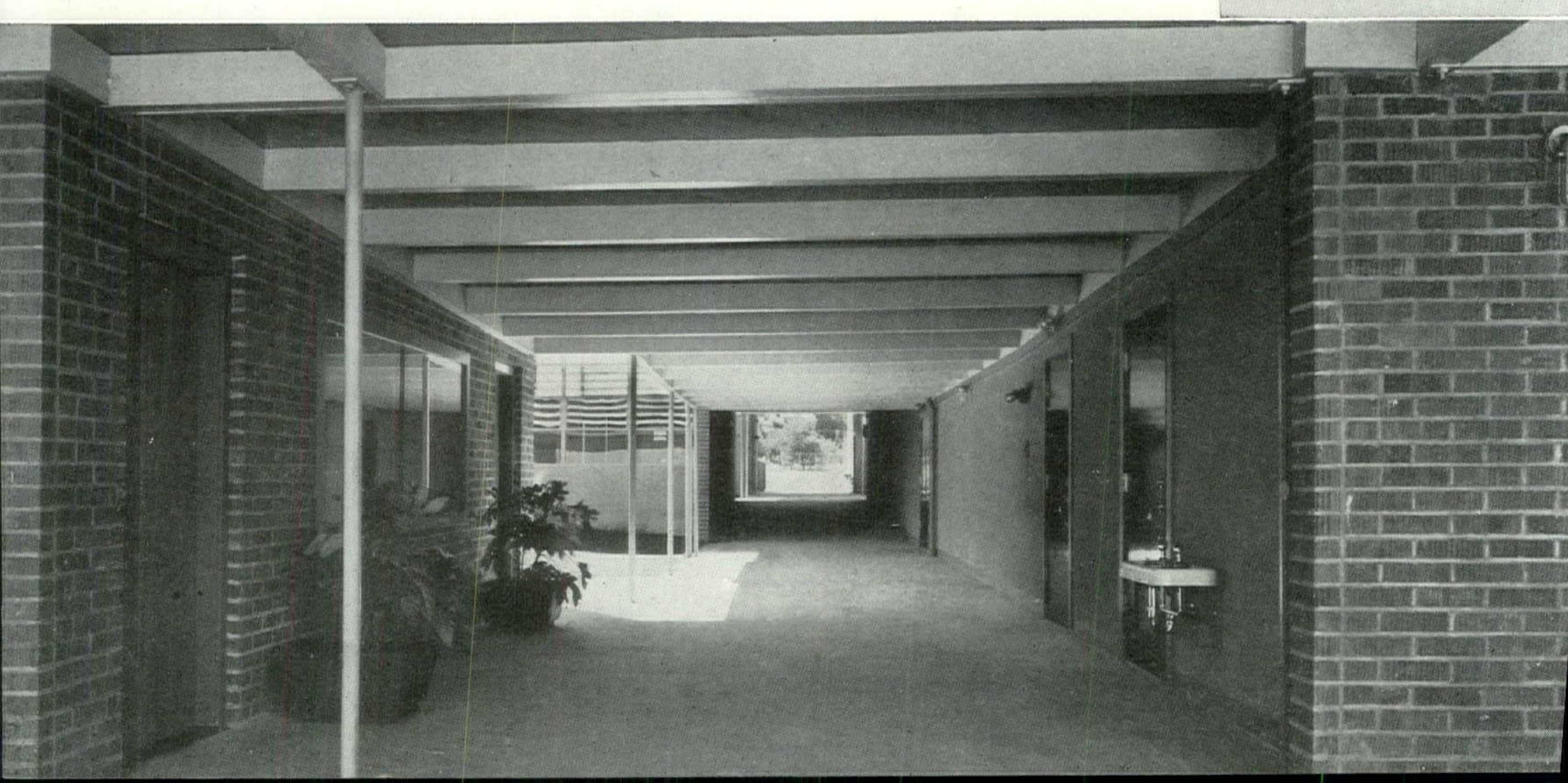


View from the south shows the lower grade classroom's projecting "porch" and activity alcove with the louvered classroom clerestory above. Outdoor classrooms are enclosed by wood and wire fences.

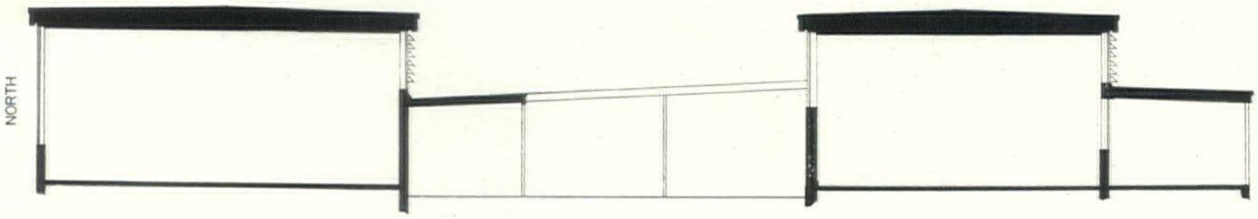




Main entrance sets color key for entire project: red brick, dark gray-green stucco, olive green corridor roof, sand color beams and girders, green trim, deep maroon doors.



LOW COST SCHOOL shortens the finger plan's corridors, tailors its indoor and outdoor classrooms to the needs of various grades



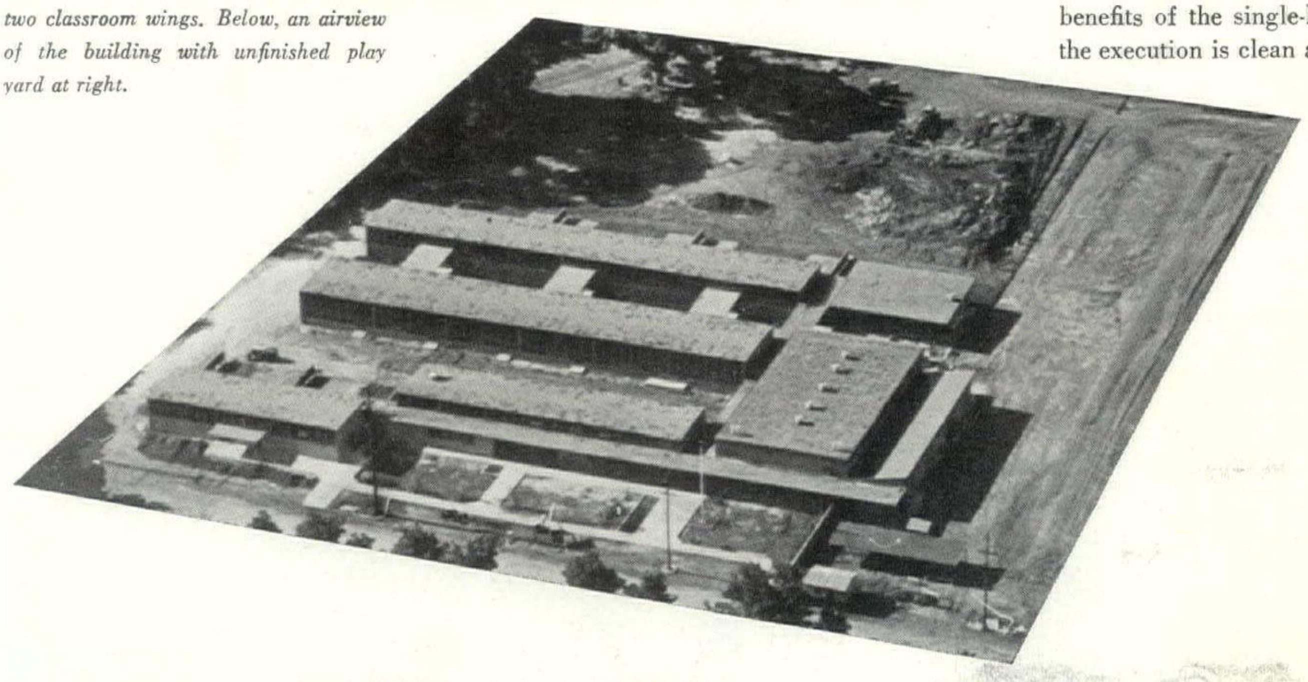
LOCATION: Martinez, Calif.

BAMBERGER & REID, Architects

B & R CONSTRUCTION CO., General Contractor

Photos: Roger Sturtevant

From court outside of multi-purpose room, a view to the west shows the open area and cross corridors between the two classroom wings. Below, an airview of the building with unfinished play yard at right.

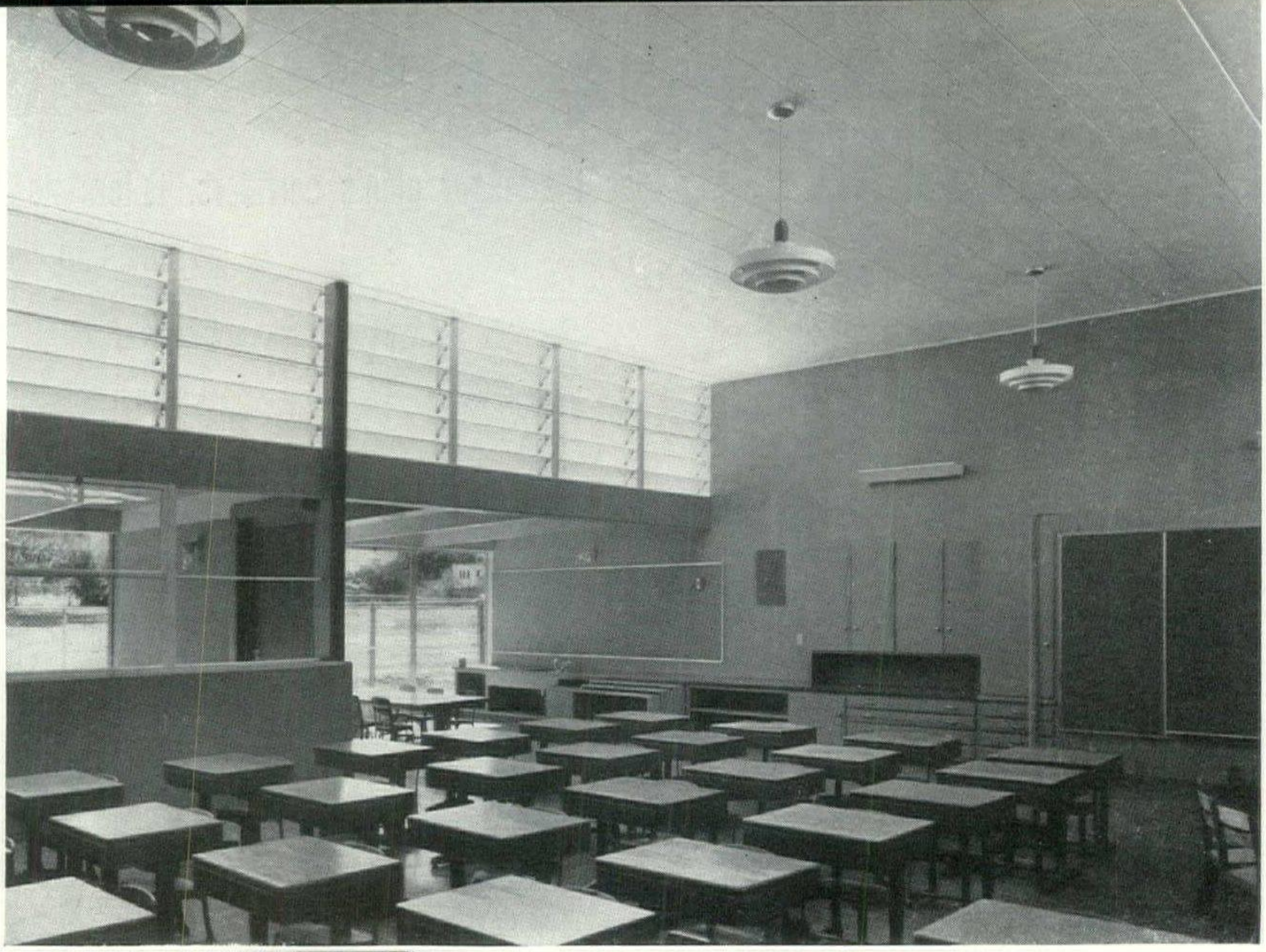


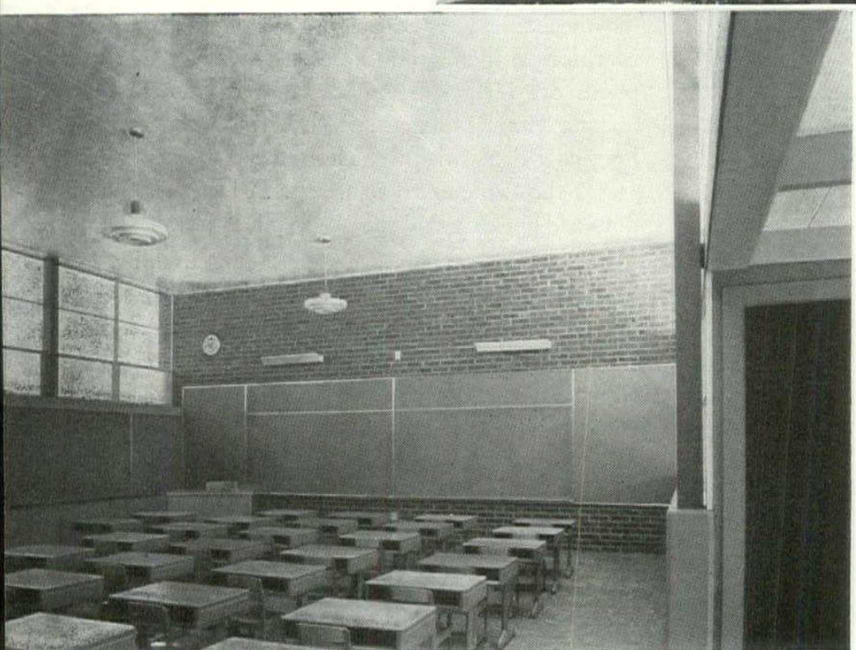
This building demonstrates what ten years' concentrated work by the nation's top school architects has done for the sprawled-out California type of one-story school. Basically, this school is still the "finger plan" type—classroom wings come off a connecting corridor as the prongs come off the cross bar of a rake. However, the architects have avoided the mechanical repetition of long classroom wing corridors which, in less imaginative California plans, are inefficient and costly even though their openness makes them easy to build. Instead, a single long corridor with three short transverse corridors serves the two classroom wings. All of these corridors are open on the sides—see photo left.

This corridor plan was made possible by the basic decision to face one classroom wing north, the other south, thus making it feasible to shorten the distance (courtyard) between wings to 23 ft. from the 32-34 ft. required for the daylighting of wings which face in the same direction.

In addition to saving money (the three transverse corridors cover only 1,150 sq. ft. compared with 1,940 sq. ft. for the single long corridor they replace), this scheme shortens walking distances and saves space on the small 5⅓ acre site for the future construction of another pair of classroom wings, duplicating the present 12 classrooms.

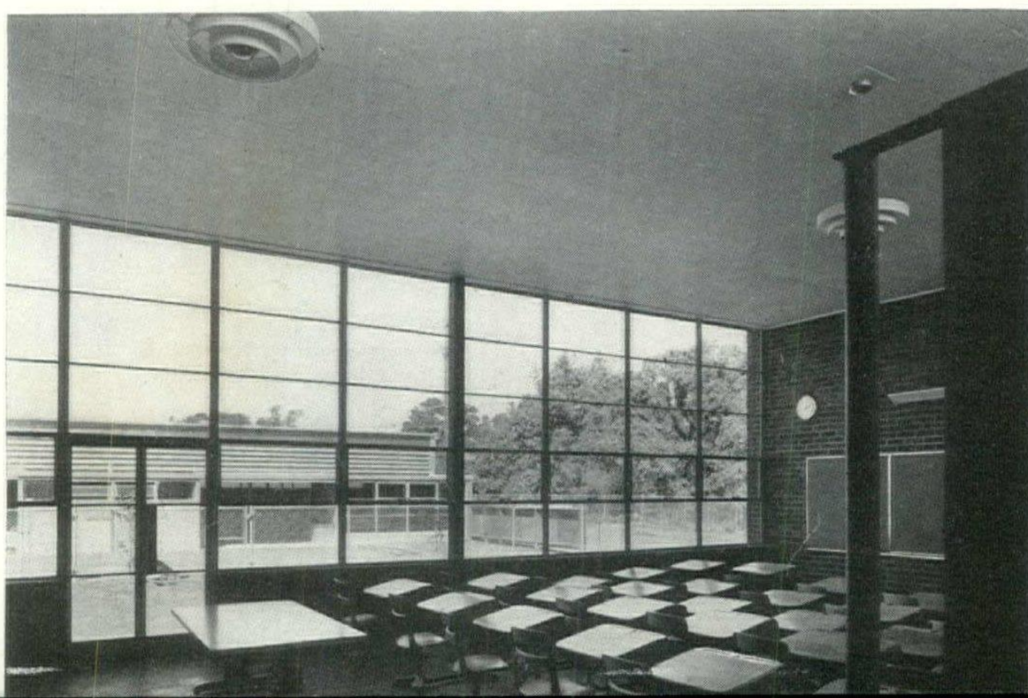
In effect, these pairs of classroom wings achieve much of the economy of a double-loaded corridor plan (see p. 113), yet gain the bilateral lighting benefits of the single-loaded, open-type plan. And the execution is clean and handsome.

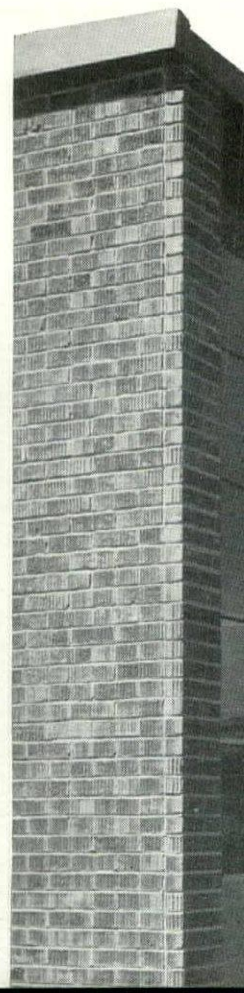




Lower grade classroom is given an L-shape by projecting activity alcove to the south, but the sheltered outdoor room (left) squares off the area. Plywood walls are stained a cool gray. Cabinets are gray-green, as is 3 ft. concrete wall at left. Floor is gray. Chalk boards are coral and, against the brick end walls (left), blue. Aluminum coated roof over projecting areas reflects light up on classroom ceiling through stainless steel louvers. Lower lights in north window (left) are glare-reducing glass.

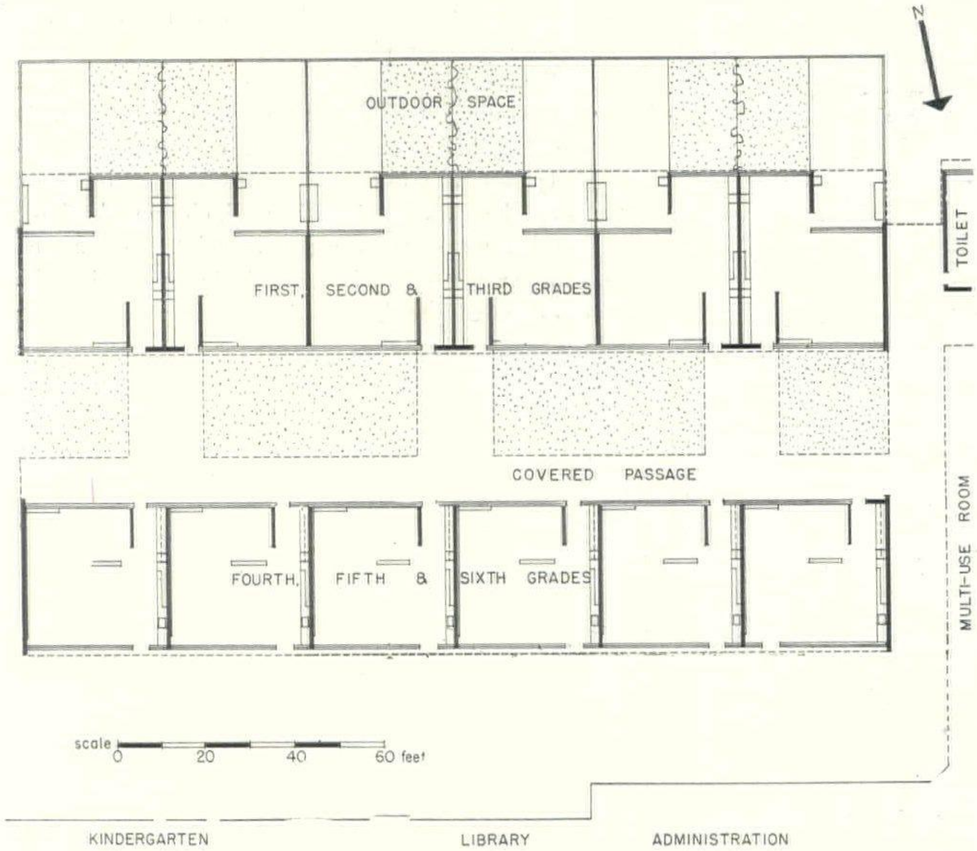
Upper grade classroom opens to the north, overlooks the kindergarten play area which will ultimately be shielded from view by vines on the wire fence enclosure. Note that acoustical tile need cover only part of the ceiling to achieve maximum efficiency at minimum cost. Right: view to the east between upper grade classroom wing and administration-library wing.





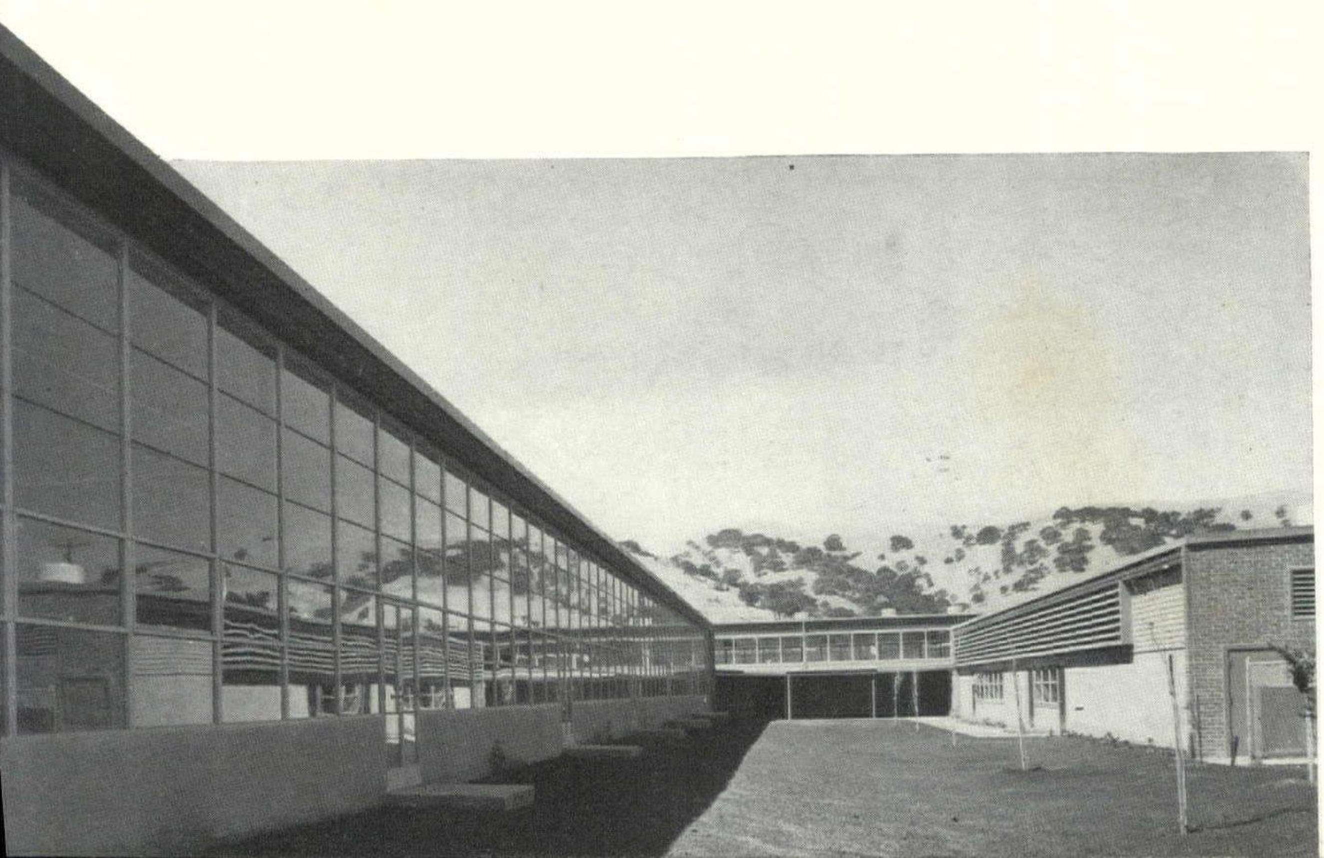
The corridor plan of the Montecito school is closely related to a sharp differentiation of classrooms for younger and older children. For the younger grades (first through third) the emphasis is on the outdoors. Their L-shaped rooms are in the south wing and face south. However, the main area of each classroom is shielded from direct sun by a projecting activity alcove whose low roof is carried over the private outdoor classroom. (In most California schools this outdoor class area is thoughtlessly placed north of the classroom wings, just outside of the big north windows where it is cast in the building's shadow and completely at the mercy of winter weather. Even San Francisco gets pretty cold in winter.) Kindergarten rooms are of similar design. However, rooms for the upper grades (fourth through sixth) are simple squares located in the north classroom wing and opened to the north by a wall of glass (lower picture opposite). They need and have no outdoor classrooms.

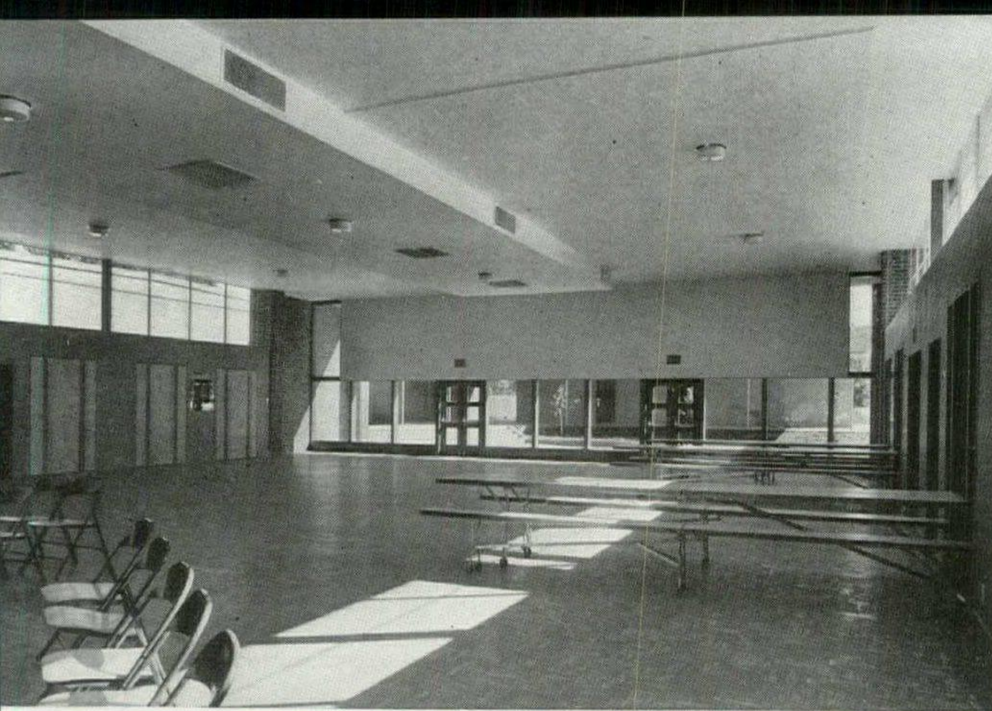
Construction is economical. Concrete piles and grade beams support a series of H-shaped columns 16 ft. on center and the masonry curtain walls. The columns, support longitudinal girders which, in turn, carry open web steel joists 4 ft. on centers. Steel work for the entire job was erected in only 2½ days.



COST DATA: Cost of building and equipment, excluding $26,400 architect's fee, was $329,722. Including 8,800 sq. ft. of open corridors at one-half, total area comes to 32,266 sq. ft., indicating a cost per sq. ft. of only $10.20.

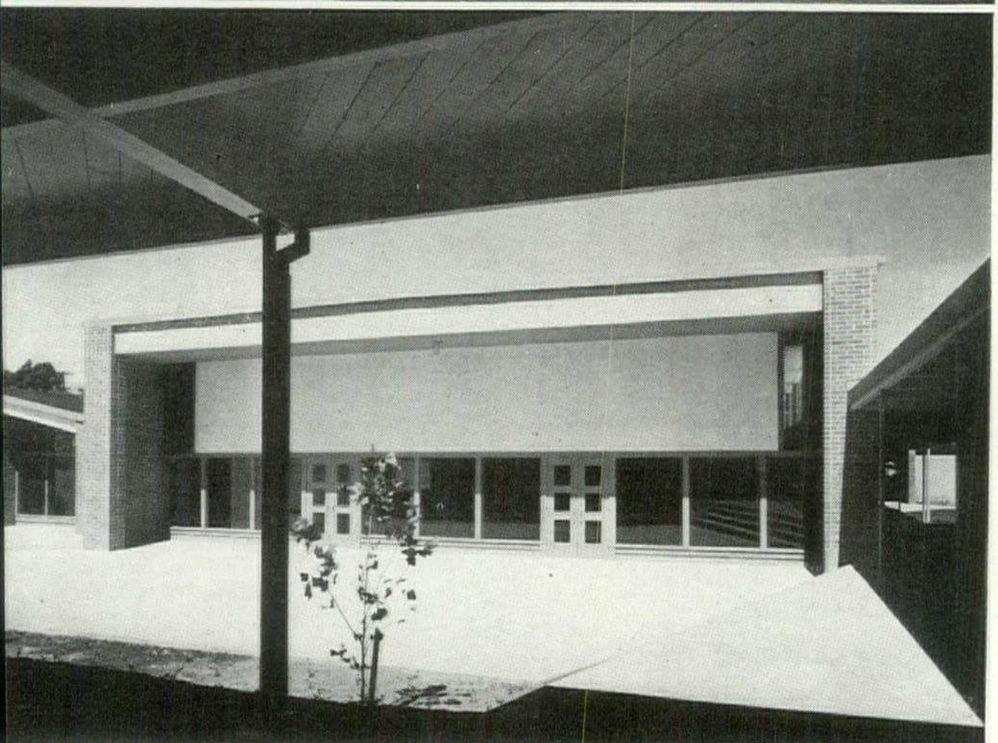
CONSTRUCTION OUTLINE: Foundations—reinforced concrete. Exterior walls— 9 in. brick with core of reinforced concrete for end walls; others—studs, sheathing and 1 in. stucco on wire lath. Structural steel—Soule Steel Co. Floors—reinforced concrete. ROOFING—built-up, Flintkote Co. INSULATION: Roof—4 in. Red Top batts, U. S. Gypsum Co. Sound insulation—Cushiontone, Armstrong Cork Co. WINDOWS: Sash—projected steel, Ceco Steel Products Co. Glass—Libbey-Owens-Ford Glass Co. FINISH FLOORING—asphalt tile, Tile-Tex Co. FURNISHINGS: Tables and folding benches—Schieber Mfg. Co. HARDWARE—Schlage Lock Co., McKinney Mfg. Co. and LCN Closers, Inc. PAINTS—Samuel Cabot, Inc. ELECTRICAL FIXTURES—Smoot-Holman Co., Crouse-Hinds Co., Pass & Seymour. Switchboard—Columbia Electric Mfg. Co. Clocks—Standard Electric Time Co. PLUMBING FIXTURES—American Radiator-Standard Sanitary Corp. KITCHEN EQUIPMENT—Charles Brown Hotel Supply. HEATING—radiant panel heating in floor slabs. Boilers—American Radiator-Standard Sanitary Corp. Thermostats —Johnson Service Co. Valves—Pratt & Cady Co. Heater units in multi-use rooms—Janitrol, Surface Combustion Co.

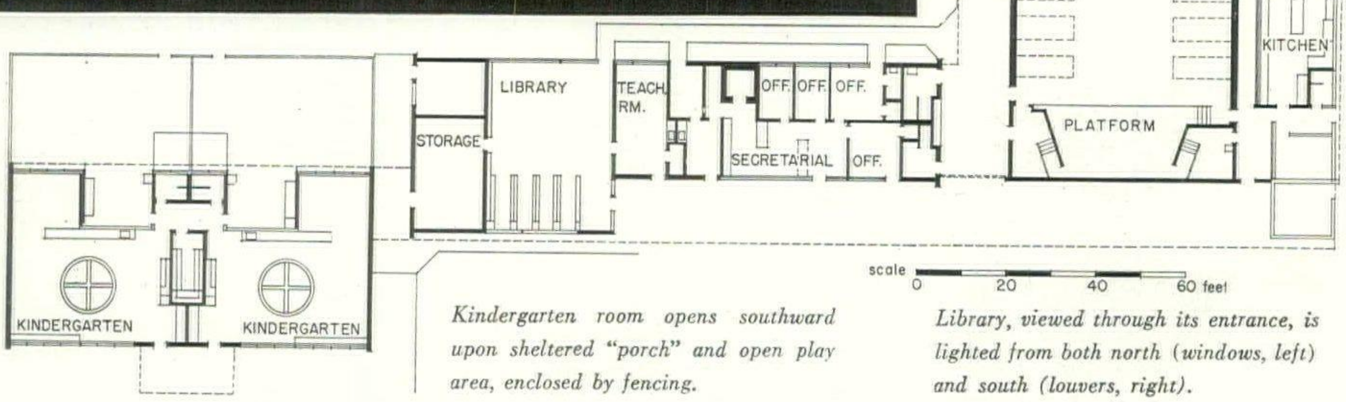




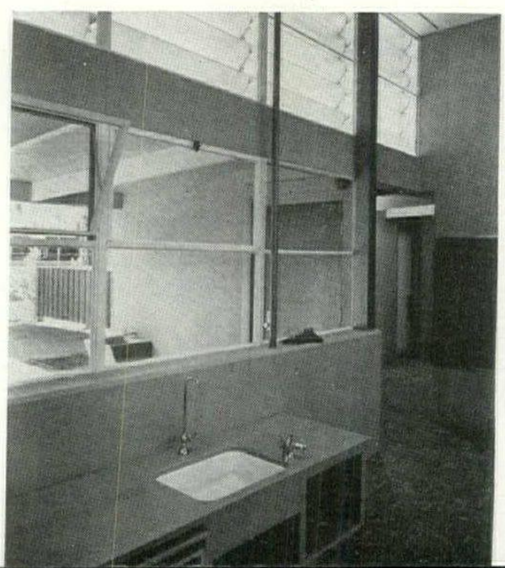
Montecito school's multi-purpose room doubles as an assembly hall, a theater and, in conjunction with its kitchen-cafeteria, a dining room. Close to the street, this room can be used outside of school hours by the community.

It is so planned that at mealtime children may line up, be served and seated in a continuous flow without any crossing of traffic lines. Children enter the cafeteria from the north and move directly into the dining room through a door in the center. After eating they go out through the room's two main doors (photo left) to the playground. The dining tables and benches fold into the wall, clearing the floor for other purposes. The panel set into the glass entry wall was required for acoustical purposes, is brilliant esthetically as the handling of a suspended "screen."

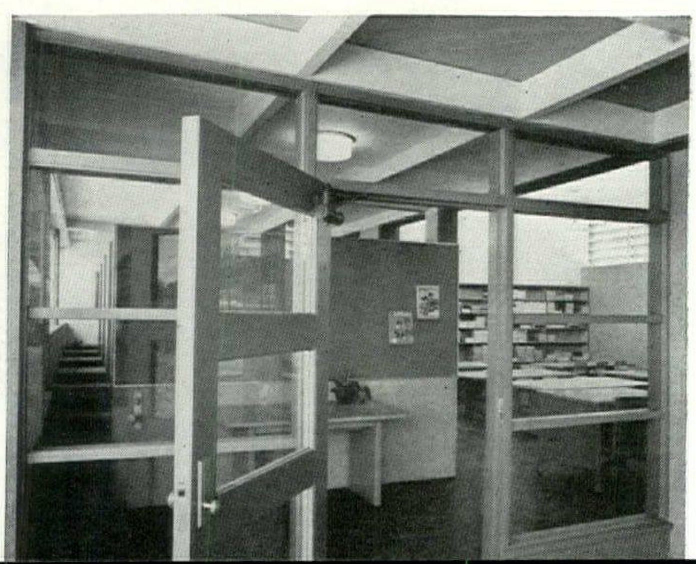




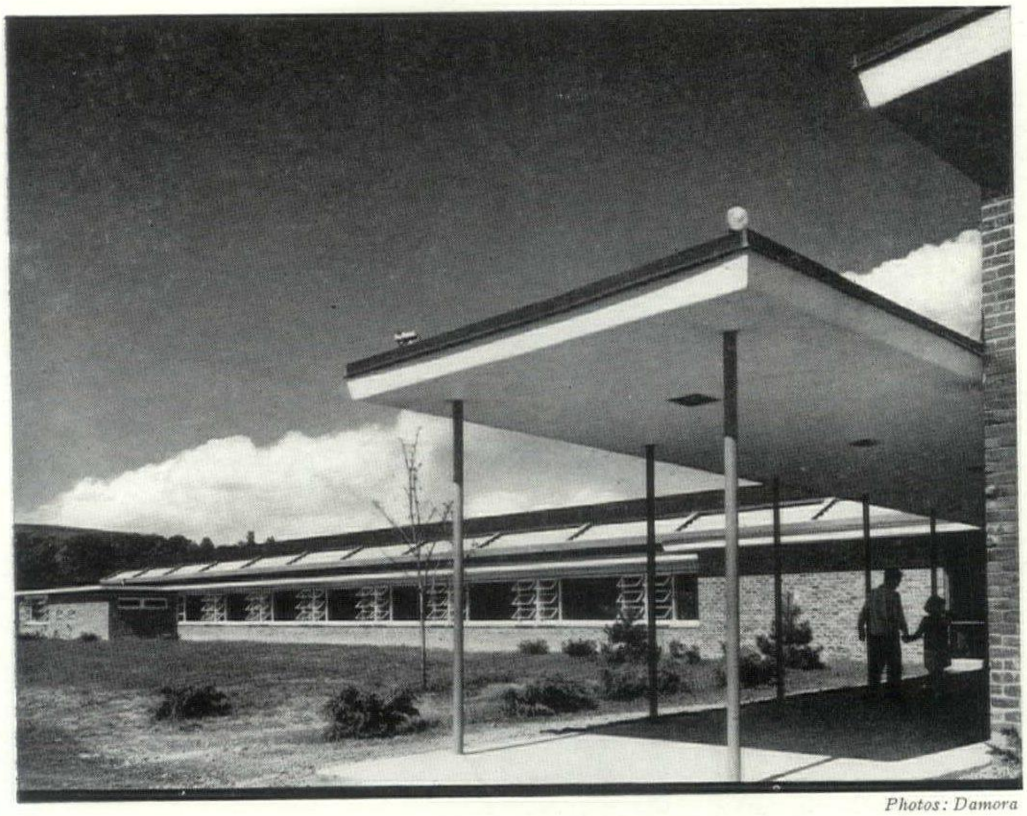
Kindergarten room opens southward upon sheltered "porch" and open play area, enclosed by fencing.



Library, viewed through its entrance, is lighted from both north (windows, left) and south (louvers, right).

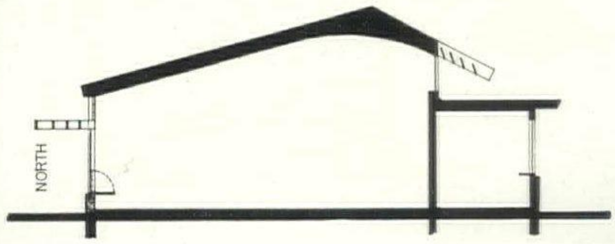


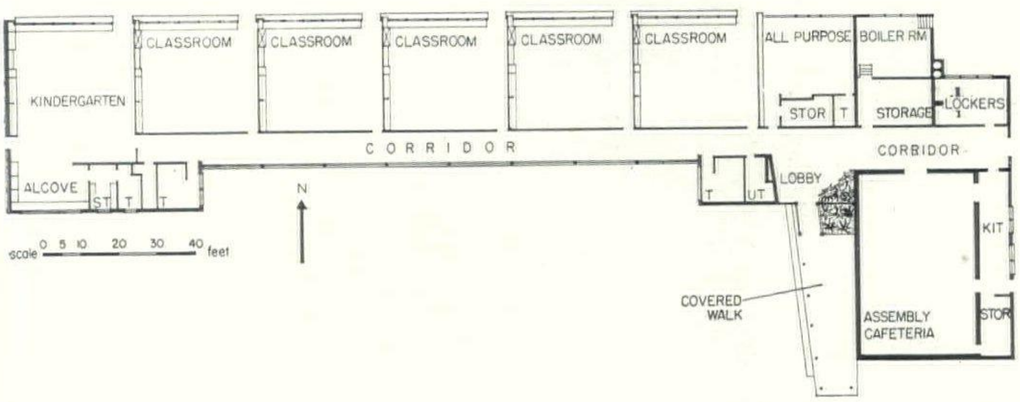
RURAL SCHOOL brings scientific daylighting scheme within reach of the country purse



Photos: Damora

LOCATION: Clarksville, N. Y.
HENRY L. BLATNER, Architect

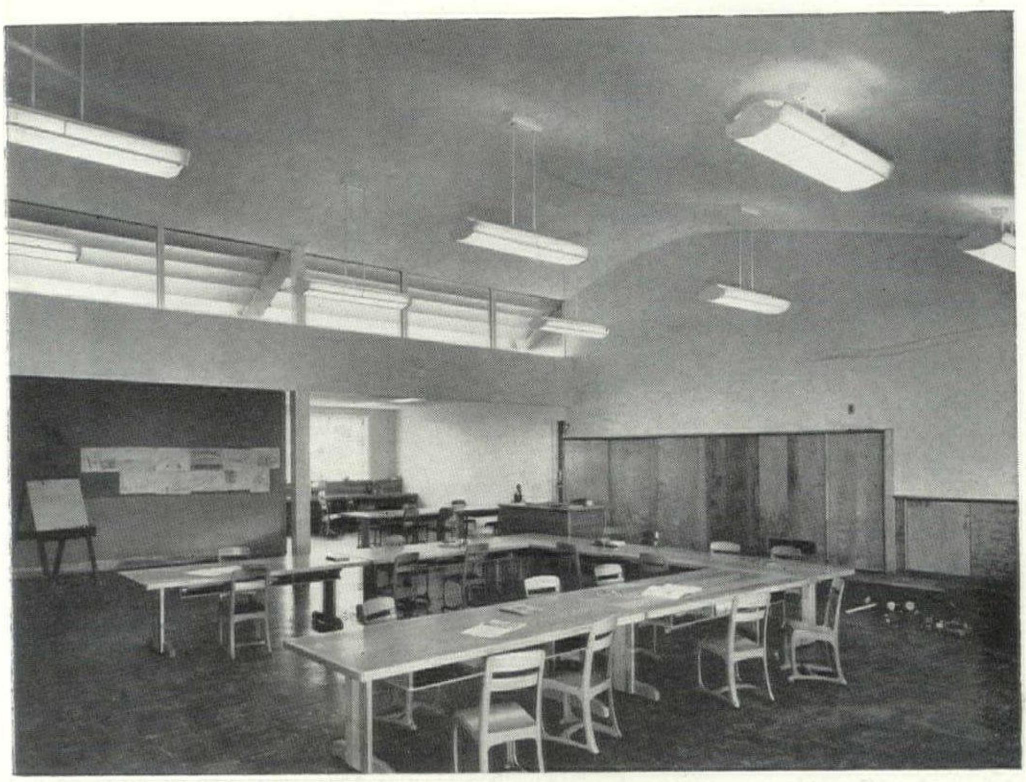




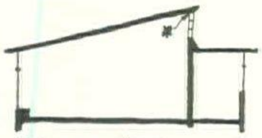
This is probably the first school building ever built in New York State with a north-south exposure. The revered canon—"sunlight in all classrooms"—has literally been thrown out of the window as a result of Architect Blatner's research in bilateral lighting. Savoring their new building, the teachers report that the restful visual atmosphere of the classroom, the view of sunbathed landscape through the big windows, and the free use of color more than compensate for the absence of direct sun.

The free hand given the architect in a suburban rural school district which had never seen anything but traditional schools before is due to a remarkably progressive attitude on the part of the school board, supervisory principal, and state education officials (see page 89). Everybody is more than pleased with the result. Said school board chairman John Bond: "We felt the architect's experiments in lighting alone were worth more than we were paying him in fees." (And they were, but the architect expects to get more school jobs!)

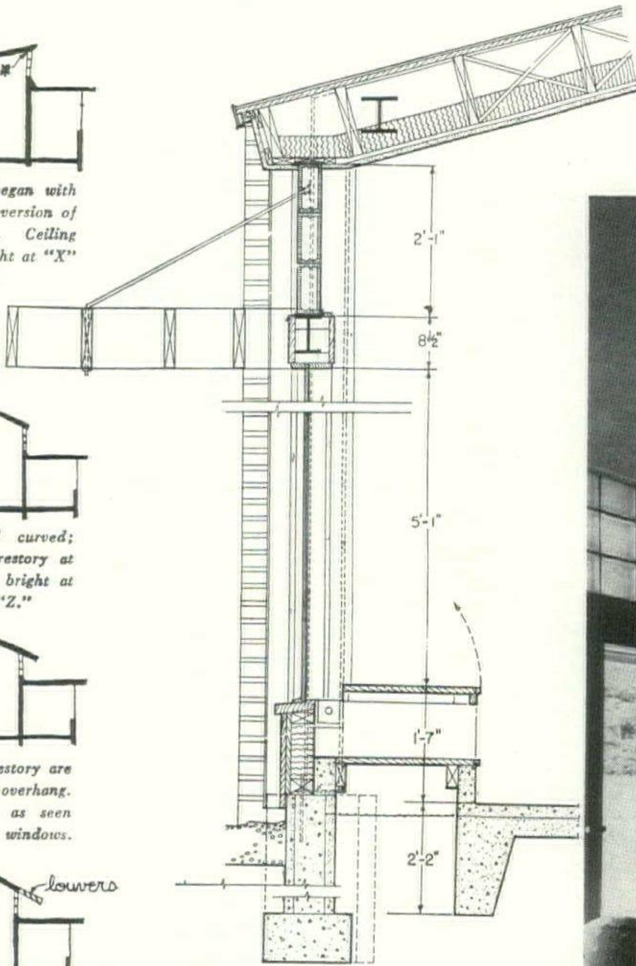
The building's six elementary classrooms are lined up along a corridor and lighted by a clerestory on the south or corridor side. On the north, they are opened widely by a 5 ft. window strip. This north-south orientation, eliminating direct sun, automatically provided a large measure of natural light control. The decision to put the large windows on the north sprang from the architect's belief that the disadvantage of solar heat in spring and fall in this climate outweighed its winter advantage. A 4½-ft. sky screen shades these north windows, which are surmounted by a 2 ft. strip of directional glass block, cutting out sky glare. Any remaining view of glaring sky will be cut down by a tree screen planted 40 ft. from the wall. The clerestory on the south is clear glass, shaded by a louvered overhang cutting off all sky view and painted a dark enough yellow to bring louvers within the desired 10 to 1 brightness limit of the room.

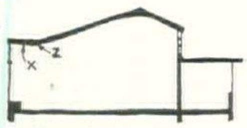


Kindergarten has alcove occupying widened west end of building and looking out on Helderberg foothills.

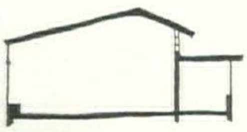


Tests on model began with this stock western version of bi-lateral lighting. Ceiling was found too bright at "X"

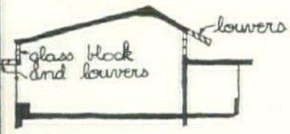




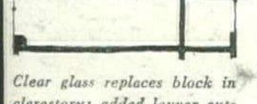
Roof peaked and curved; glass block in clerestory at south. Ceiling too bright at "X," too dark at "Z."



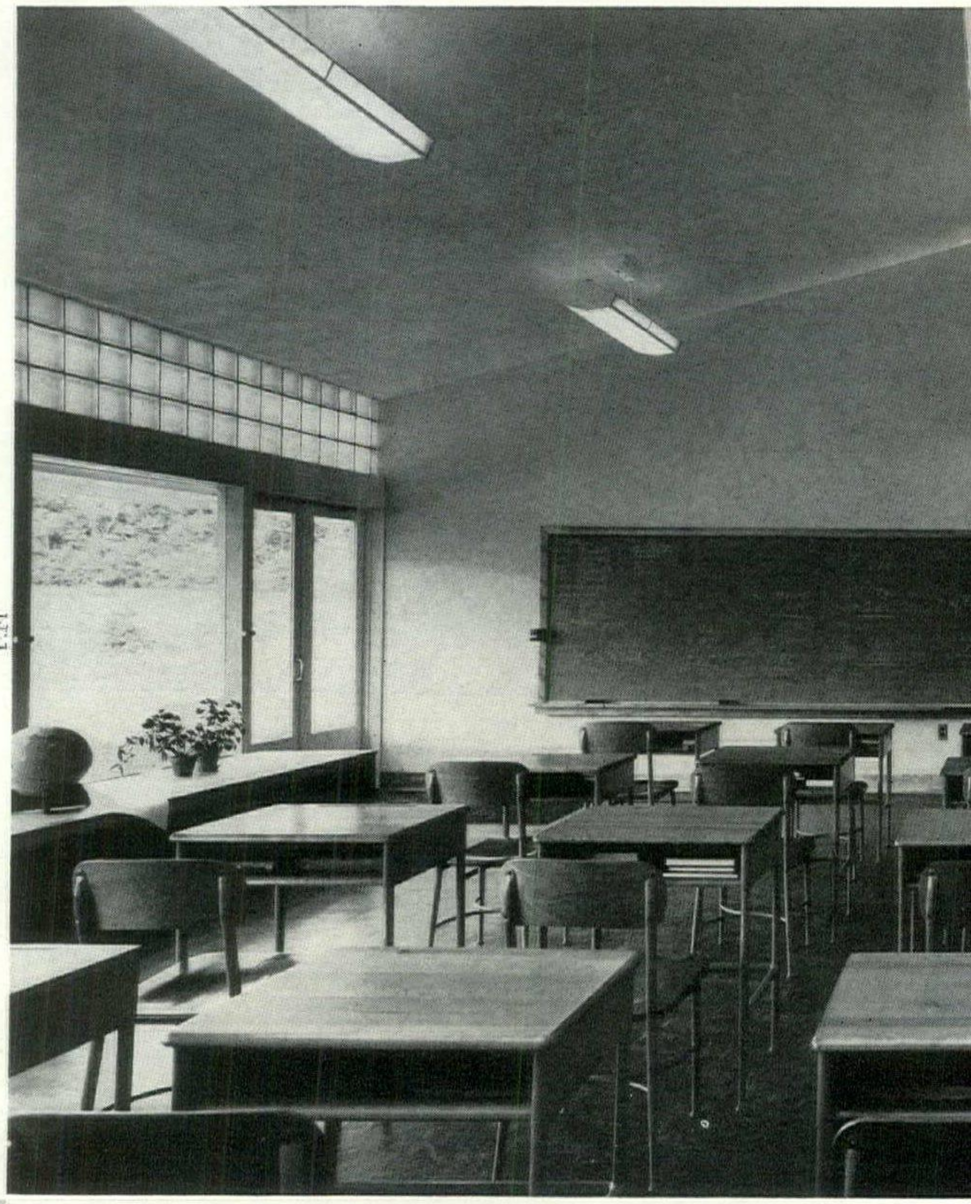
Glass block in clerestory are shielded by solid overhang. Sky is too bright as seen through the north windows.



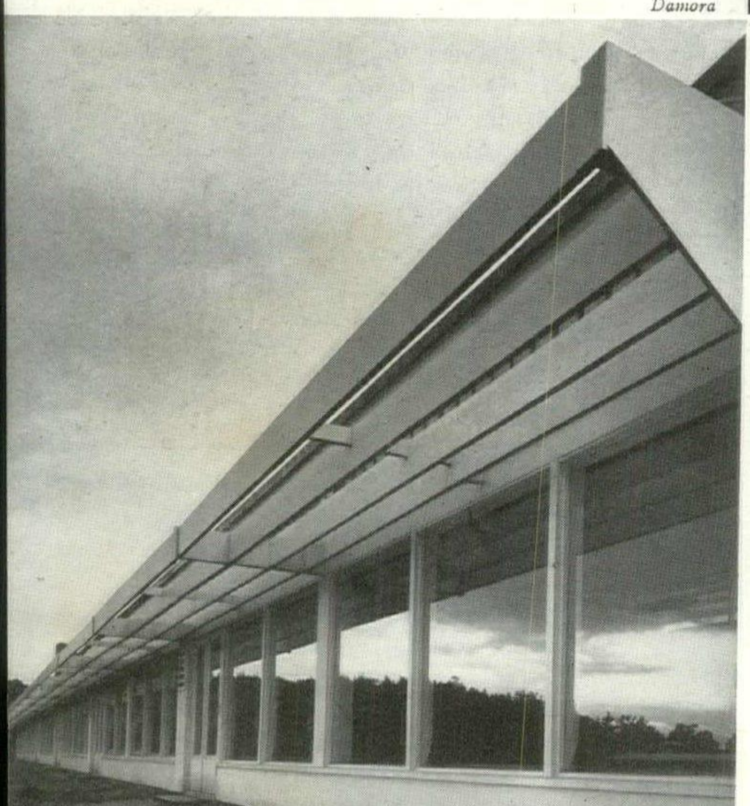
Glass block and louvers to cut sky view at north; louvers instead of solid overhang let in more light through clerestory.



Clear glass replaces block in clerestory; added louver cuts out all sky; tree screen at 40 ft. cuts all northern sky view.



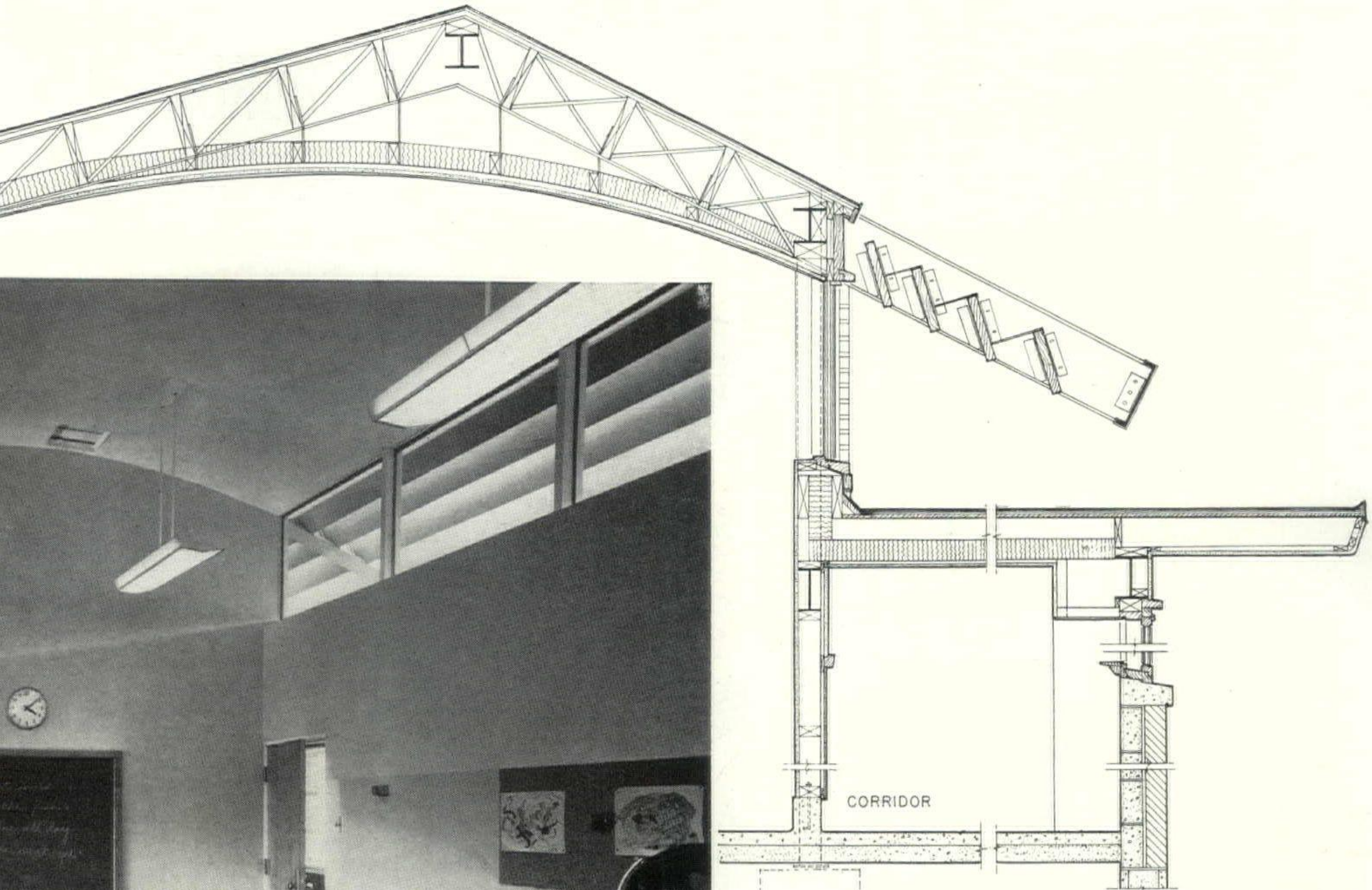
Damora

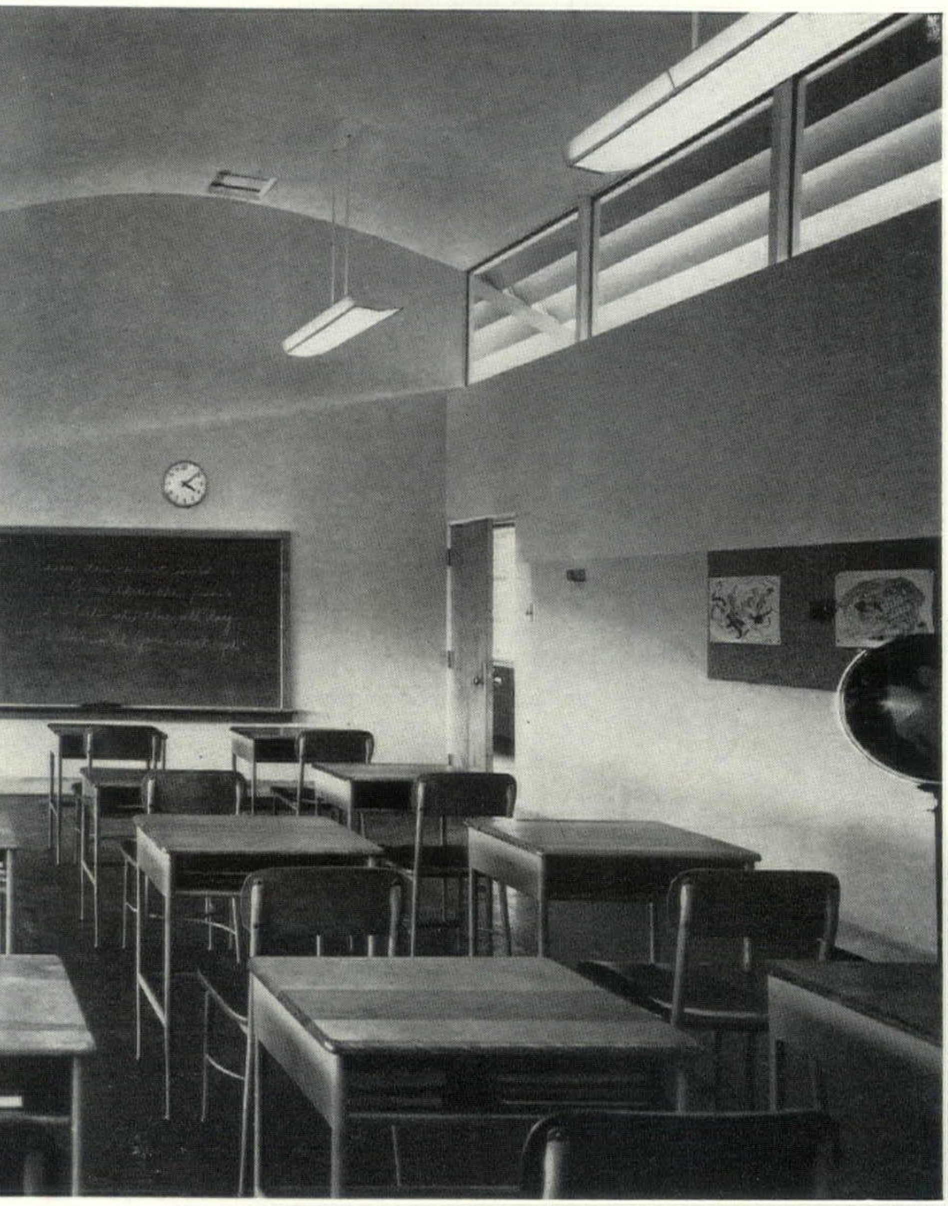


The roof angle, like the specific combination of glass block, sky shades, tree shade, was worked out by the architect after months of field tests. Built at 1/5 scale, a model classroom was placed outdoors and tested for foot-candle and brightness readings under a variety of weather conditions. Five separate designs were built and tested (see above, left), beginning with the stock western solution.

Refinement was ultimately carried to such a degree that lids of window boxes seen at the left in the large photograph can be hinged up on bright winter days to cut out snow glare! Yet in the end the effect of the school depends as much on art as on science: soft coral, gray, yellow colors, plenty of space, the gently curved ceiling, the view across sunny fields, and above all the implied chance to run directly out of doors.

COST DATA. The building contained 12,806 sq. ft.; construction costs were $187,972.84. Unit costs: $14.68 per sq. ft.; $.99 per cu. ft.; $31,328.80 per classroom; $1,160 per pupil.

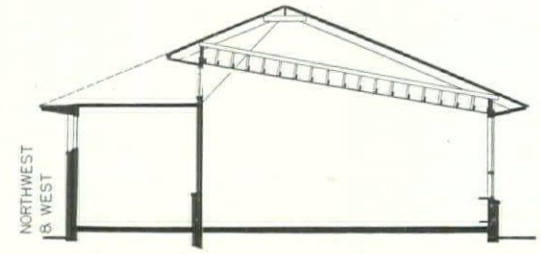




Damora

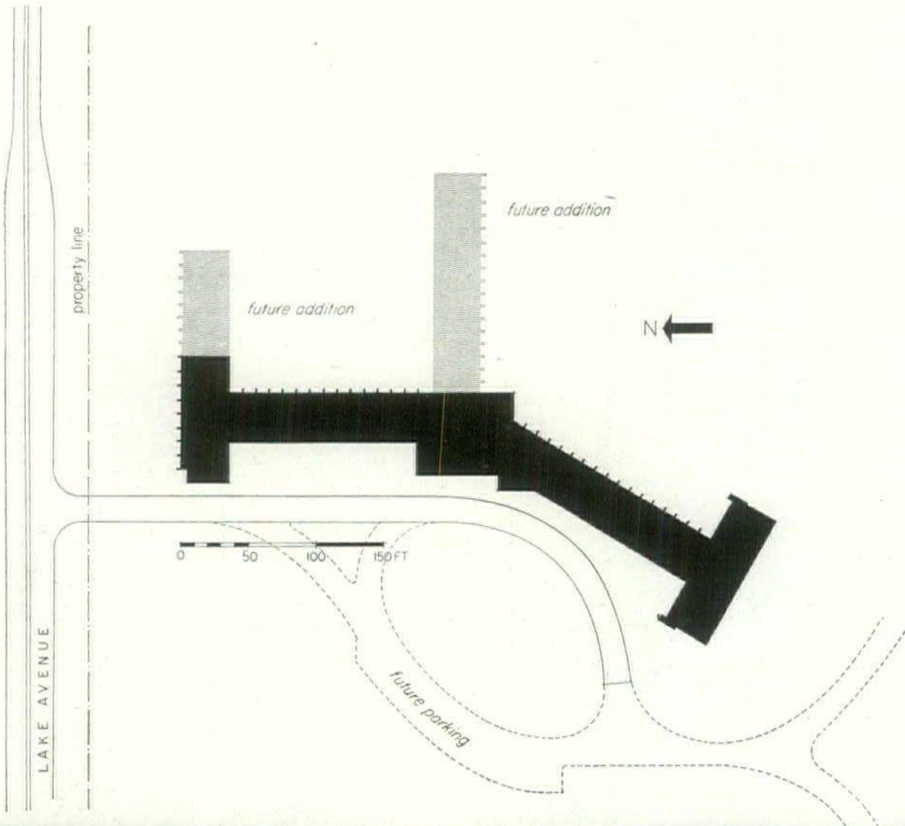
Barbara Morgan

CONSTRUCTION OUTLINE: Exterior walls—brick; interior exposed cinder block or studs, Rocklath, U. S. Gypsum Co., plaster or Masonite Corp. Presdwood. Floors—Zonolite aggregate, Zonolite Corp. ROOFING—built-up, Johns-Manville Corp. SHEET METAL WORK: Flashing—copper, Revere Copper & Brass Co. Ducts—Alcoa, Aluminum Co. of America. INSULATION—U. S. Gysum Co. and Zonolite Corp. WINDOWS: Sash—wood awning type, Gate City Sash & Door Co. Glass—Libbey-Owens-Ford Glass Co. Glass blocks—American Structural Products Co. FLOOR COVERINGS—asphalt tile, Hood Rubber Co. and Armstrong Cork Co., some maple in assembly room. FURNISHINGS: Metal chairs and tables—American Seating Co. DOORS—Roddis Lumber & Veneer Co. HARDWARE—P. & F. Corbin Co., Stanley Works and Glynn-Johnson Co. ELECTRICAL FIXTURES—Fullerton Co. Switches—General Electric Co. PLUMBING FIXTURES—Crane Co. Water pipes—Revere Copper & Brass Co. HEATING—low pressure steam system. Boiler—H. B. Smith Co. Oil burner—Ray Oil Burner Co. Radiators—Vulcan Radiator Co. Grilles—U. S. Register Co. Regulators—Minneapolis-Honeywell Regulator Co. Water heaters—Taco Heaters, Inc.



SUBURBAN SCHOOL p

LOCATION: Glenview, Ill.
PERKINS & WILL, Architects
ERIK A. BORG CO., General Contractor



Clyde Lyon School is in suburban Chicago, and i shows what Chicago is doing with the ideas from the West. School building progress was bound to come out of Chicago, where Sullivan fought the battle of modern architecture, and Dewey the early battles of progressive education.

Chicago school men appreciated the freedom in the new western one-story schools: the chance for every child to run directly out of doors from his classroom, the flood of controlled daylight inside the directness and simplicity of the construction But in the colder climate of the Midwest it is no feasible to build a string of rooms and run a canopy alongside on steel posts and call it a corridor. So in Clyde Lyon's predecessor school, the Ruger School, Architects Perkins & Will set the Midwestern pattern with corridor enclosed. And rather than face all classrooms north, the Rugen plan formed a big cross producing four separate play areas. In fitting Clyde Lyon to its tougher plot, orientation has been made more random. Classrooms face mainly east and southeast; kindergartens south, first grades north. A little direct sunlight in classrooms does not bother Chicago people.

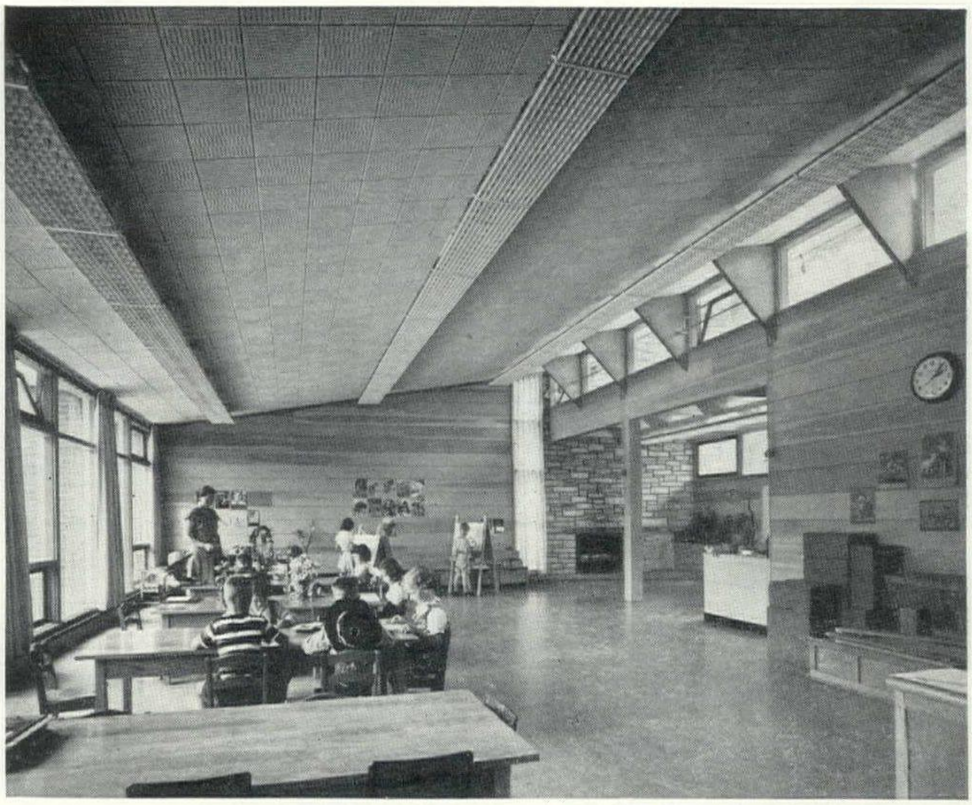
Photos: Hedrich-Blessing Studic

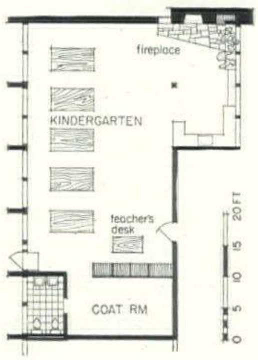
pitched roof on a free plan for a more domestic appearance

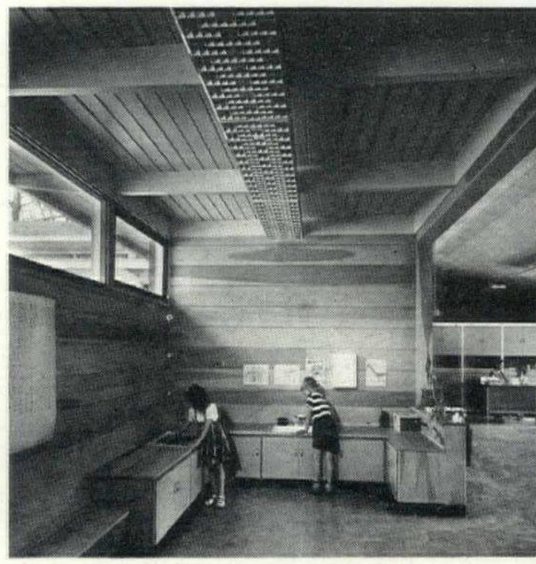
In the design of their classrooms, the Chicago school men did not buy the Western idea of movable partitions. On the principle that in elementary schools (as contrasted with high schools) a classroom partition once well placed is never moved, they built partitions mostly of solid brick, which has the superior quality of being able to stop more noise between rooms. Extending this brick out past the window walls, they created a distinguishing architectural feature in the form of "jib walls" to diminish the transmission of sound carried out through open windows. Smaller jib walls at every window bay also help shield windows from slanting morning sunlight. (See photo below.)

Another departure from the pattern in the West, which is content to mark off its "activity areas" by an imaginary line on the floor, or movable storage walls, is that Clyde Lyon has the characteristic Perkins & Will workroom—here a glass-faced alcove—added to every classroom as a built in feature.

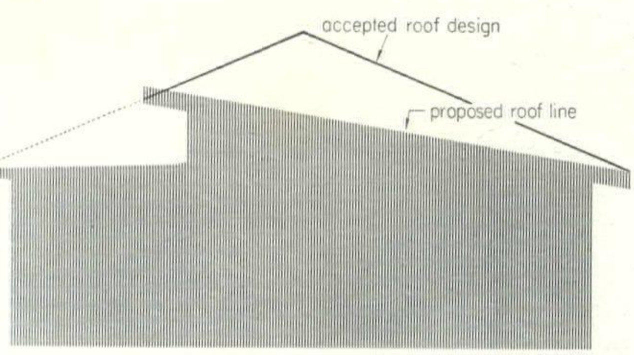
In one respect Clyde Lyon cannot be called an organic solution. The school board's sentimental demand for a pitched roof—at an added cost of around $9,000, or enough to build an extra classroom—has resulted in a sort of truncated roof truss to carry the illusion of the gabled form, and still leave the classroom with a neat single-slope ceiling and bilateral lighting. For an example of how the architects made a thoroughbred again out of a pitched roof school—by double-loading the corridor—see the Riverside School, page 122.

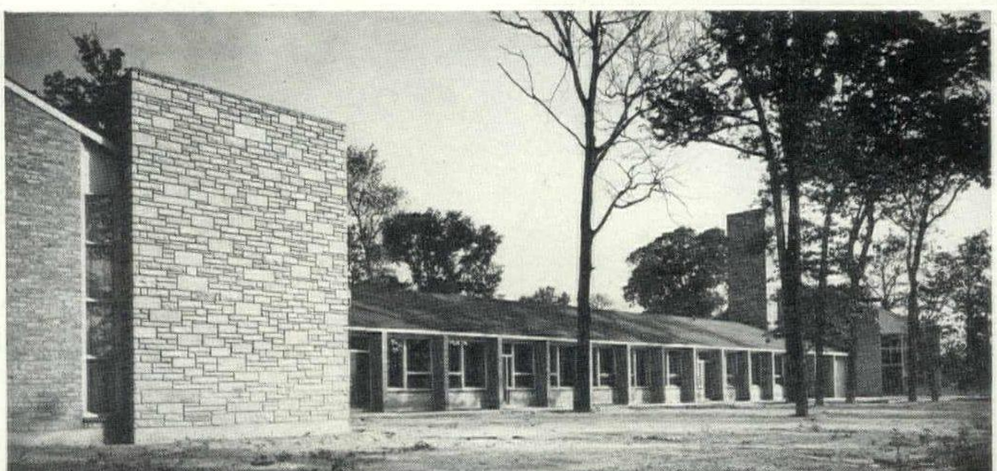




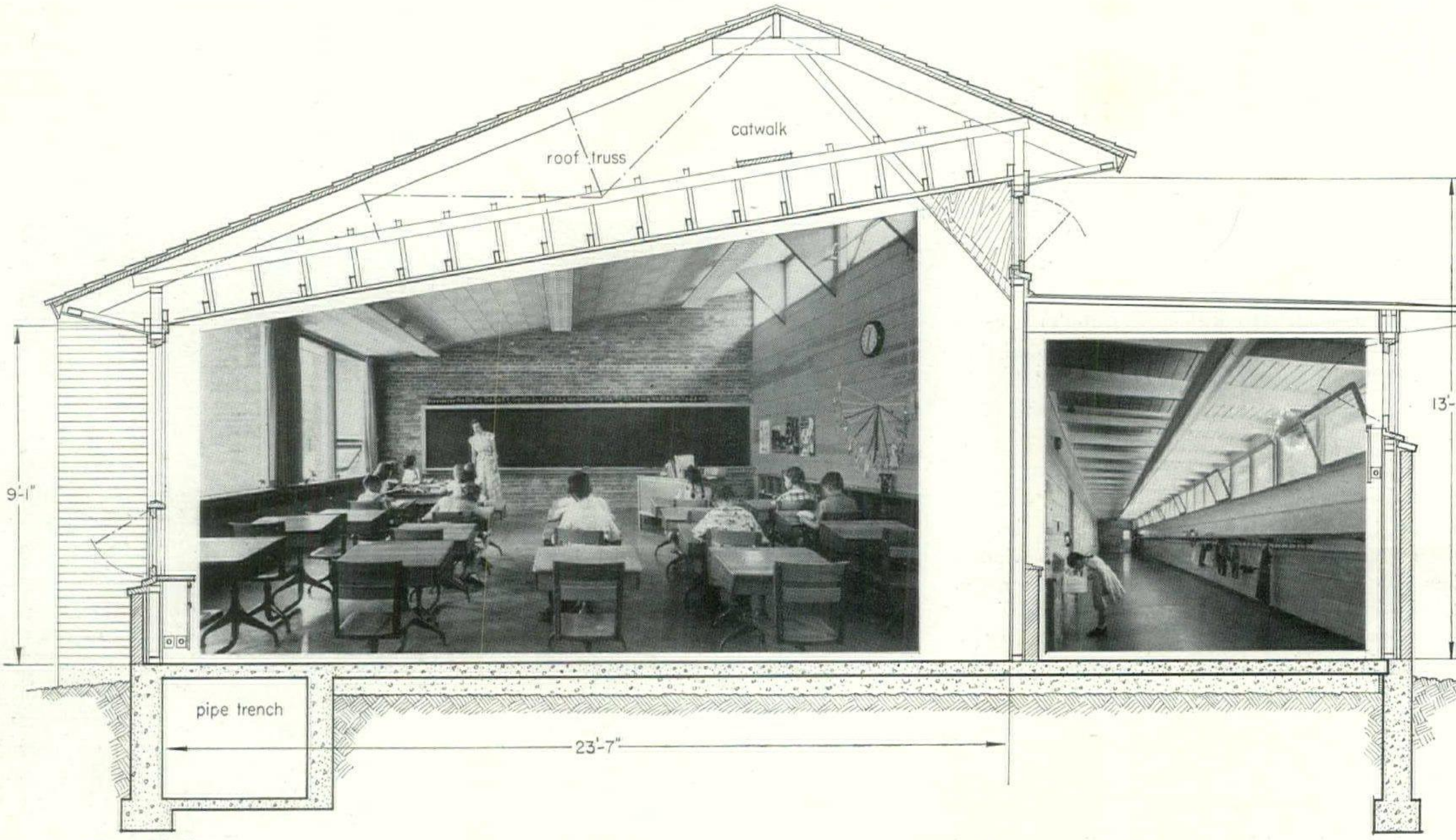


Activity room (right) provides space for special projects and storage cabinets. Above, kindergarten room. Horizontal pine paneling provides wall-size, convenient tack board.

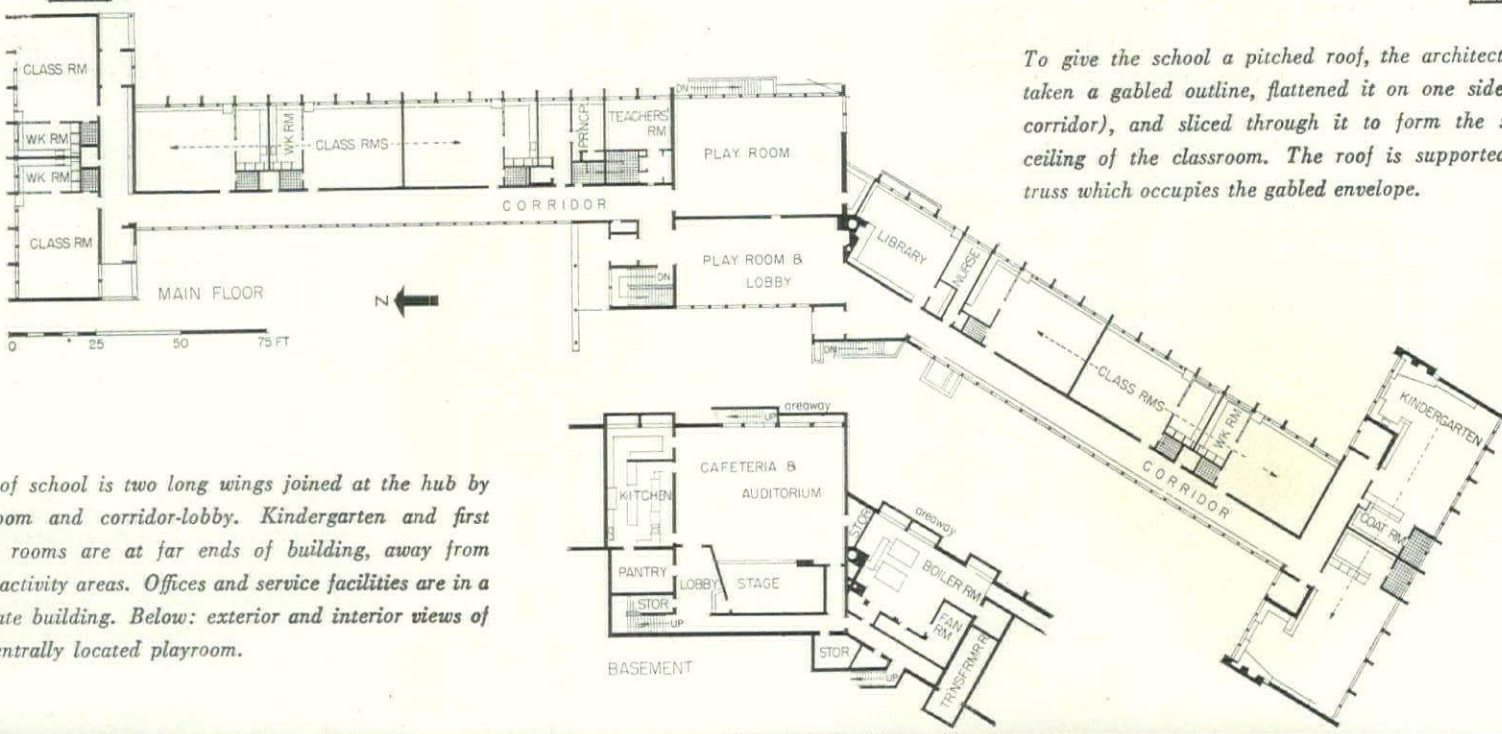




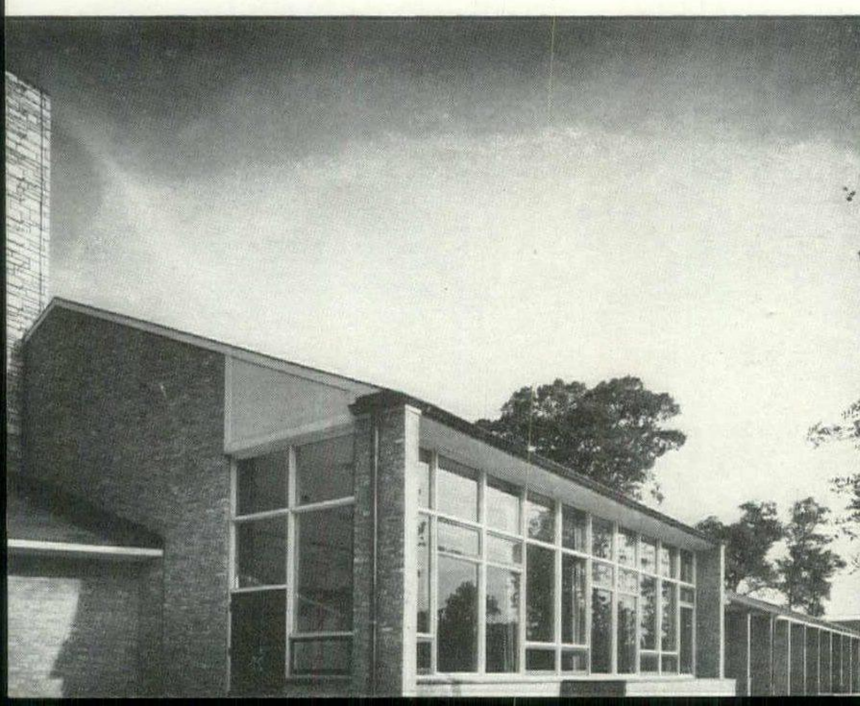
Main building and classroom wing (photo at left) shows covered loading zone and entrance to school. Two rows of continuous windows daylight the corridor (lower tier) and classrooms (upper). On the right is an example of jib walls which act as vertical sunshields and noise breakers. Diagram (above) shows simple roof originally proposed by architects, as compared with truncated gable design finally devised to meet the school board's desire for a symbolic form, at an extra $9,000.

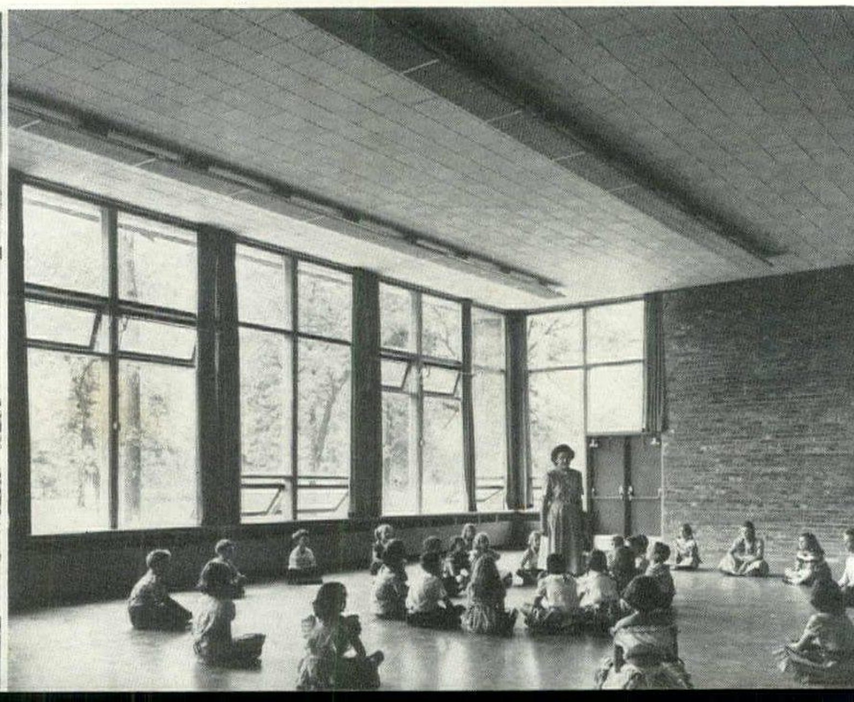


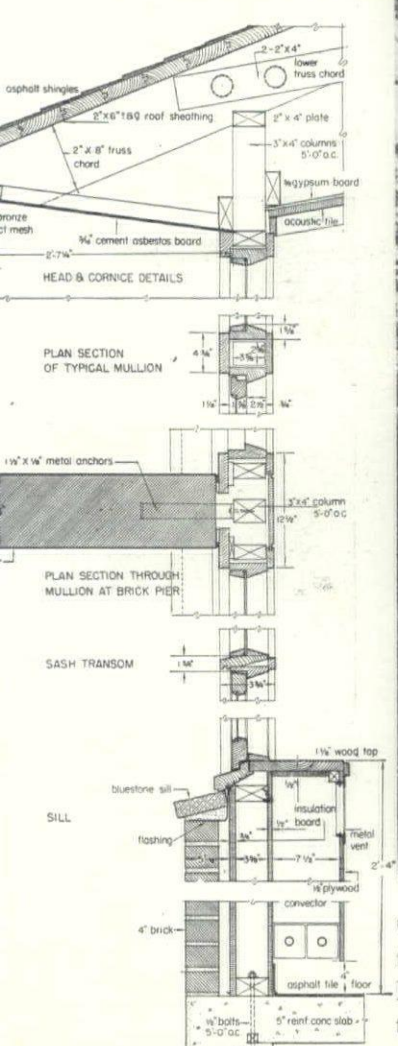
To give the school a pitched roof, the architects have taken a gabled outline, flattened it on one side (over corridor), and sliced through it to form the sloping ceiling of the classroom. The roof is supported by a truss which occupies the gabled envelope.



Plan of school is two long wings joined at the hub by playroom and corridor-lobby. Kindergarten and first grade rooms are at far ends of building, away from main activity areas. Offices and service facilities are in a separate building. Below: exterior and interior views of the centrally located playroom.







One of the pleasantest features of this school is the warm, human environment created by the use of basic materials (wood and brick) as unifying textures to give the youngsters a feeling of friendliness and familiarity. Rooms have an intimate, rather than institutional, character. Permanence is suggested rather than the possibility of change. Partitions are of salmon-colored brick. By lining the inner wall from top to bottom with horizontal pine boards the architects have made the whole of it available as one grand "tack board" and done away with fussy little bulletin boards. Thermal comfort is assured by a "split" system of hot water floor panels and convectors, the former responding to outdoor thermostats, the latter controlled from inside. Windows are depended on for ventilation.

With an ample budget to work with, the architects have also been able to add such "extras" as a large playroom and a cafeteria-visual aid room. The entrance corridor has been expanded to form a community lounge-exhibit center (photo below).

COST DATA: Total cost was $368,773 with masonry (exterior and interior brick and stone) accounting for the largest single item—$34,000. Total area: 29,591 sq. ft. Cost per sq. ft.: $12.10.

CONSTRUCTION OUTLINE: Exterior walls—Brisch brick, Carey Brick Co. Interior partitions—concrete block and brick, Illinois Brick Co., Ponderosa pine veneers. Lumber—Edward Hines Lumber Co. Structural steel and reinforcing—Jos. T. Ryerson & Sons. Floors—concrete, Kentile finish, David E. Kennedy, Inc. ROOFING—Certainteed Products Co. Roof trusses—McKeown Bros. Co. SOUND INSULATION—Auditone, U. S. Gypsum Co. WINDOWS: Sash—white pine, special design, Weise Millwork & Lumber Co. Sash operators—Payson Mfg. Co. Glass—plate, Libbey-Owens-Ford Glass Co. BLACKBOARDS—National Slate Blackboard Co. PROGRAM BELLS—Edwards & Co. HARDWARE—Federal Iron Works, P. & F. Corbin Co. and Vonnegut Hardware Co. PAINTS—Pratt & Lambert and U. S. Gypsum Co. ELECTRICAL FIXTURES—Smithcraft Lighting Div., A. L. Smith Iron Co. PLUMBING FIXTURES—Kohler Co. and American Radiator-Standard Sanitary Corp. Drinking fountains—Halsey Taylor Co. Special equipment—W. D. Allen Co., U. S. Sanitary Specialties Corp., Powers Regulator Co. and Scott Paper Co. KITCHEN EQUIPMENT—Albert Pick Co., Inc. HEATING—split system with hot water radiant coils in floor. Boiler—U. S. Radiator Corp. Oil burner—Todd Shipyards Corp., Combustion Div., Convectors—Trane Co. Controls—Johnson Service Co. Fans—American Blower Co. Pump—Chicago Pump Co. Grilles—Tuttle & Bailey, Inc. Hot water specialties (radiant system)—Bell & Gossett. Incinerator—Goder Incinerator Co. Radiators—Vulcan Radiator Co.

PARK-SIDE SCHOOL doubles usefulness of both school and park and double-loads its corridors

LOCATION: Riverside, Ill.
PERKINS & WILL, Architects
CHELL & ANDERSON, General Contractors

The half-million dollar Blythe Park School at Riverside, Ill., is presented before completion because of its significance in three directions: 1) it couples the advance of the highly efficient western classroom with the economy of the eastern central corridor; 2) it works out beautifully the theme that schools should be made of the right size to begin with, and be self-contained—*not* infinitely expansible; and 3) it points the way to fund-saving collaboration between school boards and park boards in doubling the usefulness of both schools and parks.

