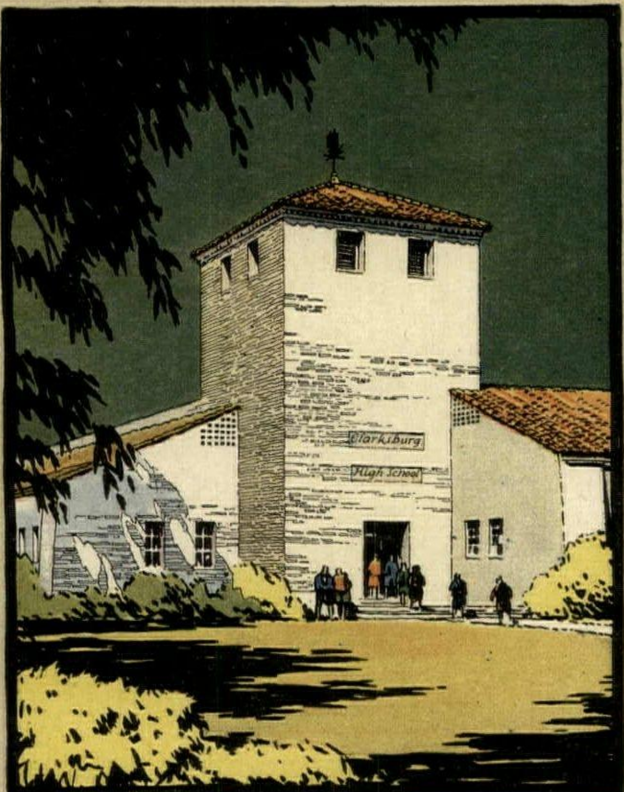
THE ARCHITECTURAL FORUM



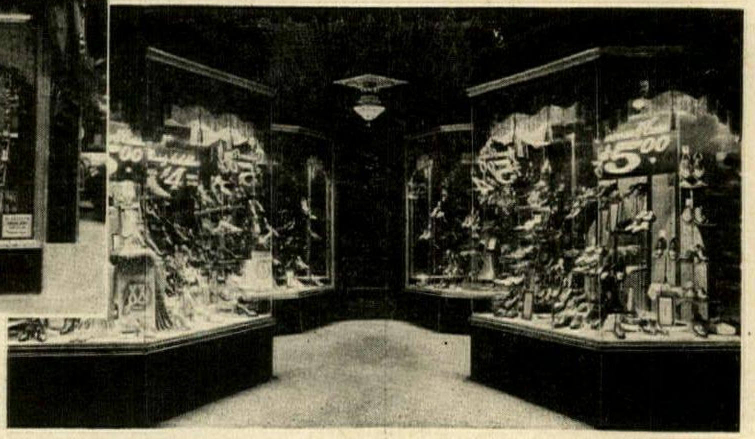
DECEMBER 1931

IN TWO PARTS PART ONE

ARCHITECTURAL DESIGN

PUBLIC SCHOOL REFERENCE NUMBER

Recent FELTMAN & CURME . . . Store Fronts



with

FORMICA

» » » FELTMAN & CURME shoe chain is one of the several leading chain store organizations—all close buyers and good business men—who have seen the advantage of Formica store front bulk heads and have made them standard on the new stores.

The picture shows three recent stores fitted out in this way.

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THE FORMICA INSULATION COMPANY

4618 Spring Grove Avenue, Cincinnati, Ohio

FORMICA

FOR FURNITURE & FIXTURES

THE ARCHITECTURAL FORUM

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VOLUME LV
Number 6

ROCKEFELLER CITY

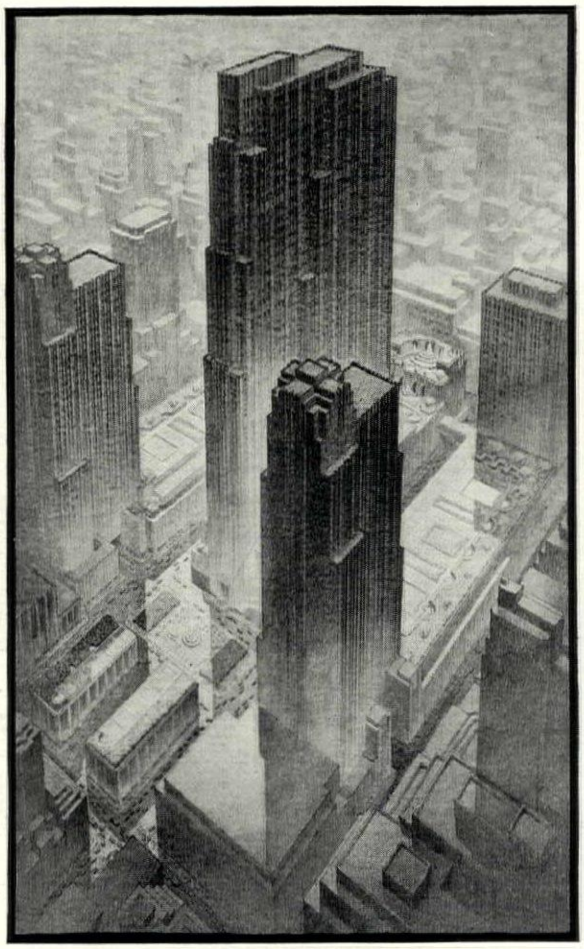
WILL BE PUBLISHED

OFFICIALLY

IN

THE ARCHITECTURAL

FORUM



Reinhard & Hofmeister, Hood & Fouiloux, Corbett, Harrison & MacMurray, Architects

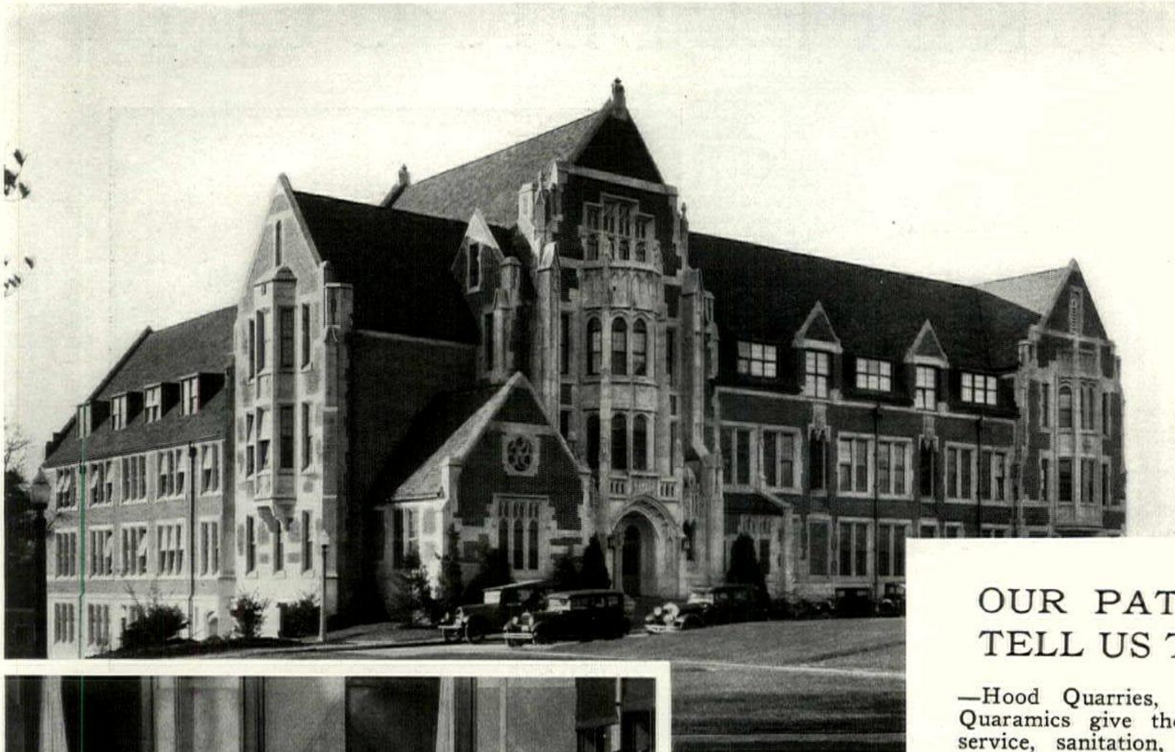
THE most stupendous building project ever undertaken in this country—Rockefeller City—is now under way. Literally several hundred buildings covering three New York City blocks have already been demolished. Daily the gaping holes grow deeper in preparation for the foundations upon which will stand this city-within-a-city. Daily, New York's thousands, their imagination caught by this promise of magnificence, pause to speculate as they hasten along Fifth Avenue. To architecture in this quarter of a billion dollar development has come its greatest challenge and its greatest opportunity.

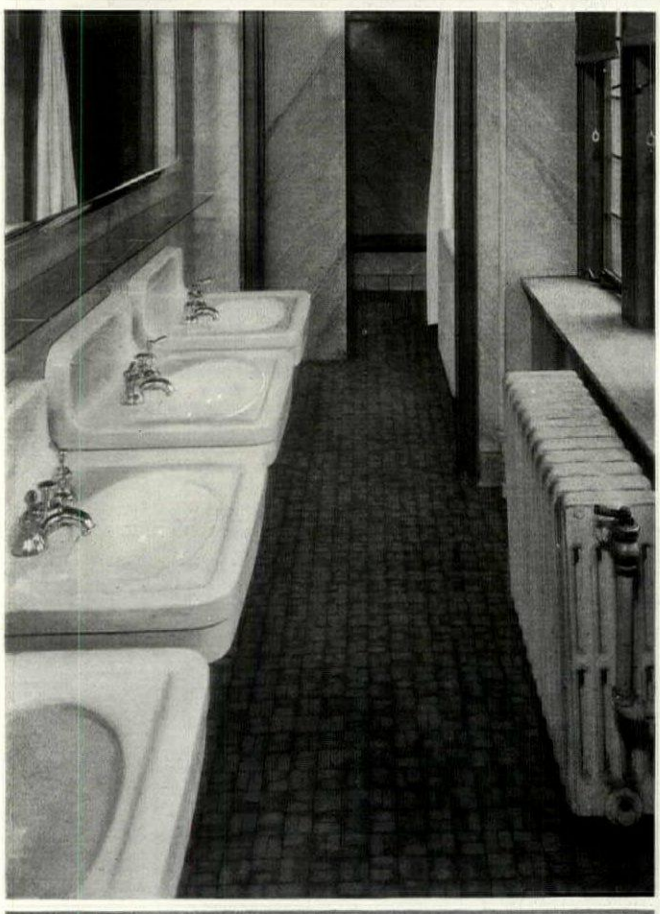
IN the offices of the architects the work goes on unceasingly. Plans, elevations, details, studies of materials and equipment come from the boards hourly. Nothing is left to chance. No possibility remains unprobed. New materials, new uses for old materials, innovations in construction methods must find their place. In the task of making Rockefeller City the ultimate in modern design and construction, architecture and engineering are fused in a supreme effort.

IT is no mere coincidence that the allied interests of Rockefeller City have entrusted to THE ARCHITECTURAL FORUM the interpretation of the architectural, engineering, and economic development of the project. It has become accepted custom for the leading firms to turn to THE FORUM for the publication of their major work. The diversification of its editorial program is such that no building which meets the high standards of good architecture is too small, none too large, to find its place in the carefully balanced editorial pages of THE FORUM. Every issue is a source of practical information and inspiration for every man in the architect's organization.

The Series begins in the January Issue of the Architectural Forum. Send your subscription Now.

SCHOOL FLOORS AND ROOFS





Above:
Agnes Scott College
Atlanta, Georgia.
Edwards & Sayward
Architects
Atlanta, Georgia

Left:
University of Tennessee
Knoxville, Tennessee
Barber & McMurry
Architects
Knoxville, Tennessee

OUR PATRONS TELL US THAT:

—Hood Quarries, Pavers and Quaramics give the utmost in service, sanitation, beauty and ease of maintenance for all service areas in schools, hospitals and public buildings.

—they give the biggest value for the least money.

—they have the longest life and genuine wealth of color.

⁂ ⁂ ⁂

—tile is the most logical and traditional of all roof coverings.

—Hood roof tiles are authentic reproductions of the best Old country roofs.

—Hood roof tiles being custom made, have styles, patterns, colors and textures that fit.

—Hood tiles give the cheapest "yearage" of any roofing material known because after the normal expected life, centuries of service still remain.

Right: University of Michigan
Ann Harbor, Michigan
Malcomson, Higginbotham & Trout
Architects
Detroit, Michigan

B. MIFFLIN HOOD COMPANY

DAISY . . . . TENNESSEE

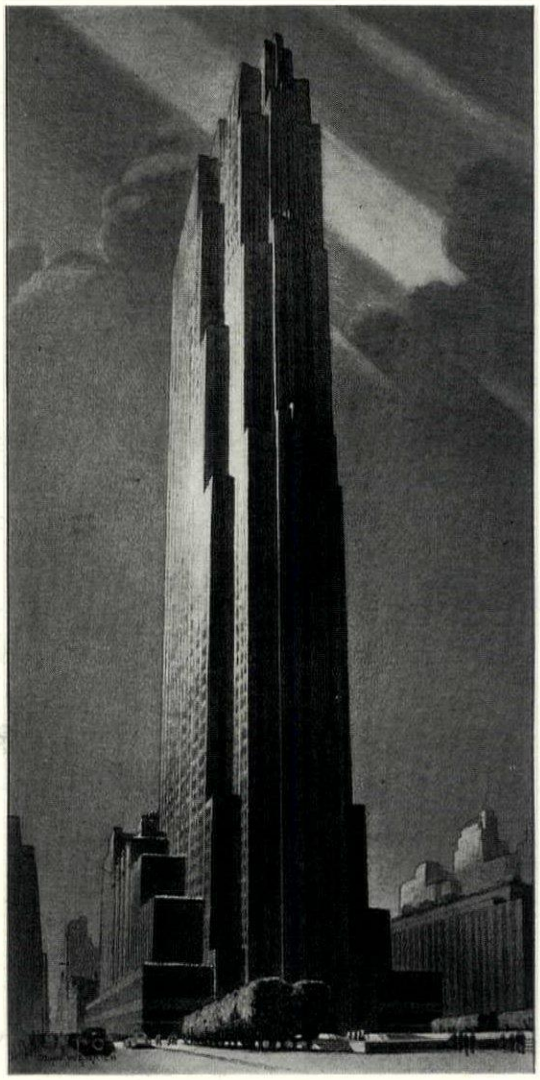
NEXT MONTH'S FORUM

THE ARCHITECTURAL FORUM has been chosen as the official vehicle for the publication of the unprecedented development which is known to the world as Rockefeller City. It is inevitable that there should exist keen interest in the design and engineering of the world's greatest building project and we are proud to announce that in the January issue will be published the first articles of a series which will describe, step by step, the architect's own story of the entire work.

RAYMOND HOOD, who is one of the architects, is becoming—despite his efforts to prevent it—one of our most widely quoted architects. He seems to have formed the creditable habit of writing only when he has something to say. The leading article in the January issue will be written by MR. HOOD, who will tell the purposes of those in charge of the design of Rockefeller City, their method of approaching the problem, and the results of collaborated efforts of architects, artists, sculptors, landscape architects, and the host of financiers, building managers, engineers, and builders which are necessary to bring an idea into actual being.

NO less worthy of note in its own field of design is the Kingswood School recently completed in Cranbrook, Michigan, of which ELIEL SAARINEN was the architect. To every architect MR. SAARINEN and his work needs no introduction and the editors deem it a privilege to present this latest product of his genius for design. The Kingswood School will be presented in a series of sixteen plates chosen to give a most comprehensive idea of the development of this outstanding building. It is unnecessary to add that the pictures illustrate many unique solutions to several unusual architectural problems. Especially is this true of the interiors of the building which illustrate the perfection which may be attained when architect and interior decorator collaborate in the production of a unified whole. The story of this collaboration will be told in a short article in addition to the plates.

CHARLES Z. KLAUDER needs no introduction to the architectural profession. He is an architect pre-eminent in design, especially the design of college buildings. THE ARCHITECTURAL FORUM has been fortunate in presenting many office buildings in the pages of former issues and in the January number we are glad to announce a series of excellent plates illustrating the new Hetty H. R. Green Hall at Wellesley College at Wellesley, Massachusetts.



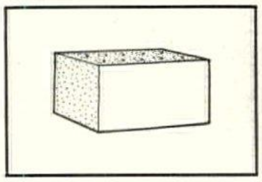
ROCKEFELLER CITY

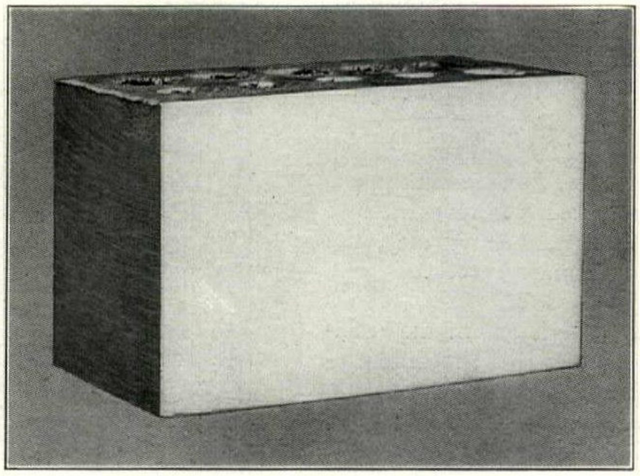
The 68-story office building which will occupy the center of and dominate the Rockefeller City Group, for which Reinhard & Hofmeister, Hood & Fouilhoux, Corbett, Harrison & MacMurray were the architects

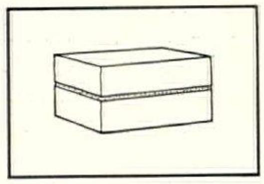
(See Page 39 in the Advertising Section for Engineering Announcement)

announcing

TU-BRIC







The Size of Tu-Bric

TU-BRIC MEASURES 4¾" x 8" x 3⅞"

THE HEIGHT OF TWO LAID LIKE ONE

Two Standard Size Brick

GENUINE ENAMELED BRICK

IN 17 COLORS AND WHITE

Presented for the approval of Architects seeking an enameled-face, ceramic unit

COMBINING

BEAUTY - PERMANENCE - LIGHT REFLECTION
SANITATION - IMPERVIOUSNESS
UNLIMITED COLOR RANGE

AT THE LOWEST FINAL COST

TU-BRIC OFFERS MANY POSSIBILITIES IN SCHOOLS, Gymnasiums, Swimming Pools, Cafeterias, Lavatories, Corridors, Light Courts, Stair Wells and All Service Areas

A "Pre-View" of Our 12 Page Sweet's Catalogue Insert Is Available

AMERICAN ENAMELED BRICK CORPORATION

Graybar Building, 43rd Street at Lexington Avenue
NEW YORK CITY

GENTLEMEN OF THE JURY

WHO WILL DECIDE

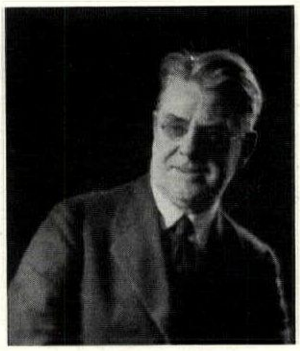
The Architectural Forum Competition

FREDERICK C. KENDALL
CHAIRMAN

RALPH T. WALKER
FREDERICK GOUDY
HEYWORTH CAMPBELL
PAUL PHILIPPE CRET
GUSTAV JENSEN
ERNEST ELMO CALKINS

Besides editing the distinguished *Advertising Arts*, Mr. Kendall edits *Advertising and Selling*, in which he conducted the campaign against paid advertising testimonials which won for him the Bok Business Award in 1929

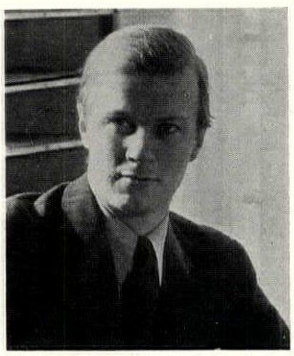
Ralph Walker is not only one of the ablest architects now practicing, but he is one of the most popular. His talents extend beyond the confines of architecture to include many auxiliary arts



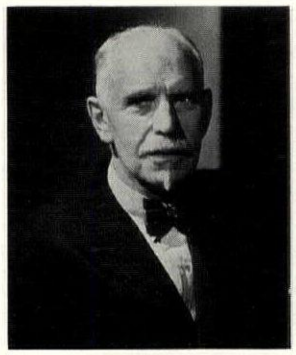
As a typographic expert, Mr. Goudy has few equals. The font that bears his name, familiar to all who have acquaintance with printing, is but one of his many contributions to typography

Mr. Campbell has erected his own monument in the formats for all the Condé Nast publications. He also designed the New York *Morning Telegraph*, one of the finest looking daily papers

There is no need to introduce Paul Cret or to mention that besides being a great architect he has been a source of inspiration to hundreds of students at the University of Pennsylvania



The versatility of Mr. Jensen is amply illustrated by a few of the commodities that he has designed—vanity cases, telephone, refrigerator, a kitchen sink, and packages and cans for food products



In the advertising profession, from which he has just retired to devote his time to writing, Mr. Calkins is regarded as a really great spirit. He influenced the entire world of advertising

(*See Page 53 in the Advertising Section of this issue for Details*)

BOOK FORUM

STANFORD WHITE

BY CHARLES C. BALDWIN

A REVIEW

STANFORD WHITE, by Charles C. Baldwin. 400 pp., 5½ x 8½, illustrated, cloth. Published by Dodd, Mead & Co., 443 Fourth Avenue, New York City. Price $3.50.

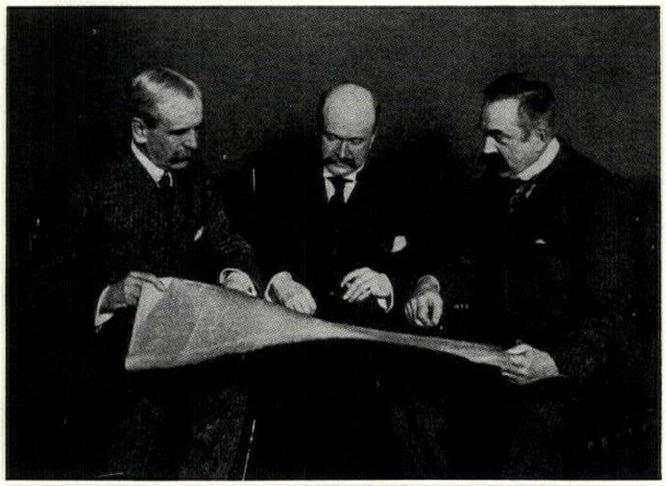
TO the architectural profession the name of Stanford White means something entirely different from what it does to the gentleman in the street. Illogical and unfair though it may be, it is none the less true that White, to the public, is not the man who designed the old Madison Square Garden, the Washington Arch, the Judson Memorial Church, and many of the magnificent mansions which once lined Fifth Avenue; he is not the man of whom William M. Chase said, "He did more to beautify New York and to encourage architectural beauty everywhere in America than any other ten men." He is the man who was shot down by a "Pittsburgh idler," Harry K. Thaw.

The biography which Mr. Baldwin has written is one that will revive in the minds of those who lived them the "good old days" of architecture, and that will give to those who have only heard about them a generous intimate picture. There were many great souls in those days, possibly no more than we have today; but the glamor which surrounds the Eighties and Nineties in American architecture, as revealed in the background of White's life, seems unmatched today.

Baldwin shows us White at work, White at play, and White the man of innumerable friends. He calls him the leader of the cultural movement of the day, and when one considers the group of which White was the dominant figure, the appellation seems justified.

Mr. Baldwin has been privileged to use many personal letters to and from his mother, McKim, and Saint Gaudens. In his relations with McKim and Saint Gaudens, we get a splendid portrait of the real White, a spontaneous, lovable, and generous man, the man whose inspiration has lasted since his death, and which is likely to last for many years more. The success of Cass Gilbert, J. Monroe Hewlett, Philip Sawyer, and many others who were draughtsmen under him, is indicative of the influence White wielded over his draughtsmen. Just as it was a great education for White to serve an apprenticeship under Richardson, so was it an education for these men to work under White.

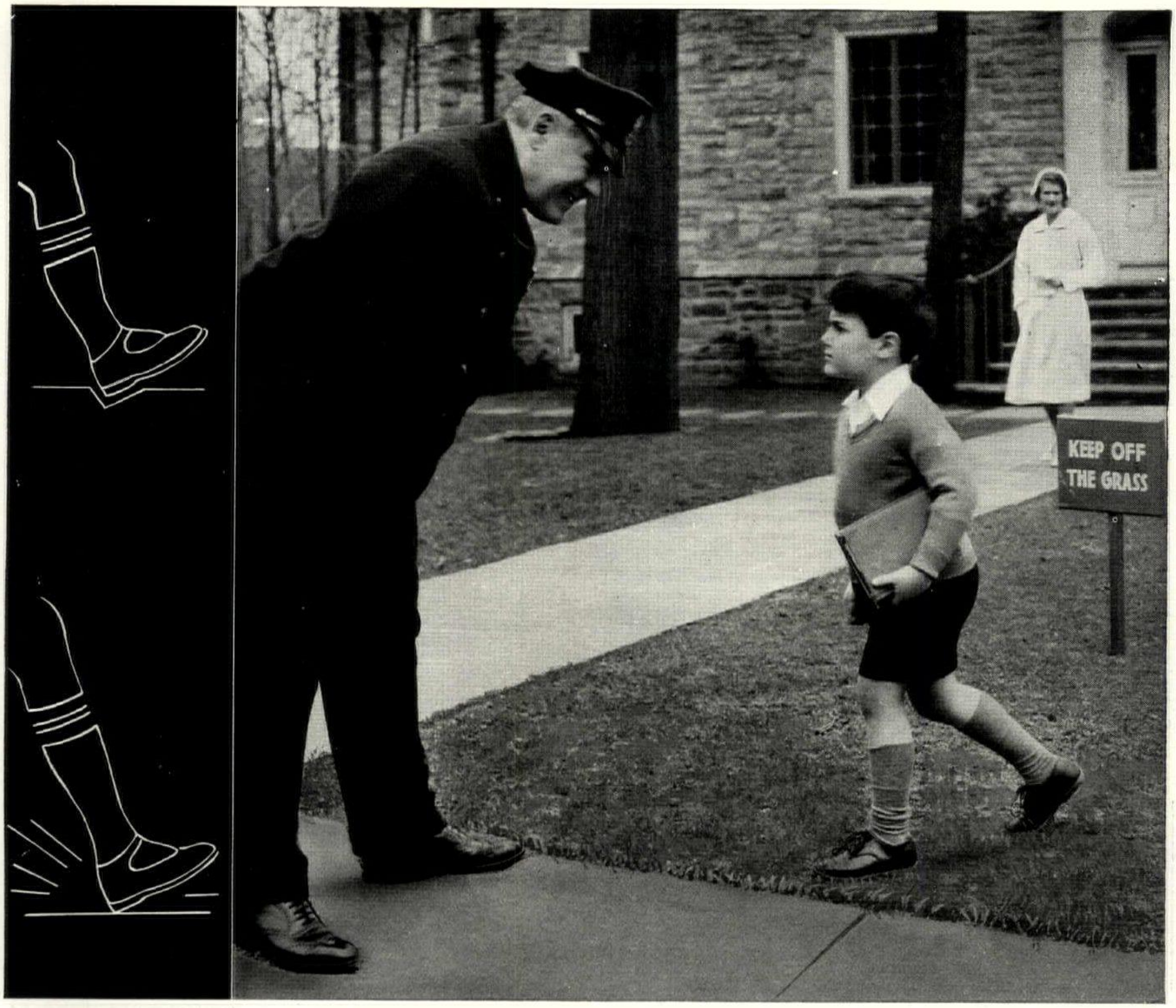
Fortunately for biographical data, Stanford White was the type of man who lived a life of colorful incident. There is the story, for instance, of his paying a farmer the full price for some timber, with the stipulation that the trees be left standing. Then there is the story of his tiffs with J. P. Morgan on the subject of angels, and his futile efforts to raise $600 from him for the Farragut statue in Madison Square. And once again the story is told of the difficulties with the Madison Square Garden Diana, the furore that was raised over the 18-foot high huntress, a furore that was both moral and artistic. Finally, White, at his own expense, had the figure taken down and replaced by another on a smaller scale.



The great triumvirate of American architecture. Left to right, William Rutherford Mead, Charles Follen McKim, Stanford White

Mr. Baldwin has properly seen fit to identify all the characters who made up the background of White's life—characters with whom the nation ought to be more familiar. Perhaps the most colorful of all was Joseph M. Wells, the man who declined an offer of partnership in the firm of McKim, Mead & White, because, so the story goes, he could not afford to sign his "name to so much damned bad work." Wells was a great figure, and although his reputation in the profession needs no bolstering, he would certainly have achieved an even higher place had he lived longer than he did. Others who were White's intimates, and who are depicted briefly, are Richard Watson Gilder, T. W. Dewing, A. P. Ryder, F. Hopkinson Smith, Kenyon Cox, Abbott Thayer, George Fletcher Babb, and many others.

The death of White is dismissed briefly, as an event unimportant in his artistic life. It is regrettable that America has chosen this incident by which to remember White when there is so much of beauty, so much of loveliness that he gave to the country.



KEEP OFF
THE GRASS

RECENT TRENDS IN HOUSING, by Edith Elmer Wood, Ph.D. 5¼ x 7¾, 317 pp., illustrated, cloth. Published by The Macmillan Company, New York. Price $3.00.

THERE is probably no greater opportunity before the architectural profession than that which lies in the sponsorship of low cost housing. While the nation has been busy with other types of "noble experiments," housing conditions for the lower two-thirds of the urban population in the country have sunk to a criminally low level; and very few hands have been raised to stop it. It is true that there have been several splendidly serious attempts to solve the problem; but in the main we have little to our credit as compared with other nations.

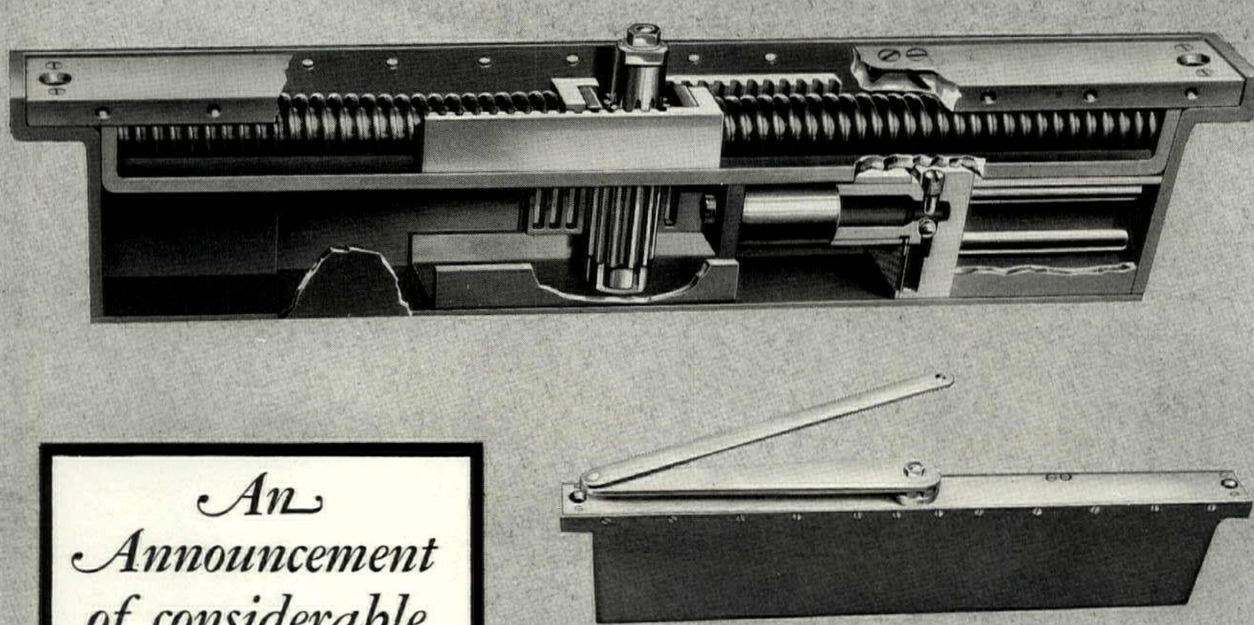
Dr. Edith Elmer Wood, a recognized authority on the sociological aspects of housing, has presented in her book, "Recent Trends In Housing," a clear picture of existing conditions, which constitute a severe indictment against the general public, and against architects and politicians in particular. Tracing the development of housing experiments since the war, she reviews every significant attempt to improve conditions since that time—not only reviews each attempt, but criticizes or praises according to the merit of the operation.

Particularly enlightening were the three chapters on cooperative housing entitled "Eliminating Commercial Profit," "Housing By Public Authorities," and "The New York State Board of Housing." In the first, Dr. Wood considers the various types of limited dividend corporations that have built such communities as the Paul Lawrence Dunbar Apartments and the Grand Street Apartments in New York, and the Marshall Field and Julius Rosenwald houses in Chicago. While outlining the good points in each of these projects, Dr. Wood is equally emphatic in stressing their weak points, and the limitations of semi-philanthropic endeavors.

Another movement that the author discusses in detail is the California Veterans Welfare Board building program, the most significant feature of which is the fact that the state, through bond issues, finances the building or purchase of homes for veterans up to $5,000. Under the plan, a veteran must make a 5 per cent down payment on the cost of the house, with a 5 per cent additional amount to cover the cost of administration during the period of amortization. Thus, on a $5,000 house, the down payment is only $500, and the monthly payment of principal and interest is only $33.10.

The New York State Housing Law is cited as one of the most advanced steps in governmental aid. The two important features of the law are that, under certain conditions, the developments of building companies which limit their dividends to six per cent, are tax free, and the fixing of maximum rentals so that the benefits of the law may be conserved for those tenants and co-operators who really need help.

The inadequacy of the present methods of home financing is also clearly discussed in a chapter on that subject. Dr. Wood finds the situation to be, that those who are able to pay 50 per cent of the cost at the outset have several sound methods of obtaining a first mortgage for the remainder, that those who can supply only from 25 to 40 per cent of the total must turn to the building and loan associations, or to some other specifically created organization, and that those who have only 10 to 15 per cent of the required capital are forced to entertain financing schemes that do not have sound foundations.



An Announcement of considerable architectural importance

Send for the illustrated folder which gives all the details

Introducing the New YALE *Concealed* Door Closer « « « « «

HERE is the long-sought development in door closing devices—a CONCEALED Door Closer, just as efficient as the best of the conventional types.

Here are some of the high points. The new *Concealed* Closer is mortised into the door like a lock and can be used for both wood and metal doors. It is equipped with a hydraulic checking cylinder whose piston is operated by a rack and pinion. This means checking control over the entire range of the device, which in turn means effective closing of even a heavy door against a strong draft.

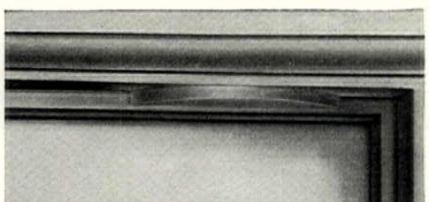
The construction of this new YALE *Concealed* Door Closer is such that the turning force is balanced through the action of compression springs. This means very little side pressure on the bearings and therefore a high rate of efficiency.

This new YALE Closer is easily regulated, noiseless and smooth in operation, and permits the door to be opened flat back against the wall.

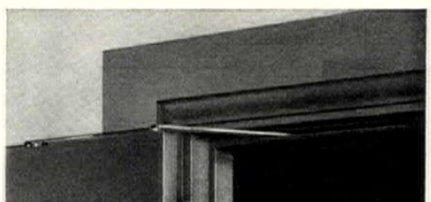
You will be extremely interested in this new and carefully perfected device. Write for the illustrated folder which gives all the details of this long-wished-for development. You can specify it with confidence.

THE YALE & TOWNE MFG. CO.
STAMFORD, CONN., U. S. A.

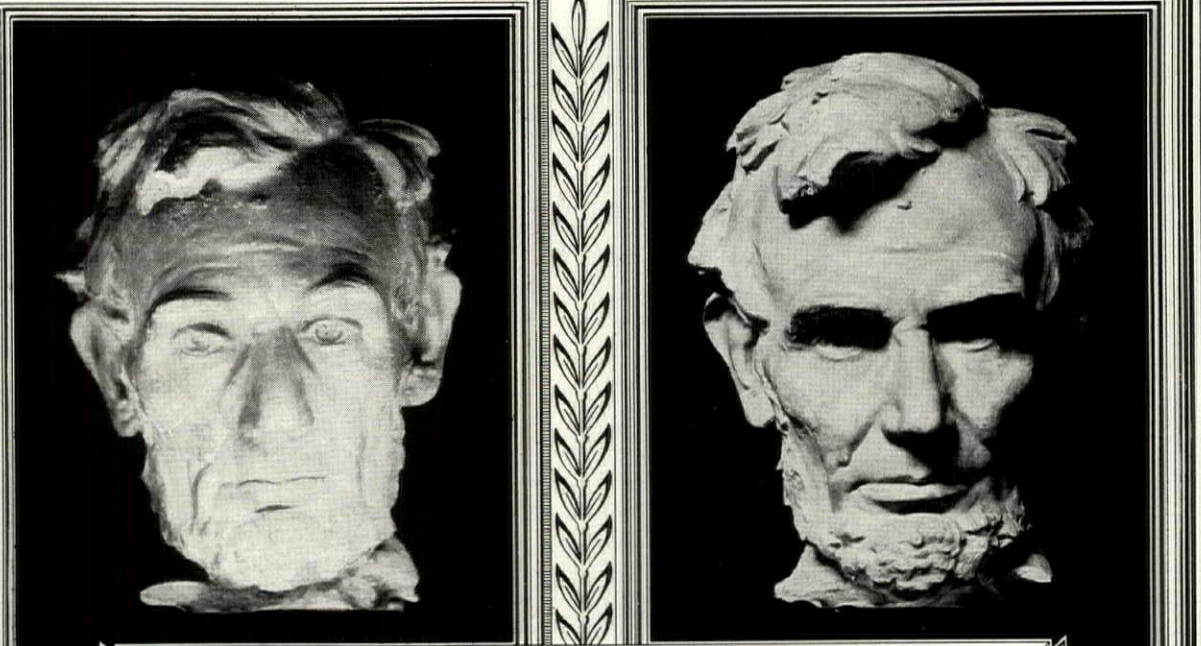
View from inside of door equipped with the new YALE Concealed Door Closer. Note the entire absence of any evidence that the door is thus controlled.



View of the same door from the outside. The only external indication of the closer is the small additional member on the trim to permit the action of the arm.



View of the door wide open. Note how the new YALE Concealed Door Closer permits the door to open the full 180 degrees—all the way back to wall.



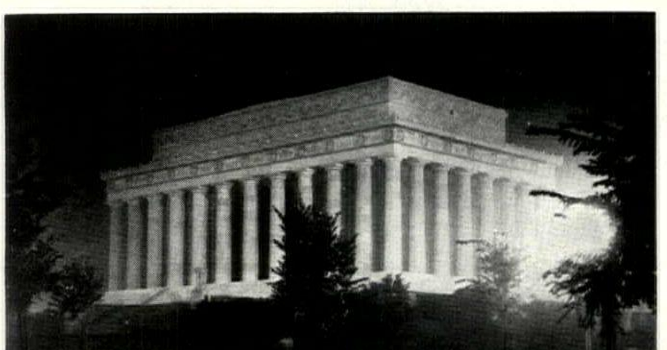
From studio photographs in which the actual lighting conditions are reproduced

"THE TRUE FACE RETURNS"

WHEN the noble Lincoln Memorial at Washington was completed, the sunlight, reflected from the marble floor, seriously distorted the expression of the sculptured face. The strong, grave features were lost in the projection of light from this unexpected angle.

To correct the reversal of values, a system of floodlighting, from behind ceiling panels of specially prepared louvers, was submitted by illuminating engineers of the General Electric Company. Their recommendation was adopted. The result, as shown in the illustration, was a complete restoration of the sculptor's conception—a return of Lincoln's true face. In the hands of the architect, floodlighting is an exquisitely precise instrument — responsive to technical skill and artistic conception—preserving intended values at night—applicable alike to statues, structural surfaces, and ornament.

General Electric specialists, experienced in the use of floodlights under every condition, are prepared to coöperate with architects in recommending installations to meet all requirements of design and construction. Address the nearest G-E office, or General Electric Company, Schenectady, New York.



Lincoln Memorial, Washington, erected under the supervision of the Office of Public Buildings and Public Grounds

Henry Bacon, Architect of Memorial. Daniel Chester French, Sculptor of Statue. Floodlighting by General Electric

710-87

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

NOTICES AND EVENTS

EUGENE W. STERN
(1865-1931)

TO those of us who have known and worked with Eugene W. Stern, his death has brought a feeling of very deep personal loss.

As architects we have had cause to realize his very great ability and his ingenuity in seeking and finding solutions for the difficult problems we submitted to him. Like his colleague, Henry W. Hodge, who likewise passed away at the full height of his career, he had the faculty of understanding and sympathizing with the point of view of the architect, and of collaborating with him in the fullest sense of the word. This interest in the problems of the architect in no way lessened his enthusiasm for the purely engineering side of his profession.

The fact that he stood among the leaders of the profession served rather to spur him on to the study of all that was new in ideas and methods of construction. His frequent trips to Europe to study the work of his foreign colleagues and his recent articles on the development of reinforced concrete, especially by Fraissinet of France, are evidence of this spirit, usually regarded as characteristic only of youth.

But aside from and above his ability as an engineer, those of us who knew him well will always remember with affection Eugene Stern, the man. His friendliness and his enthusiasm made him beloved by all with whom he had to deal. In the days to come we shall feel an abiding loss, not only for the great engineer, but for the good friend, who has left us all too soon.

CHARLES BUTLER.

LE BRUN TRAVELING SCHOLARSHIP

THE annual traveling scholarship, founded by Pierre Le Brun, with a monetary value of $1400, has been announced by Chester H. Aldrich, chairman of the executive committee of the New York Chapter of the A.I.A. Competition for the scholarship is open to any architect or draftsman between the ages of 23 and 30 who has been engaged in practice for three or more years. The program will be issued about January 15th, and drawings are to be delivered about March 15th. Information may be obtained from the secretary of any Institute chapter, or from the Le Brun Scholarship Committee, Room 530, 101 Park Avenue, New York City.

COLUMBUS MONUMENT AWARDS

J. L. GLEAVE, English architect, was awarded the first prize of $10,000 in the international competition for the design of the Christopher Columbus Memorial Lighthouse to be erected at Santo Domingo capital of the Dominican Republic. Second prize of $7,500 was won by Donald Nelson and Edgar Lynch, of Chicago, Bennett, Parsons & Frost, associated architects, and Oskar J. W. Hanson, sculptor. Third and fourth prizes of $5,000 and $2,500 were awarded to Joaquin Vaquero Palacios and Luis Moya Blanco, of Spain, and Theodore Lescher, Paul Andrieu and Maurice Gauthier, of France, respectively.

Other American winners of $1,000 awards were Corbett, Harrison & MacMurray, of New York, Douglas D. Ellington, of Asheville, N. C., and Will Rice Amon, of New York.

W. KENNETH CLARK
(1884-1931)

TO Kenneth Clark, who died October 31st, the architectural profession owes a debt of gratitude for his important contribution in raising the standards of architectural photography. Mr. Clark himself an architect, and who at one time was associated with Goodhue, Bacon, Magonigle, and Barber, gave up his professional practice almost entirely to devote himself to photography. Perhaps his best known work was done in association with Russell Whitehead for the White Pine series.

JOHN F. BACON
(1876-1931)

JOHN F. BACON, who supervised the work of the Waldorf-Astoria Hotel for Schultze & Weaver, died suddenly on November 7th. Mr. Bacon was a graduate of M.I.T., and had been associated with Warren & Wetmore, Trowbridge & Livingston, and Benjamin Wistar Morris. Mr. Bacon also supervised construction for the Grand Central Terminal.

ARCHITECTURAL FORUM COMPETITION

DETAILS of THE ARCHITECTURAL FORUM competition for the design of a new format will be found on page 7 of this issue.

(Other Notices and Events will be found on page 22)

NOW INDIVIDUAL CARPET DESIGNS ARE MADE *when the carpet is laid!*

A portion of the new showroom in the offices of the General Fireproofing Company, in New York. Note how the "G. F." monogram is inlaid in the Collins & Aikman Carpet—and how two colors have been joined to give a custom-tailored effect and unusual design at the doorway and around the broad pillar. Eugene Schoen, Architect.

FORMERLY, if you wanted a special design in a carpet, you had to have it specially woven. And the cost of that, in most cases, was prohibitive. With the new Collins & Aikman Carpet, special designs are not made in the weaving—they are made when the carpet is laid! It is a new decorative medium, giving individual, custom-tailored effects, *at reasonable cost.*

With Collins & Aikman Carpet you can get effects almost as versatile as you could get with paint and brush. Inlaid designs, crests, monograms. Intersecting angles and planes of color. Special borders to harmonize with drapes or wall-tints.

And all this with never an ugly stitched seam!

It is soft, quiet carpet, with a luxurious, long-wearing pile. It comes in 54-inch widths—and the widths are joined on the under-side, in a new manner, giving an unbroken broadloom appearance in rooms of any size or shape. Any number of colors may be joined, in an infinite number of designs. The carpet comes in a choice of sixteen colors—all approved by leading decorators.

As for the reasonable cost—*Collins & Aikman Carpet sells at the low price of the old-fashioned strip carpet that had to be stitched together.*

You certainly owe it to yourself to know all about the Collins & Aikman idea before you buy or specify *any* floor-covering. For complete information, write to Collins & Aikman Corporation, 25 Madison Ave., New York City.

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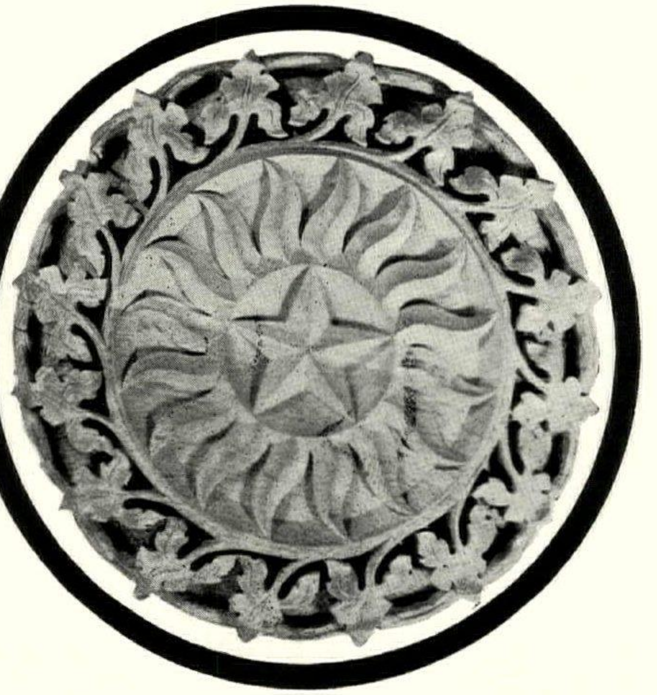

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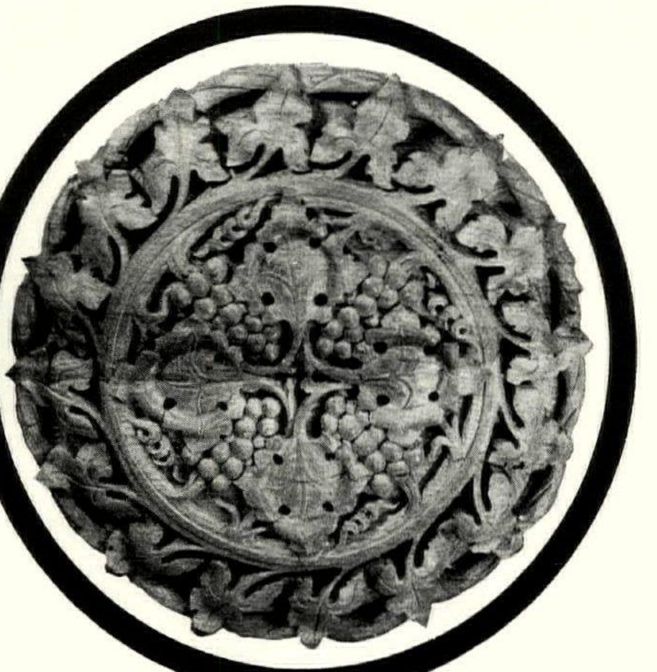


REVIEWS AND ANNOUNCEMENTS

COMPLETE OFFICE FOR SALE

The complete equipment of an architectural office established for twenty-five years is for sale. Every item used in architectural practice is included, several cases especially designed for architectural work, manufacturers' catalogs on shelf and in A. I. A. file, new plate file, architectural library, etc. Will be sold only as a whole. Interested more in disposal of equipment than in price received. For information, address Ernest L. Stouffer, 256 Administration Building, Urbana, Illinois.

Samuel Z. Moskowitz, R. A., announces the opening of an office for the practice of architecture at 578 Madison Avenue, New York City.

The office of Emory Roth, architect, has been moved from 1440 Broadway to 18 East 48th Street, New York City.

HILLWOOD MANUFACTURING CO., 21700 St. Clair Ave., Cleveland, Ohio. "Helyx Nails."

"The round nail that makes a square hole" is the slogan adopted by the Hillwood Company to describe their new product. The nail is made from a high carbon steel square wire twisted into a spiral coil. It is said that when the nail is driven through a drilled hole it automatically threads itself into the steel as it is driven, and makes a permanent attachment. It can also be driven through sheet metal up to twelve-gauge without the use of a punch according to the gauge of the nail. Helyx nails are offered to take the place of clamps, bolts, lag screws, etc., for attaching wood to steel.

FRANTZ MANUFACTURING CO., Sterling, Ill. "Over-the-Top Door Equipment."

Complete details and specifications of "Over-the-Top" door equipment" are contained in this pamphlet recently issued by the Frantz Manufacturing Company. According to the booklet, the principles of mechanics in this type of door departs radically from the customary method of operating doors overhead. There are no pulleys, no cables or counterbalance weights are needed, and overhead trackage is held to a minimum. By a patented device, the company states, all possibility of slamming a door in opening or closing it, is positively eliminated.

Operation is accomplished by two large springs, whose strength has been tested to be equal twice the necessary strength for good operation. "Over-the-Top" equipment is available for special size openings as well as for the standard doors (7 to 8 ft. high and up to 8 ft wide).

AMERICAN RADIATOR COMPANY, 40 West 40th Street, New York City. "Arco Radiatherm."

The Arco radiatherm described in this pamphlet is a new development of the American Radiator Company. It is a combination of thermostat and radiator valve and is installed on the radiator just as any ordinary valve would be. Regardless of outside changes in the weather, it is designed to keep the room temperature at the fixed degree for which it is set by controlling the amount of steam or vapor flowing into the radiator. In effect, it is an automatically expanding and contracting orifice valve actuated by a thermostat. It is applicable to all two-pipe steam, vapor, and vacuum systems, for exposed or enclosed radiators, or for ferrous or non-ferrous radiators.

NOTICES AND EVENTS

(Continued from page 13)

FREDERICK J. STERNER (1862-1931)

FREDERICK J. STERNER, former New York architect, died in Rome on November 12th. Mr. Sterner was a brother of Albert Sterner, the artist, and of Lawrence S. Sterner, playwright. He was best known for his remodeling work of old New York residences. Among his other work were the Greenbriar Hotel at White Sulphur Springs, the Antler Hotel in Colorado Springs, and the residences of Gen. Cortland Palmer in Denver, and of Stephen Clark, William Ziegler, Jr., and Philip Gosler in New York. Mr. Sterner had been living abroad since 1925.

JAMES TEMPLETON KELLEY FELLOWSHIP

APPLICATIONS for the James Templeton Kelley Fellowship, open to all architects, draftsmen and students residing within the area under the jurisdiction of the Boston Society of Architects, should be in the hands of Niels H. Larsen, Secretary, 814 Statler Building, Boston, Mass., before January 18, 1932. The fellowship has a value of approximately $2500 a year, to be used for foreign travel in the study of advanced architecture. Applications should state the applicant's age, education, present occupation, experience, and suggestion for his work abroad.

CHICAGO A. I. A. AWARD

THE annual award of the Chicago chapter of the American Institute of Architects for 1931 was awarded to Ernest A. Grunsfeld, Jr., for his Adler Planetarium. This building was featured in THE ARCHITECTURAL FORUM for February, on pp. 140-142 and pp. 145-150.

ARCHITECTURAL FORUM COMPETITION

DETAILS of THE ARCHITECTURAL FORUM competition for the design of a new format will be found on page 7 of this issue.

MEMBERSHIP CERTIFICATE COMPETITION

ARCHITECTS and draftsmen living or working in New York State are invited to compete for 14 awards for the design of a membership certificate in the New York State Council of Registered Architects. Designs will be judged upon the merits of their composition as a whole, their decorative embellishments, if any, and the excellence of the lettering. The first prize is $100, second $50, third $35, fourth $25, and ten additional prizes of $20 each. Copies of the program may be had upon application to the Architects' Emergency Committee, 115 East 40th Street, New York City. The competition closes December 22.

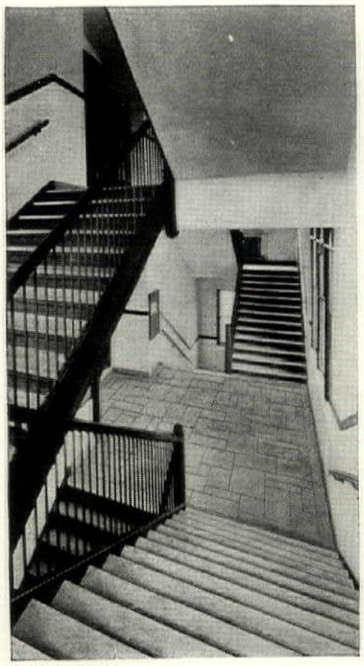
INDEX TO ADVERTISING ANNOUNCEMENTS

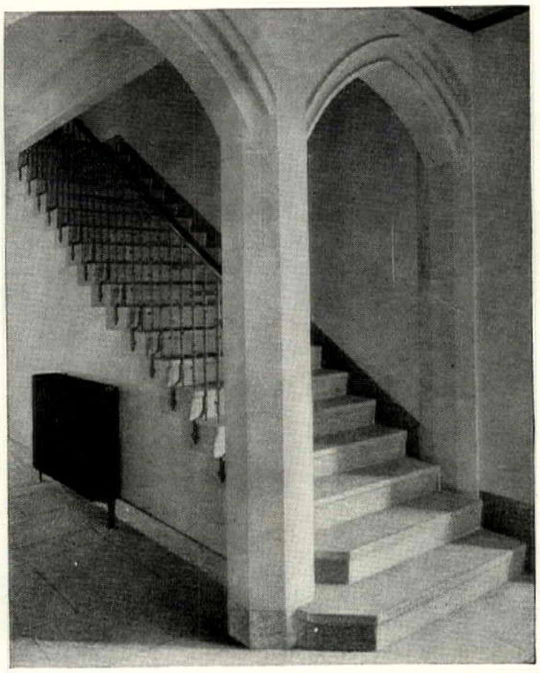
Part 1—Architectural Design

Part 2—Architectural Engineering and Business

STAIR TREADS • • • • • • • •

THAT STAND UP UNDER DECADES OF ABRASION





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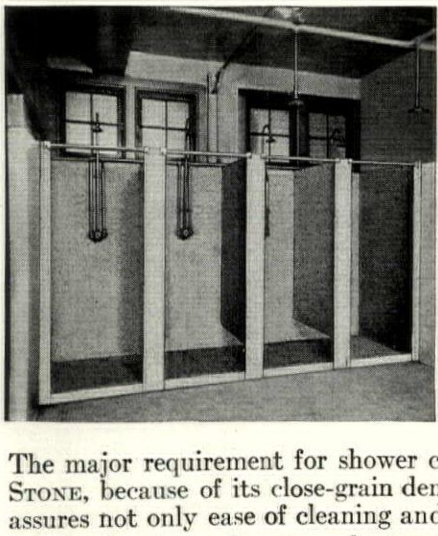
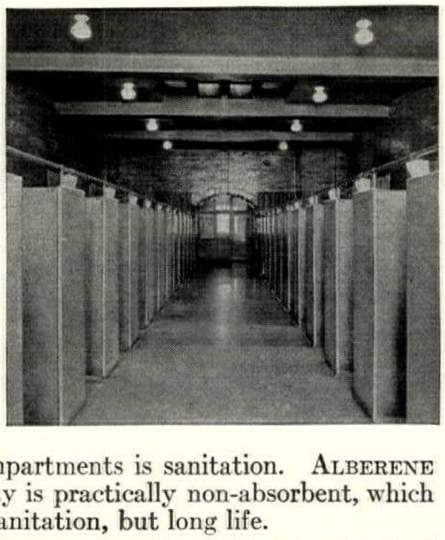
SHOWER COMPARTMENTS • •

THAT REMAIN SOUND, CLEAN, SANITARY





The major requirement for shower compartments is sanitation. ALBERENE STONE, because of its close-grain density is practically non-absorbent, which assures not only ease of cleaning and sanitation, but long life.

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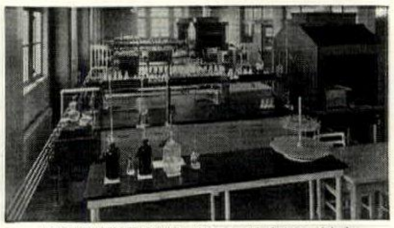
STAIR TREADS AND SHOWER COMPARTMENTS

SOAPSTONE'S CONTRIBUTION TO *Science* · *History* *Architecture*

CHEMICAL LABORATORIES



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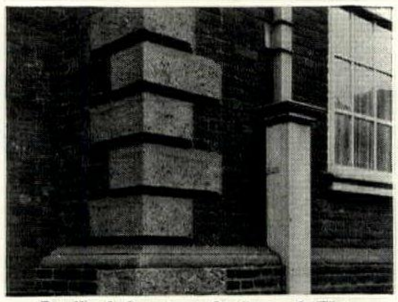
INDEPENDENCE HALL



Detail of Soapstone Quoins and Water Table, Independence Hall

The use of Soapstone for exterior trim is not a new development. It is, rather, a revival of interest in this natural stone whose heritage in America goes back to the early 1700's. Independence Hall erected in 1736, for which soapstone was used as trim for quoins, coping, water table, window heads and sills, etc., is a monument not only to the age and weather-resisting qualities of soapstone, but also an historical record of the value of soapstone for decoration and color contrast.

SPANDRELS FOR MODERN BUILDINGS

City Hall, Buffalo, N. Y., Dietel and Wade and Sullivan W. Jones, Architects, ALBERENE Spandrels used

The exteriors of a large percentage of the outstanding office, public and commercial buildings built during the last five years have been of the *pier and spandrel type;* and in most cases the spandrels, for *structural* or *economical* reasons have been a different material from the masonry pier, and for the sake of beauty and design have been of a contrasting color.

Its pleasing color, structural soundness, and durability establish the suitability of ALBERENE STONE for spandrels.

Other uses of ALBERENE STONE are explained in the brochure "Architectural Alberene" which contains actual color reproductions showing contrasts produced by using ALBERENE in conjunction with other stones. This book will be sent to any architect requesting it, together with samples of ALBERENE STONE.

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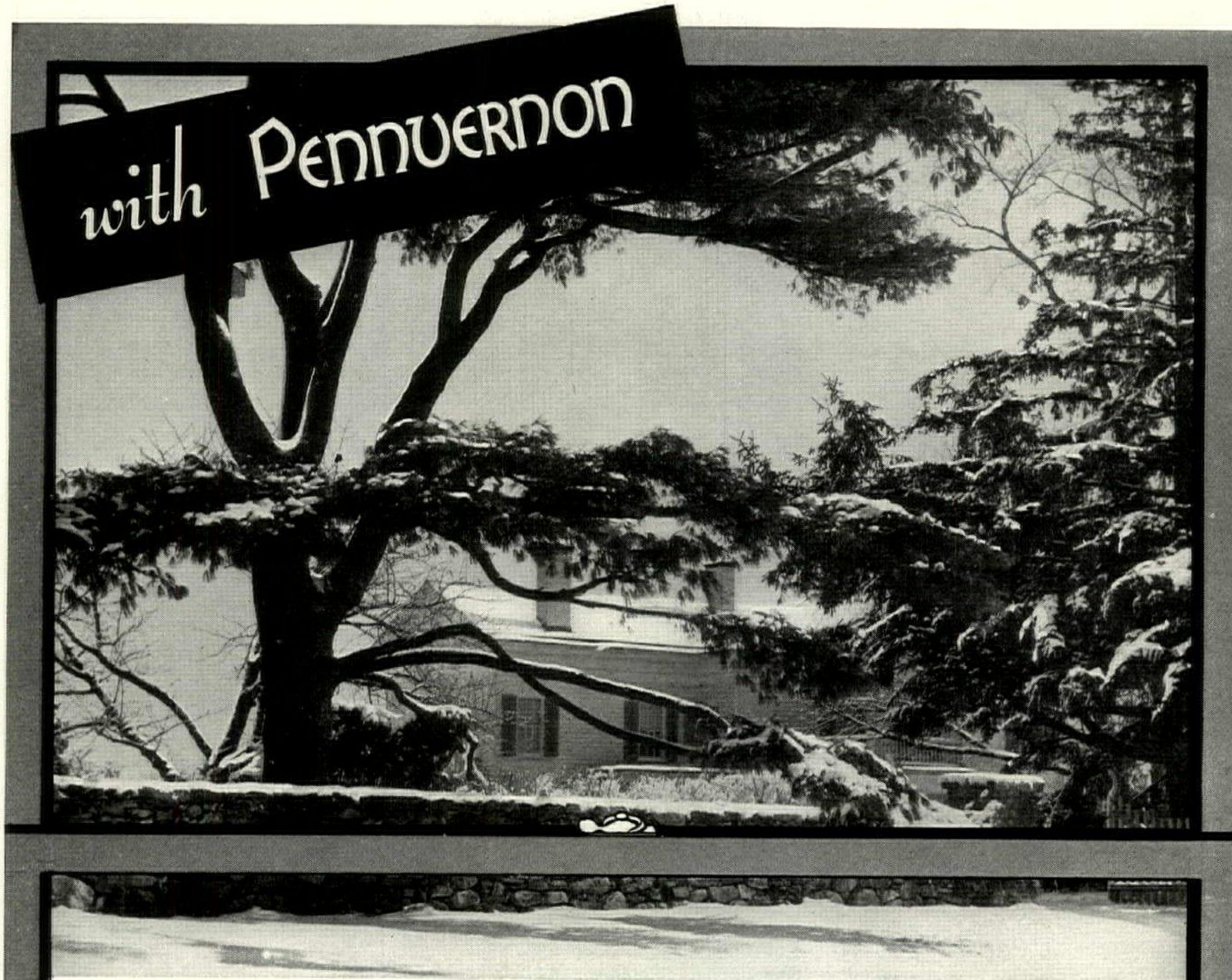

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THE
ARCHITECTURAL
FORUM

VOL. LV. No. 6

CONTENTS

DECEMBER, 1931

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PART II—ARCHITECTURAL ENGINEERING AND BUSINESS

The Architectural Forum is published monthly by Rogers and Manson Company, 220 East 42nd Street, New York. Howard Myers, President; Kenneth K. Stowell, Vice-President and Treasurer; George J. Reilly, Secretary. Yearly Subscription, Payable in Advance. U.S.A., Insular Possessions and Cuba, $7.00. Canada, $8.00. Foreign Countries in the Postal Union, $9.00. Single Copies: Quarterly Reference Numbers, $3.00; Regular Issues, $1.00. All Copies Mailed Flat. Trade Supplied by American News Company and its Branches.

The Architectural Forum

"OPPORTUNITY FOR INDIVIDUAL DEVELOPMENT"

A KINDERGARTEN IN THE DAVID SMOUSE OPPORTUNITY SCHOOL, DES MOINES, IOWA. PROUDFOOT, RAWSON, SOUERS & THOMAS, ARCHITECTS

THE ARCHITECTURAL FORUM

VOLUME LV NUMBER SIX

DECEMBER 1931

MODERN IDEAS FOR MODERN SCHOOLS

BY

N. L. ENGELHARDT

PROFESSOR OF EDUCATION
TEACHER'S COLLEGE, COLUMBIA UNIVERSITY

EDUCATION has been defined as that agency which will provide an opportunity for individual growth and individual development. It is the instrumentality which assists the individual in living a happy and productive life. It maintains ideals and sets up purposes. It provides for initiative and growth and is designed for the service of the social group as well as for the service of the individual. World developments within recent years have made it clear that the social and economic order constantly changes. As our social order changes, thus education changes. Education cannot remain static but must be a dynamic force always forging ahead with new methods and new aspirations into new experimentations. Because of this constant evolution taking place in the purposes as well as the methods of education, it follows that a similar change must occur in the school buildings in which the educational program is to be advanced.

Some of the most striking changes which have taken place within recent years in public education are connected with the larger numbers of children going to school. A few decades ago the high school was the institution which selected a relatively few children from the grades and gave to them, because of their peculiar abilities, a training which fitted them for the college and university world. Compulsory education laws, the attitude of the labor interests, and the influences of the machine age, have forced more children to stay in school during the high school years. At the same time, the social order has changed its ideas concerning its responsibility of education for the masses. A new philosophy of education advanced by Professor John Dewey and advocated and put into effect by his followers laid down a new charter of human rights. More children in school over longer periods of time have thus resulted in vast problems for public education.

What was to be taught these children during their school attendance; how to adjust subject matter to the needs of all types of children over a long range of time; and how to prepare children for an economic order in which their specific skills might not be required. The answers to these pressing questions have by no means been fully secured. The most serious problems of what to teach the children of the coming generation and for what to train them will continue to stand as most significant challenges to society. One may rest assured that the education program of the next few decades will change very rapidly and that the problems of housing this educational program will require from the architect even greater skill and more devoted attention than has been true in the past.

At all levels the public education program has modified its general plan to the degree that planning and construction of any school building are vitally affected. Only a few years ago our elementary schoolhouses were merely nests of classrooms, but changes have taken place which include a complete reconstruction of educational aims and methods from the kindergarten through the high school.

Probably the most significant statement of the new objectives in elementary education has been prepared by the classroom teachers of New York State.[1] Their report on "Cardinal Objectives in

[1] Second Report Prepared by the Committee on Elementary Education of the New York Council of Superintendents, October 1, 1929. Cardinal Objectives in Elementary Education, p. 13, University of the State of New York, Albany, N. Y.

Rosenfell, Courtesy Electrical Research Products Co.

Activities of first grade pupils in a Bronxville, N. Y., public school. Primary school children are endeavoring to satisfy their individual needs and much more equipment is therefore necessary than has been needed formerly. Note how interested the children are in what they are doing. Articles with which they work require storage space

Elementary Education" states that it is the function of the elementary school to help every child:

1. To understand and practice desirable social relationships.
2. To discover and develop his own desirable individual aptitudes.
3. To cultivate the habit of critical thinking.
4. To appreciate and desire worthwhile activities.
5. To gain command of the common integrating knowledge and skills.
6. To develop a sound body and normal mental attitudes.

In reviewing these cardinal objectives, it is clear that what was once the sole aim of the elementary school, namely, gaining command of common integrating knowledge and skills, is today considered fundamental but not the only part of the problem which confronts the elementary schools. To secure results in the other fields mentioned, the military precision of the classroom must be eliminated. The elementary school child must be thought of as endeavoring to find himself within his own social group. He must learn to adapt himself wholesomely and wholeheartedly to his environment. He should be given the opportunity for expressing desirable attitudes, for thinking his problems out by himself, and for participating in wholesome social activities. He ought not to be sent to the elementary school merely to prepare for the future, but he should be given the opportunity in the school itself to live a thoroughly expressive, contented and worthwhile life.

It is clear that this kind of an educational program can be carried on only with great difficulty in the formalized and institutional type of classroom which is to be found in so many school buildings. Teachers who are attempting to train in accordance with these objectives require materials of instruction, of testing, and individual use which are far more extensive and comprehensive than were needed in that kind of a school where the textbook constituted in large measure the sole teaching equipment.

It is interesting to note that the kindergarten first learned to carry out these new principles of education. This was probably due to the fact that the school tried to make for the young child a more easy transition from the home life with its many opportunities to the school life with its traditional and limited program. It was felt that the kindergarten should be a place where sunlight entered, where music was played, where opportunities abounded for the study of plants and birds and fish, and where children might learn the "give and take" of social contacts. Thus, the kindergarten in the past has been made the most attractive room in the elementary school. It has also been that room which has been best adapted to teaching needs as well as to pupil development and pupil activities.

A better integration of kindergarten and primary grade programs and an analysis of what should be taught in the primary grades for children of the ages seven to nine have resulted in requiring material for children's use, such as easels, work benches, work materials, animal cages, and the like, which have made new demands upon teaching space. The modern primary classroom is quite unlike the classroom of twenty years ago. It recognizes the teacher's desire to give children a maximum number of contacts with literature, material things, and animal and plant life. It provides a maximum of teaching space so

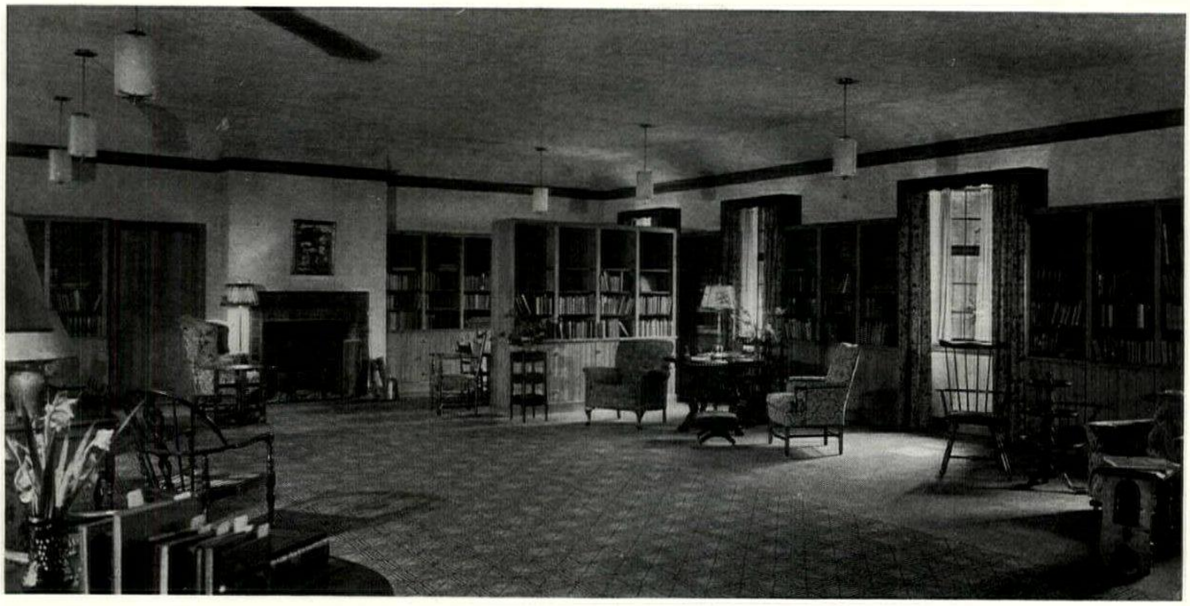
Activities of sixth grade pupils in a Bronxville, N. Y., public school. The system started in the first grade has been expanded to include such activities as the making of simple electrical circuits, block prints, pictures, etc. Note the grouping of the tables, the desks and chairs, also the equipment and materials which need storage space

Rosenfell, Courtesy Electrical Research Products Co.

that a clear space of a 23 x 30 ft. minimum is available. Storage spaces abound in the classroom, spaces for teachers as well as for children. The blackboard is limited in amount. Bulletin boards upon which children may display the products of their own initiative at heights permitting the entire class to see, supplant the blackboard in large measure. Bookcases, magazine racks, and library table are developed to form a library nook. The teacher is supplied with storage cases for the large charts and posters which are brought in or which the children make. There are also installed vertical files for tests and achievement supplies, and storage cases with adjustable shelves for the many materials which children use in their various activities. The equipment of the classroom consists of movable desks and chairs, or movable tables and chairs, planned for both individual use and for grouping as the situation demands. As part of the built-in equipment each pupil is provided with a cupboard or nook in which he may keep his own private work materials. Even primary rooms take on the aspects of a laboratory in which children are actively engaged in interesting tasks culminating in individual as well as group development.

Intermediate School Buildings. Grades 4, 5, and 6, have not been content with the restrictions of bare classroom walls and desks attached to the floor. The very nature of the subject matter in these grades has changed significantly. Instead of studying factual geography and factual history, the children of these grades learn about transportation or the interdependence of nations, or the history, achievements and results of changes in communication among peoples. The child is being taught to associate the geography of the world with his own life. He is learning to find himself among the wealth of materials which world geography provides. Thus it goes with the other subjects of the curriculum. Again, in the classroom, the child is being given the opportunity to live a well-rounded, integrated, and good life. The color scheme of the classroom, the preparation of the room for teacher and pupil materials, and the opportunities for bringing the world into the classroom through the agency of radio and sound picture, are all potent elements affecting architectural planning.

The important objective in all of the grades of the elementary school is the development of a sound body, and the growth of normal mental attitudes. This requires that well sunlighted and well ventilated rooms be set aside for play, and that these rooms be occupied a significant part of the school day so that the money investment may bring an adequate return. The demands for body development suggest the elimination of basement playrooms, and of poorly conceived and poorly equipped spaces which have in the past been designated as playrooms. The program of health and physical education requires a large school site, at least five acres, for each elementary school with special provisions for play for the kindergarten children, the primary grade children, and the larger children of the fourth, fifth and sixth grades. In congested centers the elementary school should have a playground on the roof where all types of active games may be played under complete protection from bad weather conditions. No elementary school is complete today without its auditorium, its health suite, its library and its special rooms for nature study and



These pictures illustrate the trend in education to create a homelike atmosphere. Above is the library in the Avery Coonley School at Downers Grove, Ill. Below is a first grade room in the Longfellow Elementary School at Pontiac, Mich. Childs & Smith, architects

art. Where the platoon system has been adopted, these rooms are provided as a matter of course. There is every reason, however, for the inclusion of these spaces in all types of elementary schools which pride themselves on providing modern educational opportunities.

It should be borne in mind that an attractive building with a planned landscaping effect, with playgrounds offering play opportunity as well as protection from the streets, should be the aim for every elementary school. Anything less than a building well adapted to its educational purpose and one which makes a distinct contribution to community development and beauty should not leave satisfaction with those who plan.

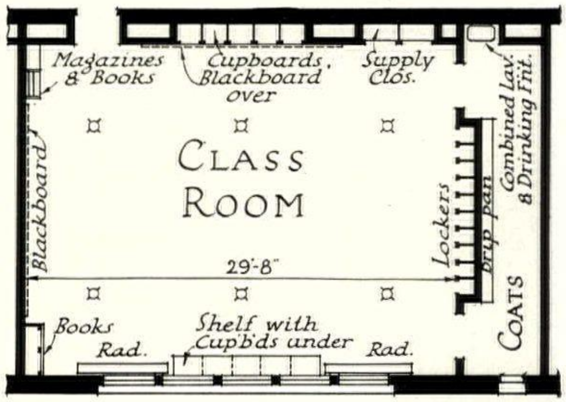
Junior High School Buildings. The most significant change which has taken place in outlook and method in public education is concerned with the development and progress of the junior high school. Based upon the fundamental philosophy of equal opportunity and promoted in terms of the universally accepted psychology of individual differences, the junior high school has rapidly taken the place of the deadly and repetitive seventh and eighth grades and has formed a splendid connecting link between the elementary grades and the upper three years of the high school itself. The junior high school age is the age of adolescence. The educational program for this age requires a building on a large site of twelve acres or more, with particular emphasis on competitive sport areas and special opportunities for the studying of nature and agriculture. Brooks and trees, flowers and shrubs, and hills and valleys should be characteristic of such a site. This intermediate type of education should provide for the beginnings of differentiation in pupils' work, should give ample opportunity for social development and should make available the workshops and laboratories where boys and girls may secure first-hand contacts with the developments in our industrial and commercial civilization.

The junior high school has been created for the purpose of giving youth confidence in his own ability and in his own native powers. The building itself should be a structure which adds to the enjoyment and development of its patrons. The architectural aim will be symbolic of the age of the children attending, of their earnestness of purpose, and of their intentness upon achieving success. Sunlight and fresh air in open types of buildings are to be sought. A maximum of safety and the utmost of sanitation should be the aim. Fire-resistive material of long life should be the main materials of construction. Flexibility of interior arrangement and the possibility of addition should be definitely secured in a building which should be built not in the ground, but as much as possible above the ground level.

The junior high school has been rapidly taking on the characteristics of the more advanced senior high school. It requires, in addition to the classrooms, special laboratories for science, household arts, industrial arts, commercial arts, and the fine arts. Its general service rooms should include an auditorium, a cafeteria, an audio-visual studio, gymnasium, and library. The administrative rooms needed are offices for the principal, for teachers, for health service, student activity rooms, and frequently offices for deans of girls and for the educational guidance department. In planning the classrooms care should be taken not to provide too limited a space, because one of the significant problems confronting the school administrator is concerned with the size of classes in both the junior and senior high schools. Much research work is still to be done to discover how adequately children learn in large groups as compared with small groups, and also to ascertain whether lessons in appreciation of literature, art, and music cannot be given just as successfully with groups of 50, 75, and 100 children as with groups of 35. This research will have a significant effect upon the planning of building spaces.

Until more definite knowledge is secured, it is reasonable to expect that each building will have a maximum of flexibility for interior arrangements and that no special rooms will be so designed as to prevent use for other than the special purpose. Even greater care should be utilized by the architect in planning the interior of all of the instructional spaces in junior high school buildings. Not only should the interior plan and decoration of the classroom contribute significantly to the educative processes, but also the character, design and decoration of the corridors should be considered to add their quota to the sum total of human incentive and human learning.

Each classroom and each special room should be planned so that the teaching process may be carried on with a maximum of ease. Special provision should be made for the storage of all materials required for teaching. Regular textbooks, supplementary textbooks, magazines, charts, paper supplies, and many illustrative materials are used in modern teaching. Bookcases, magazine display rack, chart and poster cases, teacher files for testing and teaching materials, general supply cases, and a storage cabinet for large articles are needed in each room. Library nooks with storage spaces for reference materials should be provided, especially in English, social sciences, and similar subjects requiring extensive reference. Above blackboards and bulletin boards, map and display rails should be installed. Whenever possible, window shelves with cabinets underneath should be provided. A lavatory is needed in many special classrooms.



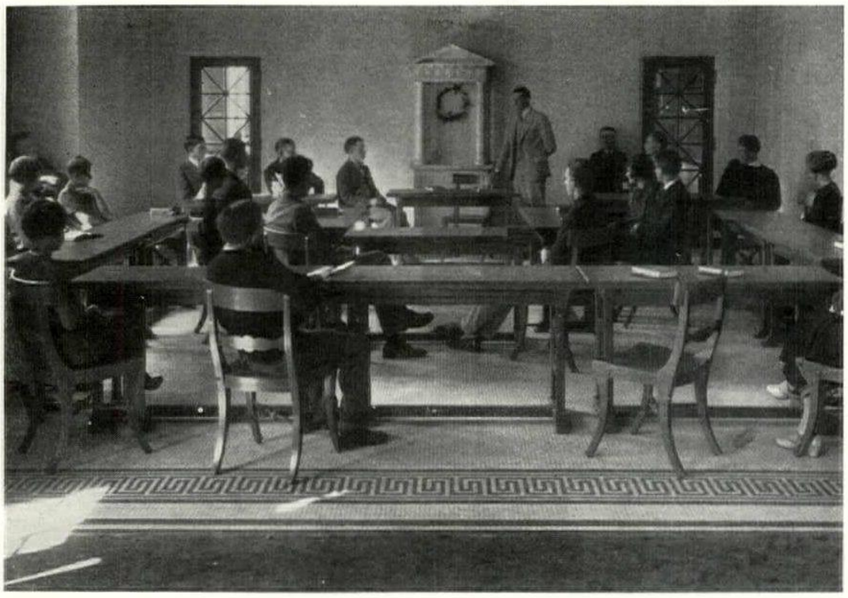
AN EFFICIENT USE OF SPACE

A plan of a typical classroom developed by Tooker & Marsh, architects, which contains all necessary storage facilities with a coat room and individual lockers

High School Buildings. Dr. Thomas H. Briggs of Teachers College, Columbia University, in the 1930 Inglis lecture[2] given at Harvard, called secondary education in a democracy "a great investment" and analyzed at great length the problems confronting the high schools of this country and their aspirations. This lecture is exceedingly well worth reading for any architect who is attempting to plan a high school building; in fact, its reading is worthwhile to any citizen who desires to secure an appreciation of what our public high schools have failed to do and are proposing to do.

The aims of the high school have been very clearly set forth by national groups spending many hours in discussion and conference. The seven objectives—the development of student health, the command of fundamental processes, the inspiration and knowledge for worthy home membership, the beginning of vocational aspirations and participation, the development of proper citizenship, the worthy use of leisure, and the creation of worthy character—are universally accepted as

[2]Briggs, T. H. Inglis Lecture 1930. Harvard University Press, 1930.



The setting of the classroom itself is often a stimulus to a more genuine interest in the subject which is being taught. The illustration is of a Latin room in the Jackson High School, Jackson, Mich. Childs & Smith, Architects

fundamentals in high school development. For the purpose of attaining these ends, public high schools cannot be mere recitation rooms with a few laboratories and one or two large spaces for the congregation of groups. The school must be planned with the purpose of creating the most democratic institution in our midst. It must serve all kinds of students and offer an abundance of opportunities for establishing responsibilities in students and for securing universal participation in a well-rounded life, as well as appreciations for the finer things that life affords. Skill and knowledge must be imparted in certain fundamental processes and include such fields as the languages, mathematics and commercial arts. There must be provided every opportunity for recognizing the fact that people in society work as individuals and that, therefore, the school itself must tend to give individual guidance and assistance. Exploration into the major fields of human activity should be encouraged and the program for guidance should be sufficiently extensive to prevent the thwarting of ambitions of no individual. The architect who would build a school after the functional concept will do well to become thoroughly conversant with the writings of such men as L. V. Koos[3], A. J. Inglis[4] and H. C. Morrison.[5]

In planning classrooms, the beauty of the subjects taught and its inspirations may well be drawn out of the architectural setting of the classroom itself. It may not be possible in every school to reproduce a Roman Forum for Latin classes, or an Elizabethan theater for instruction in Shakespeare, or to surround each mathematics room with pictures of the history of mathematics. There ought, however, to be the possibility of expressing classroom individuality to a far greater degree than is to be found in most schools. The interesting development in special classrooms for high schools has been proceeding with such rapidity that the near future may make all rooms special in nature. In no sense should such special rooms be developed to prevent use during the entire school day. The content, however, of all teaching subjects is being refined and expanded to such a degree that every classroom agency must be utilized as a medium of instruction. Given the proper classroom setting every teacher should be able to secure classroom results far beyond those that result where the teaching process must overcome the deadening effects of unattractive, unadorned and poorly planned classrooms.

In the high school, as in the junior high school, very definite efforts are being made to solve problems related to the size of classes. Without doubt, many types of classes will increase in size. Especially will this be true of classes where broadening, exploratory, and æsthetic aims are being sought. American history taught in connection with speeches by national characters brought by radio into classrooms and large assembly rooms, European economic conditions portrayed through sound and picture showing present-day conditions, and vocational guidance outlined by having workers in special activities pass on the screen before the student body, indicate changes in the approach to high school teaching. Such changes will vitally affect building planning.

[3]Koos, L. V. The American Secondary School. Ginn and Company, 1927.
[4]Inglis, A. J. Principles of Secondary Education. Houghton Mifflin Co., 1918.
[5]Morrison, H. C. The Practice of Teaching in the Secondary School. University of Chicago Press, 1931.

Not only will an auditorium of large size be required, but small rooms seating 100 to 125 for audio-visual, dramatic and inspirational presentations must be included in such buildings. Even the auditorium stage has begun to change its nature because stage activities are being tied up with student production of scenes and equipment so that large work spaces for this purpose have become essential.

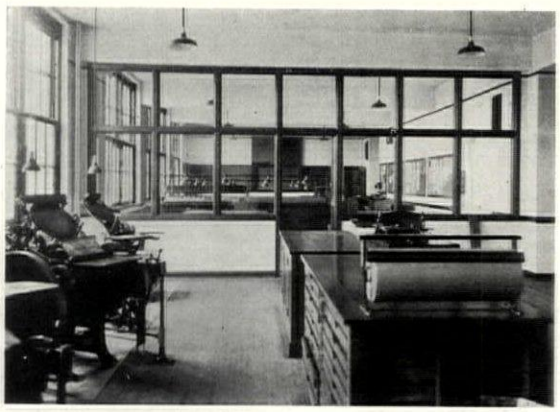
The laboratories in the past have been planned very frequently in terms of college tradition. Even the college lecture room has been handed down to the high school without reason. The elimination of lecture rooms, a more active participation by students in the work of the laboratory, the use of visualization equipment as a substitute for many laboratory experiments, and more comprehensive instruction covering the science fields are aspects of the instructional program which affect building planning.

Only recently so-called model housekeeping apartments were included in the household arts department. For example, the folly of incorporating model household arts apartments has been frequently pointed out by teachers who find no way in which these spaces may be utilized for class purposes. The household laboratories for cookery, and for clothing, should be planned to reproduce home conditions and at the same time to provide for group activities. Here the highest type of architectural skill is constantly challenged. The architect who seeks aid in this field should read "Buildings and Equipment for Home Economics in Secondary Schools" as written by Dr. Melvin Brodshaug[6]. Industrial arts shops will more and more take on the characteristics of industry so that boys may work not in the world of make-believe but in the world of reality.

Gymnasium facilities should be provided in abundance not that students may have one or two hours a week of gymnasium instruction, but that four hours a week in this field of physical development may be allotted to each student. Locker and shower space, too frequently planned as an afterthought or cramped into a congested space, is only sufficient in amount when its area equals or exceeds that of the gymnasium floor itself. Music rooms, large in size, and soundproofed from the remaining part of the building, libraries planned in conformance with the detailed standards of the American Library Association, and art rooms expressive of the achievements of man in this field, are types of spaces which give opportunity for real architectural planning.

The administration of a high school building has become more and more complex. Because of constant curriculum changes, the statistical analysis of students' work, the psychology and vocational guidance attention to individuals, the care spent in the health and social guidance of both girls and boys, the administration suite takes on a new character. It not only is the office of the principal but it is the combination of spaces where principal, research worker, vocational guide, psychology assistant, and the dean of girls or boys may work as a team for the successful development of human individuals during one of the most crucial periods of their lives. The social program of the school, the student activity work, and the teacher student conferences demand building spaces for their successful expression. Thus, the high school student body teeming with aims and ambitions, and forging forward in the creation of a new generation of human activities, furnishes the opportunity for architectural planning which recognizes the true place of our secondary school in the social order. Large sites, with ample playground, buildings in which teachers and students may equip themselves for real achievement, and building interiors inspiring individuals toward success are the essential criteria for architectural planning.

[6]In press. Bureau of Publications, Teachers College, Columbia University, 1931.



Press room in the Ottawa Hills High School, Grand Rapids, Mich. H. H. Turner, Architect

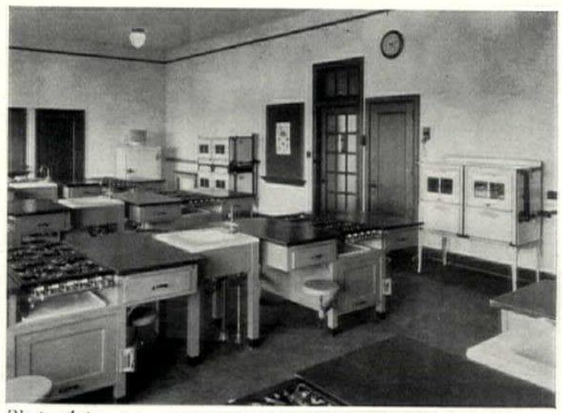


Photo Art

Cooking room of the John Deere Junior High School at Moline, Ill. William H. Schulzke, Architect

PLANNING FOR MULTIPLE USE

Multiple use of rooms through flexibility in planning is an important factor in keeping school construction costs low. From his wide experience, Mr. Betelle has drawn many interesting conclusions, and points out here several methods of intensifying the use of space

BY

JAMES O. BETELLE

OF GUILBERT & BETELLE

ARCHITECTS

IN recent years building costs have become so high and the demand for public instruction so great that there has been a severe strain upon the public purse to provide proper school building accommodations. In many localities school buildings, for one reason or another, have not been provided as they should have been. To provide the necessary additional school building accommodations various methods have been adopted: the erection of new buildings, the more intensive utilization of existing buildings, changes in educational programs, and the multiple use of classrooms.

When school building costs were low a number of years ago, school room space could be used with a liberality which is impossible at the present time. Rooms for which there were only limited uses could be, and were, left idle part of the time. Classrooms could be reserved for the special use of individual teachers, which meant they would be vacant one or two periods each day. There also could be pupil accommodations in laboratories, shops, domestic science departments, and similar rooms which were unused a portion of each day, if there were not sufficient classes in those subjects to use the rooms all the time.

The progressively high building costs have forced the school authorities to a different point of view, and have made them use their buildings more intensively. They began to realize that education was a business proposition and that they owed it to the tax-payer to make the greatest possible use of their buildings, just as a business man owes it to the stockholders to use his factory to the greatest possible extent.

It is sometimes said that the architect is not particularly interested in how intensive a use is made of the building which he designs after it is completed. But the architect who understands enough of the fundamentals of educational administration to be able to show the school board ways and means of taking care of more pupils, with less space, is surely rendering a valuable service to his client. An architect designing an industrial plant would know the routine and processes of production to be carried out in the factory, and would route the raw material through the building in such a way that the least amount of space would be occupied and there would be no retracing of steps by the unfinished goods. He would make every effort to lay out the building so that there would be maximum production, a maximum of use for all equipment, and a minimum of waste and effort. This is expected of an architect handling industrial work, and school boards have just as much right to expect a similar type of service from the architects designing their school buildings, so that the architect not only has to know building design and construction but also educational routine as well.