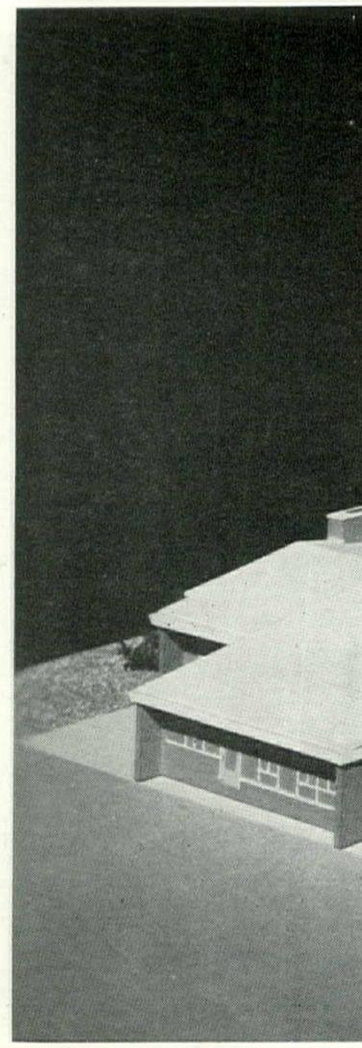
Chief obstacle to the rapid spread through the East of the western classroom with its bright two-sided daylighting has been the expense (which seemed unavoidable) of stringing such rooms out on endless side corridors. By showing how to "double-load" the corridor with classrooms left and right, and still retain bilateral lighting, some leading architects have been pointing the way to halving walking distances, cutting down heat loss and construction cost. At Blythe Park, Perkins & Will obtain the bilateral light by simply dropping the corridor roof and building clerestory windows above it, which will throw light to desks nearest the corridor. The fact that the dropped roof creates a snow trough has bothered the architects not at all; they point to previous examples where glass block clerestories and interior drains have produced no special leak problems. (Perkins is sensitive on this point, since he has several skylights, left behind by his architect father, still to deal with.) An alternate method is, however, to raise rather than lower the corridor roof, and let the classrooms "borrow" light from corridor clerestories. In any case, the scheme permits a pitched roof to be arrived at with unforced naturalness.

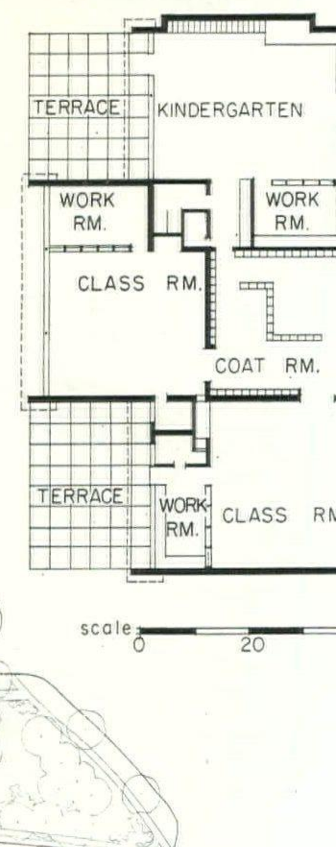
Blythe Park has a nice plan organization, with the central block of classrooms bracketed between the two end elements: community room on the northeast, kindergarten wing on the southwest. The passageways at the ends of the main block, which let you see through the school, isolate these different groups and keep community activities on the one hand away from the main school section, the little children on the other hand isolated from their formidable bigger brothers and sisters.

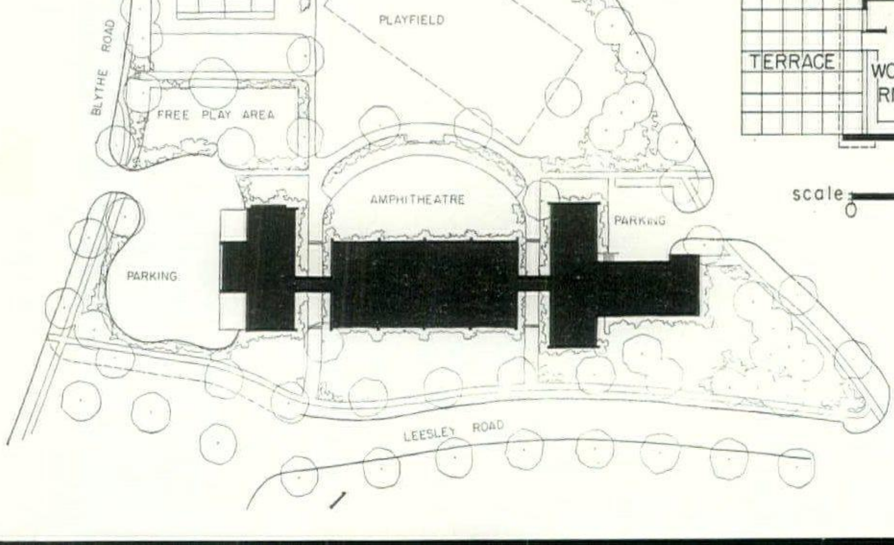
This nice organization is possible because the idea of infinite expansibility has been deliberately discarded. Where the western finger plan is free to expand at every point, like the roots of a tree, this plan is self-enfolded like a human organism with well-marked head, trunk, feet. If more children are to be served later on, the answer will be to form more new schools, not graft on to old ones. Each school, under such a program, can be kept to optimum size for purposes of education.

Sometimes school systems and park systems can assist one another: a school can escape the expense of its own playground facilities by using the facilities of a park, while the park gains by community rooms alongside it in a school open summer and winter to children and adults. Blythe Park illustrates this: the actual site is extremely small, long and narrow, but it adjoins a neighborhood park. The combination site was voted only after a bitter two-year political struggle, as there had been a 50-year-old tradition in Riverside of preserving small parks. But ultimately the recreation commission, the park department, the village manager and the school board got together on plans for a joint "community-park-school" concept.

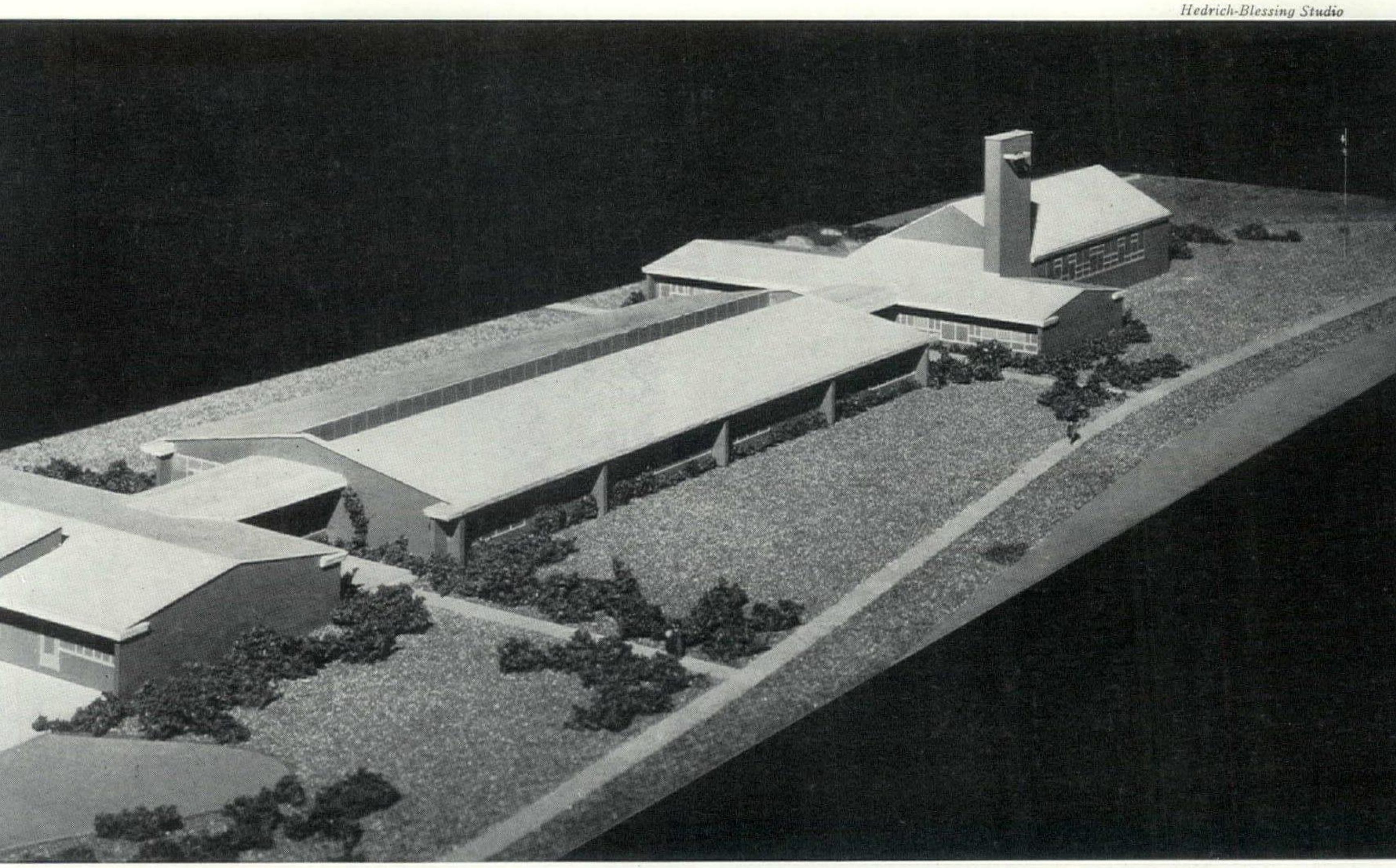
Two-thirds of the $5\frac{1}{2}$ acre site is owned by the village, one-third by the school board, with a resultant saving of thousands of dollars in taxes. By agreement the school board maintains the entire "park-school" area, while the recreation commission, a non-school municipal body, plans activities for both the park area and the community center building. The community wing can be opened in the evenings without unlocking, lighting or heating the two classroom wings. It includes such all-purpose rooms as 1) a large playroom-gymnasium; 2) a visual-aids room beneath the gym, complete with sloping floor, motion-picture and broadcasting equipment, and stage for amateur theatricals; 3) a music room, acoustically treated, that can be converted ultimately to a classroom when the postwar enrollment peak is reached; 4) a grade-school library which will operate three evenings and Sundays as a circulating branch of Riverside's public library.

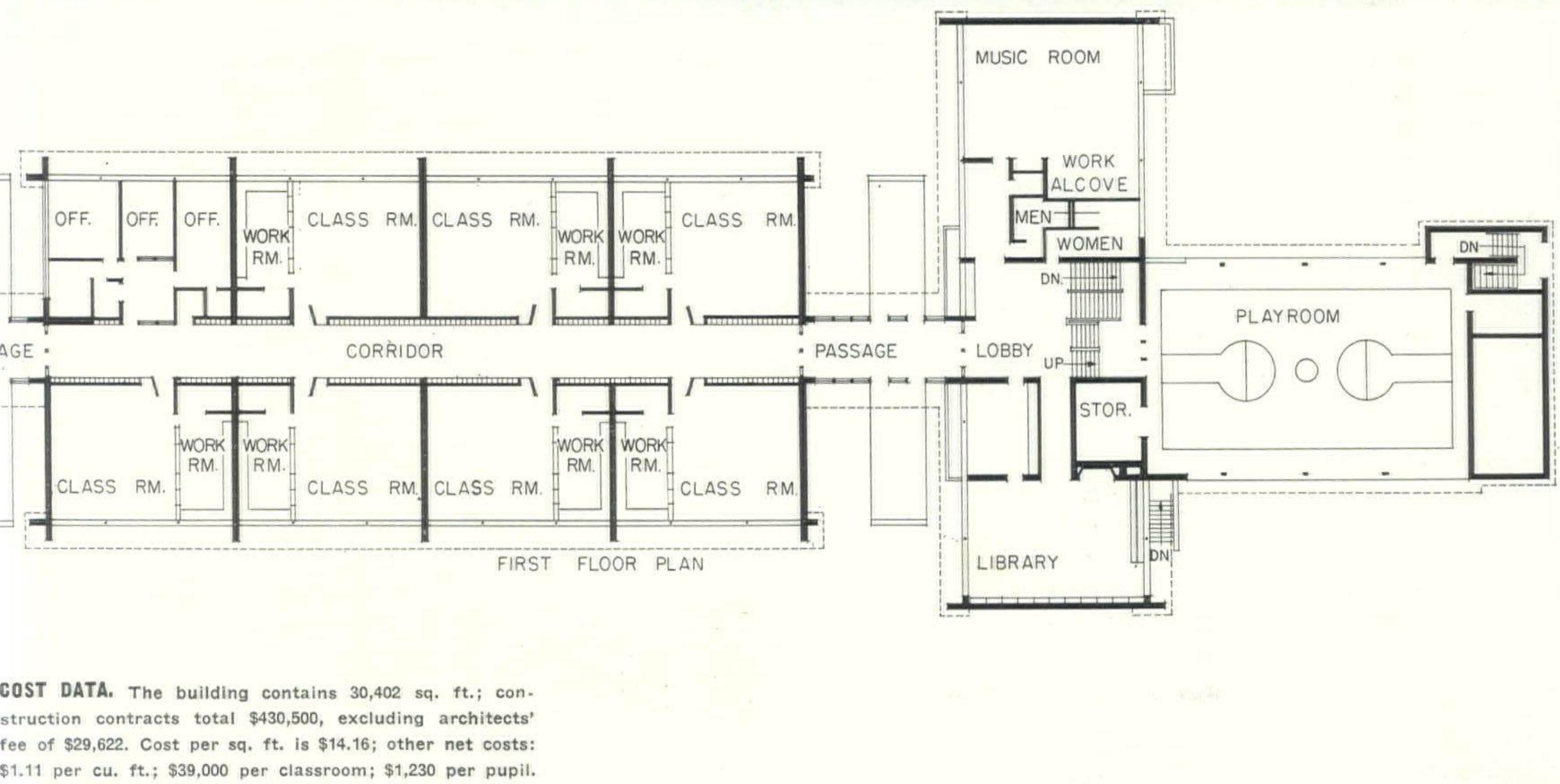




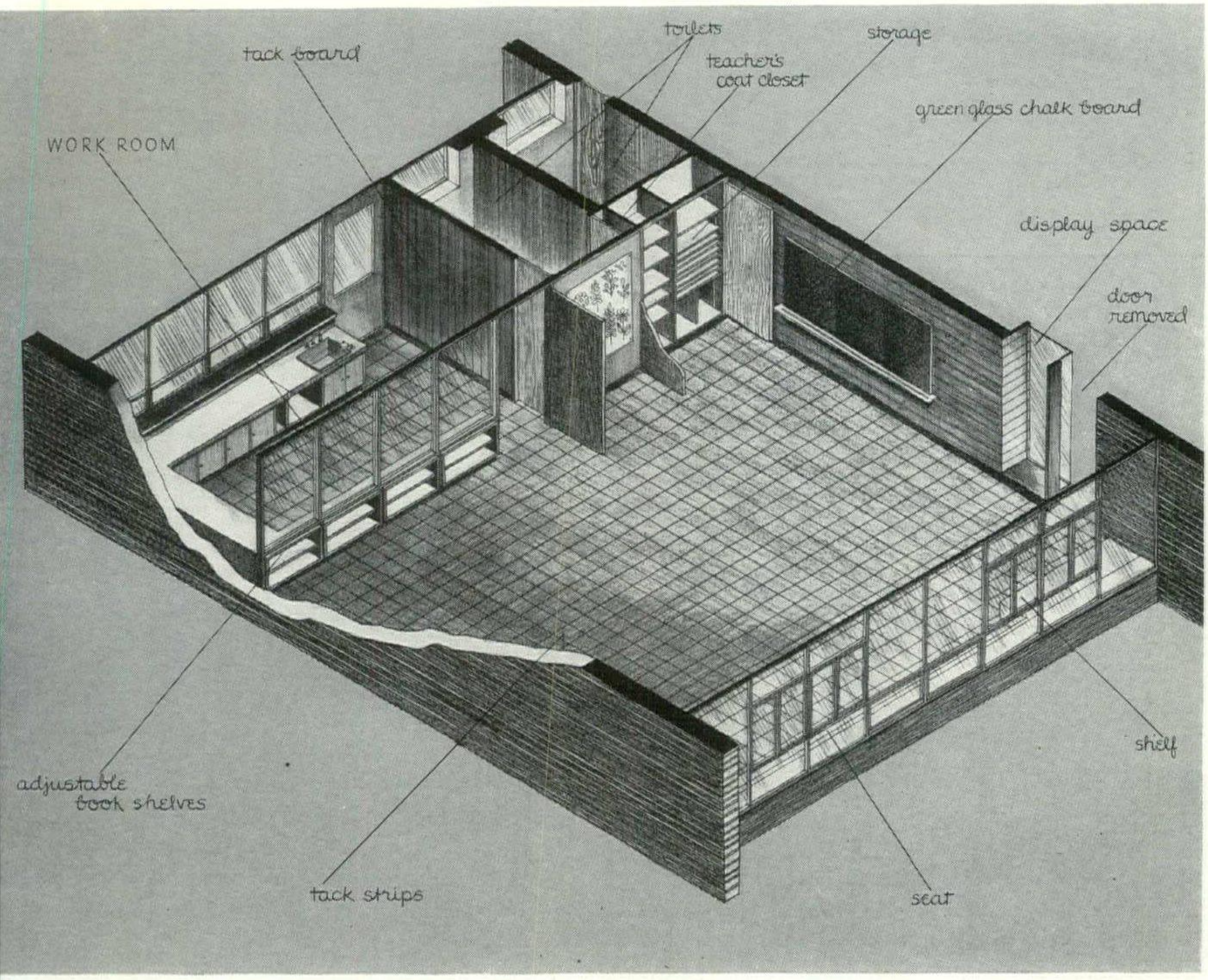


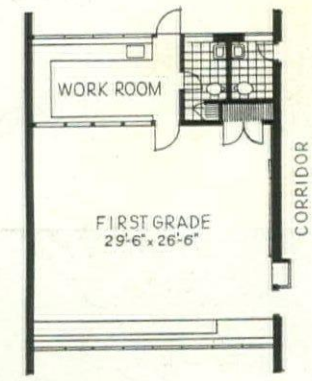
Hedrich-Blessing Studio



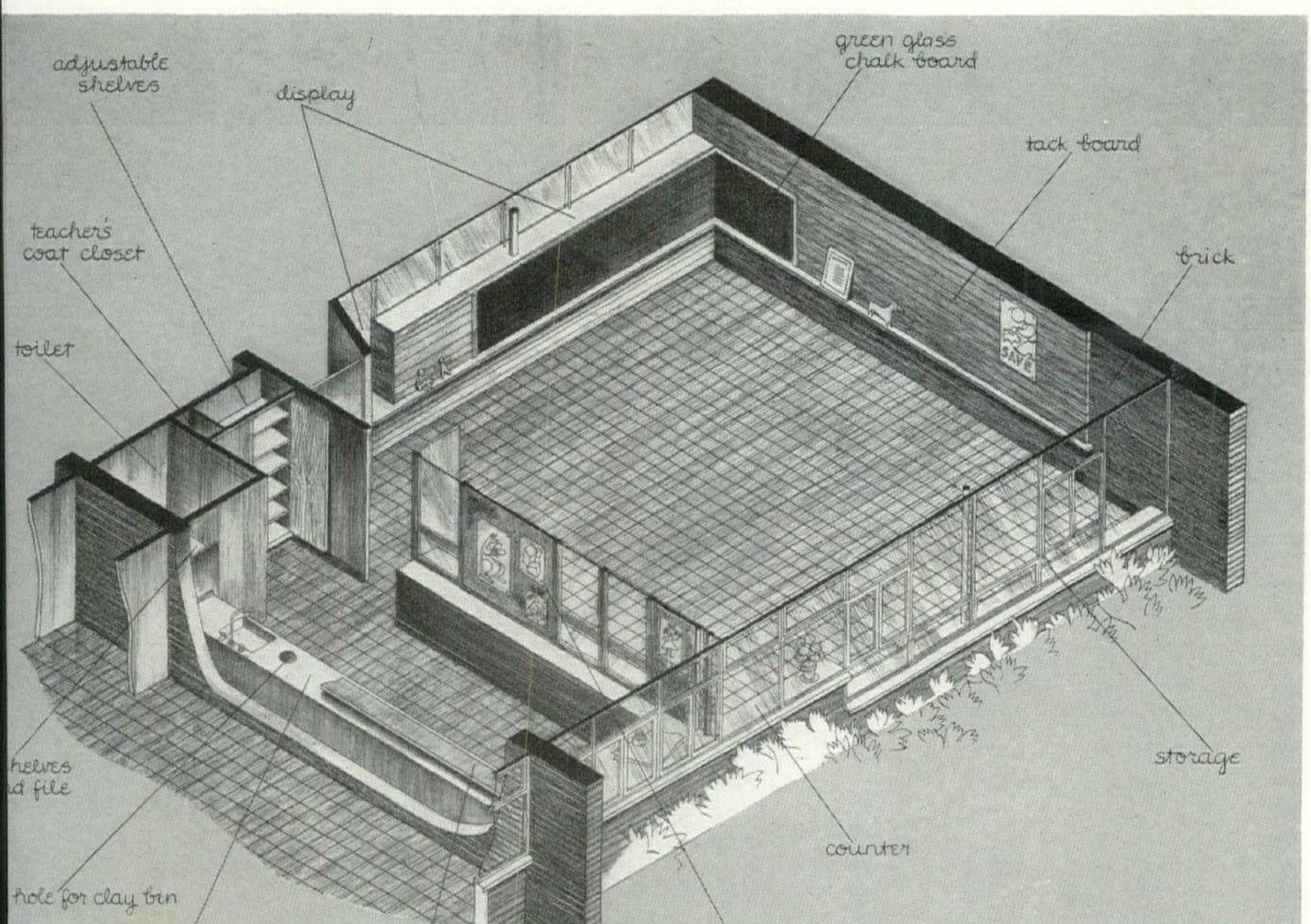


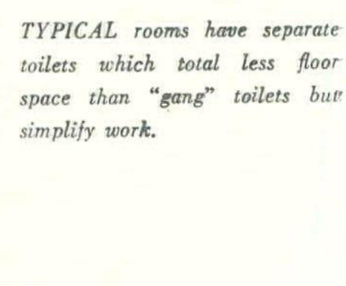
COST DATA. The building contains 30,402 sq. ft.; construction contracts total $430,500, excluding architects' fee of $29,622. Cost per sq. ft. is $14.16; other net costs: $1.11 per cu. ft.; $39,000 per classroom; $1,230 per pupil.



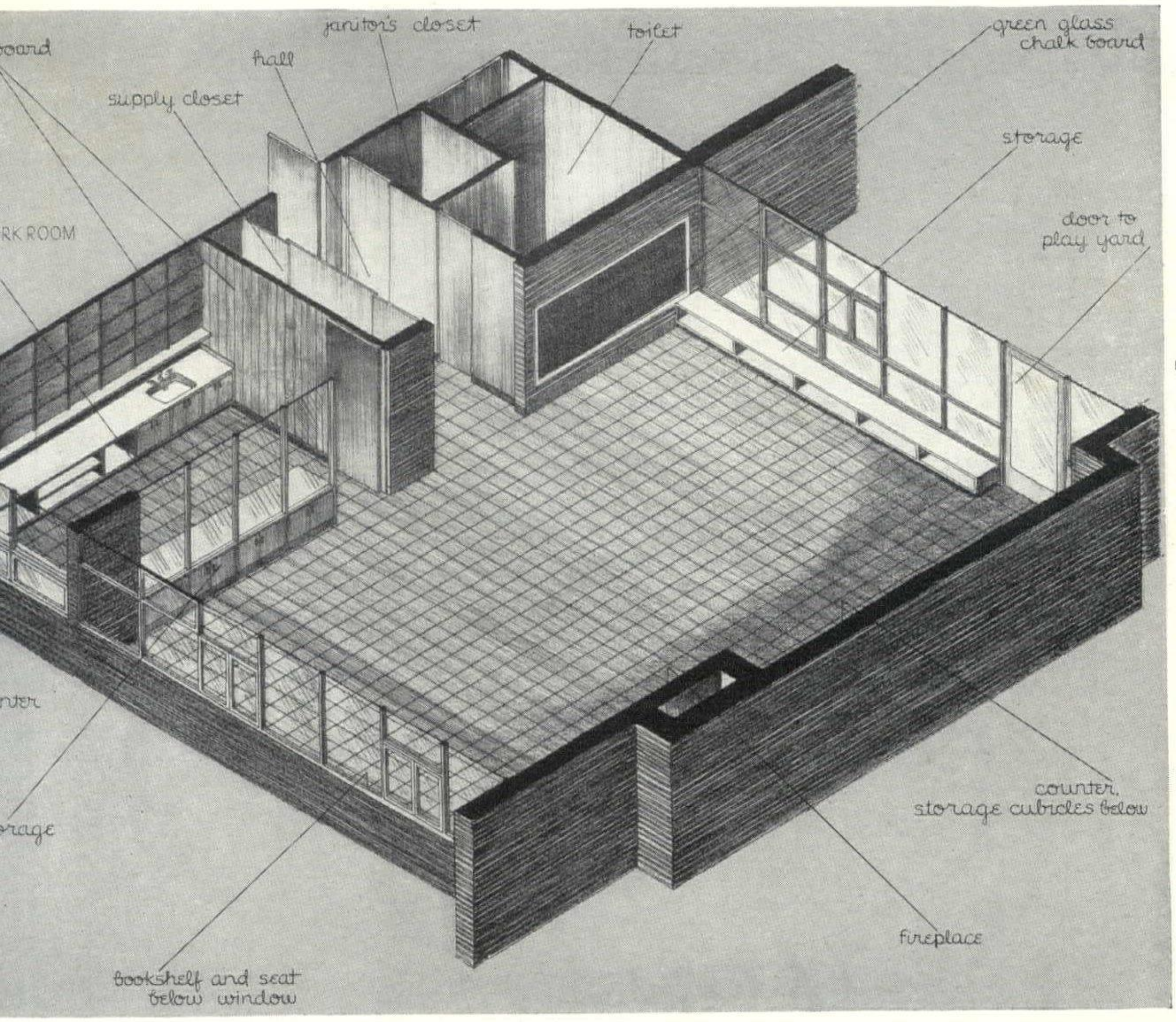


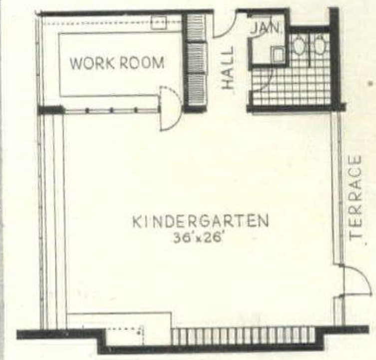
PRIMARY rooms stress an "active" educational program, with lots of cupboards, workrooms, gadgets.





TYPICAL rooms have separate toilets which total less floor space than "gang" toilets but simplify work.

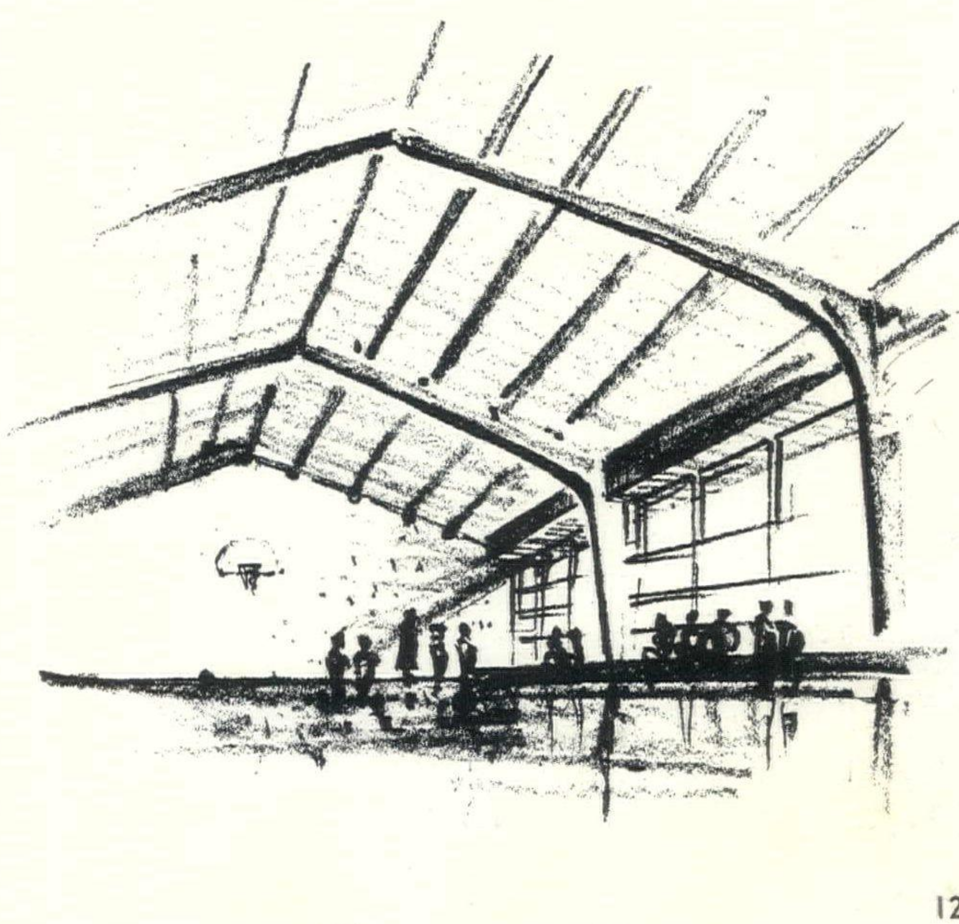




KINDERGARTEN like other rooms is lush, with specially designed Knoll furniture and green glass chalk boards, etc.

CONSTRUCTION OUTLINE: Exterior walls—brick concrete block or Chicago common backup, Thomas Moulding Floor Co. Interior—concrete block covered with brick or Ponderosa pine. ROOFING—poured gypsum roof, U. S. Gypsum Co.'s Pyrofill. Stage and playroom roof—concrete over McKeown Bros. laminated wood girders with ring connectors by Timber Engineering Co. Flat roofs—built-up, Barrett Div., Allied Chemical & Die Co. Shingles—Johns-Manville Co. SHEET METAL WORK—Revere Copper & Brass Co. INSULATION—Celotex Corp. and Armstrong Cork Co. WINDOWS: Sash—steel, Hope's Windows, Inc. Glass—Pittsburgh Plate Glass Co. FINISH FLOORING—Tile-Tex Co., Armstrong Cork Co. WALL COVERINGS: Toilets—ceremic tile, Arketex Ceramics Co. FURNISHINGS—Hans Knoll & Associates and Heywood-Wakefield. Draperies—Angelo Testa. Counter tops—H. H. Robertson Co. and General Electric Co. HARDWARE—Schlage Lock Co. and Vonnegut Hardware Co. PAINTS—Pratt & Lambert. ELECTRICAL FIXTURES—General Electric Co., Morris Kurtzon & Co. and Holophane Co. Bell system—Standard Electric Time Co. PLUMBING FIXTURES—American Radiator-Standard Sanitary Corp. Pump—Bell & Gossett Co. Soap dispenser—U. S. Sanitary Specialties Corp. Fire extinguisher—W. D. Allen. HEATING—low pressure steam. Convectors—Trane Co. Boiler—U. S. Radiator Corp. Oil burner—Todd Shipyards Corp. Valves, etc.—Hoffman Specialty Co. Heating specialties—Bell & Gossett. Supply and exhaust unit—American Blower Corp. Registers—Tuttle & Bailey, Inc.

PLAYROOM-GYM has kitchen-cafeteria for Kiwanis and PTA meetings, as well as teen-age and kids' games.

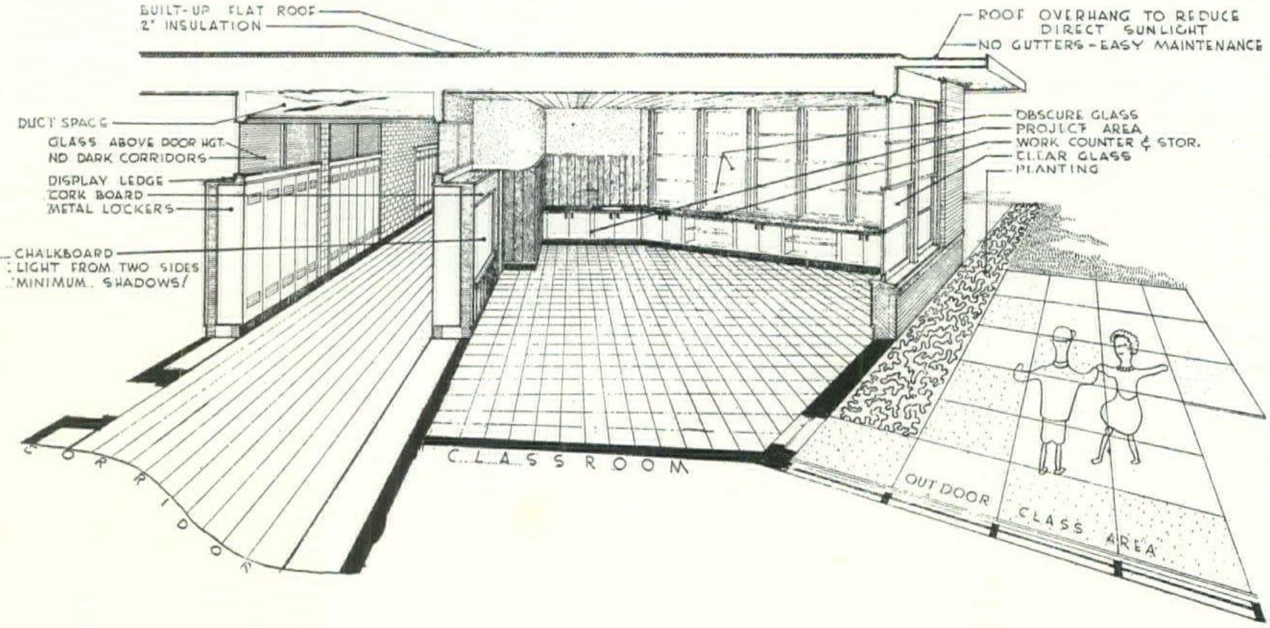


ZIG-ZAG SCHOOL obtains sun for all classrooms at moderate cost

LOCATION: Findlay, Ohio

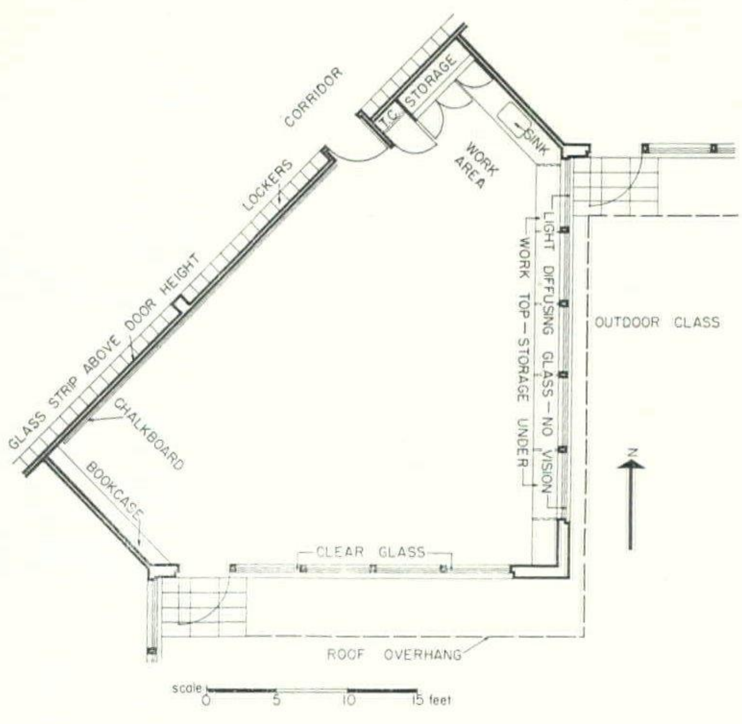
OUTCALT & GUENTHER & ASSOCIATES, Architects

The four new schools in Findlay, Ohio, hark back for precedent to the Crow Island School (FORUM, Aug. '41, p. 79) of a decade ago, bringing many of its advantages down to an everyday budget level. Crow Island's classrooms were little L-shaped houses strung in a row along the corridor and separated by courts. Dropping out the workshops at the base of the L's, architects Outcalt & Guenther have pushed their classrooms together in a saw-toothed row and saved periphery (Crow Island, 80 ft. per class; Findlay, 54 ft.) The resulting pentagonal-shaped classrooms still expose extra wall area to the light (compared to the conventional classroom's average of 32 ft.) while outdoor playcourts are formed at corners between rooms. This shape, moreover, brings natural light in close to the central corridor, ensuring proper light-direction for left as well as right-handed children. Costwise, Outcalt & Guenther have found that in this locality their plan is slightly less expensive than any other method of improved lighting—even conventional construction with directional glass block. It has the added advantage of materially lessening the objections to double loading of corridors, since the two window-walls set at right angles provide sunlight at some time of the day for every room.

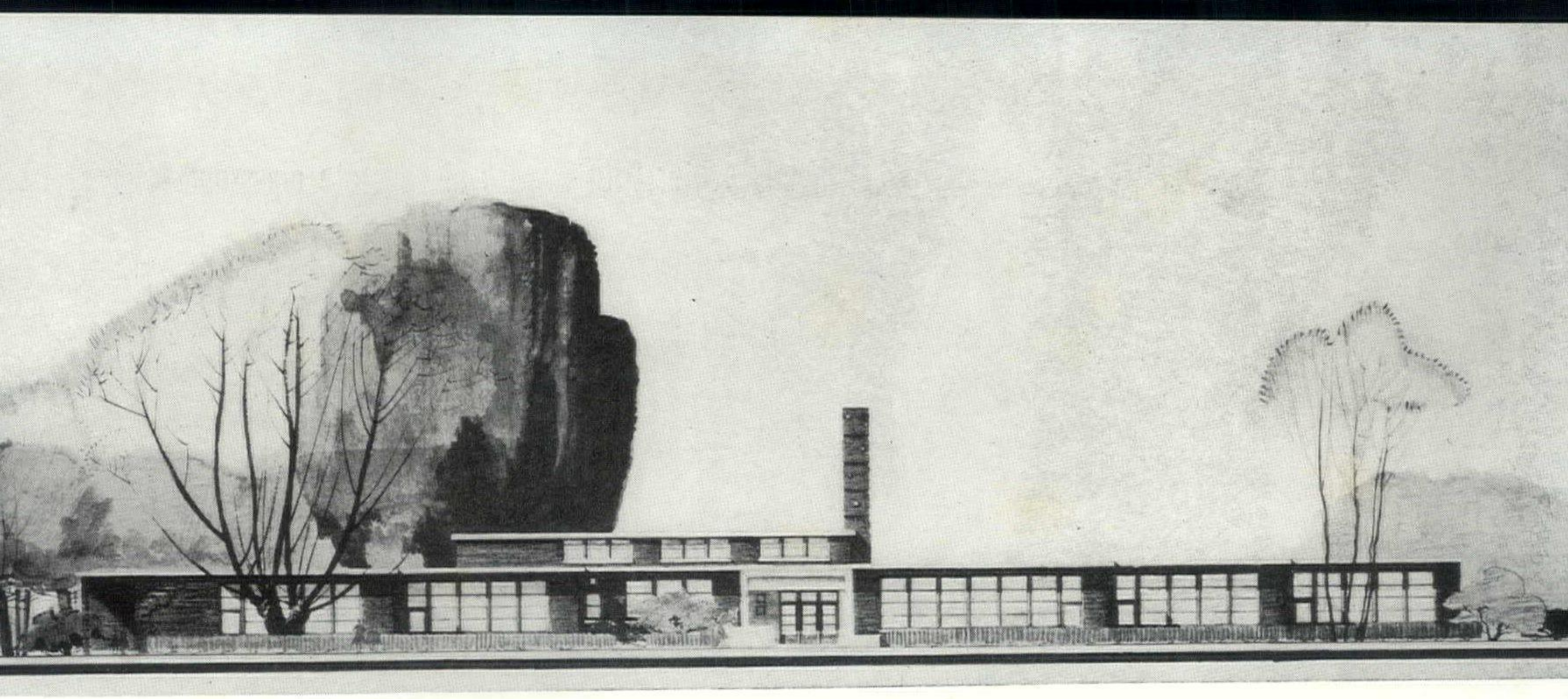


The significance of the Findlay plan is increased by the fact that it is the only system of multi-source lighting that can, if necessary, be used for two or three-story school buildings. Originally designed for light steel or concrete construction, these four schools have worked out with equal effectiveness in conventional masonry, since this was cheapest and most easily available at the time of bidding.

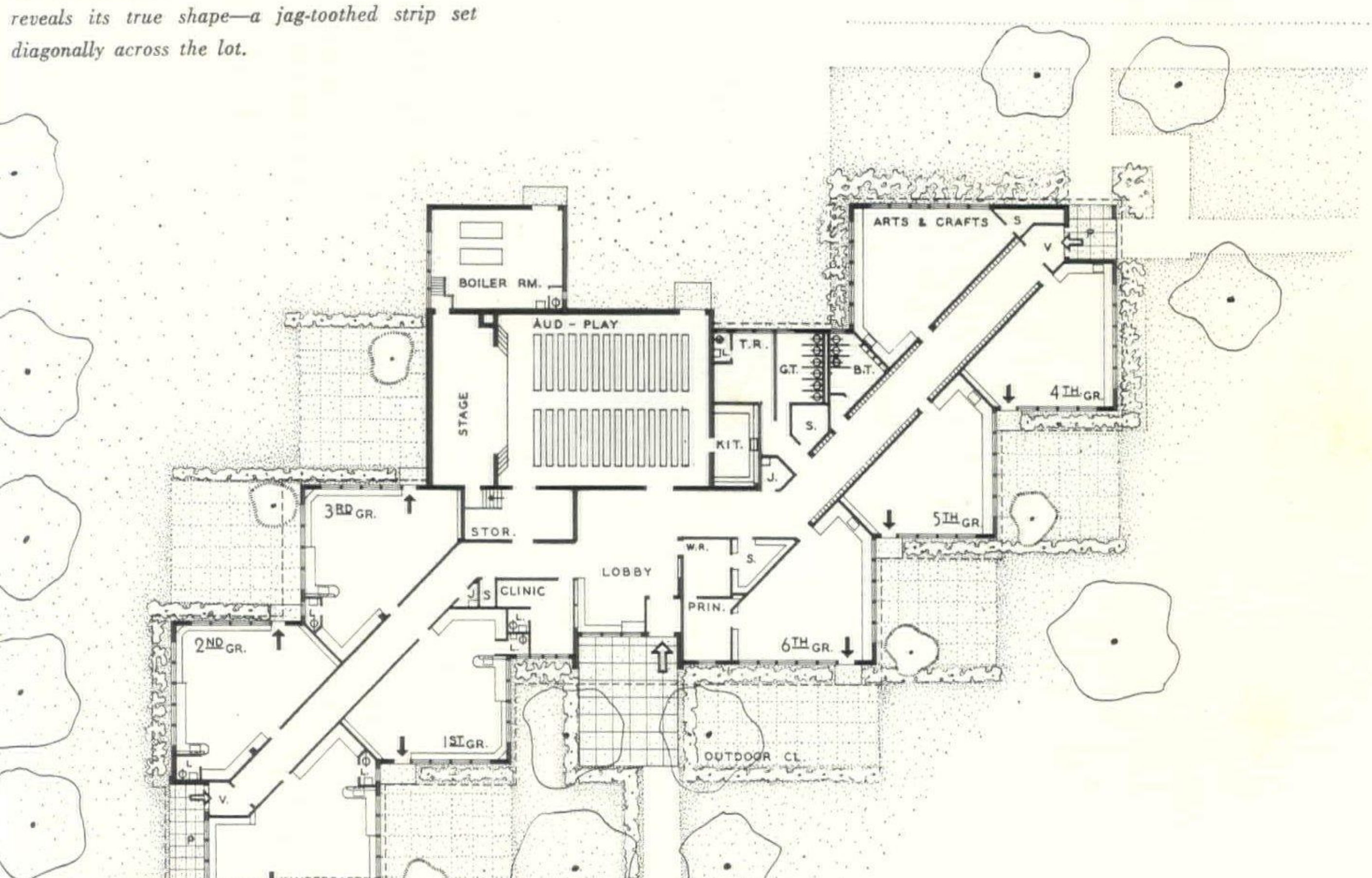
During the planning stage the architects considered the merits of one large school as against the four small ones now being built. Their studies showed that the per square foot cost was not always a true measure of eventual value to the community. The single large school with big centralized gym and auditorium areas would seem at first cheaper to build than these four small multi-purpose units. This saving, however, seemed more than counterbalanced by the extra convenience, and usefulness as neighborhood centers, of these separate schools, plus the resulting elimination of an expensive bus system.

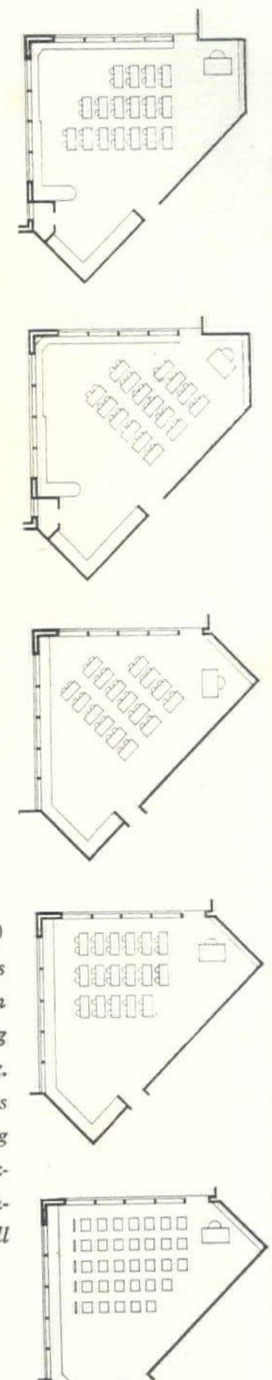


COST DATA (excluding architect's fee): $247,924 for 16,535 sq. ft. or $15 per sq. ft.



Drawing of McKinley School (above) looks like the conventional one-story type. Plan (below) reveals its true shape—a jag-toothed strip set diagonally across the lot.





The strip of classroom sketches (right) shows with what ease Findlay's generous allotment of 860 sq. ft. per classroom can be adapted to a variety of seating patterns—all with excellent lighting. The pentagonal room-shape creates its own project corner outside the teaching area without resorting to the more expensive formal nooks and ells once considered essential to working out a full program.

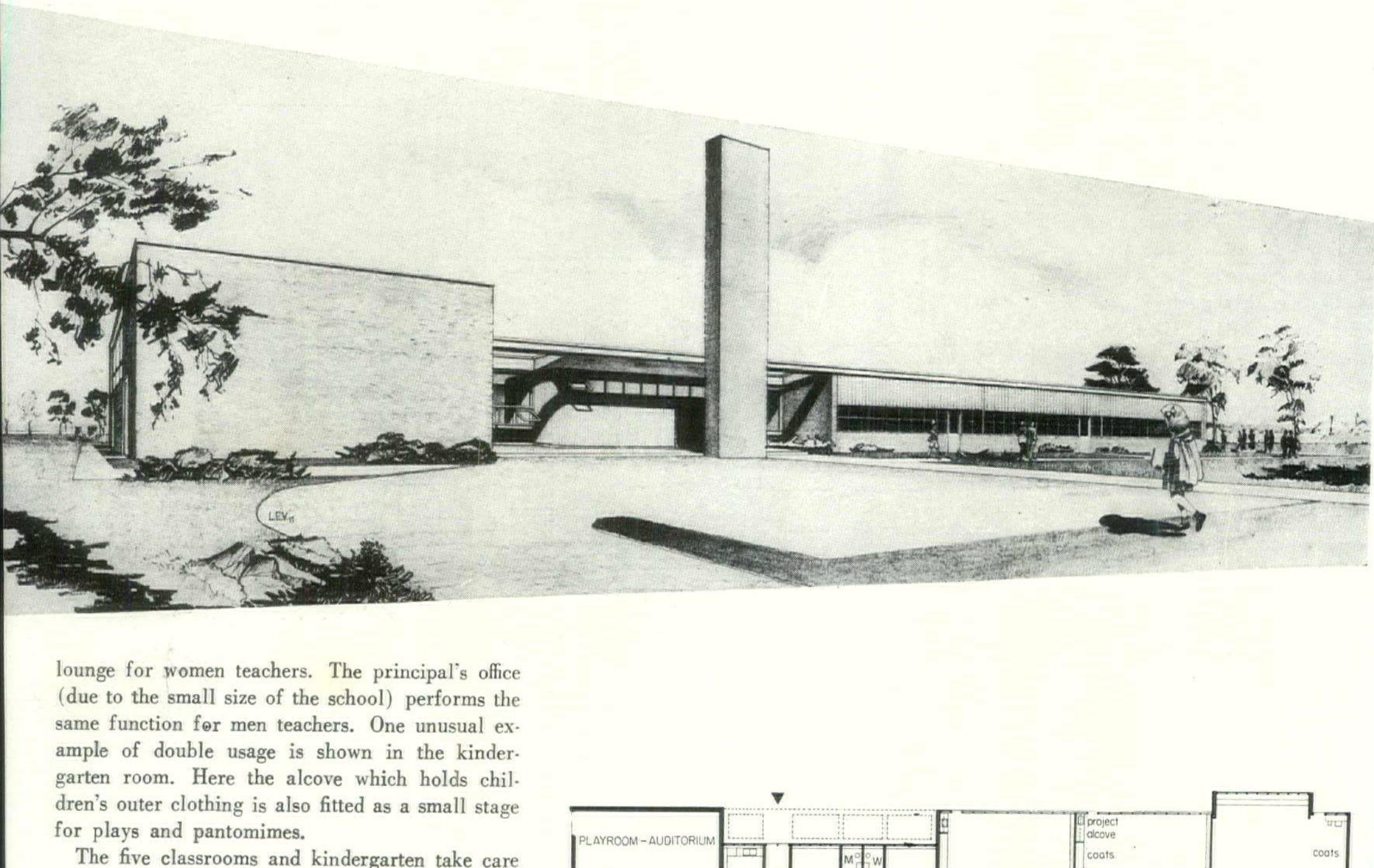
Findlay's layout reveals school planning details of a high order—individual play yards, central public areas, individual wash and toilet rooms for younger children.

COUNTRY SCHOOL doubles as community center with closure of separate classroom wing

LOCATION: Tillsonburg, Ontario, Canada
JOHN B. PARKINS, ASSOCIATES, Architects

This elementary school in the south of Canada rates high for careful integration of its various elements. The playroom-auditorium, intended for school and community gatherings, is set in a wing apart from classrooms. Available for use by either or both wings is the central entrance unit which houses administration offices, kitchen and lavatory-toilet rooms. Elaborate stage facilities are unnecessary since dramatic performances will be held at the large high school next door.

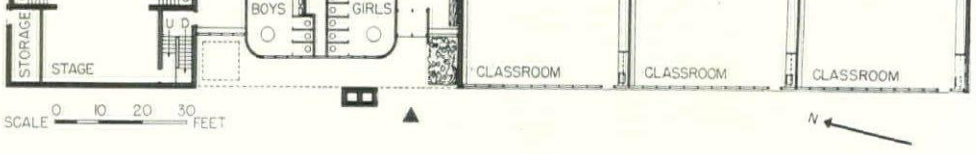
Double use of rooms makes further savings possible. The health room serves between times as



lounge for women teachers. The principal's office (due to the small size of the school) performs the same function for men teachers. One unusual example of double usage is shown in the kindergarten room. Here the alcove which holds children's outer clothing is also fitted as a small stage for plays and pantomimes.

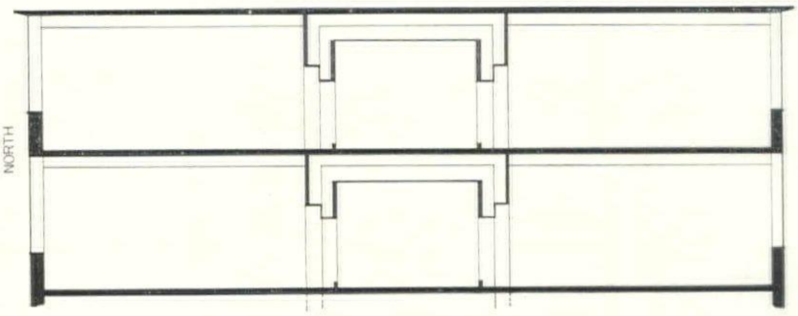
The five classrooms and kindergarten take care of a student population of 175; two kindergarten sessions bring the total number to 195. In all grade classrooms daylight is admitted through directional glass block above a vision strip of double hung windows. Since completely diffused light is considered less necessary for the kindergarten, that room has a less expensive window-wall of clear glass. Load-bearing brick walls in the auditorium and the corridors have been left exposed, not only for economy, but because they provide a handsome finish that will remain impervious to the slings and arrows of energetic first graders.

COST (excluding architect's fee): $137,850 for 13,500 sq. ft. or $10.20 per sq. ft.



CITY HIGH SCHOOL of conventional two-story design leaves both ends free for easy expansion

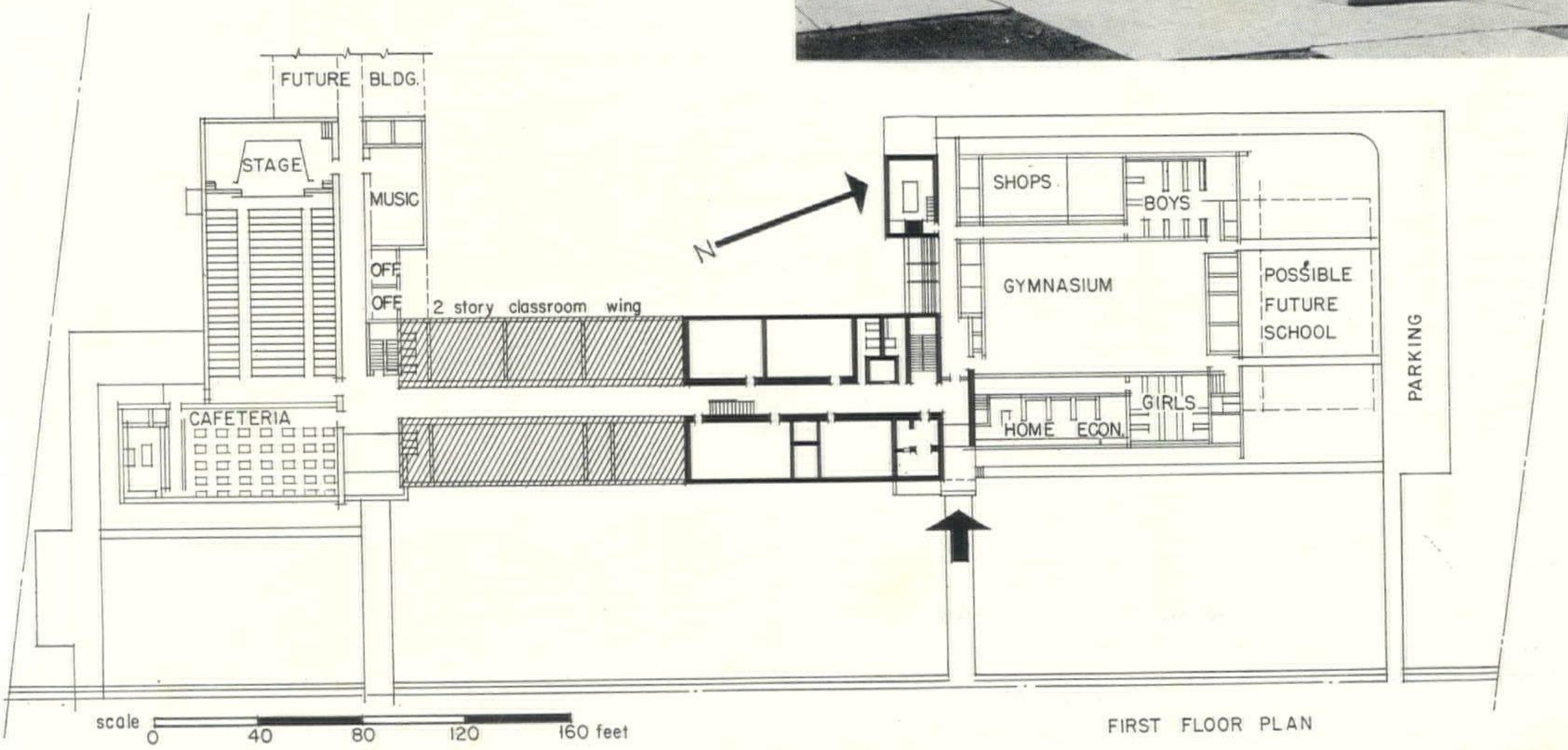
LOCATION: Wayne County, Mich.
EBERLE M. SMITH, ASSOCIATES, INC., Architects
ATKIN-FORDAN CO., General Contractor



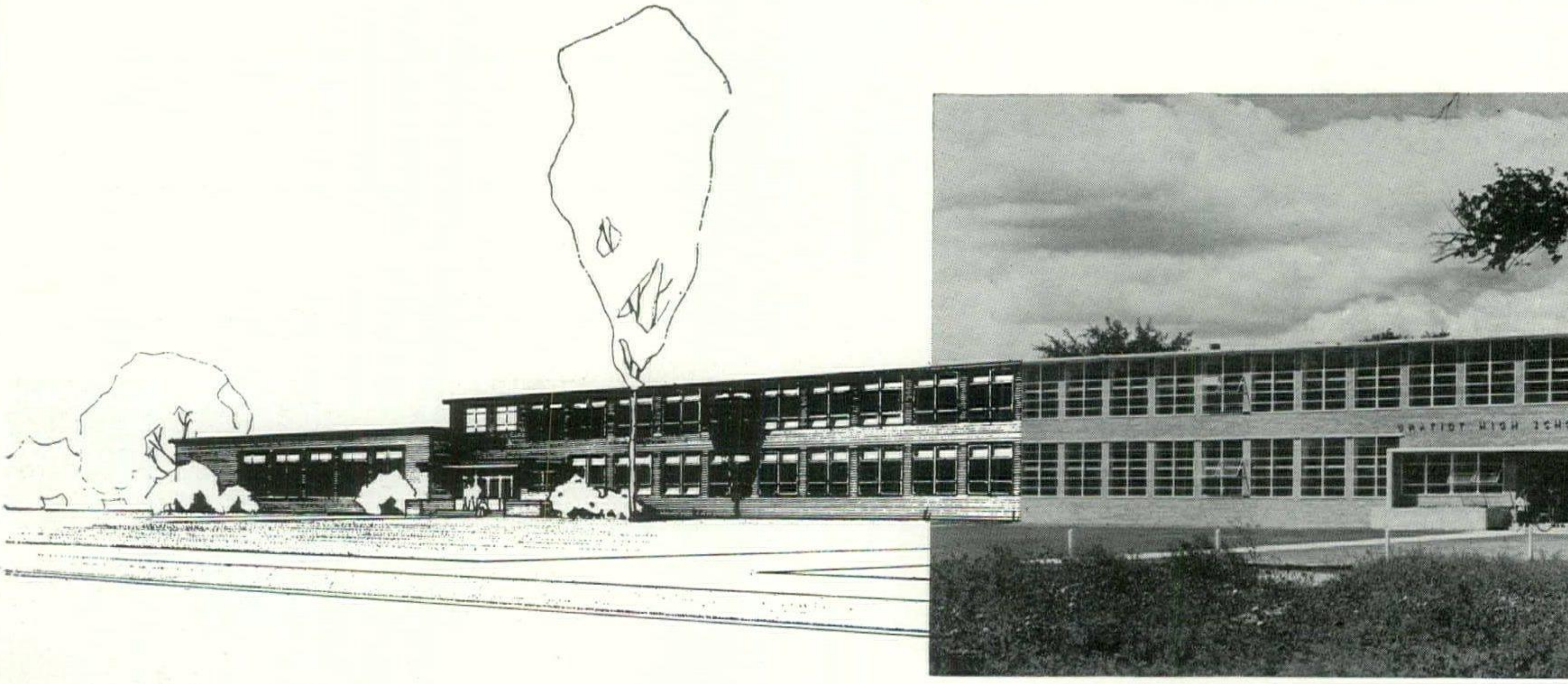
Gratiot High School uses the conventional two-story plan that has been in currency for the last 20 years—but even this has come a long way from its clumsy 1930 status. Undistorted by any attempt to look like a twelfth century stronghold or even Independence Hall, the central classroom group stretches out between the (future) auditorium and gymnasium wings—each of which assumes its natural, quite handsome, form.

The present rectangular block provides a junior high school course for 350 students. Upon extension, it will house the complete curriculum, and will include gym, auditorium, cafeteria, departments for manual training and home economics and eleven additional classrooms—bringing the final cost up to $1 million. Rooms that now house the manual training and home economics courses will revert to their true status as general classrooms. The present science lab is only the first unit of a full department. Nowhere has architect Eberle Smith tried to cover up the school's structural elements—cinder block walls and concrete beams. Acoustic tile has been glued directly to the ceiling slabs of both first and second stories.

The system of hot water heat was carefully worked out for maximum flexibility and efficiency. Each room has individual thermostatic control. Pipes carry heated water through the center of the building and out to exterior walls, where, contrary to usual procedure, it drops to a heating unit under window level. Tempered-air ventilators provide air changes for halls and cloak rooms. Public rooms and offices will have separately controlled heating and ventilation units.

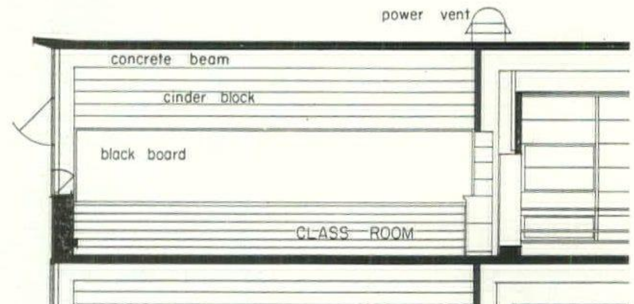


FIRST FLOOR PLAN



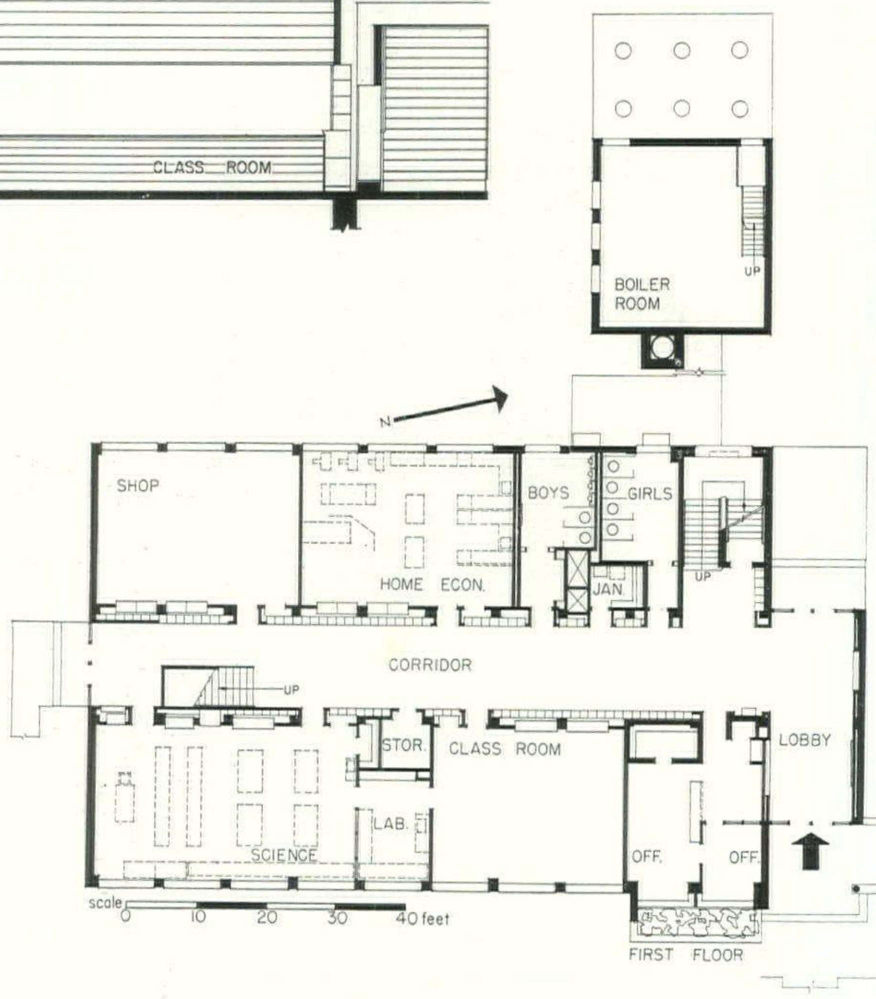
In the detailing of Gratiot minor cost savers were snowballed into large size economies. Typical is its use of the standard metal factory shelving instead of expensive wood millwork. This item, together with the use of metal trays and fixtures (ordinarily found in automobile dealer shops) has effected an equipment savings of $45 on the usual $150 cost for each classroom. This metal trim is undamageable and sprayed for soundproofing.

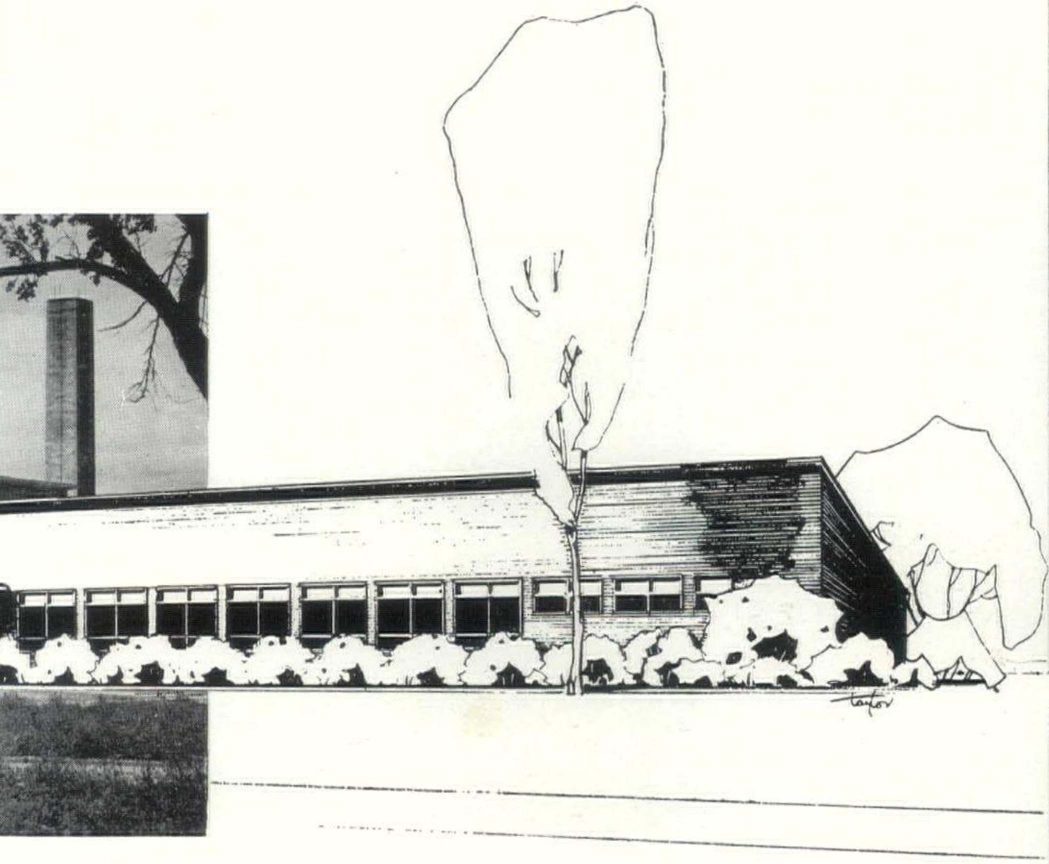
The fairly high square foot cost of Gratiot is in part misleading. This first unit carries the load of heating and other installations for the full school. Again, all rooms here are classrooms—there are no big rooms to pull down the average cost. In the long run, however, Eberle Smith believes that one-story school buildings are more efficient.

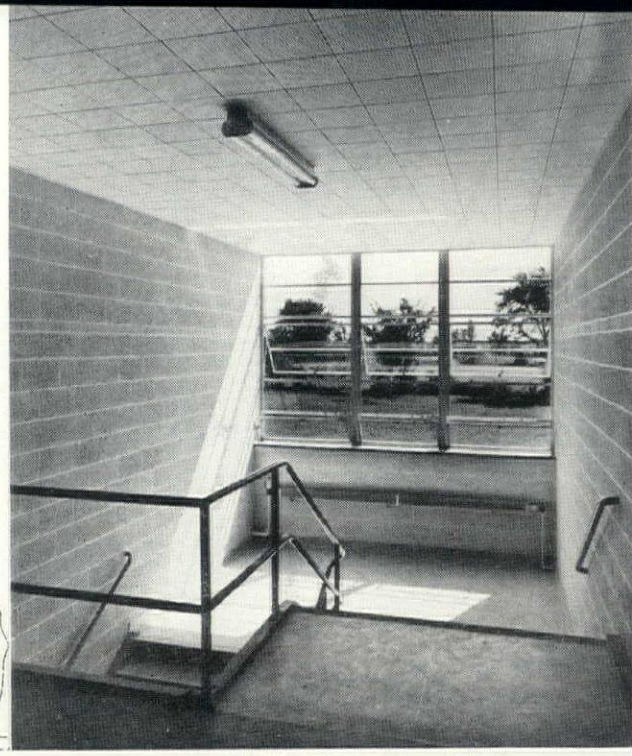


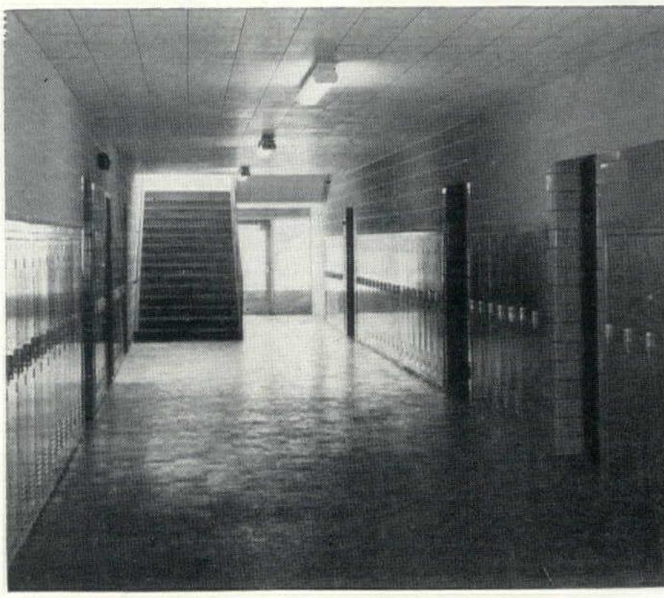
COST DATA (excluding architect's fee): $218,348 for 13,928 sq. ft. or $15.70 per sq. ft.

CONSTRUCTION OUTLINE: Reinforcing and structural steel—Truscon Steel Co. and Bethlehem Steel Co. Waterproofing—R. I. W., Toch Bros., Inc. Exterior walls—face brick, Metropolitan Brick Co., Inc., ceramic tile, Architectural Ceramic Tile Co. Interior partitions—cinder block, Cinder Block, Inc. Ceilings—acoustic tile, Celotex Corp.; suspended ceilings in corridors by The Jackson System. ROOFING—4-ply, Ruberoid Co. SHEET METAL WORK—Chase Brass & Copper Co. and Aluminum Co. of America. INSULATION—Owens-Corning Fiberglas Co. and Celotex Corp. WINDOWS: Sash—steel, Detroit Steel Products Co. Glass—Clearlite Co., Blue Ridge Glass Co. and Pittsburgh Plate Glass Co. FINISH FLOORINGS—Vermont Marble Co., Willingham-Little Co. and Thomas Moulding Floor Co. FURNISHINGS—Kewaunee Mfg. Co., St. Charles Mfg. Co. and Penn Metal Corp. DOORS—metal frames, Trussbilt Co. HARDWARE—Russell & Erwin Mfg. Co. PAINTS—Devoe & Raynolds Co. ELECTRICAL FIXTURES—F. Wakefield Co. PLUMBING FIXTURES—Kohler Co. Pipes—Republic Steel Corp.; water pipes by Mueller Brass Co. Sump pump—American Marsh Pumps, Inc. HEATING—steam system. Aerofin blast coils—Aerofin Co. Fan—American Blower Co. Boiler—Pacific Boiler Corp. Coal stoker—Iron Fireman Co. Radiators—Vulcan Radiator Co. Grilles—Tuttle & Bailey Mfg. Co. Regulators—Minneapolis-Honeywell Regulator Co. Valves—Warren-Webster Co. Water heater—U. S. Radiator Co.

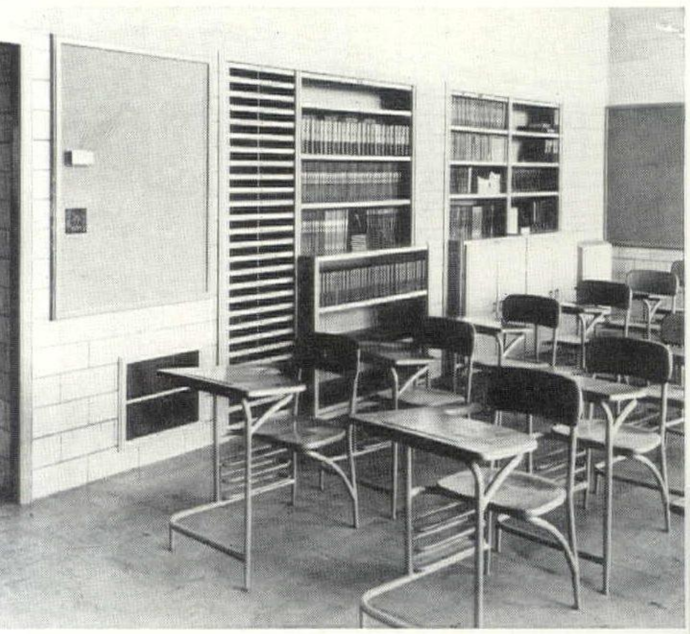






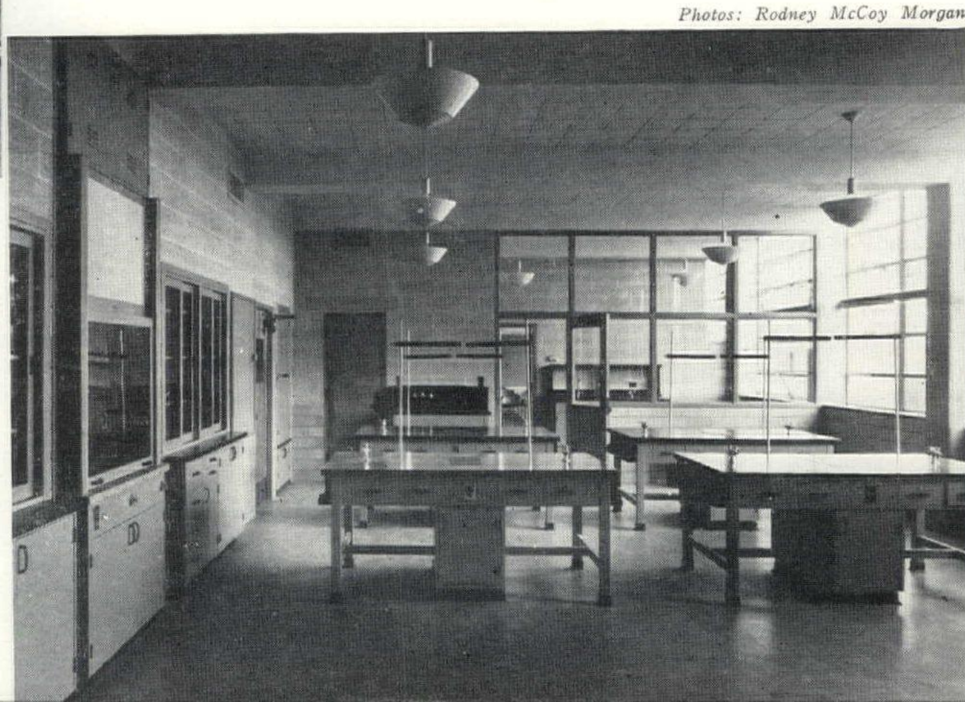


Corridors (above) use simplest detailing—pipe handrails, unpainted cinder block walls—concentrate on utility. Tile floors, metal door and window frames, together with marble windowsills, promise a minimum of janitor and decorating bills. Fluorescent fixtures supply the stronger light needed for these interior halls which also double as locker rooms.



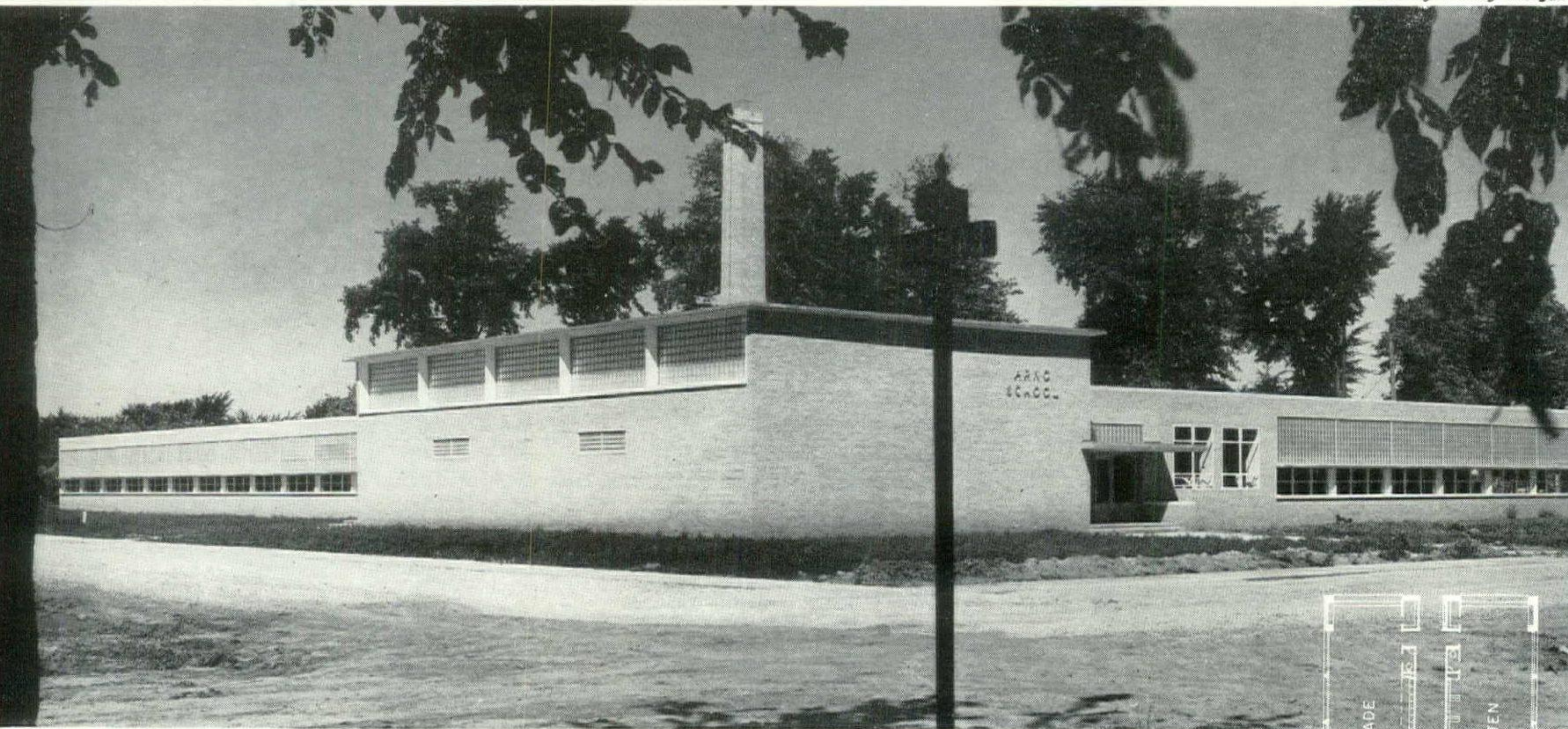
Metal trim and equipment (see photo above) is handsome, serviceable and inexpensive. Conventional drop lighting fixtures are used in the science room (at right) as well as all other classrooms. This is mainly due to a gimmick in Edison Co's tribal custom which makes free replacement of ordinary light bulbs but not of the silver bowl kind.

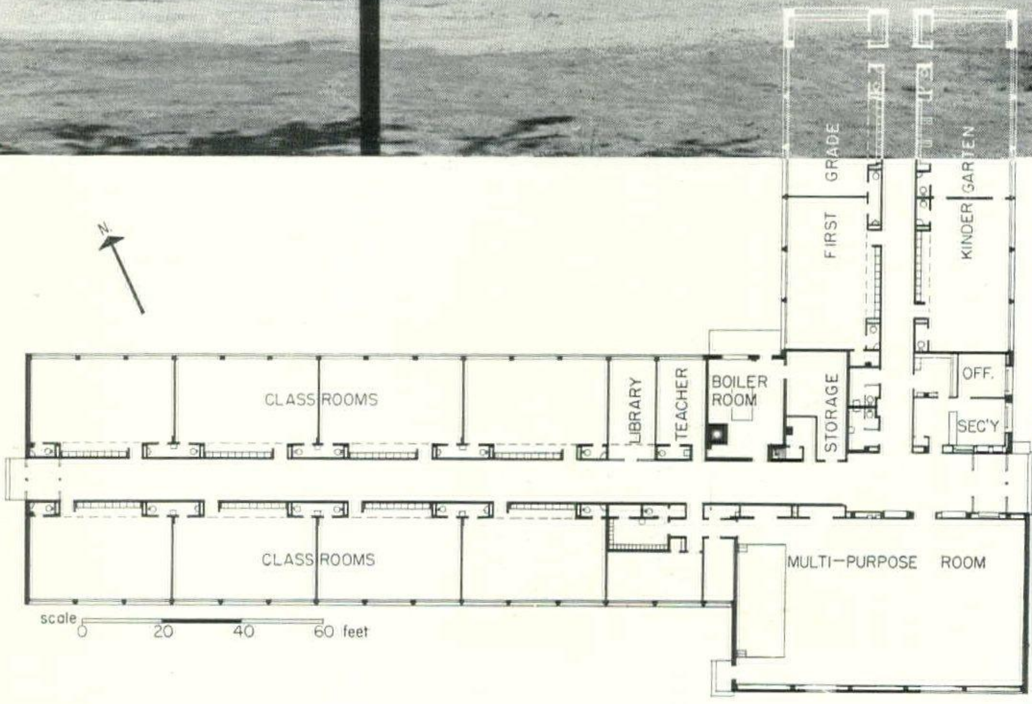
Photos: Rodney McCoy Morgan



L-SHAPE SCHOOL uses directional glass block and clerestories for bilateral lighting of classrooms

Photos: Rodney McCay Morgan

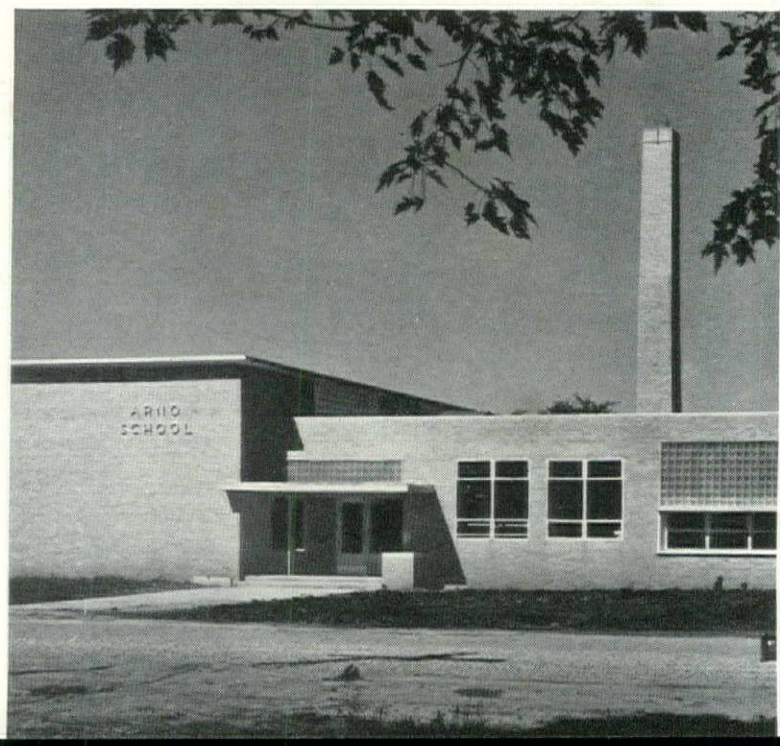


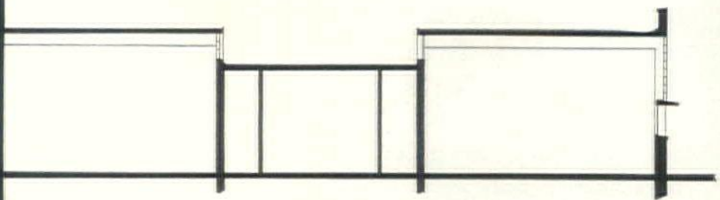


LOCATION: Allen Park, Mich.
EBERLE M. SMITH ASSOCIATES, INC., Architect
EMIL VAN SILE CO., General Contractor

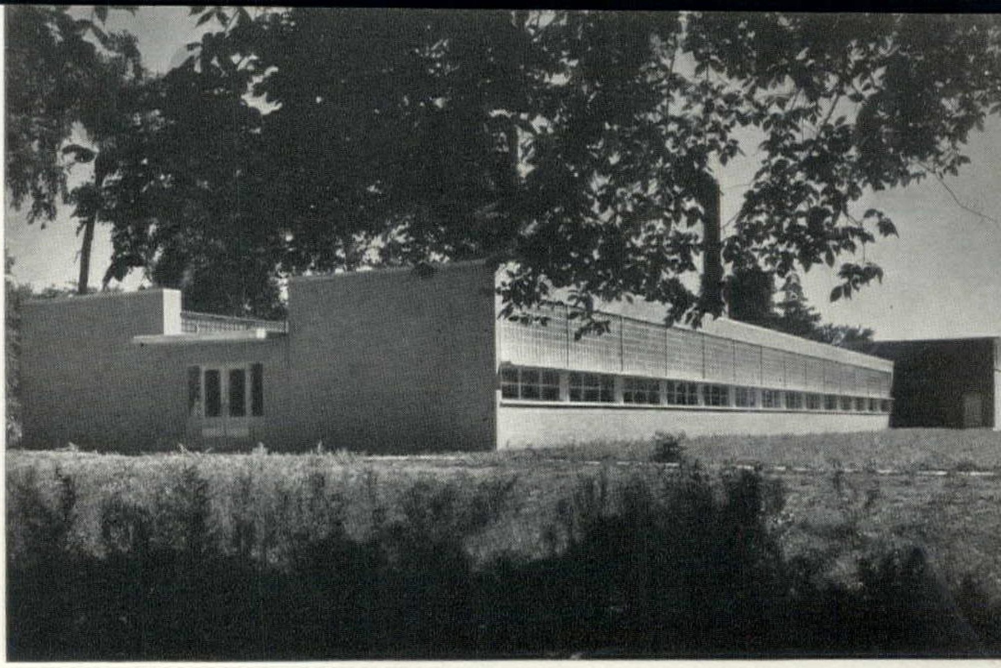
The Arno School makes the best of a variety of new school planning techniques without being utterly dedicated to any one of them. Clerestory windows in its dropped corridors provide bilateral lighting for all classrooms while still permitting double corridor lighting. The right-angle wings of the school make use of east-west as well as north-south orientation. The main classroom windows combine directional glass block with a clear glass viewing strip. This is protected from glare by a narrow overhang. In its present state the school has 15 classrooms, takes care of 420 students. Eventually it will accommodate double that number, when plans for its expansion (toward the west of the lot) have been completed.

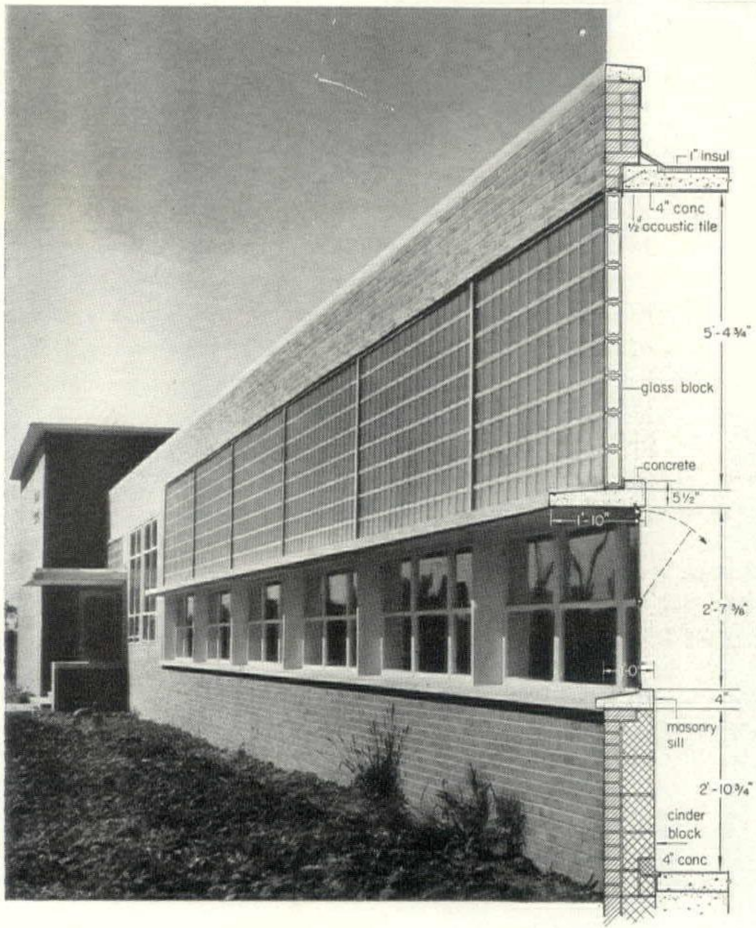
The careful traffic planning which went into Arno's design has already justified itself in the first few weeks of the school's existence. Hall traffic has been noticeably reduced by the provision of individual lavatory and toilet facilities for each of the younger class groups. (Superintendent William Harris says that a check-up in a nearby school showed from 1/6 to 1/5 of the teacher's time was spent leading small children to and from lavatories.) Kindergarten and first grade children are located in a wing with separate entrance and playyard. There is also separate community access to the multi-purpose room which serves as gym, auditorium, clinic and locker-room.