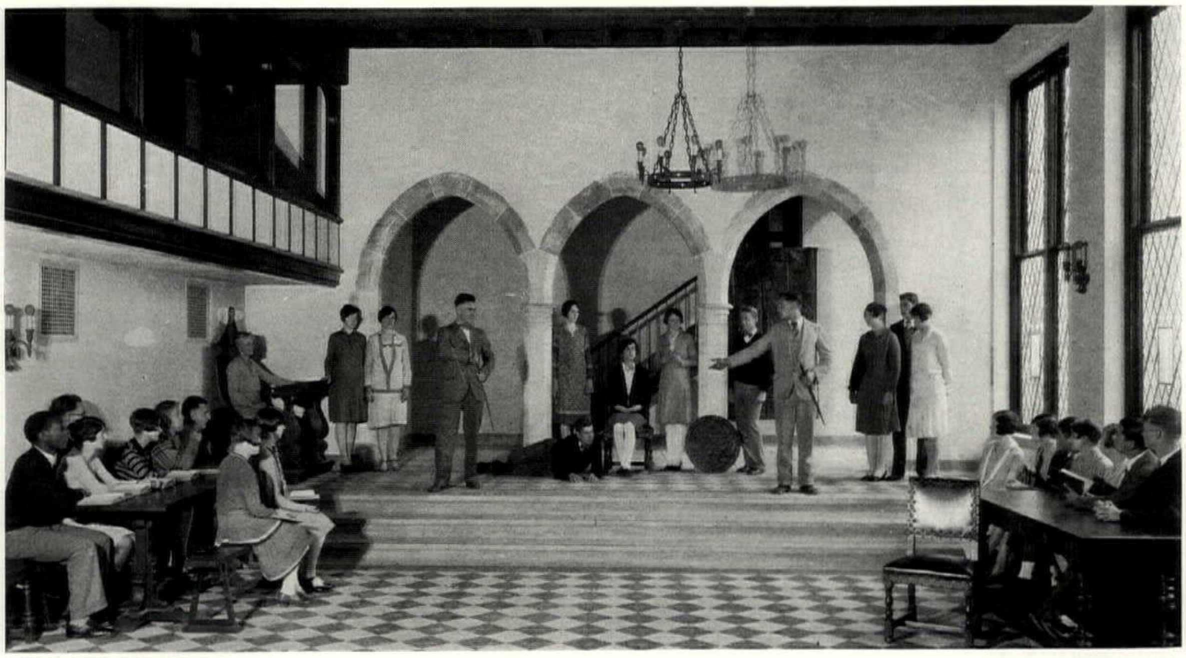
Flexibility in Use. When a survey is made of the use of existing school buildings it almost always shows that a greater number of pupils could be accommodated in them and still more could probably be accommodated with certain minor alterations in the building or in the equipment. For example, the auditorium may be used only in the morning for fifteen minutes of chapel exercises and for one or two other periods during the day, and possibly some days not at all. It is now realized that in order to justify the expense of an auditorium which costs anywhere from fifty to seventy-five thousand dollars, it must not only be used for assembly purposes but also by several classes at a time during each period of the day. The auditorium is suitable for any subject which can be taught in groups, such as singing, visual instruction, English, dramatics, etc. Three classes of 35 each could easily be accommodated in an auditorium. This immediately increases the number of pupils the school can accommodate.

It is in the smaller high schools that the greatest difficulty in proper utilization of the building is encountered. A high school for less than 500 pupils is an uneconomical unit, yet the architect is often called upon to design a high school for 200 pupils or less. There are usually just as many subjects taught in a small high school of 200 pupils or less as there are in a building accommodating 2,000 pupils. In the smaller building it will be difficult to use special classrooms for all of the periods unless special attention is given to making their equipment flexible. With the small number of pupils in a school there is not the chance to use the building so intensively as in a large school where there are many classes available at different times and of different sizes to use the otherwise vacant rooms. Classrooms with highly specialized equipment, suitable for only one purpose, will cut down the general use of the rooms for other purposes and thereby probably reduce the total capacity of the school.

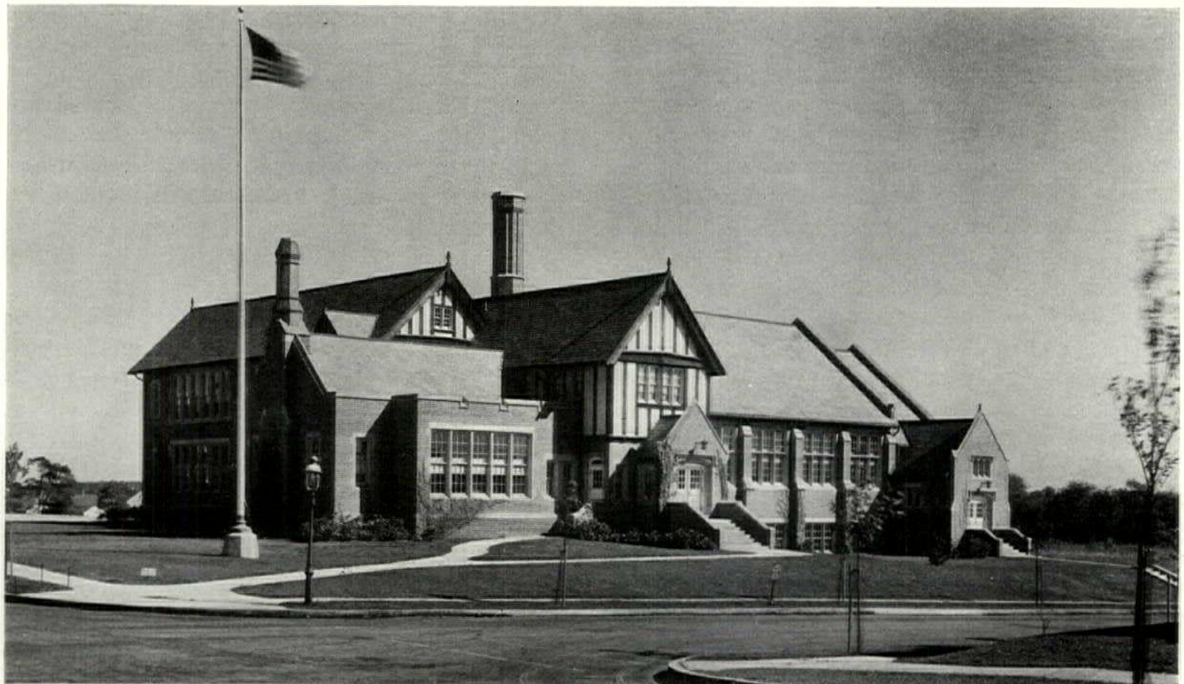
The architect can be expected only to design and erect a well planned building and it is then up to the educators to make proper use of it. It is essential that the architect be familiar with the ways in which a school building can be made to work to maximum capacity, and that he understand the educators' point of view. It is to be assumed that the architect is familiar with architectural problems and building practice, but if (in addition to this) he understands school management and equipment and can talk in the language of the educators, and understands their problems, he then promotes good will for himself and establishes confidence in his service.

Elements of Intensive Use. There are three elements which make for greater use of a school building. First is proper layout of the plan. Assuming that a building is properly planned, the second thing that makes for its intensive use is suitable equipment—equipment which can be used when necessary for more than one purpose, by which means the classroom, if not always in use for the purpose originally planned, can be used for other purposes. The other element is the educational program. To make up the program for a high school and keep all of the teachers and rooms busy all of the time in the many different activities, is very much like solving a jig-saw puzzle. If enough time and trouble are spent in arranging the many parts or classes, everything can be made to fit in properly, but it takes time and patience to do this.

The old or traditional school program is not so difficult to arrange as the modern platoon program. In the traditional scheme there is a home room for each class, and when these home rooms are all in use many of the special rooms are vacant, and vice versa. In the platoon program scheme it is the aim not only to use the home classrooms but also the special rooms as nearly all of the time as is possible, which means that the laboratories, the auditorium, the gymnasium, the shops, etc., are busy at all times. In a platoon system, 25 to 30 per cent more pupils can be accommodated than in the traditional program.

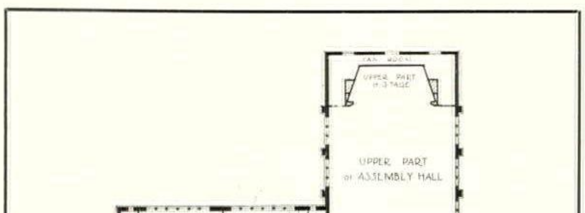


The English room in the Jackson High School, Jackson, Mich., Childs & Smith, architects. The room has been designed primarily as a setting for the study of English literature and may also be used for play rehearsal, public speaking, music and art work. The stair leads to a room used for costume design and special work



Richard Averill Smith

The Forest Avenue Grade School at Glen Ridge, N. J., Guilbert & Betelle, architects, has been planned to give the maximum of use for a variety of purposes. The classrooms may be adapted to any number of subjects, and the assembly hall may be used as a public auditorium or as an instructional space for special subjects



Multiple Use of Rooms. Another element entering into the intensive utilization of the school building is the multiple use of rooms. It is very difficult to use intensively a high school designed to accommodate 200 pupils, or less, because of the many special rooms required, which cannot be used all the time during the day for the particular purpose for which they were designed, due to an insufficient number of pupils. By putting in the proper kind of equipment, suitable for multiple use, a special room may be used at different times for different purposes. For instance, a single laboratory can be used for chemistry, physics and biology, if the proper equipment is provided. There can be a combined cooking and sewing room, combined auditorium and gymnasium, and some schools, especially in the Middle West, have combined the auditorium, gymnasium and cafeteria. A cafeteria lunch room, if used only for lunch purposes, is one of the least used rooms in a school and is often one of the largest and most costly rooms. This represents a considerable waste as far as economy in use is concerned. Lunch rooms in many schools, where arrangements have been made so that the kitchen and serving counter can be quickly closed off, are used as study halls or libraries, for special conference purposes, sometimes for sewing, and for any purpose where a flat-top table with chairs can be made to serve as equipment. This duplicate use of the lunch room helps to justify the expense of including it in a school plant.

Teachers' rest rooms, which are vacant much of the day, can be used also as medical inspection rooms. The superintendent of schools' office suite can be combined with the board of education meeting rooms, which are used only a few times a month. Mechanical drawing and free-hand drawing rooms can be combined, and if there are still vacant periods, this room could be further used for a regular classroom. Mechanical drawing is sometimes taught in the manual training room by placing the drawing board on a multiple service workbench with drawing-board facilities. Still further utilization of the shop is sometimes obtained by using it and the pupils in the maintenance and repairs of the local school buildings. The smaller the school enrollment, the greater the necessity for flexibility in use, if the principles of specialized public instruction are to be carried out, and if subjects such as dramatics, classroom work, socialized recitations, etc., are all to be carried on in the same room.

These cases of multiple uses of rooms and equipment may not be ideal, but they are possible and are carried out in various parts of the country. Small communities cannot afford high schools and other adequate school facilities unless they are willing to justify the expense by reducing the number of rooms required to a minimum and to use these rooms for many purposes and during every school period.

Working Capacity. It is realized that no school building can be used to 100 per cent of its capacity; that is, it is not possible to put a child in every seat in every classroom, in every station in the gymnasium, shops, and laboratories, and in the various special rooms—all at the same time. Many schools operate only on a 50 or 60 per cent efficiency basis, and if the school is operated on a basis of 80 per cent of its maximum capacity when all seats and stations are counted, it is about all that can be hoped for. Classes vary in size and all rooms cannot be exactly full all the time. A room may have two or three more pupils than can be accommodated, or a few less; then again there may be too many pupils for one class and too few for two classes, which means that two rooms have to be used at reduced capacity.

Pupil Capacity. The term "pupil capacity," as used by the educator and the architect, often varies, and the different points of view are not thoroughly understood by both parties. The superintendent of schools thinks of the capacity of the building as its working capacity, whereas the architect usually thinks in terms of its maximum capacity. The working capacity is equal to about 80 per cent of the maximum capacity, but if seats or spaces which may accommodate pupils are not used, they are nevertheless paid for and enter into the cost of the building. Therefore, in speaking of the capacity of the building, it should be made clear whether we are thinking of the working capacity or the maximum capacity, and the architect, in arriving at cost per pupil, or cubic foot space per pupil, always speaks in terms of maximum capacity.

Possibly an illustration of an accepted method of computing pupil capacity of a high school building might be in order:

14 Classrooms	390
Bookkeeping Room	40
Typewriting Room	25
Sewing Room	20
Domestic Science and Household Suite	30
Art Room	24
Biology Laboratory	24
Chemistry Laboratory	24
Physics Laboratory	24
Lecture Room	24
Mechanical Drawing Room	20
Manual Training Room	24
Gymnasium 60 x 80 ft.	60
Auditorium 55 x 80 ft.	60
Maximum Pupil Capacity	789
Working Pupil Capacity	631

This figure represents the number of pupils the building will probably accommodate working under normal capacity—80 per cent of the maximum capacity.

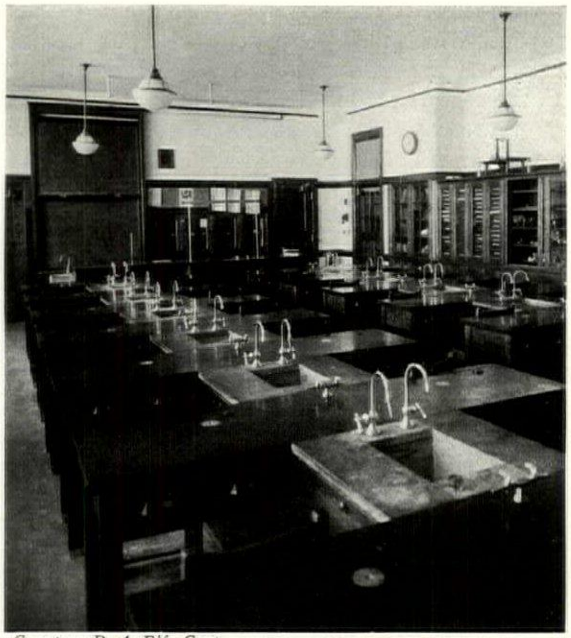
Cubage of Building	1,110,000
Cubic foot space per pupil	1,406

(1,110,000 ÷ 789)

The number of cubic feet per pupil is one of the architect's important units of measure. It has been found in a series of buildings that grade schools average from 800 to 1,000 cu. ft. per pupil, junior high schools 1,000 to 1,200 cu. ft. per pupil, and high schools from 1,200 to 1,500 cu. ft. per pupil, with gymnasium and auditorium, all depending upon whether they are rather complete schools or whether they contain only the minimum requirements with these rooms.

The cost of a high school building, exclusive of architect's fee and equipment, can be quickly and approximately arrived at by multiplying the maximum pupil capacity by 1,500 cu. ft. per pupil, and this product by the local construction cost per cubic foot.

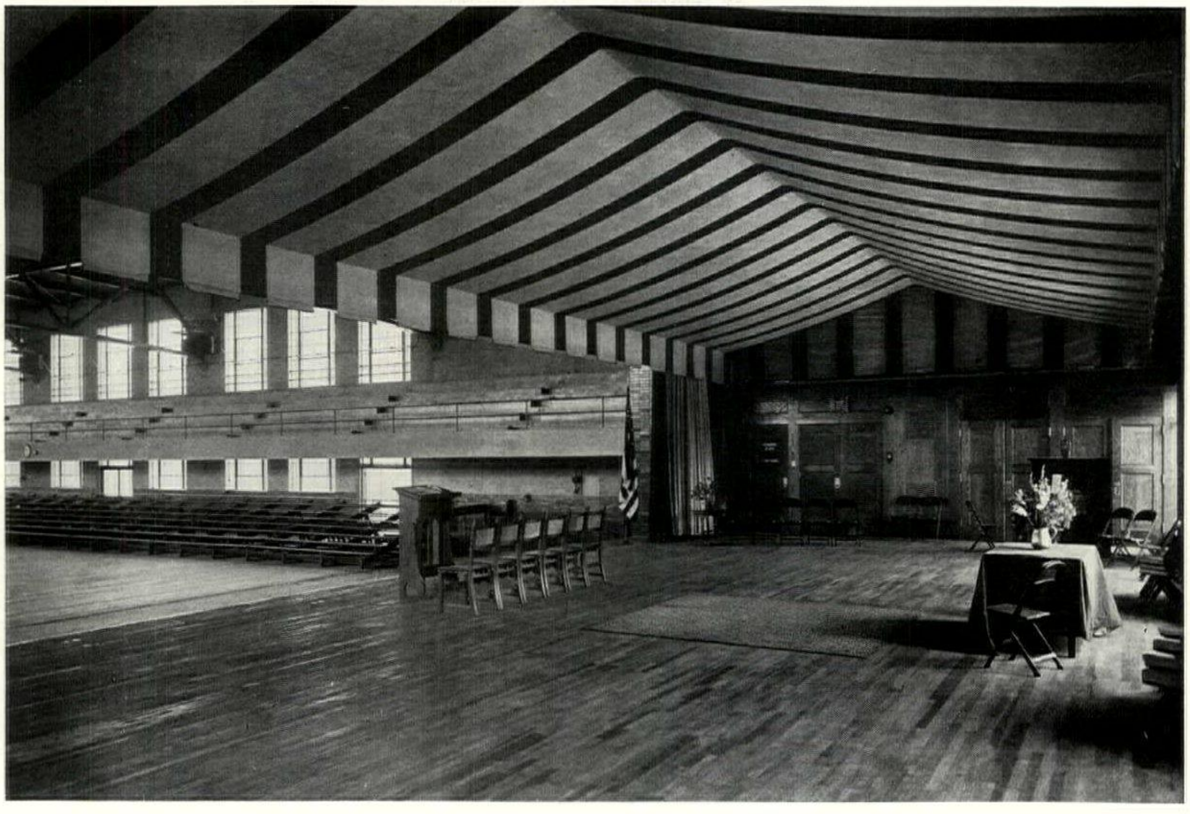
Community Use of Schools. It is important that the school system of a community have the moral as well as the financial support of the citizens and taxpayers of the community. Naturally, every family desires the best school accom-



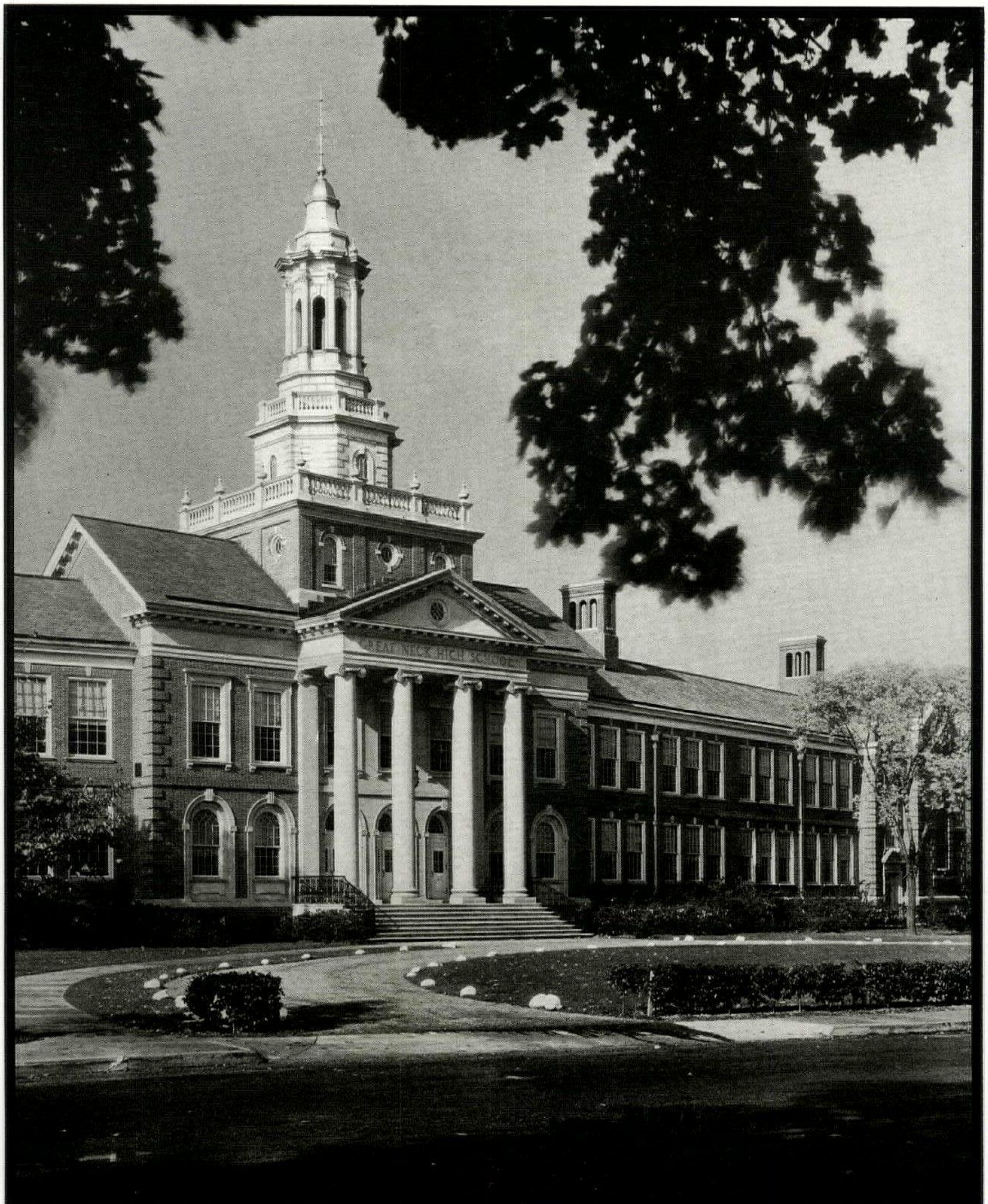
Courtesy R. A. Fife Corp.

A laboratory room in the White Plains High School, White Plains, N. Y., Starrett & Van Vleck, architects, which may be used for chemistry, physics, or general science and also as a classroom for any or all of these subjects. The special equipment usually makes planning for multiple use a necessary economical measure

modations for its children, and in most cases is willing to pay a share of the cost. If school buildings were designed with some provision for community activities, this share would be more cheerfully borne. By using the building for community activities, the intensive utilization of the building is increased for the reason that these community activities in a great majority of instances take place outside of school hours and, of course, the more hours the building is in use each day, the more the cost of the building is justified to the community. Different cities make different provisions for the community use of their buildings; many of them use the schools for polling places on Election Day, and all of them use the auditorium for political meetings, charitable and civic entertainments, community choruses, etc. The kindergarten is sometimes used for parent-teachers' meetings, the sewing and cooking rooms and shops for adult education along these lines, the gymnasium for community basketball games and adult physical training, the swimming pool for the teaching of swimming and community uses, and the play court is used by the local children and Boy Scouts. All of these uses promote the good will of the community toward the school, lower the costs of education, and provide recreational possibilities for leisure.



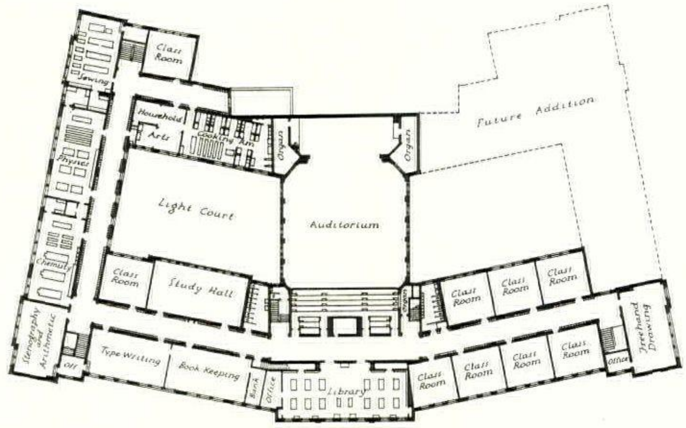
The stage of the field house in the Lincoln High School, Wisconsin Rapids, Wis., Childs & Smith, architects, may be shut off from the gymnasium and used as an auditorium, dance hall, study hall, or instructional space



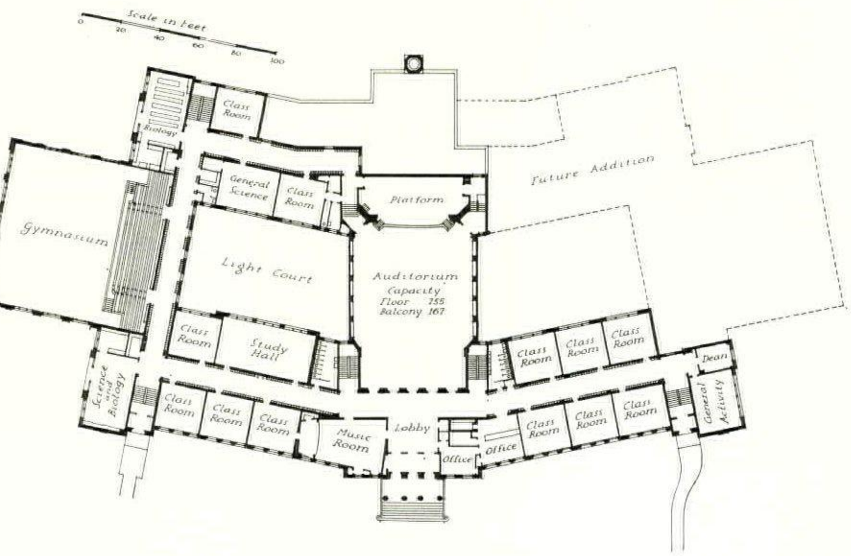
Richard Averill Smith

GREAT NECK HIGH SCHOOL, GREAT NECK, L. I., N. Y.
GUILBERT & BETELLE, ARCHITECTS

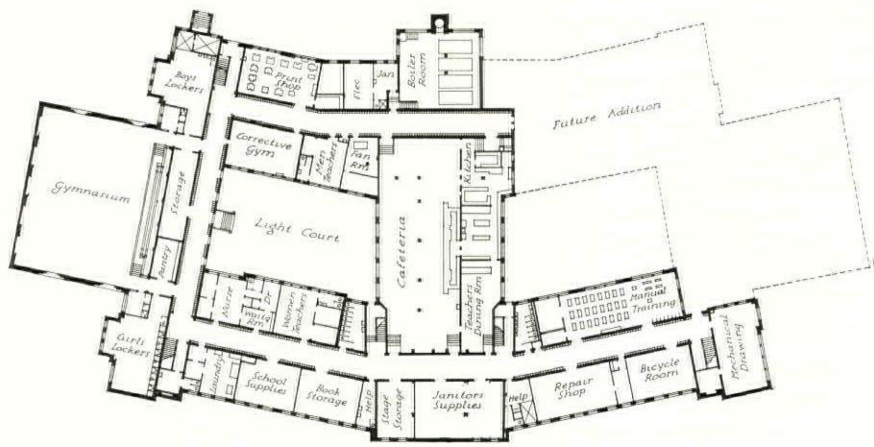
NINE SENIOR HIGH SCHOOL BUILDINGS



SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

GREAT NECK HIGH SCHOOL, GREAT NECK, L. I., N. Y.

GUILBERT & BETELLE, ARCHITECTS

Stackliff

A GENERAL VIEW OF THE SCHOOL

EXTERIOR: The Colonial character of the building was decided upon as being in harmony with the history and earlier architecture of the community. The walls are of red brick, with limestone trim, and the roof is of green slate. The windows are of wood, double hung

INTERIOR: The corridors and stairs have glazed-brick wainscoting, plaster walls and ceilings. For most of their length the corridors are lined with lockers. The classrooms, library, administrative offices, etc., have plaster walls, chestnut trim, and maple floors. Corridor floors are of concrete. Toilet rooms have tile floors and walls, and metal toilet partitions. The building is heated by direct steam radiation, and ventilated by unit ventilators; the controlled cut-off system permits heating of the library, auditorium, and cafeteria independently of the balance of the building

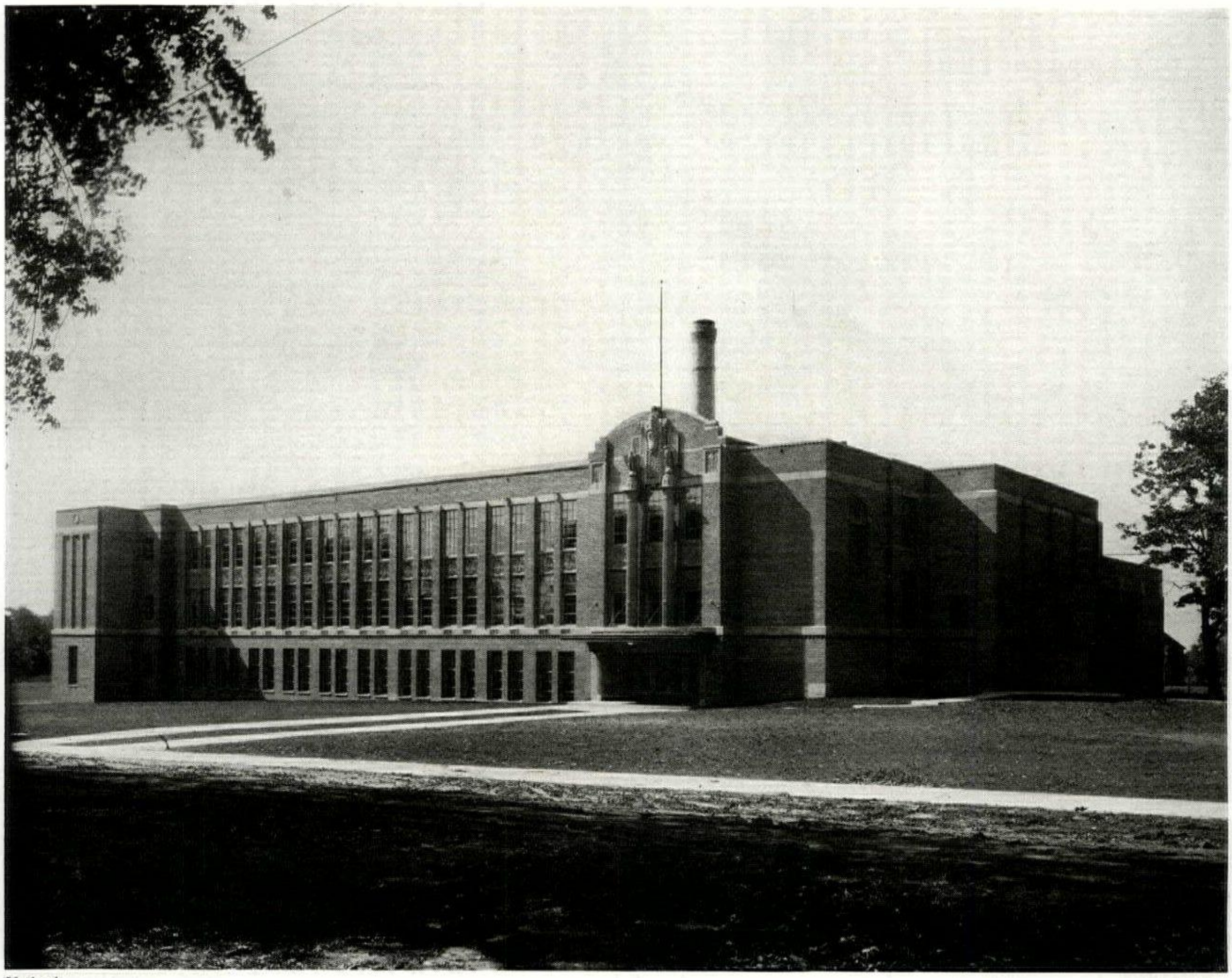
COST AND CONSTRUCTION: The building is of fireproof construction, with solid brick walls, concrete floor slabs and steel framework over the large spans of the auditorium and gymnasium. The non-bearing partitions throughout are of terra cotta. Total cost, exclusive of land and architect's fee, was $907,000, or 1,905,000 cu. ft. at 46½ cents per cu. ft.

GREAT NECK HIGH SCHOOL, GREAT NECK, L. I., N. Y.

GUILBERT & BETELLE, ARCHITECTS


United

COMMUNITY HIGH SCHOOL, NORMAL, ILLINOIS
LUNDEEN, HOOTON, ROOZEN & SCHAEFFER, ARCHITECTS



United

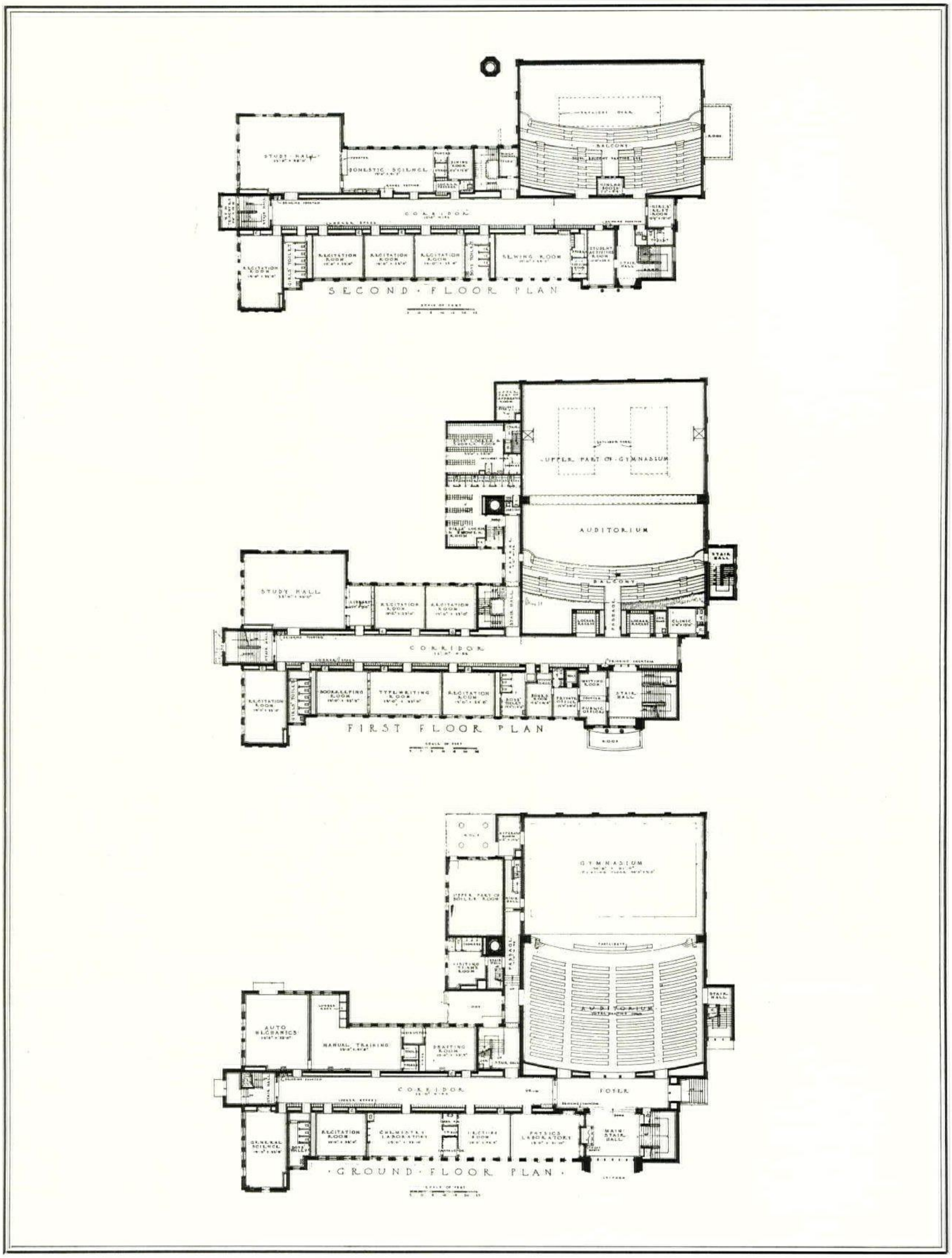
EXTERIOR: The walls are of variegated buff brick, stipple textured, with trim of light buff cast stone. Spandrels are of cast cement, finished in copper green. Horizontally pivoted steel sash are used for the windows. The roof is of a built-up asbestos composition

INTERIOR: All walls are sand finish plaster, except those in the gymnasium, which are cream color pressed brick. Floors in classrooms, study halls, administrative offices, etc., are of olive green mastic; in stair systems and corridors, the floors are of gray and black terrazzo, with wainscoting of gray terrazzo. Trim throughout is natural finish white oak. A direct radiation steam heating system is used, with separate thermostatic control in each room, and automatic control of the ventilating system, which consists of a fan blast system in the school proper and auditorium, and unit heaters in the gymnasium. One of the two study halls is separated from the library only by a glass partition, permitting one teacher to supervise both the library and the study hall. The other study hall serves as a lunch room during the noon hour

COST AND CONSTRUCTION: The building is constructed on a poured concrete foundation, and with the exception of the roof, which is of wood construction, is entirely fireproof. A bar joist, concrete slab system is used for the floor construction. The walls are of face brick with hollow tile backing. Total cost including architect's fee, equipment, grading, walks, drives, planting, and athletic field, was $254,771.72, or 27 cents per cu. ft. for 949,000 cu. ft.

COMMUNITY HIGH SCHOOL, NORMAL, ILLINOIS

LUNDEEN, HOOTON, ROOZEN & SCHAEFFER, ARCHITECTS

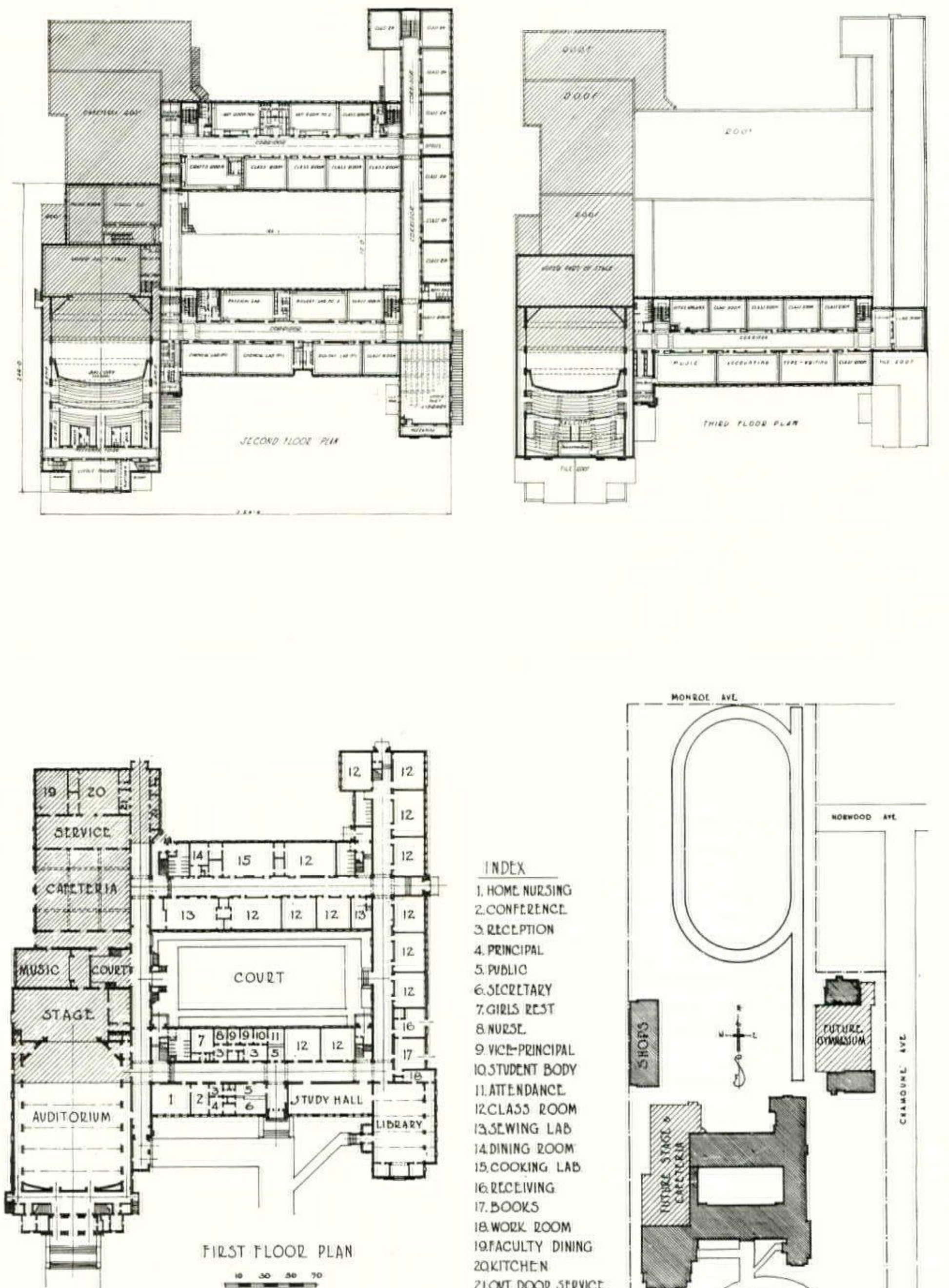


COMMUNITY HIGH SCHOOL, NORMAL, ILLINOIS
LUNDEEN, HOOTON, ROOZEN & SCHAEFFER, ARCHITECTS

Mott

HERBERT HOOVER HIGH SCHOOL, SAN DIEGO, CALIFORNIA

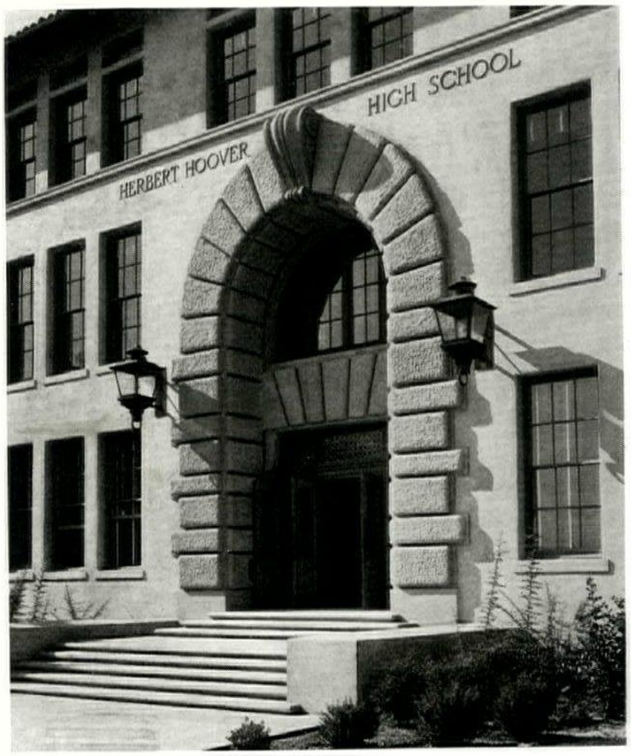
T. C. KISTNER & CO., ARCHITECTS



HERBERT HOOVER HIGH SCHOOL, SAN DIEGO, CALIFORNIA

T. C. KISTNER & CO., ARCHITECTS

Mott Photos



EXTERIOR: The walls are of steel troweled stucco, light buff in color. The roof is part composition and part red Mission tile

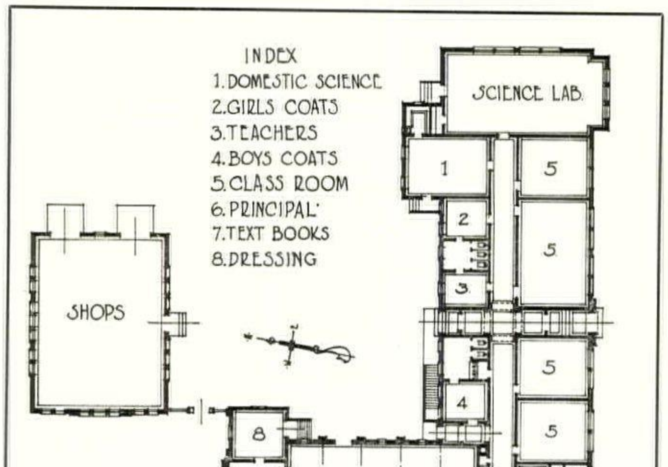
INTERIOR: Floors are of concrete in public areas, maple and composition tile in others. The walls and ceiling are of sand finished gypsum plaster with pine trim in all but first floor corridor and offices, which have mahogany trim. Walls and ceiling of auditorium and ceilings of library and corridors are acoustically treated. A steam vacuum return heating system is used, with a univent in the auditorium

COST AND CONSTRUCTION: The building is of steel and concrete frame construction on a concrete foundation. Interior bearing walls are of hollow terra cotta. Completed in 1931, the total cost of the building was $615,183, or 206,062 cu. ft. at 29¾ cents per cu. ft.

HERBERT HOOVER HIGH SCHOOL, SAN DIEGO, CALIFORNIA

T. C. KISTNER & CO., ARCHITECTS

Mott



EXTERIOR: Sand dashed light buff stucco is used for the walls, red Mission tiles and composition for the roof. The windows are wood casements

INTERIOR: All floors are of maple, and the walls and ceilings are of sand finished gypsum plaster with pine trim

COST AND CONSTRUCTION: The foundation is concrete, and the building is of wood frame construction with a structural tile veneer. Interior bearing walls are of 4-in. hollow terra cotta tile. Sanitation and drainage are supplied by septic tanks. Total cost, including the shop building, was $48,682, at 23 cents per cu. ft.