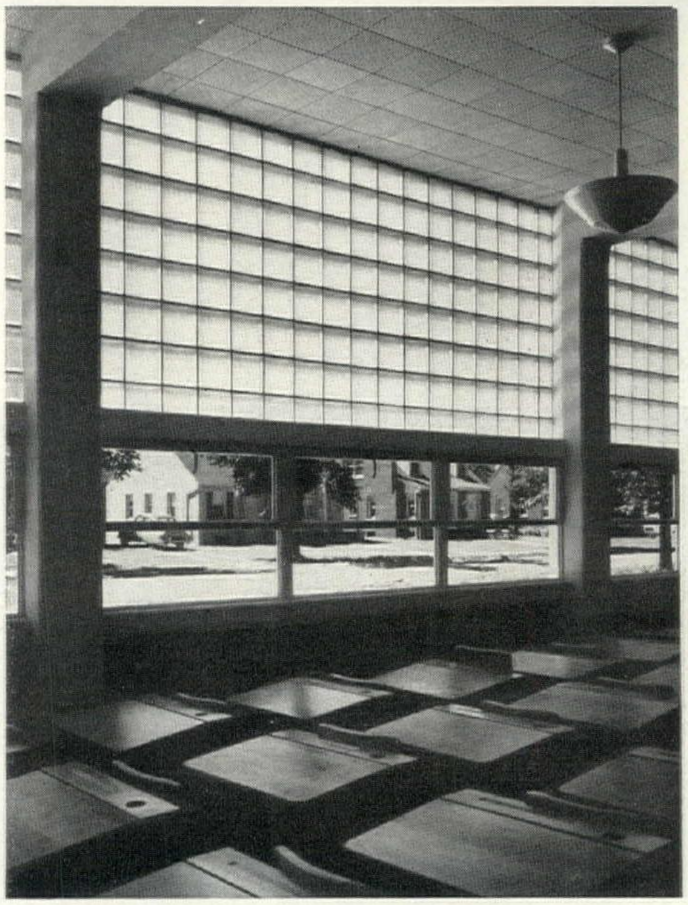




The drop in corridor height (see above and right) gives bilateral lighting to all classrooms. Clerestories and large windows exposed to sun are equipped with directional glass block.







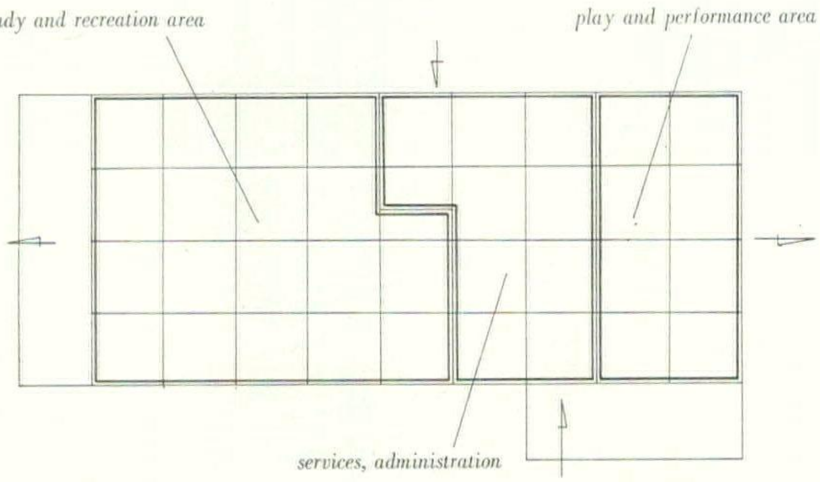
Directional glass block is used as a major tool in diffusing classroom light—see exterior and interior views above. It reduces sky glare as effectively as most shading devices without requiring adjustment or special maintenance. It also refracts light to the ceiling near the corridor side where it is reflected to desks farthest from windows. Some children, however, find its curtailment of view disconcerting.

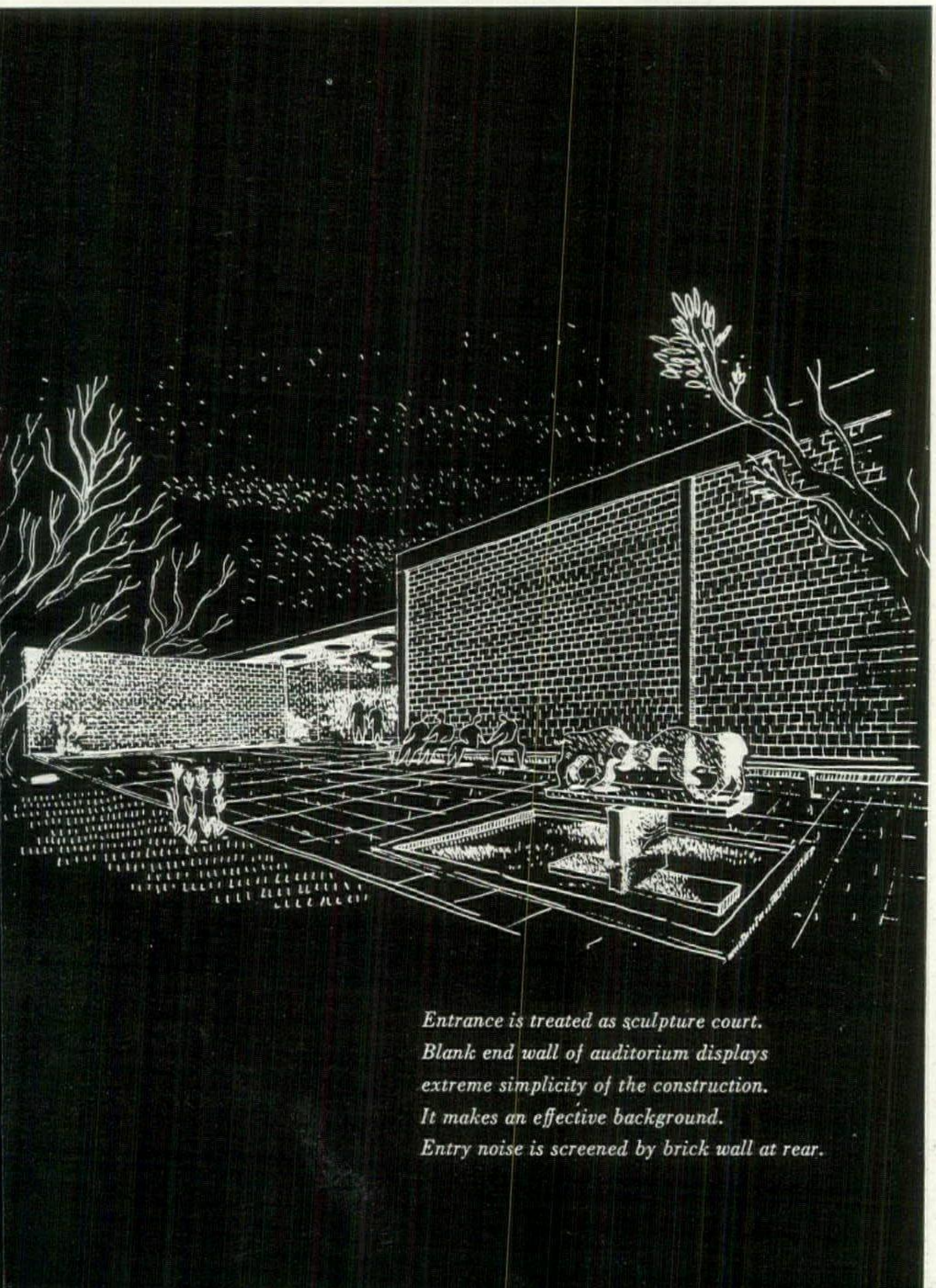
CONSTRUCTION OUTLINE: Exterior walls—face brick, Metropolitan Brick Co., cinder block, Cinder Block, Inc., glazed tile, Arketex Ceramic Corp. and cut stone. Steel (reinforcing)—Ryerson & Son, Inc. Ceiling—acoustic tile, Celotex Corp. Floors—concrete, Cooper Supply Co., asphalt tile, Armstrong Cork Co., ceramic tile, Franklin-Olean Tile Co. FLASHING AND GUTTERS—copper, Chase Brass & Copper Co.; aluminum facing, Aluminum Company of America. Ducts—galvanized steel, Wheeling Corrugating Co. INSULATION—Owens-Corning Fiberglas Co. and Celotex Corp. WINDOWS: Sash-steel, projected, Mesker Bros. Glass—Libbey-Owens-Ford Glass Co. Glass block—Owens-Illinois Glass Co. FURNISHINGS—Pontiac Millwork Co. and Republic Steel Corp. JAMBS AND TRIM—steel, Trussbilt Div. of Seims Bros., Inc. HARDWARE—Sargent & Co. PAINTS—Berry Bros. ELECTRICAL FIXTURES—Art Metal Co. Switches—Harvey Hubbell, Inc. Power panels—Bull Dog Electric Products. PLUMBING FIXTURES—Kohler Co. Water pipes—copper, American Brass Co. HEATING—hot water system. Heating unit—McQuay Corp. Fan—American Blower Corp. Boiler—U. S. Radiator Corp. Oil burner—Enterprise Heat & Power Co. Radiators—Vulcan Radiator Co. and Modine Mfg. Co. Grilles—Tuttle & Bailey, Inc. Regulators—Powers Regulator Co. Water heater and pump—Bell & Gossett Co.

COST DATA: excluding architect's fee, construction cost was $299,950 for 21,448 sq. ft. Unit cost: $13.98 per sq. ft.

FORUM'S SCHOOL FOR 1950

MATTHEW NOWICKI, Architect





Entrance is treated as sculpture court. Blank end wall of auditorium displays extreme simplicity of the construction. It makes an effective background. Entry noise is screened by brick wall at rear.

Measured by industrial buildings and office buildings, even our most forward school buildings can be called obsolete in important aspects, before the mortar is dry. True, in the past few years the forward schools have come down from several stories to a single story—as industrial buildings did fully two decades ago. But where the one-story factory gains efficiency by covering large areas of ground compactly, the school is still shredded out into long thin wings or fingers. These demand a maximum area of expensive construction in the outside wall; expose a maximum surface to the weather; demand maximum walking down long corridors. They do so because they depend on windows not just for view but for light.

Struck by the fact that the standard classroom size so nearly approaches the economical size for the standard floor bay which is the basic structural unit for cheaply built lofts or factories, FORUM asked skilled architect Matthew Nowicki to try his hand at designing a school based on the same undeviating repetition of the standard bay.

In working it out, Nowicki has brilliantly demonstrated the architect's multi-ordinal kind of thinking, which correlates several different kinds of factors at once.

▸The standard 24 x 24 ft. bay which rules the entire plan does not change at corridors. Because all partitions are independent of structure, the corridor can in fact be made of any desired dimension, fitted in anywhere.

▸The 24 ft. span can be built economically in wood, steel or concrete, including certain tilt-up methods.

▸To shorten the building periphery, which entails expenses of building, maintaining and heating outside walls, Nowicki has turned his classrooms around—exposing the short ends instead of the usual long sides.

▸To gain daylight for all parts of the school, despite the greatly increased distance of central areas from the outside wall, the architect has resorted to the industrial method of top-lighting.

▸A step is taken beyond ordinary saw-tooth or monitor lighting by assuming that an industrial manufacturer can develop a suitable plexiglass or other plastic bubble, mounted on a cylinder ready-made for insertion into any kind of roof deck.* By cheese-holing the roof with these bubbles, Nowicki can get diffused top-lighting as desired into all parts of the school. This does away with complicated roof breaks and on-the-job flashing such as present-day clerestory, high dormer, or skylight windows demand. The bubble, as a manufactured article, can be assumed to have competent waterproofing processes built in.

▸Even were the light bubble to fail him, Nowicki could retreat to standard factory roof monitors adopted in many English schools and now being built by Robert Alexander for the University of California at Los Angeles. A third line of defense suitable in many areas is electric lighting.

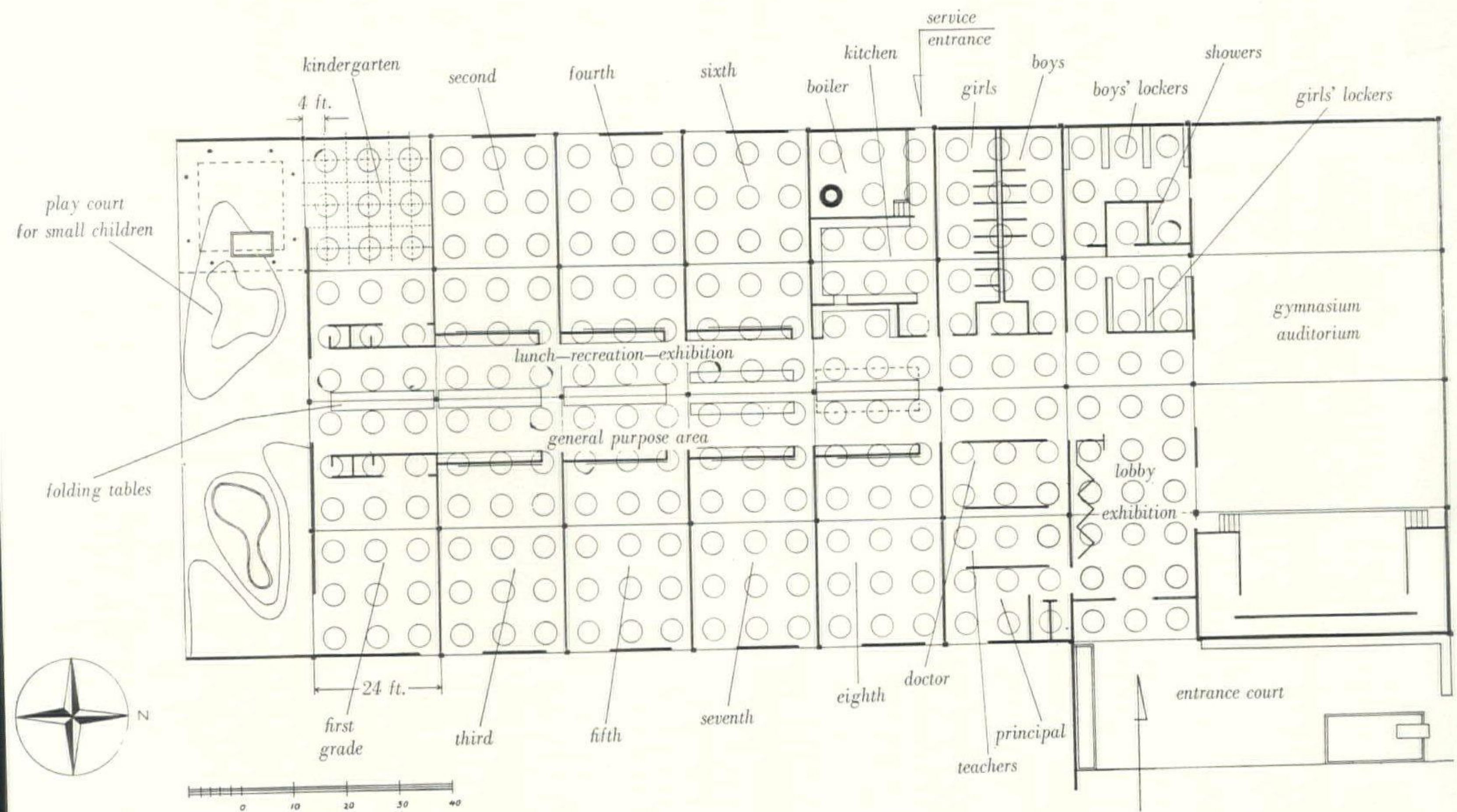
▸To exploit still further the economy of his deep space Nowicki fights out what he calls "the battle of the corridor." Building areas devoted to circulation alone are a chronic waste in modern buildings.

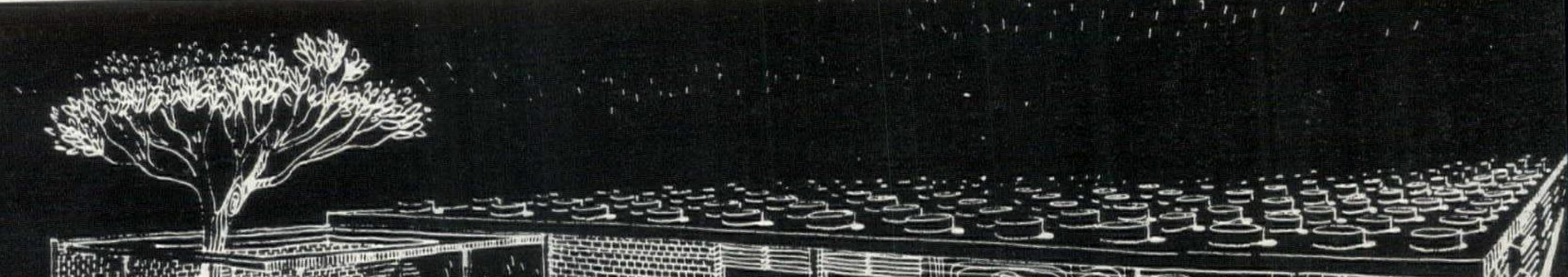
▸The first way in which the architect fights back corridor waste is by arranging all schoolrooms in close proximity so as to shorten corridors.

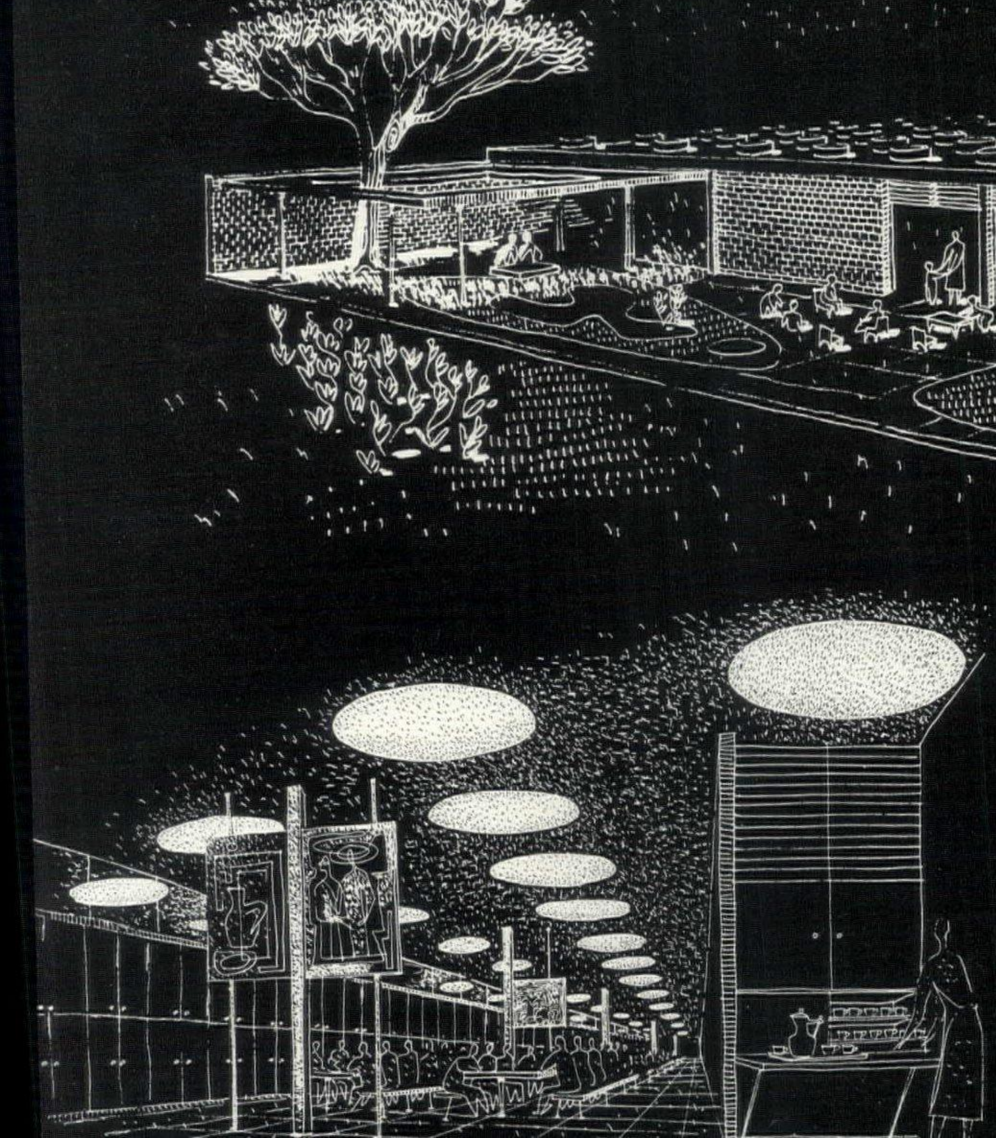
▸The second, more ingenious, device is to make the corridor itself serve as a kind of "room" and skip the expense of building separate rooms for those uses. The widened corridor of the plan serves for gatherings, for the school cafeteria, rainy day play, for exhibitions.

▸Thus by the combination of 1) absolutely standard bays, 2) compact plan, 3) short periphery, 4) short communication lines, 5) corridors put to redoubled use, Architect Nowicki shows the next probable trend in economical school buildings.

* For a custom-made version, see Aalto's dormitory, FORUM, Aug. '49.

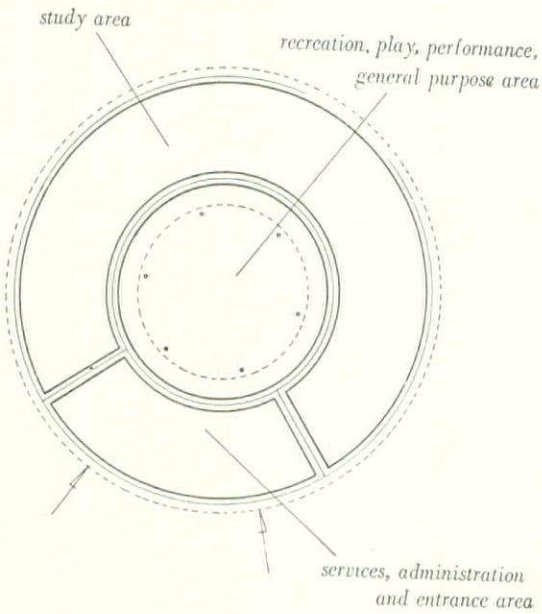


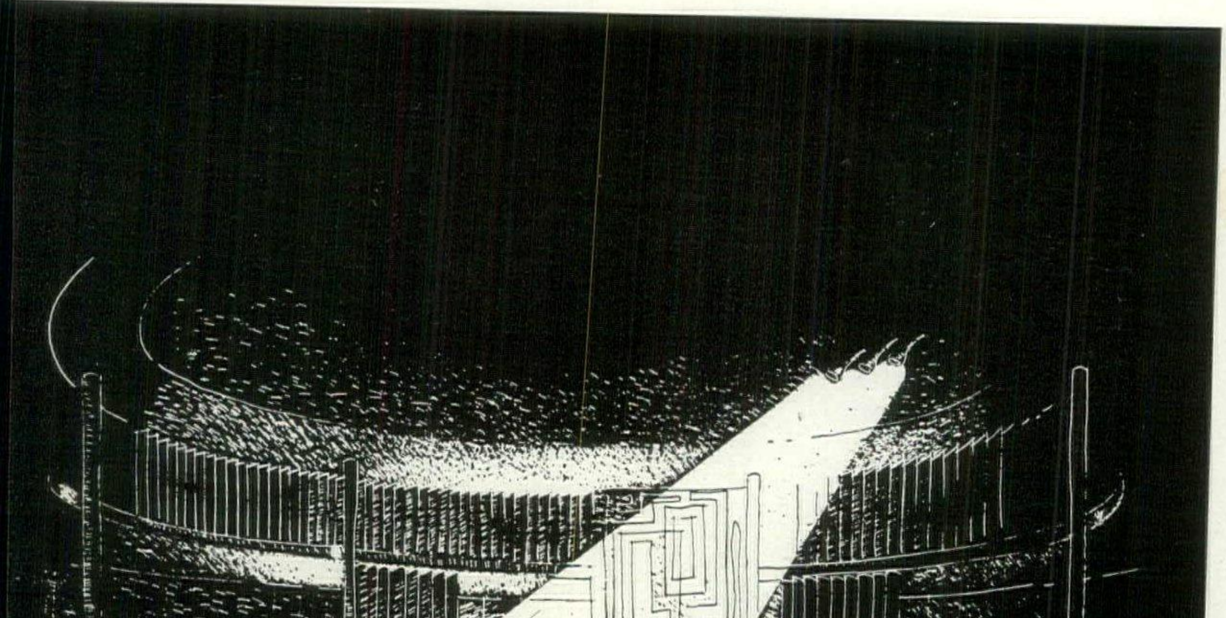




The play court for small children.
All exterior openings are mere view-slots
between masonry panels—simplest kind of building.
Plastic bubbles on cylinders
bring daylight through roof to all areas.

Wide central corridor serves at noon as cafeteria;
is also recreational space,
exhibition room, general purpose area.
Light without windows makes possible
the position with classrooms both sides.





Combination auditorium-playroom occupies entire center area of this school, and its outer "gallery" space doubles as the school's main passageway. Shutters or louvers seen lining clerestory aid in breaking up sound reverberations, always a special problem in a large round room.

A round plan, as Buckminster Fuller has never tired of pointing out, has a perfectly terrific efficiency in use of area and perimeter. Here are substantially the same provisions as in the rectangular plan on the preceding page, but the area is roughly 15,000 sq. ft. instead of 20,000 and the perimeter is 440 ft. against 624 ft. The fact that round plans have not been more widely adopted has been attributable to deficiencies in building technology, not to intrinsic demerit. So Neutra's ring plan school in FORUM'S Jan. '35 issue was to prove almost a stillbirth at the time.

Architect Nowicki has drawn this plan with the idea that the structural system might be the Youtz-Slick invention, being engineered by Fred N. Severud and tested at Tom Slick's Southwest Research Institute. In this method, the raised roof of the central playroom auditorium would be poured as a concrete slab on the floor and lifted up hydraulically, using the six hollow posts as the cylinders.

After that, each of the classroom segments would be raised in similar fashion, each on three posts (the number creating least strain). (The spans could of course be handled in wooden or steel construction if desired.)

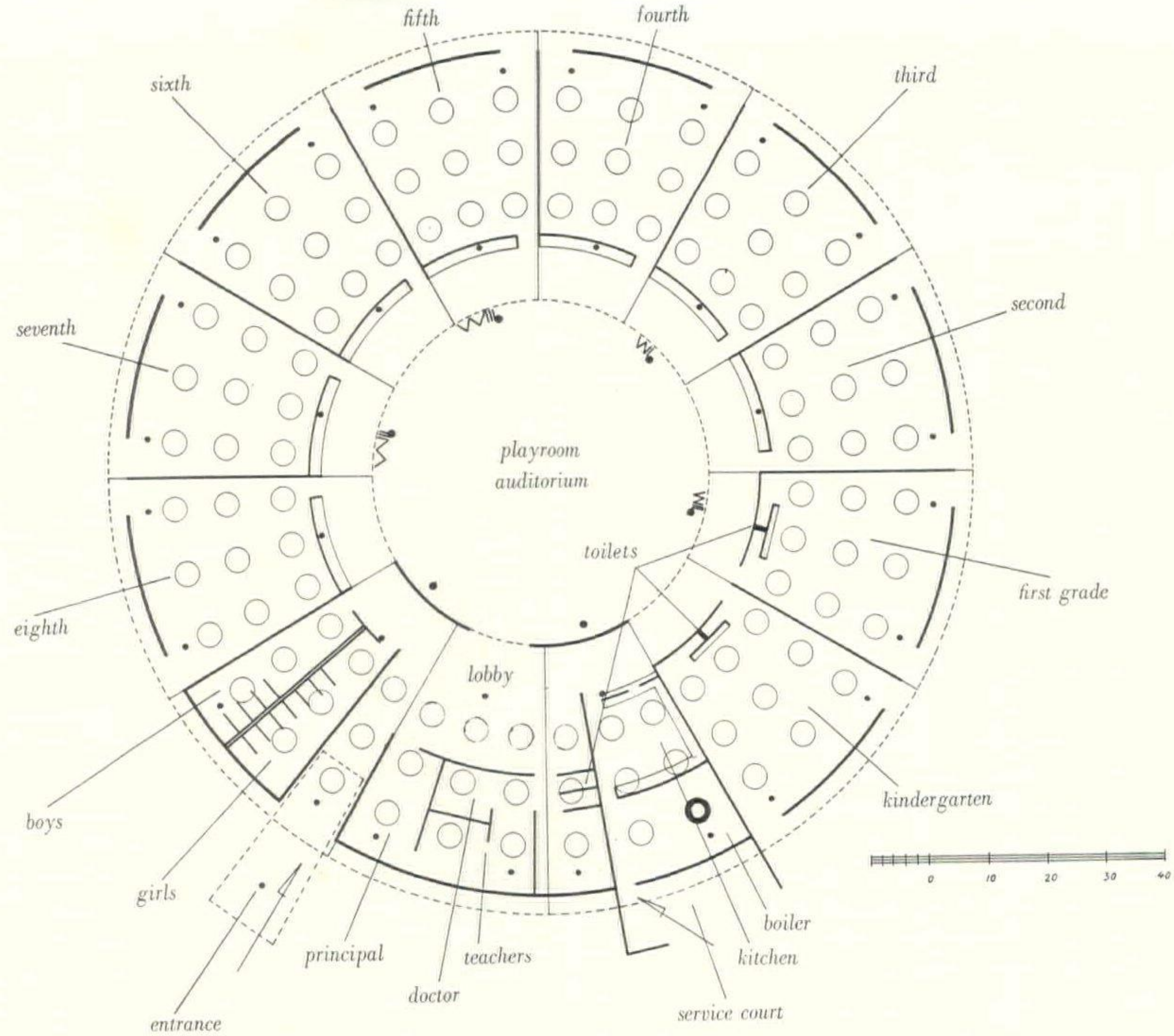
For the curved walls the roof and floor would supply an easy guide; and each of the classroom walls being a single masonry panel with no window framing or other interruption, it would be cheap and direct to build.

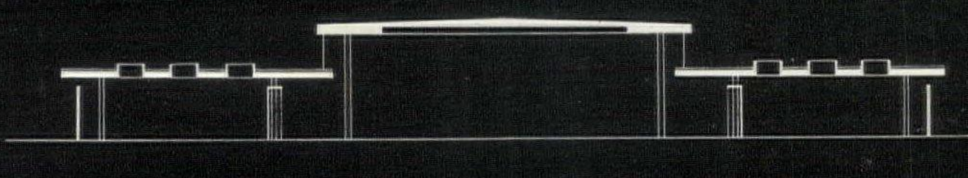
Light comes in again through the roof; and this will suffice to take away that darkness on the interior side of the exterior walls which might otherwise make an unpleasant contrast with the bright ceiling-high glass doors which give glances into the natural surroundings.

Such a building would be intrinsically as monumental as any that man could build. Its framed construction and big interior space make possible rearrangement within. But expansion is deliberately ruled out; further facilities would be provided by multiplication instead.

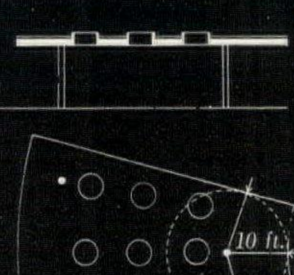
Here again the interior lines of communication are extremely short; indeed, as the sketch suggests, the gallery of the playroom and auditorium is also the corridor. This central room with its high clerestory windows gives wonderful opportunities for new kinds of theatricals.

It is assumed that any major events or noise producing activities in the auditorium can be scheduled for afternoons, when classrooms are deserted. Such a dynamic solution can often save a great deal in cost of building.



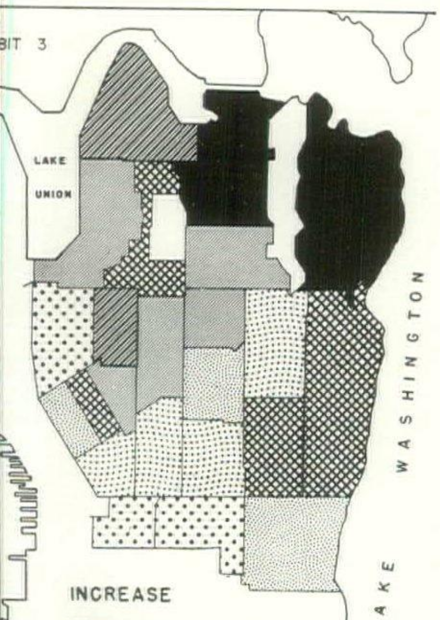


High central roof over playroom-auditorium is a concrete slab poured on the floor, and lifted hydraulically onto hollow tube posts by the "Youtz-Slick" method. After that, segmental roof slabs for classrooms are raised in the same way. Each is on three posts (to produce least stress in lifting) and the 20 ft. span at the inner end is set by the 10 ft. radius which is the maximum cantilevering distance.



Classroom shape lends itself to informal as well as formal use; nonparallel walls aid in acoustics. Since all necessary daylight comes from above, glass doors to the outside serve as view windows for psychological release only.

TRANSPORTABLE SCHOOL—a solution in Seattle to the problem of the shifting school popula



Increase and decline of Seattle's population in period from 1920 to 1940. Below, south view of school showing two transportable classrooms.

GEORGE WELLINGTON STODDARD & ASSOCIATES, Architects

Local population shifts do two things in the U. S. educational economy: 1) They leave good school plants derelict. 2) They cut down on money available for needed new schools, because this money has already been spent on the derelicts.

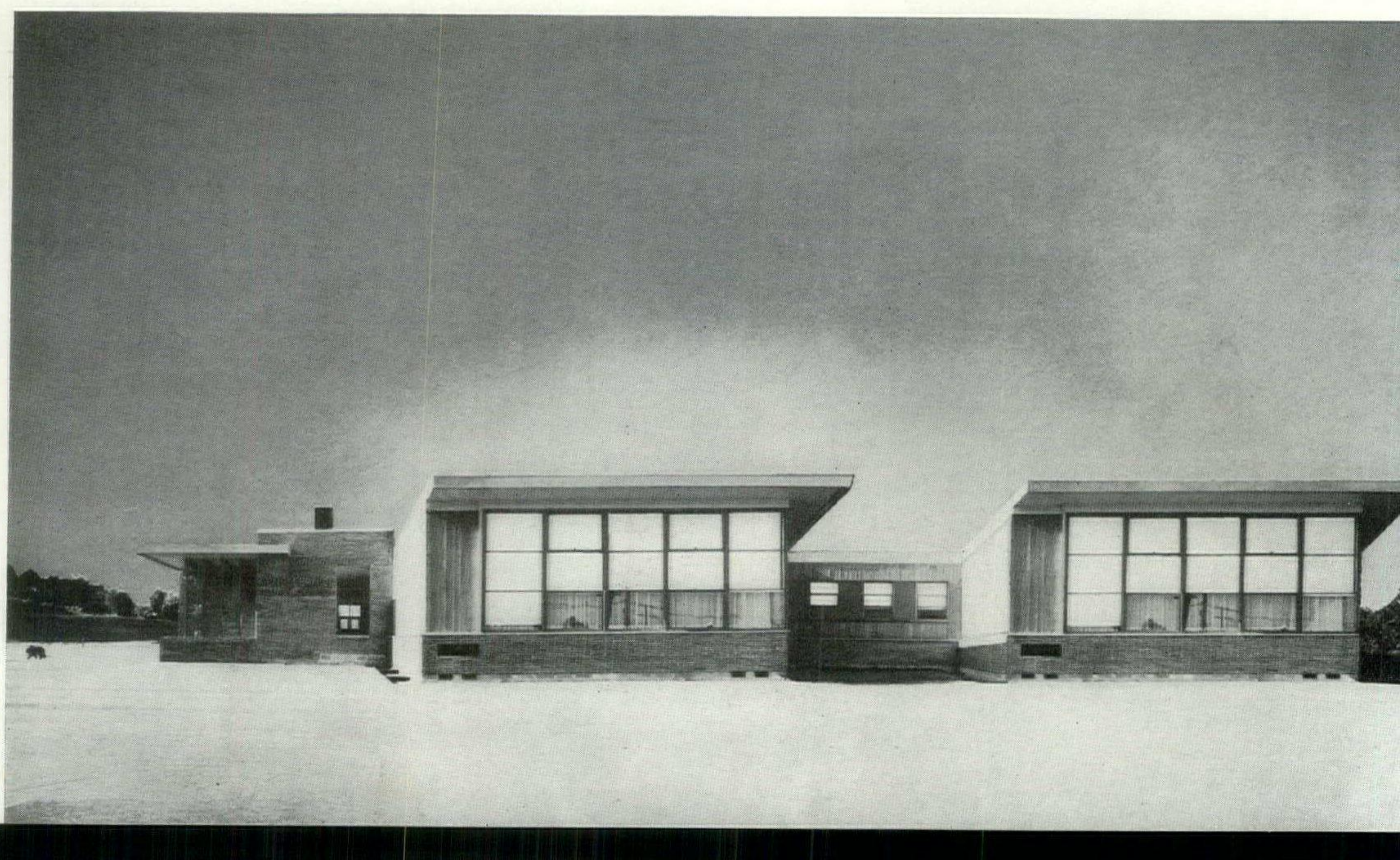
Some months ago Seattle squarely faced this problem of long range planning of school accommodations and came up with a solution, a transportable school building, designed to track the educational needs of the city from generation to generation, or even from year to year.

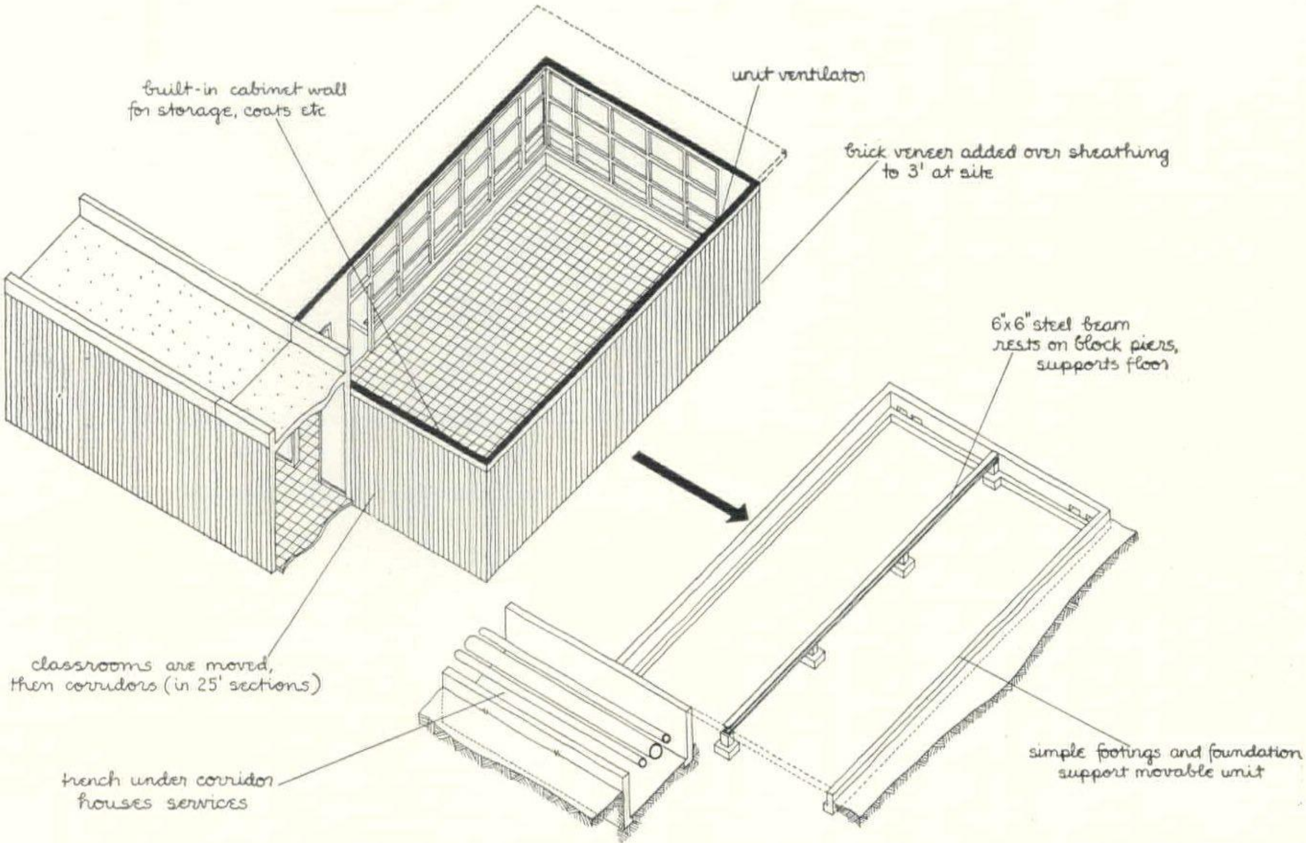
Seattle school district No. 1 of King County, Wash., through its superintendent, Samuel E. Fleming, had been at work for several years on a long range survey of population trends and school population loads within its present and immediately foreseeable boundaries. This was a survey to determine school needs, site acquisitions, construction and abandonment, and it had been of even more than usual importance. While there probably were almost enough schoolrooms for the then present population in Seattle, proper types of buildings had not always been available when needed, and it was obvious that soon few would be available *where* they were most needed. (Seattle's City Planning Commission puts the neighborhood elementary school maximum walking distance at ¼ to ½ mile.) Seattle was growing not only statistically but physically, because of frequent annexations to the city and school district. The city had reached the age that found some districts decreasing sharply in residential population while the new subdivisions, with their young families, had an unbalanced load, particularly of young children. The wartime high birth rate also helped cause a disproportionate immediate need for primary schools.

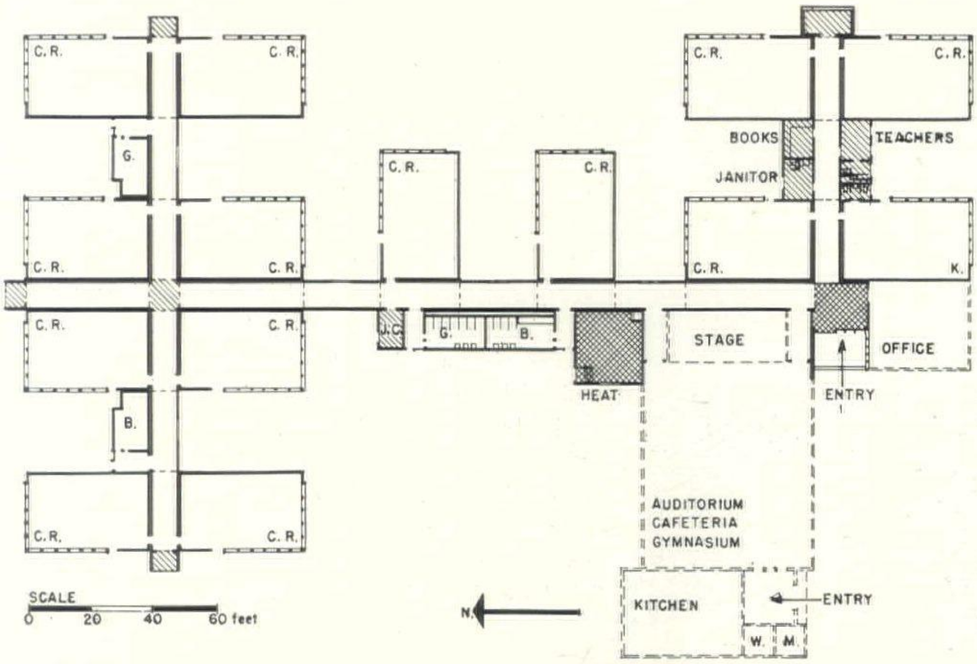
Director of School Planning Byron B. Smith posed this problem to George Wellington Stoddard & Associates—how should they economically provide for several districts having an immediate critical need for classroom space, a foreseeable need for additional space within two to five years, and then a gradual reduction in load back to present need—and perhaps to the point of complete elimination.

The first answer was obvious—demountable sectionalized, portable schools. But Stoddard rejected this as uneconomical in a long range program, and undesirable as a solution to modern classroom requirements. However, as the portable classroom principle was discarded, his office evolved the theory of the transportable frame school: first the classrooms, then the toilet rooms, and finally the cor-

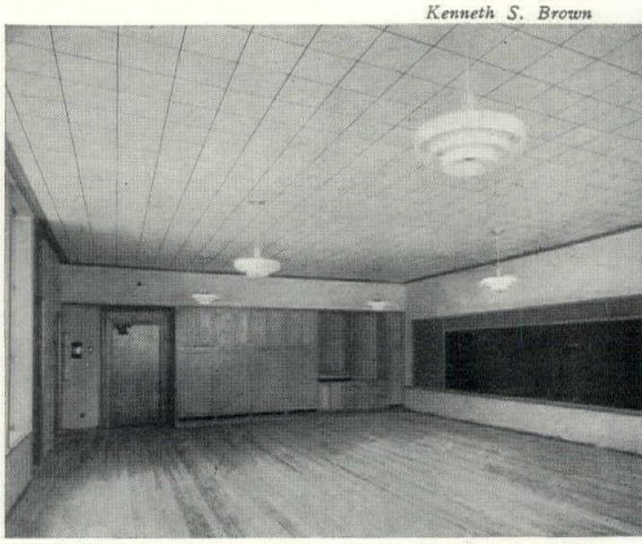
(Continued on page 178)

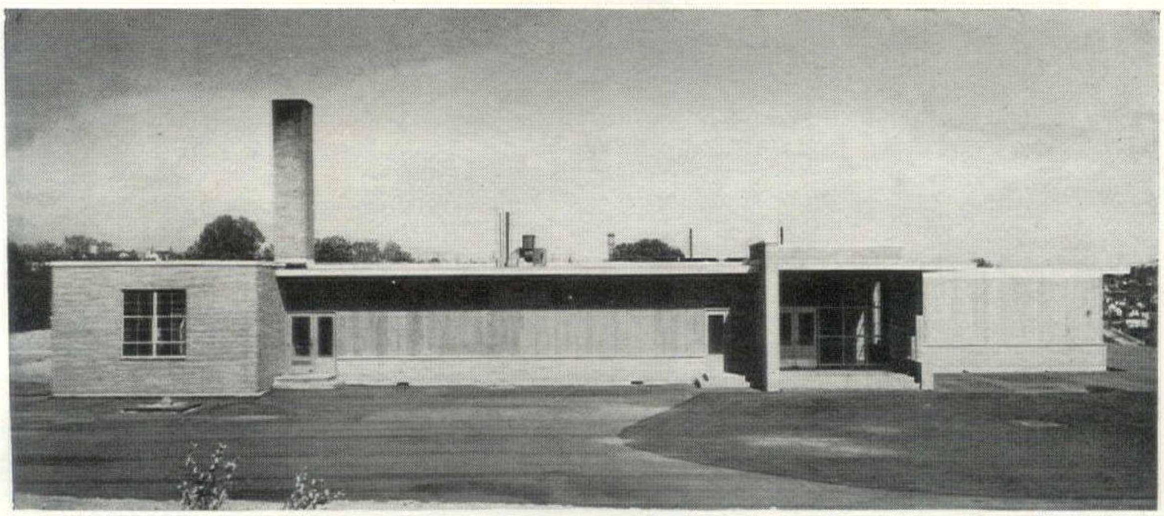






Kenneth S. Brown





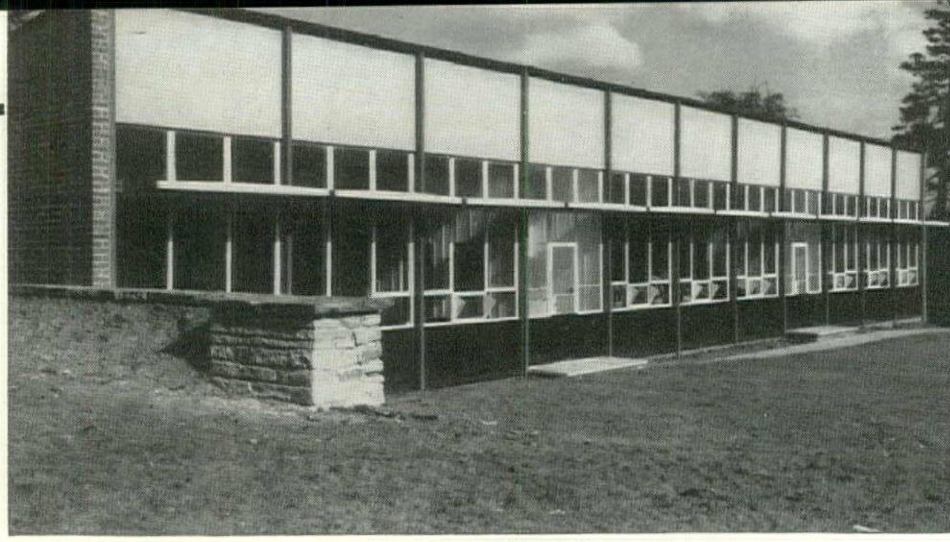
Classroom has built-in cabinets and closets at one end. Floor plan shows school at far point of expansion, including 14 classrooms, auditorium.

East elevation of school in early stage of expansion.

PREFABRICATION

There are three big reasons for putting up schools which are prefabricated in whole or in part. The first is low cost—which can be achieved in prefabrication by careful design, quantity production and shrewd planning for a minimum amount of handling. The second is the speed of installation, which sometimes is startling even to the workmen who put prefabs up. The third reason is closely related to the second—some prefab schools may also be taken down very fast and re-erected in locations of greater need.

Today's totally prefabricated schools may not be the best answer to the high demands of architects and educators. But it is sure that designers who make use more and more of substantial prefabricated parts will furnish a considerable part of the answer. On these pages are presented several schools in several degrees of prefabrication—more are shown on pages 182, 186 and 190.



AN ENGLISH PREFAB shows the beneficient results of crisis

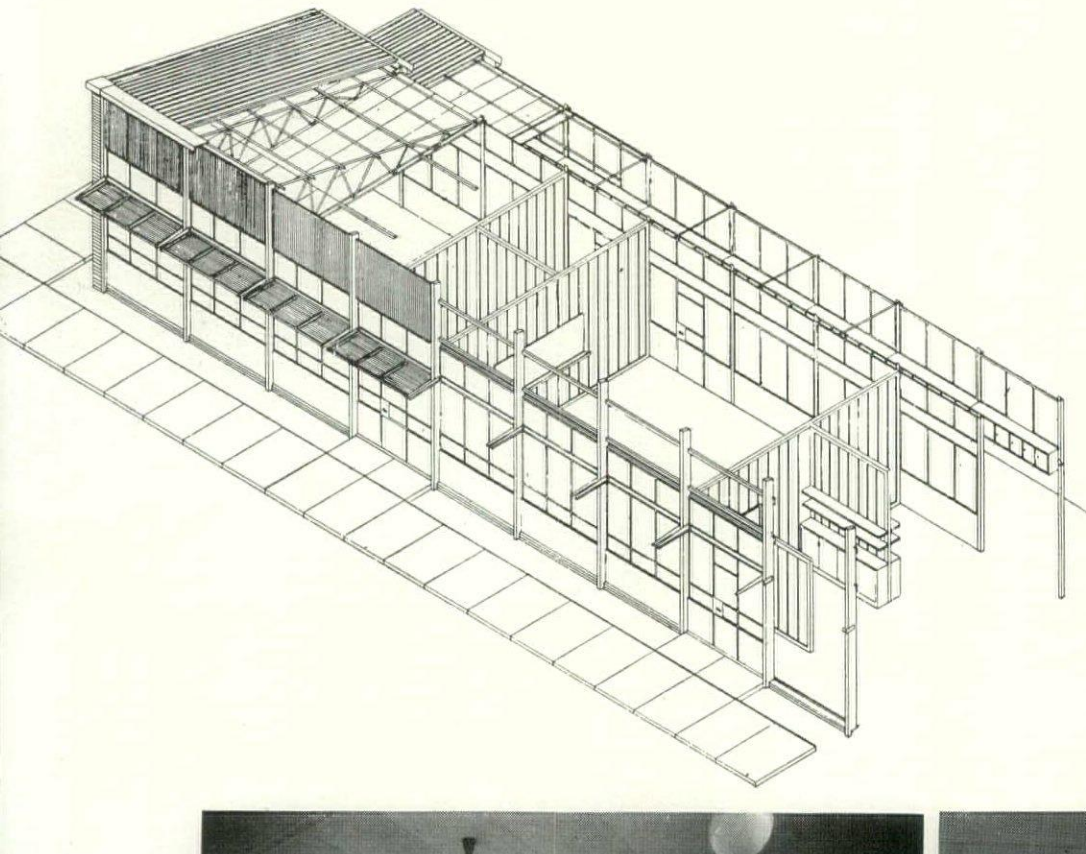
ARCON, Designers

Quick, prefabricated construction of schools on the British Isles and the continent is not merely an advantage. These days it is often a necessity. The direct solutions which grow from this situation, like this prototype three-classroom unit at Hatfield in England, might serve as model for some American communities too.

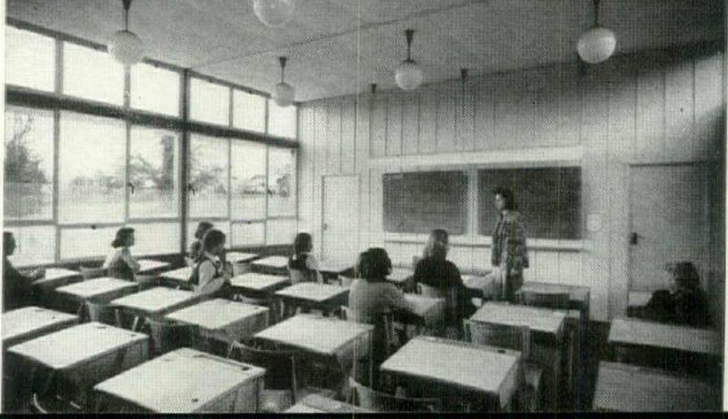
Exclusive of foundations, it was erected in a month. The structure consists of light steel cold-rolled rectangular stanchions, supporting welded steel tubular trusses. These carry a single pitched roof covered with corrugated asbestos cement sheeting. All external wall units are steel framed, incorporating windows and doors, the solid panels below the glass comprising two steel sheets with slag wool insulation. Above the windows on the high side, the wall is double asbestos cement sheeting, fluted out side. Sound absorbent ceilings are set at the tie-beam level of the floor trusses, and are built of fiber board panels supported by light aluminum T-sections. Heating is floor radiant.

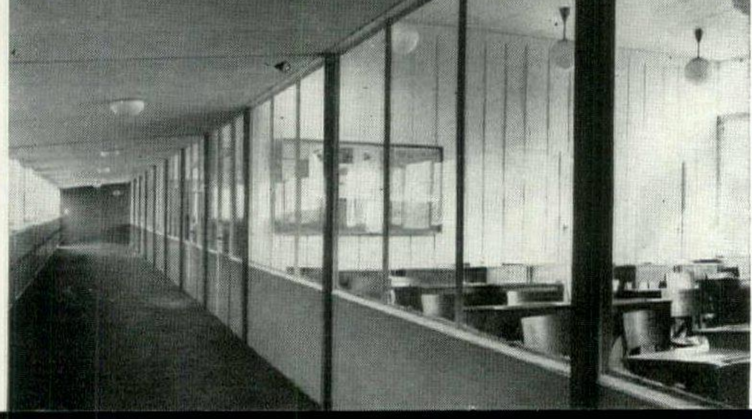
Three spans are designed in the prefab system: 21 ft. for classrooms; 27 ft. for workrooms and laboratories; and 40 ft. for assembly halls and gymnasia. The common bay module of 8 ft. 3 in. is retained throughout all types.

Classrooms get a lot of natural illumination. The one outside wall can be completely glazed, and to some degree protected from direct sun by louvered sun screens as in the example published here. Windows above the sun screen are obscured glass.

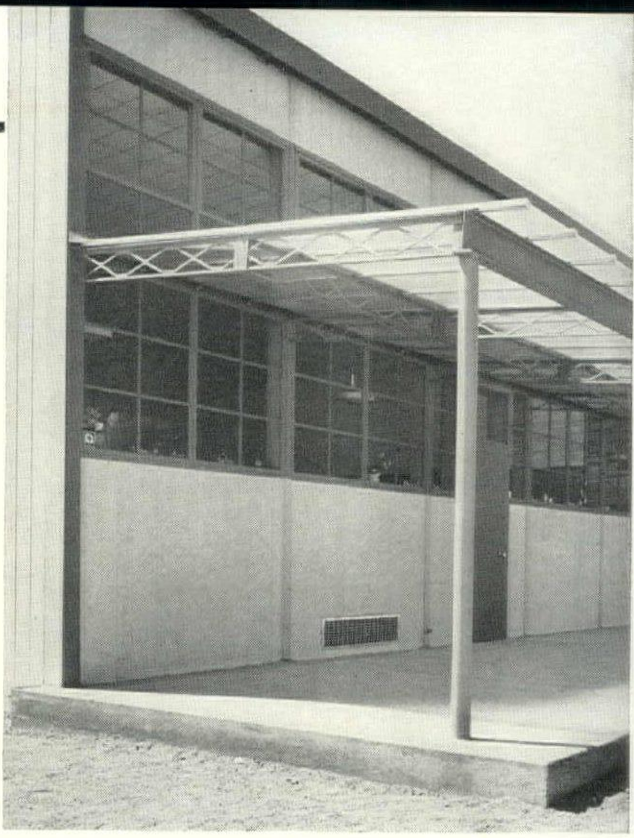


Photos: Sidney W. Newberry





PREFABRICATED PARTS are assembled with handsome frankness, producing high design



This outstanding American elementary school is a good example of the clean efficient construction possible with prefabricated panels and light expanded steel joists and studs, shop welded.

The structural system was chosen not only because it provided a permanent, semi-fireproof, verminproof construction, but also met the required predictable economies of the problem. The cost was $11 per sq. ft., a total of $90,967. An additional wing is now building at $9.20 per sq. ft.

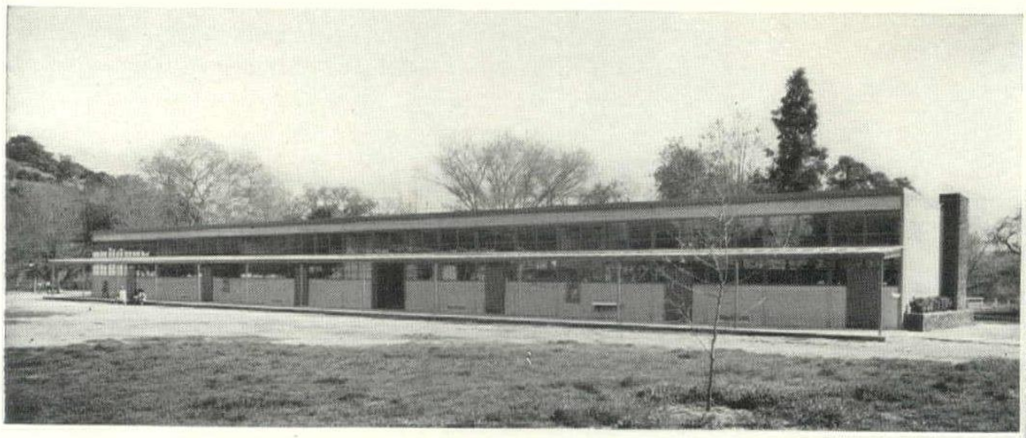
An interesting design feature is the orientation and circulation. The architects decided on maximum north exposure, which would normally dictate a corridor on the south side, in the typical finger plan. But in this school—which is just the beginning of what eventually will be a 16 classroom unit—it was necessary to locate the corridor of this first wing on the north side to segregate the primary play areas from other play areas. Daniel, Mann & Johnson's solution to this was to put a glass roof on the corridor, pulling the north light inside.

LOCATION: Atascadero, Calif.

DANIEL, MANN & JOHNSON, Architects

FAB-CONSTRUCTION, INC. Prefabricators

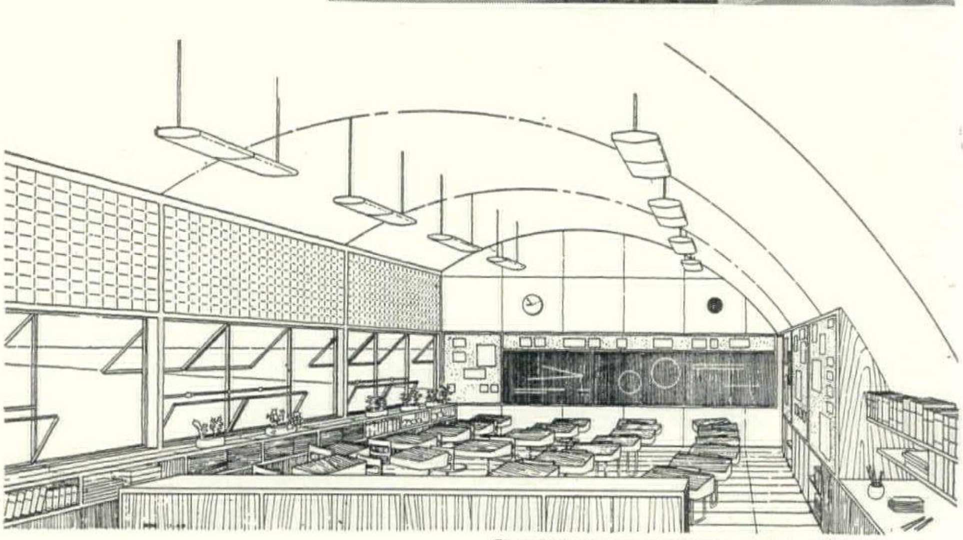
MAINO CONSTRUCTION CO., General Contractor



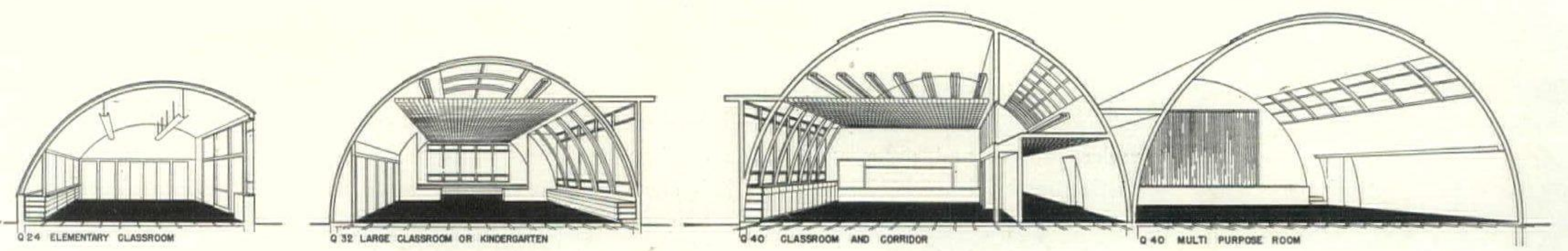
Photos: Snyder-Bell Studios

THE QUONSET—an economical schoolhouse shell

Wherever there is rain, there probably is also a Quonset. This already venerable prefab steel structure is in the forefront for many simple sheltering functions, and one of these is in schools. The sheltering problem is not quite so rudimentary when a conscientious attempt is made to build a pleasant, efficient classroom, but sketches on these pages show the possibilities when some imagination is applied to those steel ribs. The wide range of sizes in which Quonset-type buildings are available are a distinct advantage, and the self-supporting barrel form is particularly efficient in big components of the school like the gymnasium. *Manufacturer:* Stran Steel Division, Great Lakes Steel Corp.



Churchhill-Fulmer Associates, Architects



Q24 ELEMENTARY CLASSROOM — Q 32 LARGE CLASSROOM OR KINDERGARTEN — Q40 CLASSROOM AND CORRIDOR — Q 40 MULTI PURPOSE ROOM

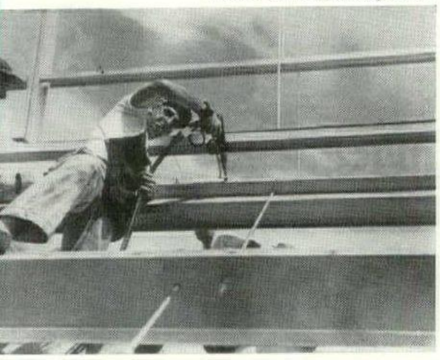
TECHNIQUES

The difference between old and new school planning is not just the difference generated by ambition for better environment. There is a vast difference as well in the methods of achieving the better environment—and that is technique.

The following pages hold recent history of practical methods (some speculation, some practical advice) in structure, heating and ventilating, lighting, acoustics, special areas, and audio-visual aids.

STRUCTURE — the problem is cost; the answers are to be found in speed and simplicity

Nelson Stud Welding Div.



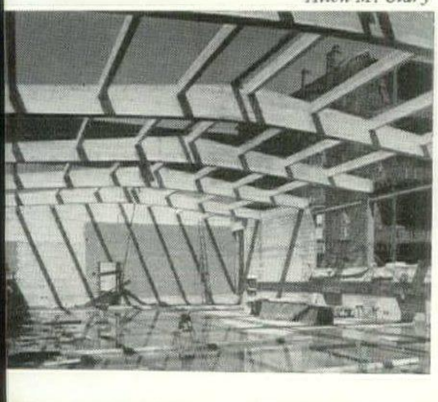
STUD WELDING

REPETITIVE STEEL FRAMING

Skelton Studios

GLUED LAMINATED FRAMING

Allen M. Clary



The path to fast construction of schools at low cost is pointed by four signposts:

1. More premanufacture of larger elements.
2. Rapid erection techniques.
3. Stark simplicity in framing, with overall repetition of a basic pattern.
4. Design to receive many identical units of building-body and building finish (that part of the finish which cannot be eliminated or incorporated in the structure).

These four points are the consensus of a number of outstanding architects specializing in schools whom FORUM asked to comment on structural technique to meet the demands of the new school. Quotations from some of these architects are on these pages and their continuation.

In the first category, larger elements made off the site, Architect William W. Caudill lists premanufactured items like steel decks, floors, and walls, and precast roof and floor slabs, exterior and interior wallboards. The saving here is in building time—Caudill estimates today's labor cost at 60 per cent of total construction cost, against 35 per cent only a few years ago.

A companion timesaver to premade items is the use of rapid erection techniques. Welding is one of the important ones. The use even on relatively small jobs of swift mechanical equipment ranging from power saws to mechanical lifts is also coming to the fore. New efficiency in applying assembly line methods to building, with close attention to such matters as re-use of concrete forms, can save money.

In the third category, the use of structural systems like rigid frame concrete, rigid frame steel, bar joist construction, and laminated timber in beams, trusses, and rigid frames can be economical because of mass production, if members are repeated without variance throughout the skeleton. Caudill points to experience in one job in which his firm used 263 identical structural bays in steel—the steel mill estimated a saving of 10 to 15 per cent.

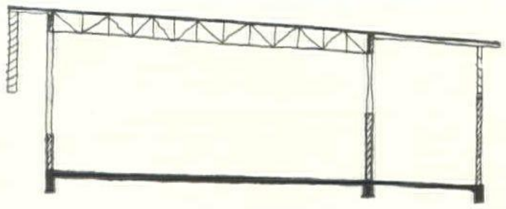
The fourth category is a matter of modular design. Repetitive application of parts and finish can achieve an even bigger saving than mass production under present and prospective labor conditions. Cutting material on the job, whether it is acoustic tile or cinder block, is very wasteful of material, and it is even more wasteful of time. Walter Anicka, designing minimal schools in Michigan, has cut costs to the bone not only by carefully avoiding the cutting of concrete block, but by using standard, uncut lengths of timber in framing.

Under Discussion

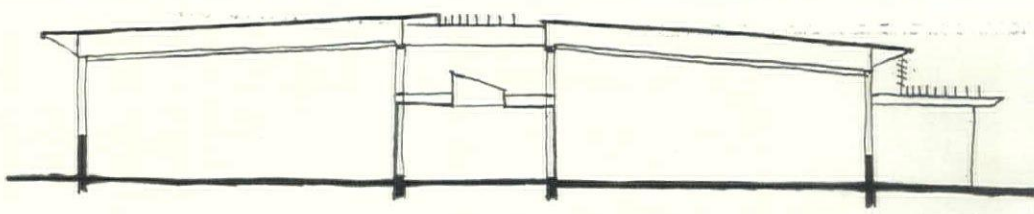
One of the basic discussions in design, the problem of single-story versus multistory schools, is often decided on a structural basis, and when this is true the preference goes to single-story schools. Space-taking fireproofing and panic-escape requirements for multistory schools are cited as expensive evidence for the one-story; the greater expense of foundations for multistory schools is another factor. And a third very important factor is the greater ease of satisfying the new demands of the new school in one story. Says Architect Linn Smith: "The advantages of one-story construction, particularly in elementary schools, are so great as to offset the questionable savings of two-story construction except in unusual cases." (For more explicit comparisons of relative costs see page 202.)

There is a noticeable preference among architects just now for light steel construction. One explanation for this is the new set of classroom dimensions which advanced educators favor. The span in the new classroom is about 30 ft. With the roof live loads imposed by most of the building codes, it is difficult to frame this simply in wood. Steel is the next alternative, particularly since light sections have become more readily available. Steel in the classroom means steel all through the structure of the school, for, as Architect John Lyon Reid points out, the structural system selected for an entire school building is usually the simplest method of spanning the width of one typical classroom.

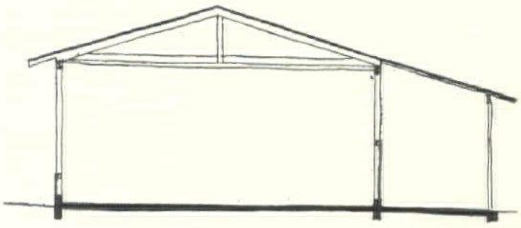
The design of clear span school buildings with non-load bearing, movable partitions is still problematical, in the matter of structural economy. This is an added complication of considerable expense in nearly all cases, and many architects are not satisfied that the money is well spent. There is even an alternative suggestion that it would be wiser to have partitions carry nearly all of the load, leaving exterior walls for very free architectural treatment. The new square classroom makes this practical.



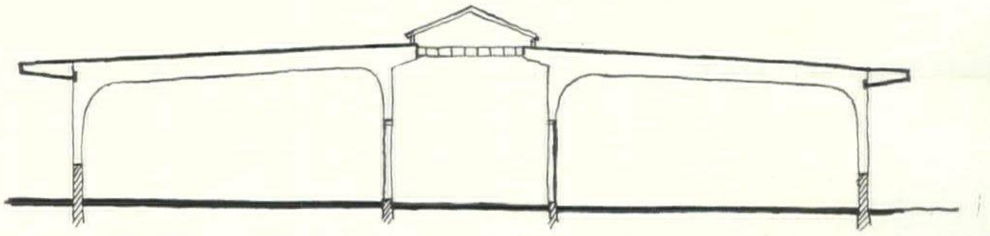
STEEL FRAME: Welded steel roof joists—4 ft. on center; light steel eave beams carried by steel pipe columns at 16 ft. centers; columns on top of sill walls; concrete, or concrete block sill walls; $10.36 per sq. ft.; (alternative wood frame; Cost: $10.41 per sq. ft.).



STEEL FRAME: 4 ft. modules; steel joists, on 4 ft. centers for flat roofs; plastered interior walls; stucco exterior; acoustic tile ceilings; composition roofing, gravel surface; Cost: $10.80 per sq. ft.

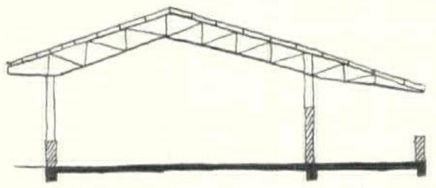


WOOD FRAME: Trussed wood roof rafters; plastered interior walls; stucco exterior; acoustic tile ceilings; composition roofing, gravel surface; Cost: $9 to $10 per sq. ft. (estimated).

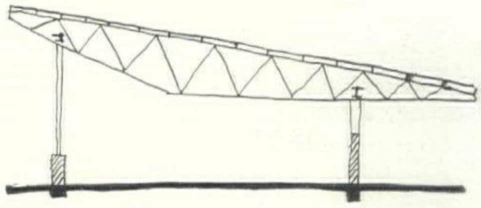


GLUED LAMINATED WOOD FRAME: Rigid frames 8 ft.; continuous wood sash; concrete or gunite sill walls, on 8 ft. centers; double plywood roof deck panels, 4 ft. x reinforced to take the horizontal kick from the frame legs; Cost: $10 per sq. ft. (estimated).

PAGES FROM COST BOOKS—Classroom sections with costs from the recent experience of Kistner, Curtis & Wright, Architects in the Los Angeles Area—augmented by data from the offices of Hillman & Nowell, Structural Engineers—furnish an interesting documentary on comparative costs in at least one section. All classrooms are 30 ft. wide, on concrete slabs, and all roofs except the laminated wood framed school are framed on 4 ft. centers.



STEEL FRAME: Steel roof joists 4 ft. on center; concrete block walls; plastered; Cost: $11.20 per sq. ft.



STEEL FRAME: Steel roof joists 4 ft. on center; reinforced grouted brick walls; Cost: $10.50 per sq. ft.

Steel joist construction is more economical than concrete but the designer must make it so

—by John Lyon Reid

While the choice of structural systems and finish materials is of enormous importance in final accounting of the cost of construction, this is not by any means the total answer. The skill of the engineer and the architect in designing the fabrication of parts and the fitting together of the various materials holds the key to the final cost.

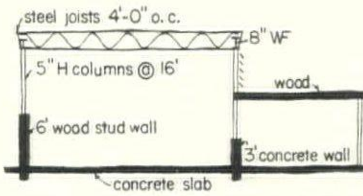
Using the same structural system we have found a great variation in price as a result of the finish materials used, and the mechanical system. To illustrate, we have found a variation of from $7.85 per sq. ft. to $11.15 per sq. ft.; each example was one story steel joist construction with radiant heated concrete floor slab on the ground. The difference is due to open corridor arrangement in one, and glazed-in corridor arrangement with artificial ventilation in the other, together with considerable special millwork. The structural system that we favor and one which we have consistently used in preference to other systems is shown in section in the margin. For the typical school this now seems to average out about $9 per sq. ft.

I do not mean to imply, however, that, designed with equal skill, all structural systems cost the same. Even when handled skillfully, concrete construction is expensive. By concrete construction, I mean concrete floor slabs, walls, columns, beams and roof deck—in short, the whole supporting structure of the building. Acquaintance that I have had with other concrete work leads me to the same conclusion.

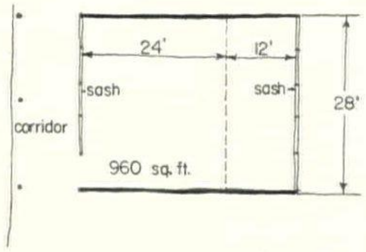
We have used steel joist construction more than most other West Coast firms and have realized surprising economies in this method.

The most important thing in the reduction of costs is in the plan. Take, for example, our Montecito School (p. 110). We have cut a considerable chunk out of construction cost by the elimination of much corridor space. One corridor, with crossover connections, serves two wings of classrooms. It seems to me that much remains to be done in the re-examination of some of the more traditional methods of grouping buildings to cut down on needless circulation. We have found another economy in the arrangement of the classroom itself. The one sketched at the right is now under construction and we have found that it represents a reduction in cost from about $9 per sq. ft. to about $8.25 for the same quality of materials, equipment and finish. This also reduces the site space required for the building proper, cuts down on the amount of outside walls per classroom and cuts 4 to 12 ft. off the amount of corridor. This classroom represents our economy model.

To sum up: Economies in building costs are in direct proportion to the skill and experience of the architect and engineer; concrete construction is costly; wood frame construction for short spans is probably the most economical of all (up to about 26 ft. in span). In our own experience steel joist construction, as illustrated by the Montecito School, is the most satisfactory of all.



FAVORED SECTION



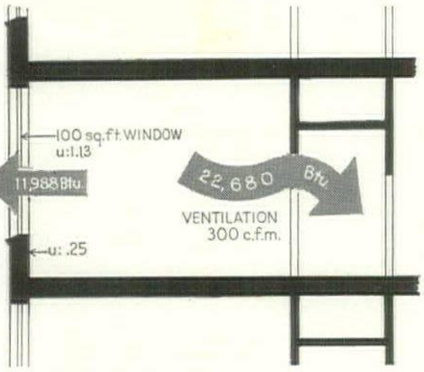
ECONOMY PLAN

* Partner, Bamberger & Reid, Architects, San Francisco.

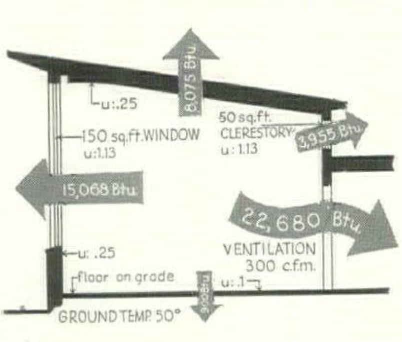
HEATING AND VENTILATING

The control of air and temperature in classrooms full of children is a constantly shifting problem which must be approached through dynamic thinking

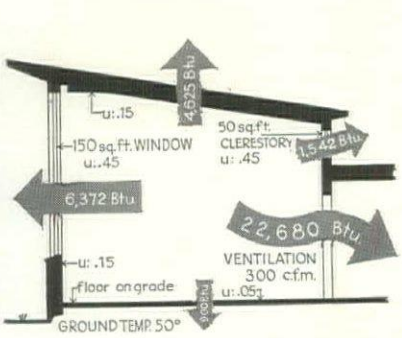
—by Henry N. Wright*



HEAT LOSS through walls of classroom in conventional multistory school is at a minimum—only a little more than half the ventilating loss.



HEAT LOSS in contemporary single-story classroom is almost 50 per cent more, due to more exposed surfaces and greater window area.



BUT INSULATION can protect contemporary single-story classroom so heat loss is only slightly greater than the most favorably situated multistory conventional classroom, and the average for the entire building might be less.

There are few types of work in which the static analysis that is the basis of most heating design comes into such open and obvious conflict with the everyday realities as in the school classroom. This is so in the first place because the use of such rooms, and consequently their heating, is on an intermittent rather than a constant or nearly constant basis. Schoolrooms are normally used only during the daytime, and during the middle daylight hours at that. At night, they are allowed to cool; in the morning, they must be warmed up quickly before school begins. Secondly, schoolrooms are in use during the time of day when solar heat gain is at a peak—either for the first half of the school day, as in an east classroom; the middle half, as in one facing south: or the last half, as in the case of a classroom facing west. Since almost all classrooms today have a great deal of glass—from 20 per cent of the floor area upwards—the solar heat gain is tremendous. On clear winter days it may exceed by a considerable margin the total heat requirement of the room for periods of two to three hours—almost half of the working day so far as the classroom heating system is concerned. Finally, classroom heating is complicated by density of occupancy—one pupil to every 15 sq. ft. or more. This presents a problem in warming sufficient outdoor air for ventilation, and this ventilating load normally exceeds the load due to other causes.

The students are radiators

Even more important, dense classroom population presents a special problem of heat *gain,* since the average pupil gives off approximately 240 Btu's of sensible heat during every hour he is in the room, and a class of 30, plus the teacher, about 7,500 Btu's per hour—a quantity that is likely to more than equal the "steady heat flow" through the walls and windows (ignoring ventilation) in all but very cold weather. The same is true of the classroom lighting system, which is likely to give off about the same quantity of heat as the occupants of the room when it is in use. In fact, the combination of these two elements—lights and occupants—frequently equals the total heat requirements of a typical, one-exposure classroom in ordinary winter weather of 45° to 50°, while the combination of pupils and solar heat gain may far exceed it.

These special considerations add up to a very simple conclusion: the problem of classroom "heating" is just as likely to be a problem of *cooling* as a problem of heating; paradoxical as it sounds a classroom heating system, to be truly automatic, should be as capable of supplying controlled cooling as of supplying controlled heating, since in all but the coldest weather it is likely to be called upon to perform the former function more frequently and for longer periods than the latter.

In classrooms equipped with ordinary steam radiators, or other basic means of adding heat to the air, and without means of artificial ventilation, this fact is ignored. The resulting lack is made up for by opening and closing the windows and turning the radiators off and on. Some approximation of comfort is obtained since, if the windows are opened too wide, cold drafts are created and occupants close them; if the windows are not opened enough, the room becomes stuffy and occupants open them; if the radiators are on when they should be off, this too is eventually corrected. But if we consider the function of heating to be one of *maintaining* comfort, we can hardly regard such manual adjustments as productive of satisfactory results. When controlled by a central thermostat, such a system requires a very nice adjustment of the windows to maintain the room air at the desired temperature—if the windows are opened at the wrong time, or left opened too long, the teacher may find herself with a chilly classroom and no heat in the radiators. When it is equipped with an individual room thermostat the air is held at the thermostat setting, but frequently only by a needless expenditure of heat.

Such systems have still another important deficiency. Ventilation, needed at all times when the room is fully occupied, must be accomplished with untempered outdoor air, regardless of the temperature outside. This is all right so long as the outdoor temperature remains within 10° or 15° of the room temperature, but when it falls below this level, air admitted to the rooms through ordinary windows is bound to create drafts and uneven temperatures, especially near the floor. The result is that the ventilation requirements of the room are likely to be ignored in favor of thermal comfort, and the windows kept closed when they should be opened.

Basic requirements

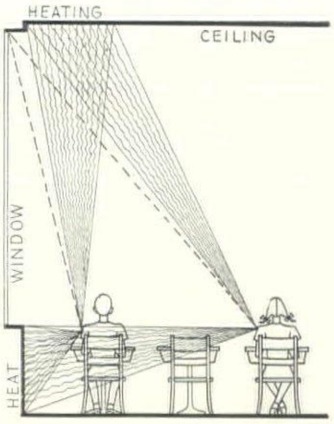
All of these things are true, to some extent, of every heating problem. But they are true in greater degree of classroom heating than in almost any other type of building. And they are of sufficient importance to the health of the school population to say that any system of classroom heating, to be fully satisfactory, should include:

1. A means of supplying heat only when the total heat demand of the room, including minimum ventilation, requires it.

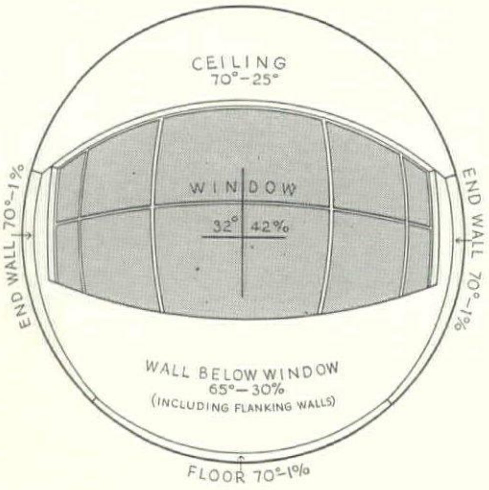
2. A means of supplying fresh air tempered for ventilation requirements.

3. A means of supplying fairly large quantities of cool air, mixed with room air to within 10° or 15° of room temperature, for cooling when the heat demand is negative. *(Continued on page 206)*

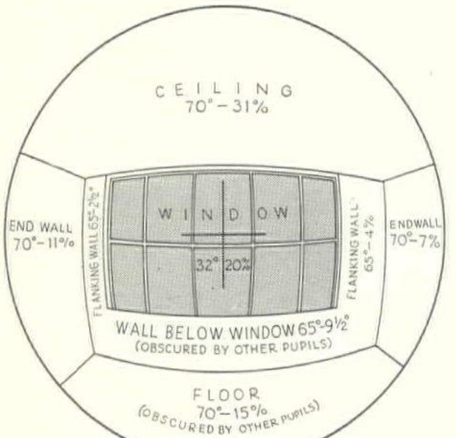
* Designer and Technical Consultant.



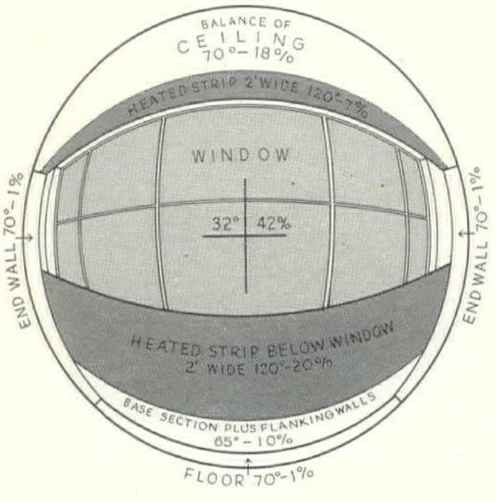
"ARM'S-EYE VIEWS" OF A COLD CLASSROOM WINDOW



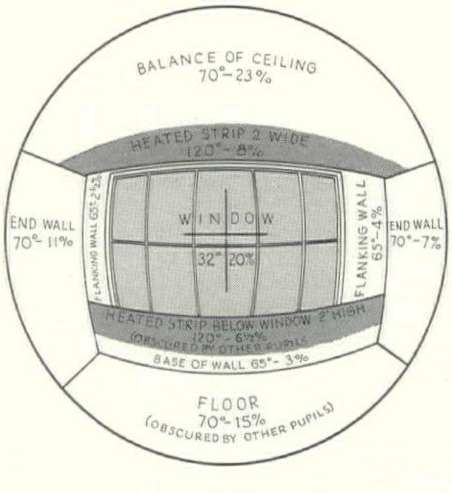
1. JOHNNY'S ARM sees the cold window surface as a leering eye, monopolizing 42 per cent of the arm's "view." The wall below the window, somewhat colder than the other room surfaces, takes up another 30 per cent of the "view." Result is that the radiant temperature, so far as the most exposed portion of John's body is concerned, is 53° in zero weather, when the glass surface is 32°. This part of his body would like an air temperature of 87°, the rest of him is satisfied with 70°. There is no way to please both parts by varying merely the temperature of the air.



2. MARY'S ARM is two rows further in than Johnny's. The lower part of its "view" is her fellow students—who are the warmest things in the room. Also, its picture of the window is much more normal than Johnny's, the window accounting for only 20 per cent of the total area. Even so, the radiant temperature from the point of view of Mary's arm is only 62°, calling for compensating air temperature of 78°. Even double glazing, raising the zero weather temperature of the glass to 60° and its radiant temperature to 67°, would still leave parts of Mary's body exposed to a radiant temperature of 65°—too low for comfort.



3. HEATING PANELS placed just below the window in the wall, and just above it in the outer edge of the ceiling, raise the radiant temperature as measured from the critical point on Johnny's arm to 70°. Panels in the position indicated would have a lesser effect on other parts of his body, corresponding to the lesser effect of the cold window, thus would not result in overheating of other body areas. Most of the heat supplied to the panels would eventually find its way into the room air, contributing to ordinary room heating, and costing practically nothing in added fuel.



4. CORRECT DISTRIBUTION of heating panels avoids over-compensating for the window in other parts of the room, as shown by this view from the point of view of Mary's arm, which works out, just like Johnny's, to a radiant temperature of 70°. Panel temperature shown would be needed only in zero weather, with the glass surface of 32°. In warmer weather, the temperature of the panels could be dropped, in proportion as the temperature of the glass went up, and the heat cut off entirely in mild weather to avoid overheating the room.

Thermal comfort is mostly a matter of the total heat exchange between the body and its surroundings. But it is partly a matter—as anyone who spends much time standing on a cold pavement can testify—of the specific exchange between a particular part of the body and a particular part of the environment. Thus a big glass area on one side of a room will lower the overall radiant temperature and necessitate a higher overall air temperature for comfort than would be needed if the window were not there, but this effect is not likely to be so critically important as the specific effect such a surface will have on the more exposed parts of the body at certain points in the room.

The unsymmetrical environment

In the typical classroom, pupils are compelled to remain for long periods in substantially the same position relative to an "unsymmetrical radiant environment"—a space in which one surface is much colder than the other five, i.e., the window-wall. This is especially significant for those pupils in the outer row of seats, who are quite literally "as close as comfort permits"—a little closer, in fact—to this side of the room. A pupil in this position is not likely to feel, in the overall sense, much cooler than the rest of the class. But certain parts of his body, notably his left shoulder and the side of his left arm, are likely to become quite chilled when exposed to the window a half hour or more in cold weather. This is bound to lead to a certain amount of twisting and turning in an unconscious effort to alter the relationship and stimulate the flow of blood, and probably induces the same type of muscular tensions which Dr. Darrell B. Harmon has shown to have such serious secondary effects in the case of badly lighted classrooms.

Air and surface temperatures

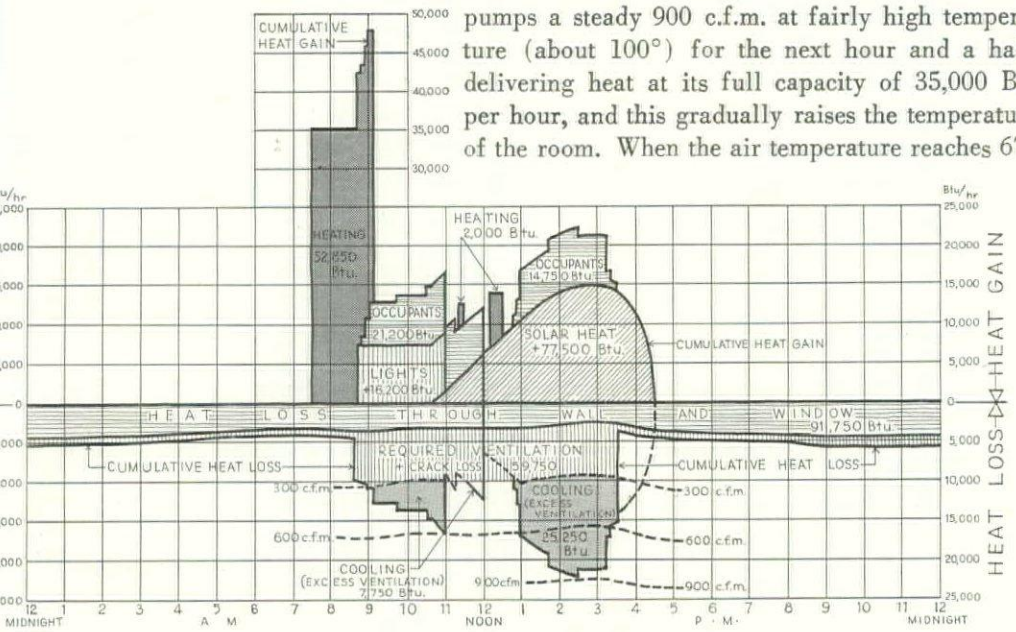
Overall thermal comfort is affected about equally by the mean temperature of the surrounding surfaces and the temperature of the surrounding air. Specific comfort, in terms of any particular part of the body surface, depends equally upon the air temperature and the temperature of that portion of the surrounding surfaces that the particular body surface "sees." To such surfaces the body surface loses heat by direct radiation, and in proportion as the several surfaces are in a direct line, i.e., are "visible" to it. Since heat exchange by radiation is extremely diffuse, and occurs almost equally between two surfaces of given temperature regardless of their angular relationship or obliquity to one another, this "view" corresponds very nearly to a 180 degree spherical perspective, with some foreshortening of the angular scale towards the periphery.

The diagrams show the effect of a typical classroom window on the critical portion of a child's arm in the most exposed position in the room, and the lesser effect of the window on the arm of a child sitting in the center of the third row from the window, with possible corrective means.

A normal school day in the life of a typical unit heater

The chart on this page shows the various heat exchanges which might take place in a typical 30-pupil classroom, with a single exposure facing southwest, on a mild January day at about 40° north latitude. Outdoor temperature is 50° during the daytime, drops to 40° at night. The morning is assumed to be cloudy, requiring artificial lighting for the first two periods, but clears a little before eleven, and remains clear.

The custodian switches on the unit ventilator at 7:30 A.M., when the temperature of the room has fallen to 62°. Drawing indoor air only, the unit pumps a steady 900 c.f.m. at fairly high temperature (about 100°) for the next hour and a half, delivering heat at its full capacity of 35,000 Btu per hour, and this gradually raises the temperature of the room. When the air temperature reaches 67°



—three degrees below the thermostat setting—a damper opens to admit outdoor air into the bottom of the unit at a standard rate of 300 c.f.m., or 10 c.f.m. per pupil. This causes a sudden drop in the cumulative heat loss line at the bottom of the chart representing the amount of heat required to warm the incoming air. A few minutes later the teacher enters the room and switches on the lights, causing an even larger jump in the heat gain line at the top of the chart, and at 9 a.m. this is pushed up still further as the first class enters the room.