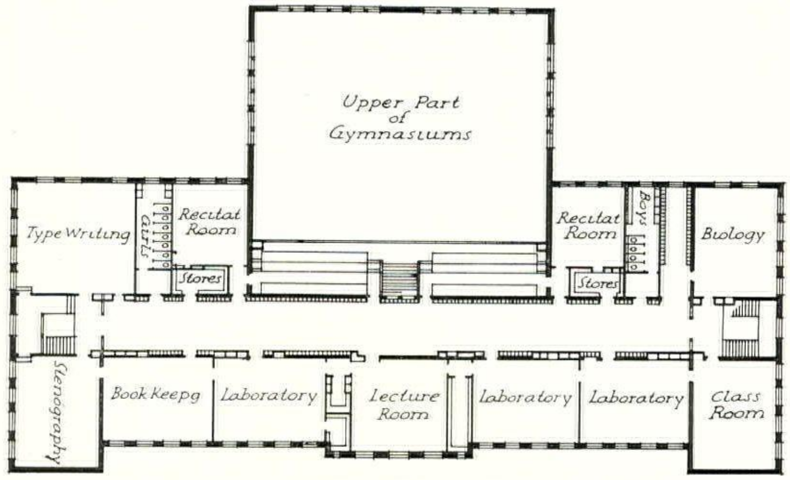
UNION HIGH SCHOOL, SAN JUAN CAPISTRANO, CALIFORNIA

T. C. KISTNER & COMPANY, ARCHITECTS

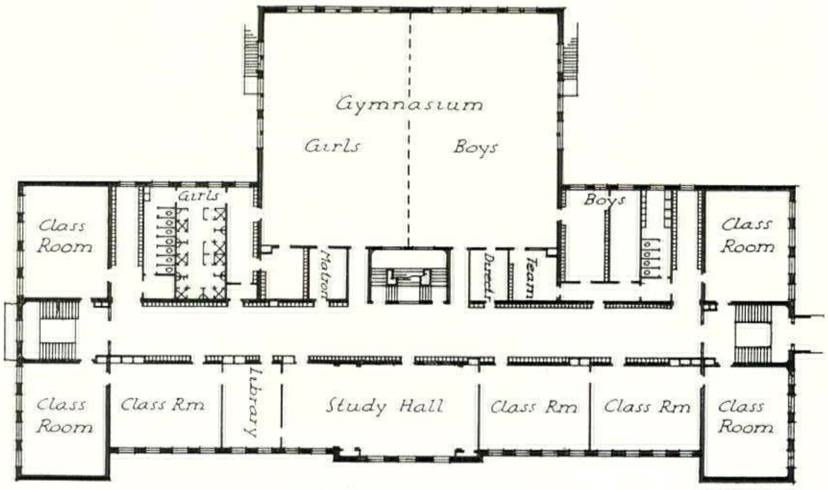
Hanson & Walsh

JUNIOR-SENIOR HIGH SCHOOL, DANVERS, MASS.

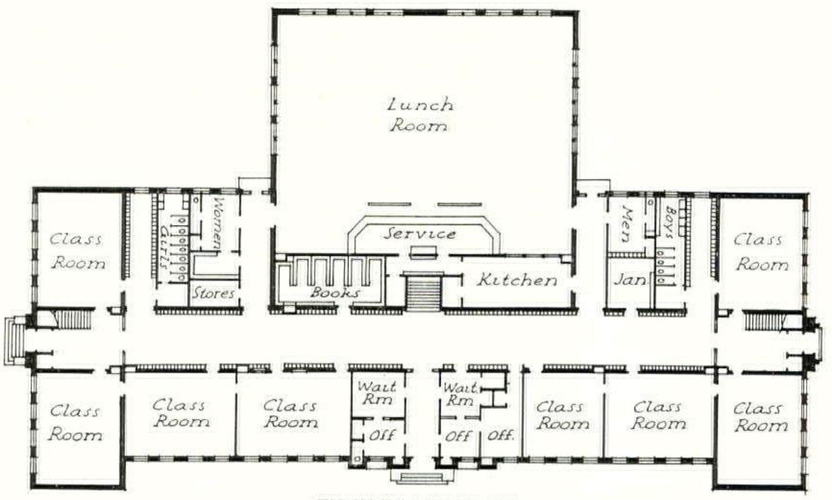
CHARLES G. LORING, ARCHITECT



THIRD FLOOR PLAN



SECOND FLOOR PLAN



FIRST FLOOR PLAN

JUNIOR-SENIOR HIGH SCHOOL, DANVERS, MASS.

CHARLES G. LORING, ARCHITECT

Hanson & Walsh

GENERAL: This building is one of two which together form a junior-senior high school group, containing every facility for an educational center of this type. Besides the common gymnasium contained in this building and the auditorium which is contained in the other, the only other common facility is the heating system. The floor plans on the opposite page are for the senior high school unit only, which is connected with the junior unit by an enclosed bridge

EXTERIOR: The design, chosen to conform with the traditions of the locality, has been executed with red shale brick walls, buff limestone and granite trim and wood framing and finish in the cupola and wrought iron railings. The windows, with the exception of the steel sash in the gymnasium, are of wood, double hung. The roof is built up and finished with tar and gravel

INTERIOR: The interior walls are finished in salt glazed brick with acoustical tile ceilings in special rooms. The floors are covered with linoleum tile throughout

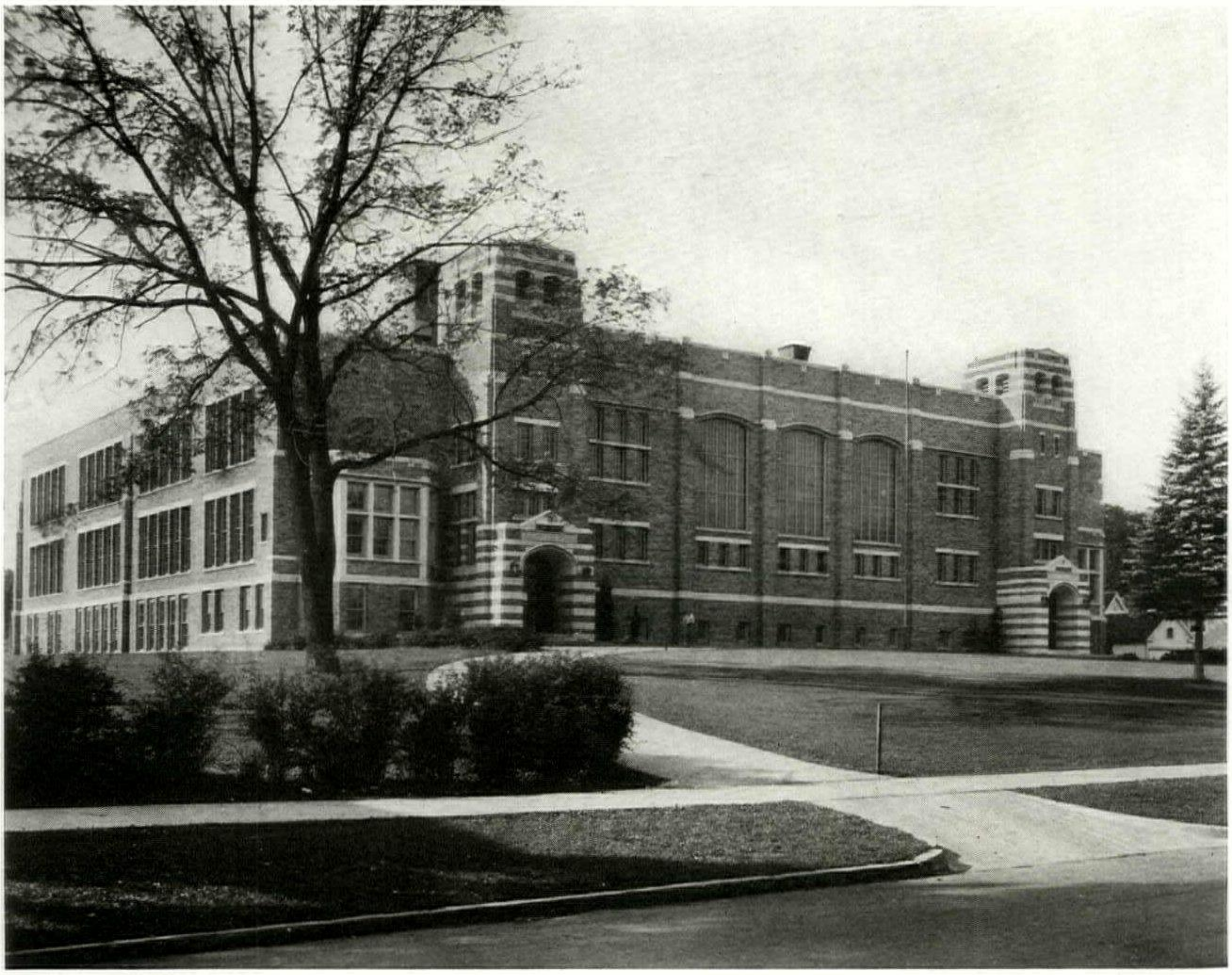
CONSTRUCTION: The building is of the semi-fireproof type with a reinforced concrete and granite foundation and a bar joist and wood framed floor construction. Heat is supplied by a steam system and ventilation from unit ventilators. The drainage system and sanitary lines discharge into a concrete septic tank. The school was completed in January, 1931, and contains 1,458,000 cu. ft. The cost was 34.2 cents per cu. ft., the gross cost being $498,419 which included $284,179 for the senior unit and $214,240 for the junior unit

JUNIOR-SENIOR HIGH SCHOOL, DANVERS, MASS.

CHARLES G. LORING, ARCHITECT

FAIRPORT HIGH SCHOOL, FAIRPORT, N. Y.

O. W. & H. B. DRYER, ARCHITECTS



A GENERAL VIEW OF THE SCHOOL

GENERAL: Although designated as a high school, the building is almost a consolidated school in that space is provided on the first floor for seventh and eighth grade classes, the high school division occupying the entire second floor. The basement will be sub-divided in the future into a gymnasium, classrooms, a lunch room, and a kitchen

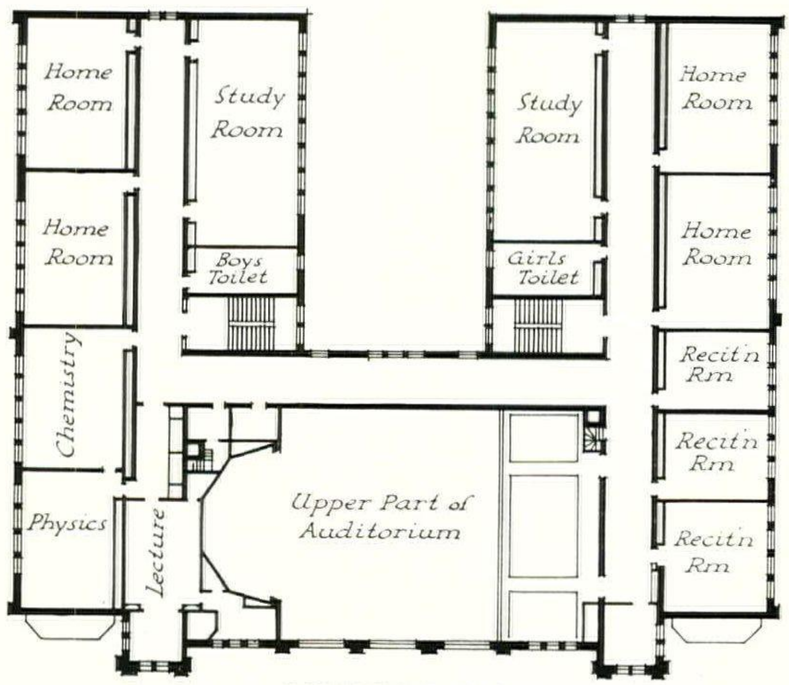
EXTERIOR: The exterior is finished in a warm gray, rough textured brick trimmed with light gray limestone. The windows are generally of double hung wood sash except those in the auditorium. The roofing is of a built-up type

INTERIOR: The general interior treatment is of sand finished plaster with oak trim. The wall and ceiling surfaces have been painted a warm tan throughout. The building is heated by warm air with a forced ventilation system

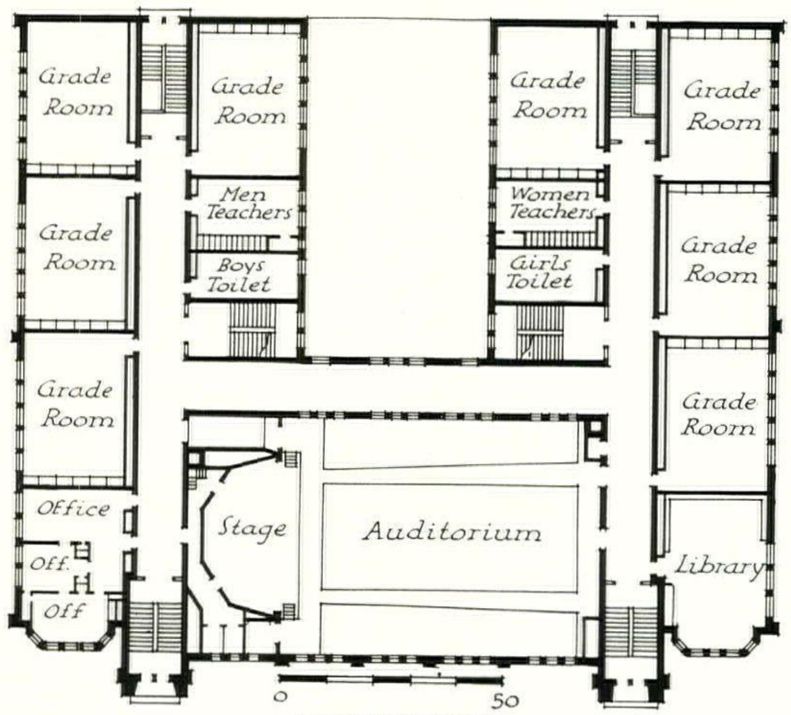
CONSTRUCTION: The school is of fireproof construction throughout, with a reinforced concrete foundation, reinforced concrete floors which utilize the pan system and solid masonry walls of hollow tile finished with face brick. No special features of construction have been used and the building contains no special provision for either sound or heat insulation. It contains 1,250,000 cu. ft. and was constructed at a cost of 30 cents per cu. ft., or a total of $375,000

FAIRPORT HIGH SCHOOL, FAIRPORT, N. Y.

O. W. & H. B. DRYER, ARCHITECTS



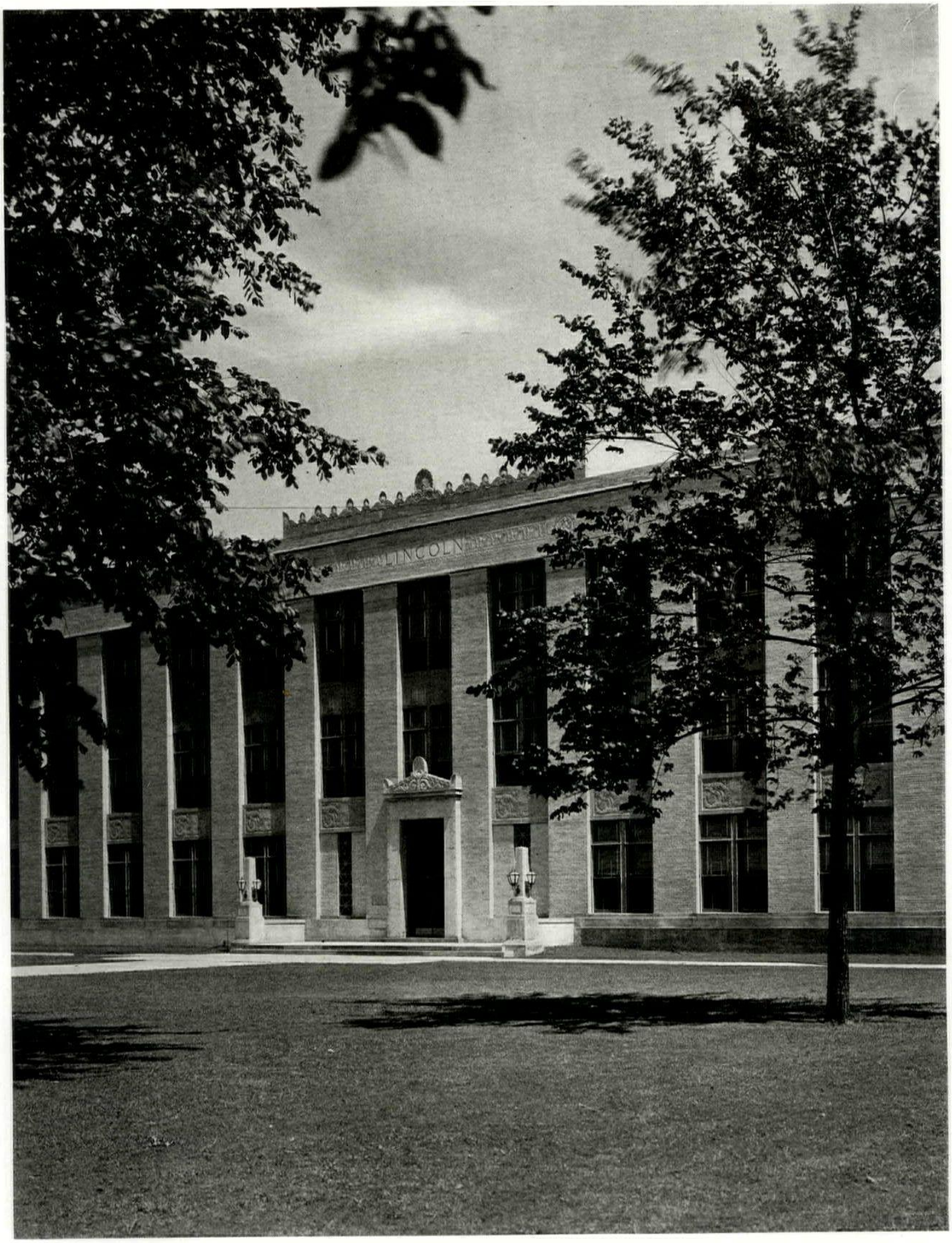
SECOND FLOOR PLAN



FIRST FLOOR PLAN

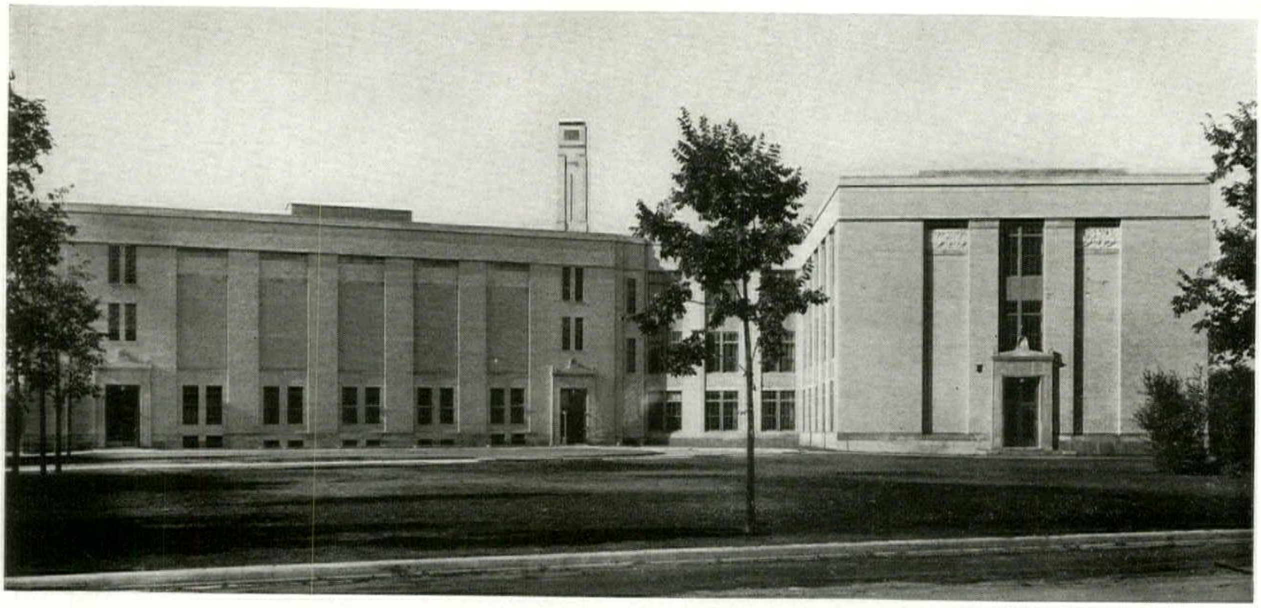
FAIRPORT HIGH SCHOOL, FAIRPORT, N. Y.

O. W. & H. B. DRYER, ARCHITECTS

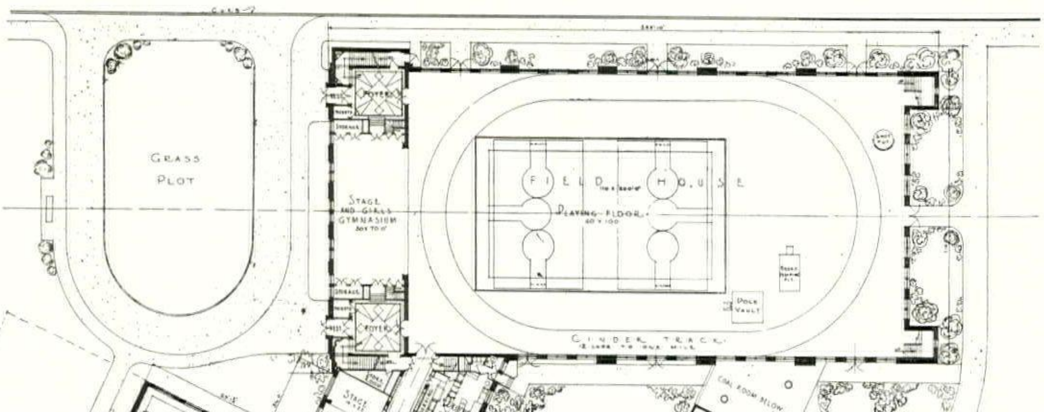


LINCOLN HIGH SCHOOL AND FIELD HOUSE, WISCONSIN RAPIDS, WIS.

CHILDS & SMITH, ARCHITECTS



VIEW FROM THE NORTHEAST



FIRST FLOOR PLAN

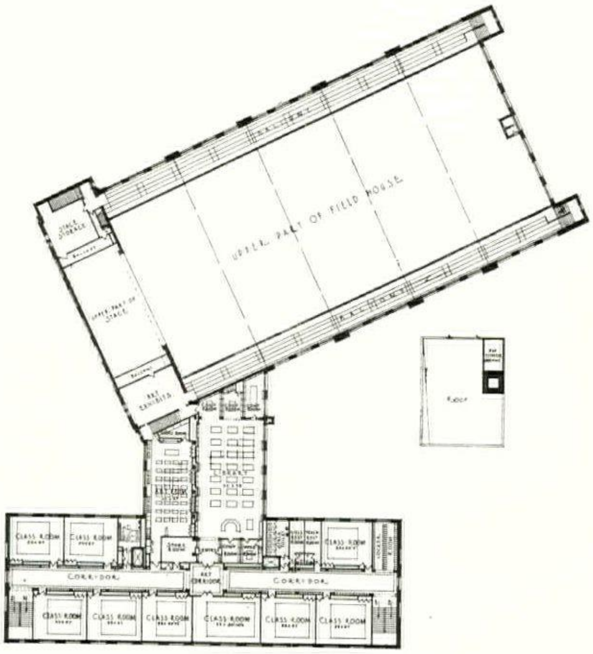
LINCOLN HIGH SCHOOL AND FIELD HOUSE, WISCONSIN RAPIDS, WIS.

CHILDS & SMITH, ARCHITECTS

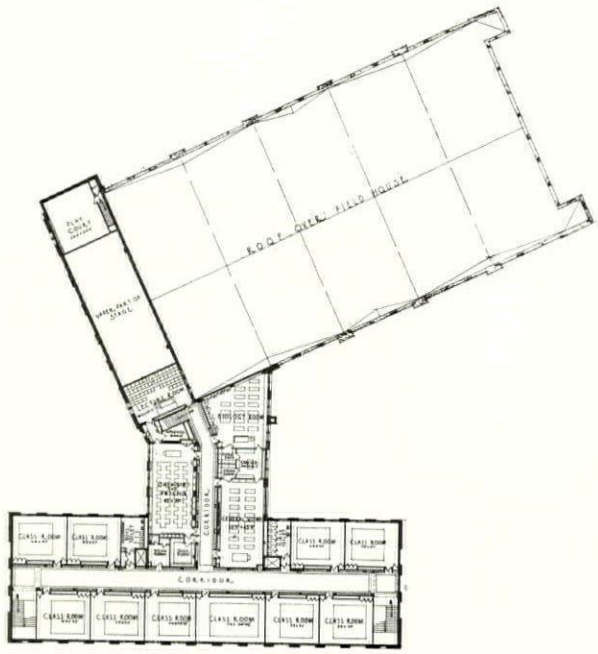
MUSIC ROOM

LINCOLN HIGH SCHOOL AND FIELD HOUSE, WISCONSIN RAPIDS, WIS.

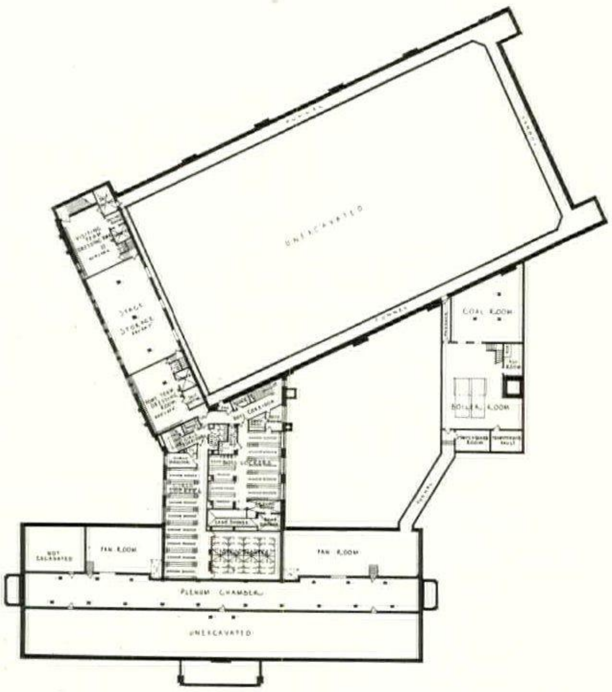
CHILDS & SMITH, ARCHITECTS



SECOND FLOOR PLAN



THIRD FLOOR PLAN



BASEMENT FLOOR PLAN

COST AND CONSTRUCTION DATA

The entire building is of reinforced concrete construction, with exterior walls of brick, and stone trim. The floors and roof are of reinforced concrete, the latter being insulated with masonite. Steel windows and frames are used throughout. Floor finishes are terrazzo in the corridors and other public spaces, linoleum in most of the classrooms, and tile in other areas. Corridor walls have glazed brick wainscoting, and hard finish plaster walls. The heating system is of the low pressure steam vacuum type, and ventilation is supplied by fans after the air has been filtered. The total cost of the building, including all fixed and movable equipment and the architect's fee, was $585,800, or 1,997,829 cu. ft. at 29.3 cents per cu. ft. The building was completed in 1931

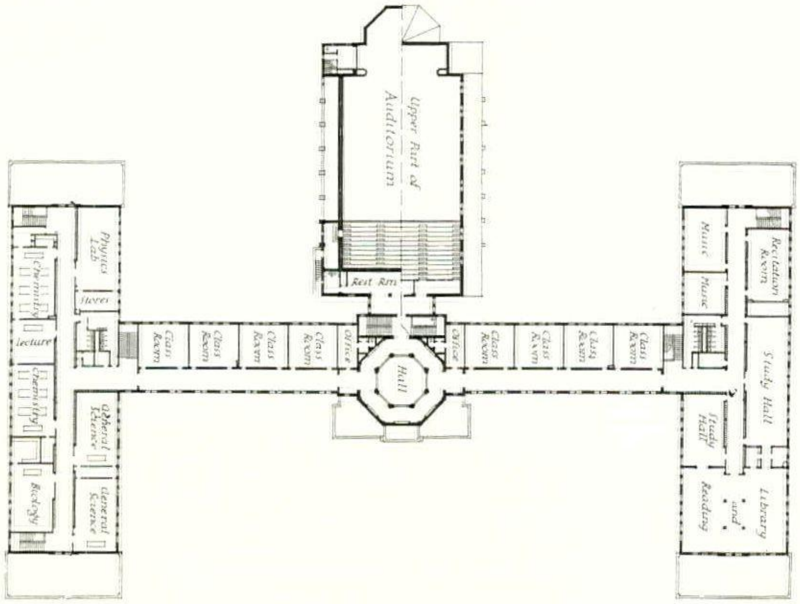
LINCOLN HIGH SCHOOL AND FIELD HOUSE, WISCONSIN RAPIDS, WIS.

CHILDS & SMITH, ARCHITECTS

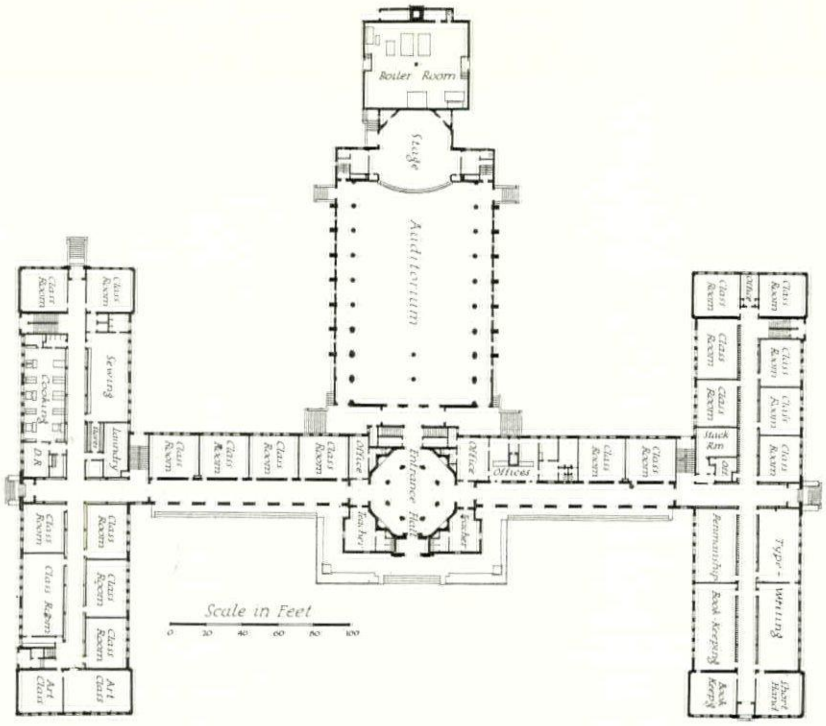
MAIN ENTRANCE

FAIRFAX HIGH SCHOOL, LOS ANGELES, CALIFORNIA

JOHN PARKINSON AND DONALD B. PARKINSON, ARCHITECTS



SECOND FLOOR PLAN



FIRST FLOOR PLAN

FAIRFAX HIGH SCHOOL, LOS ANGELES, CALIFORNIA

JOHN PARKINSON AND DONALD B. PARKINSON, ARCHITECTS

Mott

A GENERAL VIEW OF THE SCHOOL

EXTERIOR: The school is an interesting example of a problem in which the conservation of ground area was not important and in which athletic facilities are provided outside the academic area. The design, characterized by the architects as "Medieval Sicilian Arabo-Normano," is carried out in painted common brick with precast cement and tile trim with double hung windows of painted wood. The roof is of red clay tile

INTERIOR: The walls are of sand finished plaster and natural concrete with a cement wash finish. Floors are of maple except those in the corridors which are of reinforced concrete with a cement finish. The entrance rotunda as well as the auditorium has been built of concrete with the natural surface untouched. The auditorium roof is supported by decorated wooden trusses built up of solid pieces, the main chord being a single piece 16 in. x 24 in. x 70 ft. The panels between the trusses are acoustically treated

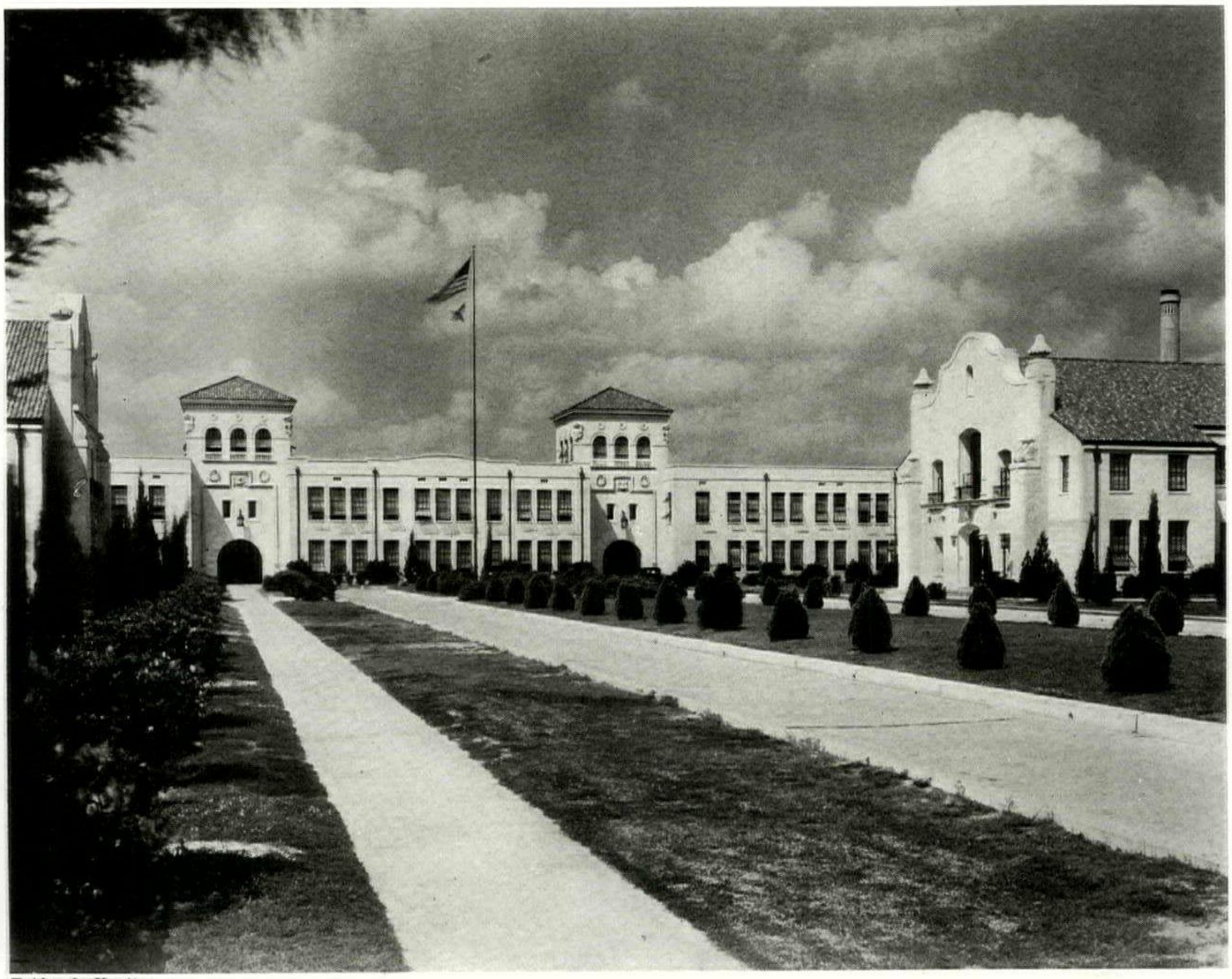
COST AND CONSTRUCTION: The building is of semi-fireproof construction with common brick and reinforced concrete walls. The corridors and stairs are built of reinforced concrete but the floors are framed with wood. The heating system is oil-fired, with direct steam radiation for classrooms and a ventilation system for the auditorium. The structure contains 2,858,000 cu. ft. and was built at a unit cost of 20 cents per cu. ft., or a total of $575,000

FAIRFAX HIGH SCHOOL, LOS ANGELES, CALIFORNIA

JOHN PARKINSON AND DONALD B. PARKINSON, ARCHITECTS

Mott

FAIRFAX HIGH SCHOOL, LOS ANGELES, CALIFORNIA
JOHN PARKINSON AND DONALD B. PARKINSON, ARCHITECTS



Tebbs & Knell

EXTERIOR: The walls are of rough textured stucco, painted light tan, and all ornamental features are of caststone. Mixed colored tile is used on the roof, and all windows have steel sash, of the projected type in the classrooms and of special design elsewhere

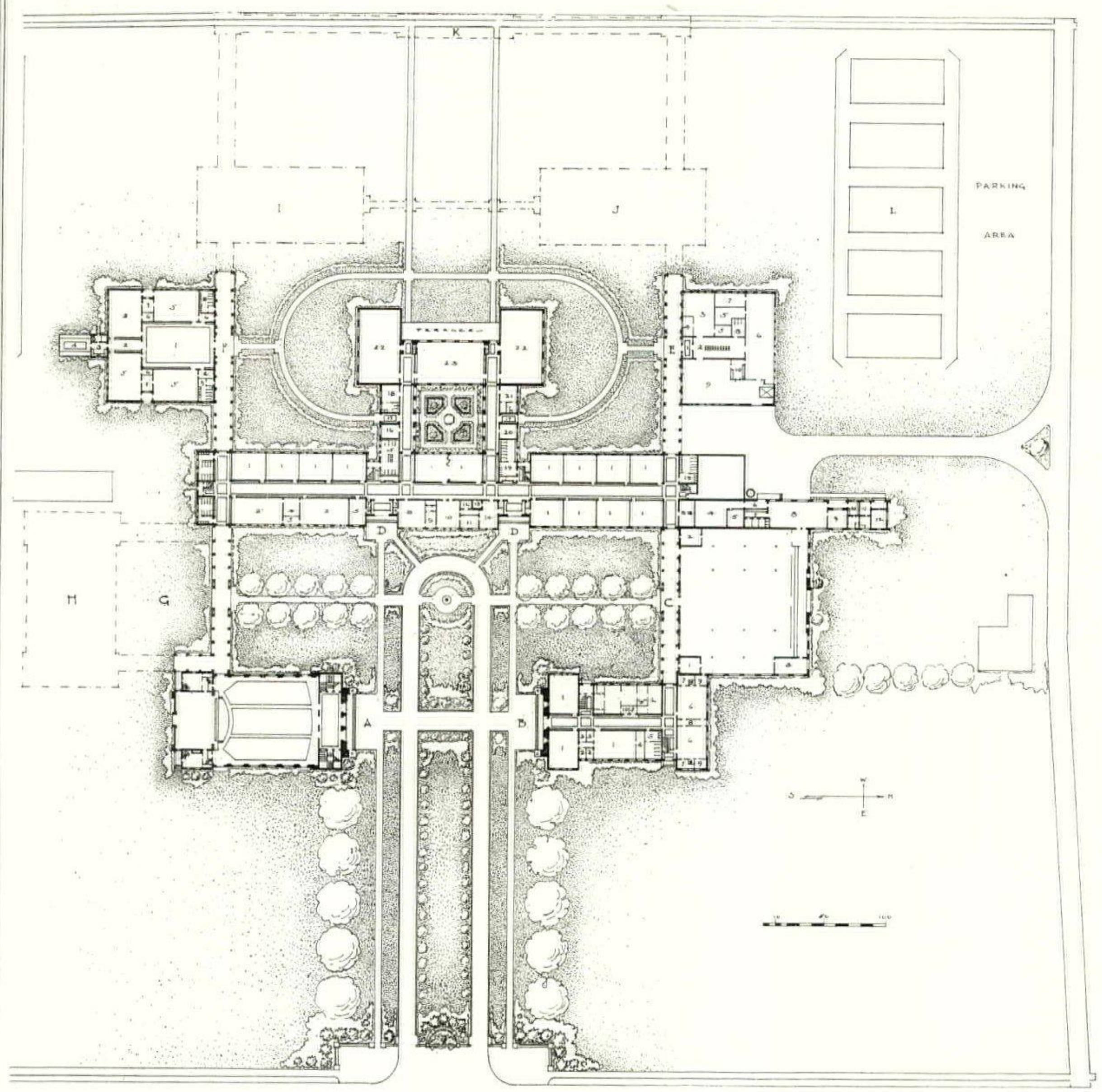
INTERIOR: The troweled plaster walls are painted light gray. A continuous metal wainscot in the corridors is formed by the steel lockers, which are painted olive-green. The corridors themselves are day lighted by means of glazed classroom doors, and by continuous transoms above the lockers. The ceilings are painted, but not plastered. All floor finishes of vestibules, corridors and toilets are of adamantile, a local product. Other floors are mastic. Heating is supplied by a steam system, with wall radiators in classrooms, and floor radiators elsewhere

COST AND CONSTRUCTION: The building has a reinforced concrete skeleton, the ground floor having a cinder fill, and the upper floors being of removable pan construction. Exterior bearing walls are of cement tile, and interior of clay tile. The flat roof construction is of the insulated concrete slab type, and the pitched roof is framed in concrete, insulated and covered with double wood sheathing. Gross cost was $704,000, or 2,454,000 cu. ft. at 28 cents plus per cu. ft.

MURPHY HIGH SCHOOL, MOBILE, ALABAMA

GEORGE B. ROGERS, ARCHITECT

PERKINS, FELLOWS & HAMILTON, ASSOCIATE ARCHITECTS



FIRST FLOOR AND PLOT PLAN

A—AUDITORIUM (SEATING CAPACITY 1,200)
B—DOMESTIC ARTS BUILDING
C—CAFETERIA
D—ADMINISTRATION BUILDING
E—MANUAL TRAINING BUILDING
F—BIOLOGY BUILDING
G—PROPOSED SWIMMING POOL
H—PROPOSED GYMNASIUM
I—PROPOSED CLASS ROOM BUILDING
J—PROPOSED CLASS ROOM BUILDING
K—PROPOSED COLONNADE

MURPHY HIGH SCHOOL, MOBILE, ALABAMA
GEORGE B. ROGERS, ARCHITECT
PERKINS, FELLOWS & HAMILTON, ASSOCIATE ARCHITECTS

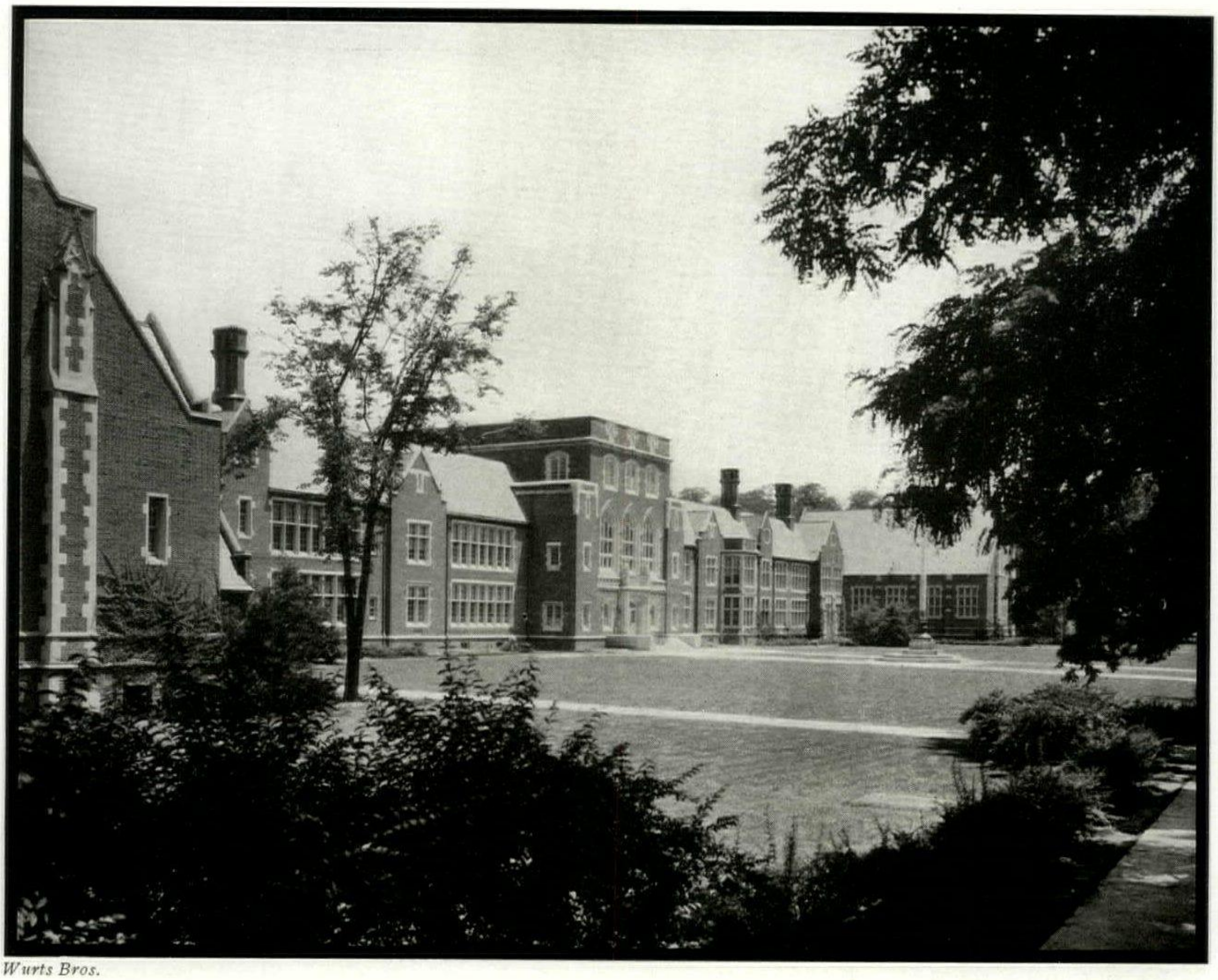
Tebbs & Knell

MURPHY HIGH SCHOOL, MOBILE, ALABAMA
GEORGE B. ROGERS, ARCHITECT
PERKINS, FELLOWS & HAMILTON, ASSOCIATE ARCHITECTS

Tebbs & Knell Photos

LEFT, ENTRANCE LOBBY
BELOW, AUDITORIUM

MURPHY HIGH SCHOOL, MOBILE, ALABAMA
GEORGE B. ROGERS, ARCHITECT
PERKINS, FELLOWS & HAMILTON, ASSOCIATE ARCHITECTS



Wurts Bros.