Class begins

At a few minutes after nine, the heat given off by the ventilator, the lights and the occupants of the room bring the temperature of the room air to the control point, 70°, and shuts off the supply of steam to the convector in the top of the unit. The temperature of the air continues to rise, however, because the quantity of heat being given off by the teacher and pupils, plus the heat of the lighting system, is greater than the heat loss, so the mixing damper in the unit ventilator opens to admit additional outdoor air, over and above the minimum needed for ventilation, and cools the room. So long as the lights remain on, the unit continues to admit outdoor air at the rate of about 450 c.f.m., or about 15 c.f.m. per pupil, thus exactly balancing the combined heating effect of the occupants and the lighting system.

At 10:45 the sun finally breaks through and begins to shine obliquely on the 100 sq. ft. classroom window. Fifteen minutes later the lights are turned off, suddenly canceling a 7,200 Btu per hour heat gain. For the next 15 minutes the combined effect of the pupils as animated furnaces and of the sun heat which is beginning to enter the window is in approximate equilibrium with the heat loss at the standard ventilating rate of 300 c.f.m., but the last class of the morning period is somewhat smaller, causing a momentary heat deficit which results in the short period of heating of the unit convector. Before this has an opportunity to have much effect, however, the rapidly increasing solar heat gain through windows pushes the thermostat above the control point and again alters the position of the mixing damper to admit additional outdoor air.

Out for lunch

During the noon recess, the fact that the room is unoccupied and the unit ventilator is left on results in another short heating period—the last for the day. By the time the class reconvenes, the solar heat gain alone has reached a point where it more than compensates for the total heat loss, including required ventilation, and the unit reverts to its cooling phase for the balance of the afternoon.

At 3:30 p.m. when school closes the unit is switched off and the room left vacant. Since at this point the solar gain is considerably in excess of the normal heat loss (which is further reduced by the effect of the sun on the outside of the wall and window glass), this results in an increase in temperature within the room of 1½° to 2° beyond the 70° control point, reaching a peak at about 4:30. From then on the room gradually cools, dropping at first about two degrees every three hours, then a degree every two hours, then a degree every three hours or so.

Little need for heating

Several things about this saga are well worth noting. The first is that, under the conditions outlined, and despite a difference of 20° between indoor and outdoor air, there was *no real need for heat* except to *warm up the structure and contents of the room before it was occupied in the morning.* The heating system operated only 2 hours out of 24—one-twelfth of the time. The "cooling system," on the other hand, operated 5 hours—almost the entire time the room was in use. The heating system added a total of 54,850 Btu's to the room; other sources, including the sun, added a total of 129,650—well over twice as much. The total quantity of heat exhausted by cooling—33,000 Btu's—was almost two-thirds of that added by heating.

This pattern is not intended to be typical. There is, in fact, no such thing as a typical classroom heating pattern. Nor is it necessarily very accurate—it is the result of rough calculation, rather than accurate observation. It does, however, correspond in a general way with observed data, where such are available. And it gives a startling sketch of the approximate relative magnitude of the many factors involved in the school heating problem.

LIGHTING

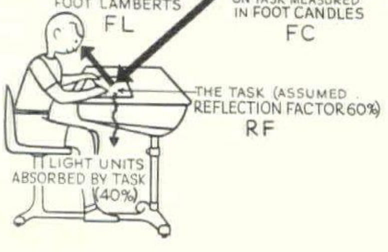
ELECTRIC LIGHTING OF SCHOOLS—a study of the fundamentals of vision and light explains how to conserve children's eyesight and school building funds

—by Howard M. Sharp*

FOOT-CANDLES VS. FOOT-LAMBERTS

An object to be seen must reflect light to the retina of the eye. How well or how speedily that object will be seen depends upon its size, contrast with background, and brightness. Size and contrast are properties of the object; brightness is the function of light—the product of the object's reflective quality (reflective factor) and the intensity of the light striking the object (measured in foot-candles). By themselves foot-candles are rather meaningless as a criterion of object brightness. For example, 20 foot-candles incident on a piece of white chalk will produce a chalk brightness many times greater than the same foot-candles on a piece of dark blue chalk.

Brightness is properly measured in foot-lamberts (foot-candles multiplied by reflection factor) which more adequately appraise visibility of an object. However, since foot-candles are more easily incorporated into mathematical lighting calculations and are more easily measured, the term will probably continue in widespread use. Nevertheless the foot-candle yardstick must always be used along with reflection factor in appraising the performance of a lighting system with respect to brightness.



In this detailed discussion of the complex and controversial subject of school lighting, these important conclusions and implications stand out:

▸*There is wide disagreement among experts as to how much light is necessary. Estimates for the same task vary from 12 to 40 foot-candles.*

▸*The curve of lighting performance flattens out at a point near the lower extreme of that range. Thus, it takes 130 per cent more light to increase visual performance only 5 per cent—from 90 per cent to 95 per cent of maximum.*

▸*Contrasts and reflective qualities are just as important as quantities of light. It is cheaper to control these aspects of the room and the task than to boost the quantity of light.*

▸*Since only a few classrooms in a school are used at night and these seldom more than once a week, the primary purpose of electric lighting is to supplement daylight.*

▸*This is particularly true in classrooms with only one window wall where the quantity of daylight drops sharply between the two rows of desks next to the window and those beyond.*

▸*But even in the darkest part of such a classroom on a cloudy day in a relatively dark latitude, there will be at least 5 foot-candles of daylight. This daylight should be counted in determining the needed quantity of supplementary electric light.*

▸*Illumination beyond 30 foot-candles requires the use of fluorescent luminaires.*

▸*The installation of fluorescent lighting costs three to five times as much as incandescent lighting.*

▸*Only indirect fluorescent lighting compares favorably with indirect incandescent lighting from the standpoint of effectiveness.*

▸*Direct fluorescent lighting is much cheaper to operate than indirect incandescent (if capitalization of installation costs is disregarded), but there is little difference in the operating costs of indirect fluorescent and incandescent.—Ed.*

The lighting of school buildings today poses a more complex series of problems to architects, engineers and school administrators than at any time in the past. The reasons are many, but chief among them are an increased awareness of the importance of lighting in the conservation of vision; improvements in the art and science of illuminating engineering which offer new techniques; new light sources which in efficiency and form provide the architect and engineer with multiple choices in application and structural integration; and finally the item of costs, both initial and operating.

Unfortunately, for those who desire simplicity, vision is a complex human function involving psychology as well as physiology. The eyes as optical instruments are not mysterious, but the interpretation of the impressions received by them and the motivations which follow are part and parcel of the enigmatic human machine. Research still does not disclose conclusive answers to many aspects of light and vision, hence there is a twilight zone in which opinion has free play with fact. There is agreement that lighting plays an important role in the process of learning; in establishing an agreeable adjustment to the environment; in promoting harmonious nervous and muscular action. On the other hand there is *not* agreement as to the degree of refinement in brightness levels, and brightness distribution, necessary for optimum lighting.

LIGHTING INTENSITY STANDARDS

The amount of daylight under which the eyes evolved is often quoted as a justification for recommending high foot-candle values. This is open to serious question. Nature is notoriously wasteful. In propagation millions of sperm are released but only one is necessary for fertilization; in sound the inner ear utilizes but a fraction of the energy available at the outer ear. Thus it seems valid to conclude that the eyes need but a small portion of the amount of luminous energy available in daylight in order for them to discharge their function.

By definition a foot-candle is one lumen of light per square foot, and since light sources are rated in lumens output, the foot-candle is a measure of *quantity* of light at a given location. If by prescription a given number of foot-candles is indicated then it is possible to calculate how many lumens must be released into the space to achieve the prescription. Hence the widespread use of the "Table of Foot-candles" for the many visual tasks and work spaces in which the architect and engineer is interested. The question arises as to the derivation of these tables or standards. Given an object of a certain size and contrast with its background, it is possible to determine scientifically and exactly the brightness necessary for threshold visibility (mere perceptibility). But threshold visibility is of only passing importance because of overriding considerations of visual fatigue, the subjective sensation of comfort, and the psychological appraisal of satisfaction with the surroundings, as well as the variations in the physical state of the individual such as abnormalities of vision, age, general health, etc. Since these factors cannot be exactly measured, "factors of safety" must be added to the threshold values, opening a wide area in which opinion, experience, selfish motives and ignorance can have free play.

* *Consulting Electrical Engineer, Snyder, N. Y.*

VISUAL NEEDS AND LIGHT

Within a school building there are three areas where the visual requirements should establish the lighting design: 1) In recitation classrooms the visual tasks are not severe. Type is usually 10 point, contrast is generally good, and handwriting on copy paper at a minimum. Most important, concentration on any one visual task is of short duration; the classes change, students move about, and the eyes have plenty of muscular relaxation. 2) In study halls and libraries the visual task is more severe, involving not only a wider range in size and contrast, but a longer time element. Therefore, foot-candle values should be higher in these areas than in classrooms. 3) In craft areas (shops, domestic science rooms, laboratories and drafting rooms) the tasks are most severe, because of generally smaller detail, low contrast, and greater concentration on work. Consequently the levels of illumination in these areas should be greater than recommendations given in many published standards.

Two general avenues of approach have been followed in establishing lighting standards. In *America* some experts have proposed an absolute scale of relative visibility of visual tasks, covering a wide range of size, contrast and brightness. The visibility scale is related to a foot-candle scale by establishing as an arbitrary base of performance the visibility of 8 point black Bodoni type (this is printed in 10 point Bodoni—Ed.) on 80 per cent reflection factor white paper illuminated to a level of 10 foot-candles. The result is a series of values reaching very high levels for some tasks of small size and poor contrast—levels which are often impossible to reach due to limitations of the art and considerations of costs. They *may* be justified on the basis of long-range considerations of eyesight conservation and minimum drain on physical resources, and, thus, they serve as objectives.

The other approach to foot-candle prescription is that undertaken in *Great Britain* by the Medical Research Council and the Department of Scientific and Industrial Research, in correlating the four fundamentals of size, contrast, brightness, and time, through tests measuring the performance of visual tasks. Fundamentally this is a continuation of work undertaken in the U. S. some years ago under the auspices of the National Research Council. The result is given in per cent of maximum possible visual performance for tasks of varying size and brightness, by young, healthy adults with normal vision, under ideal test conditions. Factors of safety must, of course, be applied to the data to allow for the departure from ideal found in conditions of the work world and among human beings. Here again is a legitimate field for the exercise of opinion.

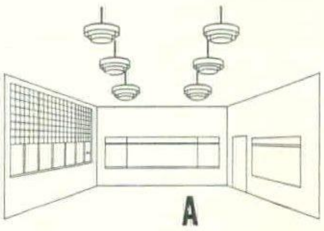
Based upon the British data and applying a safety factor of 10, the table at the left has been prepared to show how different approaches lead to different answers. The tabulation indicates that to improve visual performance from 90 per cent of possible maximum to 95 per cent, the foot-candles must be doubled. Note also the very high foot-candles indicated for drafting. A more detailed analysis would show that a rather wide choice of foot-candles can be made without jeopardizing the eyesight of the students. Even at the low end of say 15 foot-candles for classrooms there can be slight criticism of establishing a lighting level that will allow for 90 per cent of maximum performance. Very few human activities are geared that high. It is also apparent that for special purpose areas, such as drafting or craft rooms, high foot-candles can be economically justified, because such areas represent but a small per cent of the total lighted space and the cost is therefore only a small portion of the total lighting budget.

Two final but important considerations remain in selecting a foot-candle value. 1) The state of the lighting art and considerations of cost indicate that at levels of illumination beyond 30 foot-candles fluorescent lamps must be used. As will be pointed out later, however, this requirement often leads to unsatisfactory compromises—cures which are more unpalatable than the disease. 2) The values of foot-candles prescribed are not precise but rather indications of magnitude. For measurable improvements in visual performance the progression in foot-candles follows a logarithmic scale; that is to say, values move from, let us say a base of 10, to 20, 40, 80, 160 etc. If, therefore, a median choice is 20 foot-candles, a moderate deviation one

FOOT-CANDLES SUGGESTED FOR SCHOOL ROOMS

Standard or source	Class-rooms	Study halls, libraries	Drafting, crafts, & sewing
90% max. possible performance—			
Text	12	12	225
Notes	18	18	...
95% max. possible performance—			
Text	28	28	570
Notes	40	40	...
American I. E. S.	30	30	50
Wisc. state code	15+	15+	25+
N. Y. State Dept of Education	20	20	30
Nat'l Council, School. Construction	20	..	40
U. S. Dept. of Ed. Bulletin #104	30	..	40

In the above table, recitation classroom and study hall visual tasks have been assumed as averaging at one extreme 8 point type on moderately white paper and at the other extreme pencil notes on gray paper; drafting and crafts at 2 minutes size and contrast of 75 per cent (equal to pencil line on light gray background).



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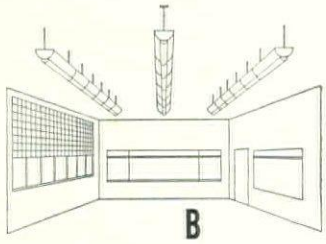


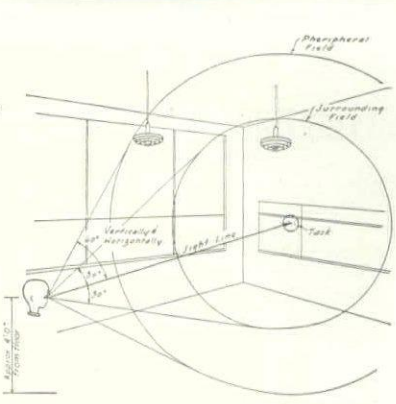
B

COMPARATIVE RESULTS AND COSTS OF VARIOUS ELECTRIC

Description of lighting system

	Type of luminaire	Number of units	Lamps per unit	Watts per lamp
A	Indirect silver bowl incandescent	6	1	500 750
B	Suspended luminous indirect fluorescent	18	2-48 in.	40
C	Suspended direct-indirect fluorescent*	6	4-48 in.	40
D	Open flush troffers fluorescent	20	1-60 in.**	40
E	Glass bottom flush troffers fluorescent	18	2-48 in.	40

* Louver bottom or glass bottom—fair lighting effectiveness with



way or the other is not important. There is no denying that more light rather than less, if of proper quality, is always welcome.

This lack of precision is not the result of sloppy technique but based upon the physiology of the visual mechanism. In heating practice a variation of 3° in effective temperature brings a definite response, but the seeing mechanism has vastly greater powers of accommodation.

BRIGHTNESS LIMITS AND DISTRIBUTION

Foot-candles, being closely related to dollar costs and being also the most tangible and measurable aspect of lighting, have always attracted the most attention. More important in the design of a proper lighting system is the matter of brightness limits and brightness distribution, for it is this aspect of lighting which has the greatest impact upon the visual mechanism (See sketch page 147). Curiously, this matter of brightness poses a paradox; there is considerable agreement as to what is correct, scant adherence to the agreement, and woeful lack of understanding of the importance of the subject among those responsible for its execution.

Brightness falls in the category of the *quality* aspect of lighting. An older and in some ways simpler but less comprehensive concept was that of glare. Brightness ratios quoted in the table at the right are compromises with laboratory determinations. A study of out-of-doors brightness ratios under daylighting reveals a preponderant ratio of 1 to 5 with few instances of 1 to 50.

An individual can walk into a room in which the brightness ratios listed in the table at the right are being observed and be immediately aware of comfort and a sense of visual well being. Many if not most complaints of "too much light" arise not from an excess of quantity but from a violation of brightness ratios because the eyes become increasingly sensitive to contrast as the adaptation level rises. Thus, increases in foot-candles bring complaints unless careful attention is paid to brightness control.

The achievement of proper brightness ratios depends upon 1) light finishes for surfaces and 2) the distribution of luminous flux from luminaires. To integrate these into a proper design requires more than rule-of-thumb methods. However, attention to reflection factor and finish of interior surfaces goes a long way toward the achievement of a proper visual environment, often offsetting rather serious deficiencies in flux distribution and brightness. Fortunately there is an agreeable acceptance of light colored interiors, and a reasonable supply of materials. Floors can and should be of 20 to 25 per cent reflectance; furniture 40 to 60 per cent; walls 60 to 70 per cent; ceilings 85 per cent; and chalk boards 15 to 20 per cent. Surface finish should be matte rather than specular because the specular surfaces image bright areas, thus introducing high brightness contrasts into the visual field.

LUMINAIRE PERFORMANCE

The characteristics of light distribution being an inherent property of a luminaire, the problem is one of proper selection. Obviously this matter lies close to the core of illuminating engineering practice and no simplification is possible. For the architect or school administrator who seeks guid-

(Continued on page 216)

VISUAL FIELDS AND BRIGHTNESS

The visual sense is so constituted that, while the object of regard is focused upon a small area of the retina not over 3° in extent, the entire retina subtending an area of 120° vertically and 160° horizontally is also at work. Thus, the entire field of view must be considered not only the particular object being fixated. The drawing illustrates the visual fields, shows how the greater portion of a classroom falls within these fields.

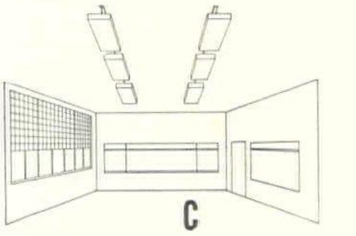
The brightness ratios quoted in the table below are compromises with laboratory determinations. A study of out-of-doors brightness ratios under daylighting reveals a preponderant ratio of 1 to 5 with few instances of 1 to 50.

BRIGHTNESS RATIOS

Suggestions for classrooms, libraries and study halls.

Surfaces	Ratio
Task and desk.......	1 to 1/3
Task and floor.......	1 to 1/10
Task and ceiling.....	1 to 10
Luminaire or window and adjacent surface	20 to 1
Task and brighter surface in periphery	1 to 50
Task and darker surface in periphery...	1 to 1/5
Task and brighter surface in surround.	1 to 10
Task and darker surface in surround....	1 to 1/5

Sources of the first four suggested brightness ratios: Illuminating Engineering Society, American Institute of Architects and A. S. A. Standard. For the second four: National Council on Schoolhouse Construction.



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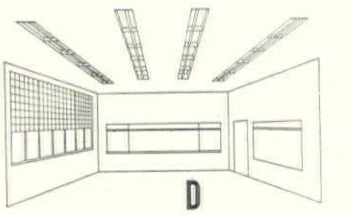

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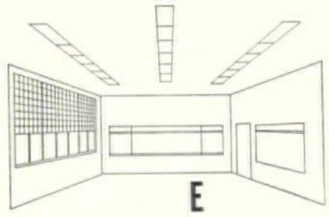


E

LIGHTING SYSTEMS FOR CLASSROOMS

Operating Results			Foot-candles in service	Initial cost of lighting equipment	Annual operating cost: 750 hours' use, Electric rate/KWH				1,000 hours' use, Electric rate/KWH				1,500 hours' use, Electric rate/KWH				2,000 hours' use, Electric rate/KWH			
Efficiency	Maintenance	Lighting effectiveness			2¢	2½¢	3¢	4¢	2¢	2½¢	3¢	4¢	2¢	2½¢	3¢	4¢	2¢	2½¢	3¢	4¢
fair	good	excellent	20	$90	$64	$75	$86	$109	$81	$96	$111	$141	$116	$138	$161	$206	$151	$181	$211	$271
fair	good	excellent	30	120	95	111	129	163	123	145	165	213	182	217	249	317	236	281	326	416
fair	fair	superior	24	325	69	76	82	96	80	89	98	116	103	116	130	157	125	143	161	199
good	fair	fair-good*	21	276	43	47	52	61	50	56	66	74	65	74	83	101	80	92	104	128
good	excellent	fair	31	540	55	63	78	94	59	68	86	104	63	73	93	114	70	83	108	134
good	good	fair	38	485	80	87	93	107	91	100	109	127	114	127	141	168	136	154	172	208

louvered bottom; good, with glass bottom. ** Low brightness lamps. Note: all figures for fluorescent lamps exclude auxiliary wattage.

DAYLIGHTING OF CLASSROOMS—a new reporting technique produces revealing comparisons of various design types which, in turn, point the way toward better school lighting

—by Charles D. Gibson, Foster K. Sampson, Henry L. Wright*

INSTRUCTIONS FOR USE OF LIGHTING SURVEY FORM

DRAWINGS. Plan, section, and perspective should provide only information which affects lighting. No construction features should be mentioned unless they affect illumination. Plan and section should be properly related to the perspective.

BRIGHTNESS READINGS. In the interest of uniformity all brightness readings should be taken from the location of the desk shown on the plan and perspective. Where high brightness levels are being recorded they should indicate the highest reading on the area being reported. Conversely, where low levels are found, report the lowest reading for that area. Brightness readings should be shown in the related area on the perspective. Where readings are taken with electric lighting turned on, show these enclosed in a square instead of circle. Take readings between 10:00 a.m. and 2:00 p.m. and indicate the time on the survey form. The brightness meter should be supplied with power for the lamp from regular dry cells rather than from batteries in the meter. (This is done to eliminate errors due to fatigue caused by continuous use of the flashlight batteries.) If possible, a tripod should be used.

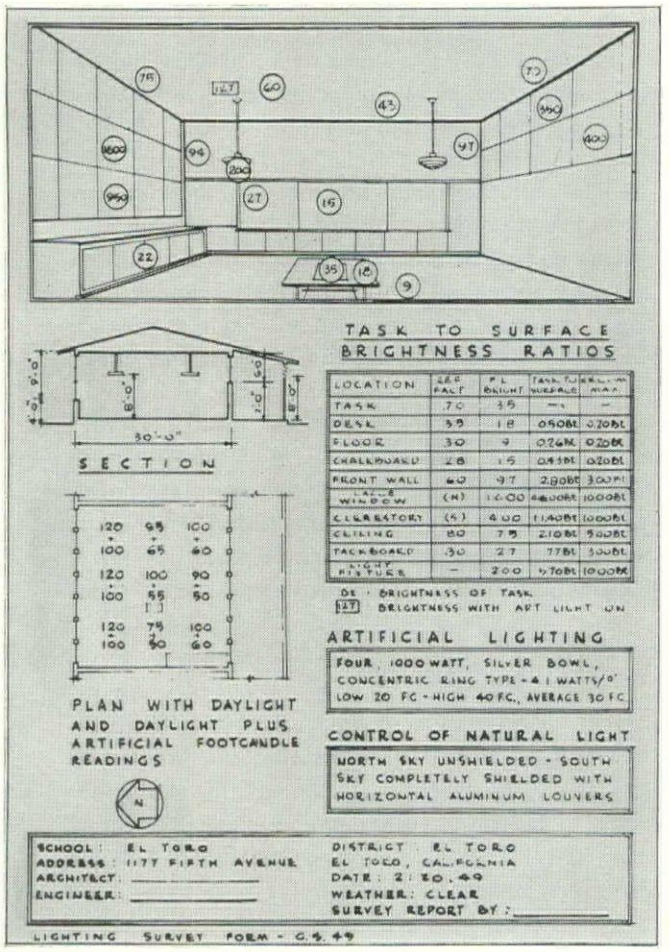
INTENSITY READINGS. The nine readings of foot-candle intensity should be taken at the points shown on the plan. Below each of the nine plan locations, indicate the intensity from natural light; above each point show the intensity of natural plus electric light. The difference in readings will determine the intensity from the electric system. If possible, use a cosine corrected meter.

BRIGHTNESS RATIOS. In the table of brightness ratios include the main points of interest. On areas, such as the front wall, where more than one reading is indicated on the perspective, use the highest for the table. In the column for reflection factors care should be taken to determine these values as accurately as possible. Under "Task to Surface" (which might better be titled "Surface to Task"—Ed.) use the decimal rather than fraction method and be sure that the ratios are for the surface to the task rather than task to surface.

RECOMMENDED RATIOS. The column for recommended ratios should be the same in all cases, following the recommendations of the National Council on School House Construction. These recommendations are goals. Although the NCSHC allows for a 50 to 1 brightness ratio in the peripheral area, it will be noted that no ratio greater than 10 to 1 is shown in the example. This is true because of the nonformal seating found in many classrooms, and because it is desirable to reach these more ideal conditions where possible. In some cases the ratios will be better than the maximum or minimum, and such are definitely desirable. The brightnesses most desirable for areas within the visual environment are those which approach task brightness.

ARTIFICIAL LIGHTING. Under this heading describe the fixture used, number of fixtures, watts per fixture, watts per square foot and intensity. Under intensity, show the low, high, and average over the seating area. These readings should conform to those shown on the plan. The section should give the height of fixture.

CONTROL OF NATURAL LIGHT. Under this heading briefly describe control methods in all window exposures of special interest not covered elsewhere in the form.



The study of daylighting as it applies to schoolhouse design has been reported from many standpoints. In any attempt to compare the advantages and disadvantages of the numerous designs, it is soon apparent that there is no uniformity in the nature or detail of the information presented. Up to now there has been no way, other than subjective opinion, to study the lighting results achieved by the numerous daylight designs and to compare them with recognized desirable goals.

This basic need led to the development of the Lighting Survey Form presented at the left. It has been developed and refined during the past two years through the cooperative efforts of school planners, architects and illuminating engineers in California and is now in regular use in the study of schoolhouse design.** (Although this particular form reports only on lighting information, another form is being developed for use in reporting more general information about school buildings such as structural systems, heating, ventilating and acoustical systems, space refinements and costs.)

As more data is gathered by means of the Lighting Survey Form, it will be possible to make more accurate comparisons of existing structures and more accurate predictions as to the probable performance of new building designs while they still are in the planning stage.

The form reproduced at the left reports a hypothetical classroom and indicates the minimum amount of information necessary for comparison and evaluation. To illustrate the use of this data, the tabulation on the facing page presents a comparison of daylighting data (excerpted from similar forms) for four actual classroom designs of varying cross section. Studies similar to these—covering 20 different classrooms—lead, in turn, to these six general conclusions about adequate daylighting:

1. The reduction of sky-brightness to less than ten times task brightness is our biggest unsolved problem. The goal is now set at ten times task brightness because we can achieve that ratio with existing materials. With the development of louvered flat glass and low light-transmission flat glass without color distortion the goal may be lowered.

2. In order to maintain tolerable brightness-differences between the task and the sky, *all* window exposures must be shielded from the sky.

*Charles D. Gibson, Supervising Field Representative, Office School Planning, California State Dep't. of Education, Los Angeles; Foster K. Sampson, Consulting Illuminating Engineer, Los Angeles; Henry L. Wright, Partner, Architectural firm of Kistner, Curtis & Wright, Los Angeles.

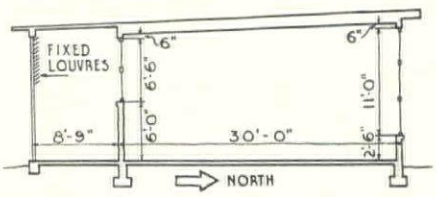
**Called the Lighting Survey Form 6.S.49, it is still in the process of revision, and the authors welcome constructive suggestions from FORUM readers.

3. The best solution of the sky-shielding problem would involve a 30 ft. classroom of typical bilateral daylight design, with 13 ft. window heads on both sides. The clear glass in the small, high windows would be completely sky-shielded with horizontal metal louvers; the clear glass in the large bank of windows, sky-shielded with horizontal metal louvers extending down from the top to a point 5½ ft. from the floor. From the 5½ ft. level down to the window sill would be a vision strip of flat glass with a 10 per cent light transmission factor but without color distortion.

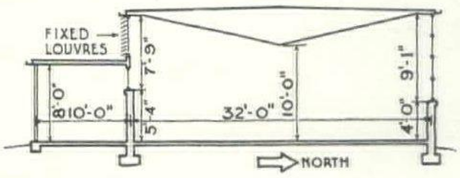
4. Whatever kind of sky-shielding is used, it should produce less than a 450 foot-lambert brightness viewed from *any* position in the room. This brightness is a practical maximum to permit flexibility of seating arrangements in classrooms.

5. In a bilaterally lighted classroom with a 28 to 32 ft. span the *minimum* heights of the window heads should be 12 ft. If a shed roof is used, the window head on the low side should not be lower than 11 ft. Greater than 12 ft. window head heights are advantageous because they result in a deeper penetration of daylight into the room and allow for sky-shielding controls which bring brightness-differences within the range of tolerance while maintaining adequate foot-candle levels. Discussions with many persons, including school teachers, students, parents, engineers and architects, indicate that the boogie-boo of *scale*, as related to ceiling heights in classrooms and the occupants of those rooms, exists only in the minds of a few designers. Students and teachers—the users of classroom space—would be much happier if architects worried more about scale relative to the work areas, sink heights, equipment, etc.

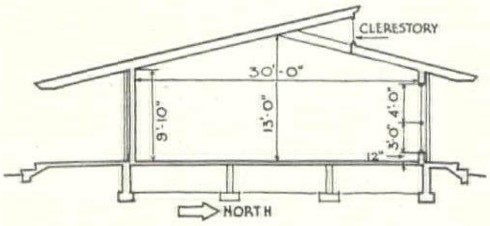
6. In his enthusiasm for developing good daylighting designs, the architect should not forget that it is also necessary to install an electric lighting system in school rooms. Many of the new daylight designs overlook this fact and are extremely difficult to handle from the standpoint of a comfortable and efficient electric lighting layout.



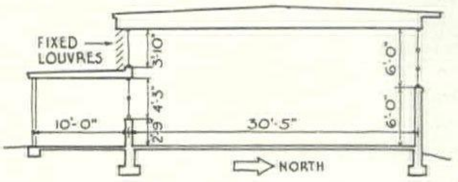
DESIGN A. This cross-section benefits from high window-heads and a high ratio of glass to floor area. High intensities are maintained on the center and south rows of desks even when the [illegible] held down to a 350 foot-lambert brightness. Daylighting could be improved by eliminating the narrow strip of south sky visible from some positions through the lower portion of the south glass.



DESIGN B. Window-head heights are adequate relative to room width and at the same time produce an apparent low ceiling by the use of the inverted truss. The louver treatment on the [illegible] clerestory windows should be re-studied for the purpose of reducing the brightness to less than 450 foot-lamberts. The diffusing-glass area under the corridor roof is shielded, but its contribution is of doubtful value.



DESIGN C. The ratio of window-head height to room width is low, and the ratio of total glass area to floor area is low. As a result the general daylight illumination is low, and the brightness-differences between the task and the window areas are unusually high. This design has been improved in later construction by adding a shielded transom at the south.

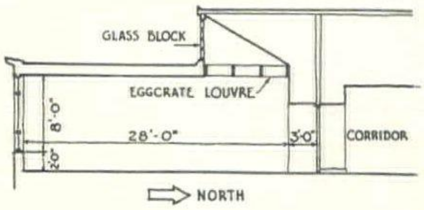


DESIGN D. The ratio of window-head heights to room width is at a practical minimum. The high intensity shown on the south row of desks appears to be the result of the reflected light from the aluminum coated corridor roof. The clerestory louver brightness of 1,800 foot-lamberts is excessive and must be reduced materially to come within an acceptable range of brightness. If this louver brightness were reduced to 450 foot-lamberts, comfort would increase despite a lower, but still ample, foot-candle level. In all four designs, north lights should be shielded.

COMPARATIVE LIGHTING PERFORMANCE OF VARIOUS CLASS ROOM DESIGNS

Lighting Characteristics	Design A	Design B	Design C	Design D
Daylight intensities (average in foot-candles)				
On north row of desks	195	175	115	95
On central row of desks	105	90	65	107
On south row of desks	80	70	43	196
Ratio of highest to lowest shown above	2.43:1	2.50:1	2.7:1	2.06:1
Brightness measurements				
Task brightness (foot-lamberts)	77	63	46	77
Highest brightness—location	N. windows	N. windows	N. windows	Clerestory
foot-lamberts	1,700	1,400	2,000	1,800
ratio to task brightness (Bt).	22.0	22.0	43.5	23.4
Lowest brightness—location	Chalk Bd.	Floor	Floor	Floor
foot-lamberts	32	20	12	15
ratio to task brightness (Bt).	0.42	0.32	0.26	0.19
Second highest brightness—location	Clerestory	Clerestory	Clerestory	N. windows*
foot-lamberts	350	900	1,000	1,200
ratio to task brightness (Bt).	4.50	14.3	21.8	15.6

* Next highest brightness: Front wall, 450 foot-lamberts or 5.90 Bt.

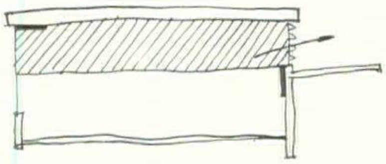


This is a favored eastern version of Scheme C with a double-loaded corridor—not tested by the authors.

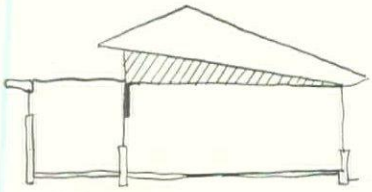
ACOUSTICS

Notes on how to improve sound insulation in the school and hearing conditions in the classroom

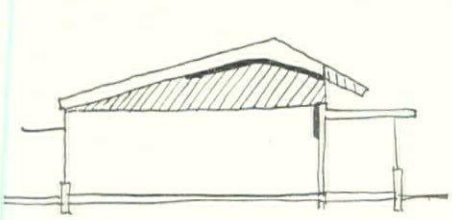
—By Robert B. Newman*



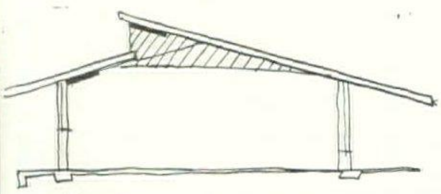
Good classroom section from acoustical standpoint. Absorbing material should be on end and side walls and around ceiling edge.



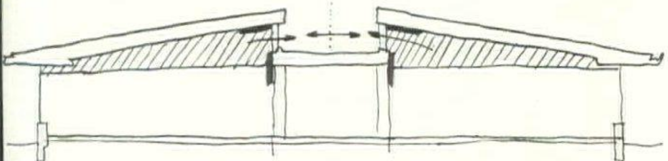
Better section than above because ceiling is sloped. Note absorbing material locations.



Poor section acoustically. Barrel ceiling has focusing effect. Can be minimized with absorbing material, as shown.



Excellent section because ceiling is broken in two planes. Put absorbing material on wall and perhaps in strips on ceiling.



Room section good but clerestories likely to give troublesome noise transmission unless sealed. High baffle between windows might help bar noise.

The field of architectural acoustics is concerned primarily with the provision of both satisfactory acoustic environment and good hearing conditions. Both of these are of major concern in school design, and with our knowledge today of the techniques of sound control, we can do much to insure good acoustics.

To achieve the desired results, the acoustic design must be integrated with architectural design, engineering, and construction.

The criteria for "satisfactory" acoustic environment in schools are concerned primarily with the matter of noise control. Certain spaces such as classrooms and libraries, for example, must be protected from the intrusion of sound from other spaces and from internally generated sound. In other areas, such as shops, gymnasiums, and cafeterias, control must be exercised principally over sounds generated internally. The means of control of these two types of noise differ considerably.

Space is inexpensive insulation

Much can be done in the planning of the building itself to minimize the intrusion of sound from one space to another by separating widely the noisy and quiet areas. The provision of adequate noise isolation between two rooms can be a very expensive operation which good planning might make unnecessary.

Between standard classrooms, a considerable degree of noise isolation is required. It is difficult to assign an exact value to the transmission loss required of interclassroom partitions—it can safely be said that a transmission loss of less than 40 decibels would be unsatisfactory and more than 55 decibels would be entirely satisfactory in most cases. The lightly painted cinder block so often used between classrooms provides less than 35 decibels transmission loss. It has been found, however, that plastered cinder block usually affords more than 40 decibels transmission loss. The increase due to plastering is due entirely to the sealing of the block to air flow—where there is air flow, there is sound transmission.

This is an extremely important point in considering any interclassroom partition. It must be heavy and completely sealed. The porous sound absorbing materials have almost no value as sound isolating barriers. The use of the term "sound insulation" for sound absorbing materials has done much to perpetuate the erroneous concept that they offer any insulation against sound transmission.

Where frame construction must be used between classrooms for reasons of economy, special precautions must be taken if anything like satisfactory noise isolation is to be obtained. The usual residential type of stud partition is unsatisfactory here but there are several types of "staggered stud" partitions which have been used with some success. The plaster on each side of this type of partition is carried on its own set of studs with no bridging or ties between the two. It is very important in this type of construction that the two sets of studs use separated soles and plates if at all possible. The important principle to be followed in such construction is complete separation between the two halves of the wall. Edge termination in a concrete slab or other massive construction is entirely satisfactory.

The insertion of an absorptive blanket between the two sides of a "staggered stud" partition can be of some aid in increasing the noise isolation, and a covering of heavy paper on the blanket material increases its effectiveness. A number of new and promising techniques for using sand as a fill in frame construction are now under development.

In multistory school buildings the construction of the floors is of importance from an acoustical standpoint. While the usual concrete slab construction affords ample noise isolation between classrooms for air borne sounds, the isolation against impact sounds is often inadequate. Footfalls and chair-moving on the floor above, for example, can be quite noisy in the room below. This can be minimized by the use of a resilient flooring material such as linoleum, rubber tile, or cork. In instances where the intrusion of such noises must be further minimized, the floor must be built with a finish slab floated on a resilient glass fiber blanket over the structural slab. The expense of this type of construction is warranted only in exceptional cases.

Putting noise on a raft

If a piano is used in an upstairs classroom, it should be placed on a platform which is floated on hair felt or glass fiber blanket to minimize the transmission of sound directly to the floor slab through the piano legs. Large console radio-phonographs should also be placed on resilient pads.

No matter how effective the partition between classrooms may be, there are other sound transmission paths which may make a "short circuit." A very common one is the open window in adjacent rooms. The transmission loss between two rooms having open windows next to each other can be less than 25 decibels (normal talking easily heard). If the windows can be so arranged that the windows nearest the common wall between classrooms do not open, this situation can be improved. The common wall may be extended for several feet from the outside of the building as a baffle. This outside

* *Acoustics Laboratory, Department of Architecture, M.I.T.*

baffle need not be as heavy as the inside wall, but should be solid and impervious (e. g. metal, asbestos cement board, glass, etc.)

Another common path for noise transmission is the duct work of the ventilating system. It is not uncommon, for example, to find that band rehearsals on the first floor of the building are disturbing in the third floor classrooms served by the same duct system. This type of disturbance can be eliminated only by lining the ducts with absorptive materials.

Corridors also form excellent "ducts" for sound transmission. The treatment of corridor ceilings can minimize this effect and also reduce the general confusion in the corridors at changes of class.

The acoustic environment in the cafeteria, library and gymnasium can be greatly improved by the extensive use of sound absorptive materials. Here the concern is principally the suppression by absorption of internally generated noises. Normal healthy children should be allowed freedom to talk during lunch hour, but they should not be in a highly reverberant cafeteria where the din requires that they shout at each other to be heard. The treatment of the entire ceiling of the cafeteria and associated serving and scullery areas with sound absorbing materials is a "must" in modern school design.

Conditions for better hearing within rooms

Up to this point we have considered some of the means by which a satisfactory acoustic environment may be insured. Equally important is the provision of good hearing conditions which involves somewhat different control measures.

To provide good hearing conditions in any room requires the satisfaction of four basic requirements:

1) Sufficiently low level of background noise.
2) Adequate separation of successive sounds (reverberation control).
3) Proper distribution of sound within the space.
4) Sufficient loudness of sounds.

The provision of a low level of background noise has been assured by proper separation of elements and attention to wall, corridor, and duct details.

All too often the matter of reverberation control in classrooms is given little attention. The room is either not treated at all with sound absorptive material, or the entire ceiling is covered with an acoustic tile. Neither of these approaches provides optimum hearing conditions.

If no treatment is used, the room is excessively reverberant and speech tends to be confused and garbled. The treatment of the entire ceiling usually provides more absorption than is necessary and makes the room overly "dead" and difficult for the teacher to speak easily. It is also important that most of the absorptive treatment applied in the room be on the upper wall areas rather than on the ceiling. The treatment can extend from top of blackboard to ceiling, for example, and give much better control of the sound than ceiling treatment. If additional material is needed to achieve optimum reverberation time, it may be placed around the edges of the ceiling, but the center ceiling area should remain hard. An important principle in the distribution of sound absorbing materials in a classroom is that there be some treatment on each of the three sets of opposite enclosing surfaces. Since the floor is covered with sound absorbing people, the ceiling may be left hard for sound reflection.

Nonparallel room surfaces

This distribution of optimum amounts of sound absorbing material not only assures an optimum reverberation time but aids greatly in assuring the proper distribution of sound in the room. Another aid to good sound distribution involves the gross shape of the room. It is highly desirable that the walls and ceiling and floor be nonparallel. Even a slight degree of nonparallelism is quite helpful in eliminating faulty sound distribution and unpleasant flutter echoes. Additional aid in this direction can be obtained by tilting the blackboards slightly. This not only aids in better sound distribution but is somewhat easier for writing.

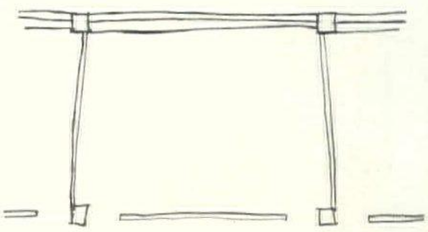
In music rooms these matters of shaping require special attention. In these rooms sound diffusion can be aided by further surface irregularities such as splayed cabinet doors, sound absorptive material in widely distributed random patches, window set skew in plan or section, and many others. While the design of these rooms should not involve the elaboration of broadcast studios, there are many simple schemes which improve conditions over those found in the conventional classroom.

The school auditorium

The school auditorium is a different problem from the usual classroom. The classroom is seldom so large that there is difficulty in providing sufficient loudness for good hearing. The auditorium, however, is usually a larger room in which every effort must be made to conserve sound energy and direct it to the listeners. The shaping and modulation of the wall and ceiling surfaces is very important in giving a more uniform distribution of sound throughout the auditorium. The rear wall must be so shaped and treated that it does not give echoes. If there is a balcony, the ceiling on the under side should slope downward toward the back of the auditorium rather than upward as in the usual design. The latter makes for under balcony seats in which hearing is extremely difficult.

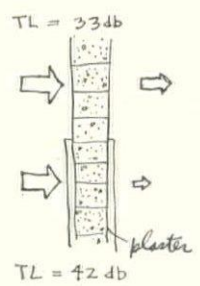
The location of such sound absorptive material as may be needed in the auditorium should be given careful consideration. The ceiling should be of hard material with possible peripheral areas of absorptive material. Other patches of material may be introduced on side and rear walls as indicated by the particular design. The entry foyer, like the corridors of the school, should be highly treated with sound absorptive material to minimize interference from noises originating there.

Absorptive material is best placed on classroom's upper walls, over doors and blackboards not on ceiling.



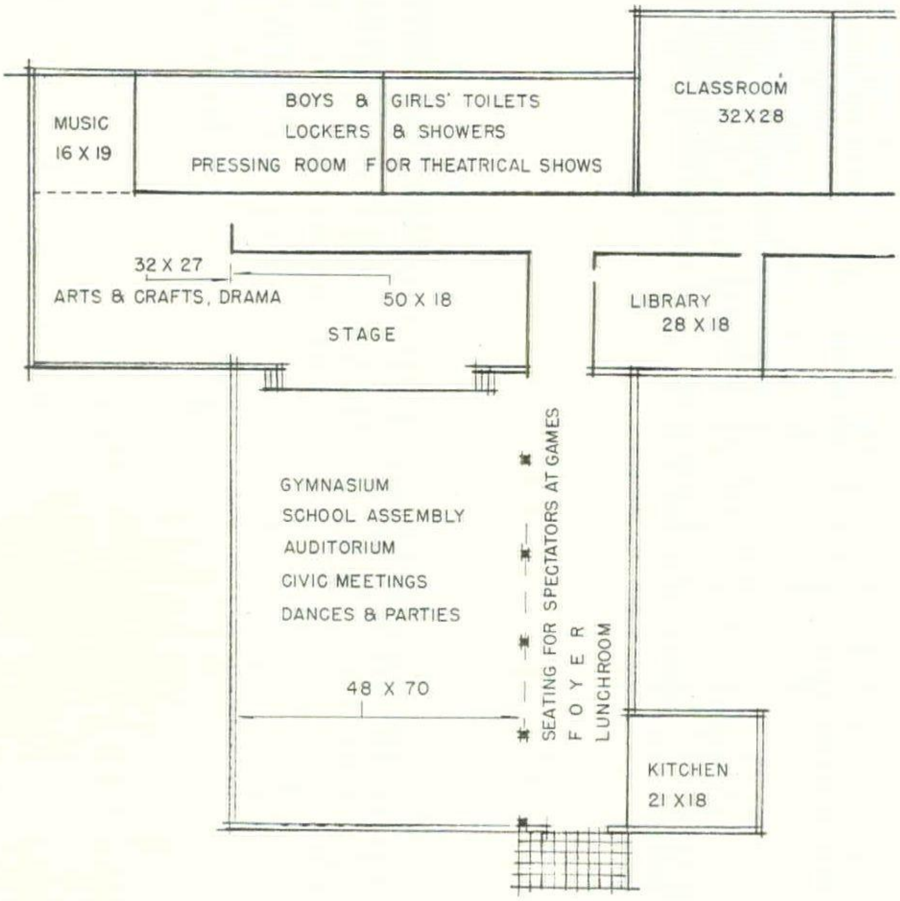
Skewing end walls of classroom in plan helps improve sound conditions within room.

Slanting blackboard is another aid in controlling sound distribution.

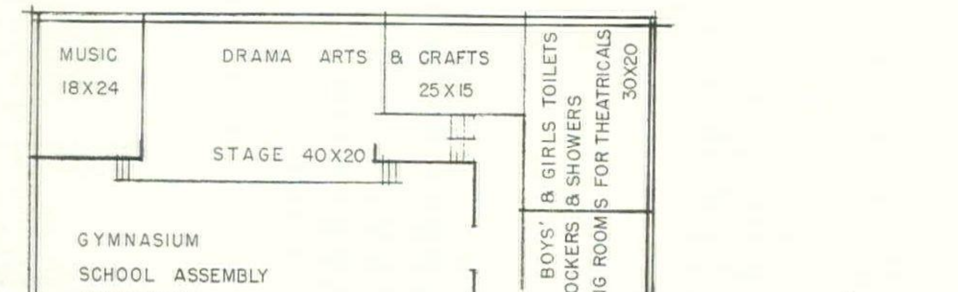


Plastering lowers sound transmission of cinder block partitions to a considerable degree.

SPECIAL AREAS



MULTITUDE of special areas are combined in proposal above for elementary school wing. Foyer is busiest area, serving also for gym spectators, lunchroom and reading room. George B. Post & Sons, N. Y. Architects.



SAME PRINCIPLES of compression are used in alternate sketch for multi-use of areas. Location of toilet and locker room facilities is especially crucial in such a plan.

A problem in compression and multi-use

The problem of designing special areas in the nation's new schools has become largely a problem of deciding what areas to combine in the same cubage. Special areas include the cafeteria, gymnasium, auditorium or assembly hall, study hall, shops and library. Most of them demand a lot of costly construction.

The ideal solution on paper is to combine cafeteria, gymnasium, and assembly hall—the biggest eaters of space. This is frequently necessary, but at best it is still a blueprint solution. Wide complaint from educators has made architects search far for other alternatives before committing the same space to these three overlapping activities. Or, if it is still vital that this be done, the architects now try to manage the space as adroitly as it is done in the examples to the left by architect Everitt Post. If the school boards still insist that the big three be one, despite the inevitable slippery grease spots left over from lunch on the gymnasium floor and despite the high maintenance expense of moving assembly seats and dining tables and chairs in and out as rapidly as is always necessary—if the controllers of the conditions are still adamant, the situation can sometimes be saved by clever planning of adjacent service areas and utilization of devices like folding tables and bleacher seats.

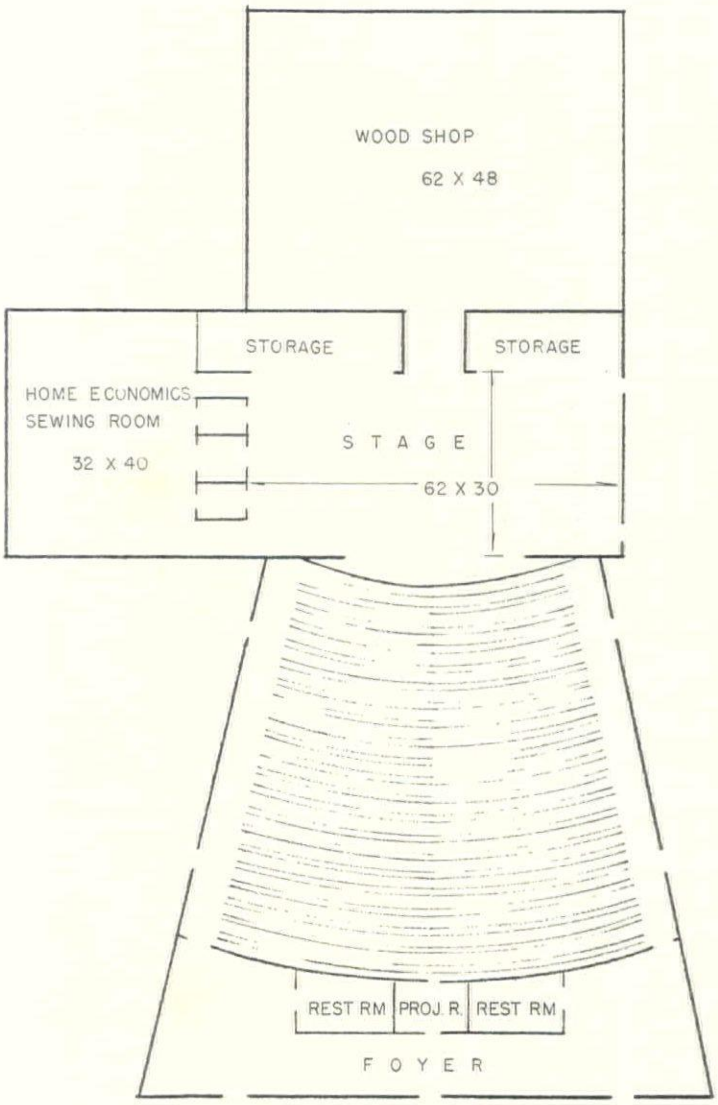
Better combinations are possible—and a shift in thinking as to what are the important areas as determined by actual use in schools, especially elementary schools, offers perhaps the most interesting possibilities. More about that on the opposite page.

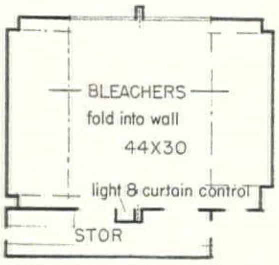
The wide corridor

The discovery of the wide corridor by architects across the country (and all through this issue) has helped put much good space to double use. This kind of cheap space is excellent for study, eating, scheduled library work, and the kind of play areas which are the proper gymnasiums of elementary schools. For example, see bottom of page to right.

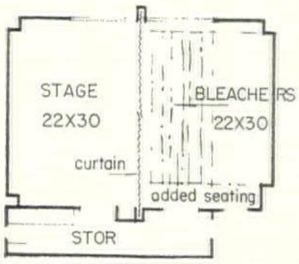
A good solution for school shops is to put up a separate industrial type building, designed precisely for machine use, rather than utilizing more costly conventional classroom space. The best insulation available, space between buildings, protects study classrooms from disturbance, and often much of the interior finishing of the shop building can be left to be done by students under instructors' supervision.

A newly important kind of multiple use which architects must often plan for is night use by community adults of their expensive investment in building. This means separate operability of that section used. Toilets must be near auditoriums and work shops, and these sections must be heated and ventilated without running the entire school system. As often as not this is the biggest test of multiple use plans.





AS ACTIVITIES ROOM

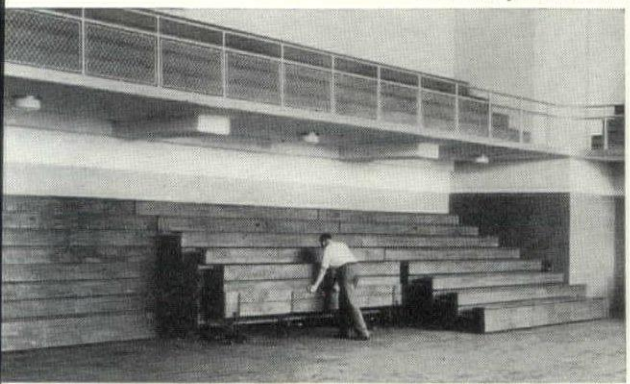


AS THEATER

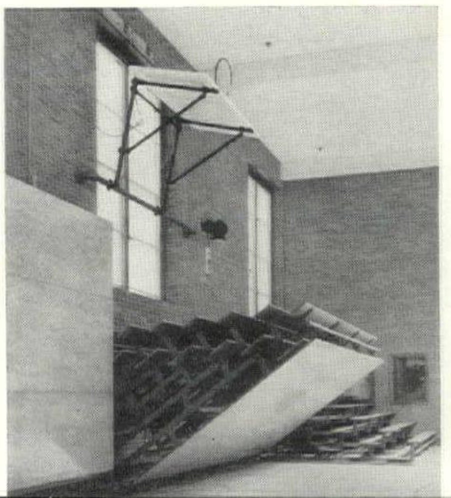
Are large assembly areas as valuable as small theaters?

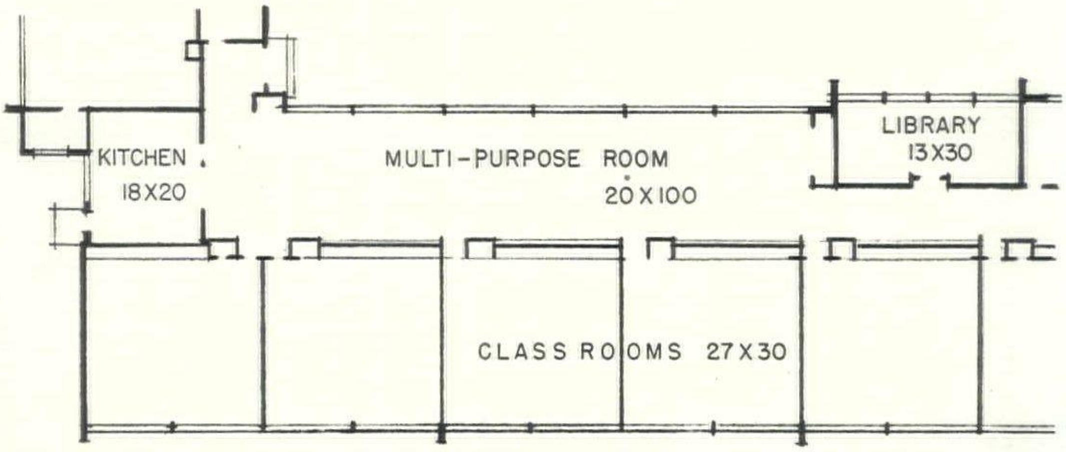
These two school theaters are projects by Jack Morrison, John Jones, and Edward Hearn, of the University of California Theatre Arts Department. Both present the theory that an auditorium for assembly of all students is not an important teaching area for which expensive facilities are necessary. The elementary school theater above is an Activities Room. "The kindergarten-primary grades who have little interest and less obligation to an audience would doubtless use the room as sheer space, while the fourth to sixth grades would undoubtedly be pleased to use one set of bleachers and pull the curtain on a somewhat more formalized presentation." The theater (left) is for large high school, but is not planned to seat all students simultaneously. "It would seat from 200 to 400 and combine the following uses: large classroom, large projection room (large gym classes, special class events, etc.) music (including community events such as quartets and small orchestras), dance and theater presentations. The space is contiguous with the sewing and wood shop (which may offer more rehearsal space) so that these activities may work in direct contact with the stage. The room would probably be booked as a classroom in the morning, as a rehearsal and construction area for theater and dance in the afternoon, and as a home for the "Community Players" at night. And three sold out performances in this theater (seating 400) are far better than two of 600 people each in a barn seating 1,000-2,000. A room like this could be one of the most popular and profitable in the school and the community."

Photos: Wayne Iron Works



FOLDING BLEACHERS are a boon to designers in high school gymnasiums which must have spectator facilities.





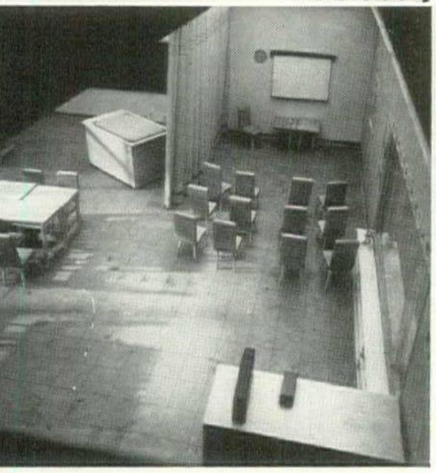
A BROAD, ECONOMICAL CORRIDOR

Corridor was widened in plan to make excellent multi-purpose area, by expenditure of $3,000, in Maple Grove School, Lansing, Mich. Warren S. Holmes, Co., Architects. In primary-school multi-purpose room, left, same designers recognized necessity for large storage space in food serving area.

AUDIO-VISUAL

Sound and motion picture equipment take a new place in education: Progress at the classroom level

Hedrich-Blessing



IDEAL AUDIO-VISUAL classroom by Perkins & Will features facilities for use of motion pictures by small section of class.

REAR-VIEW PROJECTION unit developed by Charles Gibson and Foster K. Sampson is excellent for classroom use in daylight.

Wallets

Mechanical sound and vision equipment have aided school teachers for a number of years. Ever since the armed forces demonstrated an enormous speed-up in learning through audio-visual aids, these have been assessed not only as a means for improving the teaching of standard subjects, but as a method of pushing the boundaries of the teaching profession forward into areas where the traditional task of instruction has not operated before. Because of this, it is predicted that use of radio-visual means of education will continue to increase rapidly. According to Floyd E. Brooker, chief of visual education in the U. S. Office of Education, writing in *The School Executive* magazine, "The motion picture . . . has reached the stage where films are being produced to advance objectives which the schools could not previously advance, or at least could not advance as well.

"One example of this is the increased number of films dealing with emotional objectives of human relations, the elimination of prejudice, and the development of better understanding of human differences. . . . Another example is the recent production of films dealing with sex education. (Films) dealing with such things as shyness, emotional temper tantrums and the like, lead to discussions and serve objectives which the average teacher is unprepared to lead or serve. In this area the training and preparation of teachers have lagged, and few teachers can with confidence and competency handle the discussions which films on mental health demand."

Other cases in which mechanical equipment is more than a supplement to standard teaching methods are the use of sound systems and wire and tape recorders not only in correctional work, but in routine teaching. Says Max U. Bildersee, Supervisor of Audio Education for New York State's Bureau of Radio and Visual Aids, "The projection of personalities, both past and present, into the learning situation gives the student a vicarious experience which contributes in large measure to the progress of learning."

Equipment is flexible

The problem of audio-visual facilities in most schools is basically one of equipment, not school design. Manufacturers have developed sound and sight teaching devices to be so flexible in use that the architect and school board really have little to worry about in regard to special arrangements in space division or shape of the rooms in which they will be used, except to provide adequate wiring. Most sound systems, and motion and still picture projectors, were designed to serve adequately in old classrooms. The presumably equal or better acoustic and sight-line design, for teacher instructing in new schoolrooms, may be exploited by the mechanical systems too — if pupils can see the teacher better, they probably can see a motion picture screen better. If they can hear the teacher better in a new classroom, they can hear the sound system or sound track better as well.

The problem of audio-visual aids should be approached on the classroom level. Most educators oppose the frequently proposed elaborate special audio-visual rooms not only on a basis of cost, but in theory as well. There are several reasons for this, the first being the usual short duration of films favored for educational use—the average running time is getting down near five minutes. Moving a class in and out of a special projection room for five minutes is not considered worthwhile, not only in the loss of time involved, but in loss of concentration which is inevitable. And the easy portability of both sound equipment and film projectors also weight the scales toward keeping the class in its seats, and moving the equipment. An audio-visual room is a good place for teachers to preview films and records, but other arrangements are possible; the provision of sufficient storage room for films, records, and equipment is more important.

An imponderable: Television

The one added element in the audio-visual field is television; there are few who are sure how it will be used in schools, but few who doubt it will be used extensively . . . the present recommended solution is to leave room in the wiring conduit for cable from the rooms to a future communal type receiving antenna.

Wiring for classroom sound motion picture projection calls for an outlet near the back of the room or that section of the room where the projector will be set, and another outlet near the screen, for sound films. Another piece of wiring urged on planners is an under-floor connection or conduit from near the projector to near the screen, for the sound connection between projector and speaker. The object is to keep yards of extension cord out from underfoot. Controls for classroom lights should be near the projector, with, perhaps, the luxury of a dimmer. Other standard items to remember in planning for classroom films are curtaining—although pitch blackness is not needed for efficiency with high light-power projectors; screen size — a width of 1/6 of the maximum viewing distance is recommended; and some means of ventilation in the dimmed room. Best location for a speaker is built-in above the screen.

Sound equipment is an infinite field for investment by schools. A central sound system can be expanded to the proportions of an intermural broadcasting system with proper studio space and equipment. But few schools will be able to afford that. Facilities for broadcasting school business

(Continued on page 234)

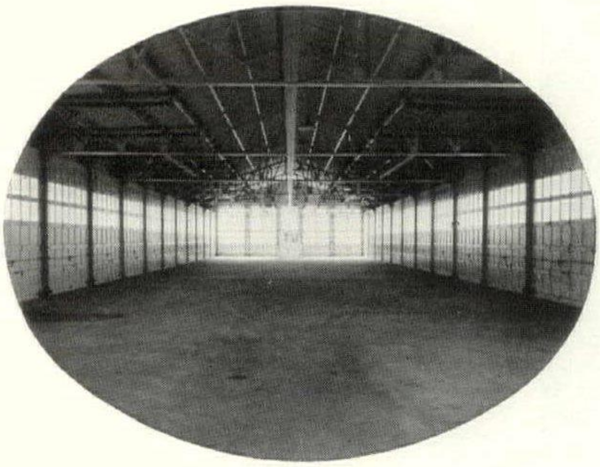
IN A DOZEN WAYS

we make sure Ro-Ways will serve better...longer

Perhaps you have never known before why Ro-Way Doors are so famous for trouble-free operation and why they keep their good looks through so many years.

Here at the factory, we take 12 careful steps to protect your customer's goodwill, your good reputation, and our good name.

Go with us through the Ro-Way Overhead Door Plant. Make 12 stops with us while we point out "A Dozen Ways we make sure Ro-Way will serve better . . . longer".



STOP 1 See the quality of lumber personally selected by Rowe's own expert buyers at West Coast Lumber Mills (no job lots here).

STOP 2 See that fine quality three-ply Douglas Fir Plywood used for Ro-Way panels. Notice that for this plywood "exterior grade" glue is used . . the kind that is highly resistant to moisture.

STOP 3 See how our Multiple Mortisers operate to assure greater uniformity and accuracy in the construction of the wood sections.

STOP 4 See the Ro-Way method of using double-end tenoners for efficient construction.

STOP 5 Watch the careful squaring up of Muntins, Rails and Stiles in each wood section.

STOP 6 See how Ro-Way Drum Sanders give the wood that silky, lustre finish.

STOP 7 Take a look at those Ro-Way workmen putting on the finishing touches by sanding all joints and surface by hand.

STOP 8 Watch the careful Rabbeting of the sections to provide weather-tight ship-lap joints.

STOP 9 Notice how we glue then dowel the Ro-Way door sections with Steel (not wood) dowels.

STOP 10 Watch Ro-Way springs being made right before your eyes. See how we power-meter them to the weight of each door.

STOP 11 See those special machines produce Ro-Way Track Rollers with that "double-thick tread".

STOP 12 Here, after all the hardware has been fabricated, it is Parkerized and painted. That means extra protection against rust and rusty streaks that so often spoil the looks of a door.

All these are extra built-in values without a nickel of added cost to your customers. Every Ro-Way Door is a sound investment in good service and good looks. It pays the owner dividends for years and years. Remember when you specify Overhead Type Doors that "In a Dozen Ways we make sure Ro-Way will serve better . . . longer".

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SEE OUR CATALOG IN SWEET'S

Congress considers Federal schoolbuilding aid. Probable cost: $500 million a year

A comprehensive bill authorizing Federal funds for schoolhouse construction, sponsored by Senator Hubert Humphries (D., Minn.), is now before the Senate. Humphries proposes to allot $500 million annually to States for the next ten years. This is roughly half the amount of money needed in each of these years by U. S. school districts to carry out necessary schools construction.

Without this Federal aid during the next ten years, school officials say they will be hard put to supply more than half of the school buildings needed in that period. Main reason for this is the lopsided tax-and-bond system now used by American school districts. Most school construction, they point out, is financed by landowners—a continuation of Nineteenth Century tax policies which relied largely on land assessments. However, the general tax pattern has changed radically in the past 40 years so that now the most lucrative tax sources are corporations and personal income. For the most part these tax sources are controlled by the Federal government. On the theory that, since everyone benefits from the school system, everyone should pay for it, U. S. school economists consider it logical to extend school financing to include these Federal income and corporation taxes.

There is another Federal power that school-aid proponents stress in their arguments. This is the Federal government's ability to distribute its school funds so as to equalize the large educational gap between poor and rich states. Only by the exercise of this overall Federal power can the poorer states be brought into more equal alignment with the better school systems of richer states. From the beginning, educators have stressed that this factor be included in any Federal-aid formula.

How does the Humphrey bill handle this problem? After several false starts, Humphrey's committee worked out a Federal-aid formula designed 1) to help every state with its schoolbuilding needs and 2) to help some states more than others because of differences in their needs. Under the bill, national schoolhousing needs are to be determined on the basis of a survey. An over-all building program—national in scope—will be set up, its extent to be determined by the survey and by the amount of Federal funds to be appropriated by Congress. This program will be broken down state-wise in direct relation to the public school enrollment of each state. Each state will receive an allocation of the Federal appropriations—not less than 40 per cent of the total funds required for that state's building program. This flat minimum will raise standards in all states, rich or poor. Over and above this, however, an equalization formula is provided. The richest state (based on per capita income per school child) will receive *only* 40 per cent, the minimum Federal allotment. The poorest state will receive a maximum 60 per cent Federal allotment. The other 46 states and the District of Columbia will be graded between these two figures in terms of their comparative per capita incomes per child. For each $100 million appropriated, $97 million goes to States and $3 million to U. S. Territories. The exact formula for Alabama would work this way:

$97 million times 2 equals $194 million. This divided by 2.6 (the State's proportion of the nation's school-age population) equals $5,044,000.

(Continued on page 160)

This would be Alabama's school-construction program for the year. Of this sum, it will receive from the government its Federal percentage, based on need, of 56.9 per cent or $2,870,036. The other 43.1 per cent would be supplied by the state. The formula for each of the states is presented in the chart below.

Over and above the formula and other mechanics of the bill, however, Senator Humphries' proposals raise a pointed question. This is whether part of the pricetag for the Federal schoolbuilding bill is Federal control? Says Senator Humphries: No, the bill explicitly eliminates Federal controls. This protestation to the contrary, however, the problem is a real one for the many educational organizations that went before the Humphries committee in support of the bill. They know that Federal funds eventually means some form of supervision over how these funds are spent.

To offset this increasing pressure from Washington, State and local governments would do well to strengthen their own role *vis-a-vis* the expanding Federal one by improving their services to school agencies. There are at least two actions that must be taken promptly. The first: to trim down the archaic administrative overhead of local school systems. The number of school districts—a staggering 103,000—could be drastically reduced without sacrificing the virtue of decentralization. Their second move should be to take a long, hard look at their school-tax policies with an eye towards long-range, stabilized programs that will insure more funds commensurate with the higher cost of present-day education. By taking these long-overdue steps, state and local governments can better assert their traditional claim of school system independence in the face of contrary trends towards decentralization.

Allocation of Federal funds to states

State	Per cent of State needs to be financed by Federal funds	Percent of school-age population 1947	Percent of aggregate Federal funds
Alabama	56.9	2.6	2.96
Arizona	51.6	.5	.52
Arkansas	58.3	1.7	1.98
California	42.5	5.8	4.93
Colorado	47.5	.8	.76
Connecticut	42.7	1.1	.94
Delaware	43.1	.2	.17
Florida	51.4	1.6	1.64
Georgia	55.9	2.8	3.13
Idaho	50.1	.4	.40
Illinois	43.6	5.1	4.45
Indiana	49.0	2.6	2.55
Iowa	51.0	1.8	1.84
Kansas	50.2	1.3	1.30
Kentucky	56.5	2.4	2.71
Louisiana	55.7	2.1	2.34
Maine	51.4	.6	.62
Maryland	46.0	1.4	1.29
Massachusetts	45.7	2.8	2.56
Michigan	47.2	4.3	4.06
Minnesota	51.1	2.0	2.04
Mississippi	60.0	2.0	2.40
Missouri	50.6	2.6	2.63
Montana	45.2	.4	.36
Nebraska	50.0	.9	.90
Nevada	40.0	.1	.08
New Hampshire	51.6	.3	.31
New Jersey	44.3	2.6	2.30
New Mexico	53.7	.5	.54
New York	40.8	8.1	6.61
North Carolina	56.1	3.3	3.70
North Dakota	47.0	.5	.47
Ohio	46.4	5.0	4.64
Oklahoma	55.4	1.8	1.99
Oregon	48.6	1.0	.97
Pennsylvania	47.9	6.9	6.63
Rhode Island	45.5	.4	.36
South Carolina	57.6	1.6	1.84
South Dakota	48.8	.5	.49
Tennessee	55.0	2.6	2.86
Texas	52.4	5.5	5.76
Utah	50.7	.5	.51
Vermont	51.1	.3	.31
Virginia	42.8	2.3	2.43
Washington	46.1	1.5	1.38
West Virginia	54.0	1.7	1.84
Wisconsin	48.6	2.3	2.24
Wyoming	47.6	.2	.19
District of Columbia	43.6	.4	.35

SOUNDPROOFING WITH "CELLULITE"

Tests Reveal Efficiency of Cotton "Blankets"

America's Little Red Schoolhouse Snug, Safe and Quiet with Cellulite Cotton Insulation!

Soundproofing with Cotton is one of the most interesting new uses developed for this long-famous product by The Gilman Brothers Company of Gilman, Conn., manufacturers of Cellulite cotton insulation.

Cellulite acoustical "blankets" are now being used extensively by leading architects and builders to prevent the transmission of sound, in addition to their well-known function as thermal insulation.

According to recent tests conducted by Leo L. Beranek, acoustic consultant of Cambridge, Mass., Cellulite is one of the most efficient sound deadening materials available. In a staggered-stud test wall, 3″ Cellulite developed an attenuation loss of 48.0 decibels.

Since 50 to 60 decibels is the approximate measure of sound in a fairly busy office, the installation of Cellulite would effectively reduce the passage of sound to the decibel measure of a whisper.

Cellulite also ranks high in sound absorption; noise reduction coefficient of a 2″ blanket is 70 per cent.

In ceiling or wall, Cellulite's dual insulating and soundproofing qualities eliminate the necessity for more than one material and the resulting increase in cost and labor.

Other Cellulite advantages, already well known to the building profession, make it an ideal material to work with. Cellulite is permanently flameproof; won't flame or melt under the concentrated fire of a blowtorch. It is odorless, verminproof and shows no mildew attraction. Extremely light in weight — .0875 lbs. per cubic foot — it is easy to handle; and, of course, its low cost is an important additional reason for its great popularity with architects and builders.

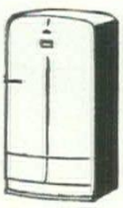
More information about Cellulite Insulation and Acoustical Blankets may be had by writing direct to The Gilman Brothers Company, Gilman 1, Connecticut.

Installing Cellulite Acoustical Blankets The ease and simplicity of soundproofing with Cellulite is demonstrated in the above photograph, where it can be seen that the Cellulite "blankets" are being "hung" by weaving them in and out between the studs.

• • • • • • • • • • • •

Every Modern School needs something

Frigidaire School Plan Makes It Easy For Students To Learn Modern Kitchen And Laundry Methods



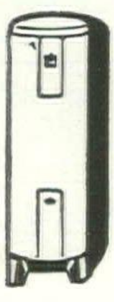
Frigidaire Refrigerators are ideal for teaching the best methods of food keeping. They're available in a wide range of sizes—in conventional styles or the famous Cold-Wall Imperial models which combine a refrigerator with a home freezer.

Frigidaire Automatic Washer permits instruction on all types of fabrics. It may be opened or stopped during any part of the washing cycle for detailed demonstration and instruction.

Frigidaire Automatic Electric Dryer makes it possible to have clothes completely dried in 20 minutes.

Frigidaire Electric Ironer makes it easy to teach expert ironing techniques. Its simple controls help students learn rapidly.

Frigidaire Home Freezers provide the finest equipment for teaching the latest methods of preparing foods for freezing, and freezing and storing foods.



Frigidaire Water Heaters are fully automatic, available in a wide range of sizes that includes single or double unit models, Table-Top and Round Upright.

Frigidaire Electric Ranges make modern electric cooking easy to teach—even beginners can get good results right away. And the same features that make these beautiful ranges easy for students to use make them simple for teachers to demonstrate.

To teach the latest home economics techniques, schools need the latest and best home appliances. Frigidaire Appliances are ideal for this use, and Frigidaire makes it easy for schools to purchase these famous products through its special school plan. Here's how the Frigidaire School Plan works:

Accredited schools may buy any of the Frigidaire Home Appliances shown on this page, for instruction purposes in home economics classes, at approximately half the normal retail price. And, for a 5-year period after the purchase, the school is entitled to automatic replacement with new models — at no additional cost!

All products sold under the Frigidaire School Plan carry the regular Frigidaire One Year Warranty. Sealed-in refrigerating mechanisms are protected for an additional four years. Prompt, expert installation and servicing are provided by the local Frigidaire Dealer.

VISIT THE FRIGIDAIRE EXHIBIT: National Apartment Owners Association Convention, Hotel Somerset, Boston, Oct. 10-12.

(Continued from page 96)

whose land will be turned into a school site, can arouse the taxpayer in such a manner as to cause them to turn thumbs down on a well planned building program. To combat this, simple maps and charts should be submitted to the public, and the facts presented in clear, simple language; then, let the people be the judge and generally they will rule in favor of a logical site.

4. *To what extent can old buildings be used?*

What shall we do with the existing plant? It represents a great investment to the taxpayer; so when we develop long-term plans, we must use the buildings to the best advantage. It may be to our advantage to abandon some buildings because of high maintenance cost. We may wish to tear down others because they are unsafe or unfit for educational purposes. It may also be to our advantage to renovate some of the existing buildings, and make them a part of the future school plant. The decision should be made only after a careful survey has been made of the existing situation. Such a survey should include:

a. *Educational considerations:* Does the building fit the teaching program, or is it economically feasible to adapt the building to the program?

b. *Safety considerations:* Is the building safe; if not, how much will it cost to make it safe? In view of today's construction costs, is it worth the price?

c. *Maintenance:* An old building usually requires high maintenance cost. In the long run, can this cost of maintenance be justified?

d. *Location:* A school building, regardless whether it be old or new, must be appropriately located. Does the location of the building offset the advantages or disadvantages of the structure?

There are many techniques for evaluating existing buildings, but the one most commonly used is the "school building score cards" method. The score card is a check list for which evaluations can be made for all considerations of a functional school plant. Its chief value is qualitative, not quantitative.

(Continued on page 168)

School Buildings Rated By Experts' Score Cards

(The fifth installment of the University of Oklahoma college of education's report on the survey of city schools.)

As has been noted in previous installments, the adequacy of the several schools in Blackwell varies, in the opinion of the experts.

None except the senior high is conside[illegible]

[illegible] 30
[illegible]phy 20
D. Provision for Use 35
II. Building 160
A. Placement 20
B. Gross Structure 90
C. Internal Structure 50
III. Service System 225
A. Heating and Ventilation 50
B. Fire Protection System 30
C. Cleaning System 15
D. Artificial Lightir[illegible] System [illegible]
[illegible]istration Offices [illegible]
B. Teachers' Rooms 10
C. Health Service Rooms 15
D. Custodial Service Rooms 10
Grand Total 1,000

Scores of Elementary School Buildings By Major Items on Strayer-Engelhardt Score Card

Maximum Score

Name of School	Average Scores Assigned for Items I	II	III	IV	V	VI	VII	VIII	T't'l
(The Ideal Building)	100	160	225	205	35	90	125	60	1000
Washington	71	87	91	103	0	14	26	14	406
Lincoln	71	112	96	143	14	14	25	9	483
Park	66	127	117	154	0	26	35	11	536
Riverside	67	124	111	158	19	7	34	9	519
South Main	61	38	53	97	0	0	0	0	249
Blackwell Heights	61	60	40	86	0	0	21	0	268

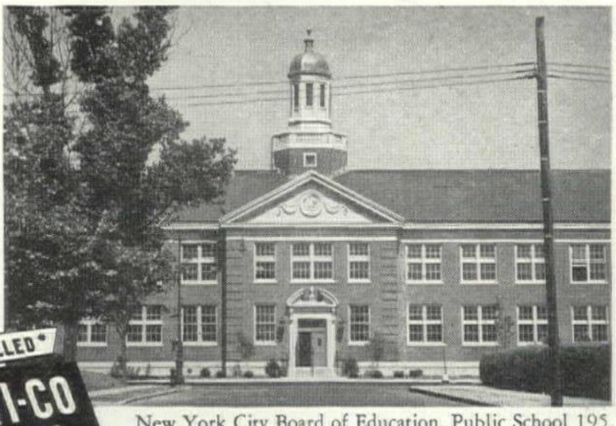
The second phase of the score card report will be carried in the next installment.

More than half of New York City's new schools* are now floored with

Matico

the new asphalt tile

*List of schools built since 1943, with flooring data, on request.



New York City Board of Education, Public School 195, Shore Road, Brooklyn. Architect: Eric Kebbon, Brooklyn, N. Y. Contractors: Caristo Construction Corporation, Brooklyn, New York. Matico installed by Circle Floor Co., Inc., New York.

QUALITY CONTROLLED*
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ASPHALT TILE FLOORING

There are no more rigid specification standards prescribed than those for the construction of New York City's public schools. Therefore, New York's overwhelming choice of Matico in its new schools is another proof of Matico's unique quality — and another reason why, before specifying or buying any floor, you *must* investigate Matico to be sure you are making the best buy.

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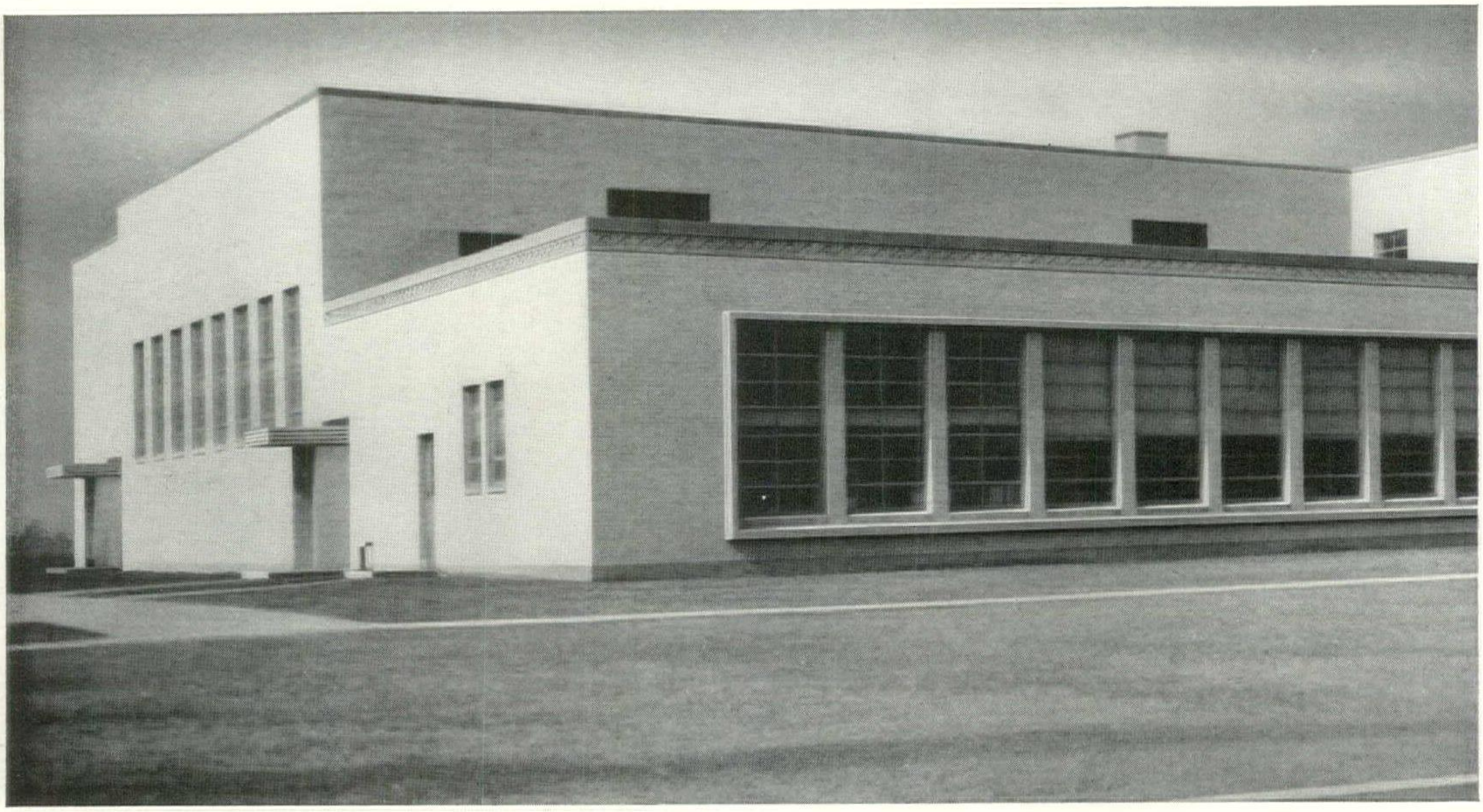
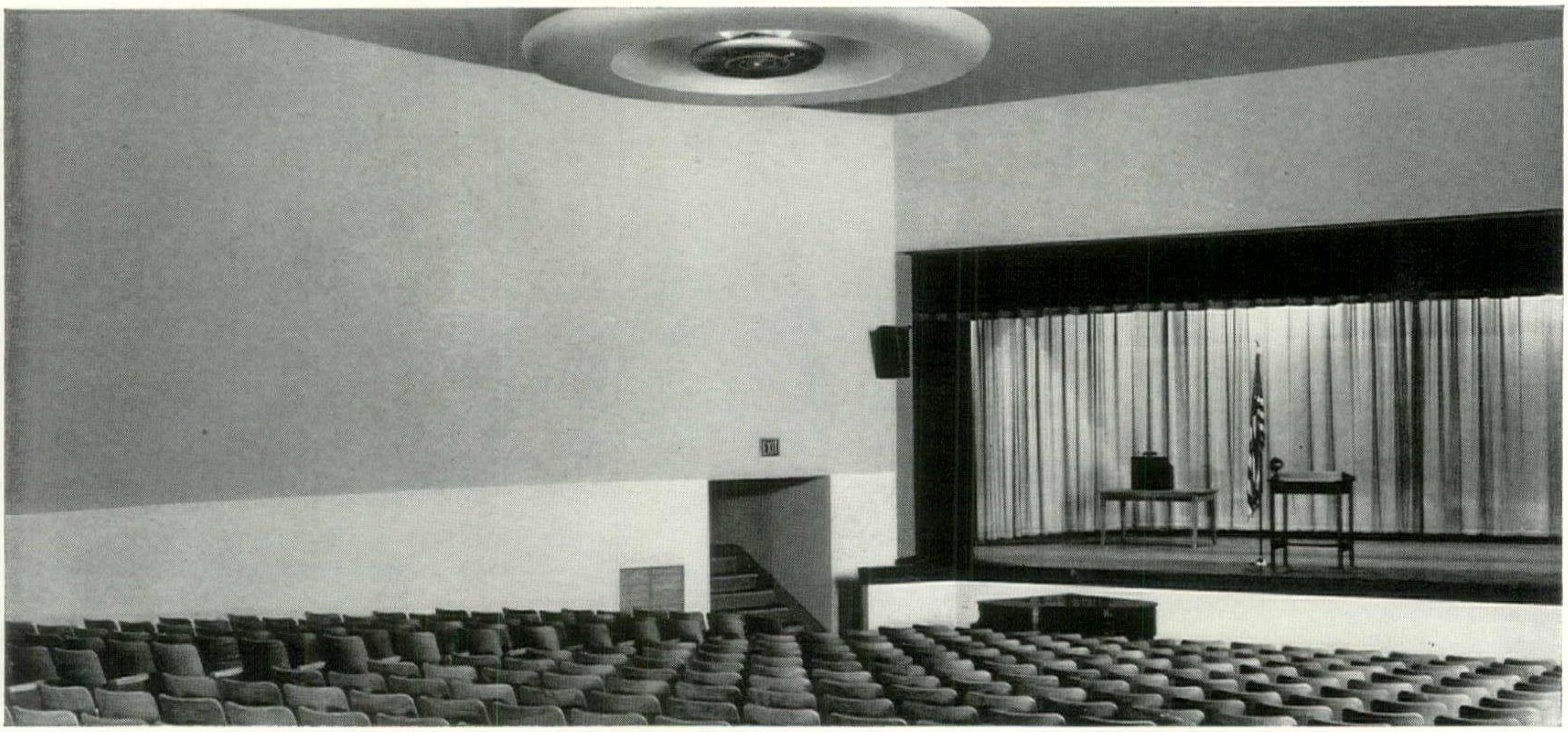



EXIT

Third step: financial

What we want in the way of schoolhouses most often does not agree with what we can afford. So before we can arrive at definite plans for a long-term building program, we must investigate the taxpayer's pocketbook; then by estimating the cost of our needs and by comparing cost with our ability to pay, we can formulate balanced plans. The question, "What can we pay and how will we raise the money?" will depend on: 1) What are the limits of assessed valuation? 2) What bonds can be voted? 3) Is state or federal aid available? The third step, therefore, will be to answer these questions:

1. *What are the limits of assessed valuation?*

Since moneys to build schoolhouses depend largely on assessed valuation, a study of these valuations is recommended. The following survey is suggested: Determine the assessed valuation of past years. Develop chart and study fluctuations and trends. Compare the assessed valuation per average daily attendance with other districts' assessed valuation per average daily attendance.

2. *What bonds can be voted?*

The borrowing capacity of a school district depends on assessed valuations and the state's statutory debt limitations. To find out what bonds can be voted, it is suggested:

a. To investigate the indebtedness of the district.

b. To investigate any existing statutory debt limitations. It is advisable to obtain legal counsel on these matters.

3. *Is state or federal aid available?*

Since some districts have insufficient taxable wealth to provide funds for an adequate building program, either state or federal aid is inevitable. Therefore, an investigation should be made of all possible state and federal grants before any immediate or long-range plans are formulated.

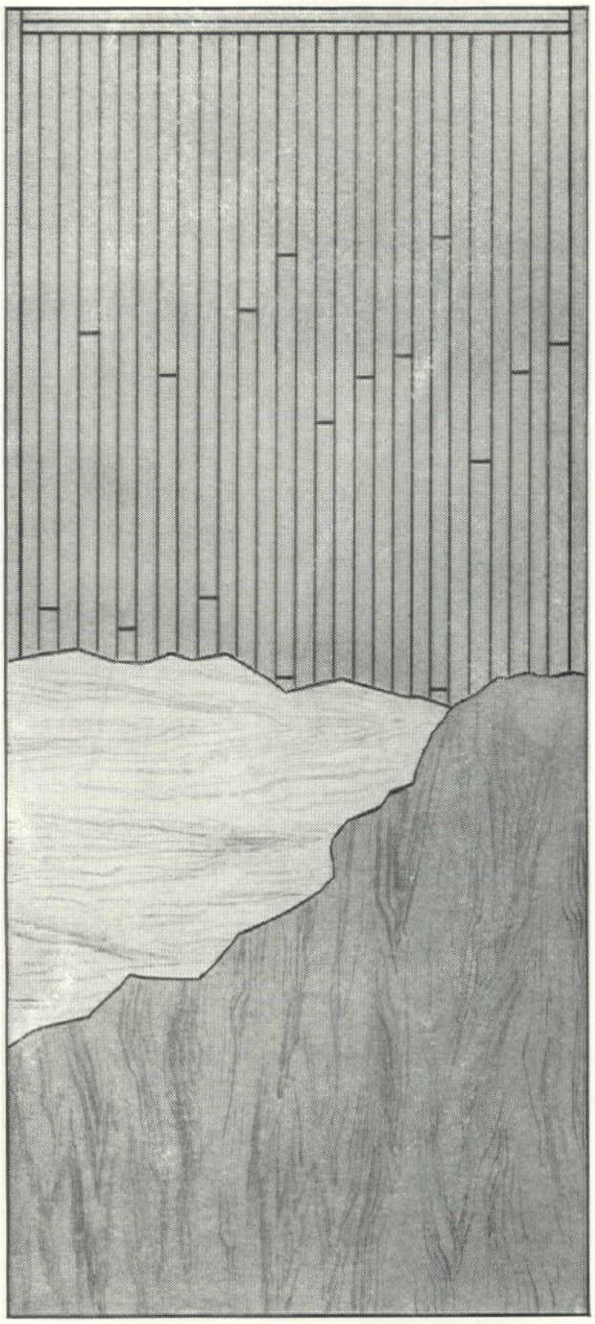
A few points to remember

▶The briefness of this discussion should not be interpreted to mean that it is a simple task to develop a long-term school plan. On the contrary, planning for the future is a difficult job. The procedure outlined here is one of many ways of going about the task. In general, it will suffice for most communities, but in detail, it will have to be altered to fit the particular personality of each individual community.

▶Making long-term school plans is not a one-man job. A successful plan will require the participation of a great number of specialists—the superintendent of schools, the architect, the educational consultant, the teachers, the school board members and many others. Even the students.

▶Here is a warning. It is as tough a job to carry out a long-term school plan as it is to make one. School administration change. Interest dies with time. A good plan can soon be forgotten unless there is a continuation of public interest. Periodically, the people should be given an account of the progress of the immediate program and a review of the ultimate scheme. There have been cases where communities have completely abandoned good long-term plans. For what reasons? Maybe a lack of understanding. Maybe a lack of foresight. Probably just a lack of interest. In any case, it was the taxpayer's loss, because long-term planning pays. But the dividends are measured not on how the plan was developed, but how the plan was used.

NOW—A WELDWOOD Flush Veneer Door with Solid Lumber Staved Core



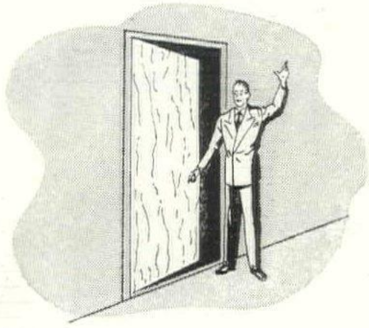


Figure on extra durability, utility, dimensional stability and modest cost when you include the WELDWOOD *Solid Lumber Staved Core* Flush Veneer Door in your plans.

* * * * * *

On your next job—you can plan on obtaining lifelong beauty and satisfaction by specifying this WELDWOOD Door, whether for interior or exterior use.

The Solid Lumber Core gives the door a real feeling of solidity. At the same time the door is substantially lighter than other doors of similar type. Available with face veneers of all the popular species, the WELDWOOD Flush Veneer Door gives you the rich beauty of real wood.

The thoroughly seasoned and kiln-dried basswood lumber laid on edge in staved construction makes the door dimensionally stable—no warping and twisting. And because 100% waterproof phenolic resin glue is used, the door is perfect for either interior or exterior use.

This WELDWOOD Door lends itself especially to cutting light or louvre openings in the field. Or you can obtain the door on order with the openings already prepared.

The addition of this Solid Lumber Staved Core Door complements the present line of popular WELDWOOD Flush Veneer Doors, including the *WELDWOOD Standard Door (with incombustible mineral core)* and the *WELDWOOD Fire Door* which carries the Underwriters' Class "B" Label. Write or contact our nearest branch for full information on the complete assortment of Weldwood Doors.

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Distributing units in Albany, Baltimore, Boston, Brooklyn, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Fresno, Glendale, East Hartford, High Point, Indianapolis, Los Angeles, Milwaukee, Newark, New Hyde Park, N. Y., New York, Oakland, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, San Francisco, Seattle, Spokane, St. Paul, Toronto. Also U. S.-Mengel Plywoods, Inc., distributing units in Atlanta, Birmingham, Dallas, Houston, Jacksonville, Kansas City, Louisville, New Orleans, San Antonio, St. Louis, Tampa. *In Canada:* United States Plywood of Canada, Limited, Toronto. Send inquiries to nearest point.

(Continued from page 102)

materials." It may be that the phrase "similar fire-resisting materials" gives some leeway, but there remains doubt whether this law would permit the use of laminated wood trusses, which were not yet available when it was written, but which are admittedly fully on a par in adequacy with steel bar joists. The chemical fireproofing of all kinds of lumber may eventually raise similar problems.

More desirable is a school building law containing certain really basic provisions regarding building planning and construction, setting up the authority for the approval of plans, providing principles for the administration of the law, requiring the publication of an informative code with provision for hearings when the code is adopted, and for change when change becomes desirable.

The law should provide a general method for the preparation of the code. In some states the school planner has to run the gamut of the state division of architecture, the state health department, the state fire marshal's office, as well as the state department of education. By the time he also gets by the local building code authorities, he has really been through the mill. Would it not be possible, at least at the state level, for these agencies to join hands in the preparation of a code as well as in its administration? Certainly the public must be protected and certainly these agencies may and should have a contribution to make. Let it be made expeditiously and without conflicting advice and requirements.

It might be well to have the code or guide prepared by a committee including not only representatives of the state agencies, but two or three competent architects and school officials.

The state code, manual, or guide should emphasize functional planning and performance standards rather than rigid numerical specifications. It should give the school planner a concept of what is needed and why but leave it to his creative ability to decide how the needs are to be met. Stock plans should be shunned by state authorities as a sure way of freezing design. It is the function of the state to provide plenty of help and advice in school planning and to assure reasonable conditions of health, safety and educational utility but not to supplant the private practitioner.

Service by the state

Service has so far been inadequate. Only about half the states include in the state department of education a division of school house planning or its equivalent. And many of these are inadequately staffed. With a tremendous school construction program already under way, such failures may be tremendously costly. Most of the state departments which do have school planning services operate in varying degrees under the kind of philosophy which has been stated above. Certainly the concept of service, rather than regulation, is finding increasing acceptance among state departments of education in their fields of operation.

State publications of the last few years in the school planning field have been of the informative type rather than simply a list of rigid regulations. Great credit must be given to the Connecticut School Building Code published in 1941. This broke the ice and established a trend. Other states in their recent publications have gone even farther in the desired direction. The National Council on Schoolhouse Construction has recently completely redone its published recommendations. The revised *Guide For Planning School Plants* is an excellent example of the type of document which can be of real help to school building planners.

(Continued on page 174)

Oh boy... IT'S JUST MY SIZE!

... the new Halsey Taylor line of Lo-Level Coolers, the right height for children

HERE at last is a drinking water cooler *designed with the child in mind!* It's the new Halsey Taylor LO-LEVEL *the little cooler for little people!*

Just the right height for children, it is ideal for cafeteria use because of foot-pedal operation, so the child can hold his tray and still fill his glass with water. Thus the LO-LEVEL promotes faster serving and less confusion where many children gather.

Developed by a house that has specialized for years in the manufacture of fountains and coolers, the LO-LEVEL is noted for its economy in operation and maintenance, condensing units being of the hermetic-seal type, requiring no oil and self-regulated.

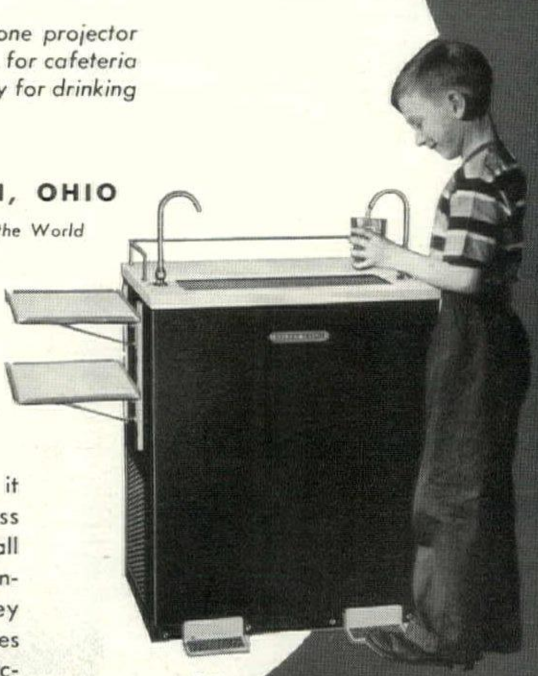
The LO-LEVEL comes in various models . . . with one projector and one glass filler, or with two or more glass fillers, for cafeteria use; and with two projectors where desired exclusively for drinking purposes. Write for further information.

Halsey Taylor health-safe projectors on all models!

THE HALSEY TAYLOR CO., WARREN, OHIO

Largest Exclusive Manufacturer of Drinking Fountains in the World

HALSEY TAYLOR
LO-LEVEL
Coolers



S-3

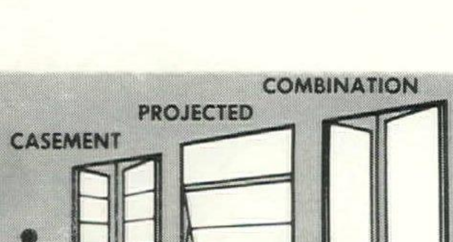
Convenient

Foot-pedal operation makes it handy for children. Stainless steel top and splash tray on all cafeteria types assure convenience and cleanliness. Halsey Taylor inbuilt quality provides a welcome freedom from servicing troubles!

THE LITTLE COOLER FOR LITTLE PEOPLE

Now...research gives you a

For good daylighting at low cost, base your design on standard units of Fenestra Intermediate Steel Windows. They are easily combined into beautiful, light-gathering window walls. Because they are standardized, you save both on original cost and on installation. Fenestra Windows can be cleaned on both sides safely from inside—cutting cleaning costs and encouraging more frequent washing for more daylight. Easily operated canopy and sill vents protect interior from rain when open, afford fresh-air ventilation, guard against drafts.



Fenestra

INTERMEDIATE STEEL WINDOWS

Local building codes cannot be said to have kept up so well. Their correction, improvement, and modernization is beyond the scope of this article and can be taken care of locally.

It is true, at least theoretically, that codes are a result of an expression of the will of the public to have structures which are safe, healthful and useful. If codes originally formulated to assure this are now outdated and are requiring buildings which are less safe, healthful, and useful, than we now know how to build, the public will eventually be concerned and will require changes. The public has been oversold on a rigid subject-matter-centered system of education and upon the type of architecture which is the physical expression of that kind of education. The public needs information on the new possibilities. Strong leadership is needed to bring about the dynamic participation of all of the people in planning better school programs and better school buildings.

EDUCATION FIRST—Supplemental remarks by John C. Nichols*

There is one reason above all others why the "procedural" code—laying down absolute rules and specifications—reigns supreme, and the "performance" code is conspicuous in its scarcity: plans and specifications are what receive approval as a rule, not completed buildings. Only by dictating methods and procedures whose performance is known can the approving agency be assured of at least a minimum level of performance. But we can improve the code situation. First, we must avoid any further enactment of building regulations into legislative law, and we must seek to remove the present regulations from this category. Second, regulations affecting school buildings should never be left to a noneducational agency alone and without reference to educational authorities. Often enough, in their zeal to cover with a wide margin of safety every foreseeable contingency which might reflect on their own thoroughness, and in ignorance of school building functions and use, noneducational authorities go to senseless extremes. Often, in their endeavors to remove one hazard, they create others more serious in the aggregate. The required use of kalamein doors, for example, to enclose all school stairways (regardless of building height, or type of construction or finish and other pertinent characteristics) often creates an accident hazard far more real than the one supposedly eliminated.

Educational aspects of the building should have top importance. Our codes must not go on insisting on more toilet fixtures that even an epidemic would demand,** at the cost of ignoring urgently needed classroom equipment which the same money would buy.

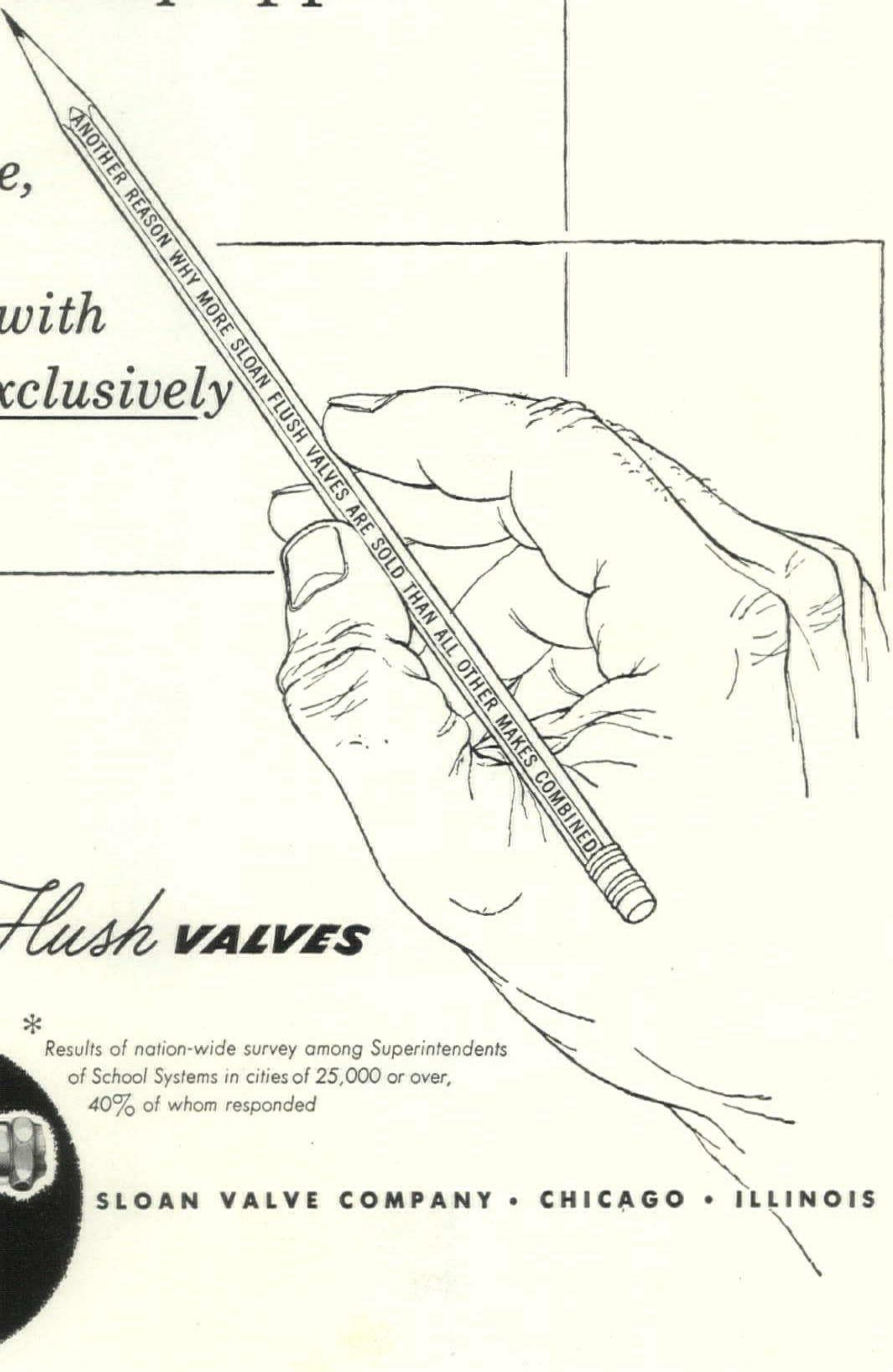
It is wise for school building codes to state the objectives or levels of performance to be attained, and then describe minimum methods or procedures. This gives the administrator a firm base to fall back on, while the architect and engineer have the opportunity of demonstrating more unorthodox procedures. This is not impractical. The Connecticut Code, for example, states levels of acoustical correction to be attained using a standard formula; lacking the calculations, a specified procedure is outlined which produces that level of performance.

Much could be done if architects, engineers, educators had some clearing house of information. The National Council on Schoolhouse Construction, without funds, makes the effort.

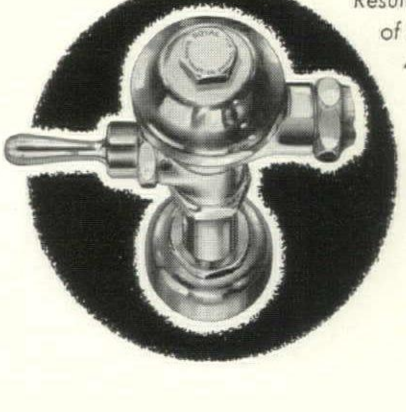
* *Archiect and author of recent pace setting Connecticut School Code.*
** *Studies by Dr. Hans Schmidt and others reveal their uselessness.*

93% of all School Systems* are SLOAN-equipped

...of these, 54.6% are equipped with SLOAN exclusively



SLOAN *Flush* **VALVES**



* Results of nation-wide survey among Superintendents of School Systems in cities of 25,000 or over, 40% of whom responded

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There are U.S.G. products for every type of construction—and U.S.G. technical data to assist the architect when writing almost any type of specification. No matter what kind of building you are currently engaged in . . . no matter what type of construction your immediate problem requires . . . you'll find the products you need and the necessary technical data at U.S.G.

Every U.S.G. product—from its beginning in the great U.S.G. laboratories until its actual use—undergoes the most exacting tests known to the industry. Quality and performance are carefully measured and rigidly maintained.

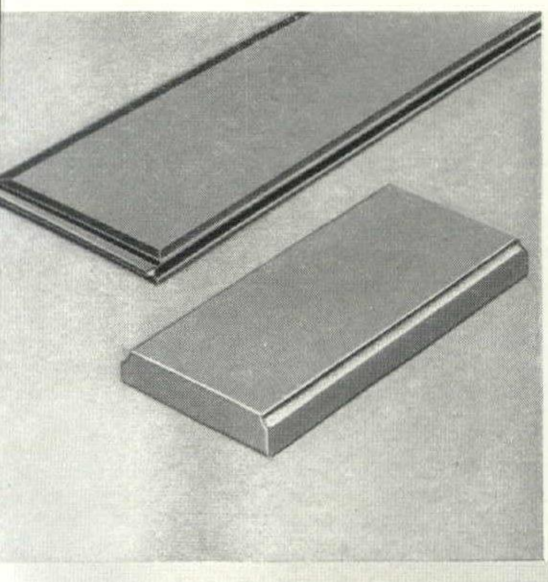
That's why the U.S.G. crest has become the symbol of quality for America's architects and builders. For almost fifty years, architects have specified with confidence when they have specified U.S.G.

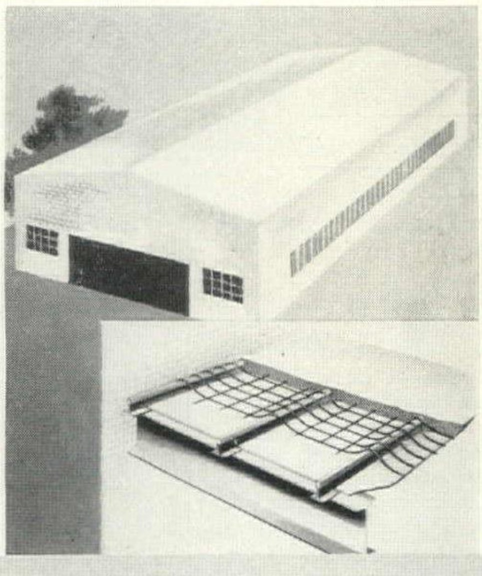
For the U.S.G. solution to your immediate problem, see Sweet's or your A.I.A. files. For further information call in your U.S.G. representative—or write United States Gypsum, Chicago 6, Illinois.

If your requirement is ROOF MATERIALS

U.S.G. roof materials are available for the least expensive house or barn—and for the largest industrial buildings and most imposing monumental structures. Any building may have a roof by U.S.G., because U.S.G. makes roof materials *for every type of building.*

The wide variety of this group of U.S.G. products is illustrated by the few examples below.





USG* METAL EDGE GYPSUM PLANK

For modern roof decks to be covered with built-up roofing. Once framing is completed the Plank goes on—there's no preliminary work, no scaffolding. This construction offers economy of erection, light weight, clean white appearance, incombustibility.

SHORT SPAN GYPSUM ROOF TILE

For pitched or flat roof decks, and gently curved surfaces. Offers maximum nail-holding power. Light in weight, will not burn.

SHEETROCK*-PYROFILL*

Monolithic SHEETROCK-PYROFILL Poured-in-Place Gypsum Roof Decks provide important economies in material and labor costs and maintenance expense. They are generally lighter than other poured roof decks, and offer the added protection of fireproof gypsum. This construction is often used for problem jobs—roofs of irregular or unusual contour. SHEETROCK-PYROFILL meets any construction schedule—up to 20,000 feet poured in a day . . . sets in less than 30 minutes.

ASPHALT ROOFING MATERIALS

USG Asphalt Roofing offers strip shingles, individual shingles, roll roofing, roll brick siding . . . asphalt paints, plastic cements and coatings . . . and an outstanding line of built-up roofing materials. These many products provide a scope to meet almost any set of roofing requirements. Any architectural problem involving shingles, for example, is readily solved through the wide variety of colors, textures and patterns in the USG shingle line.

*T. M. Reg. U. S. Pat. Off.

TRANSPORTABLE SCHOOL

(Continued from page 139)

ridors, each to be shifted intact by house movers from simple foundations to new sites.

Building codes helped determine the plan. A 12 ft. ceiling is required in that area except in a one-room schoolhouse, so a school composed of numerous one-room schoolhouses with 10 ft. ceilings was developed—for the very practical purpose of being low enough to pass under trolley wires and the ubiquitous bridges with which the district is blessed. Next, the one-room schoolhouse unit had to be 10 ft. or more from its fellows; hence, the intervening play area. Corridors were developed merely as a means of circulation and as ducts for service from a central plant, not as a means of egress, for each classroom has its own direct exit.

Easily connected central heating

Early conferences with maintenance and operating department heads determined that a central heating plant was more desirable than separate heating for each classroom. To accomplish this, each room is heated by a split system. Convectors are located around the wall under windows. Univent heaters supplement the convectors, introducing fresh air warmed at the source, and taking care of the ventilation problem. This entire room heating is connected at the corridor by two unions which may be disconnected and connected in a matter of minutes for removal or reassembling. One flexible connection similarly cares for the electrical service link.

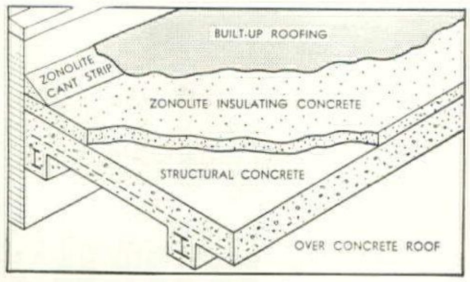
A basic four schoolroom unit is the start for each school, containing, in addition to the four classrooms, a boiler room, toilet rooms with pupil capacity for six classrooms, and connecting corridors. The initial boiler capacity is eight classrooms, with provision in the room for a second boiler to handle four more classrooms and an auditorium. There is also a combination office and teachers' room, book room, and janitor's closet. The second step in each school will be to add two to four more classrooms with an additional corridor. The main office and health room also enters at this point. The third step will be the construction of the combination auditorium, playroom, and cafeteria. This unit will, as now planned, be permanent, for use as a community facility after the dismantling of the balance of the project. Additional rooms, to a total of 12, are planned. When the school load declines in the community, the school will be removed room by room to another site where a need develops, or will be used to replace obsolete schools in use.

Portability is the economy

The system is economical. There will not be a great original saving in cost over conventional types of school buildings, because standard floor coverings, acoustically treated ceilings, insulation, and modern equipment bring the price up near that of the usual school. The economy is one of insurance against obsolescence of site and neighborhood. The cost of removal and relocation of a room is estimated to be at least 50 per cent less than that of relocating a prefab.

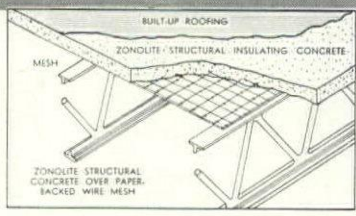
Bids taken on several of these schools have established the following general formula, excluding site work and auditorium: four room school—$100,000; six room school—$122,000; eight room school—$142,000. The estimated cost of moving a classroom unit is $500 for the actual move, with labor for detaching and reattaching and new foundation, $1,000 to $1,500. Latest bid for a ten room addition to the Genesee Hill school (see page 138) in May of 1949 ran $149,950. The breakdown was $115,000 for general work, $27,749 for mechanical, and $6,301 for electrical.

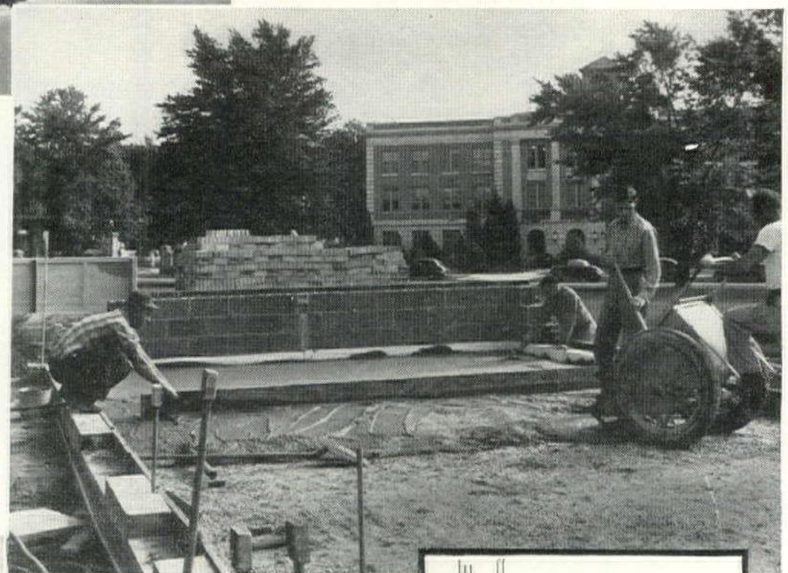
Build New Safety Into



ABOVE: This application of Zonolite insulating concrete offers a convenient and economical means for insulating structural concrete roofs of existing buildings as well as new construction.

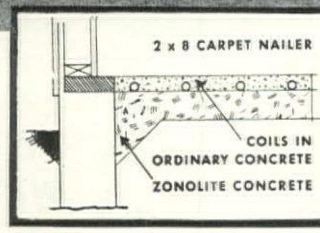
ABOVE AND RIGHT: New High School in Fairfield, Iowa, has 14,000 square feet of structural roof deck—Zonolite concrete over paper backed wire mesh as diagrammed at right.
Architect: Keffer & Jones.





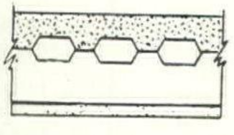
RIGHT: Zonolite concrete is shown here being laid over sand-stone fill as the insulating medium for the radiant heating installation of women's dormitories for Bowling Green State University, Bowling Green, Ohio. Erected by Weaver Construction Company of Bryan, Ohio.

RIGHT: Entire roof area of Wayne University's new Science Building is insulated with Zonolite concrete. Zonolite plaster on suspended ceiling provides maximum fire protection.
Architect: Ralph R. Calder, Detroit.
Contractor: W. E. Wood Company, Detroit.

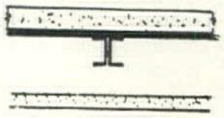


ABOVE: Zonolite insulating concrete installed below radiant heating pipes minimizes lead and lag in temperature control, eliminates heat loss into the ground. Similar to installation at Bowling Green State University.

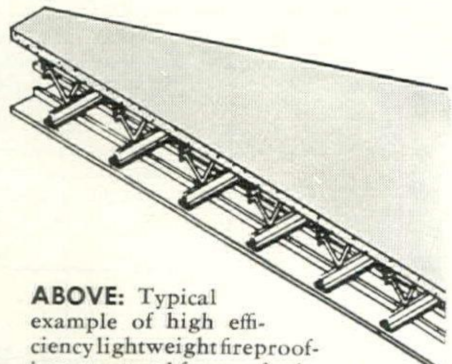
ABOVE: In the Clarksville School, New Scotland, New York, Zonolite insulating concrete was poured 3″ thick on grade to provide warm, dry floors throughout. Zonolite Acoustical Plastic was employed to obtain *fire-safe* sound-conditioning.
Architect: Henry L. Blatner, Albany.
Contractor: Modern Construction Co., Schenectady.



ABOVE: Accorded a 4-hour fire rating is the above system of fireproofing cellular steel floors. Minimum of 2″ concrete fill, suspended ceiling of 1″ Zonolite vermiculite plaster on metal lath. (BMS-92 table 45)



ABOVE: Method of fireproofing a steel plate roof assembly, awarded a 4-hour fire rating by Underwriters Laboratories. Construction—2″ Zonolite vermiculite concrete topping, suspended ceiling of 1″ Zonolite plaster on metal lath. (UL Ret. No. 2773)



ABOVE: Typical example of high efficiency lightweight fireproofing: structural frame of columns, beams and ties in which the ties act as a unit in system of open truss joists spaced 2′ on center. Joists are topped by 2½″ Zonolite concrete slab and sustain suspended 1″ ceiling of Zonolite vermiculite plaster.

Zonolite plaster fireproofing has achieved high ratings in numerous other applications, for roofs, floors, ceilings, beams, columns, and trusses.

Schools With Fireproof Zonolite* Aggregates

For Maximum Fire Protection PLUS Insulation and Sound-Conditioning SPECIFY LIGHTWEIGHT ZONOLITE VERMICULITE AGGREGATES

No architect would ever settle for less than 100% fire-safety in schools if that were technically possible. Now, methods and materials described herewith bring that ideal much closer than ever before . . . usually with little or no increase in building costs—often with decided economies through reduced weight of structural steel members.

Roofs and Floors That Insulate

In short-span structural roof decks, for example, Zonolite vermiculite concrete combines high insulating value and structural deck in one material, applied in one operation; hence, both labor and materials are saved. This same concrete, only 1/5 the weight of ordinary concrete, can be poured as permanent insulation fill over any existing roof.

Zonolite concrete is also ideal for on-the-ground floors because of its complete, permanent immunity to decay, vermin and fire plus high insulating efficiency. It prevents heat loss—blocks condensation—is the perfect base for panel heating—can be poured right on the ground.

New Fire Resistance in Plaster

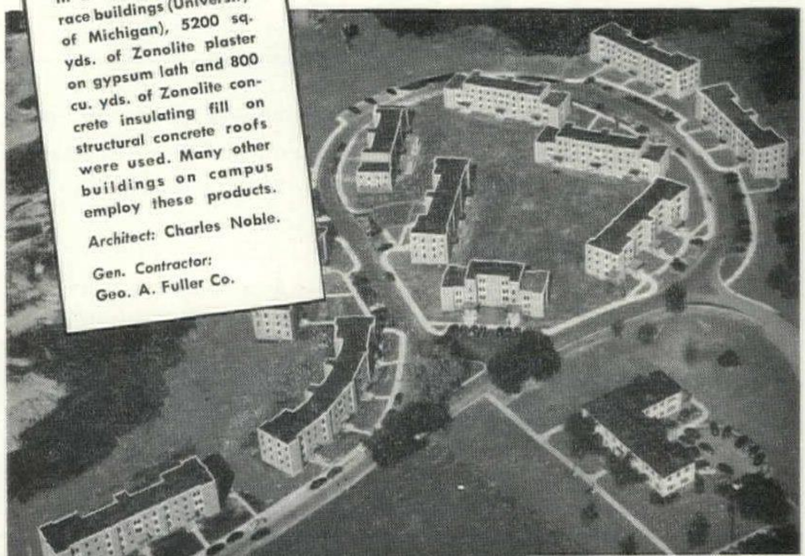
Plaster, too, is improved in many ways by using Zonolite Aggregate. Plasterers prefer it because there's only 1/3 the weight—it sticks better—spreads more easily and with fewer droppings. The finished plaster is so tough a sledge hammer blow only dents it, and it won't chip when nails are driven into it. Above all, it is remarkably fire-resistant. When used as explained at the right, it effects dramatic economies as well as the fire protection noted. In one large building, steel savings amounted to over $235,000.00!

Lowest Cost Acoustical Treatment

Zonolite Acoustical Plastic, applied like ordinary plaster, combines complete fire safety with lowest cost sound conditioning. It does not restrict design, as it bonds directly to concrete, plaster or any clean, firm, water-resistant surface—curved, ornate, irregular or flat—without furring, lathing, cutting or fitting. These and other cost-cutting factors frequently make *Zonolite Acoustical Plastic* available for schools where other acoustical treatments would be out of the question.

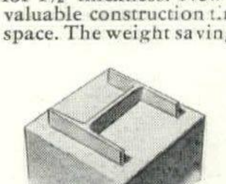
Free Data . . . Mail Coupon

The examples cited here are only a few among countless uses for Zonolite products. Complete data for your files is yours if you send in the coupon below. Mail today and be sure to ask for more specific information if you so desire.



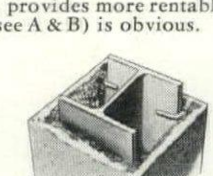
In these University Terrace buildings (University of Michigan), 5200 sq. yds. of Zonolite plaster on gypsum lath and 800 cu. yds. of Zonolite concrete insulating fill on structural concrete roofs were used. Many other buildings on campus employ these products. Architect: Charles Noble. Gen. Contractor: Geo. A. Fuller Co.

In recent Underwriters Laboratories tests, columns fireproofed with Zonolite plaster as shown on the right were awarded a 3-hour rating for 1" and 4 hrs. for 1½" thickness. New fireproofing method saves valuable construction time, provides more rentable space. The weight saving (see A & B) is obvious.



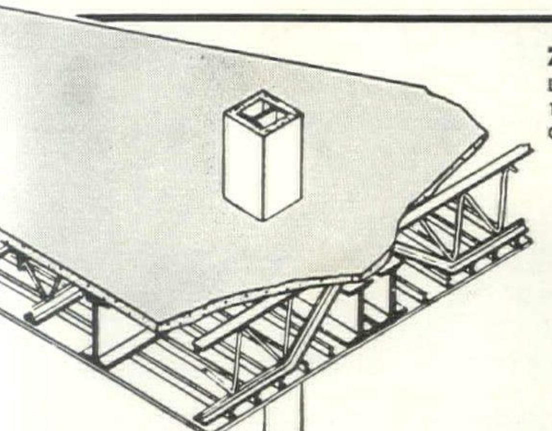
A

Old Method of Fireproofing with Heavy Concrete



B

New Method of Fireproofing with ZONOLITE Vermiculite Plaster



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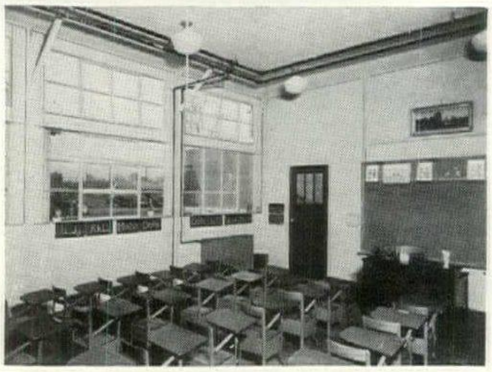
Name..

Address..

City and Zone........................ ......*State*..............

( ) Architect—( ) Engineer—( ) Draftsman—( ) Contractor—( ) ....

Scheible's Art Studio



PREFABRICATION

(Continued from page 141)

STEEL PANELS are designed for quick construction of roof and walls on single story steel chassis.

Preassembled steel buildings are one compelling answer to the great schoolroom need in many communities. The one-story building built with prefabricated structural steel framework and preinsulated steel wall panels and roof sheets provides a solution to the problem of enclosing space which the manufacturers estimate saves approximately 60 per cent over the cost of equivalent conventional masonry construction. They can be put up quickly and cheaply, and a capable designer can milk good solutions from their system of modular manufacture. Pioneer Steel Co. of Pittsburgh uses an 8 ft. module in their product, with preassembled steel wall panels of 16 gauge flat sheet steel backed with ½ in. insulating board. Multiple height side wall units permit uncomplicated variation of room height within the same building.

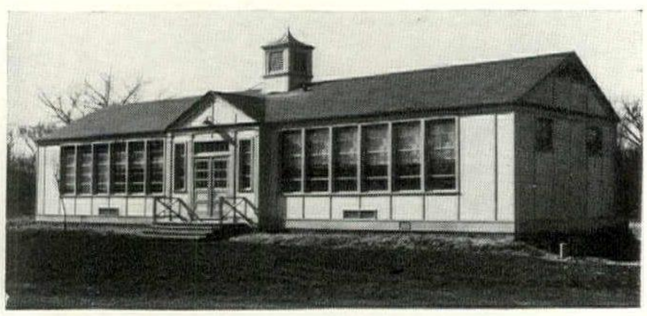
STEEL PREFAB exploits another characteristic of this type school—ready transportability.

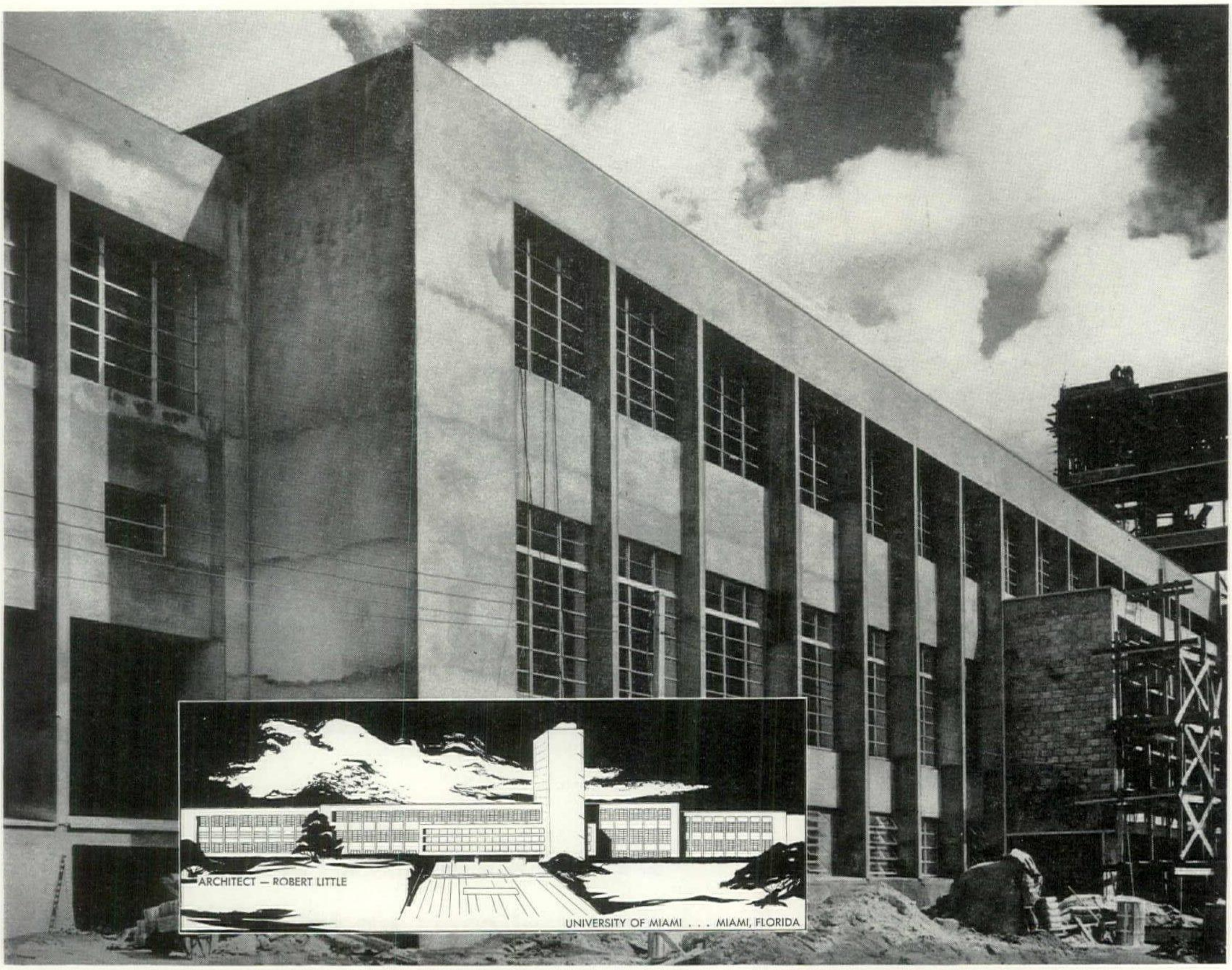
Another advantage of steel buildings, exemplified in this rudimentary schoolroom, is their simplicity in disassembly and transportation from one easily prepared site to another. This unit, a product of Armco Metal Products Inc., can follow population shifts and resultant educational crises from one school district or county to another without depreciation. Armco school in Caro, Mich., was completed recently at a cost of $7.50 per sq. ft. Again, the proper use of this type schoolroom demands even better designers than many other less simplified forms of construction, but if the buildings are keyed properly into the master plans of schools over the width of a large school district, they can be of great value in making the entire setup very flexible.

WOOD FRAME UNIT, demountable, with two classrooms, is Chicago's own solution to the problem.

Chicago's own demountable school is a $12.50 per. sq. ft. wood frame structure of two classrooms plus service, with a total capacity of 80 students. Designed by Board of Education architect John C. Christensen, seven such schools are now up, with six more under construction. The construction is dry wall, and heating is hot water, oil fired. Construction cost per unit is approximately $5,700 for heating, $3,600 for plumbing, $1,600 for electrical work, and $14,100 general work—a total of about $25,000 each, complete with sad cupola.

(Continued on page 186)





MIAMI ALUMINUM AWNING WINDOWS are growing favorites with America's leading Architects and Builders. Manufactured with watch-like precision, every moving part is expertly machined and carefully balanced for easy, "friction-free" operation.

Both sides of glass panels are supported by "PATENTED" concealed cross-shaft, joining panels into one smooth working unit. Easily turned operator opens glass panels to nearly 90 degrees wide, simply and quickly. This is an EXCLUSIVE Miami Awning Window feature.

Miami Awning Window locks automatically in any position without necessity of extra wearing parts.

Closed, the Miami Aluminum Awning Window seals into one compact WEATHER-TIGHT unit because glass panels are designed with overlapping flanges assuring absolute weather protection through double metal contact. NO WEATHER STRIPPING IS REQUIRED.

Miami Aluminum Awning Windows are used in School, Public Building, Church and Home Construction.

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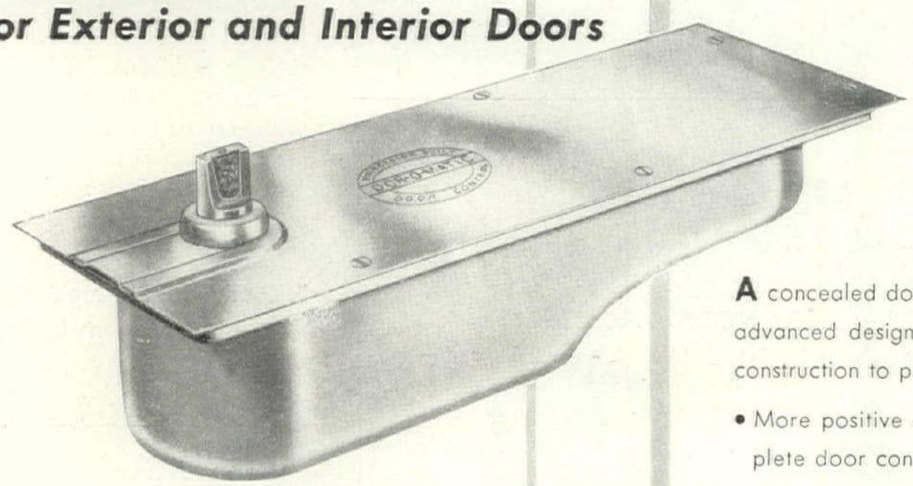
DOOR CONTROL

For Exterior and Interior Doors



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- More positive and more complete door control.
- Longer service life under all service conditions.
- Complete adaptability to modern design.

A Logan PRODUCT Dor-O-Matic Controls are now manufactured and distributed by Logan Engineering Co., makers of precision mechanical equipment known and used throughout the world. The Logan quality reputation is added assurance of outstanding performance from every Dor-O-Matic Door Control you specify.

The Dor-O-Matic Control is available in forty different models to meet a wide variety of application requirements. Write today for full information.

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It belongs in your specifications file.

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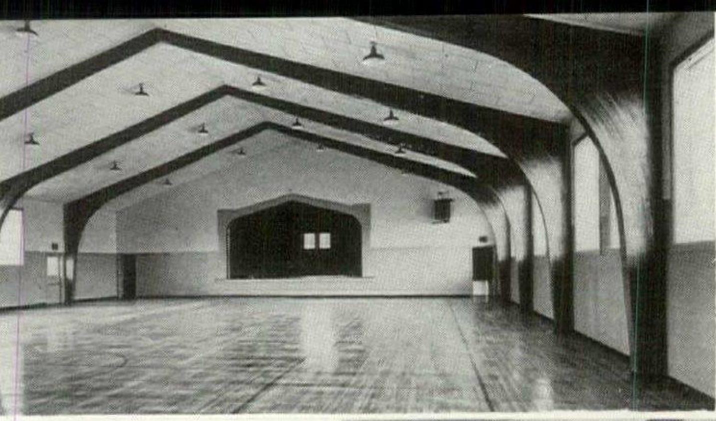
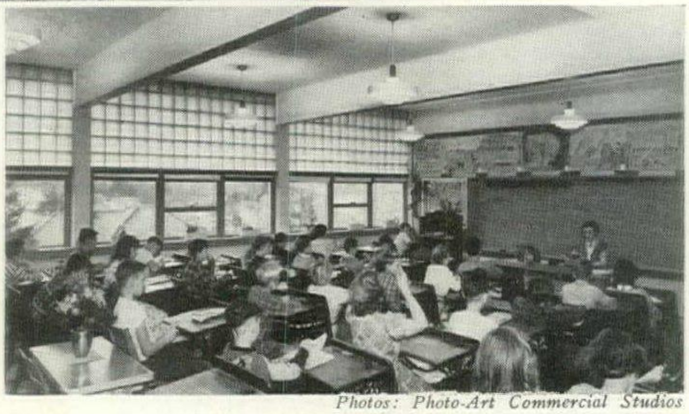
LOGAN ENGINEERING CO.

4906 W. Lawrence Ave., Chicago 30, Illinois





LAMINATED BEAMS (in view at right) hold clerestory windows above middle of classroom, (beginning at top right corner of photo) (Wm. A. Johnson & Associates, architects)

Photos: Photo-Art Commercial Studios

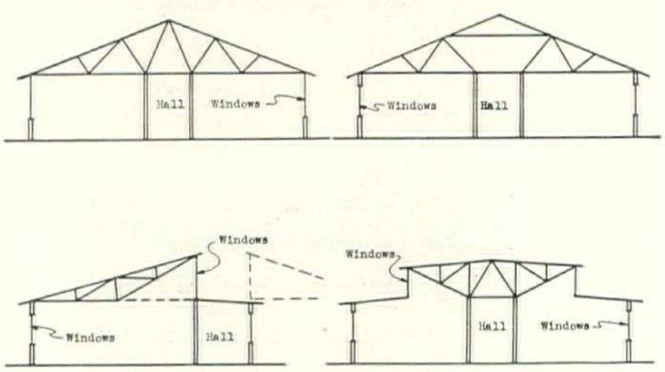
LAMINATED WOOD frames, factory-made to order, have great strength, durability.

Glued, laminated wood beams, arches, and rigid frames are found in many shrewd school designs over the country. These prefabricated members, made by Timber Structures Inc. of tough, straight-grained Douglas fir, are especially appropriate in large enclosures where wide spans must be bridged. And particularly suitable for gymnasium construction are the handsome lamella roofs engineered by this company.

Favorable fire insurance rates are an important advantage of this heavy timber construction to school boards. The wood chars, but its natural fire resistivity is preserved in this kind of use, and load-bearing qualities outlast considerable exposure to high temperatures.

Structural forms are fabricated to the designer's specifications, with thickness of laminations determined by the radius of curvature required. Laminations are kiln dried and specially surfaced prior to the gluing operation. Casein and other water resistant glues are used for interior members, with phenolic resin and other exterior type glues for members exposed to weather.

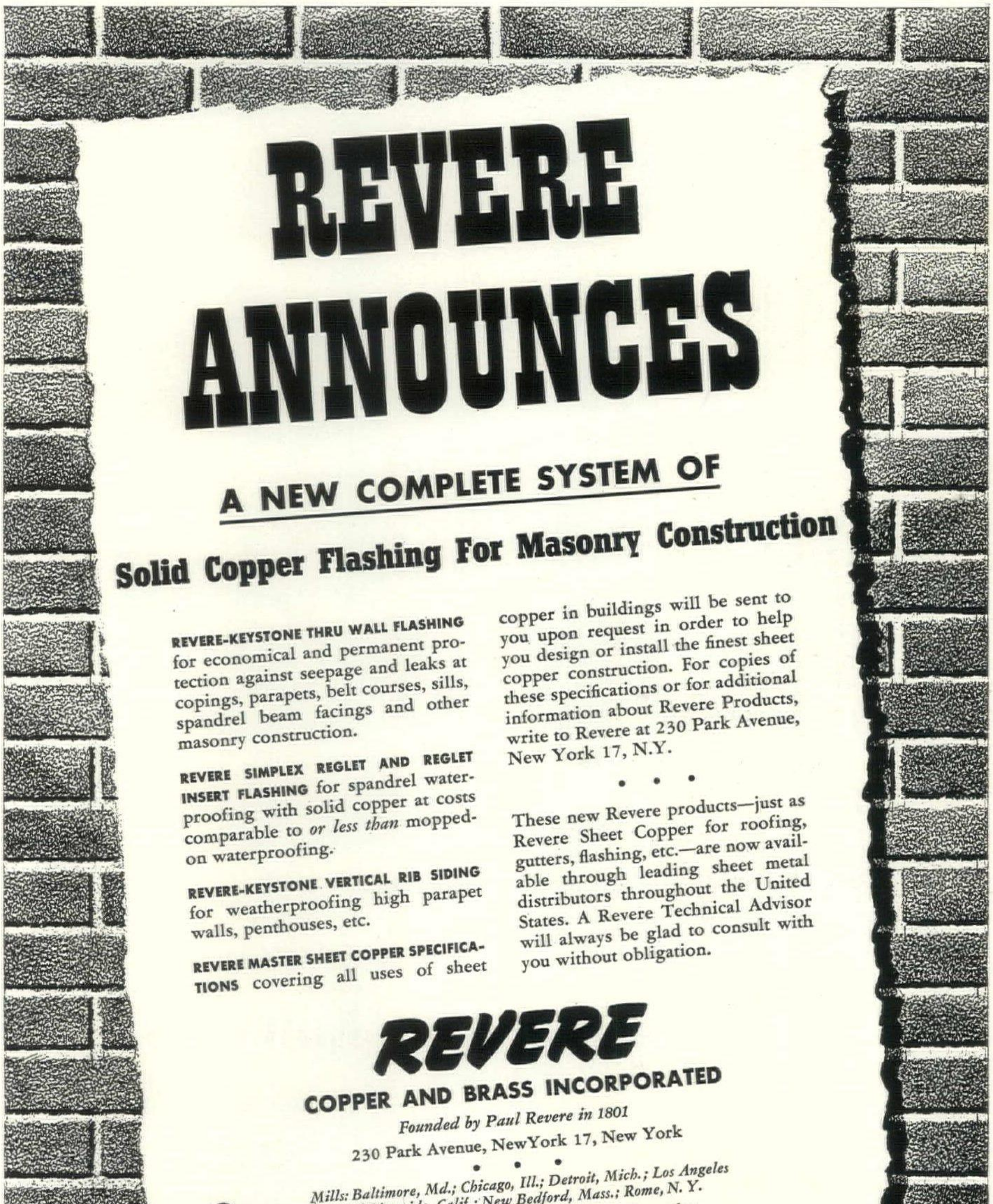
TIMBER TRUSSES are designed for use in classroom widths as well as long spans by Timber Engineering Co.



This company's new educational interest is in the classroom, but its truss designs continue to furnish many schools a method for spanning gymnasiums and auditoriums as well. Advantages cited for the use of the various design trusses in classroom building include the dominant fact that this method uses about 20 per cent less material than conventional framing. The TECO people also point out savings available through contractor prefabrication of the trusses or by straight purchase in completed form from firms specializing in this work. The advantage of trusses grows with the width of classrooms, and in the case of cantilever trusses outer walls may have very large window areas without the necessity of having costly lintels overhead. Work on the job is aided by the familiar advantage of early roofing.

LIGHT STEEL TRUSSES also bridge the classroom as handily as heavier sections span the gymnasium.

Macomber, another company specializing in steel structural prefabrications, is emphasizing not only its wide span trusses, which are available in stock units to bridge widths up to 180 ft., but also small lightweight trusses for classroom widths. Speed in construction, with strength, are the advantages. In addition to steel joists, longspans, roof purlins, and trusses, this company produces steel loadbearing partitions, siding, and decking. (Continued on page 190)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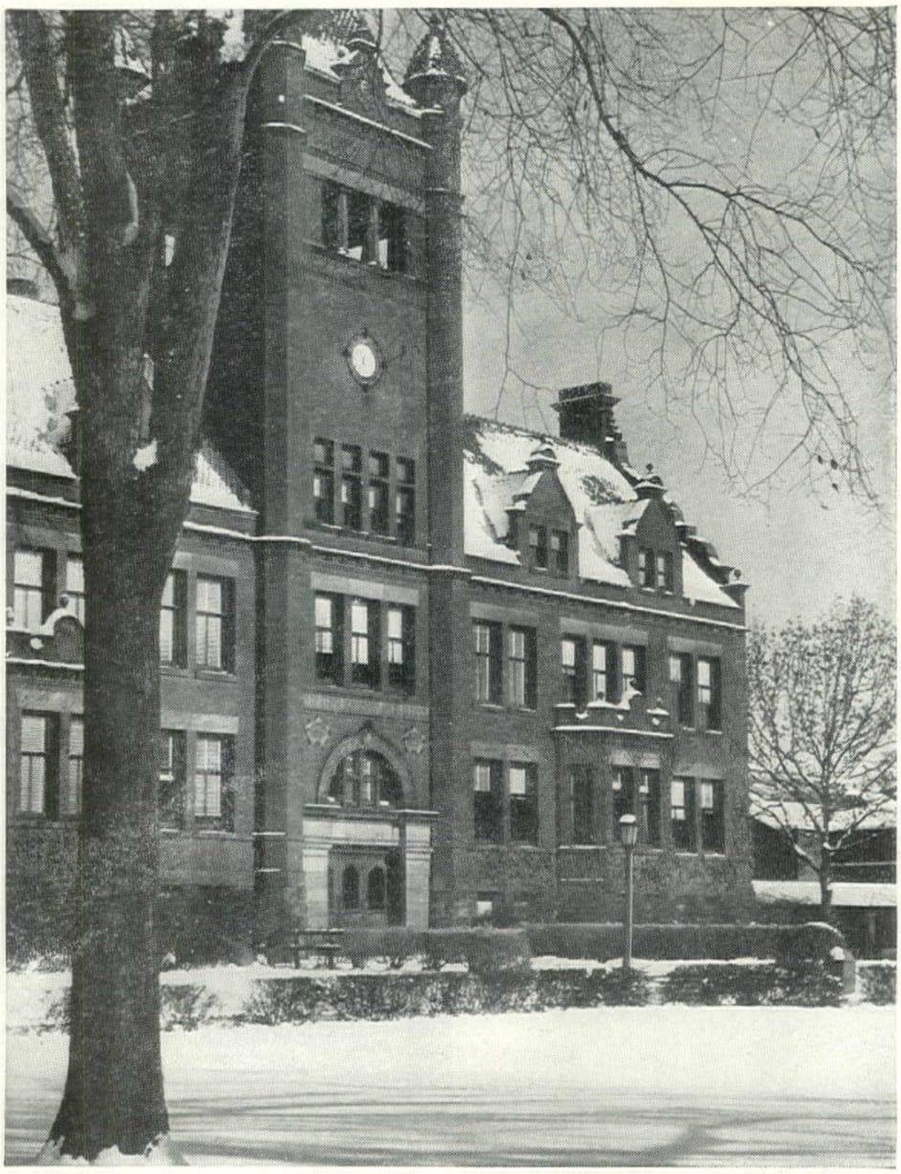


"Never called for a service-man"

New Trier Township High School, Winnetka, Ill., reports 18 years of trouble-free service from Telechron-powered clock and program systems.

"In the 18 years since our first Telechron-powered synchronous clock and program was installed," writes R. L. F. Biesemeier, Supervising Engineer of the New Trier Township High School, *"we have never called for a serviceman.*

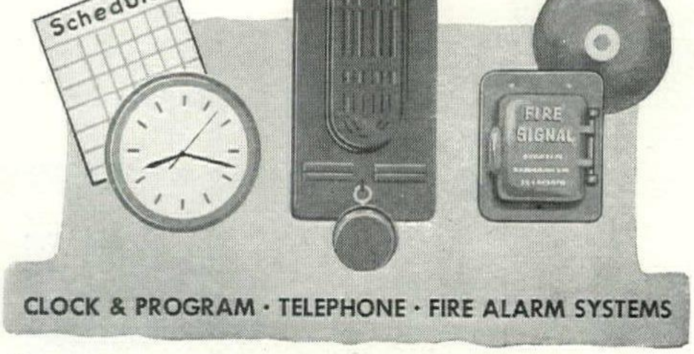
"Based on our experience, we recommend Edwards Telechron-powered Clock and Program Systems without reservation."

★ ★ ★

It's a safe recommendation, Mr. Biesemeier . . . because that service record is typical. Edwards systems operate *without* a master clock . . . eliminating all need for otherwise frequent servicing and adjusting at this point in the system. Send for illustrated bulletin on clock and program systems.

EDWARDS

77 years' experience in electrical signaling



Edwards Co., Inc., Norwalk, Conn. *In Canada: Edwards of Canada, Ltd.*

PRECUT STEEL FRAMES are delivered ready for bolting, can be finished with various curtain walls.

The Luria pattern of rigid steel frames precut to size started, as have almost all other such lines, as industrial and service buildings; but the economy and flexibility possible in adaptation, and the wide variety of frame sizes manufactured have drawn school builders' attention. A $126,000 Luria school similar to the one below recently cost $10.30 per. sq. ft.

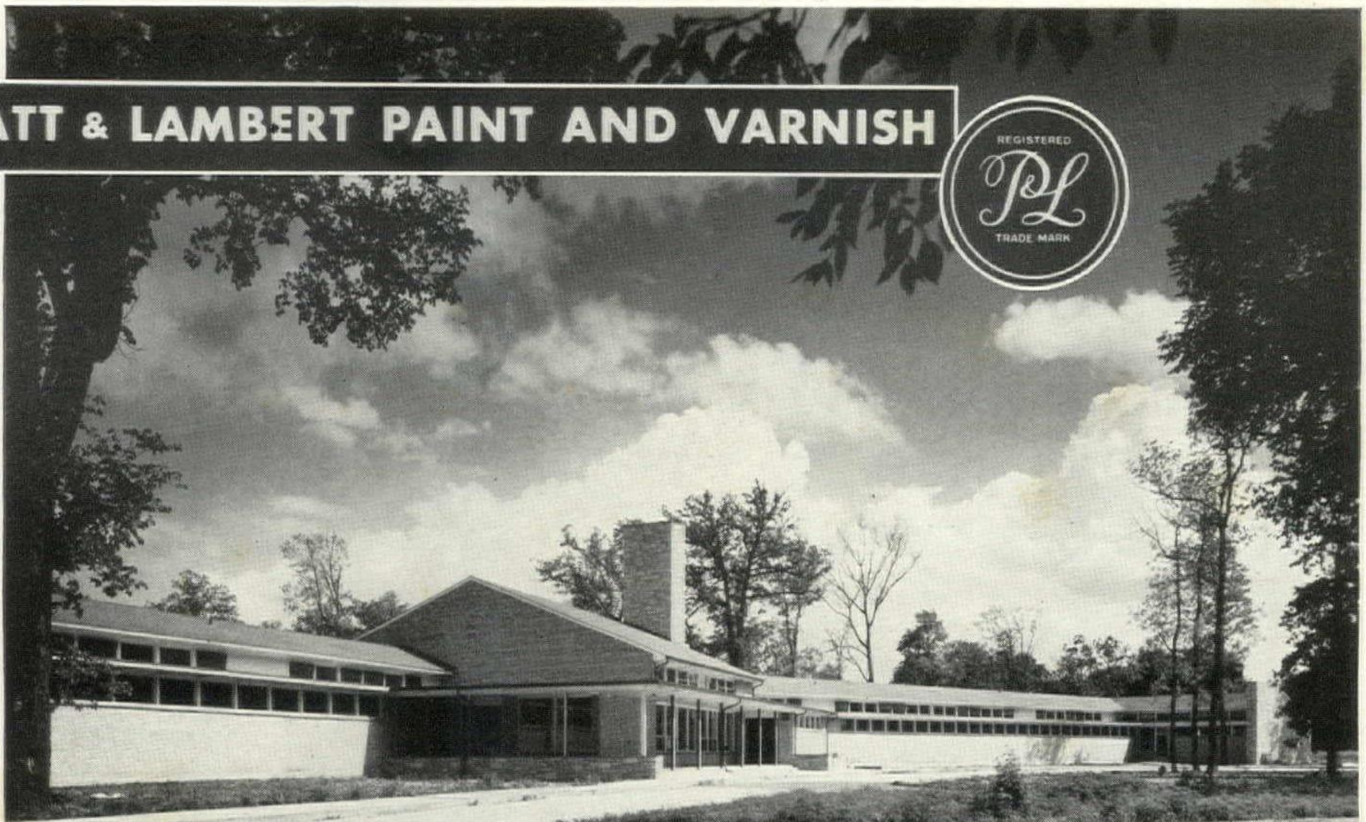
The basic structural shape is a fairly heavy steel rigid frame, in most of the school adaptations, which varies in span from 40 to 100 ft., with lengths available in increments of 20 ft. Light and ventilation can be provided by conventional or sawtooth monitors, individual or continuous skylights, or glass roof panels. Many standard parts are interchangeable, and any common curtain wall can be used, fenestrated as wished. The frames are fabricated from sizeable rolled steel sections, bolted, with shop-welded connection plates.

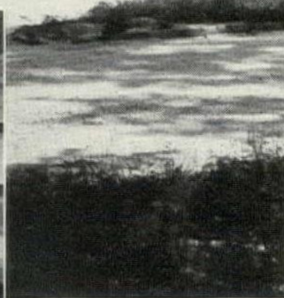
Hedrich-Blessing Studio

SOME BASIC AIMS AND METHODS in the search for the standardized school unit are phrased in current project.

A research project on standardized school units, now under way at the University of Michigan College of Architecture and Design, utilizing some of the all purpose metal framing products of the Unistrut Co., has not yet reached its final stage, but conclusions reached along the line should be interesting to those concerned with the problem of the portable school. The project has been to develop a standardized unit structure which local architects and local school boards can adapt to their needs in an infinite variety of forms.

The decision was reached early that any such planning unit should be based on a standard structural unit rather than a standard size classroom. Reasons for this include the disagreement among educators about the best size classroom. The Michigan planners hold that the width should offer a clear interior span of at least 36 ft., with the length a variable factor in multiples of 8 ft. Dry construction is to be used throughout, in order to get complete salvageability of materials. Slab floors were ruled out in favor of a prefab platform floor, and the only excavation is to be holes set at the 8 ft. module to take the load below frost level. The heating system will probably be electric panels, based on ease of operation and on salvage value, an anticipated example of economical expense. Illumination will be achieved through artificial means rather than through daylighting, to avoid expensive roof construction and also to get greater freedom in orientation of the school building. A project for the industry to watch with interest, the study will probably be substantially complete within six months.





Hedrich-Blessing Photos

CLYDE L. LYON ELEMENTARY SCHOOL, GLENVIEW, ILL.
PERKINS & WILL, Architects and Engineers, Chicago · ERIK A. BORG CO., General Contractor, Chicago · ARTHUR M. GELDEN CO., Painting Contractor, Chicago

COMFORT, health and progress of its young pupils were prime considerations in the designing of this modern school. Abundant natural lighting is augmented, when needed, by illumination from fluorescent louvres suspended from sound-conditioning acoustical tile ceiling.

Optimum cold weather comfort, even temperature and freedom from drafts are obtained through an unusual "split" system which combines floor radiant-heat from circulating hot water coils, with regular convectors beneath the windows.

Salmon-colored brick was used for the exterior and also some of the interior walls. Other walls of Ponderosa pine serve as a tackboard with many teaching applications. Each classroom has its own multi-purpose workroom, useful for individual and group projects and activities, special instruction and consultations. Large drawers and storage bins help develop each child's sense of order and responsibility for his own property and work.

Included in the Pratt & Lambert Paint and Varnish used in the decoration of this interesting school, were "38" Pale Trim Varnish, Lyt-all Eggshell, and "61" Enamel.

Prompt, practical assistance in planning authoritative decoration is available on request to the nearest Pratt & Lambert Architectural Service Department.

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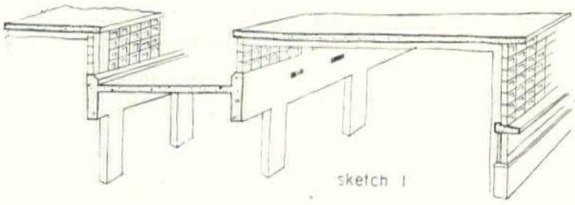
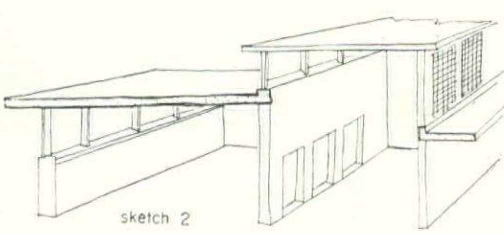
STRUCTURAL MEMBERS may serve as finish to simplify construction and save money —by Richard H. McClurg*

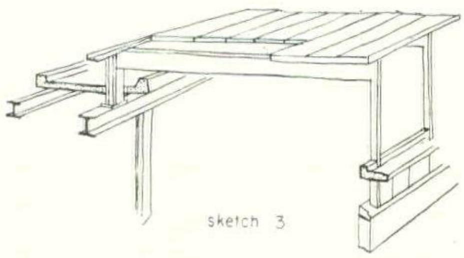
The structural scheme has become a part of the finished school building and as such must be integrated carefully with the finished components of school design.

Today's trends in school design assume that students and teachers alike can concentrate on their work just as well if they are surrounded by rubbed concrete or painted steel as by plaster or tile walls. Further, the structural designer knows that the structural sections must be so proportioned that they readily become a part of the finished interior and exterior, and still admit the use of more daylight and an optimum amount of ventilation.

This trend is well represented by the reinforced concrete structure shown in Sketch No. 1. Columns are exposed and painted, and they are shaped to admit a maximum amount of light as well as to present a pleasing exterior appearance. Interior beams are left exposed and ventilation is handled directly through the girders. Sketch No. 2 represents a trend in utility room construction wherein long span flat slabs (beams are part of and the same depth as the slab) are combined with thin steel columns to permit sash or glass block to come up to the smooth ceiling.

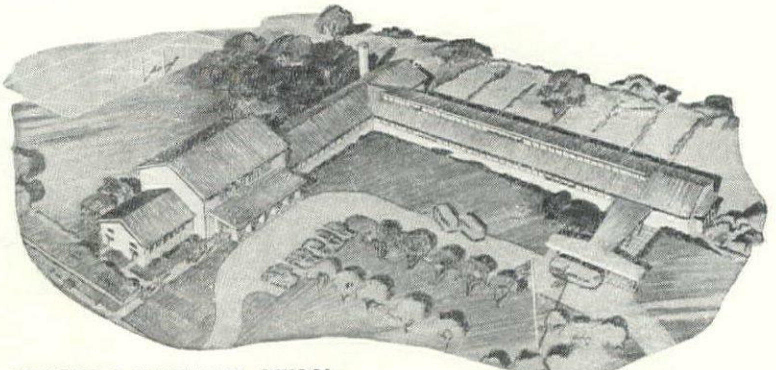

sketch 1


sketch 2


sketch 3

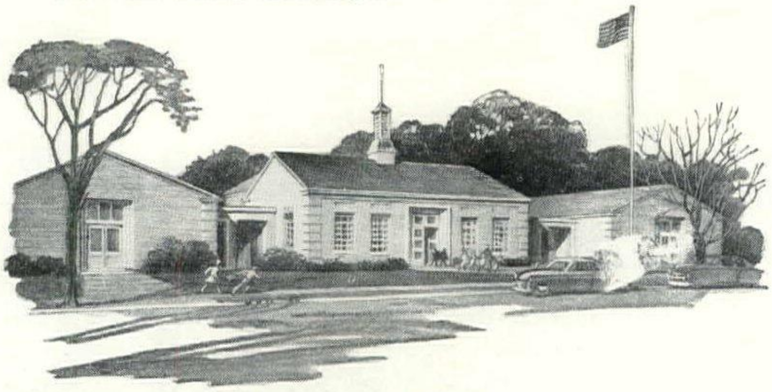
The increased use of welding in both shop and field fabrication of structural steel permits nearly as much flexibility in finished design as does concrete, with the added advantage that sections can be smaller. Sketch No. 3 is a good example of this type of construction. Note that columns become mullions for windows and glass block, and that the beam becomes an unobtrusive element of the ceiling, which is itself part of the precast roof deck. These building frames are welded in the shop and are shipped to the job ready to be set in place. The concrete corridor roof stiffens the structure and also presents a good surface for acoustic treatment. This concrete is particularly desirable where the corridor is loaded with classrooms on one side only and the slab can be extended as a cantilever over corridor windows by again using thin columns as window mullions.

* *Engineer for Architects Eberle Smith & Associates, Detroit.*



MODERN 9-CLASSROOM SCHOOL

***Side-corridor Design*...** consisting of four Luria Standard Buildings – three, 40-feet wide with 12-foot eave height, and one 60 feet wide with 20-foot eave height.

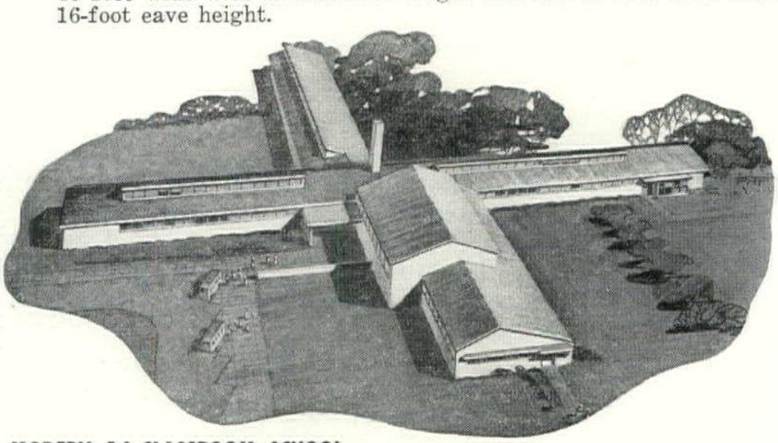


TRADITIONALLY-STYLED 10-CLASSROOM SCHOOL

***Side-corridor Design*...** planned around four Luria Standard Buildings, each 40 feet wide; three with 12-foot eave height and one with 16-foot eave height.

MODERN 10-CLASSROOM SCHOOL

***Side-corridor Design*...** including four standard Luria units; three, 40 feet wide with 12-foot eave height and one 60 feet wide with 16-foot eave height.



MODERN 14-CLASSROOM SCHOOL

***Side-corridor Design*...** consisting of four Luria Standard Buildings – three, 40 feet wide with 12-foot eave height and one 60 feet wide with 16-foot eave height.

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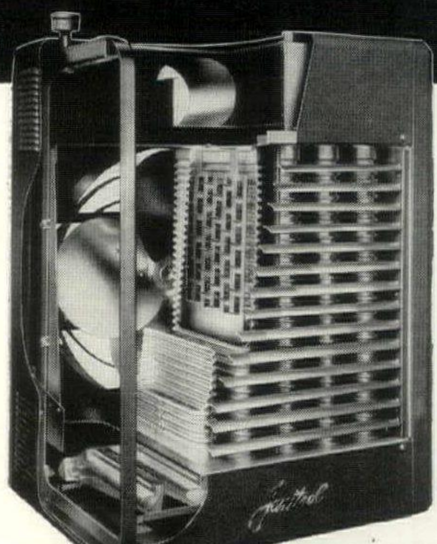

Field engineering helped build Janitrol's new, advanced line of Unit Heaters.

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Then the actual design and construction improvements in the new Janitrol Unit Heater line became the responsibility of Surface Combustion engineering staff.

This policy of analyzing all practical heating requirements first has resulted in equipment with far greater user acceptance. So, you can count on Janitrol for not only advanced design and efficiency but also for practical, easy maintenance under all kinds of rugged operating conditions.

Because more and more Janitrol Unit Heaters are being installed by retailers, in places of amusement, restaurants, and all kinds of service businesses, special attention was given to smart appearance and compactness.

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★ New Cartridge Type Ribbon Burners: Designed for easy removal and interchangeability for different type gases, special chrome alloy steel for high temperature and corrosion resistance. Separate burners for each heat exchanger make for high efficiency and even heat distribution.

★ Improved, Long-Life Tubular Heat Exchangers: High efficiency of Janitrol's unique design makes possible extreme compactness. Interior suspended alloy steel turbulators accelerate heat transfer. Improved vertical design minimizes dust and dirt collection, contributes to better air flow.

★ Improved, Automatic Pilot: New actuating lever and switch design assures long life, positive operation. While pilot is more positively positioned, assembly can be removed in a few seconds.

★ Combination Fan and Limit Control: Only Janitrol provides dual overheat safeguard as standard equipment, in case of stuck gas valve fan continues to dissipate heat preventing damage to unit or adjacent area.

★ Motor and Fan Assembly: Resilient mountings minimize vibration and noise. Overlapping blade type fans provide maximum air velocity with quiet operation. Direct-a-Flow housing provides uniform airflow over entire unit.

★ Smart, Quality Appearance: Smooth dark grey hammerloid baked enamel finish on steel casing fits unobtrusively in most surroundings. Bottom panel is hinged for opening without removal for inspection of burners and bottom of heat exchangers.

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Structural economies for a demanding climate

—by Alonzo Harriman, Architect, Auburn, Me.

In considering economy in school construction, there is much to be said about relative economy, both in relation to the factors of climate and exposure, and in the relation of the school to the community.

In the first instance, schools in Maine *have* to be more expensive in certain factors than schools of the South and West. Due to frost action our foundations must be brought down deep and must be rigid; due to snow and ice loads our roofs must be designed practically to floor loadings—we build two floors in a one-story school; due to cold winters our heating costs, both of initial installation and fuel consumption, become a major money-consuming factor.

In the second place, it seems to us that too many schools are being built beyond the true financial reach of the community, for it is true that what might be a practical economy in a wealthy urban community is an utter extravagance in the poorer rural community.

We have found that a great deal of practical economy can be gained or lost in the initial stages of planning. In planning schools we avoid all possible corners. For this reason our schools may appear somewhat long and monotonous. This type of school has been referred to as "hen house" school, *but* a hen house is withal a very functional economical structure. We know that our high foundation costs and other factors make set-back classroom schemes cost much more than most of our communities can afford. Projecting classrooms would amount to an approximate increase in the cost of about 10 per cent.

For clear roofs

The same theory applies to breaks in the roof; but breaks in the roof have the added disadvantage of being more difficult to make water-tight. Skylights, clerestories and sawtooth roofs simply will not work satisfactorily in our climate and almost always leak sooner or later. The best roof is one with no holes in it. This applies particularly in the case of a bonded roof which the owner believes protects him from leaks; yet almost every break—such as flashings, parapets, penthouses, vents—in that roof is at a point *not* covered by the bond. By keeping the metal work and breaks or projections through the roof at a minimum, we are in a far better position to get maintenance from the bonding company.

We have found it very economical to have what we call a utility core for each classroom. This is generally located near the door where our light switches usually are. Thus all wiring, together with any plumbing (this particularly for elementary school rooms which often have sinks and, less often, individual room toilets), as well as mechanical ventilation equipment, are all together in this utility core, readily accessible by a removable panel or door.

Wherever possible we build one-story schools, particularly elementary schools. By opening each classroom to the outdoors with a fire exit door, we can achieve the great economy of a wooden structural frame, often combined with asbestos cement exterior weathering or some of the various protected metals. All of our planning and structure is on a 4-ft. module adaptable to various manufactured boards.

It is our belief that a good deal of the current thinking about school design is overly concerned with trying to provide large amounts of natural daylight. In some designs we have seen terrifically expensive systems of reflective parapets,

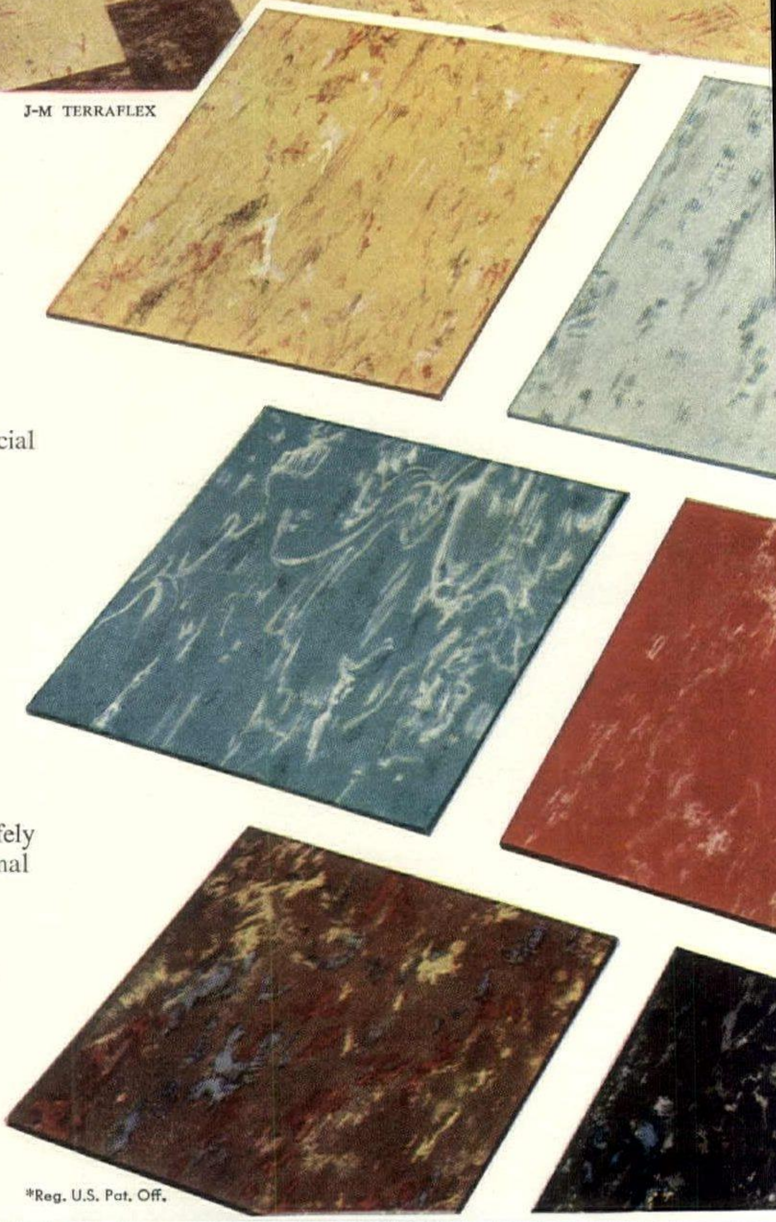
(Continued on page 200)

Terraflex or Asphalt Tile

which type Johns-Manville Flooring should you specify?

J-M ASPHALT TILE

J-M TERRAFLEX



J-M ASPHALT TILE . . .

When you want a quality floor covering at *low initial cost*, you have every reason for preferring J-M Asphalt Tile—modest in price, standard of quality for decades!

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BUT, when your preference is for the *best* there is, look to Terraflex! It is the revolutionary *new* flooring made of *plastic-asbestos*, now offered by Johns-Manville after 15 years of testing and development. Terraflex will outwear other types of decorative flooring *two to one*. It is the nearest approach to an ideal all-purpose flooring ever developed!

The resilient tile-like units are *unaffected* by greases, oils, alkaline moisture. They come in clearer, brighter colors . . . can be safely used on concrete floors in contact with the ground . . . withstand normal movement of wood subfloors without breaking.

Whether you select J-M Terraflex or J-M Asphalt Tile, your flooring choice will be on a firm foundation. See your J-M Approved Flooring Contractor, or write for our new flooring brochures. Johns-Manville, Box 290, New York 16, N. Y.

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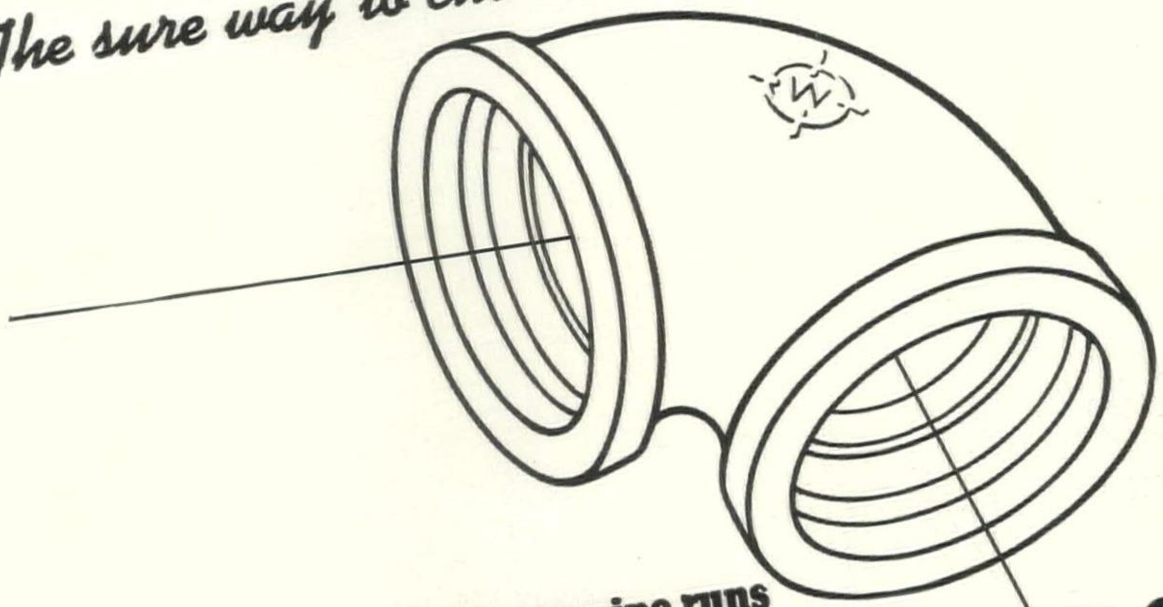

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*Patented – Reg. U.S. Patent Office

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD clerestories, louvers, etc., developed for an end result that we feel is not commensurate with either the original high cost or the high maintenance costs in a climate of any appreciable severity.

The best of any day-lighting scheme must have good electric illumination for dark days and evening work, and we believe it is far more practical to use this supplementary lighting a slightly greater amount of the time and keep our simple roof structure than to embark on clerestory or skylight schemes which *always* give trouble in this climate.

We have been able to get very satisfactory lighting in our classrooms by using glass block over clear glass, which avoids a glare problem and *does* give us 25 to 35 foot-candles on desk tops at the corridor wall. To do this, we run the glass block continuous without piers the whole length of the classroom and also to the ceiling. We expect to gain greater economy when we can obtain flat prismatic glass and double glazing, as we will accomplish the same light refraction and can avoid the high cost of laying the glass block.

In the case of an absolute minimum school, we believe that good lighting can be obtained by the use of clear glass sash, run continuously, and Venetian blinds for control of glare and reflected light to ceiling. This expedient is much more economical than any special louver or jalousie scheme.

On materials

In selecting materials, both curtain and structural, we have found that three fundamental principles usually hold true:

1. Structurally, in comparable spans, we can get more pounds of fiber stress per dollar from wood than from steel, notwithstanding the steel's greater efficiency of section.

2. As a general rule, a local material is more economical than a material from outside.

3. Whenever the use of mechanical or electrical energy can take the place of physical energy—power saws, for instance—there will be economies in like measure. This principle is also reflected in machine-finished materials—the larger the units, the more economical will be our construction.

As an example, we use a great deal of the various manufactured boards and panels, which are intrinsically more economical in two major respects: in the first place, these panels often provide the two functions of insulation and a tough weather-proof exterior skin, and, being erected as one unit, they achieve the economy of reducing the number of operations required at the building site. The more combining of corrective factors in one material, i.e., a tough skin, plus insulation, plus good acoustic qualities, plus low maintenance, plus ease of erection, etc., the more economical the material will be.

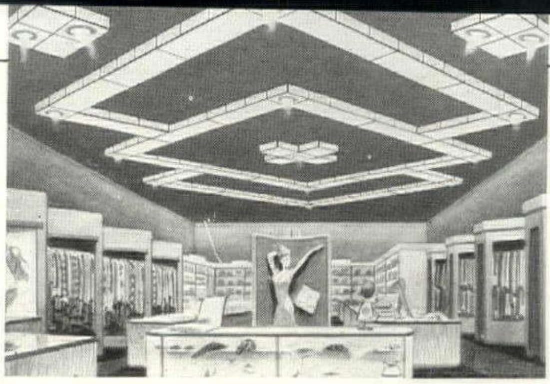
Although we have often used brick for the space between the concrete of the foundation and the first-floor windows, our most economical solution is to continue the foundation concrete up to the windows. With the recent development and present high efficiency of the various manufactured panels (whether of cement, asbestos, coated metal, metal-insulation sandwiches, etc.) we would prefer their use instead of brick or stone on the entire exterior of our schools, and would feel certain of a far better, more weather-tight structure.

The tough, portable partition

We have had to do considerable research on the problem of an interior partition that is tough and rugged, yet portable and economical. We do not like to use plasterboard or fiberboard in this way, due to their lack of strength to stand all the rough treatment they may get, but we find that we get a very satisfactory and economical partition by using prefabricated panels of laminated fiber and asbestos-cement board.

This same material, painted with a chalk board paint, is giving us *extremely* economical chalk boards; the smooth cement asbestos giving us the hard background to which the surfacing material is applied.

Common-sense economy in schools at this time is first and foremost a matter of common-sense evaluation of realistic *needs* relative to the wealth of the community; a complete exploitation and use of the newer, more efficient materials when they are cheaper and better than the old; and a complete integration of these materials into the building plan and structure and into the methods of erection; and finally, a seeking of the sincere, direct solution to all problems.



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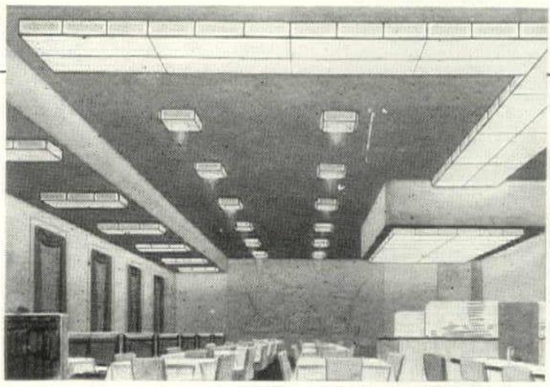

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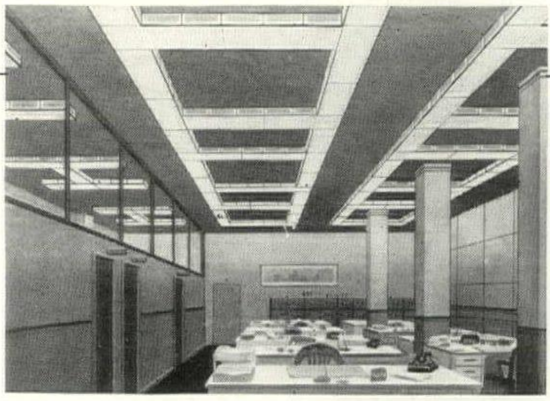
the revolutionary

new idea in lighting



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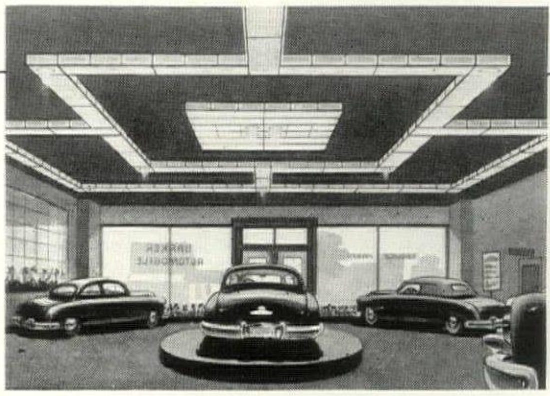

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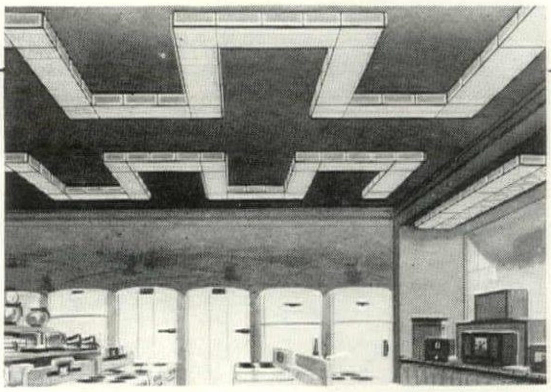

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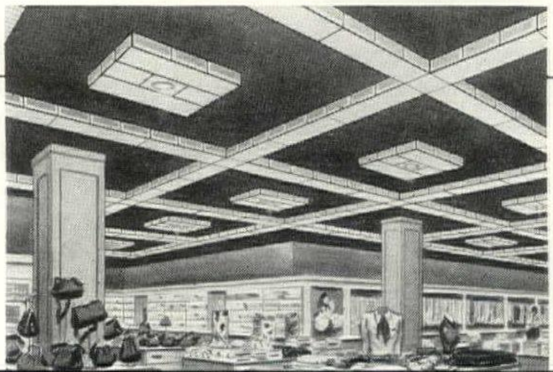

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ECONOMIES OF ONE-STORY CONSTRUCTION are documented in a 14-school analysis— by Philip Will, Jr.*

We have made a careful analysis of some 14 single and multi-story elementary school buildings of fire resistant construction with steel frames and joists, non-combustible roofs, double loaded corridors, and reasonable ceiling heights, designed by this firm for erection in Indiana, Illinois, Minnesota—and bid during the past 12 months. In function, character and quality of materials, these buildings are comparable. Allowance was made for the change in construction costs during this period. Our conclusion is that single story structures of this character and in this portion of the Middle West are cheaper than fairly comparable multi-story schools:

By the sq. ft. yardstick	6.5% less
By the cu. ft. yardstick	4.6% less
By the classroom yardstick	4.8% less
By the net teaching area	5.0% less

In respect to structural systems, there are two major factors which are not affected by architectural considerations, i. e., the floor system and the roof.

The floor system

The floor system is dictated by the site, and whether or not the building shall contain a basement. With site conditions satisfactory as to drainage and soil, a floor slab poured directly on the ground is the most economical. By proper designing of foundation walls and a heat distribution tunnel, cold floors can be controlled and overcome. In areas where a heated floor for small children is required, this can be provided. A slab not on ground is sometimes erroneously considered to be warmer and not to require supplementary heatiny. This is not true unless warm air is circulated under the space, at added cost, or an all wood floor construction is used. The latter is not desirable because of its impermanence.

When site conditions are not ideal for slab-on-ground construction due to unsatisfactory soil conditions, drainage, or contours requiring excessive and expensive fills, then a supported floor system is indicated. Whether it is built of conventional reinforced concrete joists and slab construction, pre-cast concrete joists and concrete slab construction, or steel bar joists and concrete slab construction, is really of minor consideration. The variation in cost among any one of the three is probably within the range of 15 per cent.

The roof

One of the principal economies which can be effected in single story schools is in roof construction. Classrooms must be large to be desirable as teaching spaces. This large size with long span rules against conventional reinforced concrete roof construction because the dead load is disproportionate to the relatively small live load the roof has to carry. In the range of noncombustible materials, bar joist construction adapts itself extremely well because it is possible to accommodate long spans and easy to provide for acoustical ceiling treatment. This type of roof is also readily adaptable to any lighting desired, either surface-mounted or recessed.

We have made some fairly recent studies of five schools utilizing bar joist roof construction. This type of construction is divided into two classifications—wall bearing and non-wall bearing. The use of the former necessarily restricts internal flexibility since it embodies wall bearing construction on partitions. The latter gives fairly complete flexibility since internal wall systems are independent of the roof. This permits more freedom in internal partition design and minimizes the cost of future changes.

It is apparent from the study that as structural steel replaces walls and partitions as the supporting element of the roof, costs increase substantially. Non-wall bearing roofs of bar joist construction with gypsum deck, in the Chicago area schools, cost approximately 82 per cent per sq. ft. more than wall bearing bar joist construction, gypsum deck roofs. It is interesting to note that during recent months wall bearing bar joist construction with steel deck cost 4.1 per cent less than wall bearing bar joists and gypsum deck.