THE BRONXVILLE SCHOOL, BRONXVILLE, N. Y.

HARRY LESLIE WALKER, GUILBERT & BETELLE AND HARRY LESLIE WALKER, ASSOCIATED

ARCHITECTS

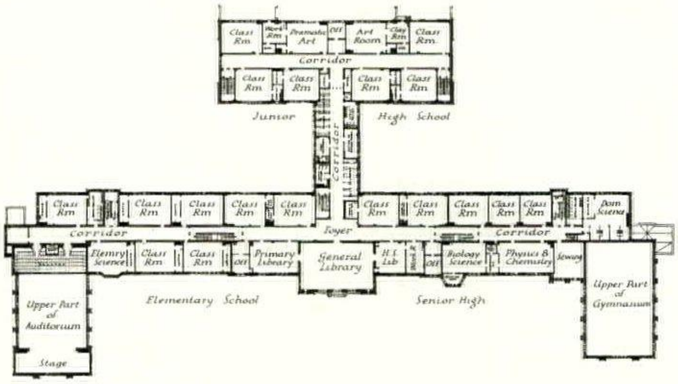
GENERAL: This building contains facilities for elementary, junior high school and high school students. The plan is worthy of study in that it achieves almost complete segregation of the activities of the various school units and at the same time allows for the common use of the important special spaces. The fourth floor occupies the central portion of the building only and contains a large cafeteria and kitchen

DESIGN: Although the two end wings were planned by Guilbert and Betelle with Harry Leslie Walker associated two years before the central portion was built, the design is of a uniform character throughout the building. It is executed in a dark red, rough textured brick, laid with smooth gray joints and trimmed with limestone. The roof is of variegated slate, sea green in color. Windows have painted wood sash

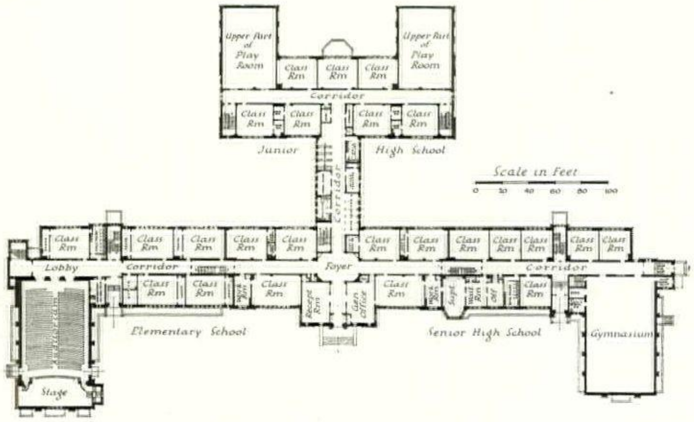
INTERIOR: In the interior the classroom floors are of wood, those in the corridors being linoleum. The walls and ceilings are of plaster, unpainted. Those in the play rooms and gymnasium are of glazed brick

CONSTRUCTION: The building is of semi-fireproof construction on a concrete pile foundation. The corridor, gymnasium and auditorium floors are framed in reinforced concrete, those in the classrooms with wood joists. The two wings of the building have brick bearing walls and the central portion is framed with steel. Heating is from a steam vapor system with unit ventilators in the classrooms. The building contains 2,641,000 cu. ft. and cost 56.3 cents per cu. ft. or a total of $1,488,000

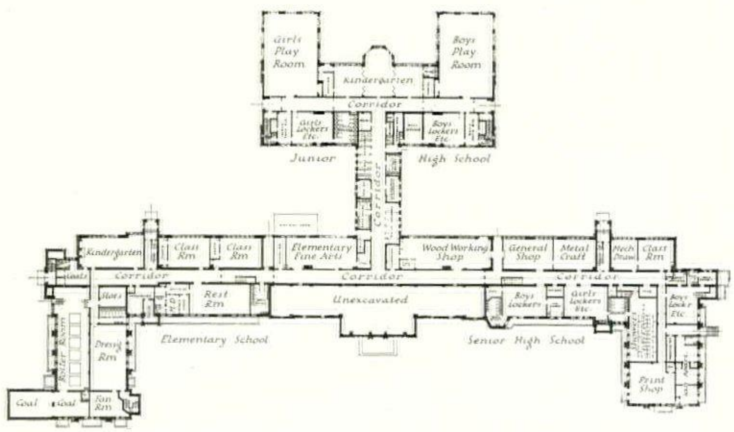
A SUBURBAN CONSOLIDATED SCHOOL



SECOND FLOOR PLAN



FIRST FLOOR PLAN

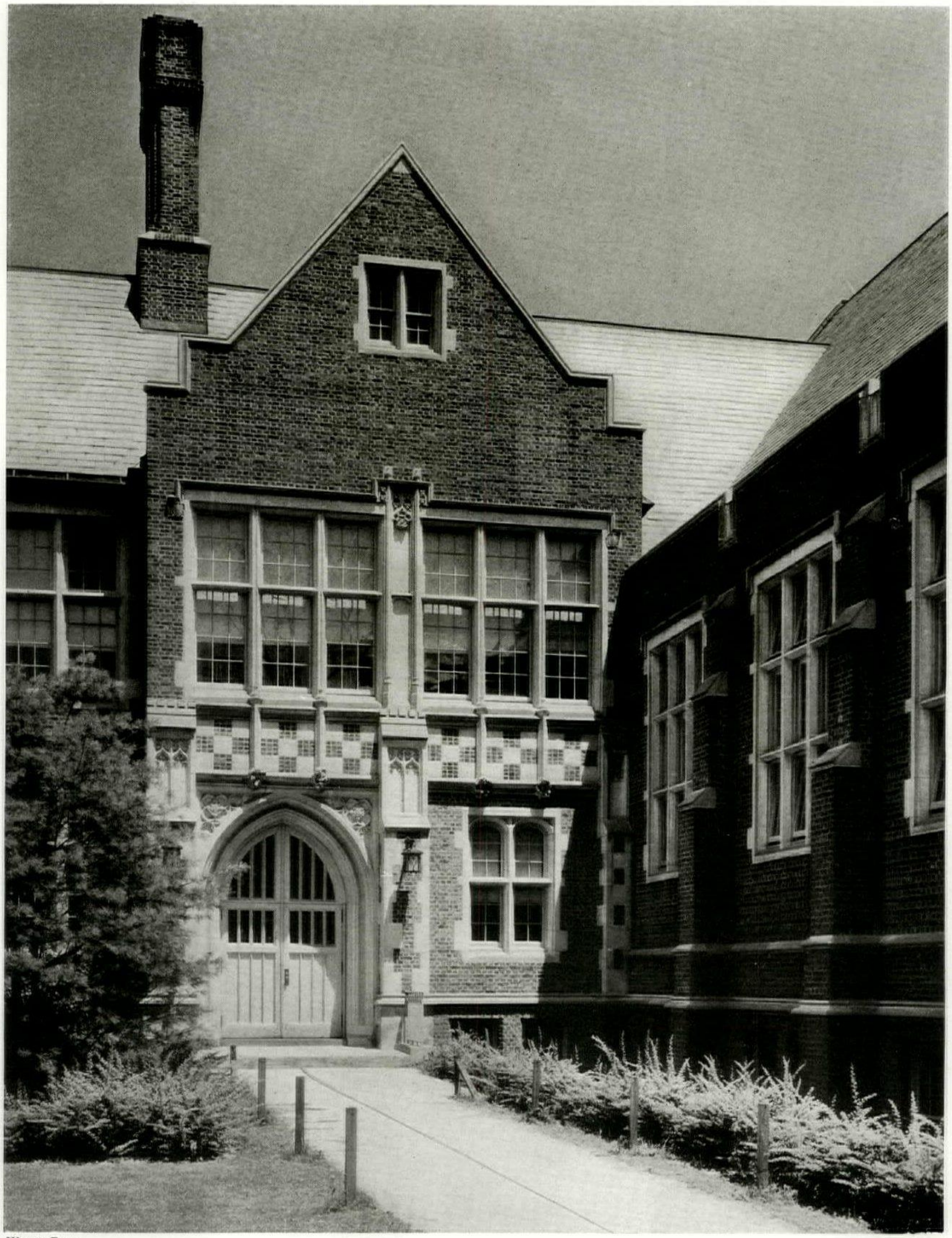


GROUND FLOOR PLAN

THE BRONXVILLE SCHOOL, BRONXVILLE, N. Y.

HARRY LESLIE WALKER, GUILBERT & BETELLE AND HARRY LESLIE WALKER, ASSOCIATED

ARCHITECTS



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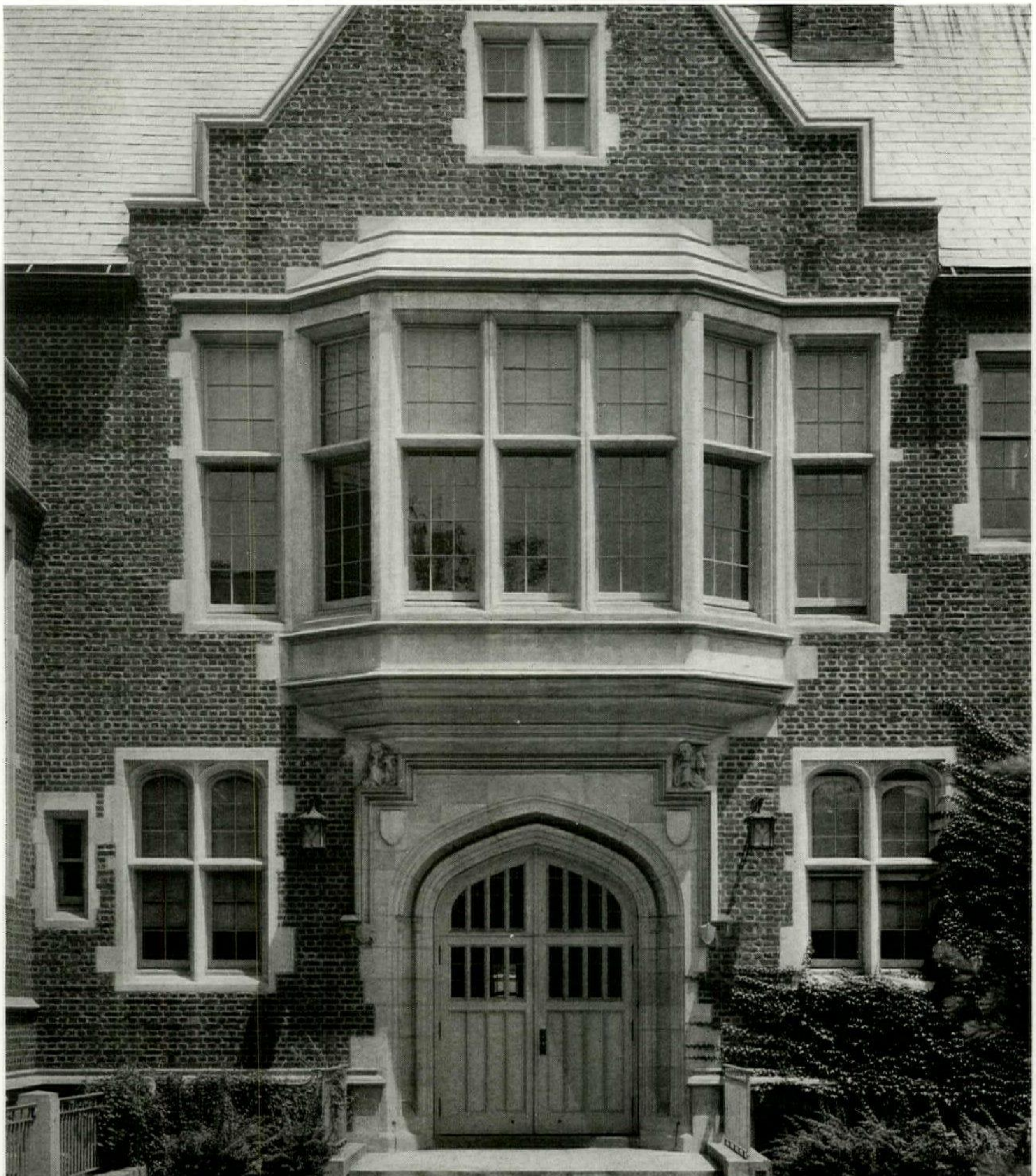

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HARRY LESLIE WALKER, GUILBERT & BETELLE AND HARRY LESLIE WALKER, ASSOCIATED

ARCHITECTS

THE EDITOR'S FORUM

IS THE NEW SCHOOL NEW?

ALTHOUGH our general impression may be the school building is largely standardized, the moment we go below the surface we find that it is actually subject to rapid change and the new school becomes a fascinating study. The new purposes and methods of teaching are already having pronounced effects on the building which is to house these activities,—and more are coming.

The most significant change in recent years is that in the *objectives* of education. This is brought out very clearly in the article by Dr. Engelhardt in this issue. The statement of the objectives of education as formulated by the teachers of New York, which he quotes, is a revelation to many who have not followed closely the recent developments. The change from the ideals of the "little old red schoolhouse," with its emphasis on the three R's, to the concept of education as a means to a better adjustment of the individual to his social and economic life in later years, is of the utmost importance to those who will plan the buildings for the education of the coming generation.

An understanding of these new purposes and new methods, many of which are of course experimental at this time, will fire the imagination of school designers and will produce buildings differing radically from those which have been erected even during the past few years. This vista of new solutions to the school problem as opposed to a cut and dried standardization is both a challenge and an opportunity. It necessitates a more intensive study on the part of architects and their closer cooperation with educational authorities. The aims and teaching methods of the school and the present and future possibilities, must be thoroughly discussed before even the most preliminary sketches are made. The school problem is no longer that of providing a "10-room school like that in District Number 5." The entire contents of this Reference Number emphasizes this fact. It will serve its purpose well if it proves a stimulant to constructive thought and a source of information for the practical working out of the school building problem—a problem that is ever and increasingly new.

HOUSING, TO THE FRONT AND CENTER

OF all problems challenging architects today, that of housing takes precedence. It takes precedence because it is universal in its interest, whether we consider it from an economic, sociological, political or æsthetic point of view. From the economic side, the "frozen assets" representing residential mortgages constitute one of the most troublesome factors in the present depression. This has been recognized by the Administration and a plan has been devised in an attempt to relieve the situation by the formation of a Home Loan Discount Bank somewhat along the lines of a Federal Reserve System. The purpose of this proposed banking system is to allow banks holding mortgage paper to discount qualified mortgages up to 50 or 60 per cent of their face value. Only 25 or 30 per cent of the sound appraisal value of the property would be available in such rediscount loans. The Home Loan Discount Bank would not, on its own account, make mortgage loans to home builders but would act through the already established channels for such financing.

It is hoped that such a bank will stimulate home building by making available large funds for the financing of housing. Certainly in its present form it would be of inestimable value to all banks now embarrassed by large holdings of first mortgage paper which cannot be liquidated. If the new system became operative, such banks would be in a much better cash position and could, if they chose, make new real estate loans for housing. In their present state of mind, however, they might prefer to remain in a liquid position or to use the funds thus liberated for investments that might promise higher profits than mortgage loans. Unless the new system is so devised as to make it obligatory to invest in new construction work the funds liberated, the benefit to housing may not be so enormous as is contemplated. "Once burned, twice shy" is as true of bankers as of school children. Through the proposed system, relief to the lending institutions is assured. It is equally important that distinct provision be made for the passing on of the benefits to new housing projects.

The plan for the establishment of the home loan discount bank, since it involves the use of federal money, must be submitted to Congress.

This will necessarily mean some delay, and also brings up the political aspects of the housing problem.

The study of housing by the government is not limited to the economic aspects although these are the most widely stressed as being strongest in their appeal. A comprehensive conference has been called to meet in Washington on December 2nd to consider the whole subject of "home building and home ownership." Committees have been appointed and have been studying all phases of housing. At the conference, reports will be presented on design, on large-scale housing projects, on reconditioning and modernizing, on interior furnishing, equipment, etc. The published reports should be a great stimulus to the general interest in housing as well as a mine of information and definite suggestion to architects, builders, contractors, decorators, loan agencies, insurance companies and others so vitally involved in finding solutions for the many problems in housing. It is sincerely hoped that they will provide more than inspiration and information. Only insofar as they provide plans for direct action will they be effective. Recommendations and reports have a faculty for remaining just that. If housing is to lead the country out of the slough of despond the reports on large-scale housing, on design, and on financing methods deserve our closest attention. As architects are taking a leading part in the formation of the reports and recommendations, so also must they devote their subsequent efforts with renewed vigor to forcing definite action, or their previous work may prove largely in vain.

OUR COLLABORATORS ORGANIZE

ARCHITECTS have frequently collaborated with the professional interior decorators, making use of their specialized knowledge and their ability to deal with the particular problems of the interior of the building and its furnishings. But more than once architects have been puzzled by the operating methods of the business side of interior decoration. It has been difficult sometimes to determine when the decorator was serving in a professional capacity as an artist, and when he was serving as a dealer in fabrics, furniture and other merchandise.

For years the architect has, through the Code of Ethics of the American Institute of Architects, eliminated all financial interest in the construction work as such, or in the sale of building materials. It is evident that the various practices which have grown up like Topsy in the field of interior decoration in these respects were not satisfactory either to the decorators, the architects or the clients. The leaders in the profession of interior decoration, therefore, have recently formed the American Institute of Interior Decorators for the purpose of elevating the standard and standing of its members to gain for them the confidence and high regard of the public. The A.I.I.D. has to this end formulated a code of ethics recently published in *Interior Architecture and Decoration.*

The code has many interesting features, for it is both like and unlike the code of the A.I.A. For instance, qualification for membership has three aspects: Education, Experience and Financial Responsibility. The qualification of Financial Responsibility is of special interest. It takes up the matter of payment for services by the client and stipulates that the "client is to be advised of the system of charges when he requests service." How much misunderstanding and litigation could be avoided if it were stipulated that architects should advise in writing of their system of charges when first dealing with a client. The obligations of the decorator to the client are no less definite comprising four rules which stipulate that the decorator shall submit definite specifications, shall supervise all work, shall "advise the client rightly regardless of personal profit," and shall "assume all responsibility for errors caused by indefinite clauses and improper execution of contracts." The relation of the decorator to the trade and to other decorators is made specific, as are also the obligations of the client to the decorator and the rules for the methods of work in the practice of interior decoration.

We welcome the newly formed American Institute of Interior Decorators into the fellowship of professional organizations and wish it every success in its splendid undertaking. We hope that it will send to every architect an outline of its purposes and work and its excellent code of ethics. We feel sure that this new organization will do much to insure the best kind of collaboration with its professional confreres in the production of buildings functionally efficient, economically sound and æsthetically satisfying.

Kenneth K Stowell

EDITOR.

AN ANALYSIS OF SCHOOL PLANNING

BY

ARTHUR B. MOEHLMAN

PROFESSOR OF EDUCATION
UNIVERSITY OF MICHIGAN

ANY study of school plant plan efficiency must be approached from the standpoint of plan purpose. Briefly, the public school plant is a physical means of satisfying a social need. It is one of the major agencies in the facilitation of the instructional process for both child and adult. The public school plant has no meaning or function apart from this primary purpose.

A public school plant has two functions: (a) to develop in permanent form the best architectural expression of curricular needs at the time of construction, and (b) to be an inspiration to both the child and the community. The primary essential of the school plant is to act as an efficient agency in the educational process. The second essential is to determine the most economical manner of translating this purpose into physical form. This functional approach to the problem of plan efficiency is essential if we are not to be unduly influenced by the always dominant question of economy, popularly conceived and expressed as "money cheapness." All architects are aware that an initially cheap product may prove finally to be very expensive; on the other hand, faulty educational designing or unwarranted architectural extravagance also may result in an expensive product. Both extremes should be avoided.

Architects and educators are quite familiar with certain extravagances in school plant construction that are commonly justified because "the community demands these things." The question that naturally arises is: can both physical efficiency and economy in planning be secured if the primary consideration—meeting instructional requirements—is adequately satisfied? The answer is simple. Instructional needs in the majority of school plants erected today are determined subjectively. The dead hand of tradition, the fancied requirements of individual teachers, or principals, the architect's desire, the superintendent's desire to build monuments, and the fancied popular demand determine building needs rather than the direct translation of the entire instructional program. As soon as the objective study of curricular activities—the size of class and the method of administration—is considered with respect to space requirements, the traditional method of planning becomes untenable and real economy in basic plan design may be achieved.

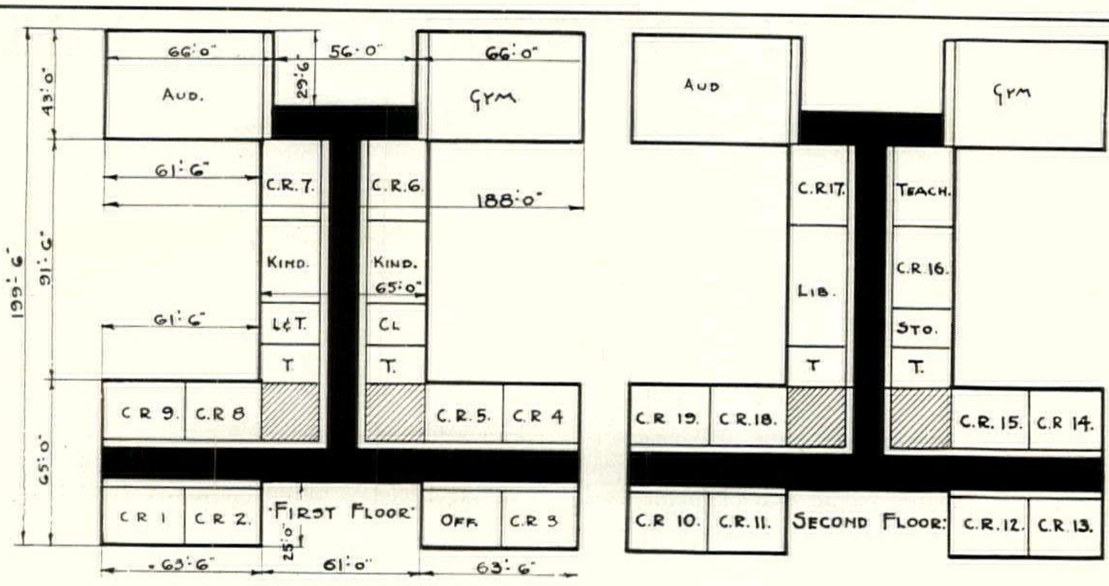
Since the primary function of the school plant is to meet instructional need, the first essential in planning is to secure the maximum instruction-space-efficiency. After that it is the architect's function to develop the most economical physical expression of these needs. In any study of the efficiency of a school plan both factors must be given careful consideration.

Types of Physical Efficiency. The physical efficiency of a building must be judged primarily with respect, first to the proportion of instructional area to total area; second, by how well it satisfies the criteria of instructional need, and third, the relationship of physical envelope to volume. To meet the needs of instruction a building should be efficient in: (a) flexibility, to permit easy physical adjustments to changing curricular activities; (b) expansibility, to provide economically for possible future extension; (c) safety, or freedom from hazards to life either through fire or panic, demanding traffic area efficiency[1], and adequate exits from rooms; (d) health requirements, adequate natural and artificial lighting, sanitation, and ventilation; (e) use, and (f) location. Use efficiency is the ratio between absolute and working capacity[2], and the actual daily use of this working capacity.

The physical efficiency of a building may be further considered from the standpoint of material and construction, maintenance and operation. While these elements are not of primary importance to instruction they are nevertheless closely related to efficiency of instruction since they directly affect school costs. The material construction efficiency of a building is expressed in the cost of maintaining the building at its orig-

[1] Traffic area efficiency is considered as the ratio between the instructional area and the area devoted to corridors, stairways, and entrance halls.

[2] See THE PUBLIC SCHOOL PLANT PROGRAM, Chapter IV, p. 149.



"H" TYPE

Instruction-Space-Efficiency	0.451
Physical-Envelope-Efficiency	7.08
Instruction-Envelope-Efficiency	3.19

This type of plan obviously does not lend itself to economical design in terms of this particular problem. Limited by the factor of adequate orientation, it was impossible to secure a well-designed plan. The attempt to arrange the specific facilities required by the problem resulted in much waste space. This does not mean that the "H" plan is inherently an expensive and extravagant design; it merely indicates that unavoidable orientation deficiencies can be overcome only in a large building. The only conclusion that may be safely drawn, then, is that the "H" plan tends to be uneconomical except for very large buildings

inal efficiency. It is best expressed by maintenance efficiency, which is the ratio between erection cost and annual costs. Annual cost includes repairs necessary to maintain the plant at its original physical efficiency. Operating efficiency may be determined by actual costs in relation to adopted standards. It is complicated by variables in construction, mechanical efficiency, personnel, and use[3].

Instruction-Space-Efficiency. This is considered as the relation between total area of a building and that portion available for instructional purposes. In general practice the immediate efficiency of a plan is now so determined. The mere allocation of 50 or 60 per cent of the total space to instruction does not mean necessarily that all rooms are the proper size, nor that they are properly lighted, ventilated, located, or efficiently used. An efficient and economical basic design may be very inefficient in the execution of details. For comparative purposes, it may be assumed that at least in all open plans it is possible to satisfy these criteria after the basic distribution of space has been made.

The ratio of instruction-space-efficiency can be determined by dividing the instruction space area by the total floor area.

$$\frac{\text{I.S.A.}}{\text{T.A.}} = \text{Instruction-Space-Efficiency}$$

The ratio thus secured is only a gross measure[5].

Physical-Envelope-Efficiency. This may be expressed in terms of building units, a variety of which have been used for this purpose, including both the cube and area. These two factors considered together furnish a good index of efficiency. Area is best expressed as shell area; i.e., the sum of the areas of the outside walls, and all floor areas. The ratio of physical efficiency will be expressed in the number of cubic feet of building secured for every square foot of shell area.

$$\frac{\text{Volume}}{\text{Shell Area}} = \text{Physical-Envelope-Efficiency}$$

Instruction-Envelope-Efficiency. The instruction-envelope-efficiency of a school plant may be considered as the product of the ratios of instruction-space-efficiency and physical-envelope-efficiency[7]. Both factors are given equal weight.

[3] Maintenance and operating efficiency is treated in the fourth volume of the series on PUBLIC SCHOOL PLANT OPERATION AND MAINTENANCE.

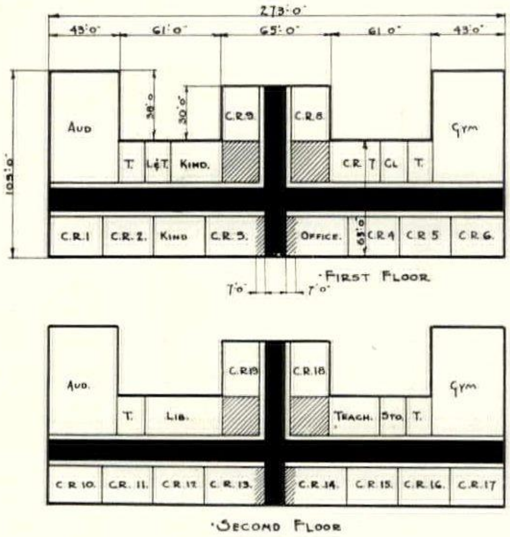
[5] The efficiency of actual use is discussed in THE PUBLIC SCHOOL PLANT PROGRAM, Chapter IV, pp. 127-32.

[7] These studies were prepared for PUBLIC ELEMENTARY SCHOOL PLANT and may be studied in this book in relation to many other factors impossible of consideration here.

"E" TYPE

Instruction-Space-Efficiency 0.454
Physical-Envelope-Efficiency 7.64
Instruction-Envelope-Efficiency 3.47

The "E" plan is very common, in which it is usual to find both the gymnasium and auditorium centered on the rear elevation with the classrooms in the lateral wings. Under practical conditions, where the size of the building and the slope of the site indicate the desirability of this type plan, it is possible to get higher ratios than indicated here. Like the "H" plan, the "E" type is one that may be used successfully with buildings larger than the one considered. The greatest weakness of this type is the factor of orientation. If the lateral wings are given east and west exposure, then the main elevation must be oriented north and south. This might be overcome to some extent if the plan were placed at an angle to major compass points



Question may be raised with respect to the validity of equal consideration. Arguments might be made that instruction-space-efficiency is worth more than mere equality in relation to physical-envelope-efficiency. There may be truth in this contention. At the present time, however, it is impossible to state objectively what the actual weighting of the instructional factor should be in relation to the physical factor. Weighting the instructional factor by two, in conformance with extreme opinion in this field, would mitigate seriously against plan efficiency, because the factor of poor physical design would be much undervalued in the final product. On the other hand, it may be argued that these two factors, in terms of scientific planning, are quite evenly balanced. It was an earlier contention that, after satisfying instructional needs, it is necessary to design the physical plant as efficiently as possible in terms of these instructional requirements. From this point of view each of the ratios have an equal value in determining instruction-envelope-efficiency. In view, therefore, of the absence of a valid objective means of weighting the instruction-space-efficiency in relation to physical-envelope-efficiency, both are assumed to be of equal value.

Plan Types. Instructional facilities, developed into building plan types, may be classified as (a) closed plans and (b) open plans. Closed plan types may include the solid square or rectangle, and the hollow square or rectangle. The closed type may be either solidly built up or may have interior light courts. In this type a number of rooms have inside light, facing a court, or overhead light if the court is used for large capacity rooms. Open plan types take their name from the letter they most nearly represent and are classified as **T, L, I, U, E,** and **H** plan. Open plans are so named because all of the rooms receive direct outside lighting.

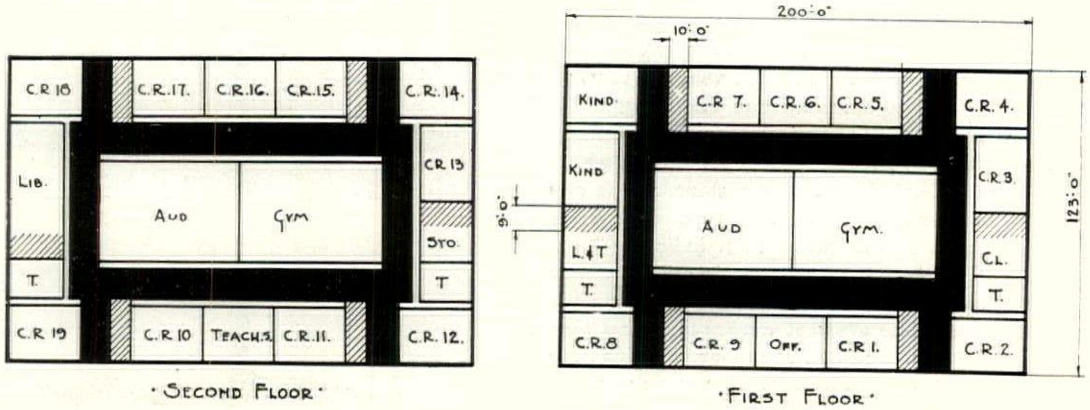
Comparison of Plan Types. By setting up the following theoretical problem, it was possible to make a fairly accurate computation of the relative efficiency of different plan combinations for elementary schools.

The selected capacity was 1,120 *children, with a semi-departmentalized form of organization, and* 40 *children to a class, except the kindergarten. The building was to be the two-story type, with flat roof and no basement. The required facilities were*: 2 *kindergartens* (22 x 30 *ft.*); 1 *kindergarten service unit* (22 x 15 *ft.*); 19 *classrooms* (22 x 30 *ft.*); 4 *toilets* (22 x 15 *ft.*); 1 *teacher's rest room* (22 x 30 *ft.*); 1 *storage unit* (22 x 15 *ft.*); 12 *ft. ceilings;* 12 *ft. corridors; and heating area underground;* 42,350 *cu. ft. Corridor lockers were considered as built into the breather wall.*

Each building was developed physically in accordance with the same standards and dimensions. Unit construction was identical in every case, the single variable being shape or form of plan. The results of the comparison are shown in the following table, type H having the lowest efficiency and type T the highest.

Practical Application. In applying the instruction-envelope-efficiency formula to existing plants a different problem was created. In the theoretical study it was possible to reduce all plants to the single variable of shape. Eight existing plants were chosen for measurement[8] in which

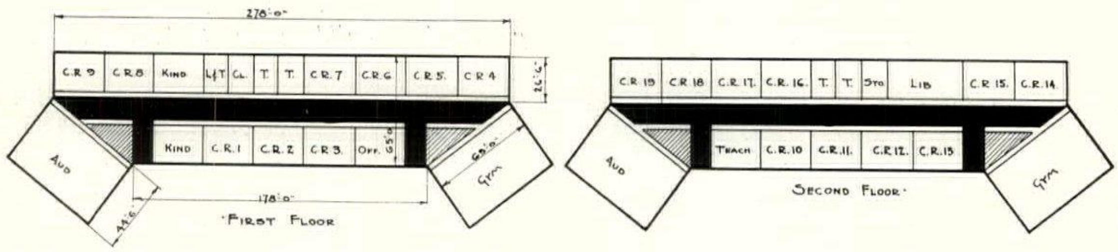
[8] These data may be found in THE PUBLIC ELEMENTARY SCHOOL PLANT.



THE SOLID RECTANGLE

Instruction-Space-Efficiency	0.422
Physical-Envelope-Efficiency	8.39
Instruction-Envelope-Efficiency	3.54

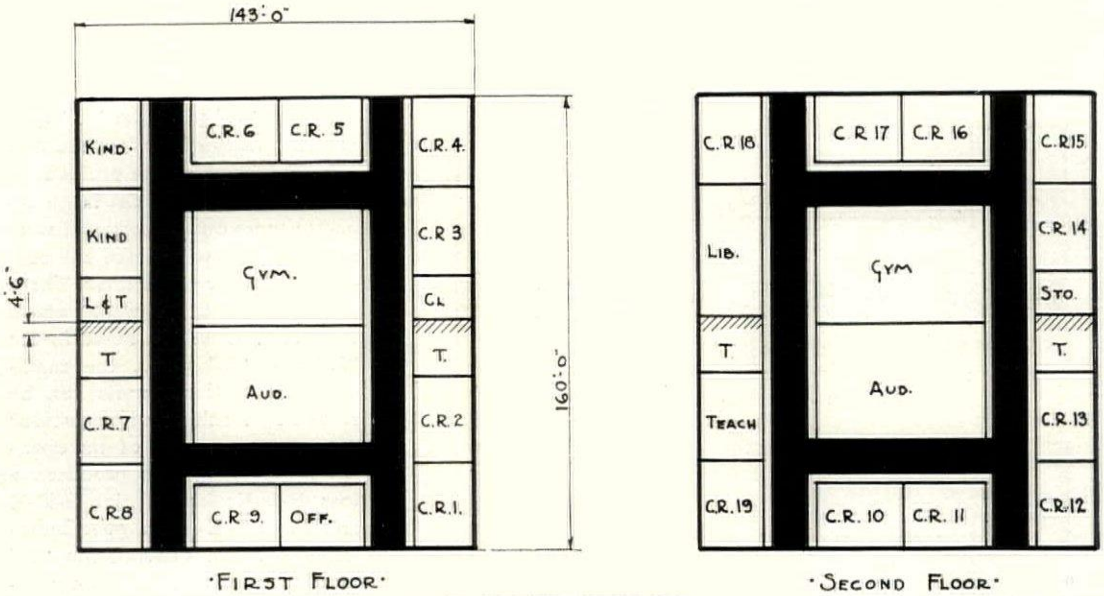
The size of this plan, with its accompanying large amount of waste space, resulted from the problem requirements of placing the large capacity units, the auditorium and gymnasium, in the center of the plan. From the instructional standpoint the basic defects of the plan are more vital than the rating developed in this instance. The lack of provision for economical expansibility, orientation defects, and the overhead lighting of the gymnasium and auditorium are serious weaknesses. The high P-E-E is expected, since the closer a plan approaches a cube, the higher the envelope efficiency. In general, it is not a desirable type



STAGGERED "U" TYPE

Instruction-Space-Efficiency	0.480
Physical-Envelope-Efficiency	7.74
Instruction-Envelope-Efficiency	3.72

This plan represents a variation from the conventional "U" type, secured by placing the large capacity units at an angle upon the front elevation. Such practice is often employed when it is necessary to place the building on a triangular site. The I-S-E might have been higher if a longer extension of the "U" and a foreshortening of the main axis had been permitted by the problem, an arrangement that would also have improved the orientation of classrooms. This is not considered a type for common use, but one designed to meet unusual site conditions. In general, it is somewhat less efficient than the "U" type, due to the space in the outside angles between main axis and lateral wings



THE SOLID SQUARE

Instruction-Space-Efficiency	0.455
Physical-Envelope-Efficiency	8.41
Instruction-Envelope-Efficiency	3.83

The Solid Square Plan is frequently recommended to boards of education because of its economy of construction. Auditorium and gymnasium were placed in the center and assumed to be lighted by skylights. Under field conditions the waste space would probably be absorbed into units for storage and room extensions. Although it is infrequently done in practice, the main corridors were extended from one end to the other, because safety requirements demand that a child standing at any point in a building may see either an exit or a stairway. Although the Solid Square has a high P-E-E, the value is more than balanced by the low I-S-E

the educational designing had been carefully developed for a specific curriculum. In this comparison, however, a number of variables were present that could not be controlled. These included: shape, size, height, orientation, and roof (flat or pitched).

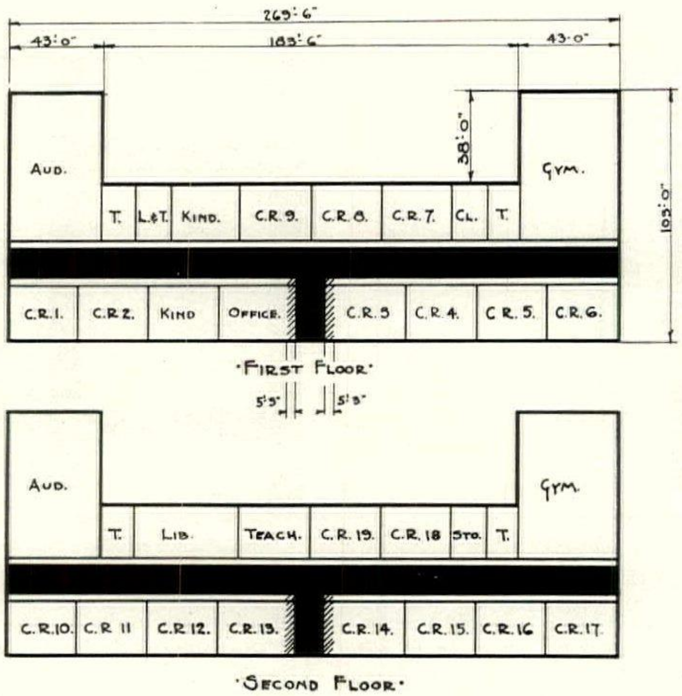
Summary of Relative Efficiencies

Type	I-S-E	P-E-E	I-E-E
H	0.451	7.08	3.19
E	0.454	7.64	3.47
The Solid Rectangle	0.422	8.39	3.54
Staggered U Type	0.480	7.74	3.72
Solid Square	0.455	8.41	3.83
U	0.503	7.65	3.85
I	0.496	7.77	3.85
L	0.506	7.86	3.98
T	0.506	7.86	3.98

Closed Plans. Two closed plans, practically square, showed an instruction-envelope-efficiency of 4.295 and 4.275. While essentially the same plan, the one with the lower rating was not originally planned for expansion beyond 1,140 capacity. To make the additions and complete the square, it was therefore necessary to add extra corridor space which accounts for the difference. The theoretical rating of the square plan was 3.83. The variables of height and size (1,840 capacity) must be given consideration in this comparison. The conclusion that may be drawn with respect to this type is that the square building may be designed educationally to rate high with respect to instructional space and its shape will give the highest physical-envelope-efficiency of any plan. The obvious disadvantages of lack of expansibility, inside lighting, and orientation must weigh very heavily against any closed type.

U-Plans. Two U-buildings with exactly the same capacity resulted in an instruction-envelope-efficiency of 4.743 and 4.351. The difference in this case was due to a pitched roof on one building and a flat roof on the second. Given the same perimeter, the addition of a pitched roof will result in a higher physical-envelope-efficiency[9]. In this case the ratios were 9.68 and 8.78, or a

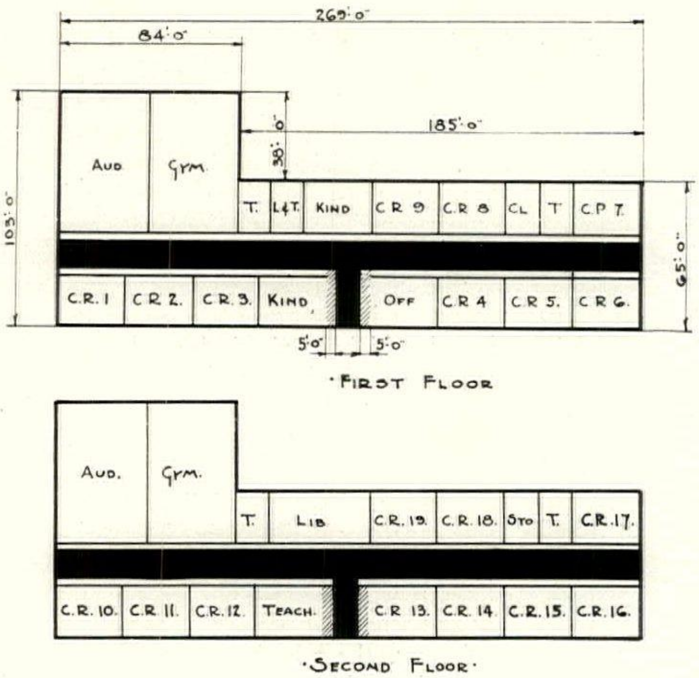
[9] Practically, however, the flat roofed building is cheaper in total construction cost. The attic space is relatively cheap cubage and increases the ratio of cubic feet of volume to square feet of shell area.



Like the "E" plan, the "U" type is well adapted to rectangular sites. In terms of the problem, it was developed with the large capacity units on the east and west axis in order to provide the best orientation for classrooms. There is a minimum of waste space here, and, as will be noted in the "L" and "T" plans, the maximum instructional units can be served by a minimum of corridor space. As a result of its openness, the elongation produces a low P-E-E; but a high I-E-E and a low P-E-E is a good building ratio. In general, the "U" plan is a good one, the only serious objection being that in practice it offers the same difficulty of obtaining proper orientation that was displayed in the "E" plan

"U" TYPE

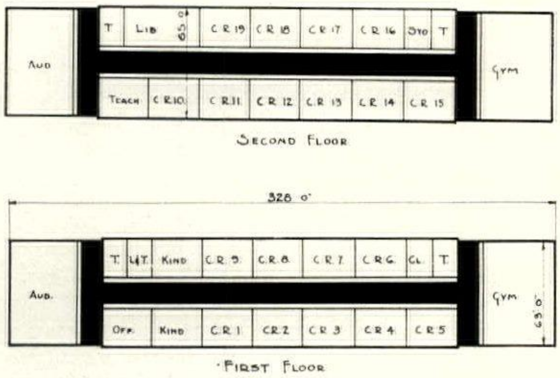
Instruction-Space-Efficiency	0.503
Physical-Envelope-Efficiency	7.65
Instruction-Envelope-Efficiency	3.85



In this example of a very popular type, the instructional facilities have all been oriented on the main axis, and the large capacity units placed at one end at right angles to the main axis. The "L" type can be criticized from only one standpoint, and that is that the large units are not centered to secure their more efficient administration. It lends itself well to orientation, waste space is low, and economical expansion is possible. This plan is of equal standing with the "T" plan, the only advantage possessed by the latter being the centering of auditorium and gymnasium

"L" TYPE

Instruction-Space-Efficiency	0.506
Physical-Envelope-Efficiency	7.86
Instruction-Envelope-Efficiency	3.98



"I" TYPE

Instruction-Space-Efficiency	0.496
Physical-Envelope-Efficiency	7.77
Instruction-Envelope-Efficiency	3.85

This type represents the simplest of the open plans, and is strongly favored by the National Education Association. Where site conditions permit, it is favored because it can be oriented perfectly. The "I" plan may be developed with the large capacity units centered, and in efficient size up to 2,000 capacity. In this case, common practice was followed, the large units being placed at each end of the building. As the ideal in instructional space and orientation is approached, the basic plan becomes more expensive to construct. Had the large capacity units been centered, the corridor space would have been reduced, and the plan would have received a higher rating

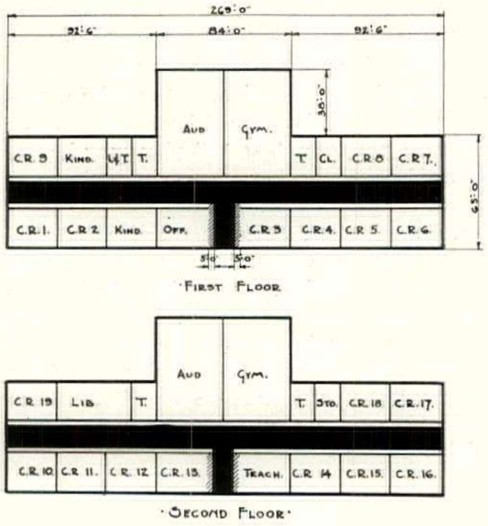
difference of 0.90 in favor of the pitched roof. The theoretical index of 3.85 is considerably lower than the practical. As pointed out, however, this was due to the nature of the problem which called for perfect orientation of all classroom facilities. In actual practice the U-plans neglect this factor and at least one wing has north and south orientation. Apart from difficulties in orientation, the U-plan is inherently a good one.