* *Partner, Perkins & Will, Architects*

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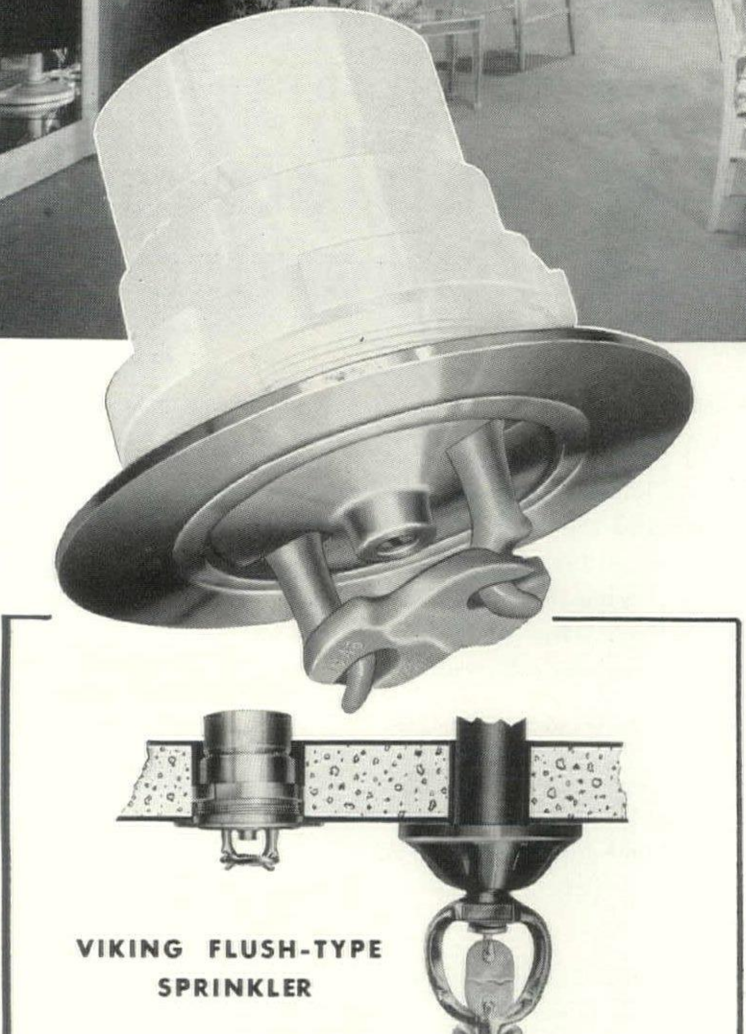

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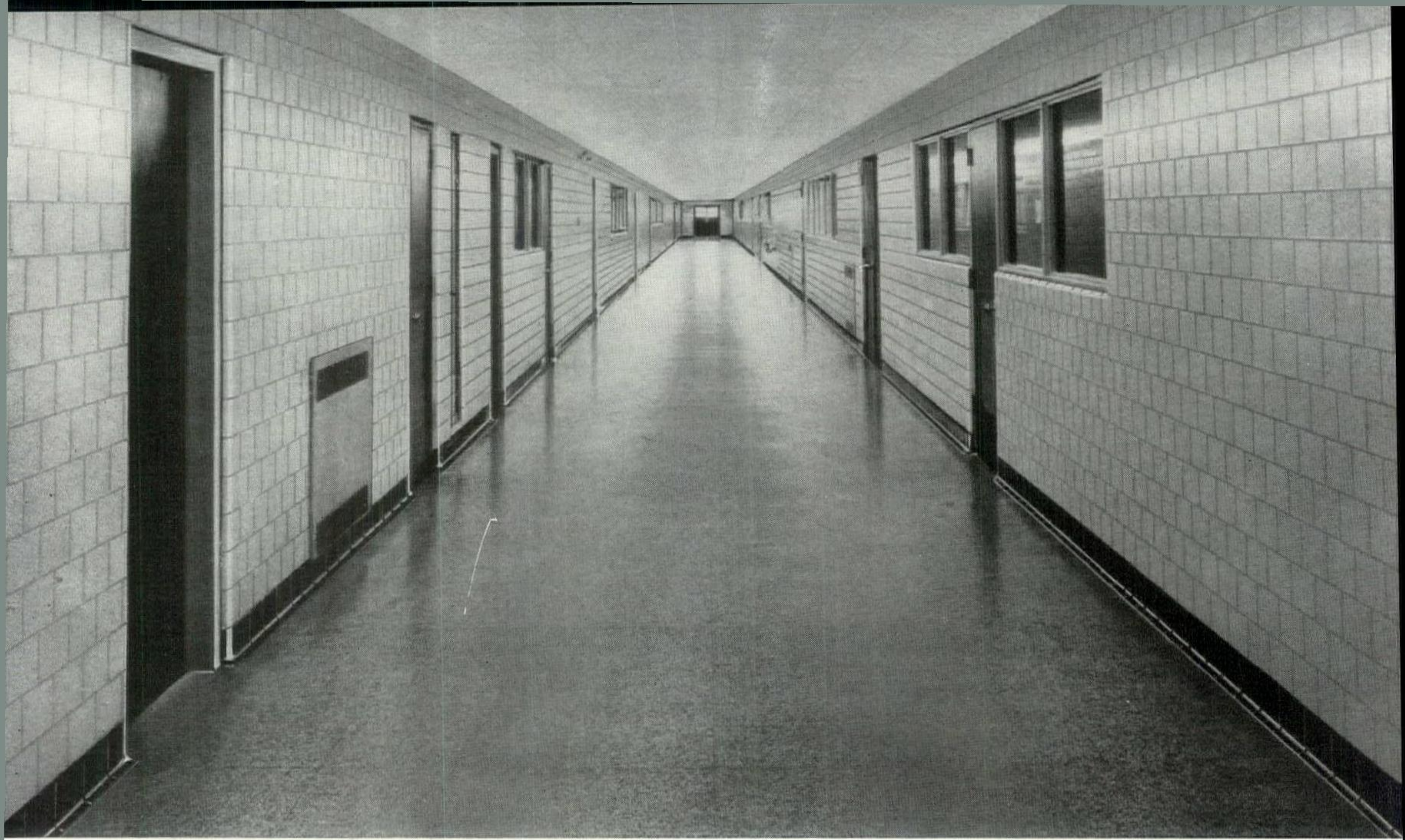

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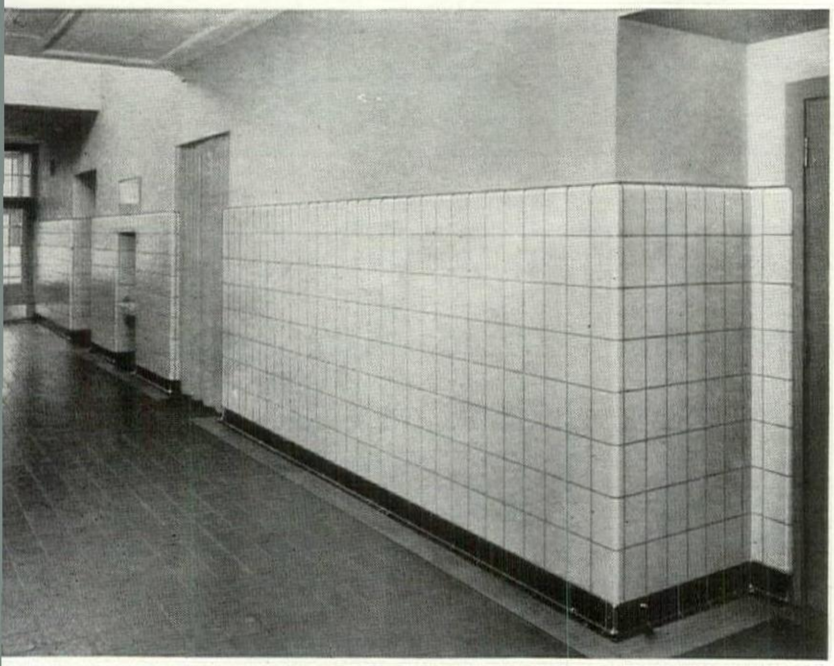

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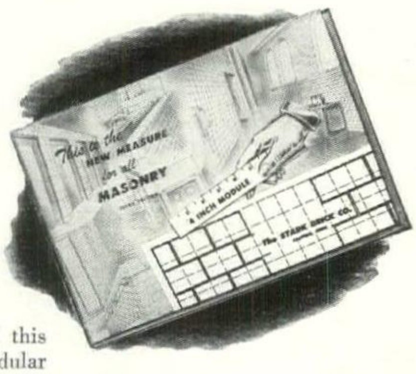

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(Continued from page 146)

4. A means of controlling and balancing all of these factors on a room-by-room basis, taking into account the variables of outdoor temperature, solar gain, density of occupancy, lighting gain and so on.

Bringing in outdoor air

There are several ways in which all this can be accomplished. One of the simplest and best known is the unit ventilator, usually built into the outside wall beneath the center of the window, discharging upwards. Such ventilators are equipped to mix varying quantities of indoor and outdoor air to a temperature close to that of the room, and then to heat the resulting air stream to higher temperatures in response to the demands of a room thermostat which controls the supply of steam to a convector in the top of the unit. They may be equipped to admit a fixed minimum quantity of outdoor air—10 to 15 cu. ft. per minute per pupil—to assure adequate ventilation under all conditions. Since the total capacity of the unit (usually 30 c.f.m. per pupil) is available at below-room-temperature for cooling purposes, they are capable of compensating for any but the most abnormal solar gain. Conversely, during the morning warm-up period the unit operates automatically on room-air alone, delivering a high temperature air-stream for quick heating.

Other means

Approximately the same effect can, of course, be achieved with a separate ventilating unit and heating elements, or a central system of ventilation combined with direct radiation. The unit ventilator is attracting particular attention now among school builders, and will be used in the general discussion of the classroom heating problem.

One objection to many unit ventilators is noise. Another objection is that in the event of a current failure they stop delivering heat in any quantity, but this latter objection really carries very little weight in a day of interlocked power stations. Nor can the unit ventilator be accused of the standard bugaboo of convection heating—uneven temperature distribution. In typical classrooms its high-velocity, low temperature discharge has been shown to produce remarkably uniform air temperature and very little stratification. Cost and maintenance of a separate fan and motor for each classroom are another objection, but not too significant in view of the considerable fuel savings usually realized by the unit ventilator in comparison with less elaborate equipment.

New problems, new criteria

It must be emphasized that it is *what* the unit ventilator accomplishes, rather than *how* it accomplishes it, that is being endorsed here. What is needed is a responsive source of heat, easily cut off and turned on; controlled ventilation together with a means of keeping the ventilating air close to room temperature; a means of carrying off excess heat during periods when this is necessary; and finally, a simple, positive means of control. Any heating system, regardless of type, which does these things equally well is suited to classroom heating.

The unit ventilator has been evolved in response to the heating problem presented by the conventional, one-exposure classroom; there is as yet no evidence that it will do an equally good job, by itself, in a contemporary one-story schoolroom which has, in addition to a larger glass area in the main window, an exposed roof and clerestory windows as well.

(Continued on page 210)

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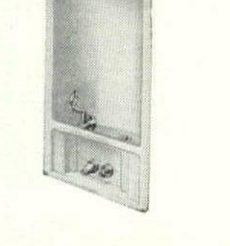

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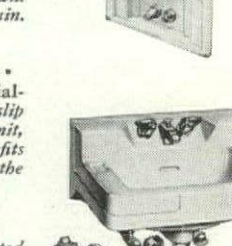

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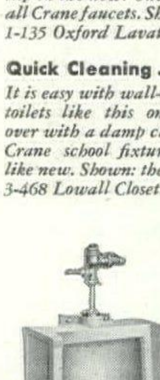

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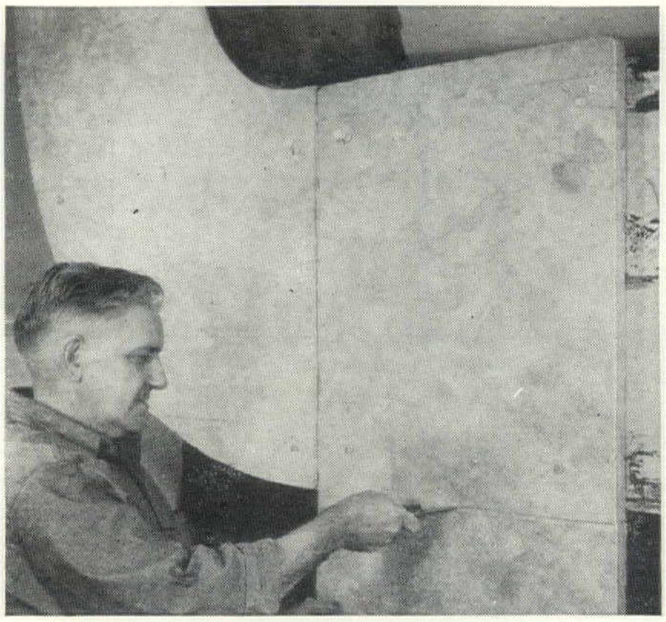

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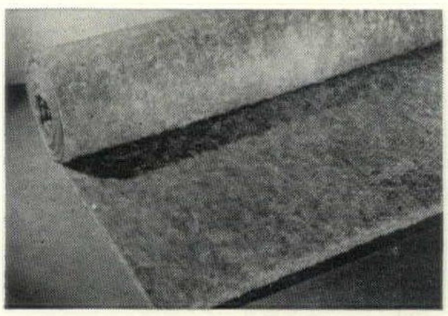

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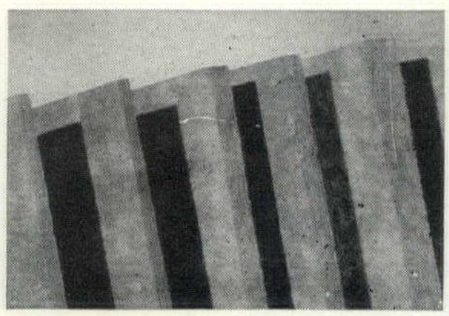

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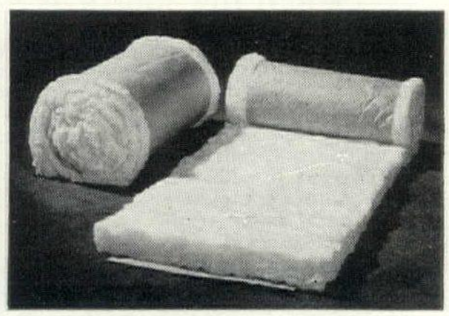

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Also, the performance of such equipment is beyond criticism only so long as we consider the sole object of heating to be the maintenance of uniform air temperature; the moment the question of uniformity of radiant temperatures comes into the picture it is obvious that the modern schoolroom, with its big areas of cold glass, presents problems that the unit ventilator alone does not even attempt to cope with.

The unit ventilator in itself delivers virtually all of its heat by convection—as heated air. It delivers practically no heat by radiation. This means that it leaves the mean radiant temperature of a typical one-exposure classroom, with 150 sq. ft. of window area, at about 67° for 0° outdoor temperature, thus requiring an air temperature—to produce comfort equal to that of a 70° uniform environment—of 73°. Furthermore, as shown elsewhere in this article, the radiant temperature in certain parts of the room and with respect to certain critical portions of the pupils' bodies, may be much lower—as low as 53° in zero weather.

Unintentional radiant heating

In this respect the older systems of "direct radiation" are superior to the unit ventilator alone because they do release a considerable amount of heat by radiation despite the fact that they were designed to deliver as much heat as possible by convection. The usual location of the radiators under the windows compensates to a considerable extent for the effect of the cold glass surface, although at the same time producing a certain amount of localized overheating. Of course, when the operation of such radiators is intermittent, with alternating periods of heating and cooling, this compensation is likely to be excessive at one moment and non-existent the next. But when, as often happens, the radiators are left on and the room cooled by opening the windows, it is probable that the radiant temperature at least in parts of the room often exceeds the air temperature, as in true radiant heating.

Intentional radiant heating has not so far been applied with much success to classrooms, but it seems probable that it can be, both to compensate for the localized effects of cold windows and to raise the overall radiant temperature and thus lower the comfort temperature of the air. It cannot successfully be applied, however, unless the special requirements of classroom heating are taken into account—the need for a responsive system, the need for controlled ventilation, the frequent need for cooling instead of heating. Any system of radiant heating which involves warming a massive part of the structure, such as the floor slab, is likely to come into conflict with rapid changes in heat demand and thus produce overheating or excessive waste of heat at certain periods, especially in classrooms with a big solar gain. On the other hand, a light weight panel system might be deliberately employed to absorb excess heat at such periods, by circulating water cooled in the incoming air stream.

Radiant scarves

Heating panels designed simply to compensate for the effect of the cold window glass (see page 145) might be added to almost any system without greatly altering the total heating picture, since their output of convected heat would not be great. Such panels should, in any event, be on a separate circuit (a single circuit could be used for one entire wall of the building) modulated in accordance with the inside temperature of the glass rather than the air temperature of the room. They might occasionally be guilty of adding heat to the room air when it was not wanted, but in general would

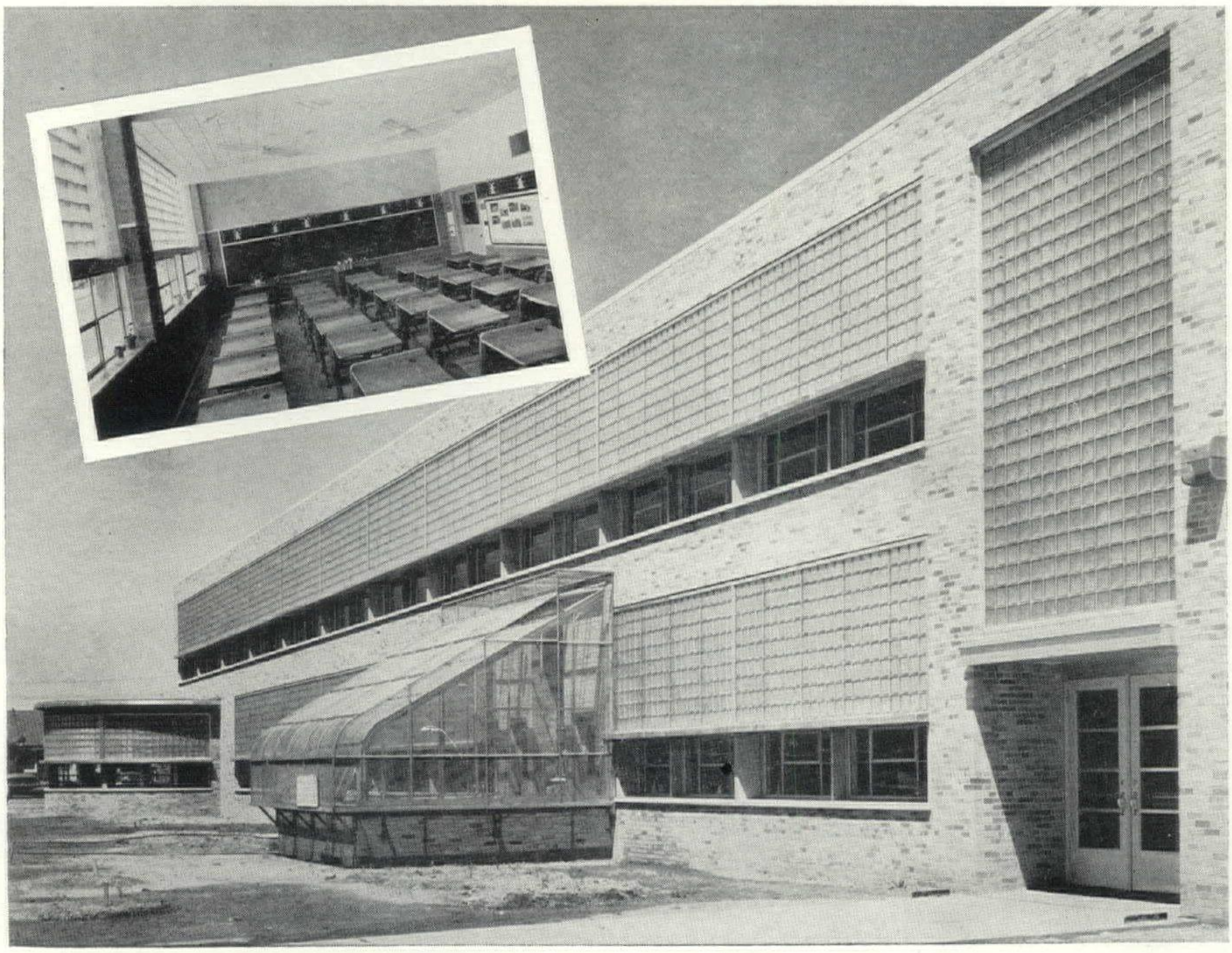
(Continued on page 212)

simply contribute a small portion of the total amount of heat needed, while performing their main function of producing a more uniform radiant temperature.

In an overall system of radiant classroom heating, the big ventilation requirement typical of classroom work might offer the possibility of actually achieving a substantial difference between the air temperature and radiant temperature. In such an arrangement, the incoming ventilating air would be used deliberately to keep the temperature of the air in the room at the lowest possible point, and the difference made up for with warm surfaces, as in the "spot" heating of factories. If this proved feasible, it should result in a more invigorating climate, and a lower comfort air temperature with consequent fuel economy, since the air exhausted from the building would be at a lower temperature and would carry off less heat. The unit ventilator system, moreover, provides the clue as to how it might be done: by mixing the incoming ventilating air with sufficient room air to bring it within 10° or 15° of the room air temperature, cold drafts would be prevented and the temperature of the room air kept low. If, at the same time, the ventilating inlet could be so positioned as to leave the air near the ceiling undisturbed, heating panels on the ceiling, while effectively warming the occupants, would have comparatively little effect on the room air temperature, except for a thin, "insulating" layer of hot air directly below the panel. Under such conditions, the heating panels would be forced to give off most of their heat by radiation, and a high radiant temperature-low air temperature comfort balance would result. Such an arrangement would constitute a controlled version of the British open-wall classroom, in which one sidewall is opened entirely to the out-of-doors, and the heat required for comfort is supplied entirely by radiant means. It might be expected to produce at least some of the invigorating effects attributed to this form of heating.

An integral part of design

Whether further development takes place along these, or other lines, it seems unlikely that classroom heating techniques will remain static in view of the extensive changes in other aspects of classroom design. Developments such as are suggested here will, of course, require extensive experimentation before they can be applied with any assurance to everyday work. It is time, however, for our present knowledge of thermal comfort and presently available technical knowledge to find better expression as an integral part of classroom design. Heating must keep pace with classroom lighting, fenestration, layout, even teaching methods—which are all in a state of rapid flux. It must meet, in one way or another, the new problems posed by the one-story school in northern locations, bigger windows, easier access to the out-of-doors, the demand for greater flexibility of use. Compared with the lighting field, very little is known about the effect of good and bad heating on the pupil's health and productivity; this must be investigated. In general, we must discover whether the current approach, which is roughly one of employing the least expensive system that will "get by," is justified, or whether more attention to this aspect of the environment will pay dividends that warrant a more careful analysis of the comfort conditions produced. We know already that the better we make the heating system the cheaper it usually is to operate. If, in addition, better comfort conditions can be shown to make a substantial contribution to the child's development, we can expect an eventual change in attitude in the direction of the best system of heating that can be devised. The means are already largely available. What is needed is the desire to use them.



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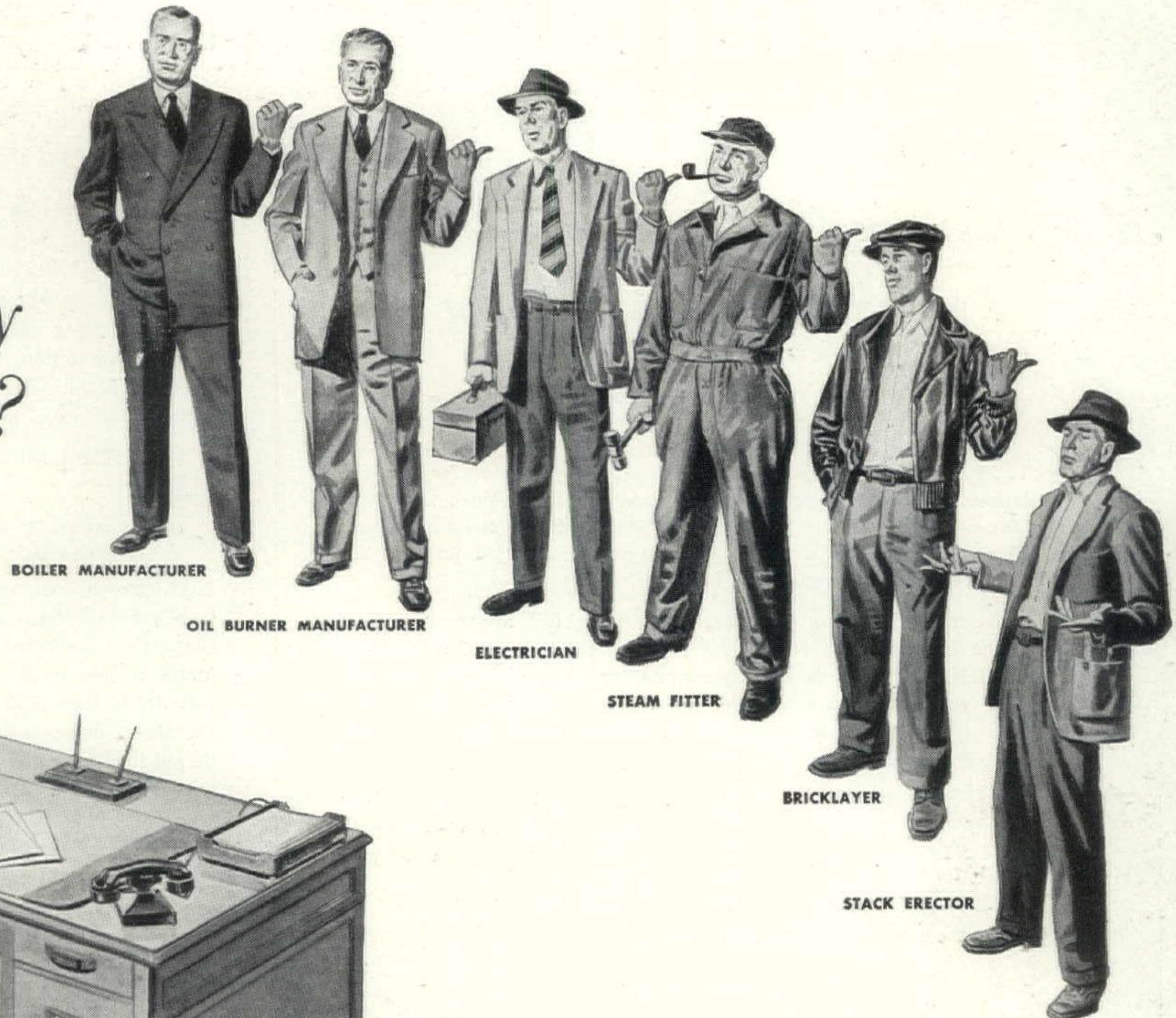

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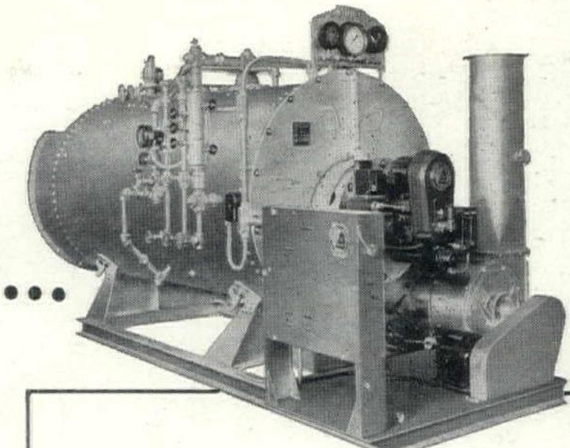

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PREFERRED UTILITIES MFG. CORP.

(Continued from page 149)

ance in this complex matter, the brightness values listed below are reliable for those areas in which levels of foot-candles do not exceed 40. A properly prepared candle power distribution curve will yield the necessary brightness data, or one may simply inquire of the supplier. For further guidance, the tabulation on page 149 illustrates some of the usual (both good and mediocre) ways of lighting classrooms along with indications of performance.

SUGGESTED LUMINAIRE BRIGHTNESS IN FOOT-LAMBERTS

Zone	Incandescent	Fluorescent
Horizontal to 45° below.........	300	225
45° to 90° below horizontal.....	400	400

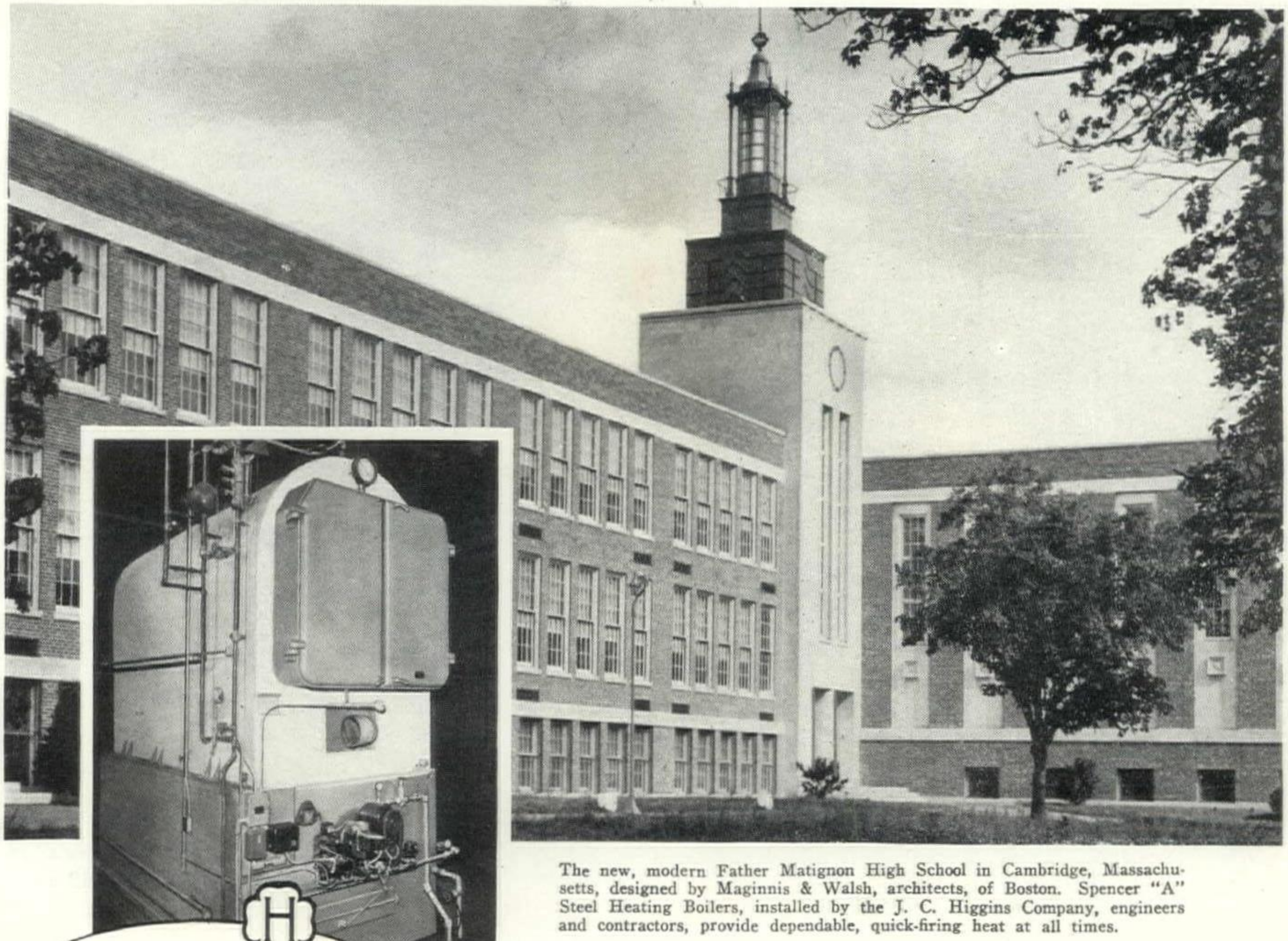
A common error in appraising a luminaire is to judge it largely on the basis of normal viewing angles, ignoring the element of reflected brightness from printed characters. Matte finishes on desks, paper, etc. eliminate to a large extent deleterious reflections from such surfaces, but printed characters possess specularity. When a bright source is reflected in printing or pencil notes the contrast between character and background is so reduced as to make it practically invisible. This reflected glare is one of the most troublesome elements in lighting practice and one of the most widely countenanced. In the first place, it is not apparent unless one actually engages in some visual task in the area being appraised. In the second place, to reduce it to manageable values involves greater cost of luminaires, generally lower "efficiency," and increased maintenance. This is particularly so in the case of fluorescent lighting. Installation costs per foot-candle being many times that of incandescent lighting, and maintenance many times more troublesome, the tendency is strong to stay on the minimum side—in other words, to reach for quantity at the expense of quality.

DAYLIGHTING

The values of foot-candles prescribed in the table on page 148, are total values *sustained in service at the work point* and may be compounded of daylight and electric light, or from either one alone. If classes are held during daytime hours only, the electric lighting may be designed as supplementary. There are no scientific data to support the occasional opinion that the two will not mix harmoniously. If the rooms will be used for long nightime classes, then the amount of electric lighting should of course be adequate for the visual task imposed.

Modern fenestration introduces large quantities of daylight into a classroom, the amounts varying widely with latitude and orientation. To avoid glare from skylight and direct sunlight, this fenestration requires controls in the form of exterior louvers or overhangs, or interior curtains, baffles etc. While reducing the discomfort of glare, these controls also reduce the amount of usable light, and nothing so far developed in the materials or methods of fenestration can eliminate this fact. In classrooms with only one source of natural light, only one-third the pupils (those who occupy the two rows of desks next to the window wall) receive adequate daylight; the remaining two-thirds generally need supplementary electric lighting during many days of the winter months—particularly in northern latitudes. Even in these latitudes, however, there will rarely be less than 5 foot-candles of daylight available in the remote areas of the room during school hours, so the electric lighting system may be designed accordingly.

(Continued on page 220)



The new, modern Father Matignon High School in Cambridge, Massachusetts, designed by Maginnis & Walsh, architects, of Boston. Spencer "A" Steel Heating Boilers, installed by the J. C. Higgins Company, engineers and contractors, provide dependable, quick-firing heat at all times.

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Extra heavy-duty construction throughout means *extra* dependability, *extra* trouble-free service.

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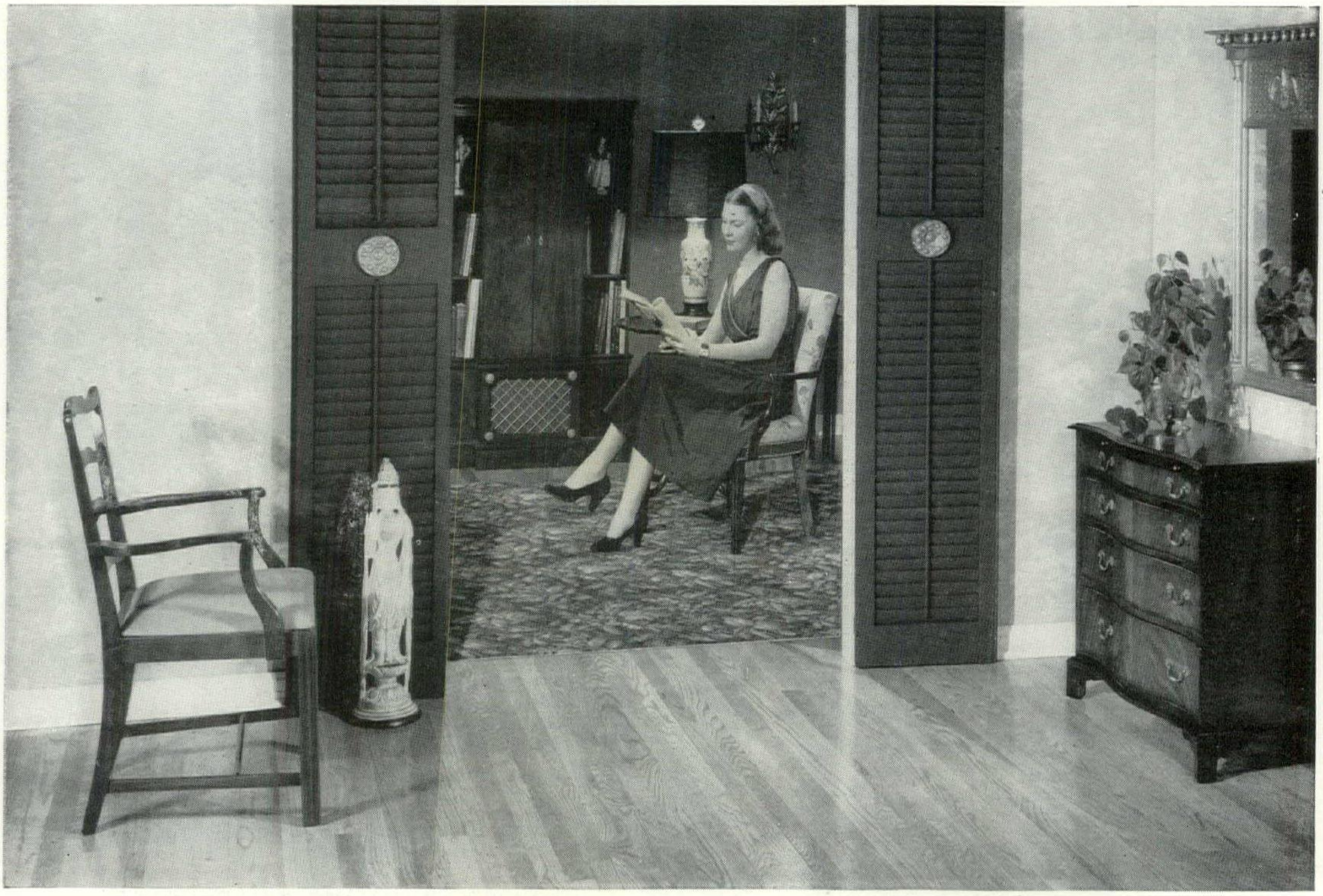

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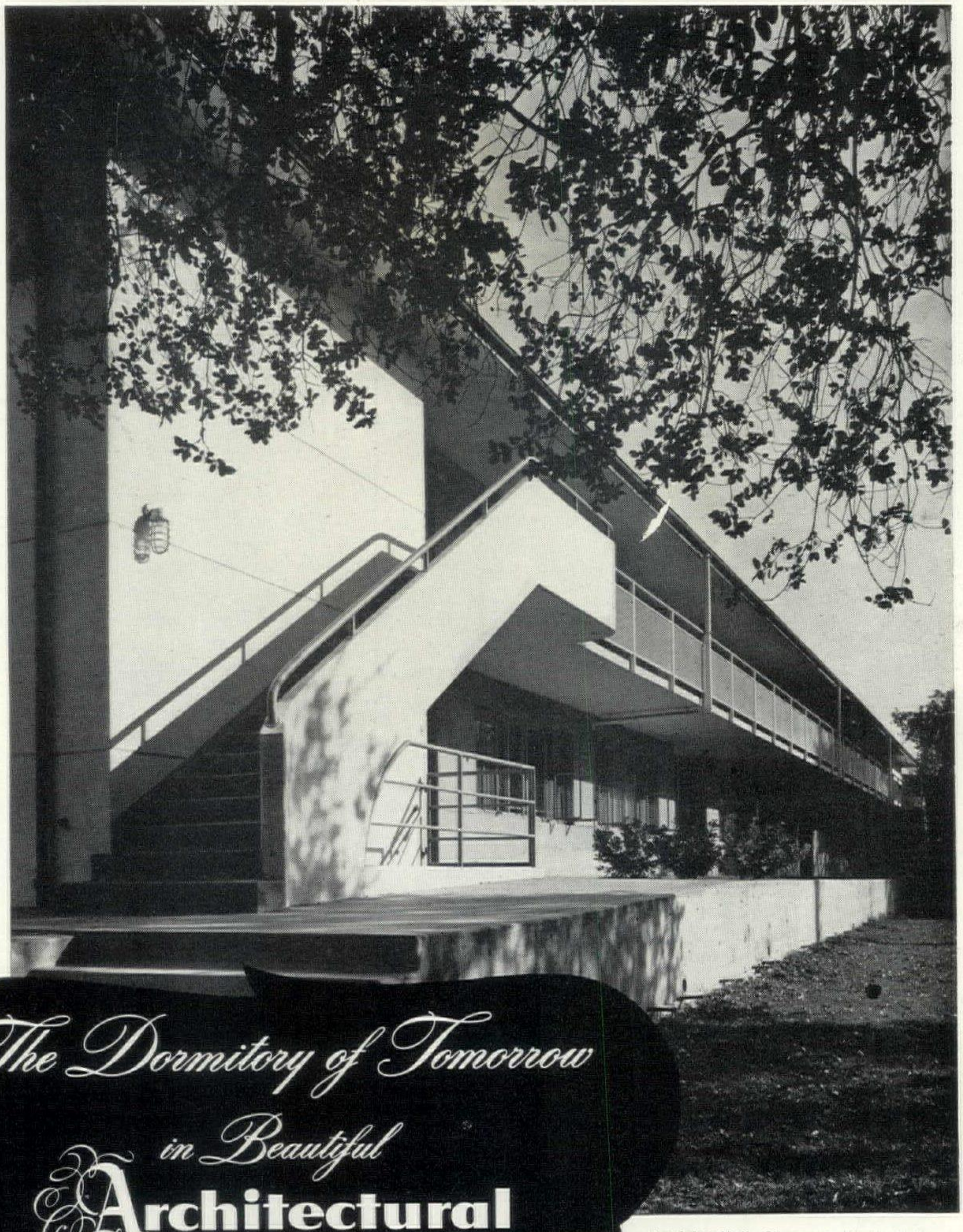

The Dormitory of Tomorrow
in Beautiful
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Appleby Hall, Claremont Men's College, was designed with concrete walls, floors, stairs, balconies and roof slab to withstand seismic forces. Allison & Rible, architects. E. S. McKittrick Co., Inc., contractor.

THE new dormitories at Claremont Men's College, Claremont, Calif., featuring a simple floor plan and functional design, strike a strong masculine note as executed in architectural concrete.

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COMPARATIVE COSTS

Every light source has its advantages and disadvantages and these are not fixed, but often modified by particular circumstances. The professional approach is to study each situation and with thorough knowledge of the sources develop a solution that is *right for that situation.*

The increasing standards of quantity and quality and the multiplicity of available luminaires have increased the importance of a careful study of comparative costs—both initial and operating. The higher efficiency of fluorescent lamps has led to the conclusion that fluorescent lighting is cheaper. Such may not be the case. Variables such as hours of operation and costs of electrical energy tip the balance one way or the other. There are those who feel that only fluorescent will serve as the mark of progressiveness; others that it is the devil's handy man. Only one generalization is safe in comparing fluorescent and incandescent lighting for classrooms; for equal quality of lighting the initial installation costs of fluorescent are about three times that of incandescent. If the electrical energy rate is low, it will take many years to make up the difference; if the rate is high the reverse is true. Long hours of operation will offset higher capital and energy charges. If the construction budget is tight, considerations of first cost may outweigh operating savings.

When making comparative cost studies it is imperative that lighting systems of equal *quality* be studied otherwise the results are meaningless. The tabulation on page 149 shows a few typical classroom electric lighting plans with notations as to characteristics and costs. The arithmetic should not be considered as precise but as an indication of general expectation. When cost figures are developed the tendency is often to reach for foot-candles and "progressiveness" at the expense of lighting quality. The result is a lighting system that eventually reveals its inadequacy but which may continue in operation as a monument to poor planning because the money has been spent.

* * *

Supplemental comments by Howard M. Sharp on the subjects of incandescent and fluorescent lamps and wiring are presented below.

INCANDESCENT LAMPS

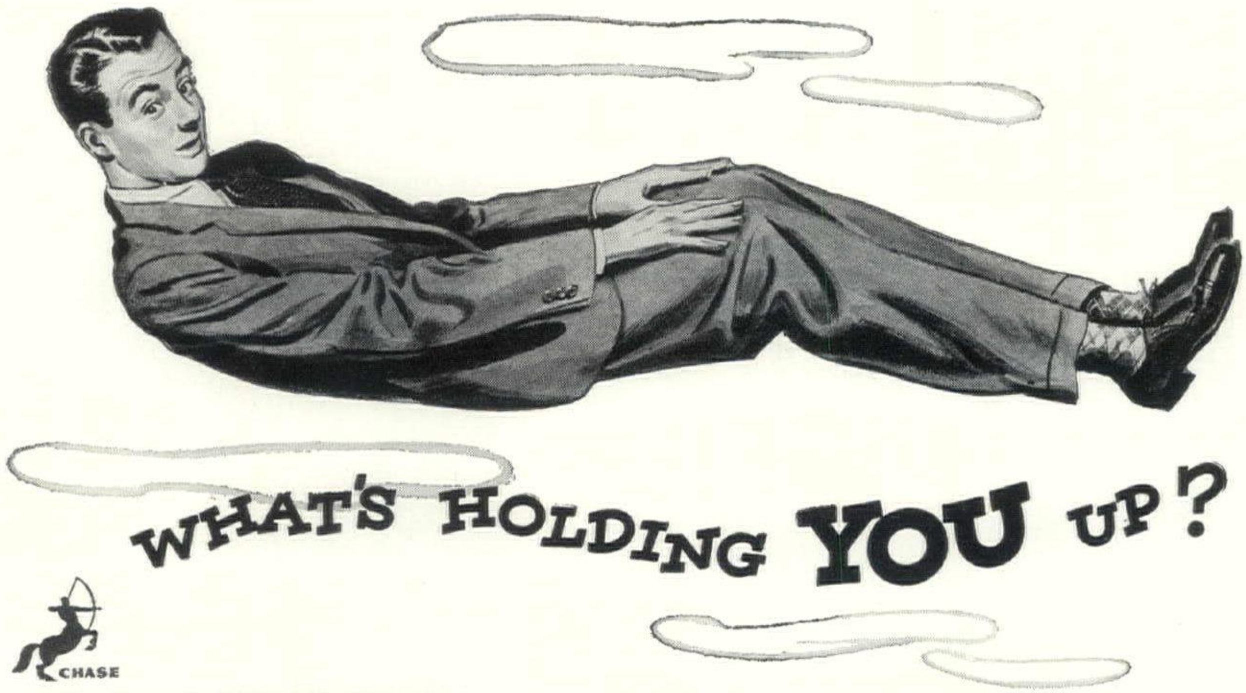
The inside frosted, and silver bowl incandescent lamps are the most widely used in this class. The silver bowl lamp is unusually good because it carries its own hermetically sealed reflector. At each replacement a new luminaire is in effect put into operation. Dust accumulation is low. The luminaire to house it may be extremely simple, consisting only of a socket housing and some means of shielding the lamp neck from direct view.

FLUORESCENT LAMPS

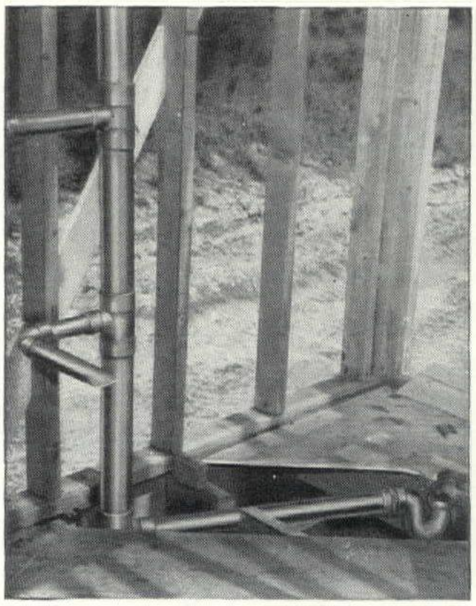
Fluorescent lamps are appearing on the market in ever increasing sizes and types and the selection of the one most suited to the purpose is no matter of flipping a coin. It is possible however to simplify the fundamental factors so that one may read the consumer data with understanding.

Described simply, the fluorescent lamp is a tube with cathodes at each end, a mercury arc maintained between the cathodes, and converting powders called phosphors coating the inside of the tube. The mercury arc produces radiation in the ultra-violet range and the phosphors convert this invisible radiation into light.

(Continued on page 224)



CHASE



Drainage installation of Chase Copper Tube in one of the 280 homes built by Levitt & Sons, Strathmore at Roslyn; L. I. Distributor: Gar Supply Corporation, Long Island City, N. Y

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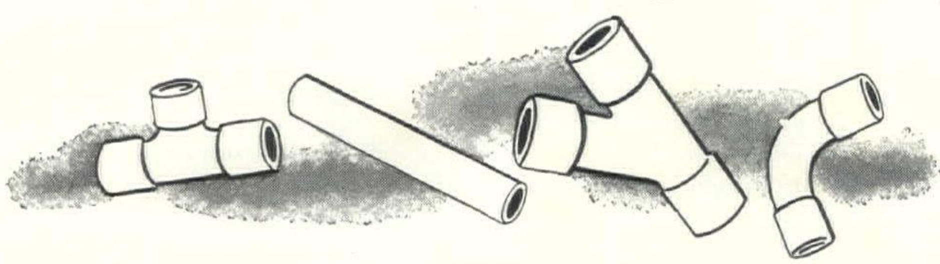
And . . . Chase Copper Tube does a *better* drainage job. Its smooth inner surface offers no obstruction to the flow of wastes—the solder-type fittings eliminate pockets.

Want more details? Write for literature on Chase Copper Tube for drainage lines. Address Dept. *AF 109.*



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All gaseous conductor arcs require external ballasting to maintain themselves, and most fluorescent lamps operate at some voltage other than the familiar 110-120, so a transformer is also necessary. The package of ballast and transformer is called the auxiliary. This auxiliary consumes power which must be added to the power consumed by the tubes in calculating wiring and figuring operating costs. (Cost of this power is not included in the table of operating costs shown on page 149.)

Cathodes are of three types:

(1) Iron cathode (cold cathode)
(2) Tungsten cathode instant start (Slimline)
(3) Tungsten cathode preheat (hot cathode)

The preheat or hot cathode lamp is the most familiar type. When the circuit is energized a two to four second pause ensues while the cathodes heat; an automatic switch or starter does the trick. The Slimline and iron cathode lamps start instantly and this feature makes possible a more simple circuit and mechanically better sockets and lamp ends.

Tungsten cathode lamps are usually operated in pairs from a single auxiliary to reduce cyclic flicker and to lower costs. The iron cathode lamps may be operated in pairs or a number may be connected in series from a single transformer.

Life of tungsten cathodes is shortened by frequent turn-on hence the variation in published life expectancy. Iron cathodes are unaffected by turn-on.

The fluorescent lamp family is undergoing continual change as improvements in old, and introduction of new products stream from the laboratories. The architect and engineer has an increasing number of lighting tools, but concurrently a more difficult task of selection. Factors of cost, obsolescence, maintenance and performance involve sums of money unheard of ten years ago, so careful analysis and expert council is most desirable.

WIRING

The wiring requirements of good lighting are the same for existing school structures as for those to be built. Wiring in new buildings can have little or no bearing on the kind of lighting planned, because good engineering and the requirements of the National Electric Code dictate a certain standard of wiring which is the same, regardless of light source or system.

The relighting of existing school buildings poses a greater problem. An all-out job may require changes in wiring which, due to complexity and cost, are out of the question. Usually some compromise is necessary and the working out of this compromise is difficult. Generalities are dangerous but fluorescent lamps are indicated for the relighting of existing school buildings. With fluorescent lamps adequate foot-candles can be obtained with proper brightness contrasts, usually without any changes in wiring other than extensions from existing branch circuits. Careful study is necessary, not only of alternative lighting plans, but of the existing wiring system. Generally relighting requires more in the way of coordinated architect-engineer teamwork than is involved in the planning of new lighting installations.

* * *

For a discussion of the use of glass blocks in school house lighting see page 228.

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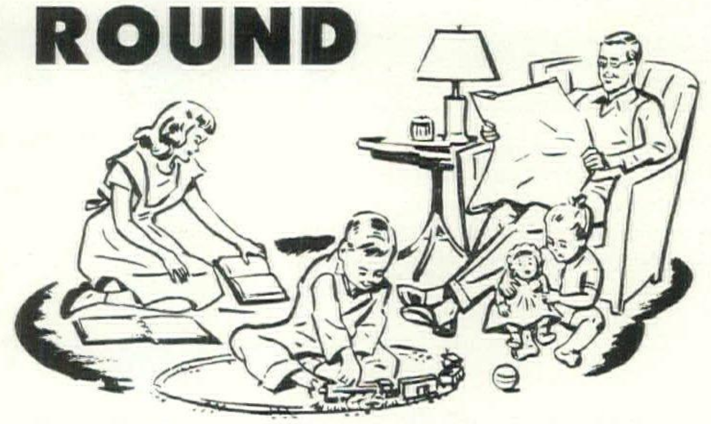

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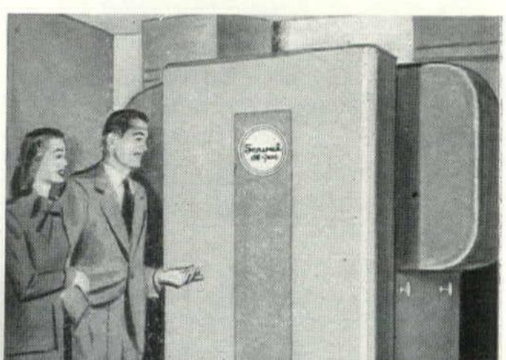

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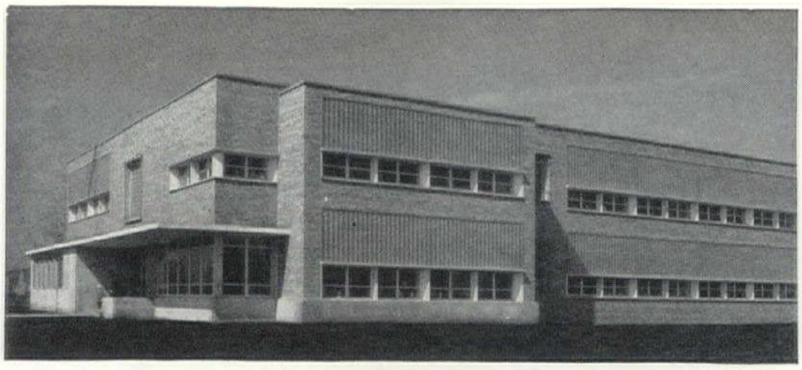
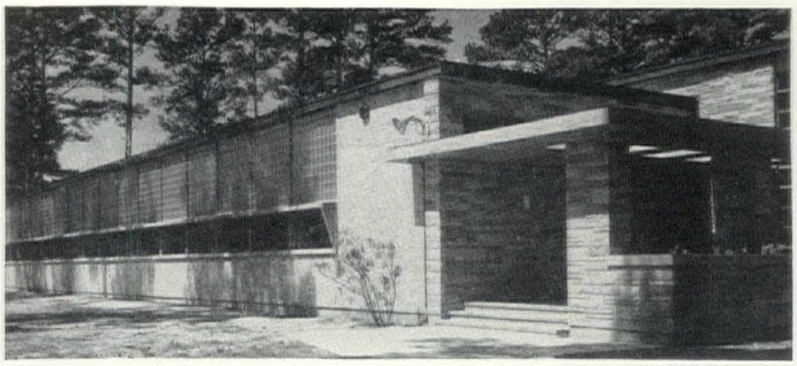
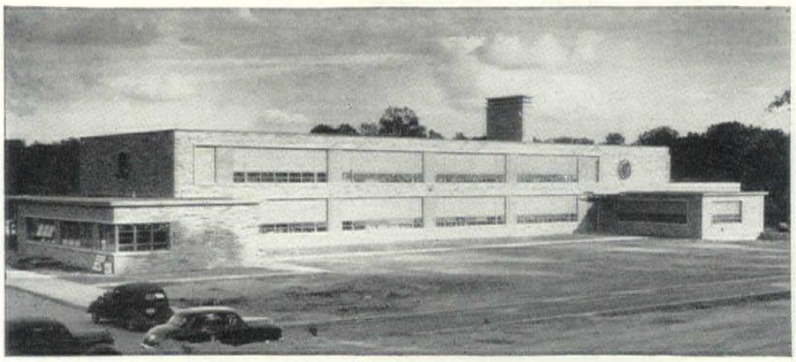


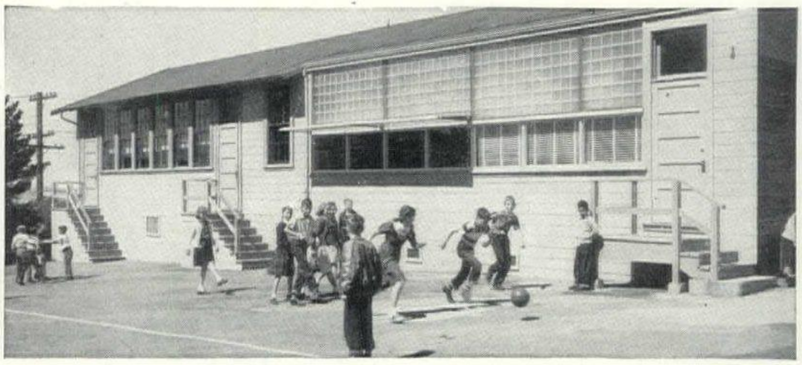
MICHIGAN! James Vernor Elementary School, Detroit, uses thousands of Insulux *light-directional* glass blocks to give uniform distribution of daylight in classroom interiors. Eberle M. Smith Associates, Architects-Engineers.



TEXAS! Use of Insulux Prismatic Glass Block, plus shaded window sections for visibility and ventilation, means better daylighting for classrooms at St. Theresa's Catholic School in Houston. Architects: Golemon and Rolfe, Houston.



MARYLAND! Unique design of Loch Raven School in Baltimore County, Md., utilizes Insulux Glass Block (No. 351) to add gracefulness to exterior; uniform lighting for desk surfaces on interior. Architects: Gaudreau & Gaudreau, Baltimore.



CALIFORNIA! For the extremely bright sun problem presented by Cragmont Test School in Berkeley, Insulux Glass Block (No. 352), with improved prism faces and special glass fiber screen inside, is used here to improve classroom daylighting over old-style windows (extreme left). Architect: John Carl Warnecke, Oakland, Calif.

Four examples of the wide acceptance of Insulux . . . the light-directional glass block for schools!

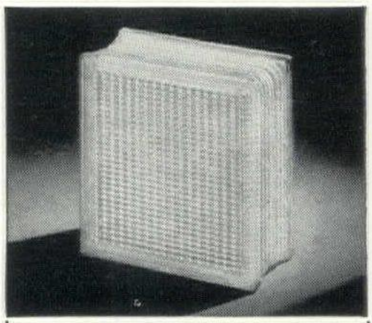
ABOVE are just four schools out of hundreds using *Insulux Fenestration.**

The fast-growing use and specification of Insulux Glass Block in modern schools is due to the fact that the prismatic faces of Insulux (No. 351) change the direction of light rays coming from the outside.

This results in daylight being more uniformly distributed throughout the classroom and the elimination of sharp contrasts within the room.

For further information on the use of *light-directional* Insulux Glass Block, write: American Structural Products Company, Dept. F-170, P.O. Box 1035, Toledo 1, Ohio.

* Insulux Prismatic Glass Block with vision-strip below.



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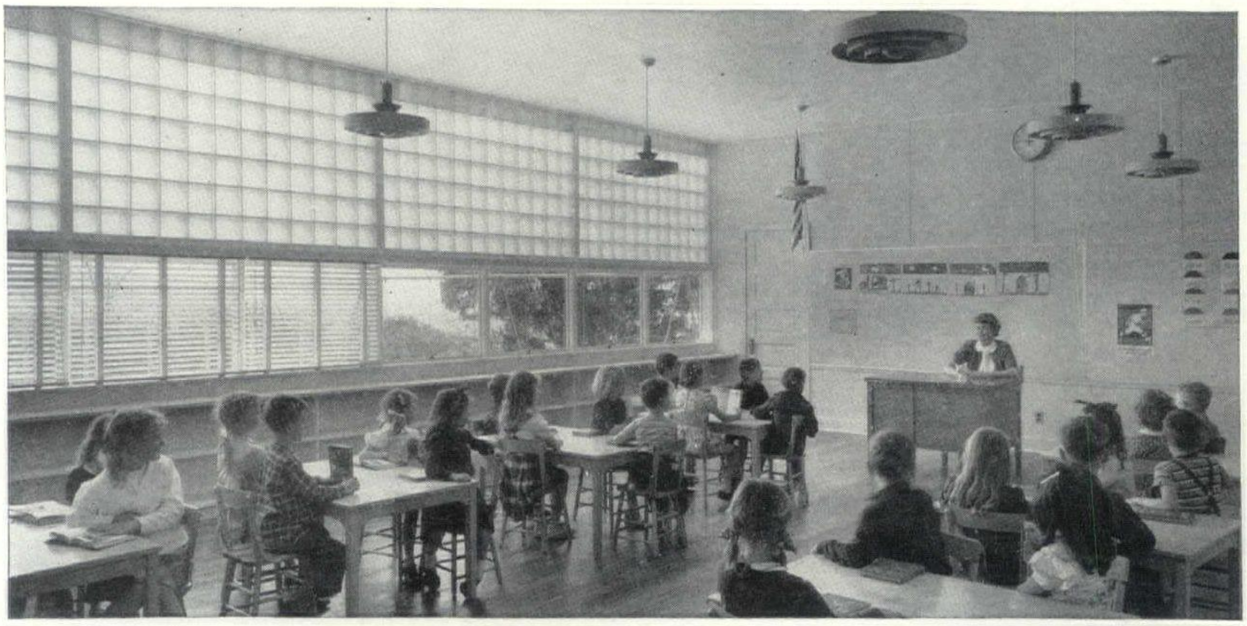


See how Insulux Glass Block panel directs sunlight upward to classroom ceiling where it is reflected uniformly to tops of desks. Elimination of sharp contrasts improves study conditions. Clear-vision strip permits ample vision and ventilation.

DIRECTIONAL GLASS BLOCKS shield sky and reduce brightness contrasts in south-lighting experiment

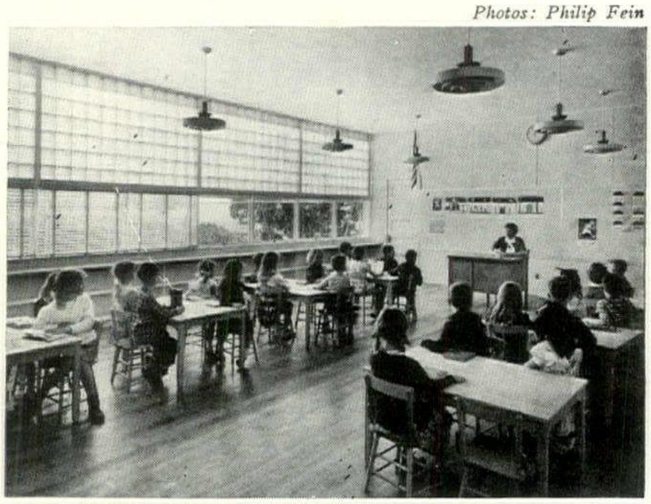
Exterior of remodeled room (at right) shows glass block panel above vision strip, half of which is cast in shadow by louvered sunshade.

Site conditions frequently prevent the location of a classroom's principle windows in the north wall. This is particularly true in planning schools for small sites and for sites on the south slopes of hills. In such cases the east, west or south light is easily controlled by the use of directional glass blocks. To demonstrate this to his skeptical West Coast colleagues, Architect John Carl Warnecke remodeled one classroom of the Cragmont Elementary School's two-room frame annex at Berkeley, Calif.

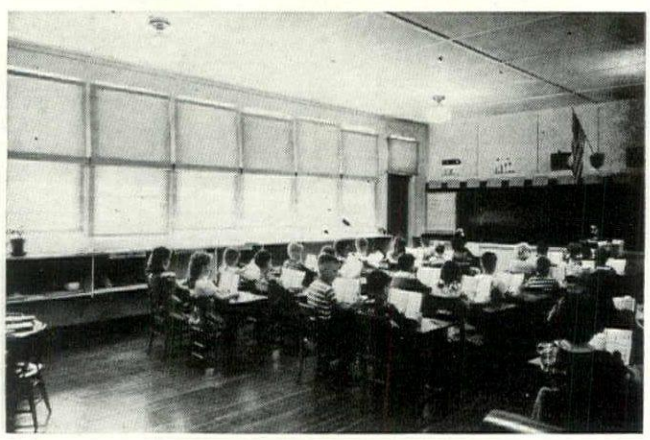
As shown in the photos, the remodeling consisted of snipping off the eave and replacing the double-hung windows with a seven-tier glass block panel and a 30 in. high vision strip. Shielding of half of the vision strip is accomplished by Venetian blinds; half by a louvered wood canopy. The latter eliminates manual sun control, does not interfere with view or ventilation, and may have the added advantage of reflecting extra light through the glass block to the ceiling.

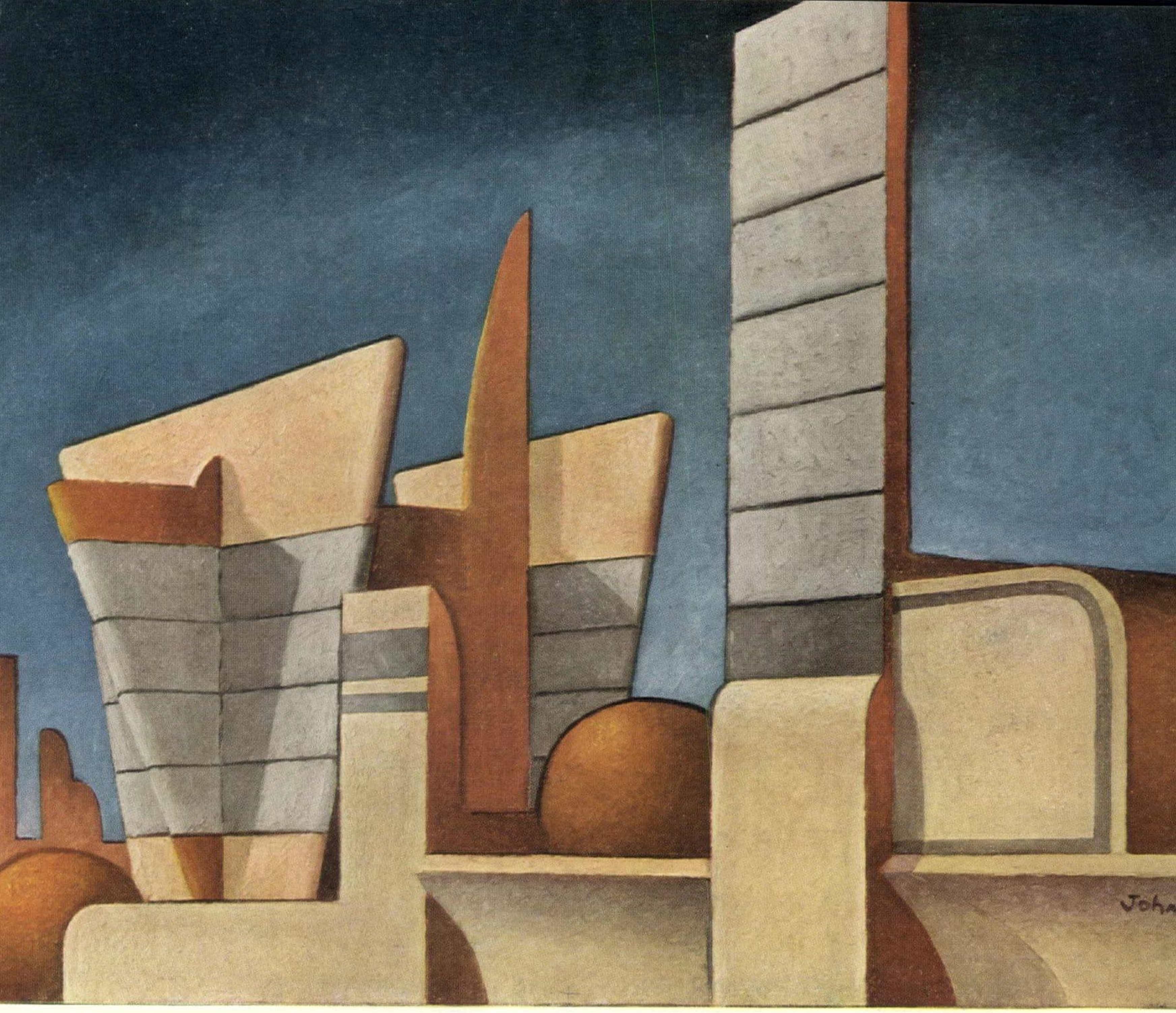
The block panel shields the sky, reducing brightness differences to less than ten to one. The service ratio of the blocks—the ratio of sky brightness to block brightness—is five to one. Thus, there is five times as much light flowing over the children's heads as they can see when they look at the block panel. Due to the prismatic construction of the blocks, this light is directed to the ceiling which, in turn, reflects it deep into the room and down on the working area.

Photos: Philip Fein

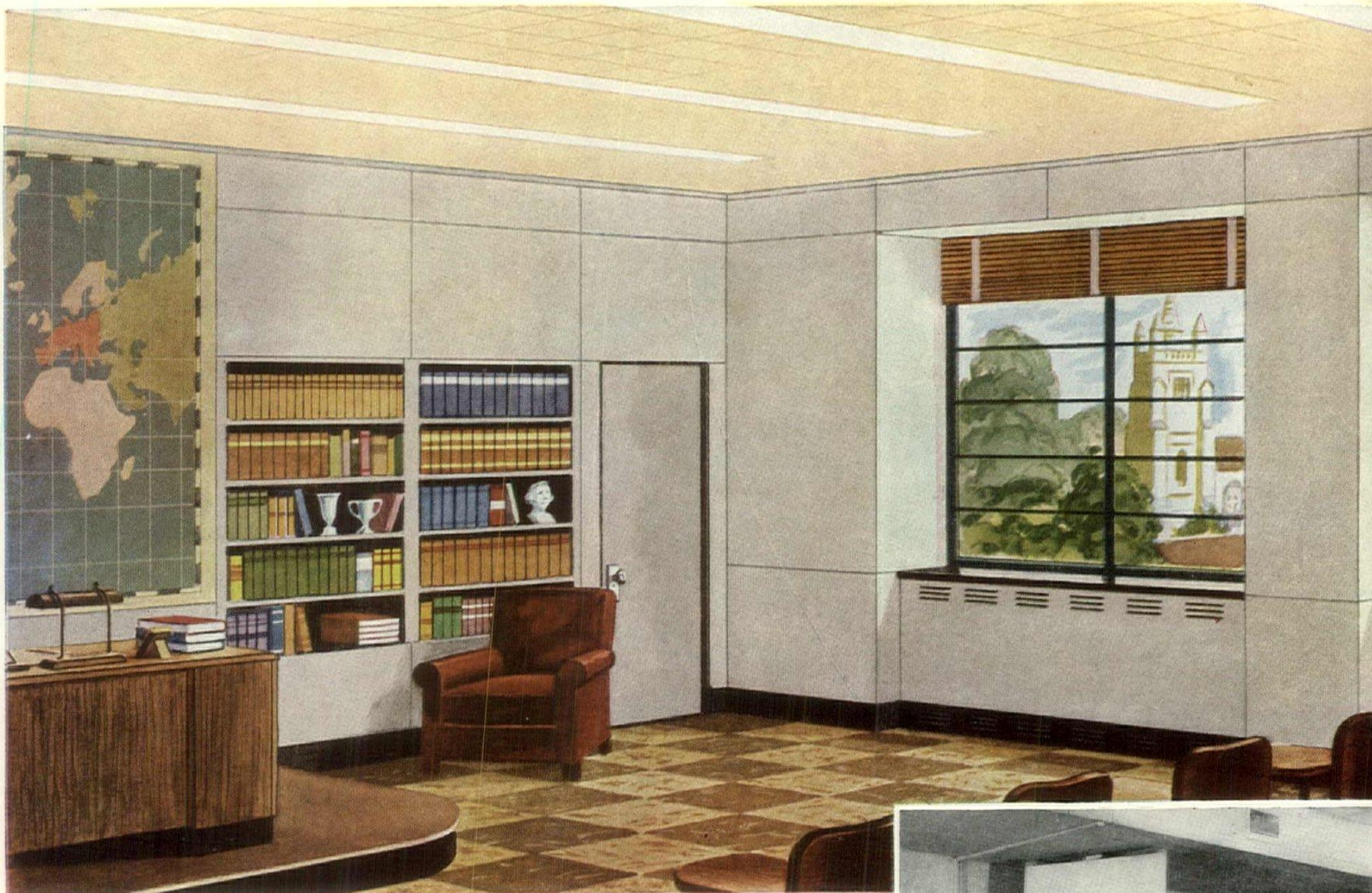


Interior of classroom demonstrates even light distribution and sharp reduction of glare and contrast by glass block panel and shielded vision strip. (Walls are painted light blue and pink; chalk boards are blue and coral.) Compare results with unremodeled room, whose glare, shadows, shaded windows and black chalk boards are pictured below.





Structural poetry, phrased in practical patterns



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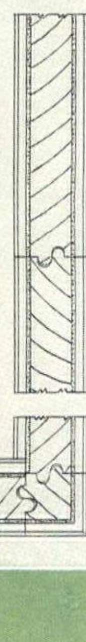
2 Types of Transite Walls



Shown above in process of erection is the Universal type of J-M Transite Wall. The finished wall consists of a sealed core faced on both sides with asbestos-cement sheets and is $1\frac{3}{4}''$ in thickness. It is one of the easiest and most economical of all walls to erect and relocate.

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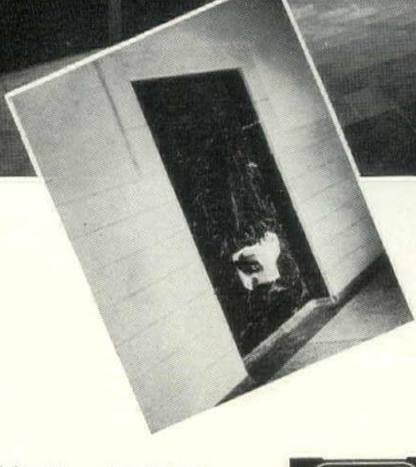

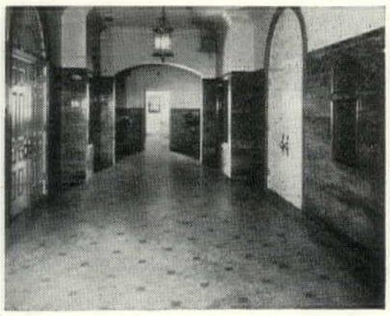

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MIA

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(Continued from page 156)

to all classrooms, or piping in important programs or transcriptions are the basis for school-wide sound participation, and this can be very valuable. Add to it proper extra standard wiring for speech correction and music rooms, and the basic requirements are covered.

One mistake made frequently in the past is the location of the heart of the sound system in the principal's office, in the attempt to make it most useful administratively. This actually should be a secondary use for a central sound system, and the origin would better be in the music or speech room or in a separate room of its own, where use by students is not inhibited by the principal. This is avoided if all rooms have intercom facilities, but this too is unusual. Max Bildersee points out the danger of a talk-back system based in the principal's office, as installed in several schools before the war, in which the individual class or teacher can reply to conversation from headquarters but cannot originate conversation. The awkwardness of this system is augmented by the natural suspicion on the part of the teacher and class that it may be used for eavesdropping, featuring supervision of the most objectionable type.

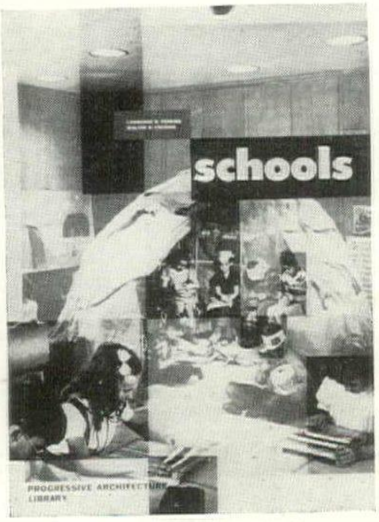
Adrian TerLouw, well known worker in the audio-visual aid field, points to four current trends in audio-visual education:

1. Use of visual material at the classroom level and in the classroom itself.
2. Integration of a variety of forms of audio-visual material.
3. Generation of visual material as part of the class activity.
4. Utilization of audio-visual materials that have a short showing or playing time.

One thing becomes obvious, TerLouw points out—everything must be done to reduce the labor factor in the utilization of audio-visual teaching aids. This means that certain facilities, like screens, should be built in and the remainder should be so arranged that set-up time is at a minimum. A two-story school should have equipment and storage room on both floors, so equipment need not be carried up and down stairs.

Set-up time for projection equipment and sound recording equipment can be greatly reduced if these are brought into the classroom on wheeled stands of appropriate height so that they are virtually ready for operation when they are brought in.

In a number of instances, sound recording is carried out in the classroom. The effectiveness of this sound recording in terms of speech training and creating the illusion of reality is dependent to some extent on the acoustics of the room. A well filled classroom usually has fairly good over-all acoustic characteristics, but recordings can be quite bad because of the reflections from walls and corners due to the fact that the sound recording is carried out *too near a wall.* In part, the solution to this problem is one of developing good microphone technique on the part of the teacher, but it also deserves some consideration in connection with music and speech departments. Here it is not always practical to record the speech or the music in the presence of a full class, so the room that is quite satisfactory when the class is in session may become unsatisfactory during these special study sessions. Therefore, TerLouw emphasizes that the over-all question of sound and room acoustics deserves careful inspection of the building budget with respect to providing special quarters for classes using these devices.



"The trend in education—and the trend in educational buildings—is towards common sense and progress, and away from the chaos of the past".—Perkins and Cocking.

SCHOOLS by Lawrence Perkins and Walter Cocking. Reinhold Press, 330 W. 42 St., New York, N. Y. Illus. 7½ x 10½. 259 pp. $10.

This is the best general book of recent years on modern U. S. schools. Authors Perkins and Cocking say frankly in their foreword: "This is an attitude book: our attitude. What we write on these pages is what *we* believe. We have attempted to present more than mere facts and figures." Representing, as it does, the considered and enthusiastic conclusions of two men with broad experience and knowledge of school buildings, their attitude forms a most valuable, positive contribution to school study. It stands firmly on the principle that since a school functions only by, with and for people, it must answer to human needs in every point of design.

What does such an attitude add up to in terms of planning an actual school? Perkins and Cocking speak out for themselves: "School building sites . . . must be much larger than at present. . . . More and more the general recreational and community needs will be coordinated at the public school. Instead of building under one roof . . . most new school plants will consist of a series of simple structures, each designed to carry out one particular function . . . Multi-story buildings will belong to the ages. The one-story building for all purposes will become the accepted type . . . More space will be provided for each activity. Rooms will be wider not only because more nearly square spaces give greater utility but because spaces with wider spans cost less to construct . . . All buildings will provide for greater . . . flexibility. It will be possible to change interiors almost at will and with the expenditure of a minimum of time and labor . . . equipment will be interchangeable. . . . Storage space will be expanded and better designed."

To the always-present question of costs, they present no magic answer—"There never was an inexpensive school." Straightforward design and a real understanding of school and community needs will give most value for the money and will allow facilities to be put to the greatest variety of uses. A building's schedule of use can be extended around the clock and through the calendar. The great specialization of rooms and permanent equipment which characterized more elaborate school plans of the last decades has proved impractical —both economically and psychologically.

From kindergartens to colleges the authors advocate the same thesis—multiple, heavy (expensive) partitions are out. Desks and chairs, once screwed to the floor on a rigid grid, now stack out of the way, leaving space for indoor play and group work. General school areas are broken down into five types, planned for a maximum of flexibility: classrooms (with auxiliary cloak and wash space); large group spaces (auditorium, lobby); shops and labs; physical education; building services.

Flexibility in auditorium, art, shop and homemaking spaces makes such areas all the more usable by adults during night courses, or for weekend or summer project work. Good planning for these will consider not only the most convenient placement of such units for school classes but also their extracurricular merits. Are they near the school entrance and parking areas? Can they be heated and lighted separately from classroom units? The investment in a school will be seen for what it really is—a full time investment—"the one property in every community that belongs to all the people." Cafeterias double as student lounges and for informal musicals; they are available for student, parent or teacher afternoon teas and evening social groups. Set near the auditorium (as recommended by Perkins and Cocking), they are handy for after-performance get-togethers or as overflow dressing rooms. Corridors take on new life as exhibit galleries or provide cloak and locker space as well as widening corners for social groups.

But flexibility is not a cure-all. In some cases, the authors warn, an effort to house conflicting needs will spoil an area's usefulness for either one. The prime example of this is the mutually destructive auditorium-gymnasium combination. The parallel walls and hard surfaces of a gymnasium are the worst possible for good acoustics. The necessary pitched floor of an auditorium is impossible for games. Besides, the schedules for ball practice and rehearsals are bound to conflict, while flying tackle and theater equipment do not make the best of roommates.

Within the individual classroom, Perkins and Cocking show what can be done with the smallest and largest budget. Storage of books, magazines, project materials, the increasing use of slides, films and the undoubted future growth of television, exhibit space for individual and group collections—these are of vital importance to a full program. One unusual suggestion that makes great sense is a glassed-in teacher's corner with access both to the classroom and corridor. This will not only provide adequate space for the teacher's belongings and more breakable collections, but also a place for conferences—acoustically but not visually separated from the main work space. Such a room becomes very valuable in these days of group activity.

While keeping a constant eye peeled for cost-saving in terms of simple construction and flexibility, the authors

(Continued on page 240)

Cut school construction costs with long-lasting low-cost KENTILE FLOORS

Asphalt Tile Selected by Architects and Builders in Preference to Any Other School Floor*

*according to results of a survey made by a leading building magazine.

• Child psychologists favor colorful floors like this to bring a playroom atmosphere to younger children's classrooms. Or where floor areas call for subdued, dignified decorative treatments you can have exactly the effect desired, because of Kentile's 23 colors and the many combinations possible with tile-by-tile installation.

Kentile offers a combination of advantages no other floor can match

• **LOW COST.** The average cost is approximately 25c per sq. ft. for 3/16" thick Kentile laid over concrete. Special Kentile inserts (see illustration below) are mass produced yet give a custom-made effect. They are inexpensive and involve no extra installation labor.

• **UNUSUAL DURABILITY.** The scraping and scuffing of pupils' feet may scar and shorten the life of other floors—but not Kentile. Colors won't wear off—they go right through the entire thickness of the material which is all tough, wear-resistant Kentile—no felt or other backing. Kentile floors in use for over 20 years are still in wonderful condition.

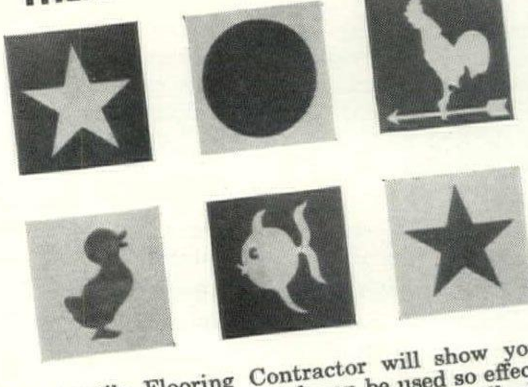
• **INEXPENSIVE TO MAINTAIN.** Kentile's smooth, dirt-resistant surface cleans quickly—with mild soap and water.

• **NON-SLIP SAFETY.** No less an authority than the U. S. Bureau of Standards states: Under most conditions, asphalt tile is safer to walk on than any other smooth-surface material, provided it has no high gloss finish.

• **FIRE-RESISTANT.** Kentile meets all fire underwriting requirements.

• **QUIET.** Resilient Kentile cushions footsteps, minimizes clatter—helps concentration.

THEMETILE AND KENSERTS



Your Kentile Flooring Contractor will show you the many decorative inserts which can be used so effectively to set off a floor. Also available are basketball, shuffle-board, hopscotch and other game designs, made of long-lasting Kentile and therefore equally durable.

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The Permanently Beautiful Asphalt Tile

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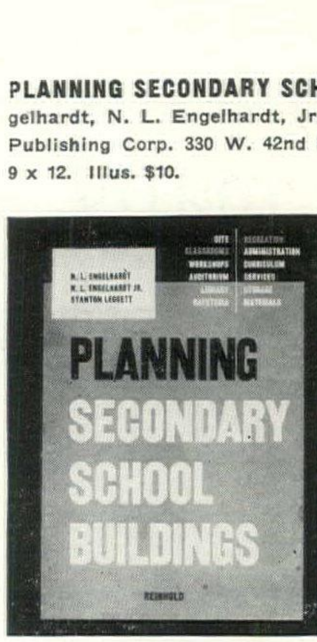
are adamant in insisting on full space allotments, with proper light and acoustics. Modern teaching methods cannot be introduced without sufficient work area—William Caudill's high estimate of 35 sq. ft. per student is commended. The possibilities of bilateral and multilateral lighting are presented in terms understandable by the interested layman. The bearing of acoustics not only on comfort but on health and learning ability is also made clear.

To those, who in spite of logic still hesitate in answering the question, "Can we afford to build such schools?", Perkins and Cocking counter bluntly—with an eye on the future of America—"Can we afford *not* to build them?"
—S.K.

PLANNING SECONDARY SCHOOL BUILDINGS by N. L. Engelhardt, N. L. Engelhardt, Jr. and Stanton Leggett. Reinhold Publishing Corp. 330 W. 42nd St., New York 18, N. Y. 252 pp. 9 x 12. Illus. $10.



This tome-sized book on high school planning does a great deal of the factual dredging that must be completed before any adequate building design can be laid out. The public secondary school has become so accepted a part of U. S. life that it is hard to realize that it has been in formal existence only since 1890—since which time its enrollment has risen from an annual 350,000 to 7,900,000. Only in the last few decades has broad enough experience been assembled to assay its most efficient form. Now it can be said with assurance that not only have the gigantic super-schools (5,000 and over) proved themselves unwieldy, but as a rule the small schools of several hundred pupils have shown themselves incapable of providing the variety of experience and training necessary for full program development. A unit of about 2,000 students seems the most desirable balance.

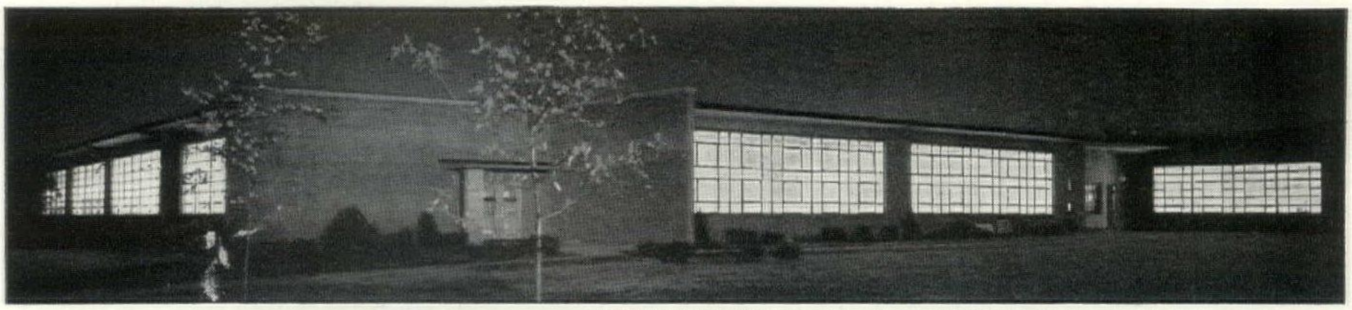
Engelhardt, Engelhardt and Leggett, well-known school planning consultants, concentrate their efforts on specifying what can be done within this 2,000-student compass. Their extensive check lists and analyses shore up the conclusions of modern design, and provide valuable data on every detail in the building from chalk boards to the facing of the storage room floor. Perhaps because land costs prohibit single story buildings in some places the authors do not consider the pros or cons of this type—taking at least two floors for granted. The importance of sufficient space is again underscored, however, not only for future expansion but for increasingly flexible instruction in mechanical and commercial, as well as artistic, fields. Not even typing, much less gliding, can be taught in the cramped desk space thought sufficient until recently. Enough administrative space to allow varied and informal group consultations is another need of the modern school. An over-all 40 to a 100 acres is regarded as basic for any fully functioning high school.

Planning Secondary School Buildings is an item for the specialist's shelf—an excellent work of its limited kind.—S.K.

SCHOOL PLANTS. American School and University, 1949-1950. American School Publishing Corp., 470 Fourth Ave., New York, N. Y. 786 pp. 8½ x 11 in. $4.

This year, for the 21st time, *American School and University* presents its annual unblinkered look at the whole field of U. S. schools. As usual, the field shows up to be a pretty uneven place whose soggy contours bear little resemblance to the rising grade of the best planning standards. However, this deadpan compendium of large-

(Continued on page 242)

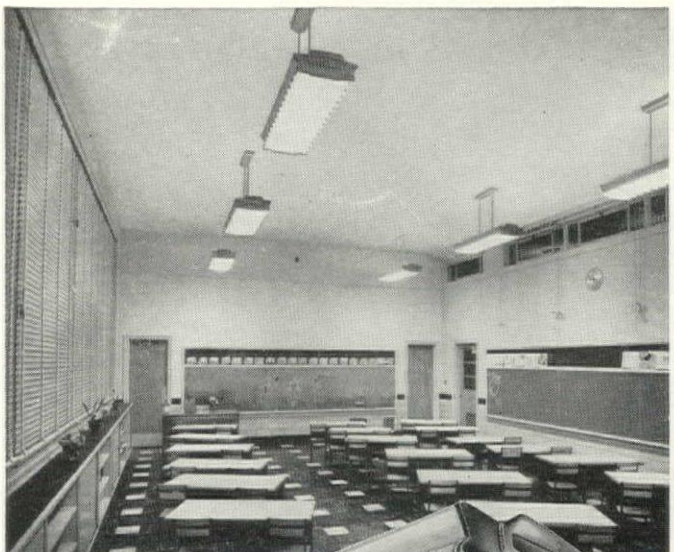


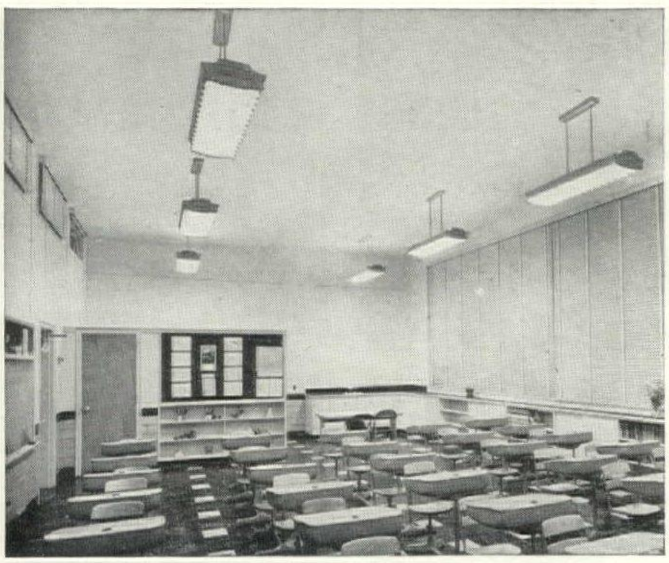
SCHMIDT AND PAOLINELLI, ARCHITECTS • OSBORN ELECTRIC CO., ELECTRICAL CONTRACTORS

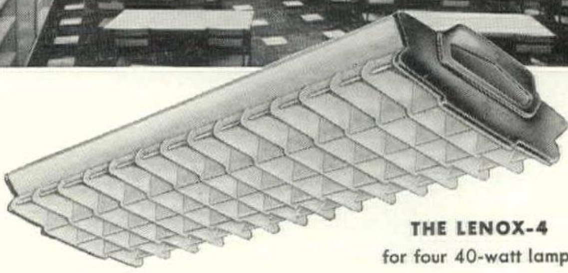
IT'S DAY-BRITE

IN THE NEW, MODERN REAVIS SCHOOL IN AFFTON, MISSOURI

From its smart, modern exterior (above) down to the smallest detail of construction, the Reavis School stands as a fine example of intelligent planning. And most important in its benefits to pupils, teachers and administrators, was the School Board's decision to invest in *nothing but the finest* of lighting installations. Since lighting fixtures must perform efficiently for at least twenty years, only top quality equipment was installed. All classrooms (two typical rooms below) are equipped with handsome Day-Brite Lenox-4 fluorescent fixtures. Chalkboard and desk top finishes, and paint color schemes were scientifically selected to get the most out of the lighting. With maintained footcandles averaging between 30 and 35 in each classroom, seeing is *easy*—and that means *learning* and *teaching* are easy, too.



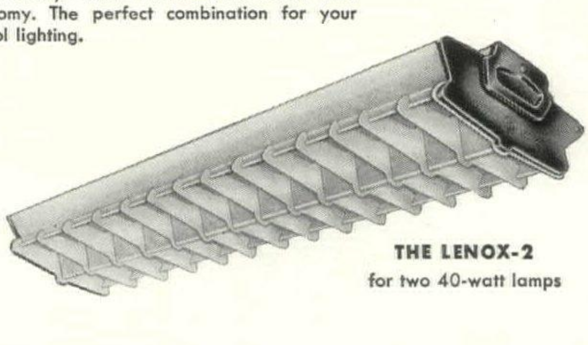




THE LENOX-4
for four 40-watt lamps

THE DAY-BRITE CLASSROOM "TWINS"

Rigid all-steel construction, finished in snowy-white, HOT-BONDED enamel. All wiring and component parts approved by Underwriters' Laboratory. New maintenance ease and economy. The perfect combination for your school lighting.



THE LENOX-2
for two 40-watt lamps

WHAT ARE YOUR LIGHTING PLANS?

May we help? Whether your lighting problem involves a remodeling program or a new construction project, the services of an experienced Day-Brite lighting engineer are yours for the asking. Absolutely no obligation on your part. For further information, and the name of your nearest Day-Brite representative, write today to:

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IT'S EASY TO SEE WHEN IT'S
DAY-BRITE *Lighting*

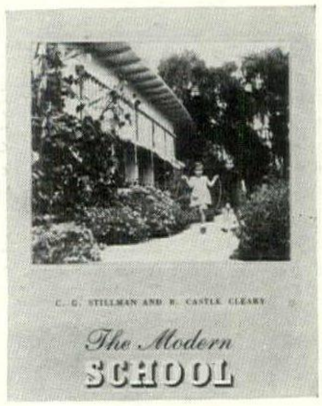
349

DISTRIBUTED NATIONALLY BY LEADING ELECTRICAL WHOLESALERS scale school projects should certainly be handed to any optimist who believes that the battles of the Greek and Georgian facade are over.

Encouraging is *School Plants'* report of painstaking research undertaken for Cleveland University under the guidance of Hermann Field. This study of the needs and scheduling of a large extension building for adult education is the first of its kind, and is bound to have good effect on this increasingly important branch of education. The specified 200 x 300 ft. building to provide for a peak class room load of 2,000 students outlaws any but a multi-story solution. Field's still-continuing experiments in optimum class-office relationships; his careful work on comparative elevator loading and his suggestion of eighth floor social rooms overlooking the city, show that the modern pioneering of Miami University is not an isolated instance in the university field.

The volume's articles on plant maintenance and operation, on auxiliary services such as bus systems and cafeterias, as well as its catalogue of equipment and building products bring the school atmosphere so close you can smell the chalk-dust.—S.K.

THE MODERN SCHOOL by C. G. Stillman and R. Castle Cleary. Architectural Press, 13 Queen Anne's Gate, S. W. 1., London, England. 151 pp. Illus. 7¼ x 9¼. 21 shilings.



In America the modern school has been propelled into wider and wider acceptance by the force of the modern school curriculum, with its basic principle that education is not a drill in the three R's but a continuous process of growing up — mentally, physically and emotionally. This principle, however differently worded or even interpreted, forms a central meeting ground for all the various groups of educators and planners. In England, the public school curriculum (crystalized in the Butler Act of 1944) seems to fall short of such common agreement. Secondary school training, only in public statutes for five years, still trembles over such problems as the "parity of esteem" between the conventional classical training and technical courses. The ideals of group study and activity may be acknowledged by individual English teachers and architects, but they do not find their way into this apparently open-minded study of *The Modern School.* Perhaps the overwhelming need for schools makes any but minimum standards unthinkable—even in print. Regarded as standard space allotment is 13 ft. per student for elementary classrooms, 16 ft. for secondary.

Just as serious as this tendency to divorce the consideration of a school building from its individual curriculum, is the authors' habit of discussing architecture from the outside in. Captions such as this are frequent—"The pitched roof has disappeared in favor of asphalt flats, parapet walls and a strong horizontal treatment throughout," or "Traditions of symmetry and axial planning are fast dying and the new conception of plastic composition is now replacing them." British school lighting and acoustics seem even more haphazard than current practice in the U. S. Their distinction between measurements of natural and artificial lighting (daylighting and foot-candles) is confusing—"daylight" being admittedly a ratio varying with season, the weather and the hour.

One point of interest: secondary school designers in England have specified a figure for optimum school size very close to that of their American counterparts—1,500 to 1,700 students.

Your client knows that today's profits go to those who provide a pleasant selling environment. He relies heavily on your ability to create an effective selling atmosphere.

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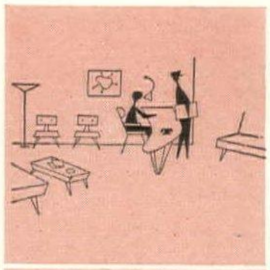
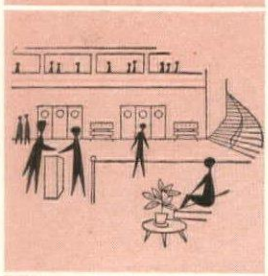
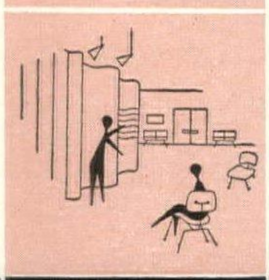


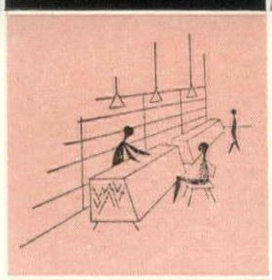
Reception Rooms



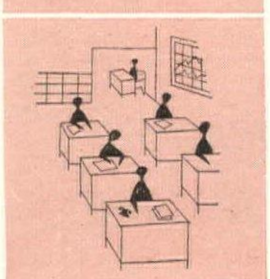
Theatre Lobbies



Show Rooms



Retail Stores



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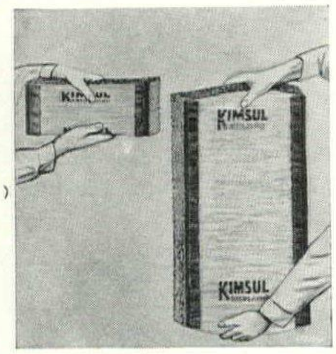
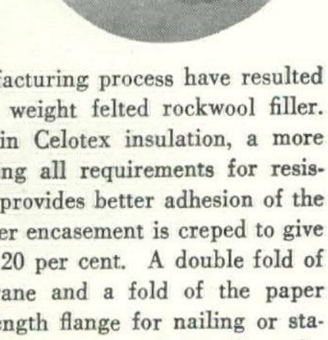
FIBER INSULATION HAS ALUMINUM VAPORSEAL with flanges to facilitate installation.



Reflective Kimsul combines heat reflection and heat resistance in the form of an aluminum cover firmly bonded to a thick blanket of treated fiber plies. Serving to reflect heat and shut out moisture, the aluminum foil cover extends over the sides of the blanket to become tacking flanges and protect areas otherwise uninsulated. Cost to the consumer is about the same as regular Kimsul with separate vaporseal, and in some instances, less. Performance of Reflective Kimsul is said to be higher than regular Kimsul for ceiling installations in the summer time and for normal applications to floors. K factor for the blanket alone is .27 per inch thickness. Compressed to one-fifth installed length, the insulation comes in lightweight, easy-to-handle rolls. Installers will find it non-irritating and clean. The material is fire resistant and acts as a sound absorber.

Manufacturer: Kimberly-Clark Corp., Neenah, Wisc.

PAPER ENCASED BATT TYPE BLANKET INSULATION is cleaner and easier to handle than open face batts.



Providing the wasteless economy of installation in short lengths, Celotex's new improved batt insulation, encased in tough Kraft paper, is marketed at a slightly higher cost than the company's open face batts. Blankets are 15 x 24 in. and 15 x 48 in. and may be had in either full-thick or semi-thick types. Changes in the manufacturing process have resulted in a highly resilient, lighter weight felted rockwool filler. Besides these improvements in Celotex insulation, a more efficient vapor barrier—meeting all requirements for resistance to vapor transmission—provides better adhesion of the wool to the barrier. The paper encasement is creped to give it a two-way stretch of 15 to 20 per cent. A double fold of the black vaporproof membrane and a fold of the paper crepe make up the triple strength flange for nailing or stapling. Designed for convenient storage and handling, the lightweight blankets go through scuttle holes easily, can be opened and installed quickly and simply.

Manufacturer: Celotex Corp., 120 S. LaSalle St., Chicago 3, Ill.

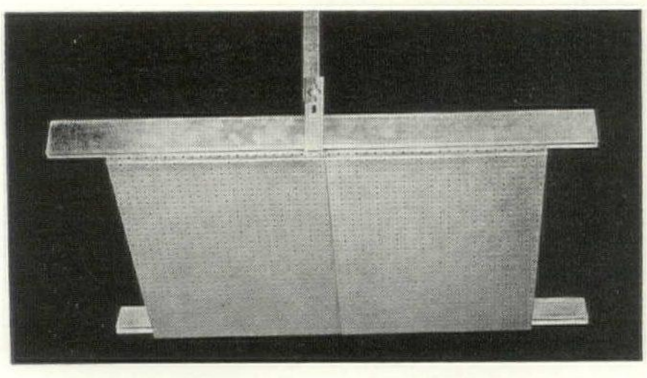
DIP PROCESS TO MIRROR-BRIGHTEN AND COLOR ALUMINUM is now available to industry.

Many European and some American manufacturers have been giving a bright dip to aluminum products for several years, but Colonial Alloys is a recent pioneer in commercializing a high gloss and iridescent coloring process for this metal. Aluminum and its alloys, including those containing copper, may be given a mirror-bright luster with reflectivity

comparable to that of chromium, or brightened and given a protective finish. By immersions in various aqueous solutions the products may be colored in brilliant shades or to simulate other metals such as gold, silver, brass, chromium or copper. In these processes the color finish becomes a permanent part of the metal. A chemist is not required to control the simple operation, consisting of a series of baths, some hot, in acidproof and common steel tanks. Cost of the chemicals is said to be nominal and their life expectancy high. Entire time of the cycle may take as little as five minutes, and in many instances fabricated parts can be put through the sequence without prior polishing or buffing. The resultant finish requires no after-lacquer and is claimed to have greater corrosion resistance than plated metals. The process may be licensed by manufacturers for operation in their own plants or Colonial Alloy will handle production on a contract basis at their Philadelphia plant, where samples will be processed free of charge and returned for evaluation. Those submitted should be small and of the wrought alloys. Castings, especially those containing silicon, cannot be expected to receive the desired finish. Specimens may be brightened only, brightened and protected, brightened and anodized clear, or brightened and anodized in color. If the latter, color should be specified.
Processor: Technical Processes Div., Colonial Alloys Co., Philadelphia 29, Pa.

ALUMINUM PANEL ACOUSTICAL HUNG CEILING is designed especially for gymnasiums.

Rugged and compact, Simplex gym ceiling panels measure 12 in. x 16 in. and are thick enough to take abuse without denting or falling out of place; each, however, can be removed for access to plumbing, wiring or ductwork above. The suspension system employed eliminates the standard cross furring, thereby cutting down labor and cost, and yet is rigid, providing ample support for fixtures. Cost of the ceiling to installers—including snap bar hangers and couplings, top and utility angles, slip molds and perforated panels—is 60 cents per sq. ft. This figure is claimed by the manufacturer to be 25 per cent less than any other type of hung ceiling specifically designed for gymnasium installations. Maintenance is a minor problem because painting is



unnecessary to protect the non-staining aluminum surfaces. The entire system is rust protected and fireproof. Where ceiling air-conditioning is used, every perforation in each panel may be utilized as an air delivery orifice to provide uniform air distribution. A 75 per cent noise reduction coefficient can be obtained by covering two-thirds of the ceiling area above with Simplex's sound absorbing pads of rockwool wrapped in flameproof paper.
Manufacturer: Simplex Ceiling Corp., 552 W. 52 St., New York 19, N. Y. (Continued on page 248)

HOME BUYERS ARE TALKING

. . . of course, it's Electric!

Home buyers *will* talk about your houses, and the way to get them talking favorably is to include the kind of cooking equipment more people want—modern Electric Ranges!

The trend to Electric Cooking is proved by the fact that another million American families switched to it last year.

So build houses that are modern today and will stay modern for years to come. During construction, include wiring for an Electric Range, leading to a range outlet in the kitchen. An Electric Range, like electricity itself, is now a "must" in every modern home!

ELECTRIC RANGE SECTION, National Electrical Manufacturers Association, 155 East 44th Street, New York 17, N. Y.

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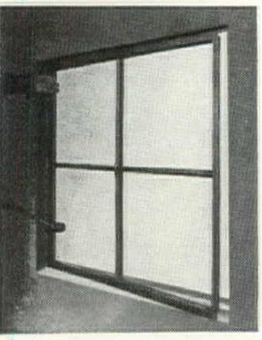
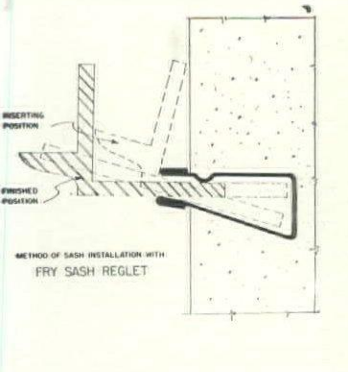
Follow the trend... **WIRE** YOUR HOUSES **FOR ELECTRIC RANGES**

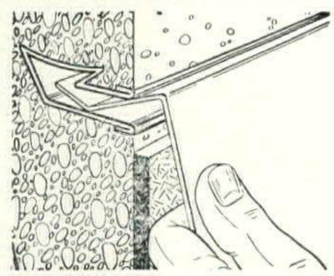
Another 1,000,000 American families switched to Electric Cooking last year





NEW METHOD OF INSTALLING METAL SASH eliminates all grouting and calking.

Sash installation takes less than five minutes with the Fry Sash Reglet method, which requires no expansion bolts, clips, angles, wedges or bracing wires. Utilizing instead a rolled metal section imbedded in the concrete wall or inserted in the masonry joint, this technique permits the contractor to put up the walls without having the sash on hand. For concrete construction the reglet, precut to size at the factory, is mounted on the wood buck and left imbedded in the wall after pouring and removal of the buck. Then the metal sash is inserted simply and quickly and the sill is cast to complete the installation. On masonry construction the reglet is set between the inner and outer brick courses by the mason. Insertion of the sash is the same as for concrete construction. In both, the rolled metal section applies a vise-like grip to the sash, according to the manufacturer, making the installation completely weatherproof. Fry Sash Reglet, including all hardware, clamps, plastic rope (used in counterflashing installations) and reglet cut to fit, can be supplied for any size opening in 26 gauge coated zinc steel at 43 cents per ft., f. o. b. Birmingham, Mich.; and at 58 cents per ft. in 16 oz. 24 gauge copper. Discounts on these list prices are allowed to authorized sash dealers.

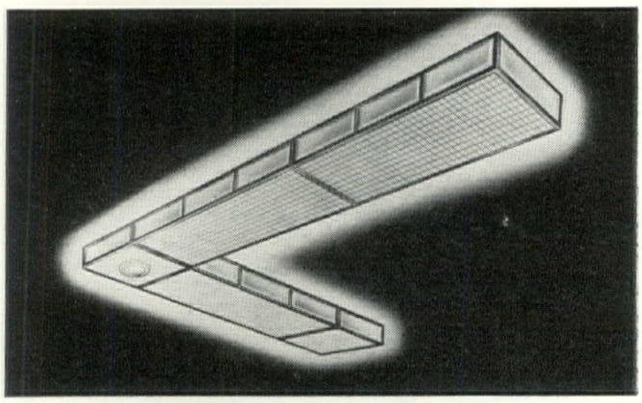


A similar reglet method has been developed by the manufacturer for installation of counter-flashing. Plastic rope, supplied with the reglet, is rolled into the space between the reglet and the flashing with a wheeled tool, making a solid and permanent contact at all points between the two surfaces.

Manufacturer: Fry Reglet Co., Div. of Watts Electric & Mfg. Co., 2222 E. Maple Rd. Birmingham, Mich.

MASS PRODUCED LIGHTING SYSTEM can fulfill custom fitted lighting requirements.

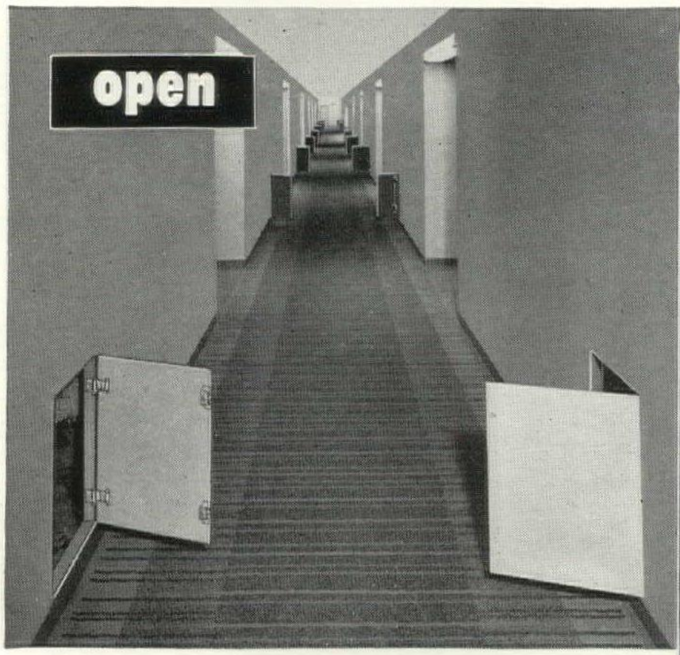
Suitable for use in institutions and office buildings, in elevators, corridors and large rooms, this new modular lighting system consists of four different fluorescent fixtures which may be installed in unlimited 90° patterns to conform with the building's design. The "Modules" fit together mechanically as well as electrically, all having a single or multiple standard measurement of 16¼ in. They may be used individually or combined in end-to-end, side-to-side and end-to-side domino fashion. Their white translucent plastic side panels and egg crate louvers mix all light sources and transmit equal low brightness throughout, regardless of the

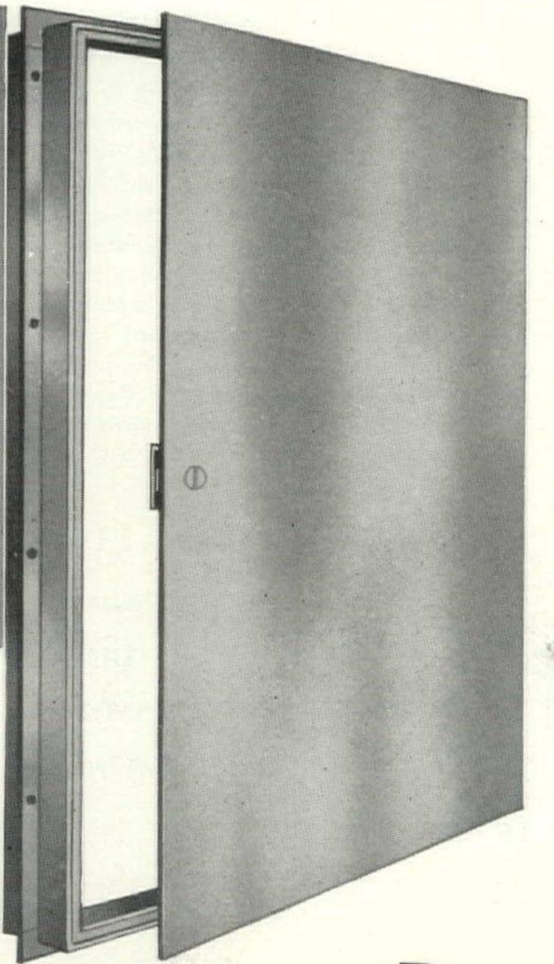


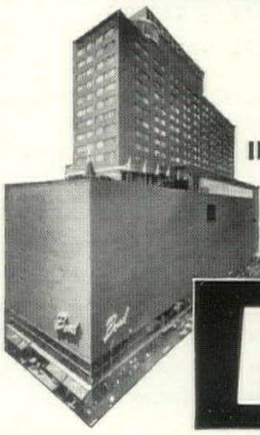
pattern. Clamp connectors simplify installation and rearrangement of the units. Module A, measuring 16¼ in. square, uses four 14 watt T-12 15 in. fluorescent lamps. Module B has the same outer dimensions and uses one 32 watt 12 in. diameter Circline lamp and one spot or floodlight lamp. Measuring 16¼ x 48¾ in., Module C employs four 40 watt T-12 48 in. fluorescent lamps and Module D, 16¼ x 97½ in., utilizes four 75 watt T-12 Millilamp Slimline lamps. Thus four popular commercial light sources—fluorescent, Slimline, Circline and incandescent—are integrated in one lighting system. Net prices for the fixtures in quantities up to 29 are: $20.62, $23.38, $38.04, and $90.27 for A, B, C, and D respectively. For quantities of 30 or more, prices are: $18.27, $20.70, $33.68, and $79.93.

Manufacturer: Mitchell Mfg. Co., 2525 Clybourn St., Chicago, Ill.

(Continued on page 250)





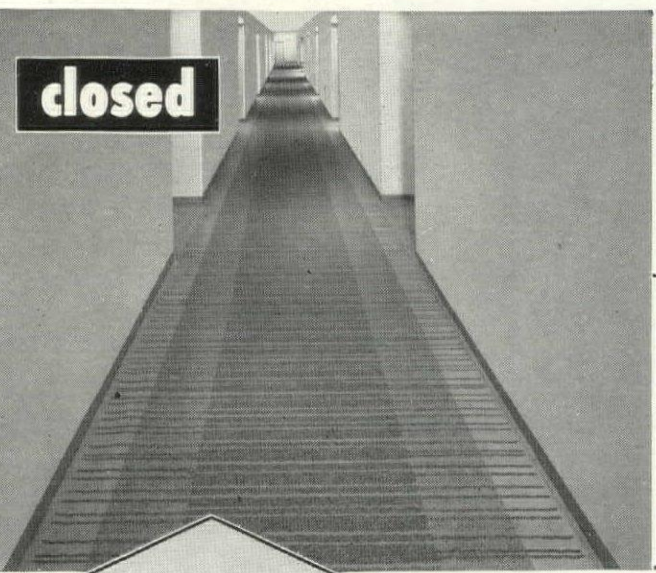


Ready to install • No special framing • Painted with rust-inhibiting prime coat • Concealed hinges • Flush, screw-type lock • 11 sizes — from 8 3/8" x 8 3/8" to 24 3/8" x 36 3/8" • For plastered or non-plastered walls • With or without expanded metal wings

IN CINCINNATI'S TERRACE PLAZA HOTEL

low-cost Milcor Steel Access Doors

provide instant access to all key points... yet blend invisibly into the wall when closed



Milcor Steel Access Doors are flush to the wall. Papering or painting right over them is easy. Quickly and easily installed, they tie right to the metal lath, actually save on building time.

Specify Milcor Steel Access Doors on all your jobs. Consult the Milcor Catalog in your Sweets File for details.

Tear out this coupon and mail today!

Inland Steel Products Co., 4033 W. Burnham St., Milwaukee 1, Wis.
Send me, without obligation, a Milcor Manual with full details on Milcor Steel Access Doors and other products in the complete Milcor Metal Lath line.

Name............ Title............

Company............

Company Address............

City............ (......) State............

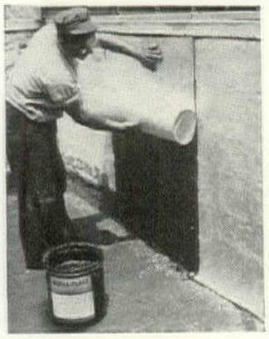
F-329

INLAND STEEL PRODUCTS COMPANY

Formerly Milcor Steel Company

4033 WEST BURNHAM STREET • MILWAUKEE 1, WISCONSIN

Baltimore 24, Md. • Buffalo 11, N. Y. • Chicago 9, Ill. • Cincinnati 25, Ohio • Cleveland 14, Ohio
Detroit 2, Mich. • Kansas City 8, Mo. • Los Angeles 23, Calif. • New York 22, N. Y.
Rochester 9, N. Y. • St. Louis 10, Mo.



COLD SETTING ADHESIVE, having permanent waterproofing qualities, will adhere to aluminum.

Easily applied by trowel, brush or spray, Nerva-Plast gives complete water and weather protection to roofs, concrete and steel decks, parapets, and gutters at a cost of about two cents per sq. ft. to the consumer. This cold plastic cement, composed of asphaltic hydrocarbons in a patented polymer base, is intended for outside waterproofing jobs on walls, tunnels and subways; used on the warm side of walls, it makes them impermeable to moisture vapor and prevents delaminations. Its adhesive and cohesive properties establish an immediate and lasting bond with felt, building papers and all types of metal—including aluminum. Where hot applications are undesirable, such as on steeply inclined surfaces, Nerva-Plast is especially useful. It is packaged in 1 gal. cans, 5 gal. pails and 55 gal. drums. Coverage is approximately 75 sq. ft. per gallon.

Manufacturer: Rubber & Plastics Compound Co., Inc., 30 Rockefeller Plaza, New York 20, N. Y.

ANTI-BACTERIAL CEMENT for swimming pool and locker room floors and walls reduces chances of infection.

Mixed and used like ordinary Portland cement and having the same physical attributes, this cement also kills bacteria and fungi on contact—and is said to retain its germicidal power indefinitely. Growth of pathogenic organisms and lactic bacteria (prevalent in dairies and food plants) is greatly inhibited on Anti-Bacterial Cement floors and walls —even while damp or wet. The product is non-toxic to animals and humans, however. Considerably more expensive than regular Portland, it does cost less per sq. ft. than installations of acid-resistant quarry tiling.

Manufacturer: North American Cement Corp., 41 E. 42 St., New York 17, N. Y.

PENETRATING MINERAL COATING preserves masonry surfaces by hardening and binding loose particles.

Serving as a long-lasting protective coat for concrete, stucco, cinder and cement blocks, stone, masonry, etc., Curex, an all-mineral coating, is particularly suited for use on schools and other institutions where maintenance costs must be kept to a minimum. When applied according to directions, this fluid stone forms into silicates and petrifies into a homogeneous, insoluble steel-like bond between all the particles, the chemical hardening process actually reaching far beneath the surface. Its protective quality lies in its water repellency and resistance to atmospheric corrosion and acids. For very absorbent surfaces Curex sealing and hardening liquid is recommended as a foundation. To retain the existing color of the masonry, this sealer may be used alone as a clear protective coat. White Curex and seven tinted shades sell for $3.95 a gallon. Cost per sq. ft. is estimated at two cents. The coating is also obtainable in a brick red color at $4.95 a gallon.

Manufacturer: Pavinoleum, Inc., 342 Madison Ave., New New York 17, N. Y.

NONSLIP FLOOR POLISH gives long-lasting high sheen to hardwood and gymnasium floors.

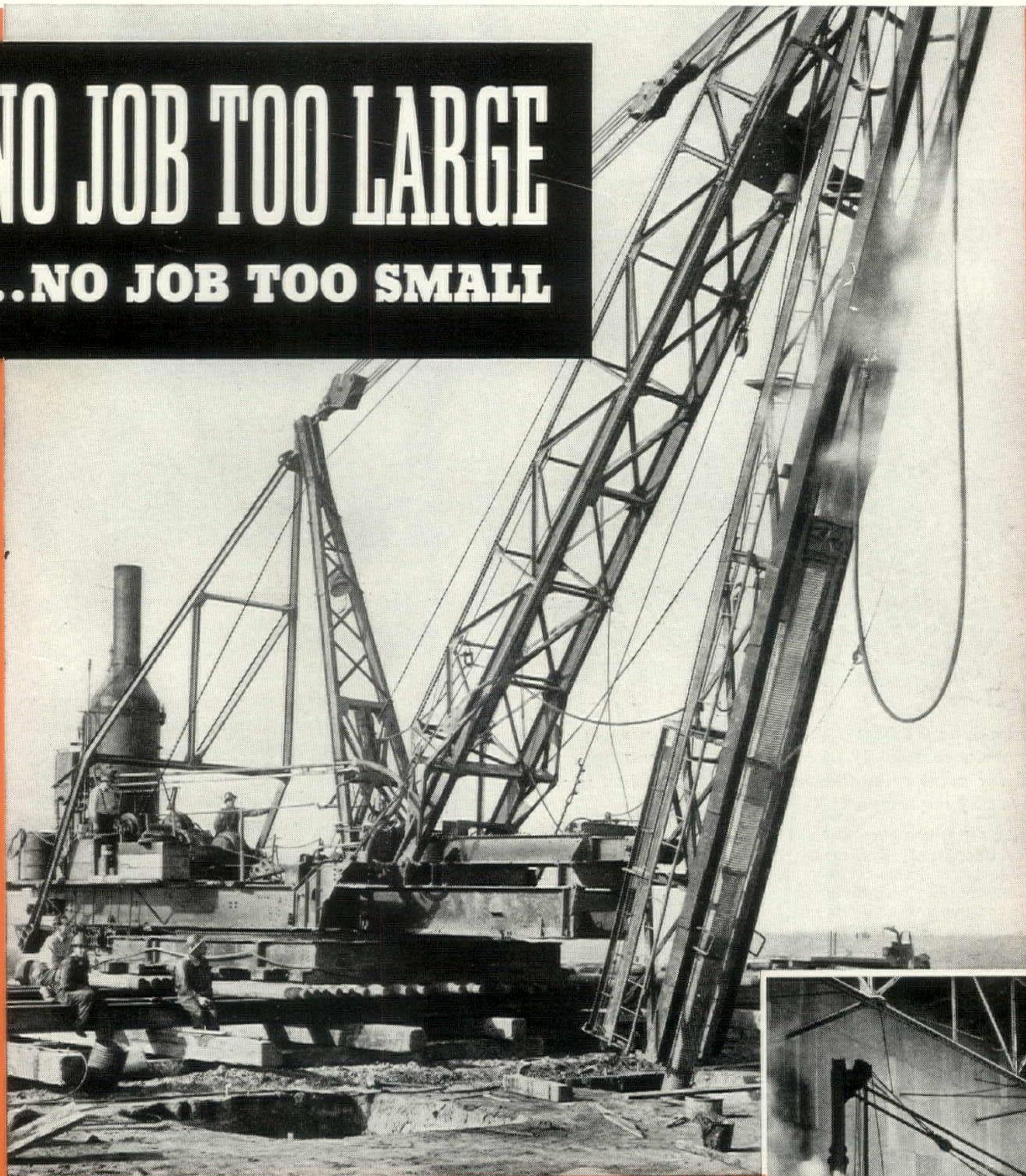
Exceptionally resistant to scuffing and traffic wear, Trafco is a recently formulated solvent type polish with a spirit base for use on wood floors. Its chemical composition of gums and resins gives the optical effect of wax but presents a continuously high friction coefficient to inhibit slips and falls and withstand the usual skid and stop marks of hard play on gym floors. In a test application on a country school's wood floor, which received heavy wear and more than the average tracking of grit and mud, Trafco was found to be still in good service after five weeks, against the one week duration of other polishes used previously. Only normal cleaning and an occasional buffing were reported necessary to preserve it. Buffing, in fact, enhances the polish's non-slip qualities as well as its appearance. Single gallon containers sell for $3.80; 5 gal., $3.50 per gal.; 15 gal., $3.25 per gal.; 55 gal., $2.95 per gal.

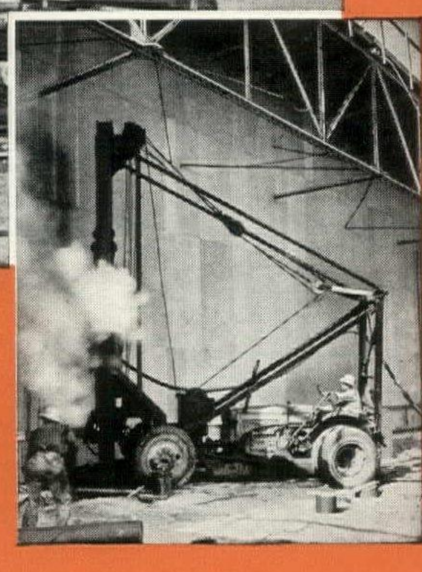
Manufacturer: Walter G. Legge Co., Inc., 101 Park Ave., New York 17, N. Y.

(Continued on page 252)

NO JOB TOO LARGE

...NO JOB TOO SMALL





AROUND THE WORLD

From a job of a few piles to one requiring many thousand piles, from a single caisson to a skyscraper foundation, from a simple soil investigation to a complete port development—no job is too large or too small for the Raymond organization. Specialized equipment, broad experience and highly trained personnel are your assurance of dependable work at minimum cost.

Your inquiry will receive prompt attention.

52 YEARS FOUNDED 1897 OF PROGRESS

RAYMOND CONCRETE PILE CO.

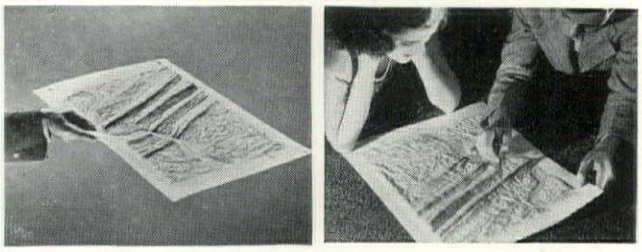
140 CEDAR STREET • NEW YORK 6, N. Y.

Branch Offices in Principal Cities of United States and Latin America

SCOPE OF RAYMOND'S ACTIVITIES includes every recognized type of foundation construction—concrete, composite, precast, steel, pipe and wood piles. Also caissons, underpinning, construction involving shore protection, shipbuilding facilities, harbor and river improvements and borings for soil investigation.

LIGHTWEIGHT PLASTIC RELIEF MAPS are suited for classroom use.

Manufactured by a process employed during the war for radar briefing maps, portfolios of 12 vinyl maps, representative of different physiographical formations in this country, are now generally available at $30 per set. In lots of ten or more portfolios the price is $18.20 per portfolio, postpaid anywhere in the U. S. Each map measures 13 x 17½ in. and weighs only 4 oz. Dust or soil can be removed with a damp cloth. Hot weather or humidity will not affect the vinyl composition.



Maps for large scale building or development projects will be made from survey data by Aero in either phenolic resin or rubber (which snaps back into shape after being folded in pocket or briefcase) on special order. For a terrain map representing the relief features of an area several acres in size, the model would cost about $75 to $100 per sq. ft. of model area. Scale for such a map would be 1 in. equals 25 ft. Duplicates of the map, having a maximum size of 4 x 4 ft., would be approximately $250 each.

Manufacturer: Aero Service Corp., 236 E. Courtland St., Philadelphia 20, Pa. *(Continued on page 256)*

Whenever you want *structural* permanence combined with lasting beauty...**use U·S·S Stainless Steel**

"Probably the most permanent building material known"—That's how a leading architect describes Stainless Steel.

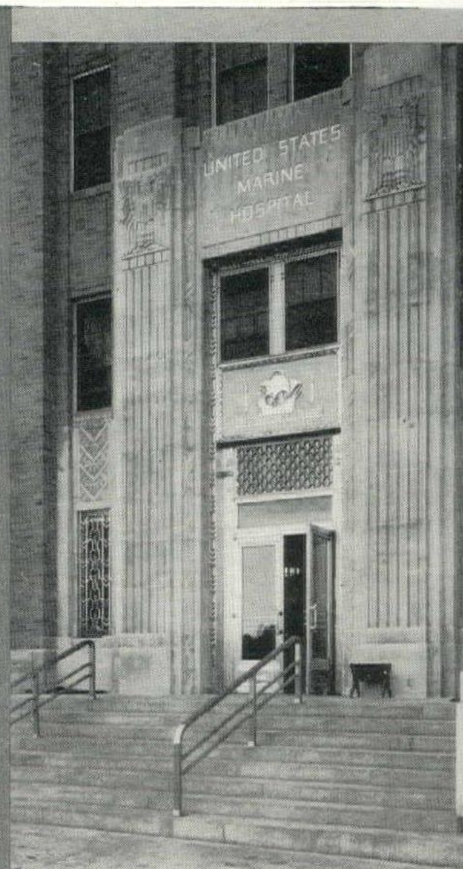
While recognizing fully the decorative virtues of Stainless Steel, he bases his conclusions purely on the utilitarian properties in structural design that set Stainless in a class apart.

Briefly, these are his reasons: Stainless provides the highest strength-to-weight ratio. It assures unsurpassed resistance to corrosive attack. It remains virtually unaffected by extremes of heat or cold. It resists wear, abrasion, and severe service far better and longer than almost any other material. It never bleeds or discolors adjacent areas. Stainless Steel remains untarnished, undimmed.

These qualities stamp Stainless Steel *not* as a luxury material, but as one of the most practical. These are the reasons why Stainless reduces maintenance costs to a very minimum, and why, for most structural applications, Stainless Steel in the long-run is actually the lowest-cost material that can be used.

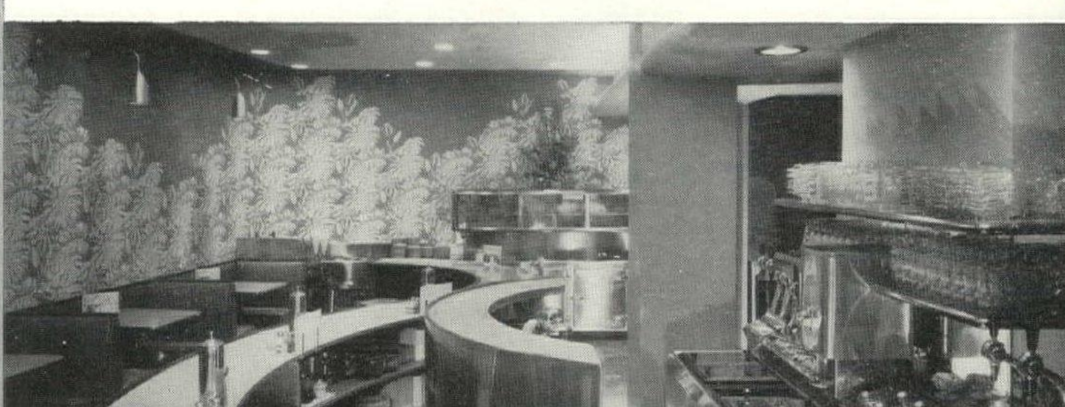
U·S·S 18-8 Stainless Steel—a perfected, service-tested Stainless—is available in a wide variety of commercial shapes, forms, and sizes, and in the standard finishes used for architectural purposes.

U·S·S Stainless Steel specialists will gladly cooperate with you in developing your designs to include Stainless Steel most economically. Simply call the United States Steel subsidiary office nearest to you, or send a postal card to United States Steel, 2111 Carnegie Building, Pittsburgh 30, Pennsylvania, and say, "Send a Stainless Steel man to see me."



HERE, U·S·S Stainless Steel lends lasting beauty to the imposing doorway of the Marine Hospital on Staten Island. Is also used in the roofing sheets of this building to ensure permanence and eliminate frequent cleaning.

THE ATTRACTIVE CLEANLINESS assured by the use of Stainless Steel in the serving counter and food dispensing equipment of this West Coast restaurant adds an air of good taste and charm that invites patronage. The smooth, hard surface and inherent toughness of Stainless mean easy cleaning and less maintenance for the owners.



Here's where U·S·S Stainless Steel will improve appearance, prolong life and reduce costs.

- Gutters, leaders and flashings
- Copings and cornices
- Window frames, sashes and screens
- Show windows
- Sculpture-relief or free standing
- Elevator doors and cars
- Heating panels
- Stair and door nosings
- Hardware
- Fireplace facings
- Multistoried building pilasters
- Chutes and conveyors
- Parapets and spandrels
- Wallpanels or structural units
- Sills
- Store fronts
- Doors, interior and exterior
- Kick plates and push plates
- Stair rails
- Escalator housings
- Interior and exterior trim
- Shower stalls
- Grilles, plaques, louvers
- Revolving doors
- Cold-formed sections
- Decorative trim

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO · CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO · NATIONAL TUBE COMPANY, PITTSBURGH · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

UNITED STATES STEEL

These buildings were stuccoed with Brixment nearly 20 years ago. They are still in perfect condition.

YOU'LL GREATLY PREFER BRIXMENT STUCCO, TOO!

More Brixment is used for *brickwork* than any other masonry cement on the market. Literally thousands of architects, contractors and bricklayers prefer Brixment to any other mortar material.

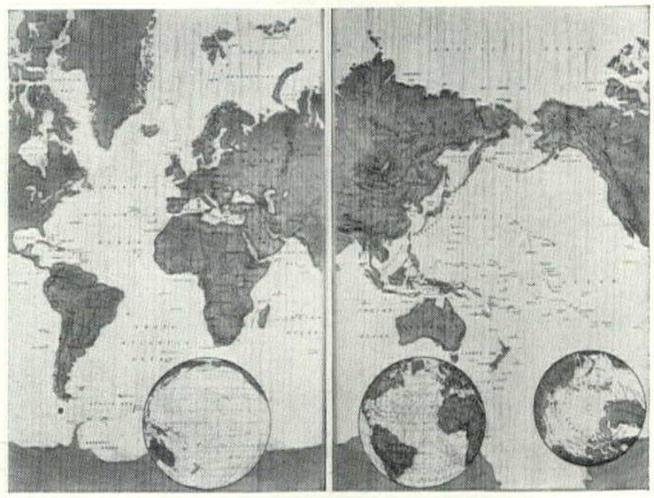
Brixment makes better, more economical *stucco*, too. It is more plastic and easier to apply. It is used in leaner mixes, hence reduces hair-checking and crazing. It is stronger, more weatherproof and more permanent than "workable mixes" of portland cement and lime.

Brixment can cut your costs and give you *better stucco jobs*. For proof, please ask your dealer (or write us) for a copy of the handbook "Brixment for Stucco and Plaster."

LOUISVILLE CEMENT COMPANY, Incorporated, LOUISVILLE, KENTUCKY

WORLD MAP is decorative and useful wall covering.

Well adapted for use in classrooms, school libraries and principals' offices is Schmitz-Horning's attractive world map wallpaper. The design is drawn to accurate scale and consists of two panels, each measuring 40 in. wide by 60 in.

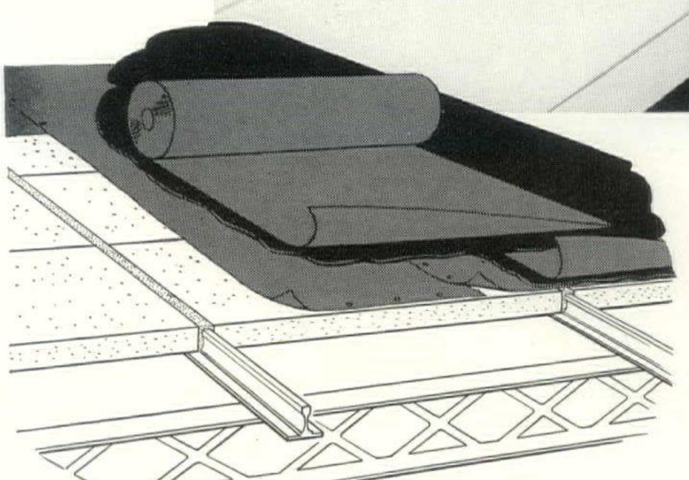


high. In full color on an off-white background, the set retails at $15; in sepia on wood grain, the price is $9. Dust, finger smudges and pencil marks may be removed easily with soap and water. The two panels may be hung so that either Europe and Asia or the America's are centered.

Manufacturer: Schmitz-Horning Co., 777 E. 82 St., Cleveland 3, Ohio. *(Continued on page 260)*

Only **KAYLO**® **ROOF TILE**

—INSULATES
—*and* IS LIGHTWEIGHT
—*and* IS LOAD BEARING
—*and* IS NON-COMBUSTIBLE



Kaylo Roof Tile is composed of one part inorganic materials and four parts submicronic voids . . . formed into a wire-mesh-reinforced tile 2⅝ x18x36 inches.

The result is a roof-deck material with characteristics no other single material offers—

INSULATION VALUE equal to 1½-in. standard insulating board. No extra insulation needed on normal jobs.

LIGHT WEIGHT—5 lbs. per sq. ft.—permits substantial savings through lighter roof structure and makes it easy to handle and lay.

STRUCTURAL STRENGTH, with load factor of 50 lbs. or more per sq. ft.—Kaylo Tile, covered with roofing material, forms the completed roof.

FIRE PROTECTION—Kaylo Roof Tile is non-combustible, protects against fire for well over 1 hour under standard test conditions.

See Sweet's File — or write Dept. F-447 for sectional sample and complete information.

SIMPLE, FAST CONSTRUCTION

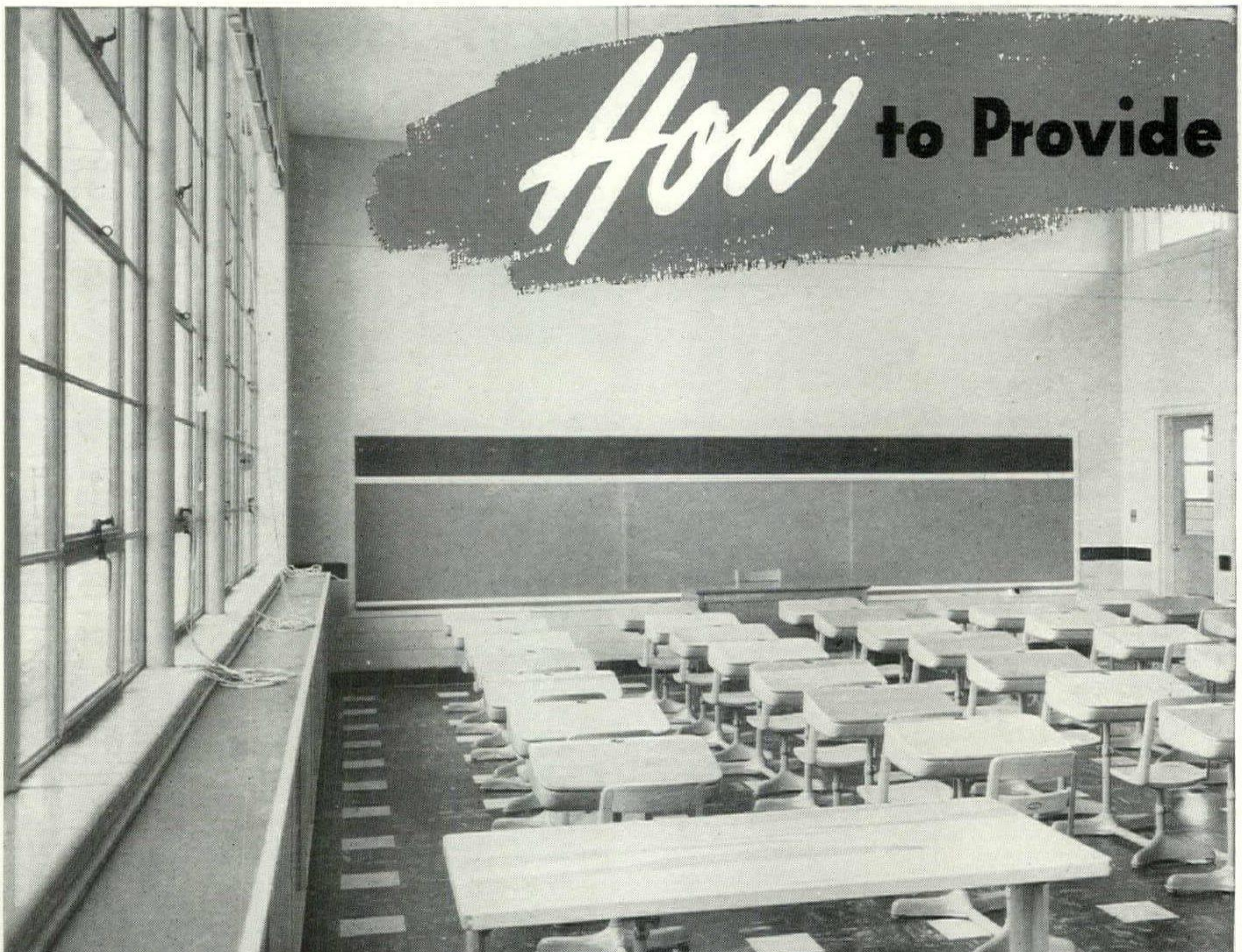
Kaylo Roof Tile are laid on sub-purlins or structural steel members or nailed to wood joists. End joints are grouted. Roofing material is applied on tile. No special skills or tools are required, and one man easily handles the 23-lb. tile.

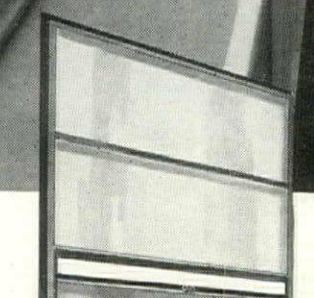
KAYLO®

INSULATING ROOF TILE

Kaylo Division • OWENS-ILLINOIS GLASS COMPANY • Toledo, Ohio

SALES OFFICES: Atlanta • Boston • Buffalo • Chicago • Cincinnati • Dallas • Minneapolis • New York • Philadelphia • St. Louis • Toledo • Washington





SCHMIDT & PAOLINELLI,
Architects

INTERMEDIATE PROJECTED—1. Built-in weathering is integral with window sections. 2. When glazed, all glass is in same plane. 3. Frame section has ½" return on inside, permitting plastering and still providing space for attaching blinds and shades. 4. Extra strong—frame section is 1½" deep and ventilator section is 1⅜" deep. 5. Treated with Bonderite process.

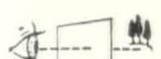
ARCHITECTURAL PROJECTED—1. Same type of controlled ventilation as with Intermediate but more economical. 2. Frame section has similar ½" return on inside. This provides space for attaching window accessories. 3. Extra strength provided in frame—1⅜" deep. Ventilator is even heavier—1½" deep. 4. Treated with Bonderite process.

In construction products **CECO ENGINEERING**

the Best Lighting for Schools

Consider the superiority of natural daylight . . . Our bodies and minds, in the main, evolved outdoors. In the recent dim past, man came inside. But since the eye evolved in natural daylight, it is just common sense that vision is best under daylight environment.

Investigate the availability of daylight in your area . . . It is important to know the amount of available daylight so you can plan for adequate illumination. The United States Weather Bureau records provide information showing the average number of clear days anywhere in the United States. For complete information, consult the United States Weather Bureau.



Explore the importance of distant vision . . . Medical science recognizes the importance of distant vision. Strain on the body, eyes and the mind is relieved through looking at distant views. Consult medical authorities for additional information on this important point.

Find out what type of window lets in the most daylight—assures distant vision . . . As a preliminary aid, consider these facts . . . steel windows admit more daylight than any other type of window design since they employ clear glass. Full height steel windows also provide more distant vision than any other window opening. There is less obstruction since frames and muntins are slender.

Determine what type of window gives the best ventilation . . . Steel windows provide more controlled ventilation than any other type of window opening. In fact, up to 100%. Stray breezes are captured and distributed all over the room. Drafts are controlled. Steel windows assure the greatest amount of life-giving pure fresh air.

Compare costs . . . The cost of steel window daylighting will vary according to localities. But, broadly speaking, comparisons show other types of window design cost from 10% to 200% more. In addition, the cost of artificial illumination is reduced and mechanical ventilation is eliminated.

Write for Ceco data booklet . . . Consider the 6 points above on illuminating schoolrooms. Then, for complete data, write Ceco for FREE descriptive booklet entitled "Better Environment Through Daylighting in Schools." The booklet covers other important subjects such as—Light Reflectance, Seating Arrangement, Light Control, Building Positioning.

BETTER LIGHT . . .
BETTER SIGHT . . .
BETTER HEALTH . . .

THROUGH METAL WINDOWS

CECO STEEL PRODUCTS CORPORATION

General Offices: 5601 West 26th Street, Chicago 50, Illinois

Offices, warehouses and fabricating plants in principal cities

CECO STEEL®

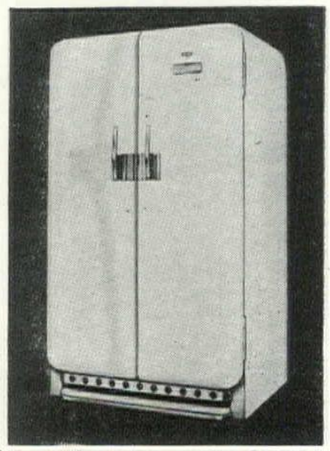
makes the big difference

Partial List of Ceco Products

METAL RESIDENCE CASEMENTS • INDUSTRIAL WINDOWS AND DOORS • METAL FRAME SCREENS • ALUMINUM FRAME STORM WINDOWS • ALUMINUM COMBINATION STORM WINDOW AND SCREEN UNITS • METAL LATH AND ACCESSORIES • STEELFORMS • REINFORCING BARS • STEEL JOISTS AND ROOF DECK • HIGHWAY PRODUCTS • CORRUGATED ROOFING • ATTIC AND ROOF VENTILATORS

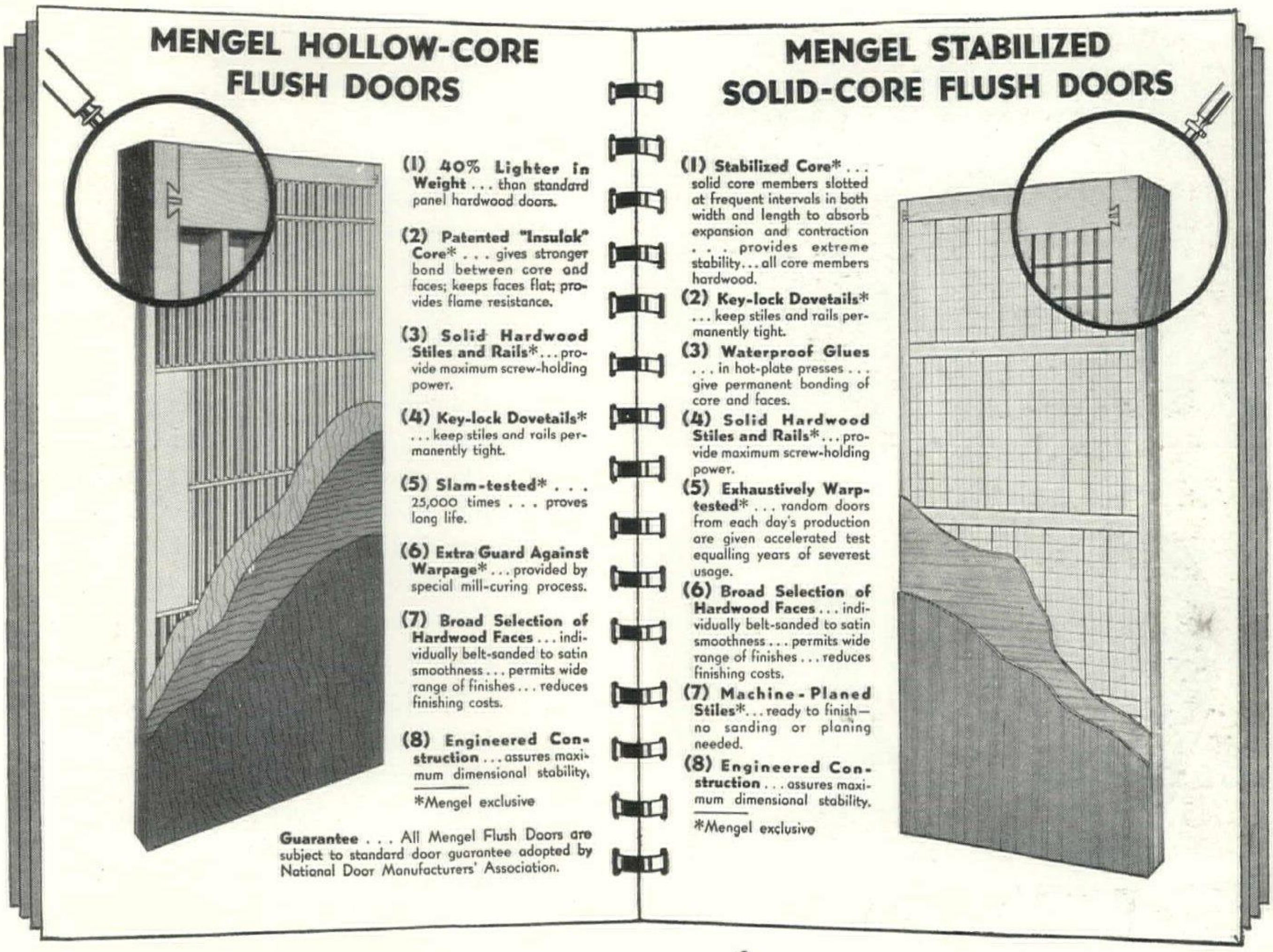
BUILDING REPORTER

COMMERCIAL REACH-IN REFRIGERATORS of new design are available in ice-making and forced air models.



Styled as highly as their household counterparts, these new Raymond Loewy-designed refrigerators for restaurants and institutions have capacities of 17, 27, 44 and 62 cu. ft. The 17 cu. ft. model pictured is of the ice-making type; the larger models feature a unique forced air unit. Cabinets are heavy gauge steel with welded over-lap joints sealed to keep out moisture, and interiors are white porcelain with acid resistant bottom panels. Fibrous glass 3 in. thick insulates the walls, top, bottom and doors. An improved sealed and self oiling compressor is housed in a small ventilated space below the food compartment, and air intake openings in a stainless steel toe strip provide a continual flow of cool air over the condenser and compressor, affording greater refrigeration capacity and lower operating costs. The entire refrigerating mechanism slides out as a package when a panel in the compartment is removed and two bolts are loosened. A continuous flow of cold air is provided in the three larger models by means of a fan enclosed in the ceiling which draws warm air from the food compartment and forces it over a large fin type cooling unit. Cold moist air is then returned to the

(Continued on page 264)



MENGEL *Flush* DOORS—

the Engineered Doors You Can Really TRUST

LET'S dispense with the pretty words and pictures, and talk *business.*

You as an architect, and we as one of the world's largest manufacturers of wood-products, have an identical interest in doors—to give our customers such *permanent values* as to warrant their continued confidence and patronage.

For many years, Mengel has built that kind of values into flush doors. Mengel Doors have been tested and proved in every-day use, while *random doors, taken from each day's production, are warp-tested, "decomposition-tested", and otherwise checked under conditions so severe as to equal years of use.*

We ask you to study the features, above. We believe they are precisely the features *you want in your doors.* The coupon will bring you complete information and specifications.

Plywood Division, THE MENGEL CO.
Louisville, Kentucky.

THE MENGEL COMPANY
Plywood Division, Dept. AF-3, Louisville 1, Ky.

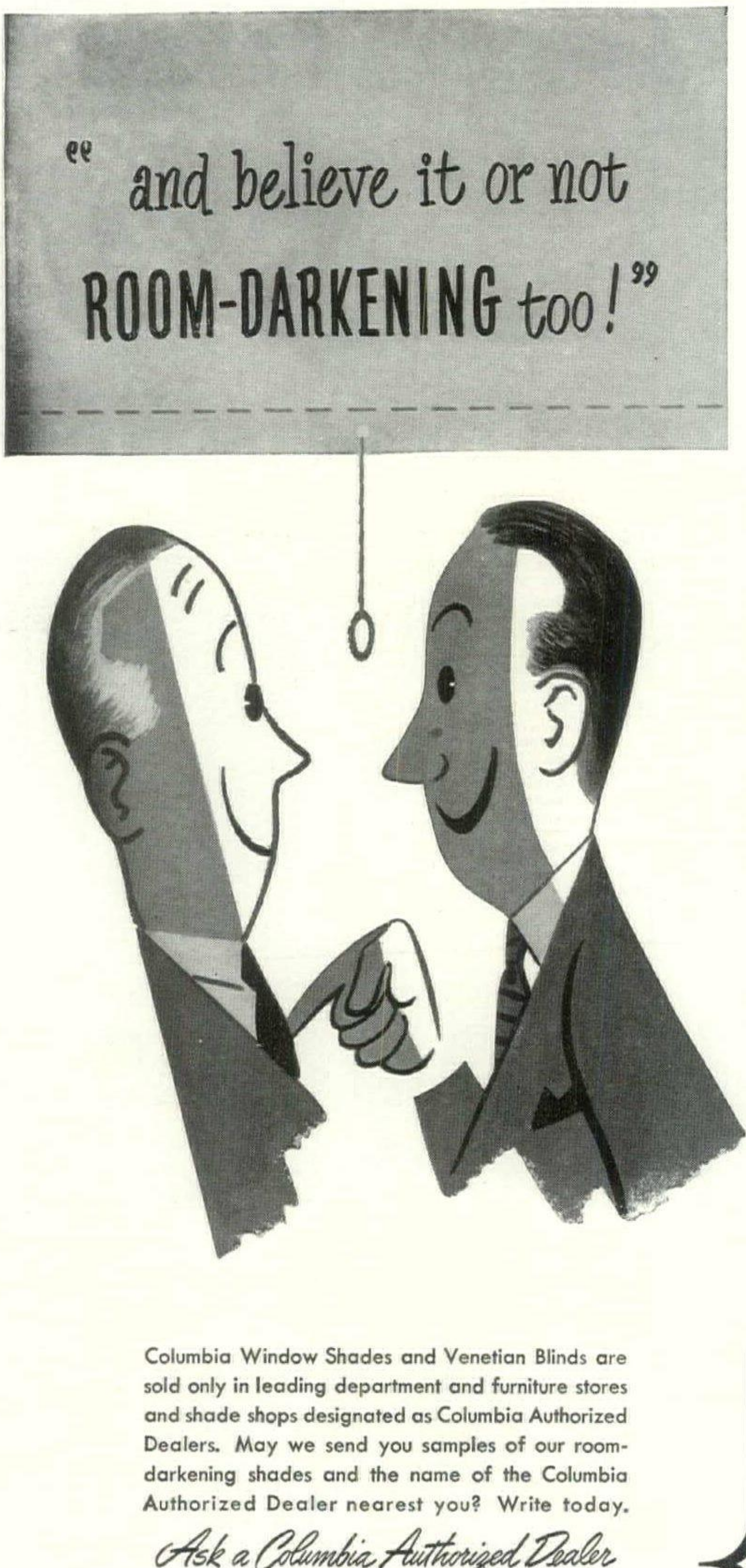
Gentlemen: Please send me a free copy of the complete "AIA File" data book on Mengel Flush Doors.

Name____________________

Firm____________________

Street____________________

City__________ State__________



Columbia's room-darkening window shades revolutionize light control. They're decorative and functional, too. Sturdy, long-wearing... with the additional special talent of shielding a room from light.

Look for room-darkening shades in Columbia's REGAL grade. Made of high-count cambric, with a truly beautiful "hand" and a smooth, dust-shedding surface. Economically priced... and easily washable for thrifty maintenance. In light as well as dark colors.

See Columbia's VELLMO, too, a super quality grade, so completely lightproof that it's standard for such uses as X-ray rooms. And here's the surprise ... VELLMO boasts high-style pastels and dazzling white. Any size you need up to 150 inches wide!

Columbia Window Shades and Venetian Blinds are sold only in leading department and furniture stores and shade shops designated as Columbia Authorized Dealers. May we send you samples of our room-darkening shades and the name of the Columbia Authorized Dealer nearest you? Write today.

Ask a Columbia Authorized Dealer

PERFECT FOR

- hotel rooms.
- hospital rooms.
- housing projects.
- school rest rooms, auditoriums.
- recreation and convention rooms with television sets.

Columbia

WINDOW SHADES
AND VENETIAN BLINDS

THE COLUMBIA MILLS, INC., • 428 SOUTH WARREN STREET, SYRACUSE 2, N. Y.

TURN ON THE SUNSHINE

The NEW *Leader* SUNLIGHTER

(First successful sun-ray reproduction over large areas)

Excellently suited for use in CLASSROOMS GYMNASIUMS · ASSEMBLY HALLS · HOSPITALS SANITARIUMS · OFFICES FACTORIES · BOWLING ALLEYS

At last, a reproduction of the sun's most desirable ultra-violet rays—the rays that tan the skin to a robust tone, produce Vitamin D; help in the deposition of calcium for sounder teeth and more rugged bones, to cure and/or to ward off rickets; *all* the benefits to health of the sun's ultra-violet rays.

A 3-lamp ensemble

STAYS COOL

with the sun-lamp centered between lighting lamps. Length of lamps gives effectiveness over large area . . . Available in 64", 72" and 96" LEADER Slimline models. Also in LEADER SM-240 (4 ft.) and SM-2-100 (5 ft.) . . . 40/60 LIGHT DIFFUSION—plus sun-rays . . . Complete specifications upon request.

LEADER leads again! IMMEDIATE DELIVERY on this revolutionary fixture!

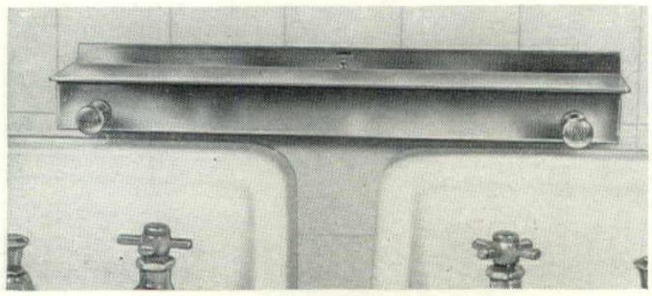
Not a theory for the future but an actuality for immediate delivery: LEADER'S SUNLIGHTER—a 2-in-1 fluorescent fixture of quality illumination and a successful duplication of sunlight's ultra-violet rays.

Here is a sun-lamp fixture that eliminates the faults of previous sun-lamps. The first ultra-violet radiations similar to sunlight: 2800-to-3200 Angstrom band . . . a continuous band concentrated in the most biologically effective spectral region . . . produces Vitamin D in very substantial quantities . . . (Undesirable wave-lengths are blocked out . . . lamp stays cool to the touch during use!)

Sold and installed only by the better electrical wholesalers and contractors

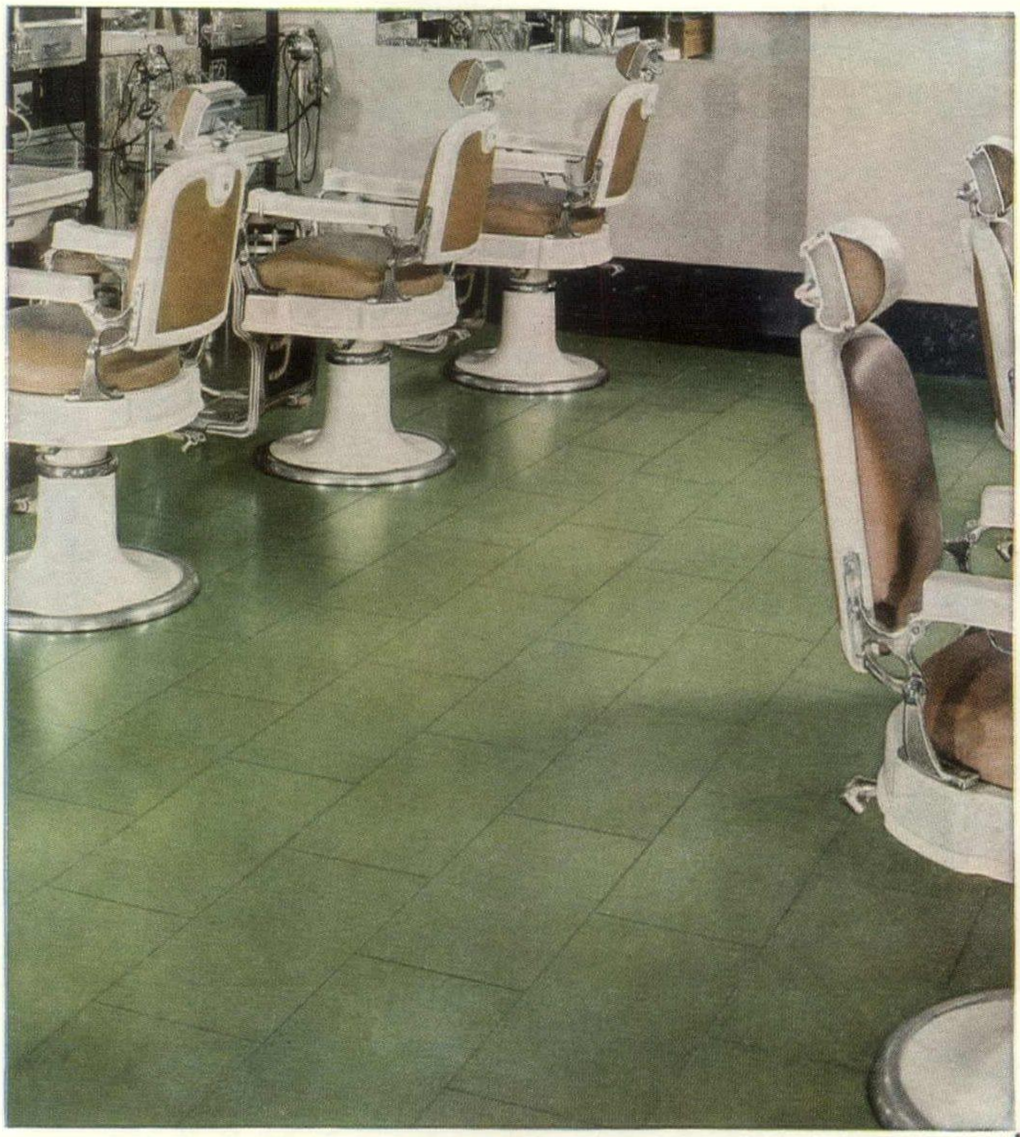
LEADER ELECTRIC COMPANY
3500 North Kedzie Avenue, Chicago 18, Ill.
West Coast Factory: 2040 Livingston, Oakland 6, Cal.

lower part of the compartment by a concealed duct and distributed through an opening extending the width of the cabinet. Prices, f.o.b., Dayton, Ohio, are $615 for the 17 cu. ft. ice-maker; $630 for the 27 cu. ft. model; $871 for the 44 cu. ft. model; and $1,039 for the 62 cu. ft. model.
Manufacturer: Frigidaire Div., General Motors, Dayton 1, Ohio.

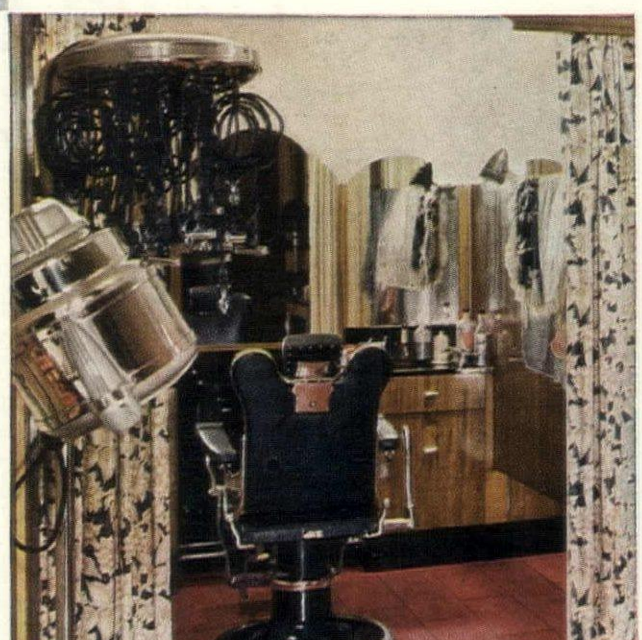


STAINLESS STEEL SOAP DISPENSER doubles as shelf.

Made of 18-8 polished stainless steel, the Lathurshelf dispenses a measured amount of lather and provides a convenient shelf for toilet articles. Any grade of 8 to 20 per cent liquid soap may be used, and because the soap is pumped, leaking and dripping are avoided. Features include a visible liquid gauge, concealed screw or toggle bolt heads, a snap lock cover. The dispenser measures 20 in. long x 4½ in. wide x 2 in. high. Lathurshelf No. 81, having one lather valve, lists at $27. No. 82, with two valves 17 in. apart to serve two wash basins, sells for $33. Both models have ½ gal. capacity.
Manufacturer: American Dispenser Co. Inc., 115 E. 23 St., New York 10, N. Y. *(Continued on page 270)*



Will Your Floors Look Like These After 13 Years?



In 13 years . . . these VINYLITE Plastic floors have been walked on by 676,000 customers! They have cushioned millions of steps of barbers and beauticians. They have taken nearly 700 washings and waxings!

Yet no wear is apparent and the floors virtually look like new!

They were laid experimentally in 1936 in a New York City barber and beauty shop. Made of VINYLITE Brand Plastic, these flexible tiles have supported the wheels or feet of chairs, tables, vibrators, sun lamps and dryers—without injury.

Cigarettes, dropped on it by the thousands, have left no marks. Neither have hair tonics, nail polish, nail polish removers, oils, hair dyes, bleaches, alcohols. Its beauty is unblemished. Foot and leg weariness of barbers has been vastly reduced.

Technical men believe it comparable to an achievement at the Chicago World's Fair in 1933. Then, a similar VINYLITE Plastic floor was walked upon by between 19 and 20 *millions of people*—without appreciable wear!

It shows dramatically why so many architects today choose tile and continuous flooring of VINYLITE Plastic for schools, homes, cafeterias, lobbies, kitchens, stores, public buildings and institutions.

Remember, it comes in a wide range of fast colors—the clearest ever available in flexible flooring.

Write Department HA-14 for information—and a list of representative suppliers.

Vinylite BRAND **PLASTICS** TRADE MARK **BAKELITE CORPORATION**

BAKELITE CORPORATION

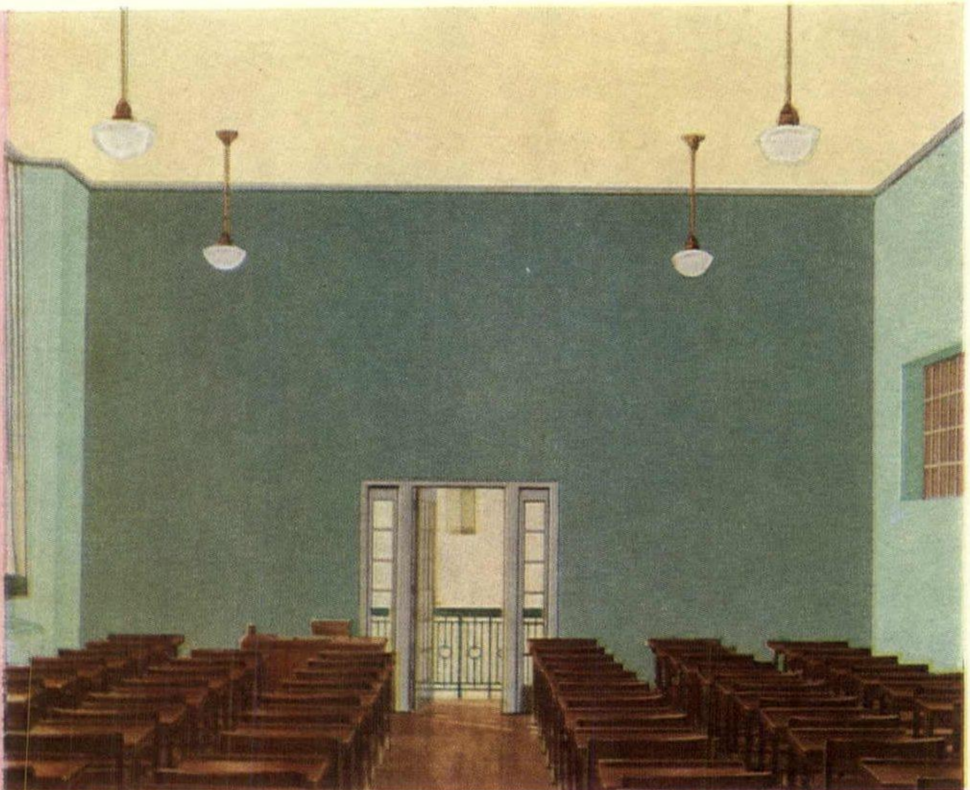
Unit of Union Carbide and Carbon Corporation UCC 30 East 42nd Street, New York 17, N. Y.

PITTSBURGH

COLOR DYNAMICS

utilizes energy *in color* to reduce eye fatigue among pupils and teachers alike — aids concentration, stimulates energy, improves morale.

★



Free—COLOR DYNAMICS Survey for School Buildings You Plan to Build or Remodel

BECAUSE of their important psychological and physical effects upon human beings, colors used for decorative purposes in schools and colleges have taken on new significance in recent years.

Entire school buildings are now being painted according to the principles of Pittsburgh COLOR DYNAMICS to promote health, happiness, efficiency and safety. This new painting method utilizes the *energy* which science has proved colors possess.

By the purposeful use of this energy, schoolrooms are given color arrangements in keeping with the activities for which the rooms are used. Colors in study and classrooms diffuse light instead of reflecting it. Eye fatigue is lessened.

Rest rooms and cafeterias become cheery and restful. Libraries suggest quietness for concentration.

With COLOR DYNAMICS, proper colors are also creating changes in appearance. Rooms are being painted to seem more spacious, halls to appear wider, ceilings to look higher or lower as desired. Wherever COLOR DYNAMICS has been applied, the efficiency and morale of pupils and teachers alike have been improved.

We'll be glad to make a scientific COLOR DYNAMICS *engineering survey* of school buildings you are now planning to build or remodel —*free* and without obligation on your part. Send for the interesting booklet which describes this painting method and how it works.

There's a Pittsburgh Paint For Every Painting Need

WALLHIDE—PBX, extra-durable; **SEMI-GLOSS**, for higher sheen; **FLAT**, for velvet-like finish; **GLOSS**, for severe service and frequent cleaning.

LAVAX PBX ENAMEL—durable finish for interior use. Dries quickly to an eggshell finish that eliminates glare. For wood, metal or other surfaces.

FLORHIDE—for floor surfaces; can be scrubbed repeatedly with soap solutions.

Pittsburgh Plate Glass Co., Paint Div.
Dept. AF-109, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your new revised and enlarged Booklet, *"Color Dynamics."*

☐ Please have your representative call for a Color Dynamics Survey without obligation on our part.

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*City*____________________

*County*__________ *State*__________

FREE BOOKLET! ➡

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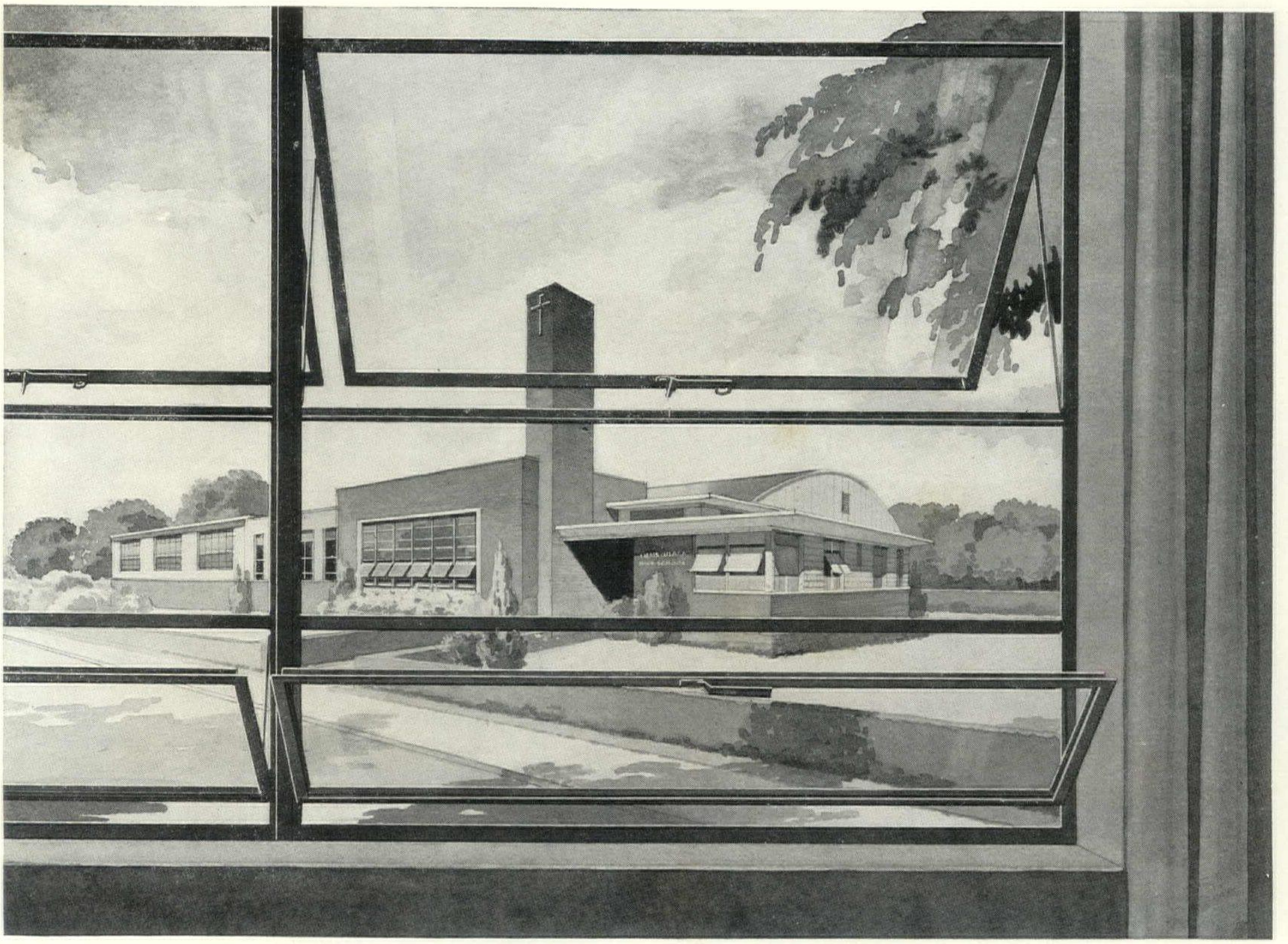
PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

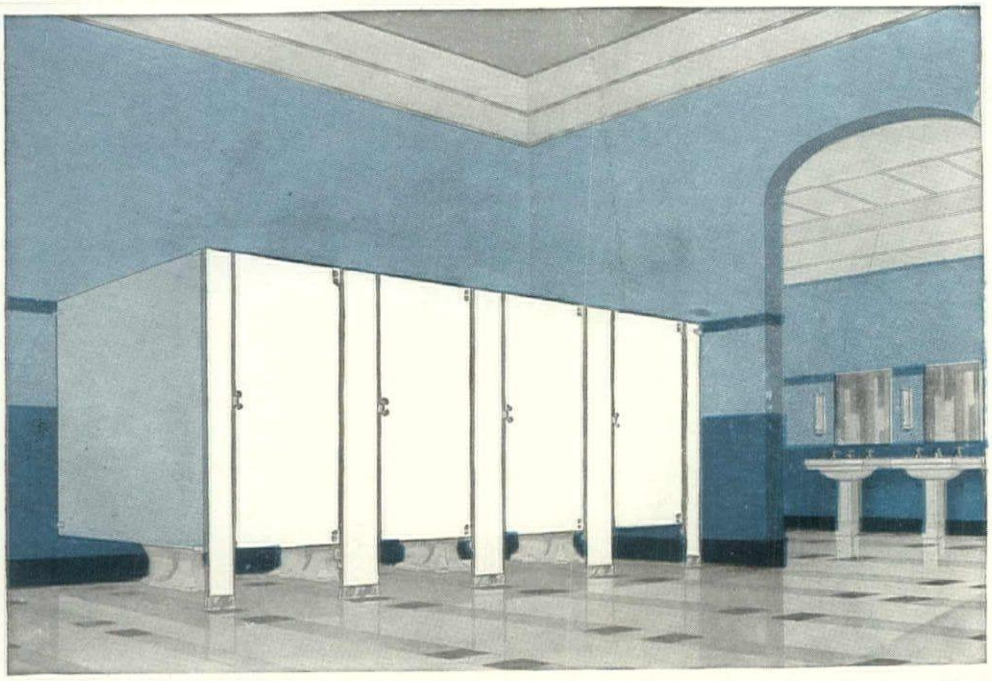


Immaculata High School, Birmingham, Ala. Director: Rev. E. J. Lawler. Architect: Wilmot C. Douglas, Birmingham, Ala. Contractor: Daniel Construction Co., Greenville, S. C.

Proper daylighting and adequate natural ventilation are vital requirements in modern school planning. Studies have proved conclusively that metal windows provide the best source of daylight plus controlled ventilation. With Lupton Metal Windows, rooms have a maximum amount of daylighting, even on overcast days. Better vision for students is stimulated through Lupton Metal Window design because of the greater glass area and slender frames and muntins. Drafts and breezes can be controlled for room comfort with ventilators that open to any desired degree despite inclement weather. Lupton Metal Windows are weathertight. Will not rot, warp, swell or rattle. There is a Lupton Metal Window for every type of building—industrial, residential, commercial. Write for our Catalog or see it in Sweet's.

MICHAEL FLYNN MANUFACTURING CO.
700 East Godfrey Avenue, Philadelphia 24, Penna.
Member of the Metal Window Institute

LUPTON
METAL WINDOWS

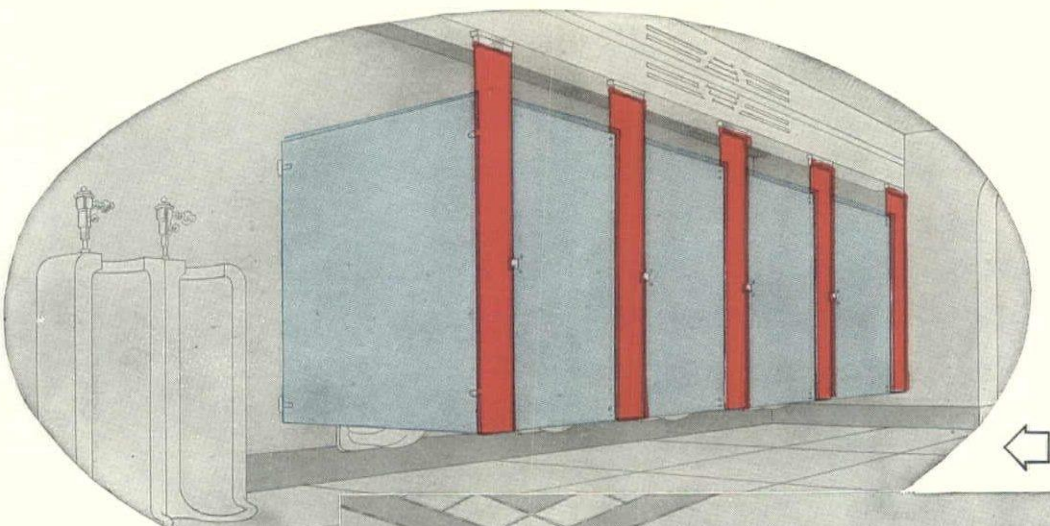


Sanymetal Normandie Type Toilet Compartments impart a moderately streamlined effect to a toilet room environment. Streamlined design wedded to utility fulfills all requirements. Unadorned utility no longer satisfies students accustomed to bathrooms embodying varying degrees of modernity and elegance. Available in three materials and in a variety of standard color combinations (see Catalog 87).

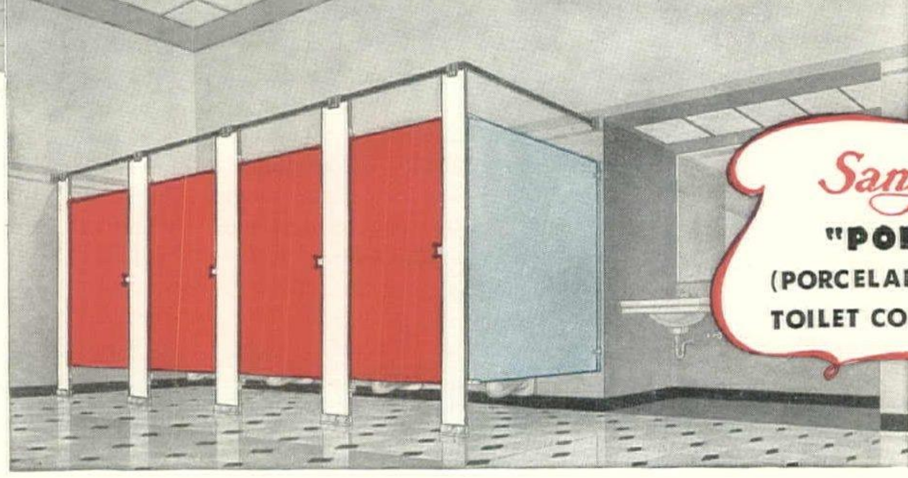
A TOILET ROOM ENVIRONMENT IS AS IMPORTANT AS OTHER SCHOOL ENVIRONMENTS

● The treatment of a school toilet room environment is no longer secondary to its utility. Blending the utility of toilet facilities with appropriate toilet room surroundings results in environments that are in keeping with other modern interior school environmental treatments. Toilet compartments usually dominate a school toilet room and influence its environment. Sanymetal offers several different types of toilet compartments for creating the most suitable toilet room environment for every type of school building. Sanymetal "Porcena" Toilet Compartments are fabricated of the ageless, ever-bright material, porcelain on steel, and embody the results of over 36 years of specialized skill and experience in making over 110,000 toilet compartment installations. Ask the Sanymetal Representative in your vicinity for information about planning suitable toilet room environments.

THE SANYMETAL PRODUCTS COMPANY, INC.
1687 Urbana Road • Cleveland 12, Ohio



Sanymetal Century Type Toilet Compartments are particularly appropriate for schools because they impart dignity, refinement and cheerfulness, and obtain the maximum degree of sanitation. This is the type of toilet compartment installation that is widely preferred. Available in three materials and in a variety of standard color combinations (see Catalog 87).



Sanymetal Academy Type Toilet Compartments provide a certain distinctiveness in a toilet room environment. This type is the only one in which all the dignity and distintiveness of standard flush type construction, unmarred by posts, is appropriately combined with the headrail. Available in three materials and in a variety of standard color combinations (see Catalog 87).

Sanymetal*
"PORCENA"
(PORCELAIN ON STEEL)
TOILET COMPARTMENTS

Sanymetal Catalog 87 illustrates several typical toilet room environments.

Sanymetal*

*Trade Mark Reg. U. S. Pat. Off.

TOILET COMPARTMENTS, SHOWER STALLS AND DRESSING ROOMS

QUICK ACTING DRY CHEMICAL FIRE EXTINGUISHER works on 'bottoms up and bump' principle.