T-Plans. The T-plan which with the L-plan rated highest, theoretically was low with respect to the other six buildings. The instruction-envelope-efficiency was 3.747 and 3.719. Although the buildings were of the same size and shape, one had a pitched roof over part of the building and a flat roof on the other. The result, as in the case of the U-plan, is reflected in the physical-envelope-efficiency ratios of 8.20 and 8.14. The theoretical efficiency of this type was 3.98, somewhat higher than the practical findings. Again, the reason is not difficult to find. In the theoretical consideration the building was designed specifically as a T-plan. In the building actually measured, the plan shows a long corridor between gymnasium and auditorium on the base of the T-plan. The purpose of including this corridor was to make possible the ultimate expansion of the T into an H-plan. If the future connecting corridors were eliminated and the large units redesigned on the rear elevation, these T-plans would rate high.

E-Plan. The E-plan is high in instruction-envelope-efficiency, rating 4.495, exceeded only by the U-type. The theoretical rating was 3.47. Building size in the problem as pointed out was not adapted particularly to the E-plan which is essentially a large building type. Again, it was necessary to provide for perfect orientation while the practical application neglects this factor. In addition the practical example is a three-story building with respect to the central part of the main elevation. The presence of all for these variables, particularly size and orientation, easily accounts for the difference between the type theoretically and the chosen existing building.

Mixed Type. A one-story building furnished a mixed plan type. Half of the structure was a closed plan with light courts, and half consisted of long parallel wings. The instruction-envelope efficiency was 4.034 due chiefly to a very high rating with respect to instruction-space-efficiency. The physical-envelope-efficiency was 7.39, the lowest of the eight buildings considered. This is accounted for by the large perimeter in relation to the cubage. The difference in physical-envelope-efficiency between two buildings of practically the same size in which the only variables are shape and height is seen strikingly in comparison with the E-plan. In the one-story type the school district received 7.39 cu. ft. for every square foot of shell area and in the E-type, 8.78 cu. ft. for every square foot of shell area.

Plan Type Summary. Due to many factors the matter of determining absolutely the most efficient elementary school plan type with respect both to instruction-space-efficiency and physical-envelope-efficiency is a difficult one. Such study must be conditioned upon the ability to make the comparison on a single variable. Setting up a specific problem, in this instance a building size of 1,120 capacity and adapting all plans to that problem indicates that certain types are more efficient than



"T" TYPE

Instruction-Space-Efficiency	0.506
Physical-Envelope-Efficiency	7.86
Instruction-Envelope-Efficiency	3.98

It will be noted that the same efficiency ratios obtain for both the "T" plan and the "L" plan, the only difference in value being, as has been pointed out, that in the "T" plan, the auditorium and gymnasium have been centered. All classrooms have east and west orientation, and the large capacity units north and south. If it is desired, expansion is simply a matter of converting it into a "H" type plan, the only change required being the separation of the gymnasium and auditorium by a corridor. For this particular problem, and for all problems similar, the "T" plan is to be preferred

others in terms of the problem size. It also shows that, considering the factors of flexibility, expansibility, and orientation certain plan types must be preferred. On the other hand, the investigations pursued indicate the certain plan types are adapted to small and medium sized buildings while others are more efficient when capacities of 1,800 or greater are involved.

The judging of existing buildings involves variables that must be considered and equated before it is possible for such comparisons to have real validity. Thus the U- and E-plans in practice rated higher than the T-plan in the theoretical problem. In each of these plans the factor of orientation was disregarded and, unless orientation is given weight, the actual rating would stand. The same factors may be pursued through each of the other building plans and the major differences between the theoretical and practical in this problem is the presence in one of at least four discernible variables as opposed to a single variable in the theoretical findings. Considering all of these facts it is possible within the obvious limitations of the problem to make certain generalizations with respect to plan types.

Closed plans, especially the square and rectangular, because of the factor of shape, rate high in physical-envelope-efficiency. By efficient planning they can also in any specific case rate high in instruction-space-efficiency, resulting in good instruction-envelope-efficiency. They do, however, lack expansibility, outside lighting for all rooms, and are deficient in orientation. Despite a possible high instruction-envelope-efficiency, which measures only certain physical factors, they must be judged negatively in terms of expansibility, lighting and orientation.

Open plans are divided into two classes: those that lend themselves efficiently to planning with small[10], moderate, and fairly large sizes and those that are adapted primarily to very large structures. The I, U, L, and T types fall in the first group and the E and H types in the second group. There are no fundamental difficulties in orientation with the I, T, L, and H types. The U and E plans possess certain inherent orientation problems difficult to overcome and the closed plans, unless they can be placed at an angle to the cardinal directions, rate lowest in this respect.

In general, other factors being equal, the I, T and L plans are preferred in elementary school plant construction. Practical field conditions in many instances make it impossible to achieve the ideal building type and the problems must be solved by the method of the best fit. In practically every case, however, it is possible to avoid the use of the closed plans. In terms of the theoretical assumptions, the summary of rank order rating of two-story elementary plan types is as follows:

Type	Rank Order			
	Physical-Efficiency	Instruction-Efficiency	Corridor Ratio	Physical-Instruction-Efficiency
T	3	1	1	1
L	3	1	1	1
I	5	4	5	3
U	7	3	1	3
Solid Square	1	6	8	5
Staggered U	6	5	4	6
Solid rectangle	2	9	9	7
E	7	7	6	8
H	9	8	7	8

[10]Small buildings, under 800 capacity; medium sized buildings 800-1,200 capacity; large buildings 1,200-1,800 capacity, and very large buildings, over 1,800 capacity.

FROM EXPERIENCE WITH SCHOOL BUILDING COMMITTEES

BY

JOHN J. DONOVAN

AUTHOR OF "SCHOOL ARCHITECTURE"

THE ever passing caravan of souls contributing to the welfare of their fellow beings as members of boards of education is truly a medley of human nature, a cross section of which would introduce the banker, the farmer, the merchant, the former school teacher, the housewife, the lawyer, the laborer, the hotel bus driver, and even the architect. Just how the architect managed to get aboard is still a mystery. No matter who composes the board, and no matter whatever else they may be, it has been my experience that boards of education are honest, earnest and conscientious.

The architect's most important relation with a board of education is generally during the first contact; for then it is that perhaps he is to be or not to be the architect. If he is capable and understands the problem and the board, dealings after employment are not difficult but friendly. But it is the first contact that counts.

All boards, while functioning according to law, proceed very much alike in their acts but not always so in their deliberations or impressions. They are good buyers in that they are good listeners until they have warmed up to the man and his subject. Board members, as a whole, are laymen, generally unfamiliar with the technical problems or architecture, engineering and educational planning. Consequently, they are prone to disregard distinctions and differences. Seldom do they have the time and more often lack the inclination to investigate the accomplished work of the architect, or to visit his office and observe his organization which produces the instruments of service.

The most unfortunate predicament an architect can create for himself, and the one which eventually proves to be most embarrassing to his clients, is to under-estimate the final cost of the building, or to over-state the quantity of building that can be produced with the available funds. It jeopardizes the progress of education, it is poor sportsmanship, and worst of all it is a handicap to a good name among a man's professional colleagues. It would be far better for the architect to admit openly that he intends to build as cheaply as possible, that quantity takes precedence over all else, and that an Act of God may sustain the structure as well as destroy it.

Very few school districts are provided with sufficient funds to attain the ultimate fulfillment of their needs and requirements. The requirements in school building projects, in fact in nearly all cases, exceed the appropriations. The architectural problem is to make the money go as far as possible without jeopardizing safety, sound construction, and the use of the proper materials. It is the worst form of economy to build cheaply. I firmly believe that the cost of maintenance should be even more firmly implanted in the minds of members of boards of education and building committees than the first cost, because maintenance cost is perpetual and the hardest expense to meet.

A prevalent absurdity with many boards of education in making their choice of an architect is to invite a number of them to appear before them for fifteen or twenty minutes and demonstrate their fitness for the work. It is pernicious, as well as distracting and confusing. It usually develops into competition of gab-fest, embarrassing to a man with any finer sensibilities. I wonder if any member of a board of education would adopt such a method of engaging a doctor or a lawyer to perform a valuable service? The procedure followed is very much like that followed in purchasing school supplies. In the latter case, however, the school supply salesman has his products before them so that they may follow as he points out the finer points of each article. He can demonstrate this and that feature, and it is not difficult for a Board to form a reasonably good judgment and make a satisfactory choice. But what a difference in dealing with the architect whose services until produced and finished are unseen, intangible and almost abstract! Drawings, perspectives and data are carried through the door unfolded and out again, drawings and data which are highly technical are often meaningless to the board member.

Very often a board will ask an architect if he will guarantee that the cost will be not more than an amount stipulated by them. Sometimes the man will tumble into this unintended pitfall. By no means is it possible for an architect to guarantee truthfully the cost of his work and be true to his clients and to his work without recognizing that, in the last analysis, the guarantee is worthless and may lead to detrimental results to the building, the architect and the owner. When an architect guarantees the cost of a building, he is practically saying in the same words, "I will place in this building just the kind of materials and requirements for their use that will enable me to keep within the cost which I have guaranteed regardless of results."

There is no need of enlarging upon this statement, no need of mentioning the danger of it. The architect is in a position to state to his client what he believes the cost will be from knowledge and data that he possesses, based on what similar buildings have cost in the past, and with a knowledge of prevailing market conditions and prices. That is as far as he can go honestly with respect to the intelligence of his client and that of his own. There is no harm in an owner establishing the up-set price that the building shall cost. It then behooves the architect to meet that price, if it is at all possible with established requirements and with safe construction and the use of good materials. The problem is then reduced to fixing a unit floor area cost and a unit cubage cost and establishing the maximum floor area and cubage this money will permit. If the results do not square with the requirements fixed by the board and its officers, the architect should make known the facts before proceeding too far.

TODAY, I believe, most boards of education realize that superintendence and inspection of the work is part of the building budget, and the cost should be borne by the board and rightly so, because the profit or reserve from any job does not warrant an architect paying for this expense, provided he devotes himself and his organization to a thorough study of the problem and enters into the research that every job requires. School buildings are awarded to the lowest bidder. Any bidder who can produce a certified check and obtain a surety bond is generally regarded as qualified to build the building, unless it can be proved that his record is questionable and that he has failed previously to build satisfactorily. Otherwise he is the lowest bidder in the eyes of the law and every court in the land will sustain him in his contention if any other bidder is favored. One recourse to riddance lies in rejection of all bids. However, that does not always prove to be good riddance, because very often he is the low bidder in the second proposals. The consequences which follow this procedure established by our democracy are of importance to the peace of mind, and health and safety of all concerned.

If the work is left unguarded, temptations will arise, short cuts and cheating are apt to follow. This is not a condemnation of the contractors of our country, for by and large they are good citizens, and as a rule they endeavor to give value for that which they receive. Nevertheless, the low bidder is not always of that class, and a board of education might preferably donate to the contractor from the public funds any sum of money he might be tempted to pilfer in cheating the job; and it would be far better for the school district and for the occupants of the building. Of course, they cannot do this.

This is a phase of the problem which, if thoroughly explained to a building committee or the board will make for a better understanding of just what the architect's function is on the work. It is his province to interpret the drawings and specifications and to visit the work in order to see that it is properly coordinated and that the plans and specifications are complied with. He cannot do this unless he has the assistance of an able man in the field, constantly following the work. An inferior man in this important position as superintendent of the work, leads to trouble, trouble for the contractor, trouble for the architect and for the board of education.

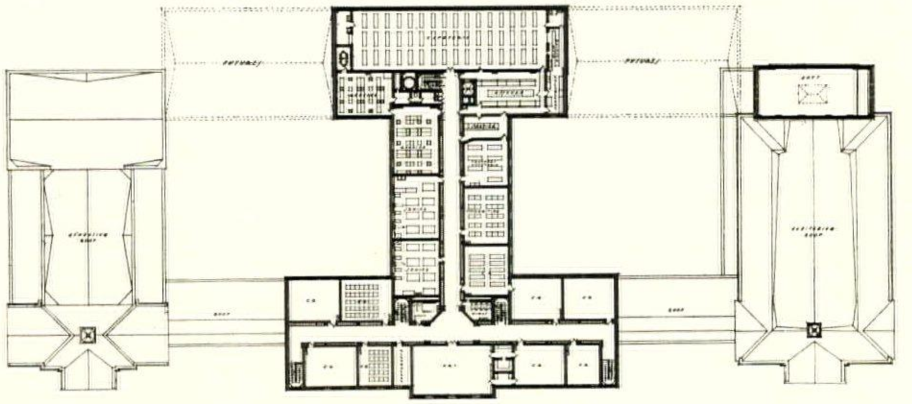
The conduct of the business, that is, the management of the building operation rests with the architect. It is his function to prepare the legal documents and then to have them properly approved by the parties authorized by law, such as the board, the district attorney, state and county officials, and on this point boards of education can either step into trouble or obviate it.

Keeping a board fully informed regarding the conduct of the work is conducive to a sincere appreciation of the architect's service. This does not mean petty reports about the contractor's errors or self-aggrandizement of the architect, but rather that of information pertaining to the coordination of the work of the several trades. There is no sounder course to follow than that of acknowledging, at the very beginning of construction, the legal powers invested by law in the board alone, namely, authorization to change and modify that shown on the drawings and specifications. This makes for clear understanding between the board, the contractor, and the architect and precludes embarrassment at the time of final acceptance of the work. This policy followed to rightful conclusions leads to respectful and worthwhile confidence on the part of all. An architect never need fear advising his client of having made a mistake either by omission or commission.

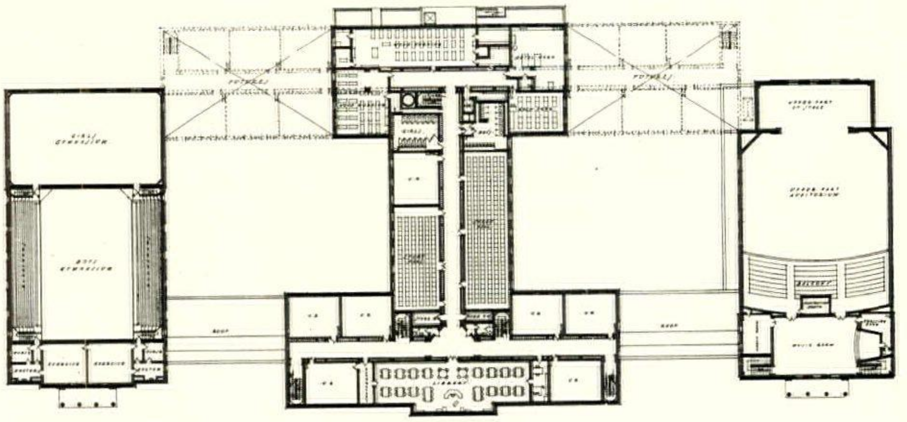
Edmondson

THE W. H. KIRK JUNIOR HIGH SCHOOL, EAST CLEVELAND, OHIO
WARNER, McCORNACK & MITCHELL, ARCHITECTS

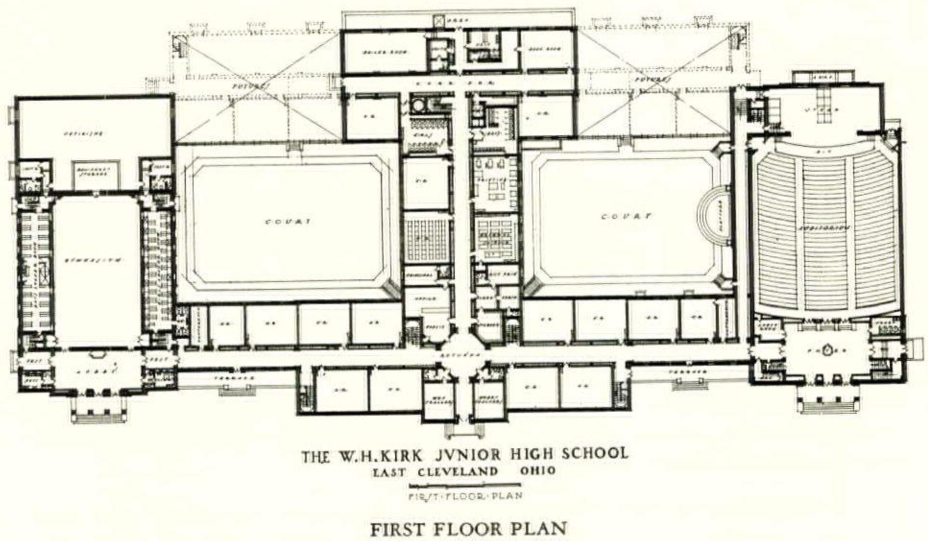
THREE JUNIOR HIGH SCHOOLS



THIRD FLOOR PLAN



SECOND FLOOR PLAN



FIRST FLOOR PLAN

THE W. H. KIRK JUNIOR HIGH SCHOOL, EAST CLEVELAND, OHIO

WARNER, McCORNACK & MITCHELL, ARCHITECTS

Edmondson

PLAN: The building is notable for its well defined separation of activity and the groupings of mass to provide the maximum of sunlight, fresh air, and pleasant outlooks. Excellent advantage has been taken of the location and special notice should be taken of the large courts which may be used as play areas

EXTERIOR: The walls are of old Virginia oversized brick with stone and white painted wood trim, composed in the tradition of the University of Virginia buildings. Windows are of painted wood and are double hung; the roof is of variegated slate

INTERIOR: The general interior finish is sand finished plaster with dark finished birch woodwork, except in the auditorium, where the woodwork is light in color. Wood flooring and rubber flooring are used generally, except in special rooms where cellized wood blocks are used. The auditorium, cafeteria, and music room are acoustically treated. Heating is supplied by an oil-fired atmospheric pressure steam system, and ventilation by a unit system in the school proper, with a mushroom system in the auditorium

COST AND CONSTRUCTION: The building is of fireproof construction, with brick and tile walls, and a steel tile floor system. Completed in 1931, it contains 2,530,000 cu. ft. and cost 37.2 cents per cu. ft., or a total of $939,700

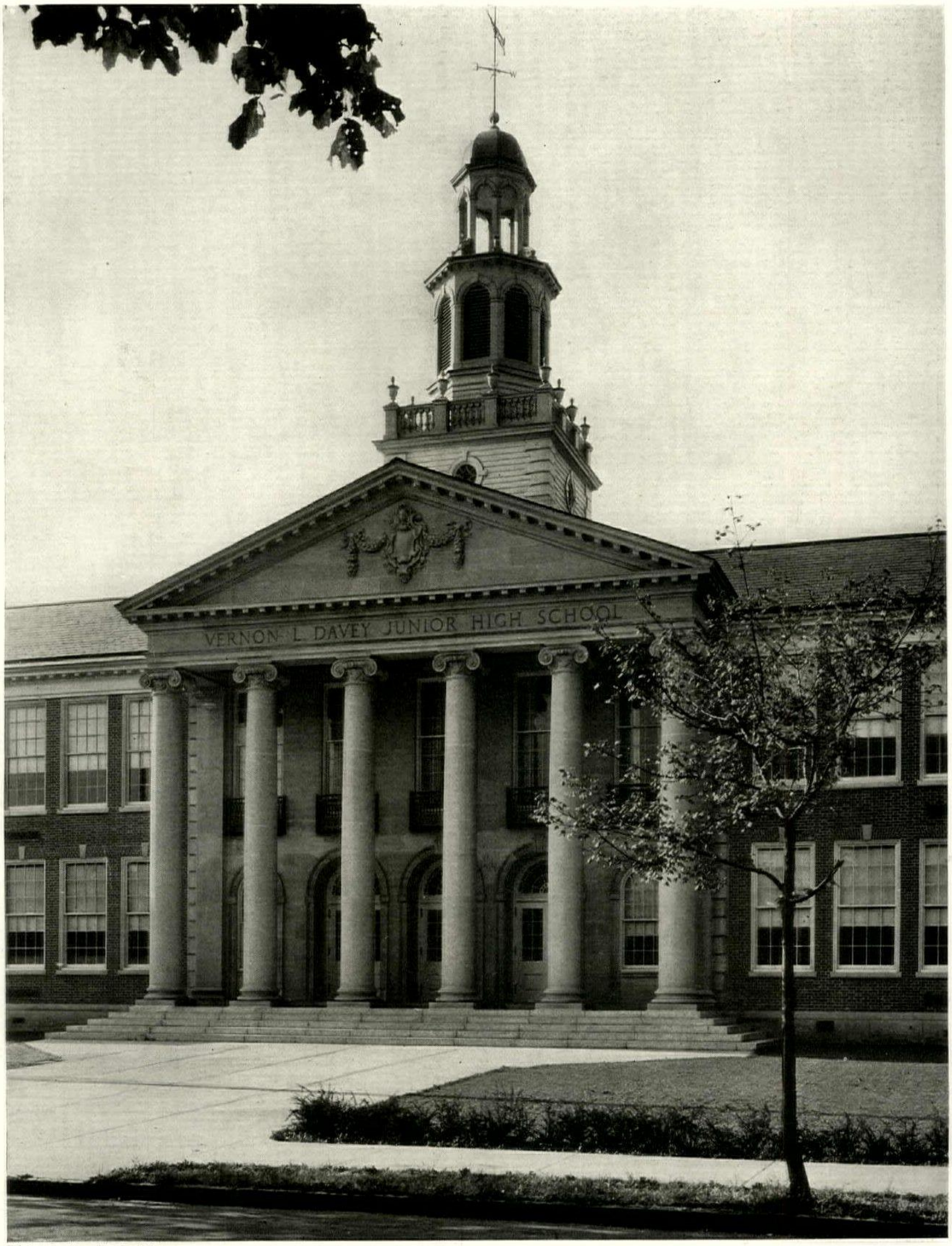
THE W. H. KIRK JUNIOR HIGH SCHOOL, EAST CLEVELAND, OHIO

WARNER, McCORNACK & MITCHELL, ARCHITECTS

Tebbs & Knell

THE W. H. KIRK JUNIOR HIGH SCHOOL, EAST CLEVELAND, OHIO

WARNER, McCORNACK & MITCHELL, ARCHITECTS



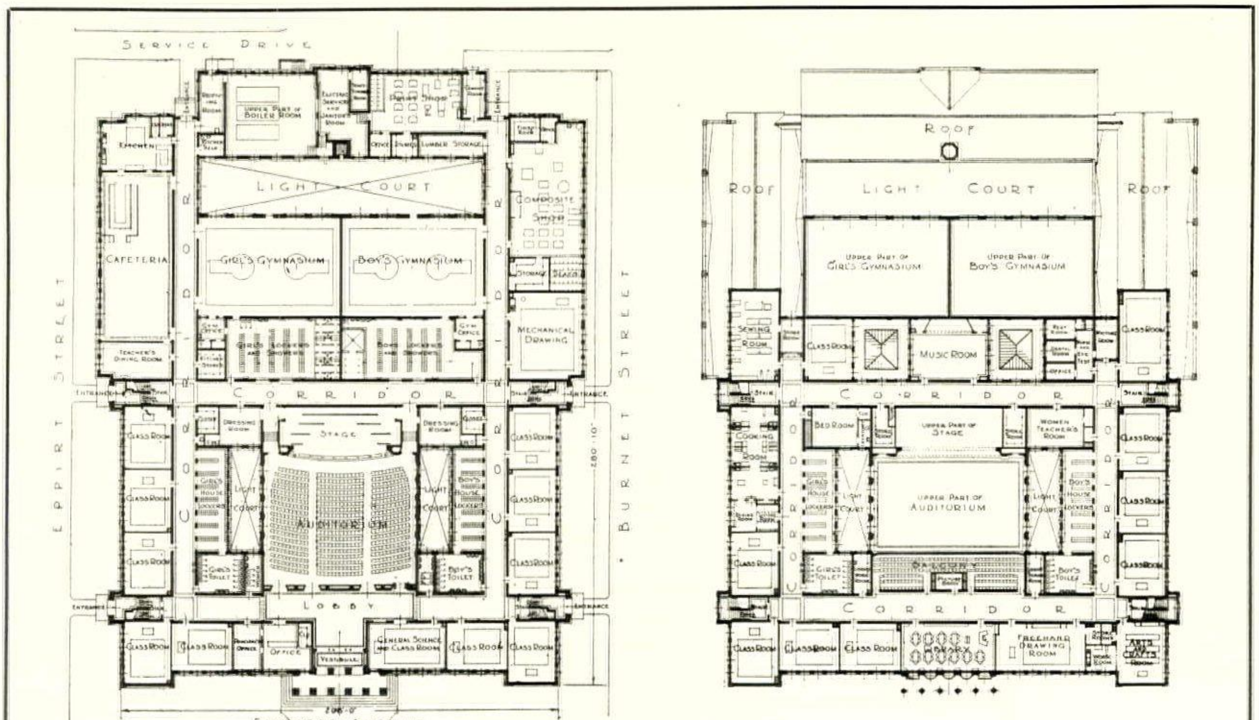
Richard Averill Smith

VERNON L. DAVEY JUNIOR HIGH SCHOOL, EAST ORANGE, N. J.

GUILBERT & BETELLE, ARCHITECTS

Richard Averill Smith

The school plant occupies an entire city block, the building itself being placed on one end, the remaining space being devoted to a playground which measures approximately 260 x 360 ft. The school is built of fireproof construction, with reinforced concrete foundations, brick walls, reinforced concrete floors and a timber trussed roof. The exterior is finished in dark red brick, with limestone trim and a green slate roof. The windows are double hung and are of wood painted white. The building was completed in 1930 for a student capacity of 800. It contains 1,600,000 cu. ft. and was erected at a total cost of $720,000, or a unit cost of 45 cents per cu. ft.



VERNON L. DAVEY JUNIOR HIGH SCHOOL, EAST ORANGE, N. J.

GUILBERT & BETELLE, ARCHITECTS

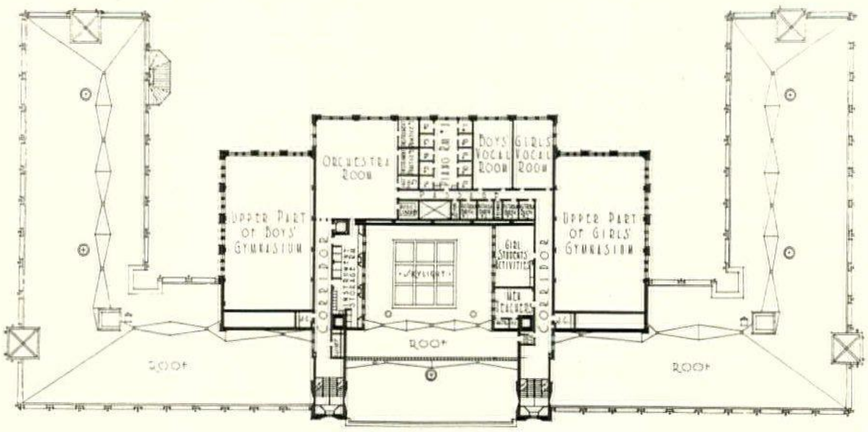
Ellison

THE KINDERGARTEN AND CONSERVATORY WING

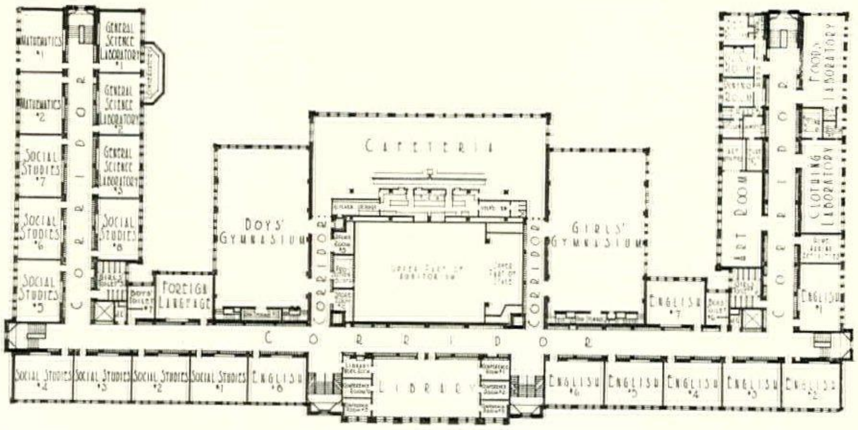
The building is of fireproof construction throughout, with reinforced concrete columns and beams in both exterior and interior walls, and concrete floors and roof slabs, and steel roof trusses. The exterior walls are orange colored brick, with limestone and polychrome terra cotta trim. Windows are of wood, double hung, and the roof is covered with a built-up asphalt roofing. Maple flooring is used for classrooms, terrazzo for corridors, cafeteria and kitchen, and linoleum tile for other areas. Corridors and toilet rooms have tile wainscoting; all interior wood finish color-lacquered birch. The ceilings of the auditorium, cafeteria, shops, natatorium, gymnasiums, speech and music department rooms are acoustically treated. A "split" heating system is used, radiators for heating and tempered air for ventilation, using oil for fuel. There are four zones of heating control. Total cost was $860,000, or 2,579,429 cu. ft. at 33 cents per cu. ft. The student capacity is 2,450

COPERNICUS JUNIOR HIGH SCHOOL, HAMTRAMCK, MICH

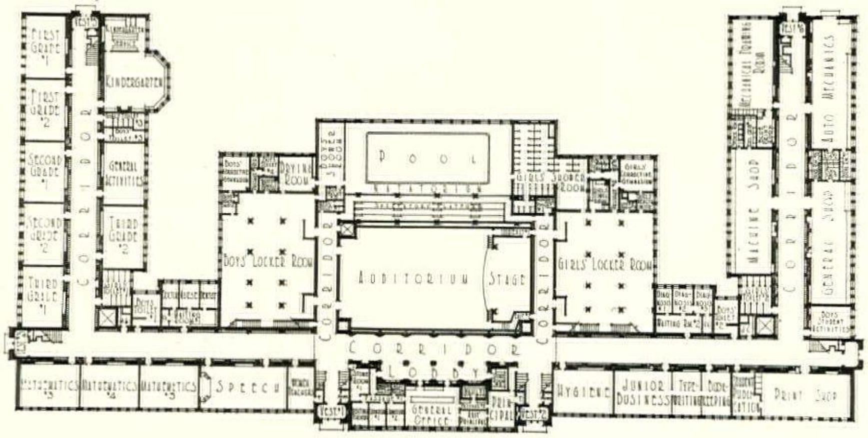
B. C. WETZEL & COMPANY, ARCHITECTS



THIRD FLOOR PLAN



SECOND FLOOR PLAN



FIRST FLOOR PLAN

COPERNICUS JUNIOR HIGH SCHOOL, HAMTRAMCK, MICH.

B. C. WETZEL & COMPANY, ARCHITECTS

Clarke

HAWTHORNE GRAMMAR SCHOOL, BEVERLY HILLS, CALIFORNIA
RALPH C. FLEWELLING, ARCHITECT

THIRTEEN ELEMENTARY SCHOOLS

Clarke

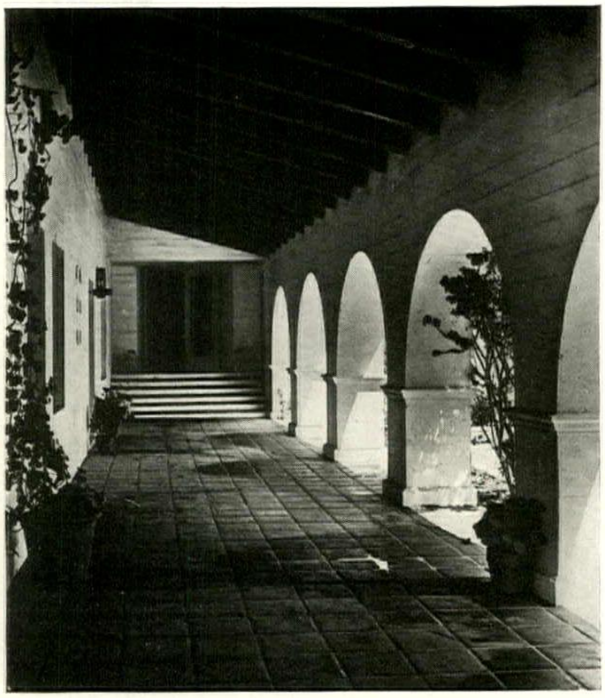
HAWTHORNE GRAMMAR SCHOOL, BEVERLY HILLS, CALIFORNIA

RALPH C. FLEWELLING, ARCHITECT

Clarke

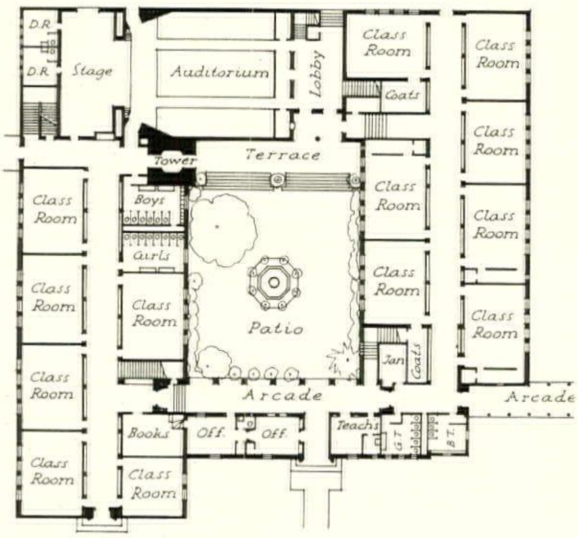
HAWTHORNE GRAMMAR SCHOOL, BEVERLY HILLS, CALIFORNIA

RALPH C. FLEWELLING, ARCHITECT

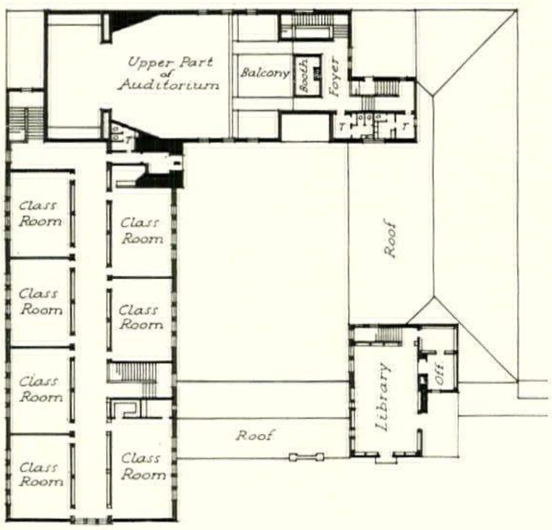


Clarke Photos

The exterior walls are of concrete with tufa stone trim. The roof is of red hand-finished tile. The wall surfaces are painted white and the window and door trim Colonial yellow. The interior walls are painted concrete. In the corridors, the ceilings are cement color, the walls oyster white, and the woodwork blue-green. Floors are of maple in the classrooms and quarry tile elsewhere. The structure was built with a reinforced concrete frame and filler walls to resist earthquake stress and contains insulation in the floor construction. It is heated by a gas-fired vacuum system with concealed radiation. Completed in 1929, the building contains 940,000 cu. ft. and cost 24 cents per cu. ft., or a total of $225,000



GROUND FLOOR PLAN



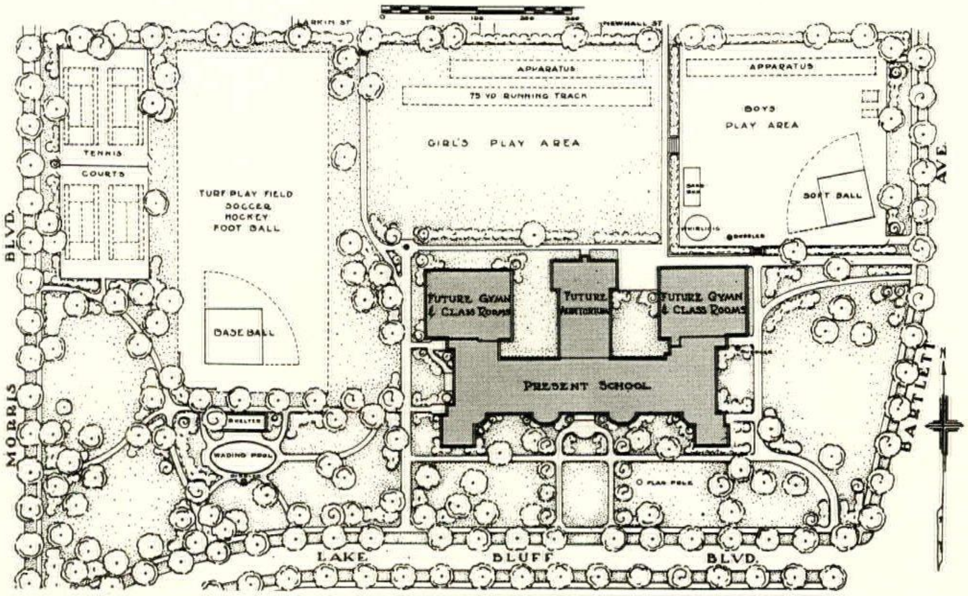
SECOND FLOOR PLAN

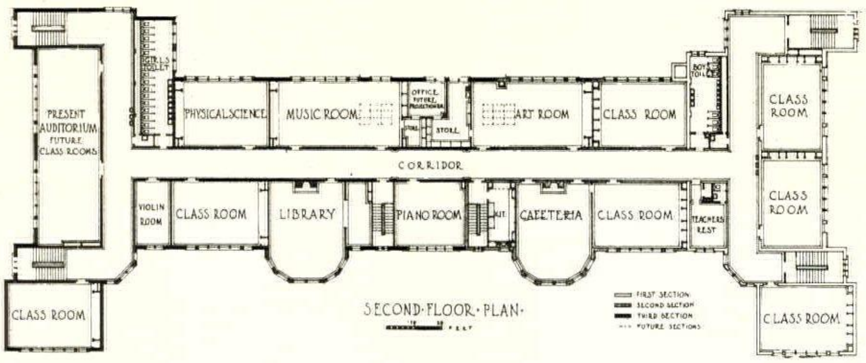
HAWTHORNE GRAMMAR SCHOOL, BEVERLY HILLS, CALIFORNIA

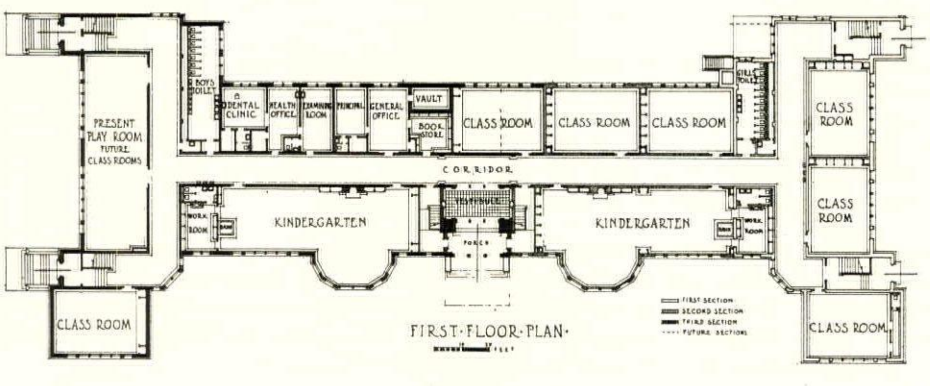
RALPH C. FLEWELLING, ARCHITECT

LAKE BLUFF GRADE SCHOOL, SHOREWOOD, WISCONSIN

ESCHWEILER & ESCHWEILER, ARCHITECTS

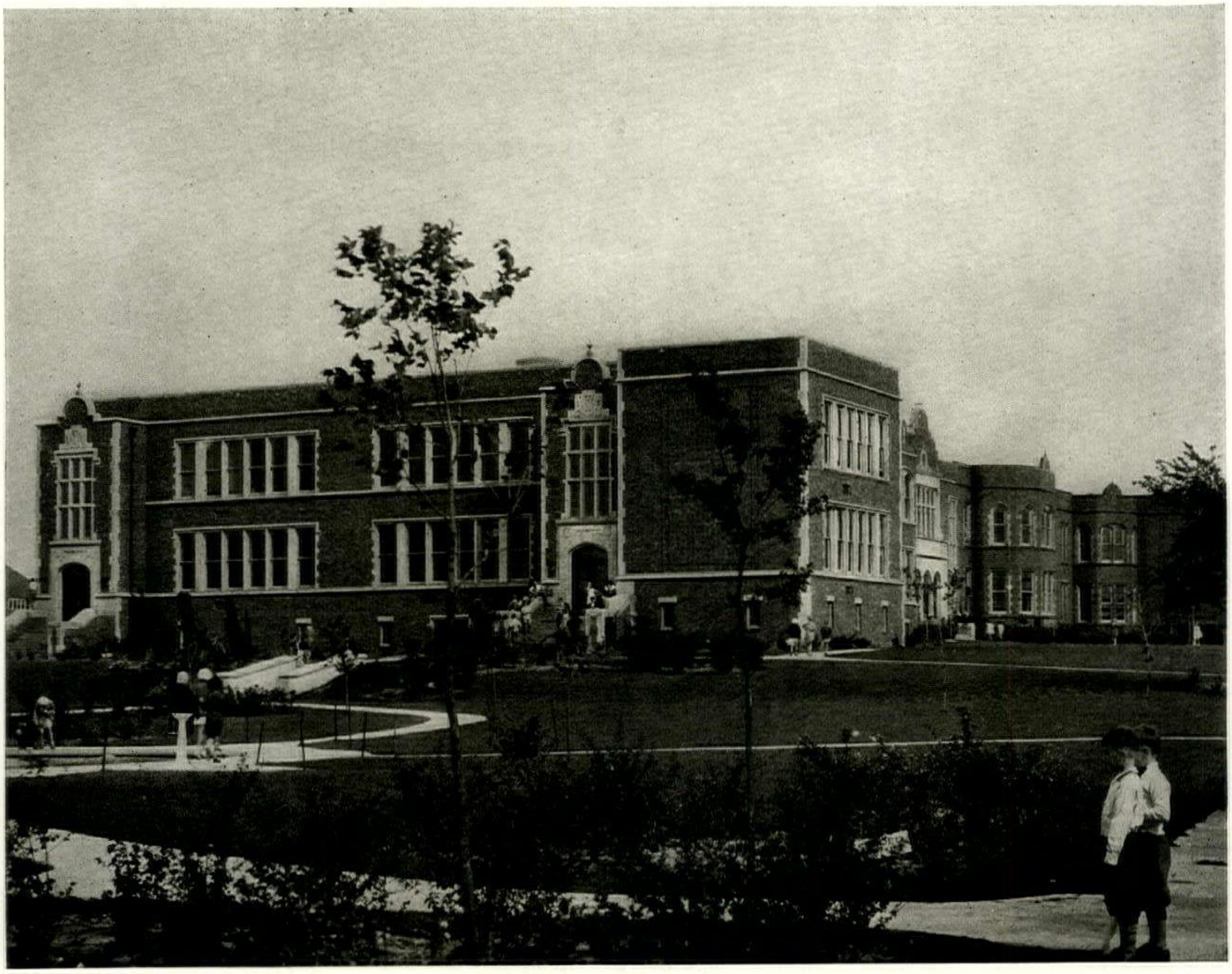






LAKE BLUFF GRADE SCHOOL, SHOREWOOD, WISCONSIN

ESCHWEILER & ESCHWEILER, ARCHITECTS



GENERAL VIEW OF THE SCHOOL

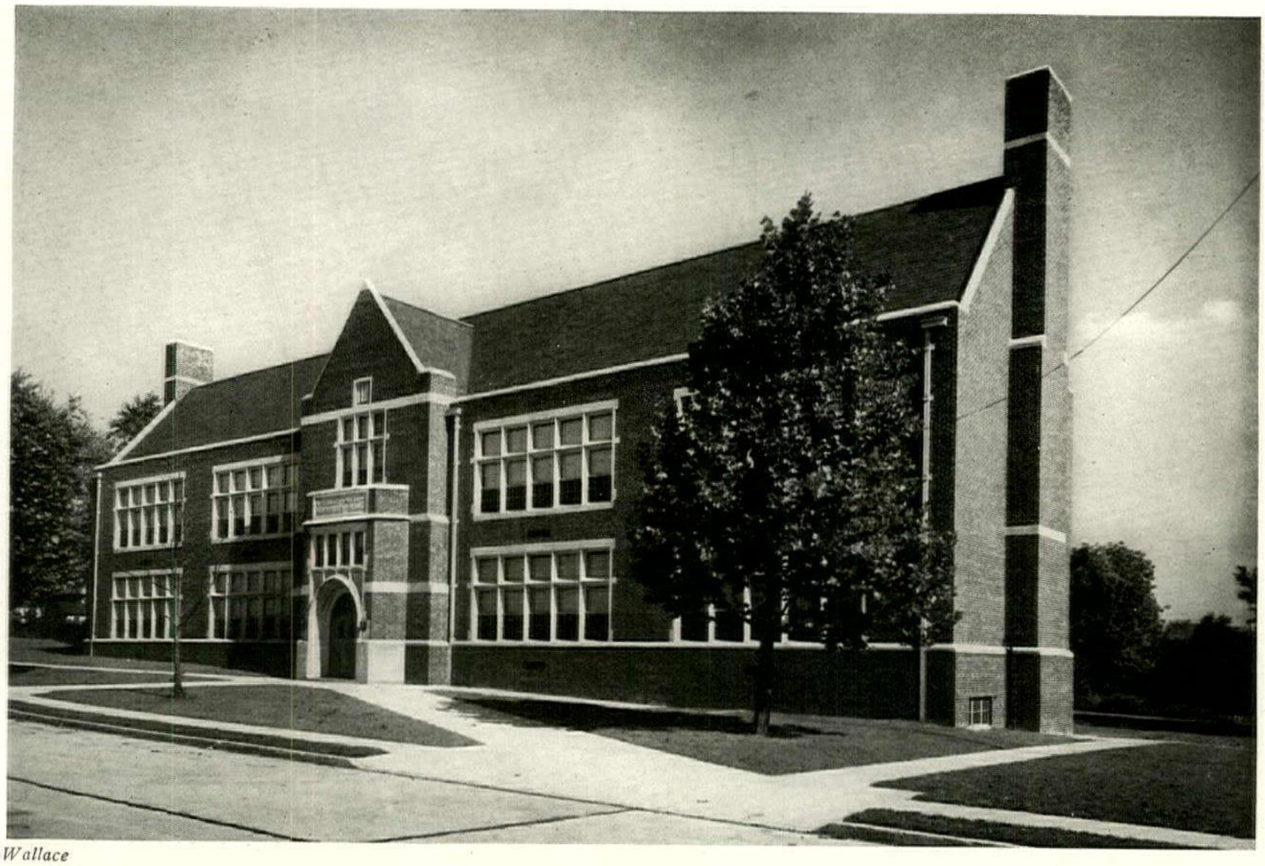
EXTERIOR: The walls are of variegated red brick with a yellow ochre joint, and limestone trim. Windows are generally of wood, double hung, but steel sash and leaded glass are used for windows in the entrance and stair halls. Roofing is of a high-grade double-ply built up type

INTERIOR: Walls are of colored sand float finish plaster, with oak trim, quarry tile stools, base and border. Blackboards are of natural slate. Special features of the interior design are the built-in wardrobes, and the faience tile basins and drinking fountain backs. All flooring is linoleum. The heating system is an oil-fired steam type, with concealed radiators; ventilation is supplied by unit ventilators, the air being filtered. Double tile walls and double glazing are a feature of the health suite

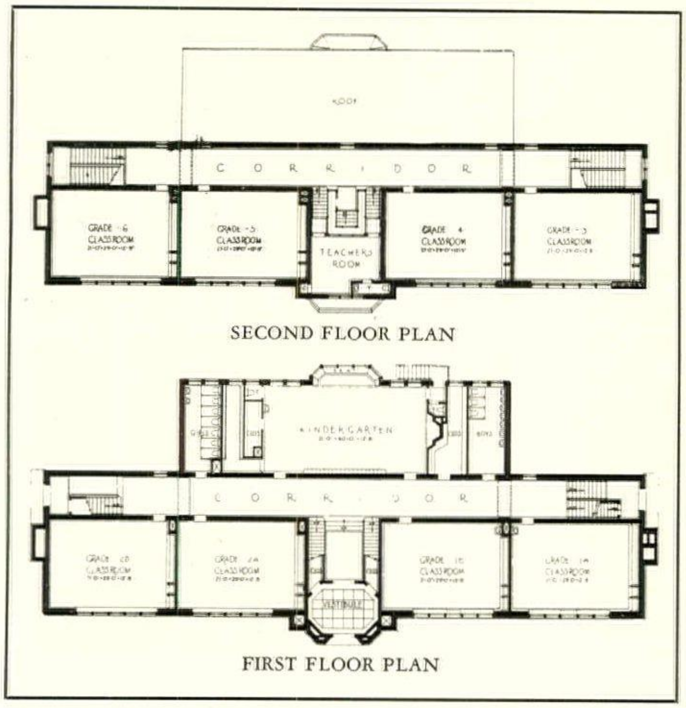
COST AND CONSTRUCTION: The building has a concrete frame, tile and concrete joist floors and brick and hollow tile walls; a gypsum tile system is used for the roof construction. The building was built in three sections, the latest being completed in August, 1930. The total cubage is 828,540 cu. ft., the average cost for all three sections being approximately 39.4 cents per cu. ft., or a total of $322,576

LAKE BLUFF GRADE SCHOOL, SHOREWOOD, WISCONSIN

ESCHWEILER & ESCHWEILER, ARCHITECTS



Wallace



SECOND FLOOR PLAN

FIRST FLOOR PLAN

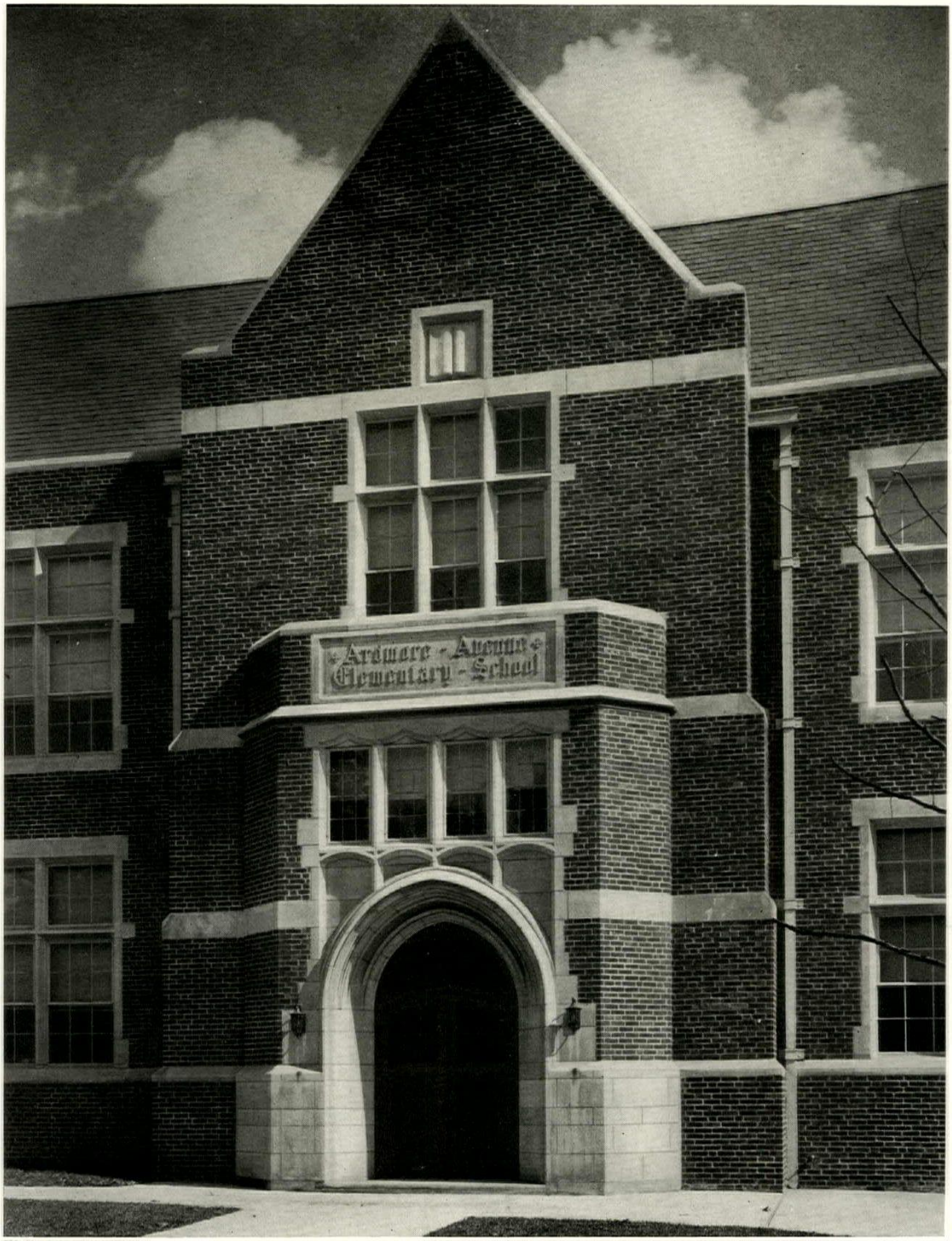
EXTERIOR: Walls are of red brick with light joints, and limestone trim. The windows are of the steel sash convertible type, and the roof is of slate

INTERIOR: Corridors and stairs have glazed brick wainscots; all walls are plastered, and all trim is of wood. Classroom floors are of maple, corridor floors of concrete. An oil-fired steam heating system is used, with unit ventilators in all classrooms

COST AND CONSTRUCTION: The building is of semi-fireproof construction, having wood joists and floors, except in corridors and stair halls. These and the floors over boiler room are of concrete. The building, completed in February, 1931, contains 265,000 cu. ft. and cost $83,000 or 31.33 cents per cu. ft.

ARDMORE AVENUE ELEMENTARY SCHOOL, LANSDOWNE, PA.

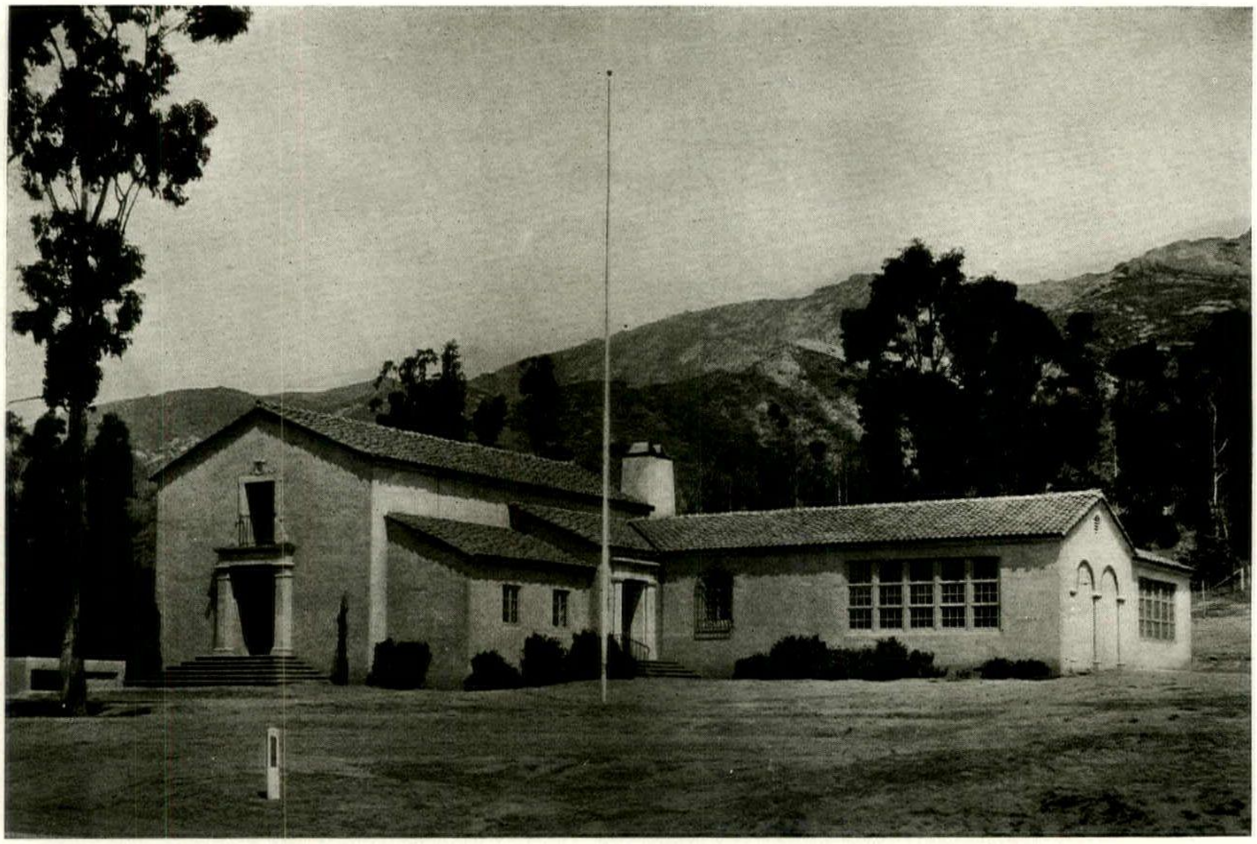
CLARENCE W. BRAZER, ARCHITECT

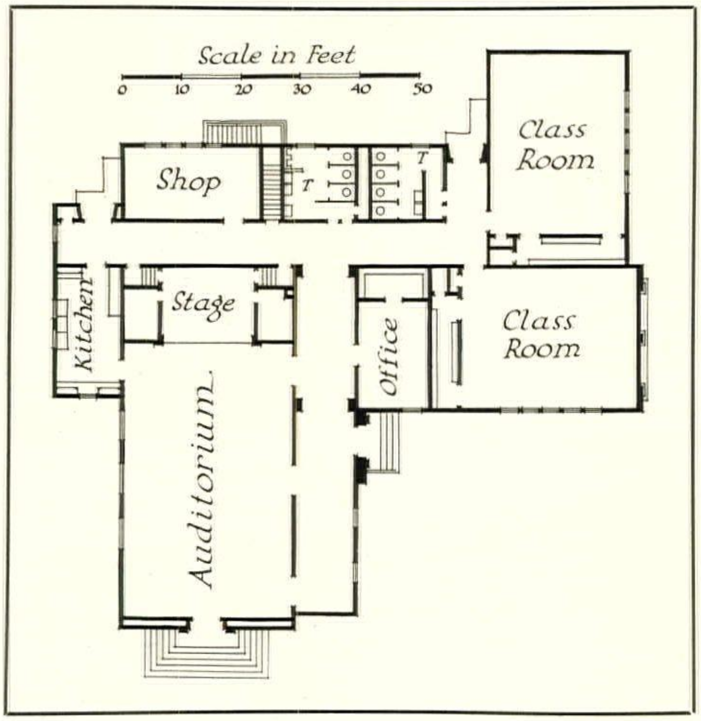


Wallace

ARDMORE AVENUE ELEMENTARY SCHOOL, LANSDOWNE, PA.

CLARENCE W. BRAZER, ARCHITECT





GENERAL: This school is an example of a building in a small rural community which has been designed to serve as a meeting place and recreation center for the members of the community in addition to its educational facilities

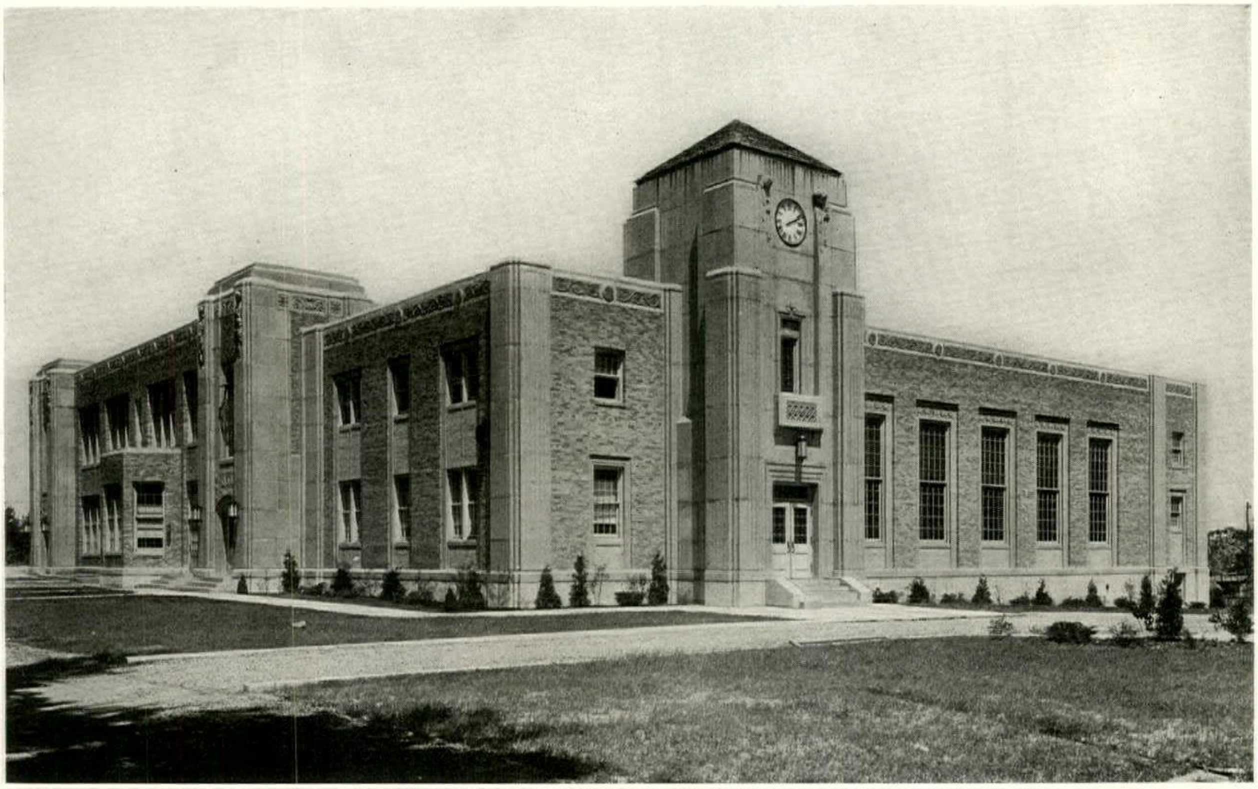
DESIGN AND CONSTRUCTION: The exterior has been finished in a smooth, cream colored stucco trimmed with cast stone and wrought iron. The roof is of red clay tile. Windows throughout are of steel of the three-section awning type. The structure is of class "D" construction, built with frame walls and floors on a concrete foundation. The interior walls are of smooth finished plaster and the floors throughout are of maple. Heat is supplied by a hot air recirculating system. The building contains 144,366 cu. ft. and cost 16.7 cents per cu. ft., or a total of $24,220

VISTA DEL MAR SCHOOL, GAVIOTA, CALIFORNIA

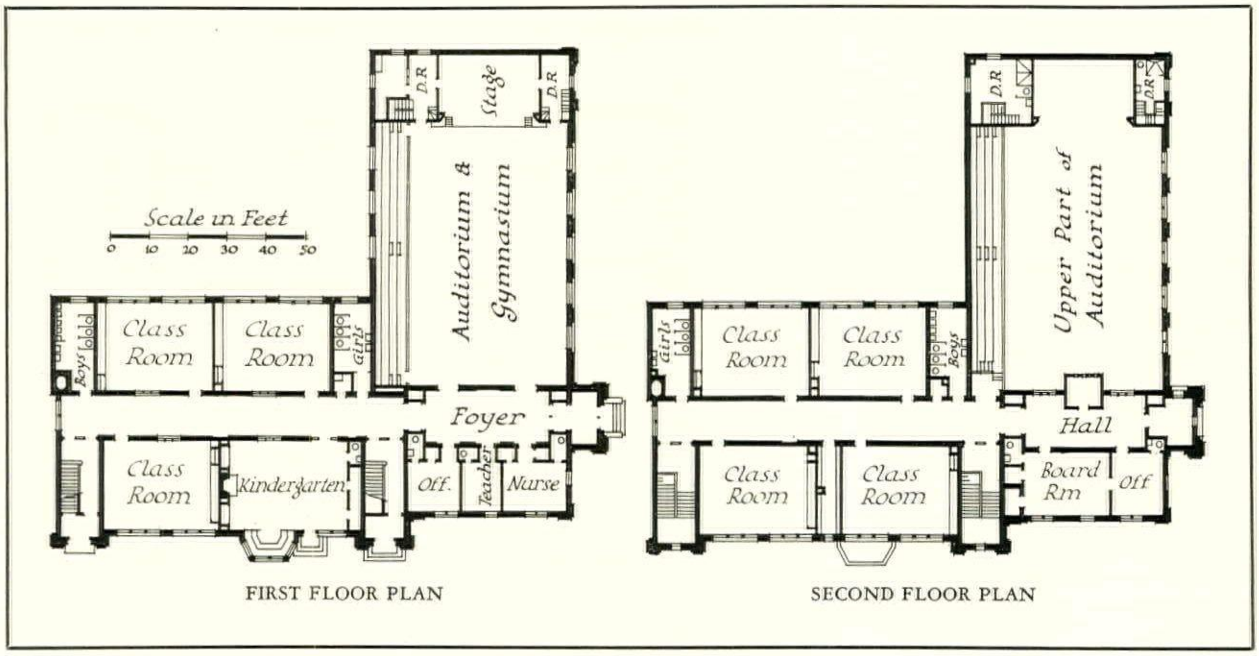
LOUIS N. CRAWFORD, ARCHITECT

JOHN HILL SCHOOL, BOONTON, NEW JERSEY

HACKER & HACKER, ARCHITECTS

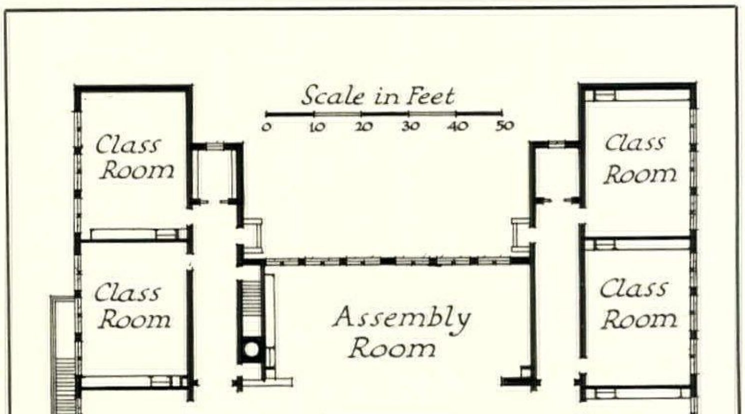


The walls are of orange-brown brick, trimmed with cut caststone, with a terra cotta frieze in colors at the parapet. Interior walls have brick wainscoting, and textured acoustical finishes in special rooms. Corridor and toilet floors are terrazzo. A split heating system is used. Cu. ft. cost, 37.4 cents



JOHN HILL SCHOOL, BOONTON, NEW JERSEY

HACKER & HACKER, ARCHITECTS



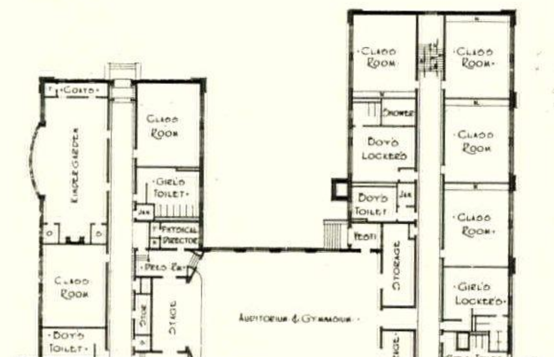
Exterior wall surface of central section is tooled buff stucco, the wings being red brick; all trim is cut caststone, and the roof is of tile. Interior walls are smooth finish plaster, with red brick wainscoting, and chestnut trim stained. Terrazzo and linoleum are used for the floors. Folding partitions separate two class units, which form assembly room. Heating is supplied by a vapor-vacuum system, and ventilation by unit ventilators. Cost per cu. ft. was 37.3 cents

BRYANT SCHOOL, TEANECK, NEW JERSEY

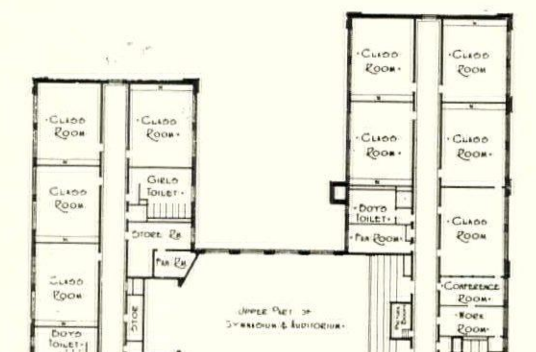
HACKER & HACKER, ARCHITECTS

Crawford

The building is of reinforced concrete construction on a concrete foundation; the roof is formed of precast concrete blocks. Exterior walls are of tan brick with buff stone trim; interior walls have sand float finish surfaces. Floors are double maple. The walls of the auditorium are acoustically treated, and the roof is insulated with 1 in. celotex. The building has a vapor steam heating system, and a central fan ventilating system. Completed in 1931, the total cost was $384,425, or 33.4 cents per cu. ft. for a cubage of 1,150,000 cu. ft.



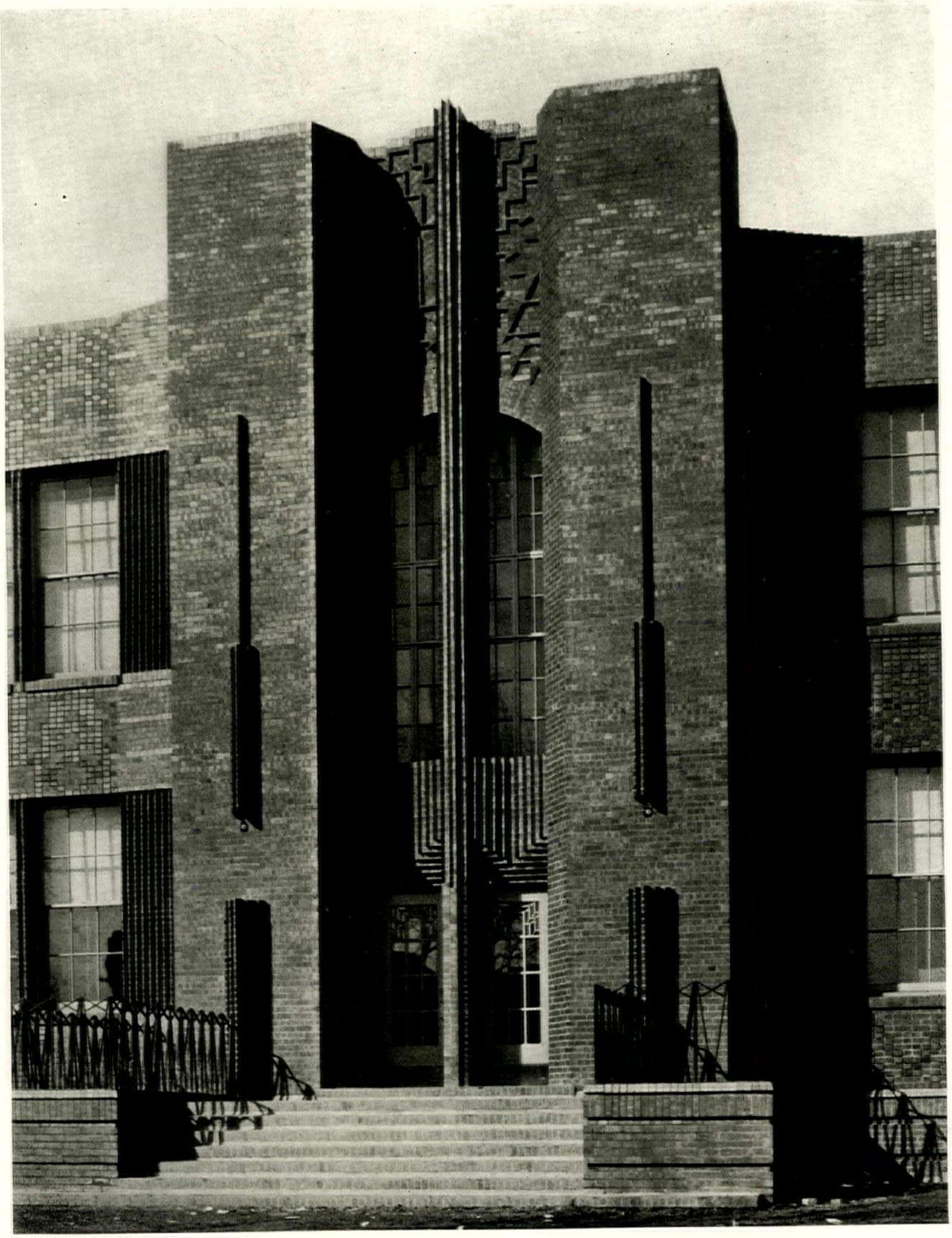
FIRST FLOOR PLAN



SECOND FLOOR PLAN

FRAZER SCHOOL, SYRACUSE, N. Y.

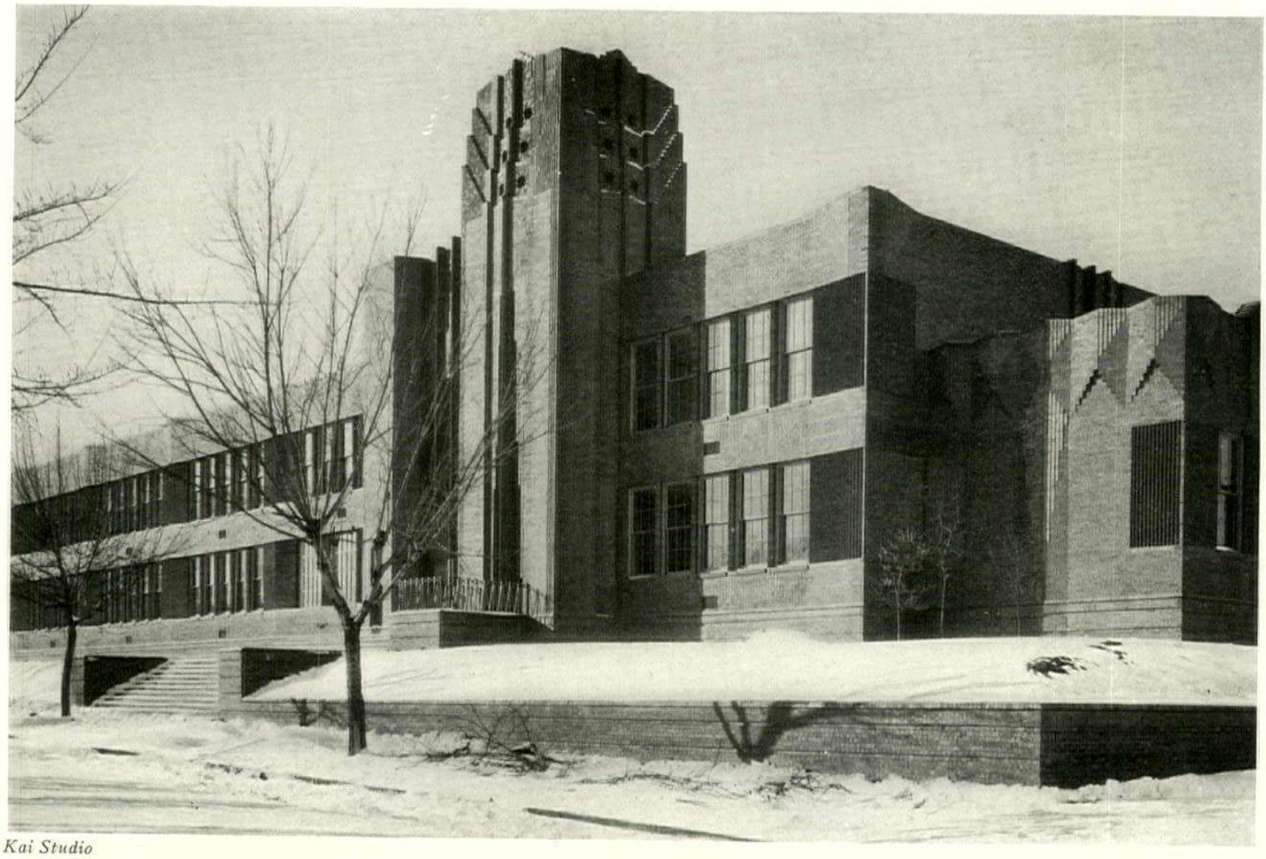
RANDALL & VEDDER, ARCHITECTS



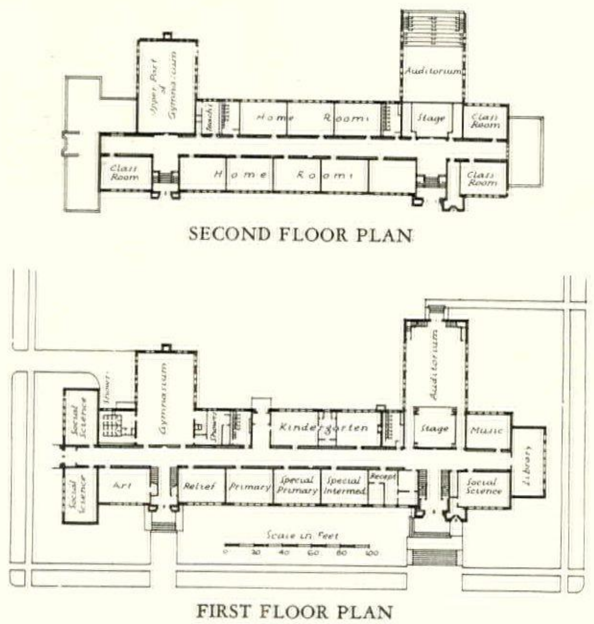
Kai Studio

BRYANT-WEBSTER SCHOOL, DENVER, COLORADO

G. MEREDITH MUSICK, ARCHITECT



Kai Studio



SECOND FLOOR PLAN

FIRST FLOOR PLAN

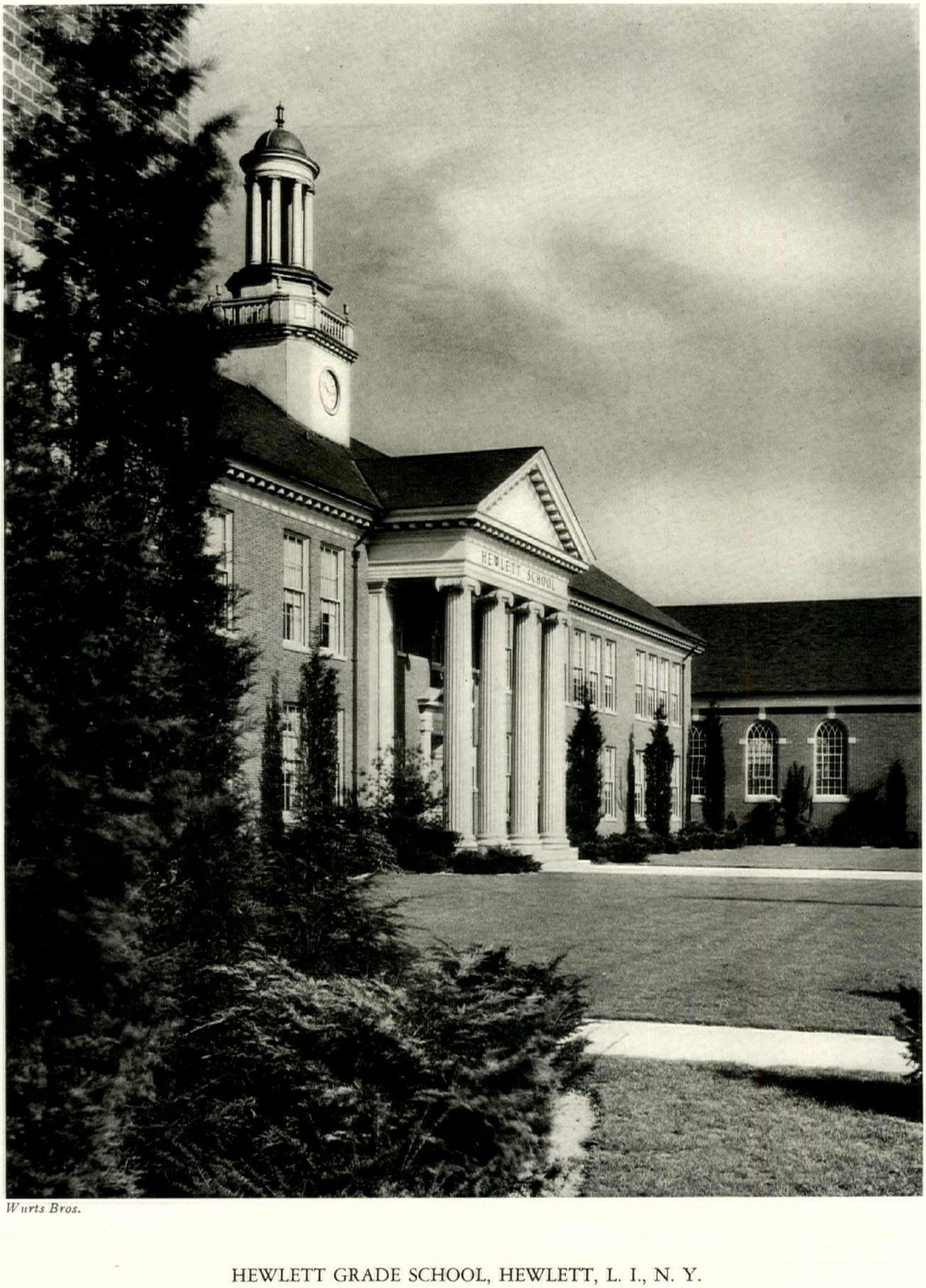
EXTERIOR: The special brick patterns and shapes, inspired by Southwest Indian motifs, are worked out in common brick, ranging from red to brown in color. Classroom windows are of wood, double hung, and are grouped in units of five separate frames with 8 in. shadowless masonry mullions. The roofing is a composition material over wood sheathing

INTERIOR: Floors are maple over wood joists. Walls are generally smooth finish plaster. The corridor wainscoting and the gymnasium walls are of glazed brick. All trim is Michigan birch. A split heating system is used, with unit ventilators, and forced air and direct radiation. Toilet, showers, auditorium, and gymnasium are air conditioned

COST AND CONSTRUCTION: The building is of Class B construction, and rests on a concrete foundation. With a gross cubage of 967,000 cu. ft., at a cu. ft. cost of 24.7 cents, the total cost of the building was $239,190

BRYANT-WEBSTER SCHOOL, DENVER, COLORADO

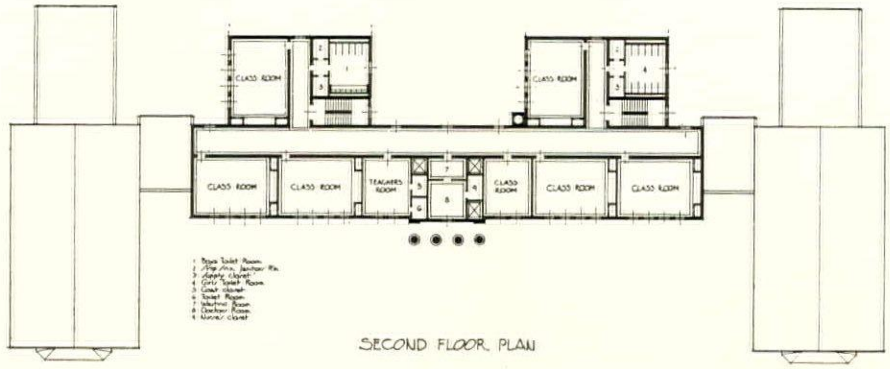
G. MEREDITH MUSICK, ARCHITECT

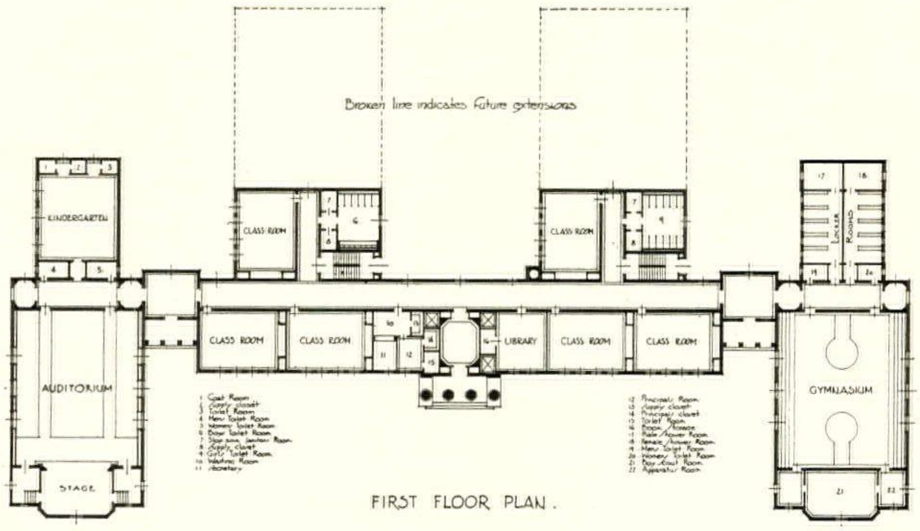


Wurts Bros.

HEWLETT GRADE SCHOOL, HEWLETT, L. I., N. Y.

LAWRENCE J. LINCOLN, ARCHITECT





EXTERIOR: The walls are shale brick in a range of reds and browns. The columns, cornice, double hung windows and tower are of wood painted white. The roof is a mixture of oxford gray and black slate

INTERIOR: Vestibule floors are of terrazzo, corridors and lobbies linotile blocks, classrooms maple, gymnasium wood blocks, all others linoleum. Walls, generally of plaster painted white, are brick in the gymnasium. Classroom trim is of birch. Toilet rooms are lined with buff-colored tile, capped with a black band; the stalls are of Tennessee marble. The heating system is steam, vacuum return, and ventilation is supplied by a central fan system, the cupola being used for fresh air intake. Kindergarten and gymnasium are separately ventilated by unit ventilators

COST AND CONSTRUCTION: The gymnasium and auditorium units, all corridors, stairs, and toilet rooms are fireproof; the classroom floors are wood framed. Total cost, $315,000, with a cubage of 900,000 cu. ft., at a cost of 35 cents per cu. ft.

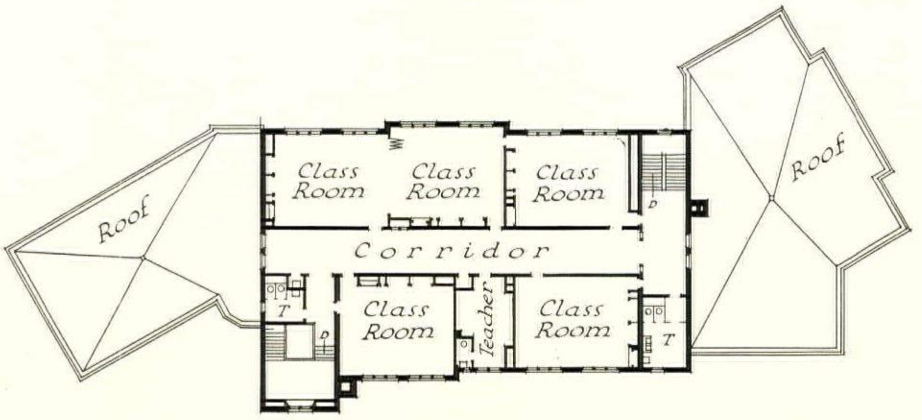
HEWLETT GRADE SCHOOL, HEWLETT, L. I., N. Y.

LAWRENCE J. LINCOLN, ARCHITECT

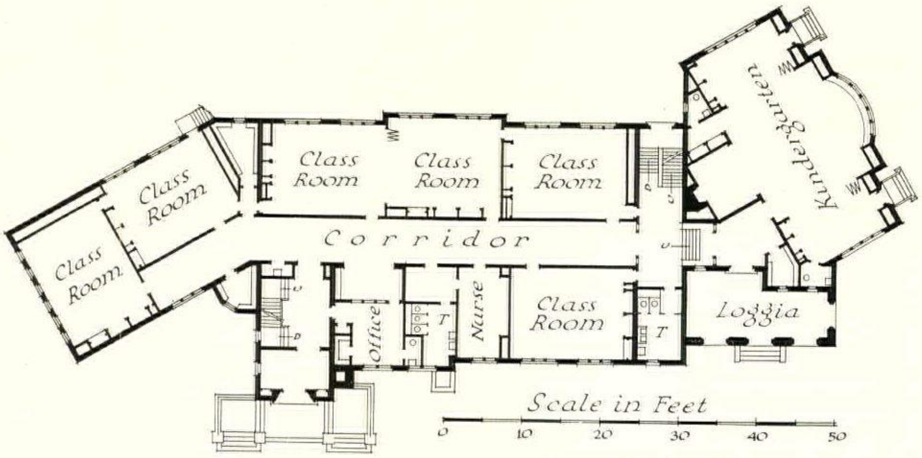
The building is located in a residential community and the design was chosen to harmonize with the surrounding buildings. The kindergarten unit is completely isolated, with separate entrances, toilets, etc. Exterior walls are of red waterstruck brick, with stone trim. The pitched roof is of slate, the flat roofs of tar and gravel. The interior walls are generally smooth plaster with metal trim. Corridor floors are terrazzo, others linoleum and granolithic. The building is of fireproof construction, employing junior steel beams and tie rods. The gross cubage is 505,954 cu. ft., and the gross cost was $234,099.31 cents, at 46.3 cents per cu. ft.