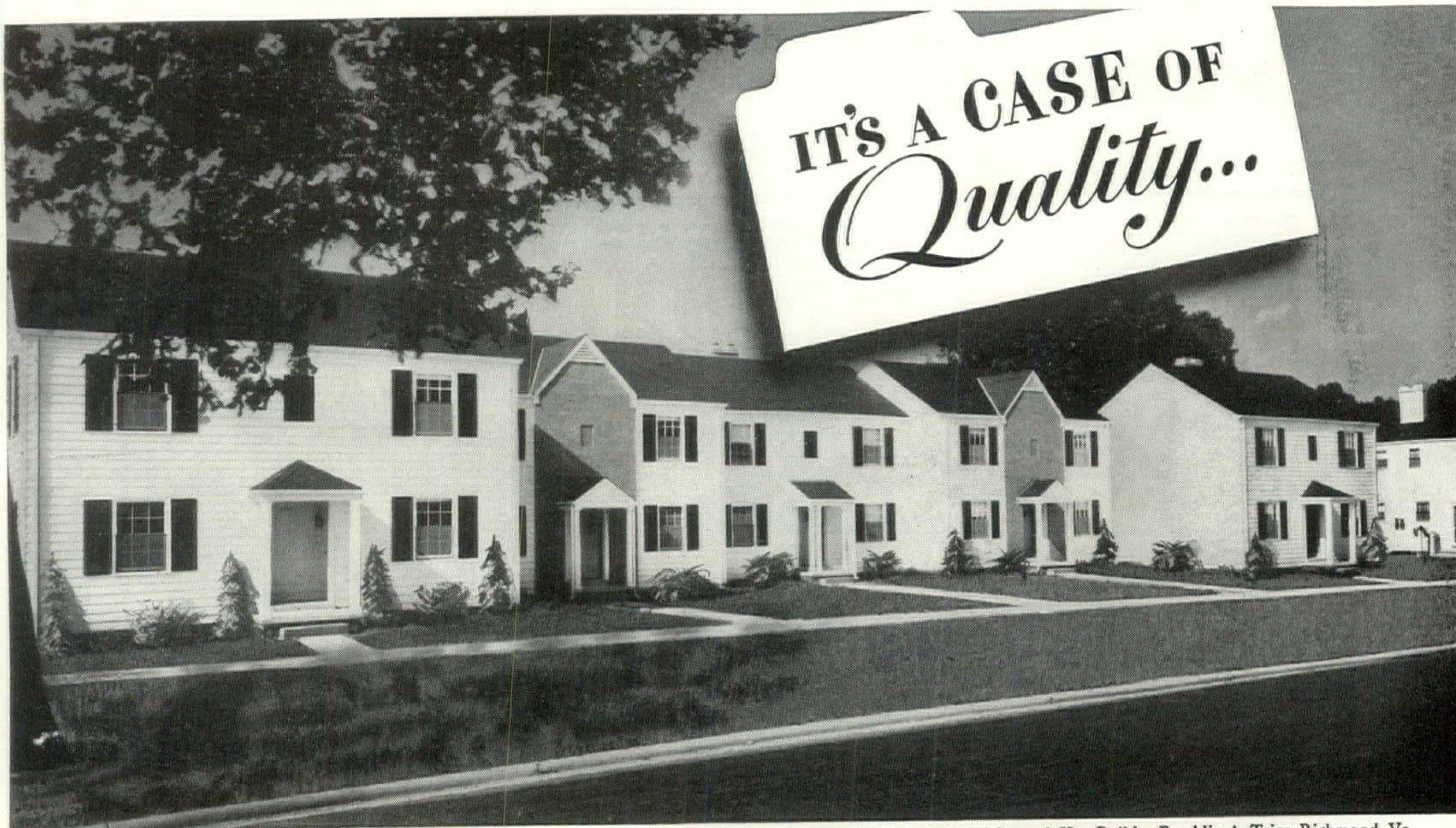
No complicated instructions must be mastered to operate this free flowing dry chemical type fire extinguisher. Foolproof yet easy to use, this self contained unit has no protruding gadgets nor syphon tubes or valves within the cylinder to become clogged. It contains a special dry chemical formula, highly effective on flammable liquid and electrical fires but nonconducing, noncorrosive, nonfreezing and nontoxic. To insure proper flow, the discharge hose and nozzle remain empty until the extinguisher is actuated by a pull on its locking collar, a turn upside down and a bump. Underwriters' approved, both the 20 and 30 lb. capacity models are engineered for fast positive action. The smaller size sells for \$53; the larger, \$65.

Manufacturer: C-O-Two Fire Equipment Co., Box 390, U. S. Highway 1, Newark 1, N. J.

NUMBERED ELECTRICAL WIRE saves time in installation and trouble shooting.

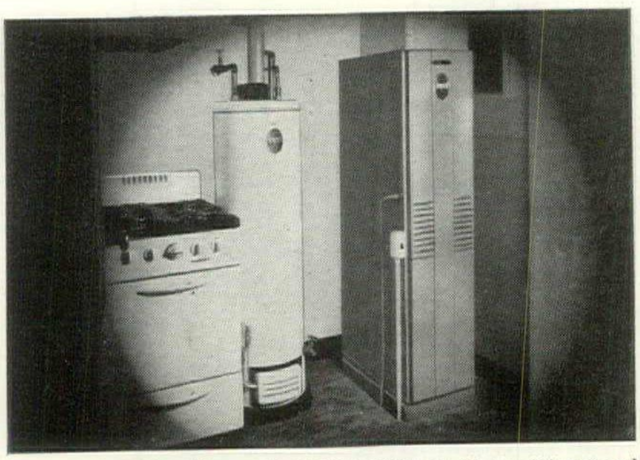
A new kind of wire for electric controls, using numbers instead of color coding, is said to lessen the danger of error

(Continued on page 274)



View of *Lewis Gardens Apartments,* Henrico County, Va.; *Architect,* W. H. Pringle, Richmond, Va.; *Builder,* Franklin A. Trice, Richmond, Va.

...of GAS ADVANTAGES beyond the city mains



526 TEAMS of Bryant Model VS-304 Winter Air Conditioners and Bryant *Black Seal* Automatic Water Heaters provide *Personalized Heating* at Lewis Gardens. LP-Gas for this equipment is supplied by Henrico Gas Service Corp., created especially to serve this project by E. O. N. Williams, President of Bottled Gas Corp. of Virginia, Richmond, Va.

There is a Bryant *Personalized Heating* system in each of the 526 suites at Lewis Gardens. Each family enjoys *independent, automatic control* of all heating in its own home. Indoor temperatures are as they want them, and there is no waste heat. There is always plenty of hot water on tap, too, for each family has its own *individual* hot water service.

For *management,* there are these benefits: *Personalized Heating* is maintained at low cost. It requires the supervision of only one man. Service or repair, if necessary, is *quickly* performed, for it is entirely local. There can be no general heating breakdown in the project.

Lewis Gardens is beyond the range of the Richmond city gas supply. Yet, its occupants enjoy the unmatched advantages of gas for *all four* important household services—heating, water heating, cooking and refrigeration. These advantages are provided by *liquefied petroleum gas,* supplied from a specially-designed central distribution system within the project itself.

Personalized Heating is the basis for this *all-gas* service. Operational economies of this equipment on LP-Gas help make possible a combined low rate for four services that will make its yearly cost to Lewis Gardens families comparable to or less than that of any other fuel or combination of fuels.

You will have a heating problem in your next project *beyond the gas mains.* Ask your Bryant Distributor to show you how you can solve it successfully with LP-Gas and *Personalized Heating.*

Let the pup be furnace man
... and water boy, too!

bryant

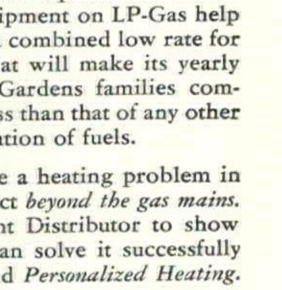
AUTOMATIC HEATING

BRYANT HEATER DIVISION
AFFILIATED GAS EQUIPMENT, INC.
Cleveland, Ohio • Tyler, Texas

"Bryant *Personalized Heating* Saved Space, Helped Make Four Gas Services Possible"

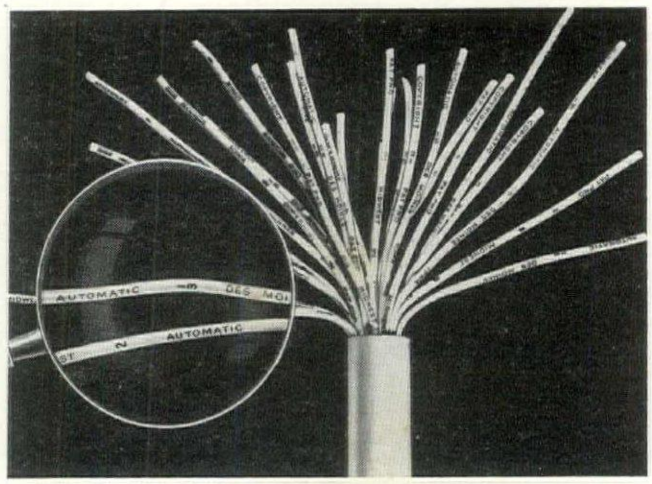
says FRANKLIN A. TRICE, Builder and Developer, Richmond, Virginia

"Economies provided by Bryant Personalized Heating helped make it possible to offer the advantages of LP-Gas for four services at an attractively low combined rate. And, considering that its space-saving feature was a truly great construction advantage, *Personalized Heating* was a happy choice for us."




SCHLAGE
...first name in cylindrical locks
Maine's Colby College at Waterville
a Schlage installation of heavy-duty cylindrical locks.
Architect: Jens Fredrick Larson
Plymouth Design illustrated at left was used in this classic New England College.
SCHLAGE
LOCK COMPANY
SAN FRANCISCO · NEW YORK

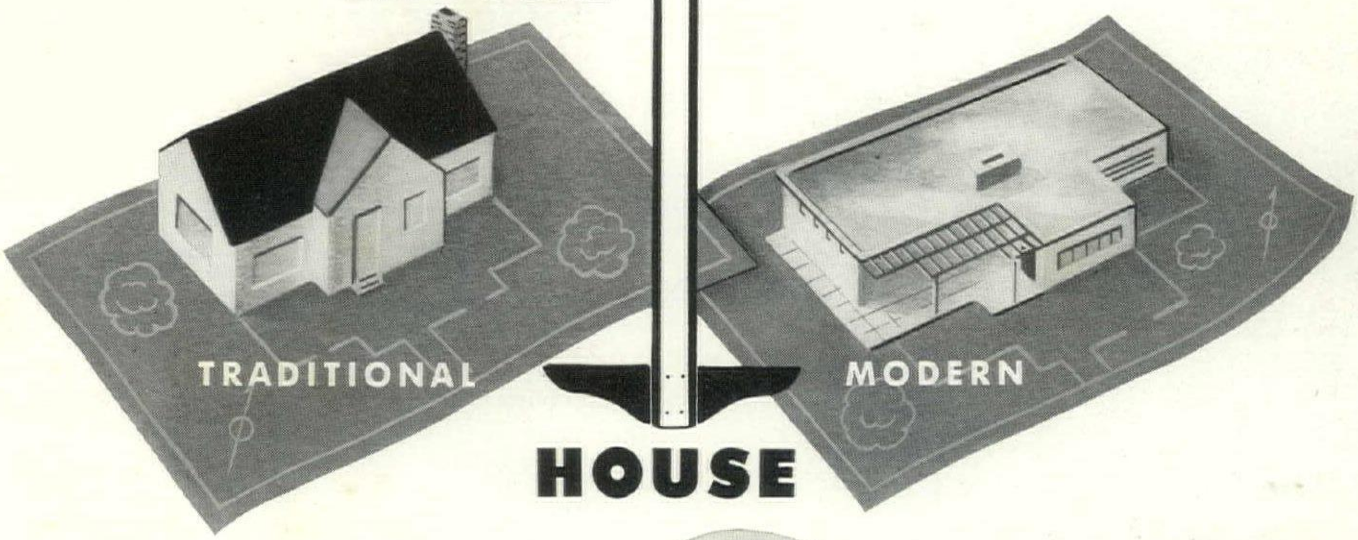
in installing and servicing electric equipment. Every inch of the yellow plastic insulation has a code number imprinted in bright red. The numerals do not wear off or become discolored with age. Called Magic Wire, it is claimed to be

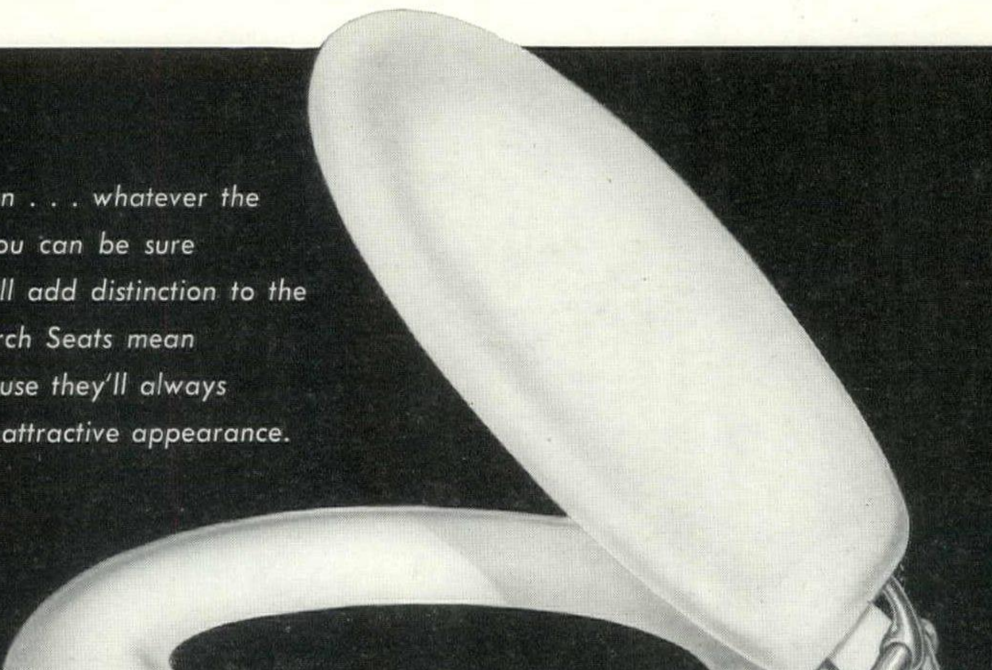


especially useful for automatic control systems, printing presses, signal devices, elevators and other equipment requiring multiple wire electric controls. It is generally available in No. 16 solid wire with plastic insulation at $1.39 per ft. Other sizes and types are obtainable on request. The manufacturer also makes a metal carrier-dispenser to hold ten 300 ft. reels of wire. The dispenser sells for $7.50; the reels for 25 cents each. Imprint service on the contractor's own wire is offered by Midwest at a fee of $3 per 1,000 ft.

Manufacturer: Midwest Automatic Control Co., 510 Third St., Des Moines, Iowa. *(Technical Literature, page 278)*

THE BEST SEAT IN THE HOUSE





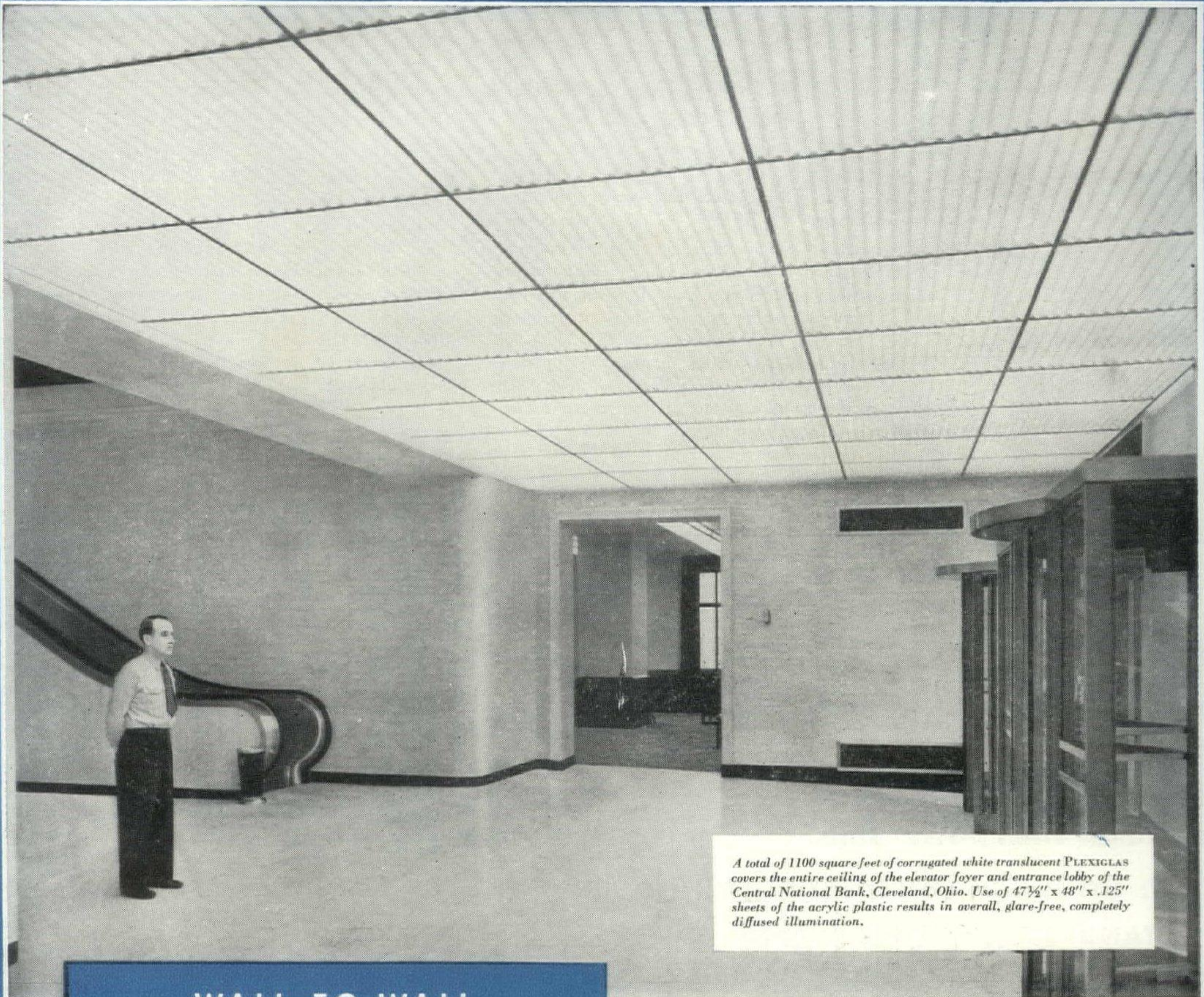
Traditional or Modern . . . whatever the architectural style, you can be sure that Church Seats will add distinction to the bathroom. And Church Seats mean satisfied clients, because they'll always keep their gleaming, attractive appearance. The first cost is the last cost.

Church Mol-Tex
No. 900

Church Seats

C. F. CHURCH MFG. CO. HOLYOKE, MASS.
Division of American Radiator & Standard Sanitary Corporation

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILER • ROSS HEATER • TONAWANDA IRON



A total of 1100 square feet of corrugated white translucent PLEXIGLAS *covers the entire ceiling of the elevator foyer and entrance lobby of the Central National Bank, Cleveland, Ohio. Use of 47½" x 48" x .125" sheets of the acrylic plastic results in overall, glare-free, completely diffused illumination.*

WALL-TO-WALL LIGHTING FIXTURES OF PLEXIGLAS

Light the Whole Room *Without* Glare or Shadows

Customers leave their shadows at the door of Cleveland's Central National Bank. PLEXIGLAS wall-to-wall lighting fixtures in lobby and elevator foyer diffuse light so perfectly that glare and shadows simply vanish. Light-absorption is negligible, and the result is better lighting with lower electrical input.

IT'S LIGHT . . . IT'S SAFE

At the same time, the lightness and shatter-resistance of PLEXIGLAS assure safety overhead. This acrylic plastic has 7 times the impact strength of glass, yet weighs less than half as much. Large, light sections can be installed easily at reasonable cost, and because PLEXIGLAS resists discoloration—even from fluorescent lighting—maintenance expense is low.

COVERS LARGE AREAS

More and more architects are using PLEXIGLAS fixtures for superior lighting, especially over large areas in offices and public buildings. Its availability in large sheet sizes, corrugated, patterned, or smooth-surfaced—and the ease with which it can be formed into shaped panels and fixtures—permit its use in highly distinctive functional and decorative lighting.

For wall-to-wall lighting fixtures, coffer panels, reflectors, shields, cove lighting fixtures—wherever optimum illumination with no direct or reflected glare is desired—get full details of PLEXIGLAS. We'll be glad to send you complete information.

PLEXIGLAS is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries

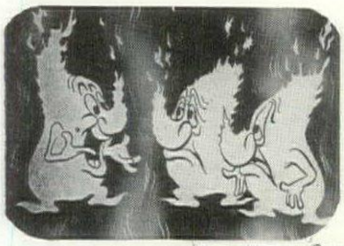
CHEMICALS FOR INDUSTRY

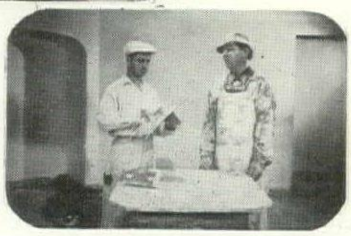
ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Canadian Distributor: Crystal Glass & Plastics, Ltd., 282 St. Helens Avenue, Toronto, Ont.





INDUSTRIAL FILMS. White Magic. Lathing and Plastering. Sheathing and Wallboard. Gypsum Association, 20 N. Wacker Drive, Chicago 6, Ill. 16 mm.

Lively entertainment and practical education are combined in these three sound color movies, which reflect the professional Hollywood production work and artistry that went into them. Jaunty the Flame is the animated character starring in *White Magic*, a 15 minute non-technical lession in the fireproof qualities of gypsum. For those interested in problems of wet wall construction, *Lathing and Plastering* is an amusing and informative film featuring Benny Baker as Handy Andy, a far from efficient plasterer who needs—and gets—pointers from a skilled tradesman. The third short film, *Sheathing and Wallboard*, is directed to an audience concerned with dry wall construction. All three films are available to any group desiring to show them. Projection equipment and an operator will also be provided. Published in conjunction with the movies are several well written booklets illustrated in two colors. The publications are: *Fireproof Gypsum Sheathing; Fireproof Gypsum Lath; Manual of Gypsum Lathing and Plastering; Standard Specifications for Gypsum Plastering*; and *Fireproof Gypsum Wallboard.*

GLASS BLOCKS. The Mark of a Modern Building—PC Glass Blocks. Pittsburgh-Corning Corp., 307 Fourth Ave., Pittsburgh 22, Pa. 40 pp. 8½ x 11¼ in.

By dividing glass block patterns into decorative and functional groups, this booklet makes it easier for architects, engineers, contractors or building owners to select the correct pattern for the job requirements. Modular installation details and estimating data also are featured.

WINDOWS. Zegers Dura-Seal Combination Metal Weatherstrip-Sash Balance. Catalogue 49. Zegers Inc., 8090 S. Chicago Ave., Chicago 17, Ill. 15 pp. 8½ x 11 in.

Construction details and general features of the Dura-Seal combination metal weatherstrip and sash balance units are covered in the catalogue. This method of weatherstripping and counterbalancing double hung windows to provide complete protection against weather, dust and dirt without the use of weights, cords or pulleys is explained in captioned diagrams.

FLOORS AND WALLS. Stylized Floors-Walls of Rubber. R.C.A. Rubber Co., Akron, Ohio. 4 pp. 8½ x 11 in.

This full-color brochure attractively sets forth the color range of Flexi-Flor and Wall-Flex rubber floor and wall coverings and suggests various pattern schemes.

FLOORING. Tuff-Tex Greaseproof Industrial Flooring. Tile-Tex Div., The Flintkote Co., Chicago Heights, Ill. 4 pp. 8½ x 11 in.

Of interest to industrial builders, plant managers, and architects is this informative folder on tile flooring. Featured in the literature are photographs illustrating typical applications of the greaseproof flooring and a chart of the 12 marbleized and plain tile colors.

FLOORING. Johns-Manville Asphalt Tile. Johns-Manville, 22 E. 40th St., New York 16, N. Y. 4 pp. 8½ x 11 in.

The complete range of the manufacturer's asphalt tile colors, including those added this year, are presented here in convenient chart form. Various pattern adaptations are illustrated in color photographs and sketches.

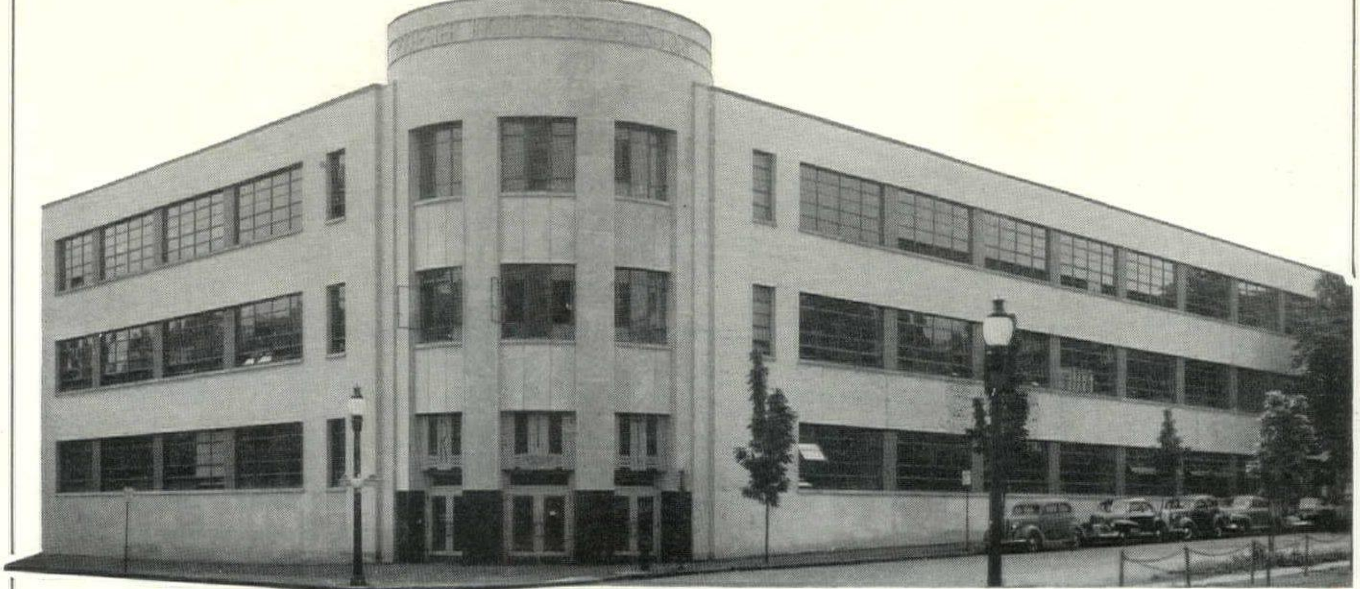
COMMUNICATIONS SYSTEMS. Signaling, Communication and Protective Systems. Auth Electric Co. 34-20 45th Street, Long Island City, N. Y. 16 pp. 8½ x 11 in.

Valuable for architects who design hospitals and similar institutions, this handbook contains typical specifications for lighting, paging, fire alarm and patient-to-nurse communication systems and lists architects' symbols.

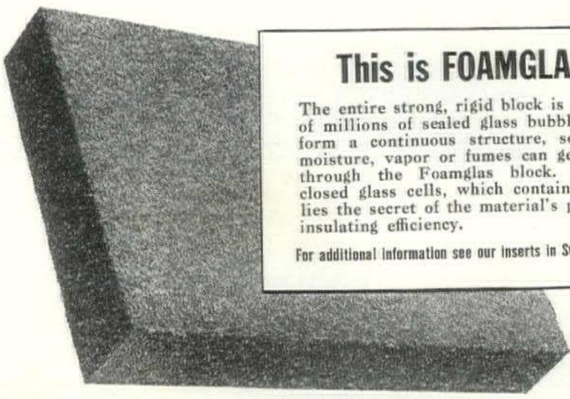
(Continued on page 282)

On the Rochester Institute of Technology

PC FOAMGLAS, THE PERMANENT ROOF INSULATION



THE ROOF of this fine modern school building is insulated permanently with PC Foamglas. More than 26,000 square feet of 2" Foamglas were applied to the roof deck and covered with roofing materials.



This is FOAMGLAS®

The entire strong, rigid block is composed of millions of sealed glass bubbles. They form a continuous structure, so no air, moisture, vapor or fumes can get into or through the Foamglas block. In those closed glass cells, which contain still air, lies the secret of the material's permanent insulating efficiency.

For additional information see our inserts in Sweet's Catalogs

● When you specify PC Foamglas for use in modern school buildings, you can rest assured that its performance will be more than satisfactory. Being true glass, in cellular form, PC Foamglas possesses excellent insulating properties. It is also fireproof, vaporproof and verminproof—impervious to elements that cause many materials to lose insulating efficiency.

In roofs, walls and floors of school buildings, PC Foamglas will retain its insulating efficiency *permanently* . . . when installed according to our recommendations and specifications.

When you face the problem of recommending the most efficient and economical insulating material to your clients, our insulation specialists will be glad to consult with you on special installations. Meanwhile, you can get a lot of helpful information on customary uses of PC Foamglas from our recent booklets and folders. Just check and mail the convenient coupon. Your free copies—and a sample of the material—will be forwarded promptly.

Pittsburgh Corning Corporation
Dept. B-109, 307 Fourth Avenue
Pittsburgh 22, Pa.

Please send me without obligation, a sample of Foamglas and your FREE booklets on the use of PC Foamglas Insulation as checked below:

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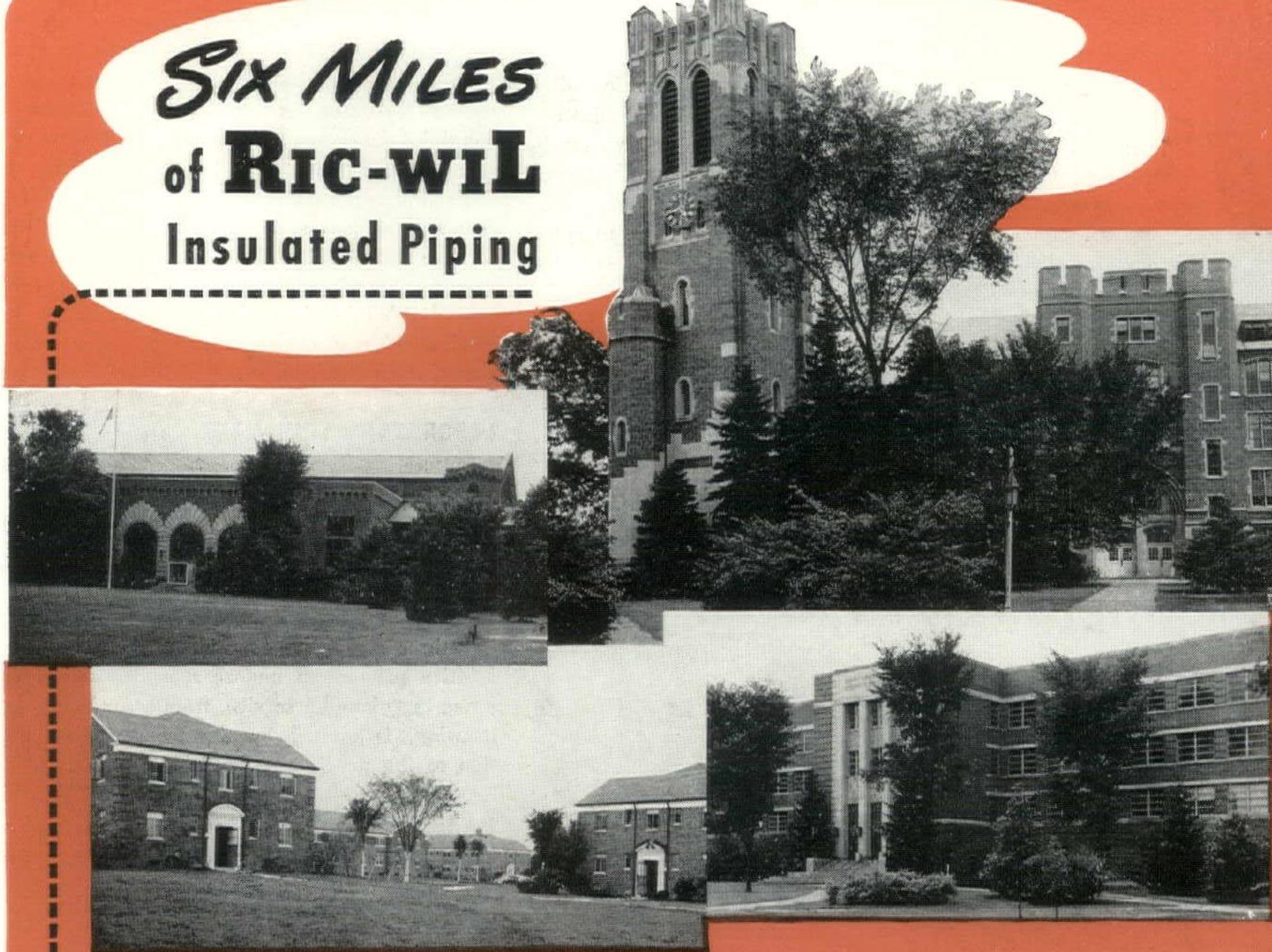
FOAMGLAS INSULATION

. . . when you insulate with FOAMGLAS . . . you insulate for good!

Six Miles of Ric-wiL Insulated Piping



Bring HEAT to this CITY OF LEARNING

THE operation and maintenance of a large educational institution in this postwar era entails far more than the discovery and imparting of knowledge.

Michigan State College is a case in point.

With an enrollment of more than 15,000 students MSC provides living accommodations on the campus for more than 11,000 persons in college operated housing. This is the equivalent of a sizable city and requires all the services a modern city affords—heat, light, power, water, schools, sanitary systems, health service, traffic control, police and fire protection.

MSC's new steam generating plant (left), and a typical run of Ric-wiL Insulated Piping.

To heat the hundreds of buildings comprising this modern "city" MSC recently put into operation one of the most modern, efficient steam generating plants to be found at any educational institution in the country. Capable of producing steam at 250,000 lb. per hour, 350 psi design pressure, 550°F, the new unit increases the capacity of MSC's generating plants to more than double previous capacity and, when finally completed, will raise it to the impressive total of 615,000 lb. per hour.

Significant too, we believe, is the fact that 31,994 feet—more than six miles—of Ric-wiL Insulated Pipe Units have been installed in MSC's central steam distribution system during this period of expansion.

For a case history on Central Heating for Institutions write for Booklet 4713. Address: The Ric-wiL Company, Dept. 4E.

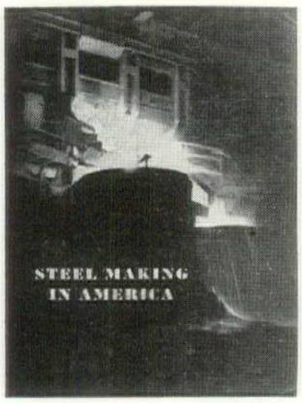
RIC-WIL

INSULATED PIPING SYSTEMS

THE RIC-WIL COMPANY • CLEVELAND, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

TECHNICAL LITERATURE



STEEL. Steel Making in America. U. S. Steel Corp., 71 Broadway, New York 6, N. Y. 100 pp. 8½ x 11 in.

With matter-of-fact eloquence *Steel Making in America* tells the story of steel—the historical background of the industry itself and the processing of raw materials into finished steel products. The book is informative not only to the student, the engineer and the architect, but to the adult layman who wishes to further his knowledge of this metal basic to contemporary living.

STAINLESS STEEL. Durimet 20 Corrosion Resistant Sheet and Plate. Bulletin No. 502. Duriron Co., Inc., Dayton 1, Ohio. 6 pp. 8½ x 11 in.

Announcement of the production and availability of Durimet 20 in sheet and plate is made in this two-color pamphlet. Developed during the war for severe corrosive applications that standard 18-8 stainless steel would not withstand, this alloy—a special low carbon, austenitic steel—has been used with success in handling sulfuric acid. Although the metal has been on the market for two years in bar, strip and tubing manufactured by the Carpenter Steel Co., this is its first commercial appearance in sheet and plate form. Standard gauges, sizes, weights and finishes are given here for the new steel which may be applied satisfactorily in corrosive services formerly handled less economically or reliably. While higher in cost than regular stainless steel, Durimet 20 may outlast it 100 to one in some uses, according to the manufacturer.

LABORATORY EQUIPMENT. Metalab Sectional Laboratory Furniture. Catalogue No. 3A. Metalab Equipment Corp., Brooklyn 13, N. Y. 80 pp. 9 x 11½ in.

Complete descriptive data on all Metalab products—tables, specialized equipment, hoods, sinks, etc.—is given in this catalogue. Metalab sectional laboratory equipment, constructed of heavyweight lead-coated copper bearing steel, has three finishing coats for prolonged utility: a rust inhibitive primer, an undercoat and a baked finish. An engineering planning service, from a rough layout to a finished drawing, is offered by the manufacturer without obligation to the prospective buyer or builder.

MARBLE. The Care and Cleaning of Marble. Marble Forecast. Marble Institute of America, Inc., 108 Forster Ave., Mount Vernon, N. Y. 15 pp. and 6 pp. 8½ x 11 in.

An attractive format characterizes the first of these two booklets, which contains directions for cleaning various types of interior and exterior building marble. Also included is a list of maintenance materials approved by the Marble Institute. The second publication is a useful guide to the source and color range of different marble, with dealers' and importers' addresses.

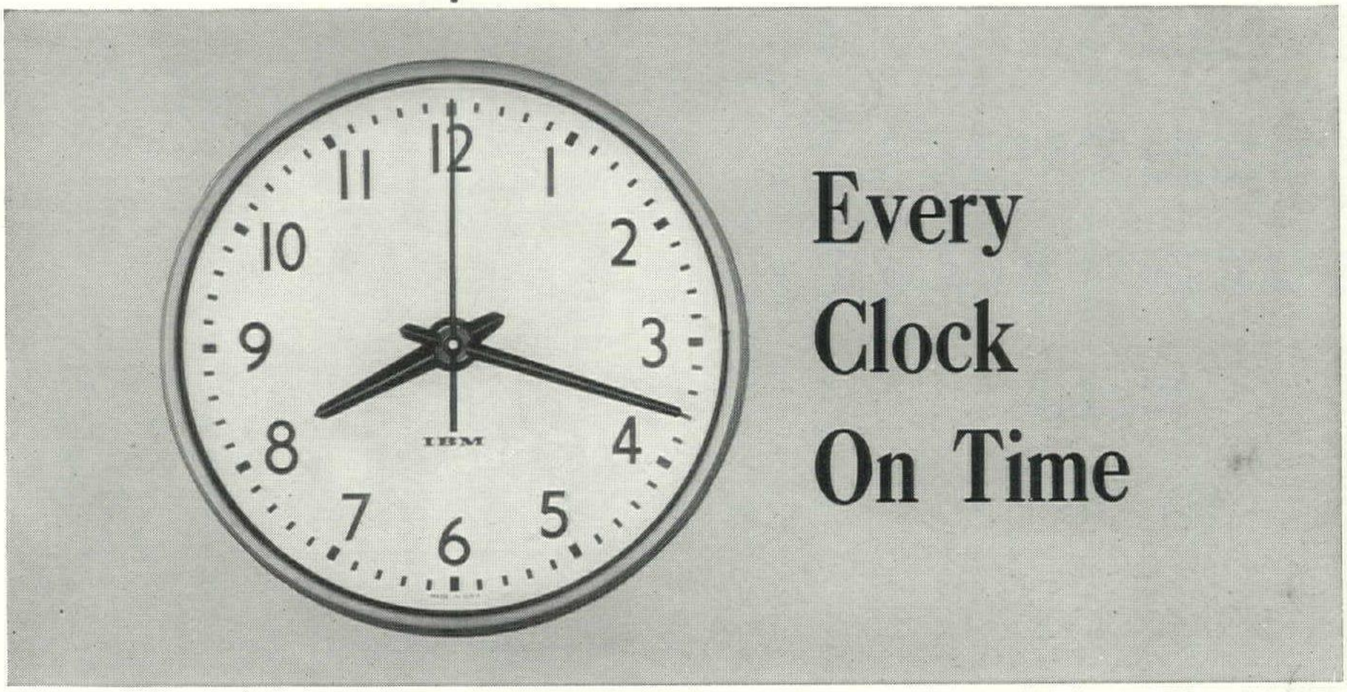
ACOUSTICS. Fiberglas Acoustical Materials. Owens-Corning Fiberglas Corp., Toledo 1, Ohio. 8 pp. 8½ x 11 in.

Properties and methods of installing Fiberglas acoustical materials—including plain and perforated tile, and board—are covered in this publication. Use of Fiberglas thermal insulations for acoustical purposes is also described. Several application photographs illustrate the text.

ACOUSTICS. The Practical Application of Acoustic Principles. E. & F. N. Spon, Ltd., 57 Haymarket, S. W. 1, London, England. 200 pp. 5½ x 8¾ in. 16 shillings.

Serving as a quick key to acoustic problems which from day to day face busy architects and builders, this authoritative work selects for analysis important construction features and points out common acoustic faults and corrections. Writing for the most part in concise non-technical language, the author, D. J. W. Cullum, regards acoustics not as an exact science but as a practical problem which varies according to the desired effects. Among the phases of the subject treated are: *The Nature of Sound; Some Specific Acoustic Defects; The Acoustics of Small Rooms;* and *The Fatigue Reaction of Noise.* In a chapter on *Absorption Coefficients,* types of acoustic action of several materials—felts, tiles, etc.— are clearly noted and graphs presented on the variations of absorption relative to thickness of the materials.

(Continued on page 286)



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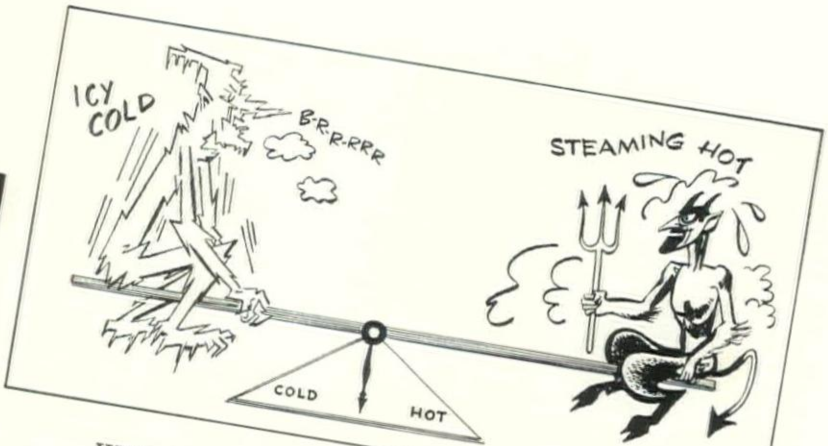
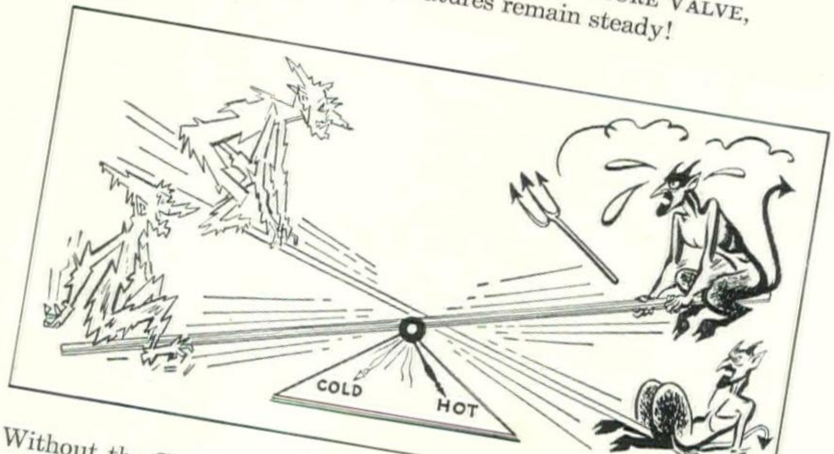
SPEAKMAN SENTINEL MIXING VALVE

Holds Shower Temperatures Steady!



With the SENTINEL BALANCED PRESSURE VALVE, shower temperatures remain steady!

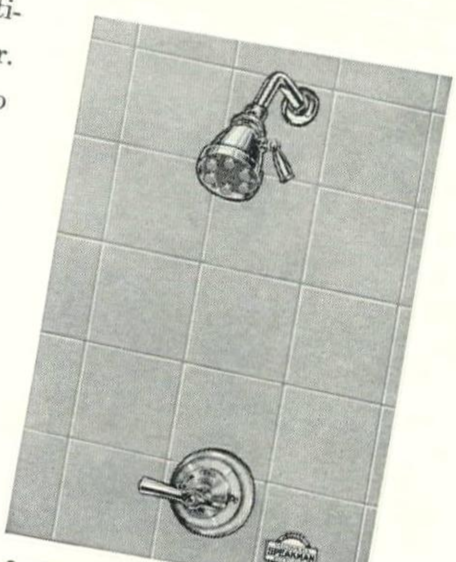


Without the SENTINEL, unbalanced pressures from water stealing result in *sudden surges* of *icy cold* or *steaming hot* water.

The Speakman Sentinel Shower thinks for itself—and automatically maintains the shower at the temperature set by the bather. Sudden, uncomfortably hot or cold temperature changes due to fluctuating supply line pressures are impossible.

The brain of the Speakman Sentinel is a miraculous piston that operates on water pressure alone. It is completely accessible whether the valve is the concealed or exposed type. There are no tricky, temperamental thermostats, rockers, springs or other gadgets likely to get out of order.

There is a Speakman Sentinel Shower for every type of installation. For further information, send for our *Recommendations and Specifications Booklet S-54.*



S-1700 SPEAKMAN SENTINEL SHOWER combines the famous Anystream Self-Cleaning Shower Head with the Sentinel Valve. Includes ball joint with concealed volume control, bent shower arm, wall flange, metal lever handle and dial plate. Size ½ inch.

S-1705 SPEAKMAN SENTINEL SHOWER —same as above with screw driver slot controlling valves in supply lines.

see our CATALOG in SWEET'S FILE ARCHITECTURAL

In Our Eightieth Year

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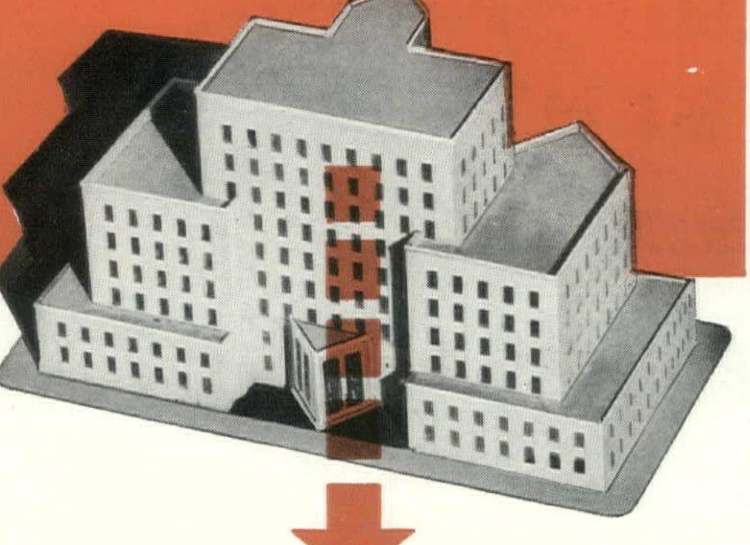
SHOWERS AND FIXTURES

SPEAKMAN COMPANY, WILMINGTON, DELAWARE

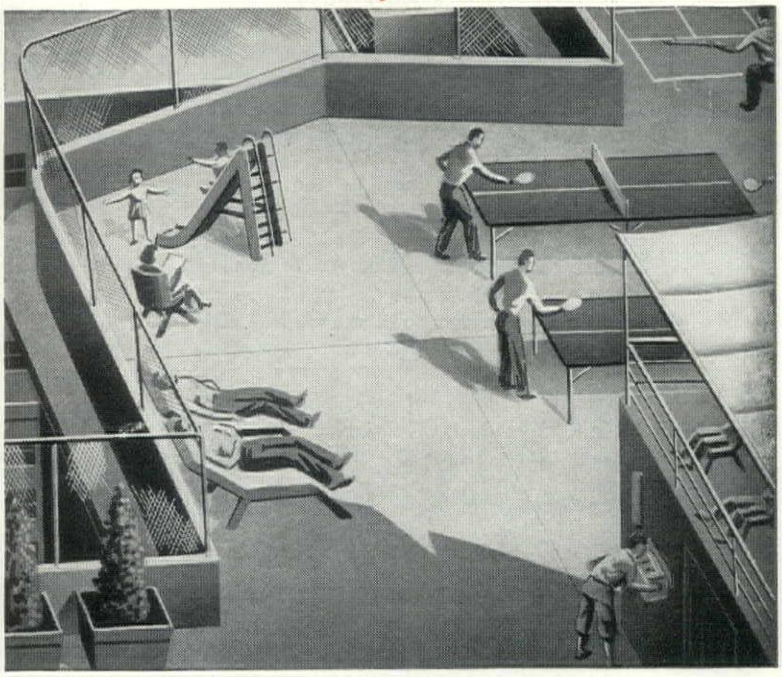
Don't waste the roof!



Like Cinderella, roofs are now blossoming forth after years of menial employment! Gardens grow on apartments and hotels. Factories and warehouses solve many space problems with new heavy duty traffic roofs. Schools, hospitals and office buildings have promenade roofs where fresh air and sunshine can be enjoyed even in the most crowded districts.

Ruberoid built-up roof specifications give the go-ahead signal to full, productive use of this valuable but long-neglected roof area. They provide the solid, workaday basis for making these new developments completely practical.

Let Ruberoid's thoroughly tested specifications help you in your current planning . . . the possibilities opened for creative design are practically unlimited. Complete specifications are available now from any Ruberoid sales office or your local Ruberoid Approved Roofer.



LIFE IS MORE PLEASANT ⟶ for everyone in this new building—the carefully planned use of this roof area provides ample recreational facilities for all.

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Ruberoid makes every type of built-up roof—Smooth Surfaced Asbestos, Coal Tar Pitch with gravel or slag surfacing, or smooth or gravel-and-slag surfaced asphalt . . . in specifications to meet any need. Ruberoid Approved Roofers are not prejudiced in favor of any one type. You are assured of one source for all materials, centralized responsibility, smoother operation, uniform quality!

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TECHNICAL LITERATURE

ELECTRICAL RECEPTACLES. National Electric Plug-In Strip. Catalogue No. 598. National Electric Products Corp., Chamber of Commerce Bldg., Pittsburgh 19, Pa. 12 pp. 8½ x 11 in.

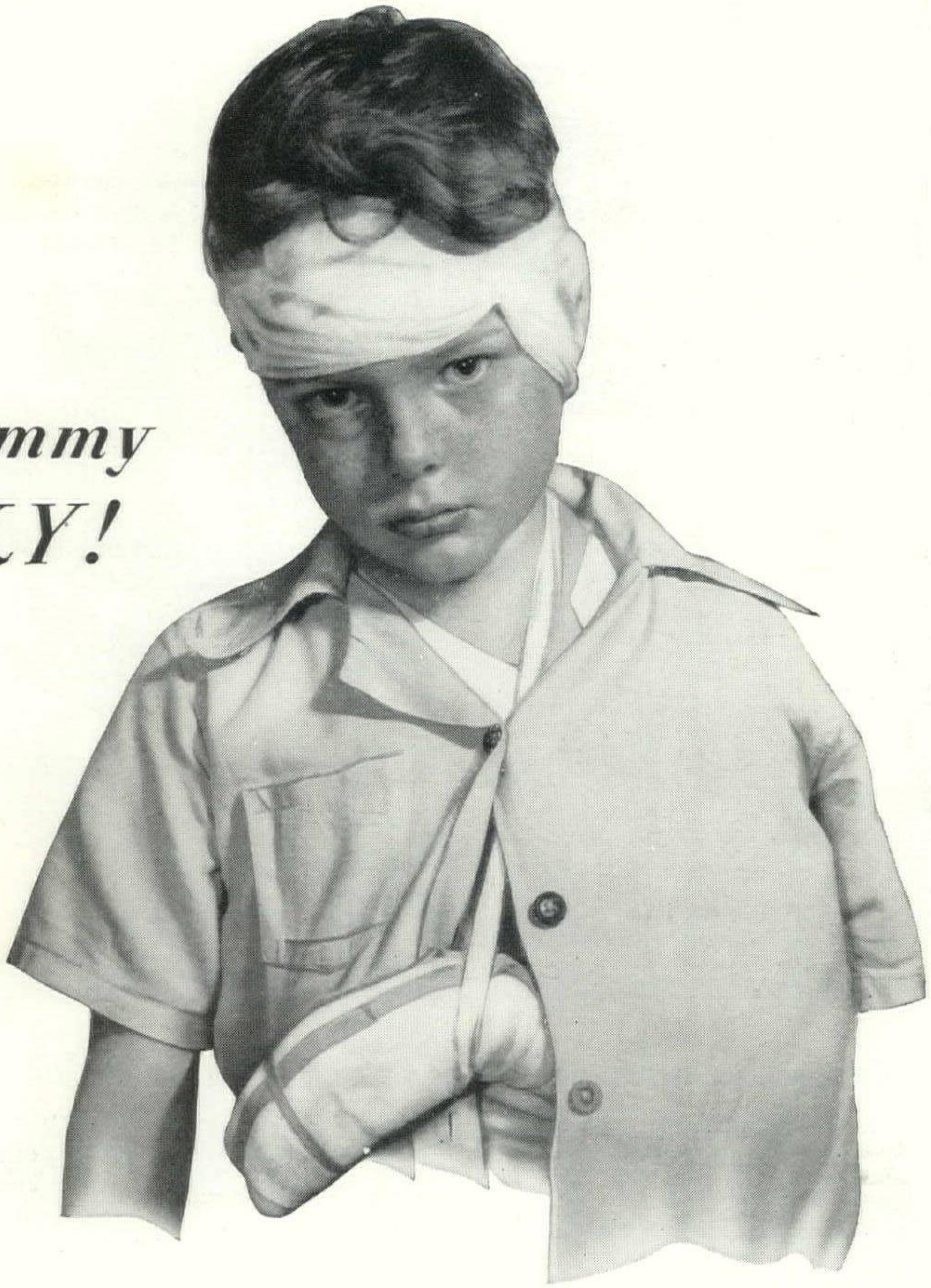
In its coverage of the CF-2 Plug-In Strip, the catalogue advocates this constant service strip for use in displays, on work benches, in offices, institutions and for other commercial applications. Recommended as suitable for home use is the CF-3 switch-controlled Plug-In Strip. Both types are listed by Underwriters' Laboratories, Inc. Electrical outlets at various intervals along the 3 ft. and 6 ft. raceways are pictured as well as the fittings required for an installation—elbows, junction box covers, end blanks and fill-in strip for use behind radiators or other inaccessible places. Shown with the strips is a hollow steel quarter-round trim which can be mounted above and below the spread of electrical outlets to form a chair rail molding.

ELECTRICAL WIRE. NEasbestos Wire for Hot Spots. Catalogue No. 509. National Electric Products Corp., Chamber of Commerce Building, Pittsburgh 19, Pa. 34 pp. 8½ x 11 in.

Hot spots, as identified by this publication, are severe operating conditions where extreme heat, corrosive fumes and fire hazards are present. For installation in these areas National Electric Products manufactures wires and cables with asbestos and varnished cambric insulation. The company's power cable, motion picture cable, stove and range wire, boiler room wire, etc. are all completely described and illustrated in this recently revised catalogue.

(Continued on page 290)

Isn't Tommy *LUCKY!*



Tommy went to a school in the middle west, with hundreds of other bright-eyed youngsters.

One day there was a fire in Tommy's school . . . from defective electric wiring. The schoolhouse was "fire-proof", but the contents weren't. So the flames spread, until the whole school was ablaze like a roaring "fire-proof" furnace.

Tommy managed to get out. He was badly burned, but he was far more fortunate than some.

That fire was one of five school fires that occur each day, and will continue to occur as long as there are worn and faulty equipment and human carelessness. Regardless of whether a school is constructed of "fireproof" materials, there seems to be no sure way to prevent some fires from *starting*.

But there is a practical and absolutely dependable way to *control* fires before they do material damage.

A Grinnell Automatic Sprinkler System stops fire immediately, automatically, wherever and whenever it strikes. Seventy years' experience shows that this protection is close to 100% effective.

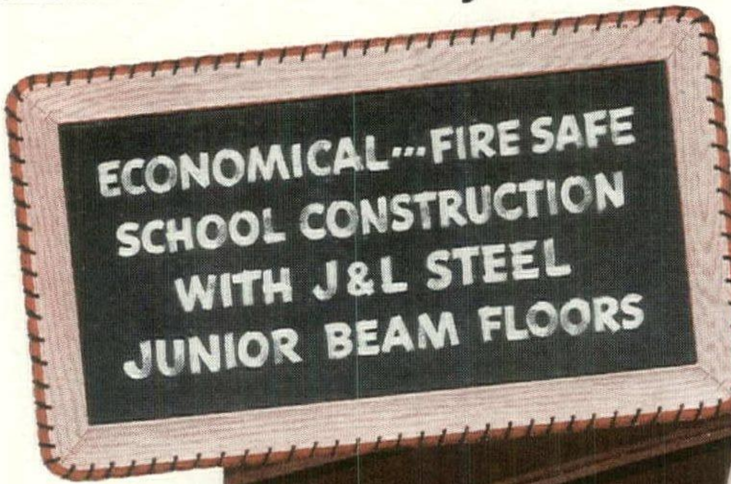
SEE THAT GRINNELL SPRINKLER HEADS ARE ON GUARD!

In schools, hotels, theatres, factories and hospitals there is a moral obligation upon management for the utmost in protection of life and property. For your own sake, be sure the schools for which you are responsible are protected with the famous Grinnell Automatic Sprinkler Heads— your assurance of protection of life and property against fire. Grinnell Company, Inc., Providence, Rhode Island.

GRINNELL

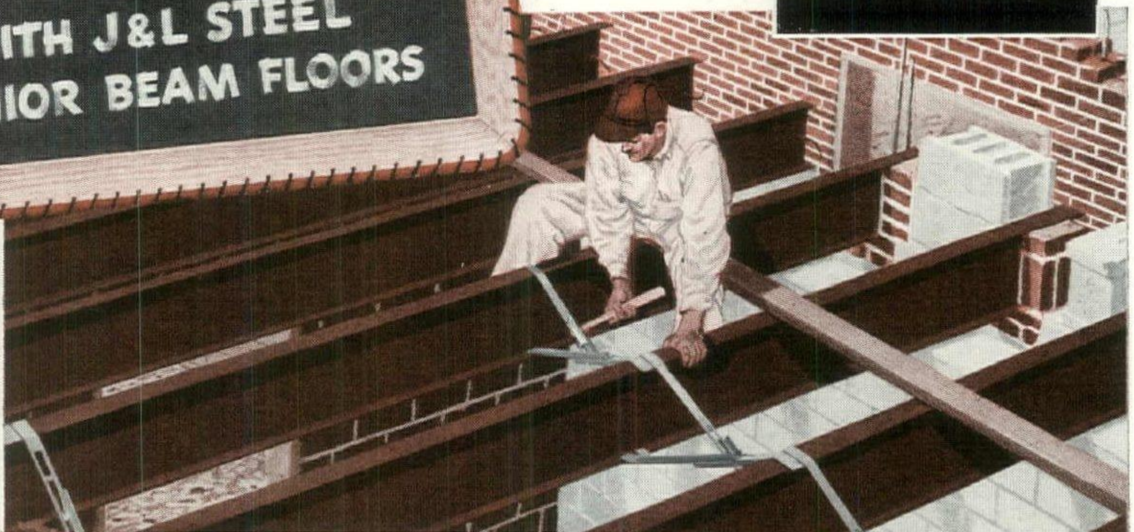
FIRE PROTECTION SYSTEMS

Lesson for Today—



—as taught by the Brunswick Township School Board

J&L STEEL



Right: Tightening the rigid bridging between the Junior Beams in the new Brunswick Township, Ohio, High School. *Below:* Architect's rendering of the new school, now under construction.

Contractor handles and places J&L Junior Beams without aid of mechanical hoist

The lesson that many school boards, contractors and architects are learning today, is that *steel and concrete floor construction with* J&L Junior Beams *saves time and money*. These beams cost less to buy, cost less to erect, yet for many types of "light" structures, they offer all the advantages of heavier structural members.

There are good, sound reasons for the trend to J&L Steel Junior Beams in schools, apartments, residences and other light occupancy buildings.

Mr. H. Joseph Nitchman, of Berea, O., Architectural Engineer for the new Brunswick Township school, specified them because: "—Compared with heavier structurals, Junior Beams are well designed for this type of structure—also well designed for use with metal lath and paper-backed mesh."

Mr. C. E. Karn, of Unit-Way Homes, Inc., Berea, O., the contractor for this school, stated: "These beams require no special handling equipment. Four men without any equipment at all, raised the Junior Beams to the second floor and placed them properly. This is an important point on many jobs."

The Brunswick Township School Board likes J&L Junior Beam floor construction, because it is fire-proof, helps hold down construction and maintenance costs, and minimizes insurance rates.

School Boards! Architects! Contractors!

Check these advantages of J&L Steel Junior Beam Floors: Economical—Fire-proof—Rigid—Shrink-proof—Termite-proof—Easy to install—Low maintenance—Permanent.

J&L Junior Beams are available now through leading steel warehouses including J&L Service Warehouses at Chicago, Cincinnati, Detroit, Memphis, New Orleans, New York and Pittsburgh. Let us send you descriptive literature and engineering data. The coupon below is for your convenience.

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Please send me complete data on J&L Junior Beams and Junior Beam Floors.

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FOR THE *Finest* IN WOODWORK
TWO GENERATIONS OF ARCHITECTS
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Architects like the way that Woodwork Corporation adheres to blueprints, down to the last detail. Architects, contractors, and clients, too, like the thoroughgoing, skillful job that Woodwork craftsmen do, not only in the shops, but installing the finished job. The Woodwork habit of delivering jobs on schedule, and the lasting beauty of the work itself are further reasons why architects and contractors today find it pays to depend upon the results this organization delivers.

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TECHNICAL LITERATURE

AIR HEATERS. Peabody Direct Fired Air Heaters. Bulletin 600. Peabody Engineering Corp., 580 Fifth Ave., New York 19, N. Y. 4 pp. 8½ x 11 in.

This bulletin tells, in words and diagrams, just what "custom-engineered" direct fired air heaters are and clarifies industrial uses for pressure fired systems. Three applications of the Peabody air heaters mentioned are: tunnel-drying for wallboard; spray-drying for soap powder; and eliminating odors. Designed to meet varying plant requirements, these heaters are available in many sizes ranging from 1 million to 100 million Btu per hr. and pressures up to and above eight atmospheres. They can be installed for horizontal, vertical upward or vertical downward firing, and are thus adaptable to plant layout and space requirements.

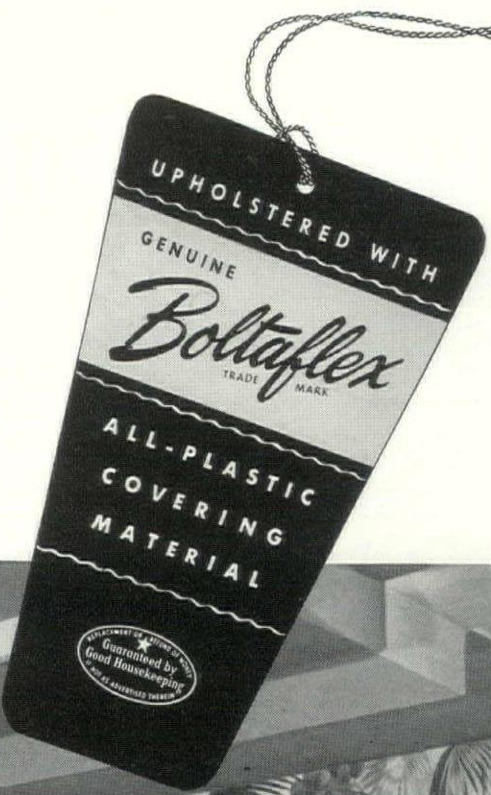
HEATING. Heil Oil-Fired Automatic Heat. The Heil Co., 3000 W. Montana St., Milwaukee 1, Wis. 11 pp. 8½ x 11 in.

The new catalogue of the Heil automatic furnaces and boilers is colorful and informative, describing in detail both oil and gas fired units. A feature of the publication is the Focused Flame burner which utilizes the pressure-atomizing principle.

HEATING CONTROLS. Sarcotherm Weather Control for Hot Water and Radiant Heating. Technical Bulletin No. 2. Sarcotherm Controls, Inc. 350 Fifth Ave., New York 1, N. Y. 11 pp. 8½ x 11 in.

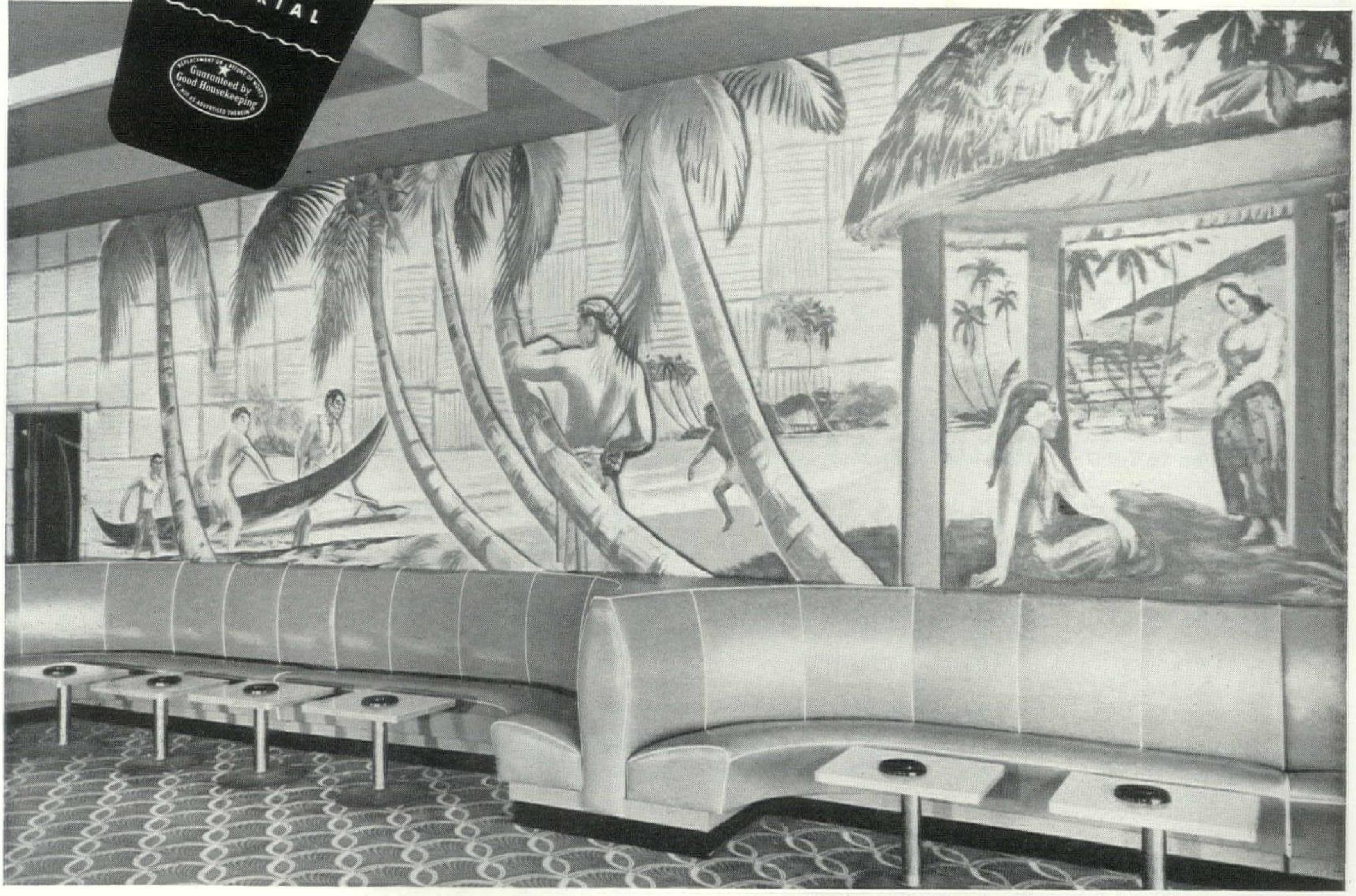
Dealing with central control panel systems for hot water and radiant heating, this bulletin contains schematic diagrams of boiler hookups and wiring of systems for schools, institutions, apartment houses and office buildings.

(Continued on page 294)



GETS STAR BILLING

IN RESTAURANTS FROM COAST TO COAST



The Famed Beachcomber Night Club, Miami Beach, Florida

"Word-of-mouth" is the most favorable business-builder in the world. You want your customers to eat, drink and pay their checks singing your praises!

Well, the word gets around pretty fast when you decorate with Boltaflex, the amazing, proven, all-plastic covering material that brings new sales-brightness aud lasting color to dining rooms and lobbies.

Resilient, supple-surfaced, color-fast . . . Boltaflex wears *better* than other similar materials because it won't peel or chip. Lasts longer, too!

No wonder leading hotel and restaurant managers specify the color-fresh beauty of Boltaflex for interior smartness. Spots can be removed with a damp cloth. Boltaflex automatically reduces maintenance costs, through longer wear and cleaning ease.

You'll find Boltaflex starred in hotels and restaurants that enjoy prestige and appreciate economy.

WRITE TO DEPT. Y-10 for color samples and information on the new beauty of Boltaflex.

Boltaflex means Covered with Beauty

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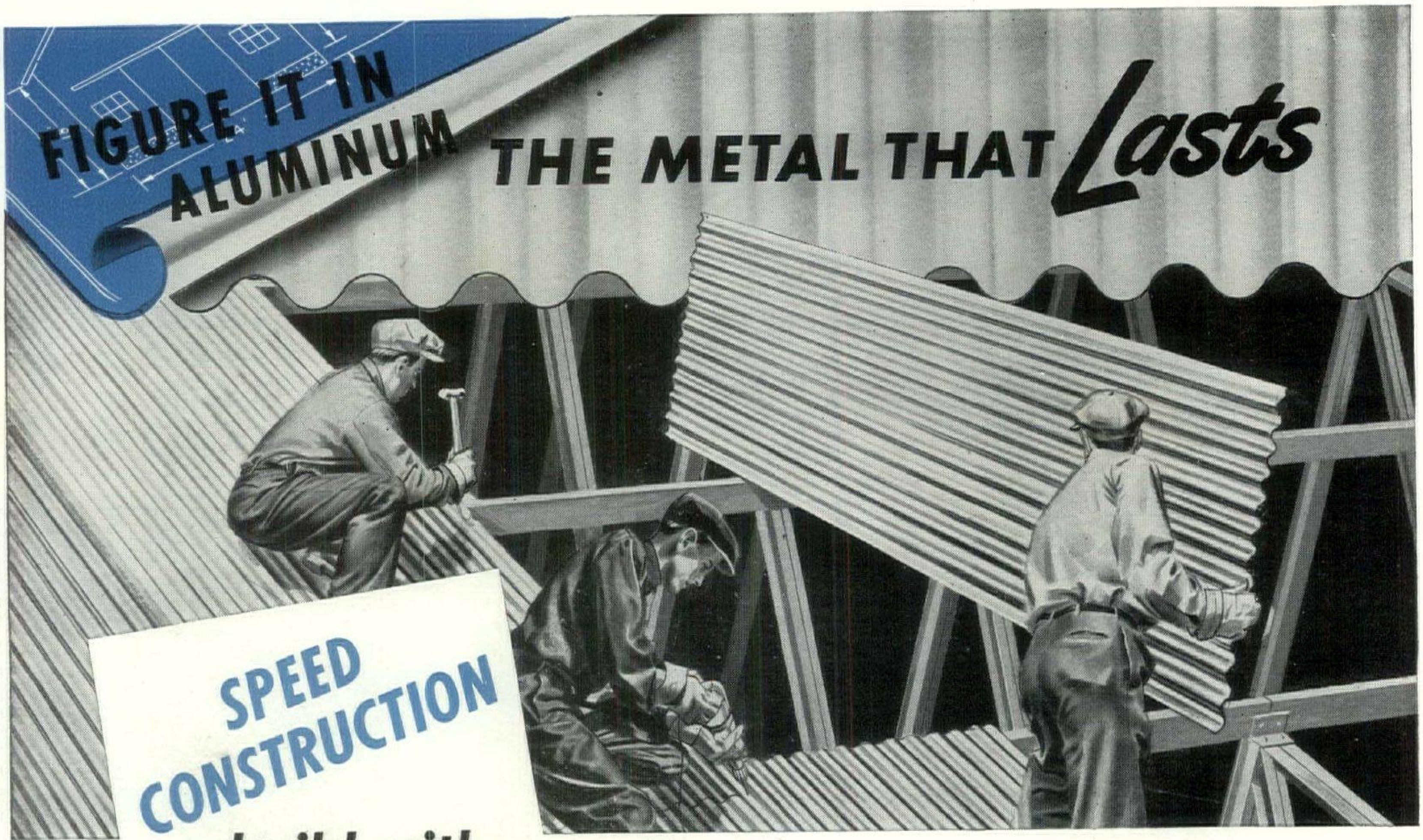

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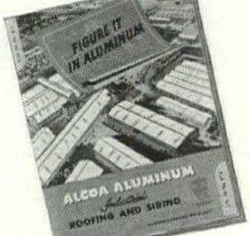
Alcoa Aluminum, proved long-lasting for roofs on monumental buildings (Alcoa roofs installed as long as 20 years ago, and with no painting, are still in excellent condition), now is available in sturdy, easy to erect corrugated sheets.

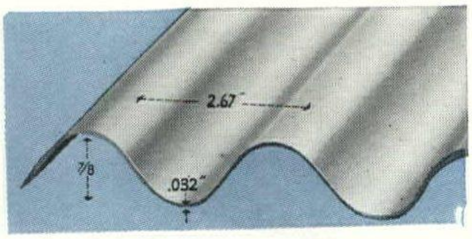
Made especially for industrial construction, Alcoa *Industrial* Roofing and Siding is made of an Alcoa Alloy that is unexcelled in resistance to atmospheric corrosion by any aluminum alloy now made.

Here is that almost unbelievable combination . . . a better material at a *low* price. A material that will withstand common industrial atmospheres . . . smoke and fume . . . for years on end. A material that needs no painting or regular maintenance.



WRITE FOR ENGINEERING AND APPLICATION DATA

Free book gives detailed information on engineering and erecting buildings using Alcoa *Industrial* Roofing and Siding. Call your nearby Alcoa Sales Office, or write ALUMINUM COMPANY OF AMERICA, 1866K Gulf Building, Pittsburgh 19, Pennsylvania.



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THICKNESS: .032 inches.
LENGTHS: 5, 6, 7, 8, 9, 10, 11 and 12 feet.
WIDTHS: Roofing sheet, 35 inches. Siding sheet, 33¾ inches; coverage 32 inches.
CORRUGATIONS: ⅞ inch deep. 2.67 inches, crown to crown.

Load Carrying Capacity

PURLIN SPACING	CLEAR SPAN	UNIFORM LOAD p. s. f. (Safety Factor, 2)
6'6"	76"	29
6'0"	70"	35
5'6"	64"	41
5'0"	58"	50
4'6"	52"	63
4'0"	46"	80

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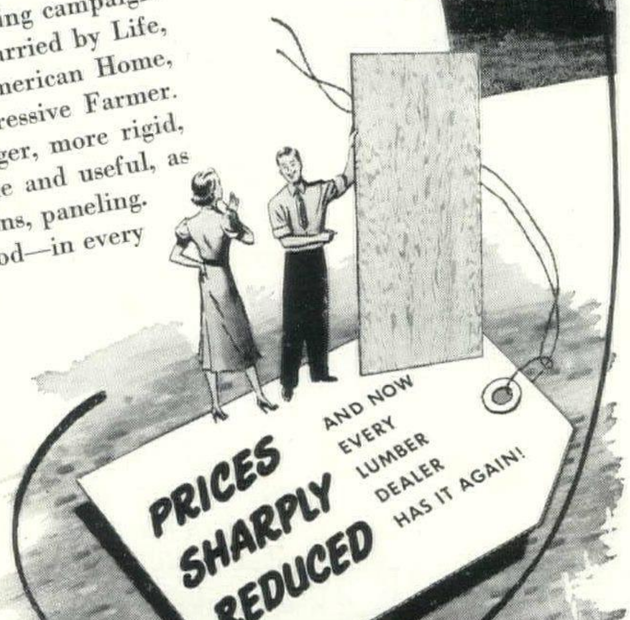
62 Million Messages to Build Plywood Acceptance

YOUR CLIENTS—the people for whom you design homes and commercial buildings—are being told the advantages of plywood construction through a concentrated national consumer advertising campaign.

This fall, a total of 62 million impressions will be carried by Life, Saturday Evening Post, Better Homes & Gardens, American Home, Sunset, Farm Journal, Successful Farming and Progressive Farmer. Every advertisement tells why plywood builds stronger, more rigid, more durable structures—why plywood is so versatile and useful, as siding, sheathing, subflooring . . . for cabinets, built-ins, paneling.

It means greater acceptance for Douglas fir plywood—in every step of the building job.



Douglas Fir PLYWOOD

LARGE, LIGHT, STRONG
REAL WOOD PANELS

DOUGLAS FIR PLYWOOD ASSOCIATION • TACOMA • CHICAGO • WASHINGTON, D. C. • NEW YORK

TECHNICAL LITERATURE

PUBLIC ADDRESS SYSTEMS. Altec Speech and Music Reinforcement (P.A.) Systems. Altec Lansing Corp., 161 Sixth Ave., New York 13, N. Y. 6 pp. $8\frac{1}{2}$ x 11 in.

This brochure briefly summarizes analytical concepts and itemizes technical components for P.A. systems engineered by Altec Lansing for all sound reinforcement situations from a 250-seat church to a 90,000-seat stadium. A chart included with the text gives a few typical amplifier combinations and indicates the innumerable possibilities for meeting almost any required condition.

PLUMBING CODES. The Uniform Plumbing Code for Housing. Technical Paper No. 6. Superintendent of Documents U. S. Government Printing Office, Washington 25, D. C. 83 pp. 6 x 9 in. 40 cents.

Management, labor and government representatives who make up the Uniform Plumbing Code Committee have formulated their opinions, based on practical experience and research, in this report. Under the auspices of the Housing and Home Finance Agency and the U. S. Department of Commerce, the Committee extended its scope of investigations to include plumbing for commercial, industrial and other types of installations. Material covered in the paper includes: suggestions for general regulations; fixtures; drainage; and inspection, tests and maintenance. Those responsible for the preparation or revision of plumbing codes will find this small volume extremely helpful. Future studies are being planned to cover the many other variables that go into the design and operation of plumbing systems and to provide a yardstick for evaluating new and conventional materials.

This new 8-foot slimline fluorescent lamp will

GIVE THEM ALL THE LIGHT THEY NEED

HERE'S the biggest slimline lamp of all—G.E.'s T-12! It's 8 feet long, 1½ inches in diameter, 75 watts. It has a greater light output than any other G-E fluorescent lamp. This makes possible higher schoolroom lighting levels—with lower maintenance in proportion to the amount of light given. (The average school has only ¼ the light it needs, according to school lighting authorities.) And this new lamp offers all the advantages of G-E slimline lamps:

1. New streamlined appearance.
2. Easy, low-cost maintenance. Single-pin base makes it easy to install and replace.
3. Instant start—no starters needed.
4. High efficiency—more light per watt.
5. Long life.

Get all the details on the new General Electric T-12 slimline lamp from the G-E Lamp district office near you. And for more information on up-to-date school lighting, write for General Electric's special school issue of "The Magazine of Light". General Electric, Dept. 166-AF10, Nela Park, Cleveland 12, Ohio.

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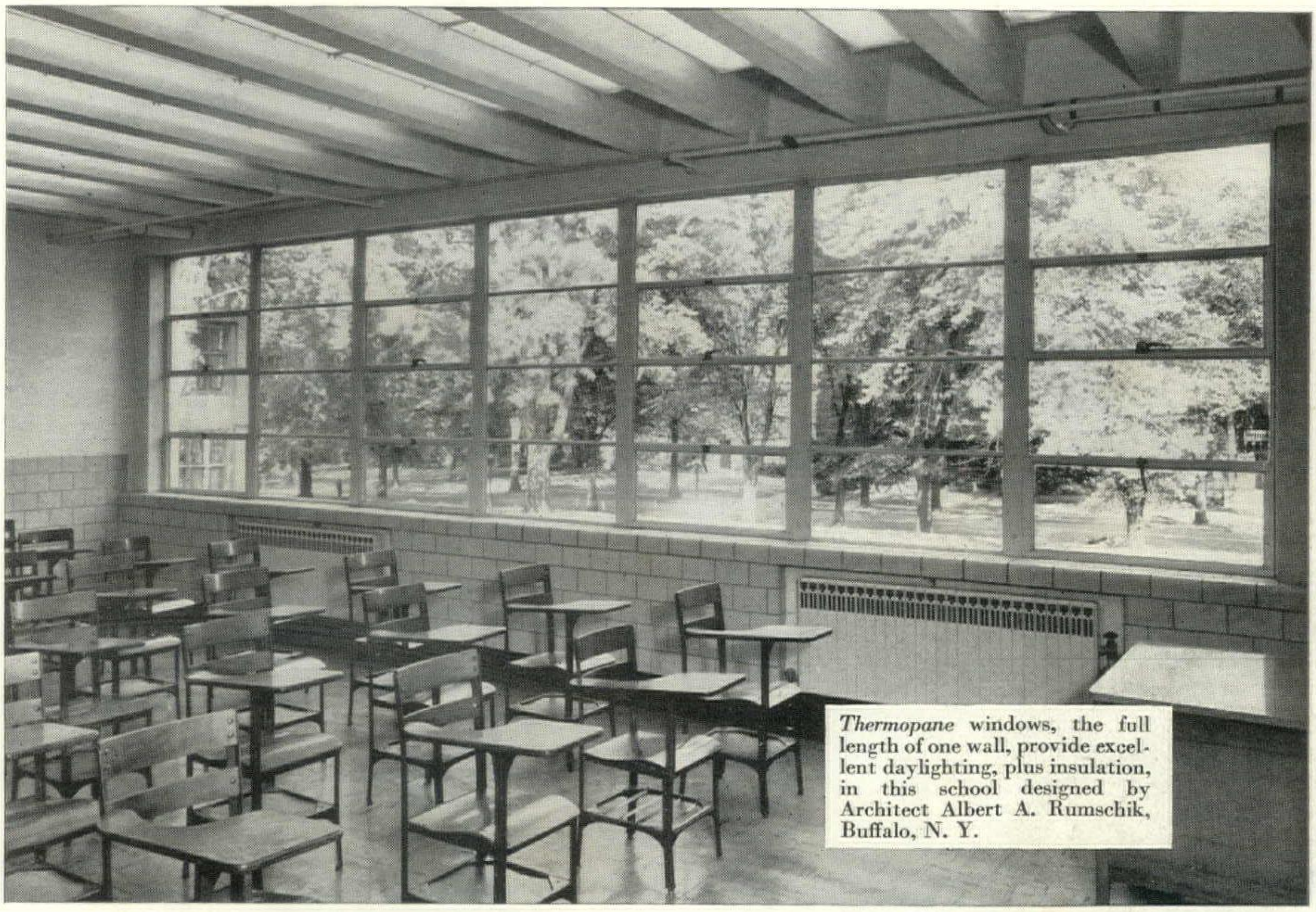
The advertising pages of FORUM *are the recognized market place for those engaged in building. A house or any building could be built completely of products advertised in* THE FORUM. *While it is not possible to certify building products, it is possible to open these pages only to those manufacturers whose reputation merits confidence. This the* FORUM *does.*

BUYING INDEX

(Continued on page 298)



Thermopane windows, the full length of one wall, provide excellent daylighting, plus insulation, in this school designed by Architect Albert A. Rumschik, Buffalo, N. Y.

New Research shows how to get *Better Vision*... ECONOMICALLY

Research recently completed at Southern Methodist University by Prof. R. L. Biesele, Jr., shows that you can fully, and *economically*, meet the recommendations of the 1948 American Standard Practice for School Lighting by the intelligent use of flat glass.

It establishes techniques which enable you to take advantage of the high light transmission of flat glass in achieving desired levels of illumination and proper brightness patterns for good seeing.

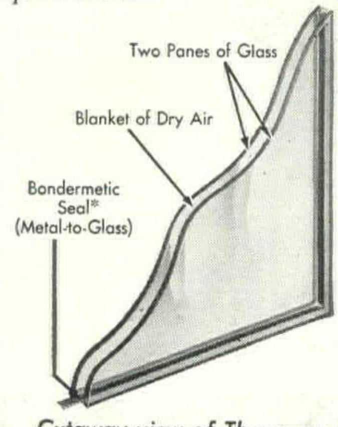
These techniques include the use of shielded unilateral fenestration, interior decoration with non-glossy surfaces of high reflectance, and proper seating arrangement to give each pupil enough light on his visual task and desired brightness ratios within his visual field.

Thus, with economical flat glass, you can provide the quality of daylighting which means less eye fatigue ... keener interest in school work ... improved posture habits ... better physical and mental development.

L·O·F *Thermopane** insulating glass is an ideal means of obtaining these conditions when insulation of window walls is desired. A double-glazed window of clear, flat glass transmits more daylight than an equal area of any other form of double glass insulating unit. *Thermopane* composed of two panes of clear glass transmits approximately 81% of daylight. To meet special requirements, *Thermopane* may be fabricated with varied types of flat glasses, including Polished Plate, Sheet, Heat Absorbing, Tuf-flex* and Patterned Glass.

Write us for further information on the Biesele research and for our *Thermopane* book.

*®



Cutaway view of Thermopane

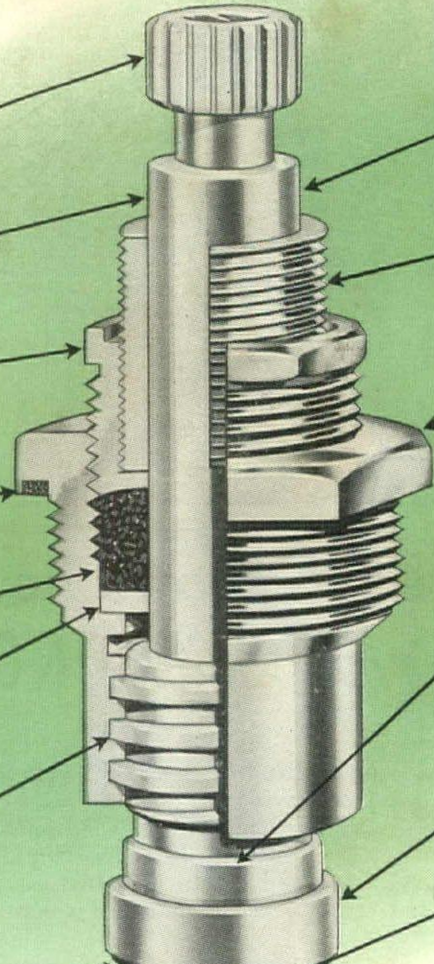
FOR BETTER VISION SPECIFY THERMOPANE
MADE WITH POLISHED PLATE GLASS

Thermopane

MADE ONLY BY LIBBEY·OWENS·FORD GLASS COMPANY
73109 Nicholas Building, Toledo 3, Ohio

More and more ARCHITECTS: now specify ELJER Brass Goods

because...



STANDARDIZED BROACHING . . . all styles of handles fit this one standardized broaching.

LARGE DIAMETER STEM . . . built to withstand rugged use.

PACKING NUT . . . adjustable to compensate for wear of the stem packing.

ENCASED GASKET . . . assures a tight joint by preventing spreading of packing.

HEAVY-DUTY PACKING . . . for longer, trouble-free service.

BRASS WASHER . . . keeps stem packing from spreading and makes it last longer.

STEM THREAD . . . heavy Acme-type double thread for long wear. Means faucets open and close quickly.

SEAT WASHER . . . finest quality, for long-lived service.

CHROME-PLATED STEM . . . heavily plated and polished to retain a gleaming finish over the years.

THREADED SLEEVE . . . provides ample adjustment for connecting escutcheon.

TOP-QUALITY, STEM-THREAD BUSHING . . . Ruggedly built, easily removable to replace wearing parts.

PROTECTED SWIVEL JOINT . . . exclusive Eljer design. Protecting curtain gives easy operation with feel of "ball-bearing" action.

SWIVEL DISC HOLDER . . . prevents turning of washer on valve seat. Gives easy, tight closing. Avoids wear and dripping. Adds greatly to life of seat and washer.

WASHER SCREW . . . readily removable for replacing washer.

Patent Applied for

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. . . you can be sure your clients will obtain *extra value* from the single source of responsibility. Too, they will appreciate the long-life styling, superb quality and extra conveniences of Eljer Plumbing Fixtures . . . and there is a size, type and design of fixture for every requirement.

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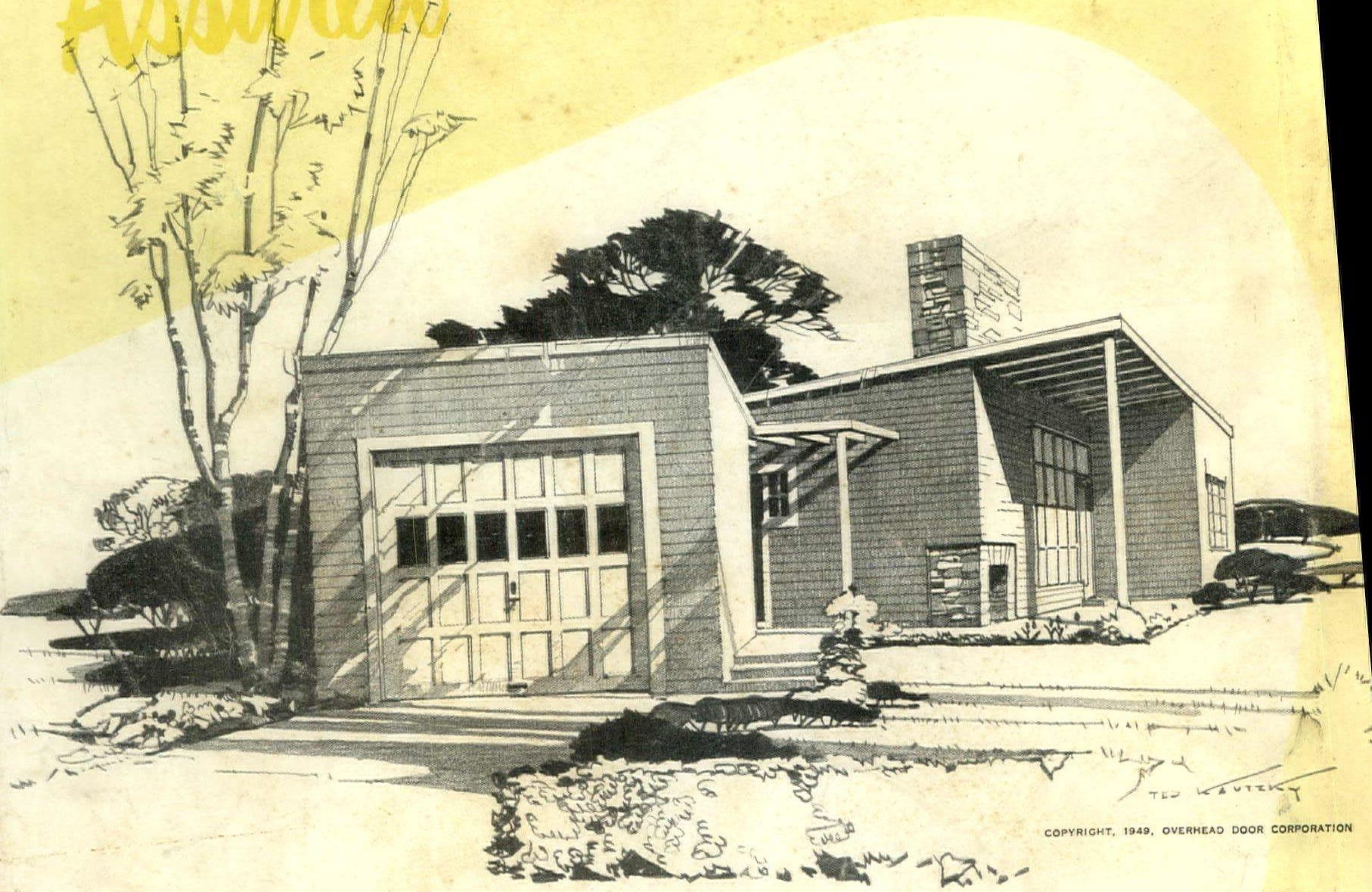
In 1949, Eljer advertising in consumer magazines, like The Saturday Evening Post will reach 115,000,000 readers, many of whom will want Eljer Fixtures. Some of them will be your clients.

Beauty and Service Assured

● In structures equipped with The "OVERHEAD DOOR", ideal opening and closing action is assured in all weathers. Millions of users attest to the superior performance of this quality door with the Miracle Wedge. Finest materials are used in its manufacture and it is fitted with durable, precision-made hardware. Specify it for residential, commercial, and industrial use. Any "OVERHEAD DOOR" may be manually or electrically operated.

TRACKS AND HARDWARE OF SALT SPRAY STEEL



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