JOHN WARD SCHOOL, CHESTNUT HILL, NEWTON, MASS.

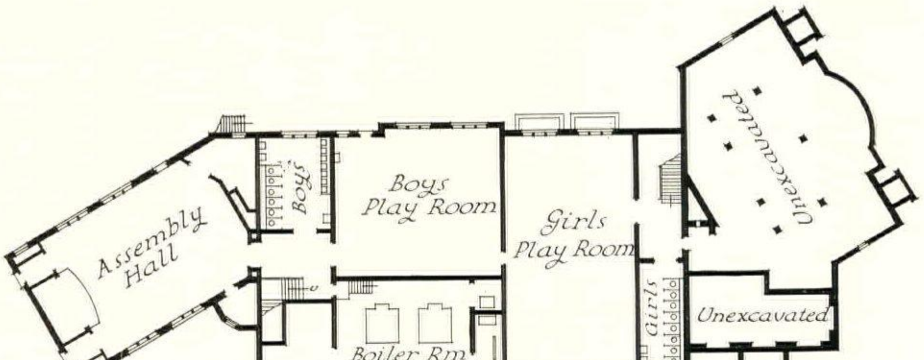
JAMES H. RITCHIE & ASSOCIATES, ARCHITECTS



SECOND FLOOR PLAN



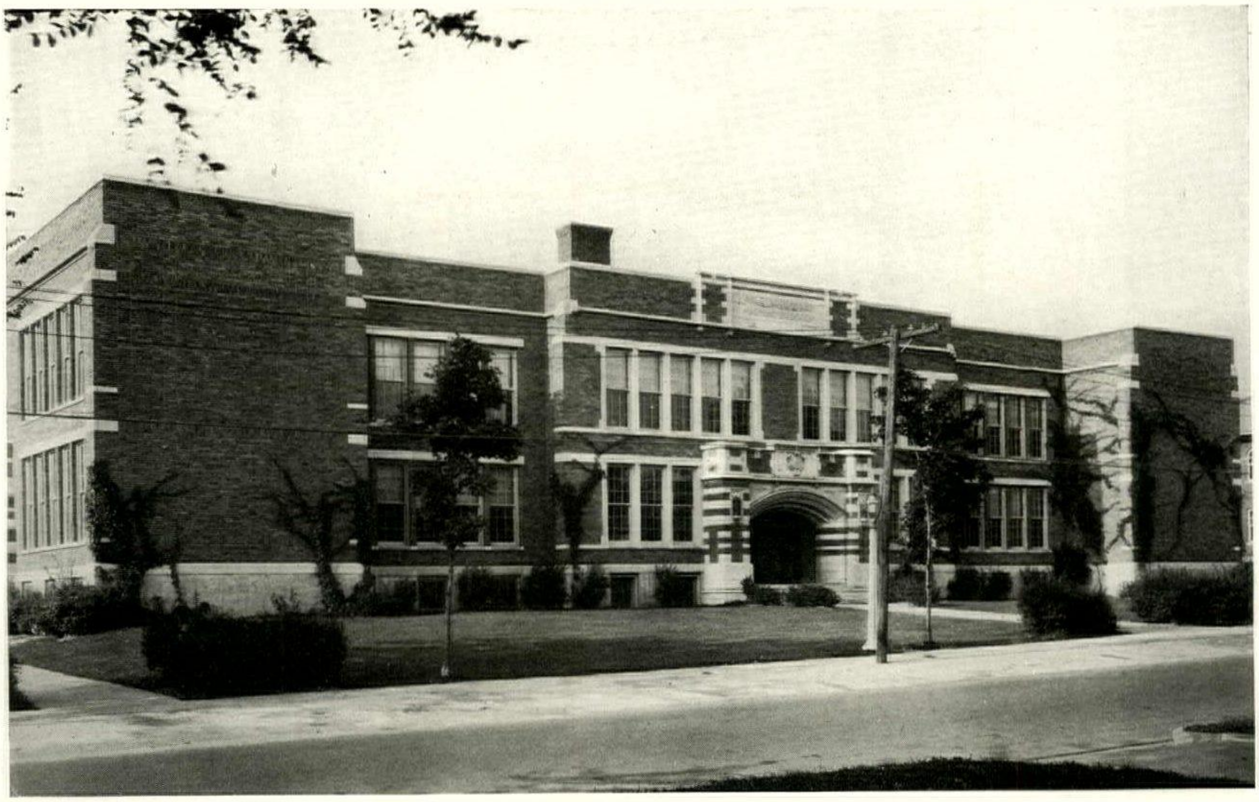
FIRST FLOOR PLAN



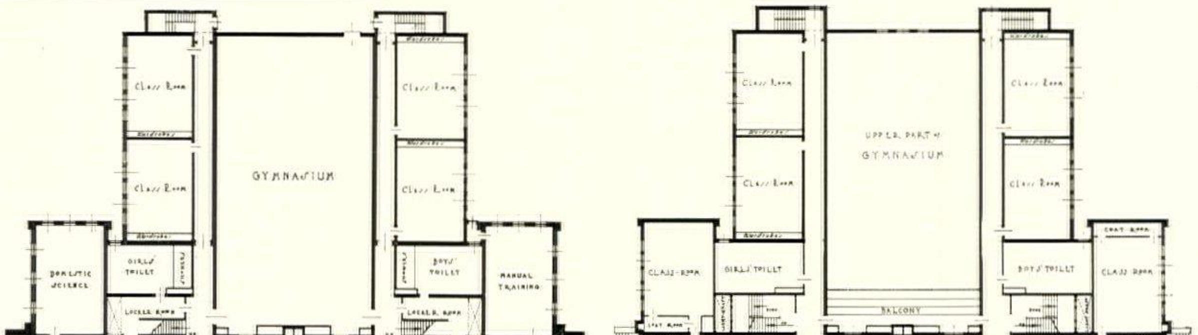
BASEMENT FLOOR PLAN

JOHN WARD SCHOOL, CHESTNUT HILL, NEWTON, MASS.

JAMES H. RITCHIE & ASSOCIATES, ARCHITECTS



The exterior is finished in variegated gray brick with cut caststone trim. The interiors are of sand finish plaster with wood trim. The building was built in two parts, the first containing 16 classrooms, a gymnasium, and administration space. The addition consisted of 12 additional rooms with the necessary corridors and stairways. It is interesting to note that the original building contained all the rough plumbing for both parts. The building is of fireproof construction throughout with reinforced concrete floors and bearing walls of tile and face brick. The cost of the original structure was 27.4 cents per cu. ft.; that of the completed structure 29 cents per cu. ft.; the total cost being $270,000

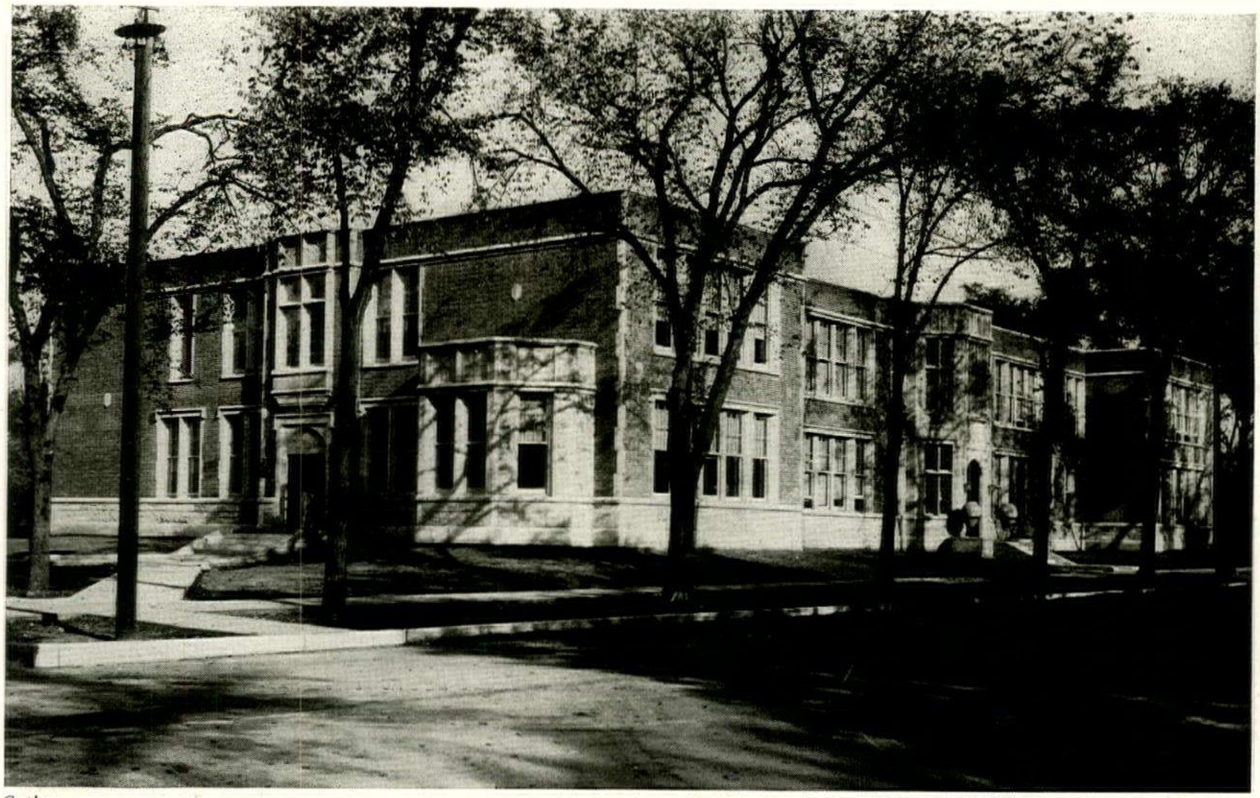


BASEMENT FLOOR PLAN

FIRST FLOOR PLAN

EAST ROCHESTER GRADE SCHOOL, EAST ROCHESTER, N. Y.

O. W. & H. B. DRYER, ARCHITECTS



Cutler

EXTERIOR: The red brick walls are trimmed with local travertine, and the roofing is of the built-up asphalt type. Windows have double hung wood sash

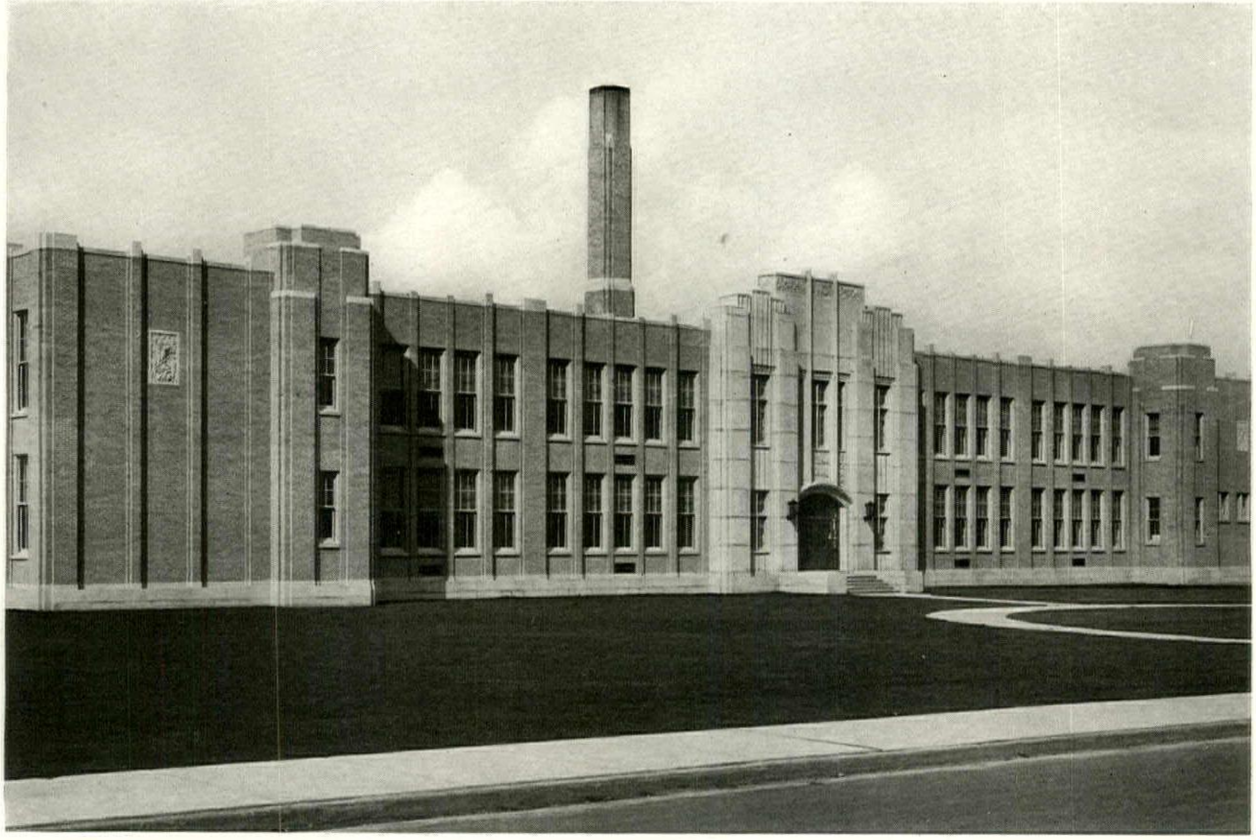
INTERIOR: Floors throughout are of terrazzo, except in the classrooms which are of maple. Walls are of smooth finished plaster with tile wainscoting in the corridors and toilet rooms. The building is wired so that all classrooms may receive radio programs, and so that the principal may speak to all rooms at once. A vacuum steam heating system is used, with wall hung radiators and automatic temperature controls. A central fan system supplies washed air to all rooms

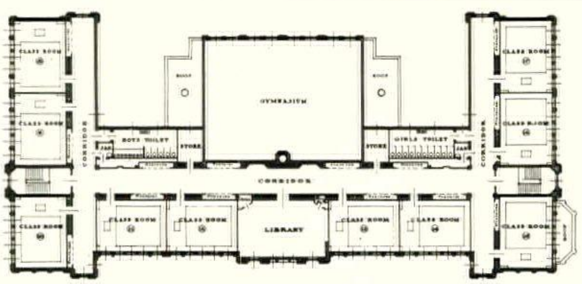
COST AND CONSTRUCTION: The building is of fireproof construction, with brick and tile walls and concrete joist floor construction. It contains 530,000 cu. ft., and at 31.6 cents per cu. ft., cost $167,000

CENTRAL GRADE SCHOOL, WINONA, MINNESOTA

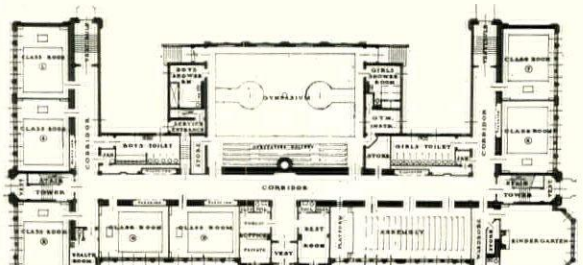
BOYUM, SCHUBERT & SORENSEN, ARCHITECTS

CENTRAL GRADE SCHOOL, WINONA, MINNESOTA
BOYUM, SCHUBERT & SORENSEN, ARCHITECTS





SECOND FLOOR PLAN



FIRST FLOOR PLAN

Except for the steel joist roof frame, the building is constructed entirely of reinforced concrete frame with face brick and back up tile curtain walls. The exterior is finished with matt texture gray brick with cut caststone trim. Windows are double hung throughout except those in the gymnasium which are of the steel projection type. The corridors have floors of linoleum with a terrazzo base and border, a wainscot of painted Keene's cement and smooth finished painted plaster walls and ceilings. Classrooms have maple floors, oak trim, and smooth finish plaster walls and ceilings. The floors in the office, kindergarten and rest rooms are linoleum. The flooring in the gymnasium is maple; the walls are of brick and the ceiling is of plaster with an acoustic treatment. Heating is by a low pressure steam system with an automatic control. The building is ventilated with unit ventilators and gymnasium shower rooms. The building contains 662,500 cu. ft. and cost 37 cents per cu. ft., or a total of $245,645

JEFFERSON SCHOOL, ERIE, PENNSYLVANIA

MEYERS & JOHNSON, ARCHITECTS

IDEAS FROM EUROPEAN SCHOOLS

American supremacy in many departments of school planning is recognized. From Europe, however, may be learned something regarding the uses of unusual materials to produce lighter, more airy, and more economical buildings. In this article are described several interesting innovations that have local application

BY

FREDERICK J. WOODBRIDGE

OF EVANS, MOORE & WOODBRIDGE, ARCHITECTS

WHY should American architects study modern European schools? There are, of course, various answers. We have been told that historic styles must express function, and that modern schools should be housed in new architecture expressive of modern educational ideas. Such conclusions might be drawn from certain examples, but I believe there are more important and fundamental lessons to be learned.

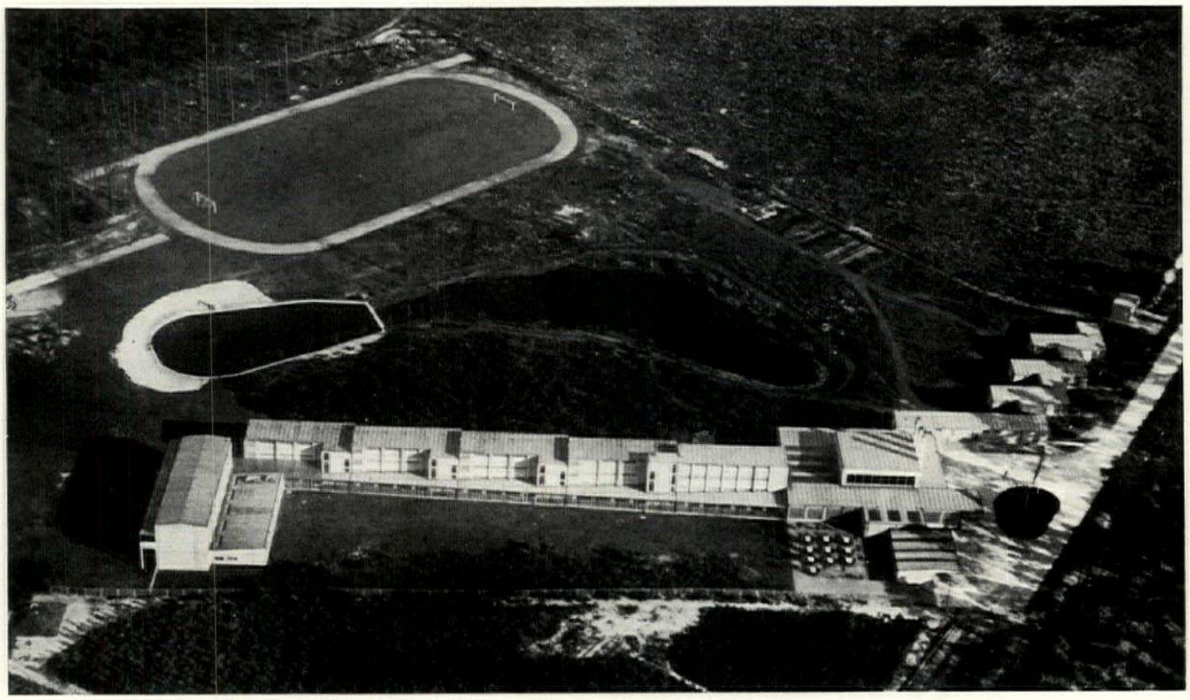
During a recent three months' survey of European schools it was my good fortune to be received in the municipal architects offices in Berlin, Dresden, Frankfort-on-Main, and Hamburg, in Germany, and Hilversum, in Holland. In these offices there was none of the familiar patter about form and function, and no wholesale condemnation of traditional design. Instead there was an atmosphere of earnest effort and careful study. This is brought about by necessity. Limited appropriations have forced upon most of the city architects as the primary consideration the most rigid economy. The character of nearly all the new schools of Germany is due directly or indirectly to economic stricture. Poverty has been a challenge, and it is from the way the challenge has been met that we can learn most.

The abandoning of traditional styles has not been due so much to an iconoclastic spirit of revolt as to the inadequacy of those styles for a practical solution of many present-day problems. Furthermore time-honored architectural forms have proved to be simply an unjustifiable extravagance. Under the pressure of having to get the best possible building for the least money, attention has been focused on the essential requirements of each problem and in every department of design fresh solutions have resulted.

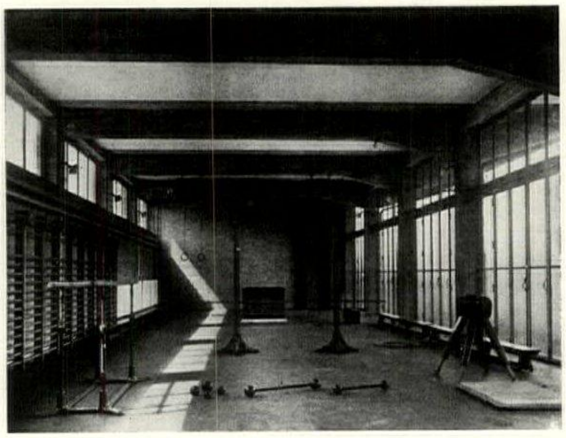
Judging from conversation with such men as Dr. Paul Wolfe of Dresden, Professor Martin Elsaesser of Frankfort, and William Dudok of Hilversum, and from dozens of schools actually visited the vital factors, divided for convenience under three headings, seem to be: first, the plan, in a three-dimensional sense, with careful consideration of the site and proper orientation of every part; second, simple, straightforward construction and the effective use of materials; third, the elimination of everything (particularly ornament and architectural forms) at all superfluous.

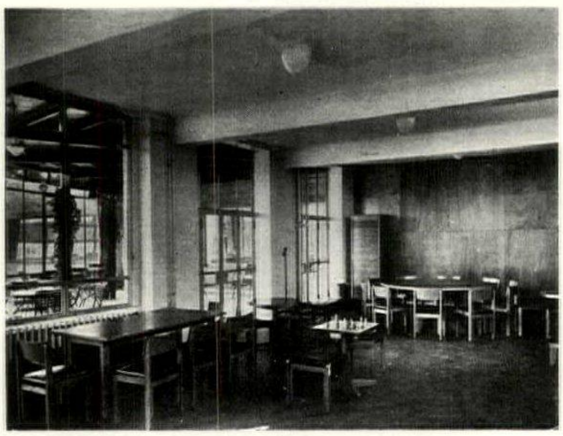
Orientation, Plan and Composition. At first glance the size and spaciousness of many of the new schools present a contradiction to many obvious measures of economy. The corridors are generally much wider, the stair halls more spacious and airy, and the rooms themselves larger than is usual in American institutions. A critical analysis, however, shows that this characteristic is not an extravagance but an important and practical factor of the buildings. The plans have been laid out with strict regard for the contour and surroundings of the site, for the absolute maximum of air and sunlight consistent with individual working conditions and for producing masses that by their very shapes and combinations will make the naked structure handsome. The elements of the exterior design are kept simple, and much is accomplished by clever fenestration. The large glass areas required to obtain the desired light and air are combined in powerful patterns. Corridor windows are composed in long horizontal lines and stair towers are often made entirely of glass and metal.

The generous sizes of halls and rooms makes circulation easy and rapid. When possible, special rooms are made to do double service. Gymnasiums are often subdivided and used as assembly halls; balconies may be used as music rooms and stages as drawing rooms, etc. Whenever possible, classrooms are confined to one side of a corridor so that each room gets the best available exposure. A development of this idea has resulted in the pavilion type of plan in which classrooms are located in wings all facing the same direction.



The Bundesschule, Bernau-Berlin, for which Hannes Meyer was the architect, is characterized by originality in plan, design, and construction. Above is an air view of the school plant. Below are two pictures of the interior, the one at the top being the gymnasium and the other a recreation room. The design is based chiefly on the problems of light and air and "one feels that he is separated from outdoors by the thinnest possible film of structure"





Construction and Materials. With a few exceptions the actual construction of European schools is surprisingly conservative. The majority of them have solid masonry bearing walls both exterior and interior; the floor construction is reinforced concrete slab or concrete and tile. When a skeleton is used it is of reinforced concrete. Steel framing is rare because it is more expensive than any of the other methods. The fact that labor is still so cheap abroad practically reverses conditions so that what is cheap in America is costly in Europe, and vice versa. In a few extreme cases a reinforced concrete frame is used with cantilevered floor slabs and walls chiefly of metal and glass. The effect is of the ideal open-air school with walls merely adjustable screens to create comfortable interiors.

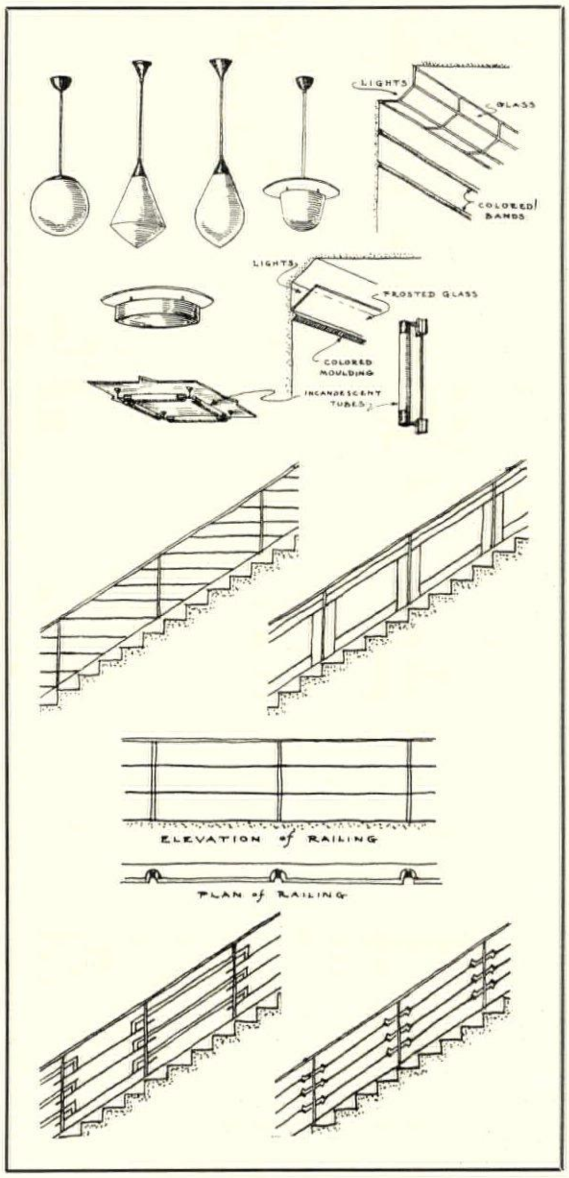
The exterior surfaces are generally of brick or stucco, and occasionally of large, square, yellow tile. The stucco is frequently colored, sometimes with strong deep tones. Reds and blues and black have successfully withstood the weather for years, even in a climate very little milder than ours. All the brickwork shows careful workmanship and understanding of the medium. In certain examples the bricks themselves are dark and gloomy or harsh in color, making the building either grim or brutal, but in Holland and Sweden the bricks are warm and mellow and of a considerable range of color and size.

Aesthetic Economy and Elimination of Non-Essentials. The utter simplicity, and in some cases the barrenness of both exteriors and interiors, is the most obvious visual effect of the economy practiced by European architects. Cornices, columns, and arcades have almost entirely disappeared. Any kind of ornament is rare, yet many of the schools are quite charming. It has been indicated that much attention is paid to line, mass, and proportion, to generous spaces, light and air, and to building materials. This has produced fundamentally sound designs. Their principal embellishment is a striking use of color. The metal or woodwork of doors and windows is painted brilliantly in primary colors. Classroom doors are usually of the flush panel hospital type and are often "Ducoed" vermilion, ultramarine, seagreen, magenta, or canary yellow, and have transparent celluloid or aluminum push and kick plates. The reveals of doors and windows are painted a harmonizing or strong contrasting color, sometimes set off by a narrow silvered strip of metal frame. Interiors are usually of light tones. Sometimes the same room will have walls of different colors, warmer tones on shaded walls and cooler on those in the sunshine. Occasionally frescoed maps or simple pictures and more rarely a relief or small piece of sculpture is used as further adornment.

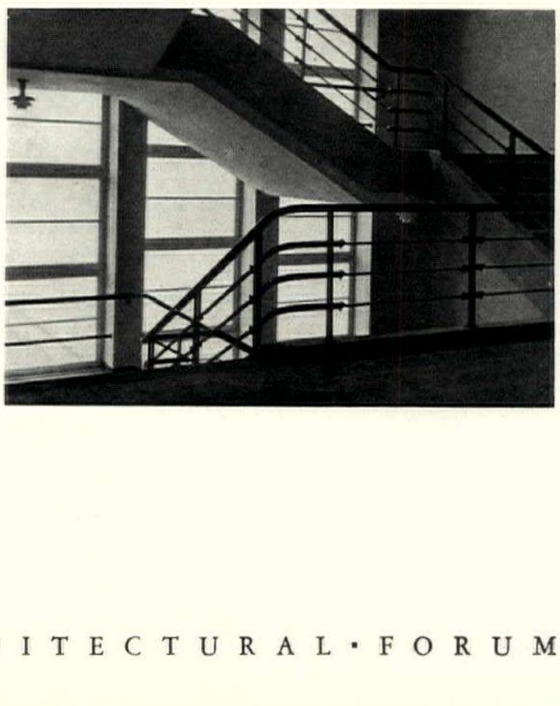
Accentuating the necessary elements of the buildings and their equipment is thus the chief means of decorating. This is notably evident in the stair halls which are among the chief features of continental schools. These glass-enclosed towers with brightly painted metal work and lively play of light and shadow over slanting runs and patterned rails give a strong impression of health and cheer. The railings themselves of painted iron or iron and brass show much variety achieved with simple elements.

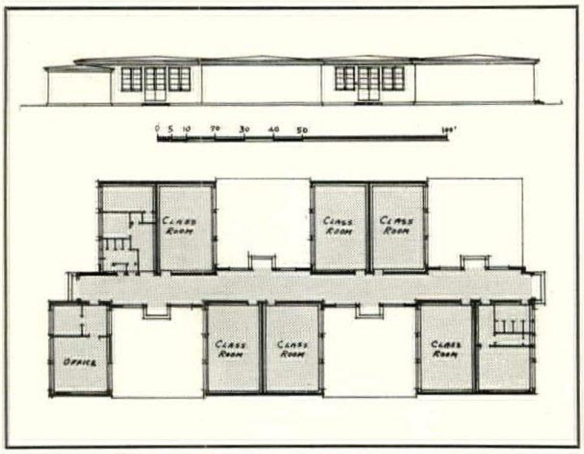
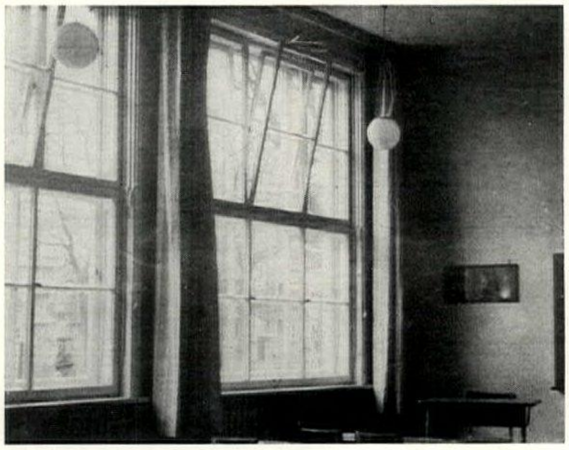
The same practical but charming character extends to the furniture. Desks and chairs have brightly painted metal frames with gray wooden tops, seats and backs. Some of the chairs have pliable backs for greater comfort, and all the furniture is movable, equipped with rubber caps on the legs for silence. Much is made of the opportunity for informal arrangement in the classrooms, as opposed to the old-fashioned type of fixed rows.

Lighting fixtures are also very simple but fresh in design. There are available stock patterns, some of which were even designed by architects for specific buildings, which have none of the heavy clumsiness of the run of commercial lighting in America. In Frankfort-on-Oder are a number of novel fixtures which have cylindrical incandescent tubes with contact at both ends instead of bulbs.



Above are sketch notes of a few of many light and stair details unusual to American practice. The stair railings vary between chromium, iron and brass; often the balusters are painted in high color. Below is a stair hall in a Hamburg school



The Siemenstadt Volkschule in Berlin. The plan takes the greatest possible advantage of facilities for light and air. The completed portion is part of a large housing development which will be incorporated with the school. At the right is a detail of the double hung windows mentioned below

Siemenstadt Volkschule, Berlin. As is frequently the case in Germany this school is planned to be the principal feature of a large housing development. When completed it will have a large central block for administration, laboratories, and auditorium, and two wings of the pavilion type. One of these wings is the only portion built. It consists of a corridor running north and south with pavilion placed alternately on both sides of it. In each pavilion are two classrooms, one facing east, and the other west. Besides forming attractive courts between the pavilions, this staggered plan permits of a slight saving in the length of corridor for the number of rooms served.

The great amount of exterior wall and the large windows made the interior bright even on a dull day. The walls of corridors are light yellow, and of the classrooms light blue or mauve. The lower half of the walls has an enamel finish.

Doors are flush panel varnished natural wood with transparent celluloid push and kick plates and no door closers, but rubber cushion on stop bead to receive shock of slamming.

Floors in classrooms are brown cork linoleum, and in corridors stone. Steel lockers with louvered doors and vent ducts running to the roof are built into the thickness of the walls. The doors roll back into the wall and are controlled by a single lock for the teacher. The double thick wall aids in soundproofing the rooms.

The windows are double hung and double thick, with six or seven inches separating the inner and outer sashes. When shut, the upper and lower sashes are in the same vertical plane, and the center portion of the two upper sashes can be tilted in by operating a crank or lever. To open the lower sashes, they must first be tilted in and then slide up like ordinary double-hung windows. Thus a variety of openings are possible, drafts can be avoided, and good circulation of air obtained by forcing the air toward the ceiling first.

Dorotheenschule, Köpenick, Berlin. This is a girls' high school with an irregular L-shaped plan, three and four stories high. The exterior is faced with large square yellow tile and the woodwork of windows is painted black. The classrooms are finished in different colors; blackboards are lined for graphs; the balcony of the auditorium can be combined with a music room and shut off from the assembly hall by a soundproof accordion partition.

Zehlendorf-Berlin. Though generally a traditional building, two details are worthy of note. The stair railings consist of three horizontal iron bands at heights proper for children of different ages, the posts being set out of the way of the handrails. The auditorium has an illuminated glass cornice and the wall is striped with raised and colored horizontal bands about a yard apart. The stage can be separated from the hall and used as a drafting room with north light from large studio windows.

Karl Marx Schule, Damweg, Berlin. Only one experimental room has been built of a great school complex to care for over 3,000 pupils when complete. It will be the backbone of a future housing scheme. Adjoining the actually constructed room are portions of two corridors, one of which is used as a second classroom and has one wall entirely filled by a metal and glass window which, operated by an electric motor, sinks into the floor at the push of a button. The room is thus transformed into a porch. The classroom proper also has one wall of metal and glass which folds back against the side walls and opens onto a covered porch. Additional light and ventilation are obtained from a low clerestory.

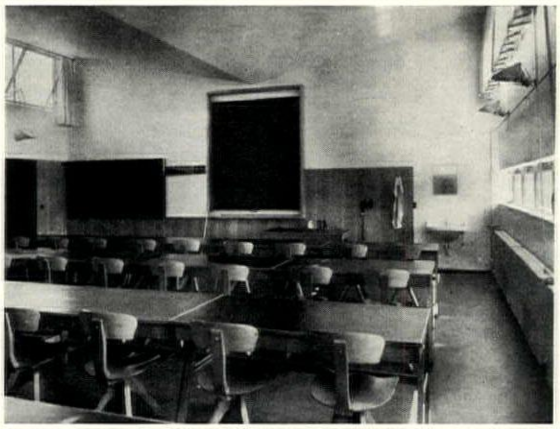
Trade Union School, Bernau. The naked structural forms are its only pretense to architecture; bright colors and a profusion of light the only attempt at charm. Yet it is an exceptionally interesting place. It possesses the distinctive character of functionalism carried to a conclusion. The architect, Hannes Meyer, used a ferro-concrete skeleton and slab construction allowing the supports and lintels to show, sometimes in the natural rough concrete. The windows of the entrance foyer are small. They are set near the ceiling and used only for ventilation, the walls being of glass bricks. This feature gives a striking and pleasant effect of soft light and spaciousness to the interior. The pattern of the joints is pleasing but the contrast of the glass and the thick mortar is not.

Their classroom ceilings are V-shaped in section and light from high horizontal windows is reflected from the slanting panes directly upon the desks. Artificial light is supplied from wall reflectors to accomplish the same result. A low row of windows on one wall appears to be chiefly for ventilation. Practically all other rooms, seminar rooms, library, bedrooms, dining rooms and gymnasium have at least one wall of glass. In the library, skylights light the book shelves on the inner walls. The dining room is also illuminated by sidewalk lights set in the ceiling. The wash rooms have one wall of glass bricks with a small window at the top for ventilation. In fact it might be said that the design is based chiefly on the problem of light and air. One felt that he was separated from outdoors by the thinnest possible film of structure.

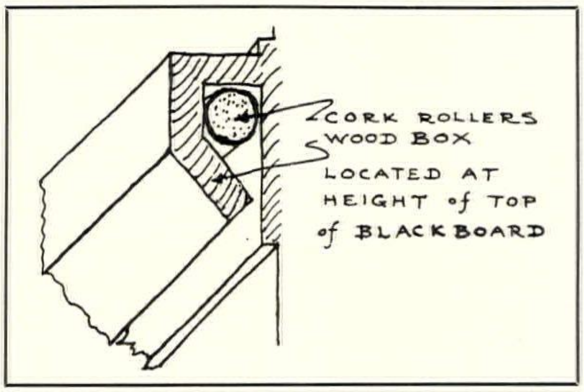
Stuttgart. In one school, classrooms are ventilated with the windows closed by wooden ducts leading across the ceiling from small openings above the windows. This school also has a device for holding posters, maps, etc., which consists of wood stripping with cork rollers behind in place of a picture mold. (See sketch.) The paper is held by the friction of the rollers but is easily removed by a little juggling back and forth. In another Stuttgart school, frosted glass with red or green painted backs was substituted for blackboards in order to give the children positives instead of negatives to look at. In practice, however, white chalk seemed to be used.

One of the newest of several successful schools is a pavilion school built on sloping ground in the suburb of Bornheimer Hang. The classrooms are arranged in one story, parallel wings at different levels, and all face east. A corridor connecting the wings climbs up the hill to the main

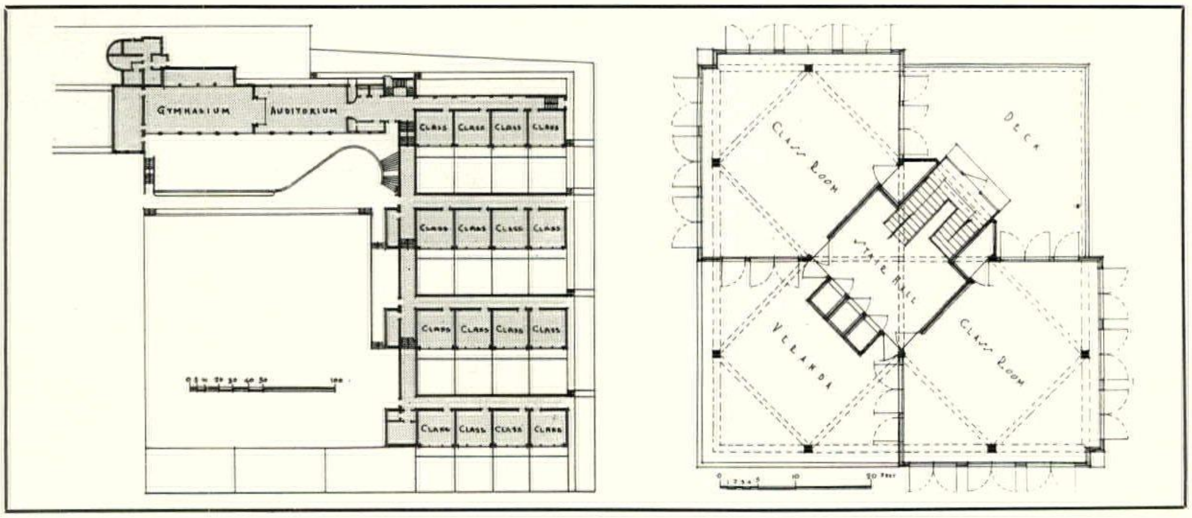
Trade Union School at Bernau. The wall is of glass brick with small windows at the top for ventilation



An interior of a classroom with a V-shaped ceiling, which serves as an aid to ventilation and a reflecting surface for both natural and artificial light. The row of low windows at the extreme right are used chiefly for ventilation. Note how the eye goes naturally to the blackboard in the center of the room and the manner in which the horizontal is accented



This device for holding posters, maps, etc., is one of the many original details found in European schools



These plans take the utmost advantage of contour and orientation. At the left is the plan of a school in Bornheimer Hang, near Stuttgart. At the right is a plan of the Open Air School at Amsterdam

block which has three floors of classrooms and laboratories, as well as the director's house and the gymnasium and auditorium which may be combined at the stage end of the latter. In the corridor are high horizontal windows and on one side low down are show cases built in the thickness of the exterior wall with clear glass on the inside and frosted glass on the outside, lighting both exhibits and corridor. The corridors of the classroom pavilions, serving also as coat rooms, are low and are top lit by skylights. The classrooms are lighted by clerestory windows above the corridor, and by the east wall which is all glass. The rooms are heated by a few small radiators which have proved inadequate, due to the large glass areas and the exposure. The dressing rooms form a terrace in front of the gymnasium wing and are lighted by a continuous band of glass bricks with metal casement sash set in at intervals for ventilation. Beyond this terrace is a large play court and there are pleasant grass plots between the pavilions. The sole decoration of the building is the brightly painted metal work, but the great glass areas, the general composition and the attractive situation make it charming.

Ludwig-Richter Schule. The outstanding characteristic of this school is the attempt to reduce the scale of the classrooms to that of the children, at the same time keeping the required volume. Each room has two rows of windows, one above the other. The upper row is on the inner face of the wall and the lower windows on the outer face, forming alcoves in the room. The upper part of the walls are stepped in a bit and painted in with the ceiling. The lower part, crowned by a picture mold, is painted in color making the room seem half its actual height.

Open Air School, Amsterdam. The design is purely functional and the structure looks like an X-ray of a building, for all the interiors are visible. The skeleton is of reinforced concrete with part of the floor slabs cantilevered. Above a low parapet the exterior walls are entirely of glass and metal, the latter painted bright blue. This color and flowers in window boxes give the school some gayety. The plaster walls of the few interior partitions are bright yellow, and the rooms are of course flooded with sunlight. Blue tile and aluminum paint contribute to the general effect of cheerfulness. The gymnasium is glass enclosed and forms a wing on the ground floor only. Each of the other three floors contains two classrooms and an open veranda. Eventually the school with its playground will be completely surrounded by a housing block.

Hilversum. The most attractive and personally charming modern buildings anywhere were those designed by William Dudok in Hilversum. Pictures fail to do them justice because, although their masses, proportions and plans are excellent, it is their brilliant color which is particularly striking. They are built of warm yellow bricks which are carefully laid to produce a remarkably smooth but mellow brick surface. Horizontal rows of corridor windows are separated by piers of glazed blue brick. The metal work of glass stair towers and gymnasium windows is coral red. Window boxes, built into the walls, are gay with flowers, which also grow inside the buildings. Interior columns are encased in blue and white or gold tiles. Classroom doors are of the flush type and are "Ducoed" vermilion or ultramarine, with push and kick plates of aluminum; stair rails are coral red.

REFERENCES ON PUBLIC SCHOOLS

The books and articles listed below on school architecture do not comprise all the reference material available on the subject. There has been an attempt, however, to list only that material which can be of practical value to the architect who is interested in further study.

BOOKS ON SCHOOL ARCHITECTURE

School Buildings of Today and Tomorrow, W. K. Harrison and C. E. Dobbin, Architectural Book Publishing Co. This is one of the most recent books on school planning that has been published. It is the combined effort of a well known architect and a well known school executive, so that the problem is approached from both angles. Much of the data has been gathered from experience with New York City schools, but the conclusions drawn are national in application. Besides offering an abundance of design and plan information, they have made an attempt to standardize certain features of construction, which are represented in the book in usable sized drawings.

Public Elementary School Plant, Charles Lyle Spain, A. B. Moehlman, F. W. Frostic, Rand, McNally Co., Inc. In this discussion of school plants, the authors have not only contributed the usual generalities on school planning, but they suggest practical methods of solving any type of elementary school problem. Although their approach is from the sociological and educational angle, their findings are far from pedantic. This book is a constant source of reference for hundreds of architectural offices engaged in school building work.

Public School Plant Program, A. B. Moehlman, Rand, McNally Co., Inc. Mr. Moehlman again demonstrated in this book his understanding of the relation between education requirements and architectural practicalities. The treatment here is a little more general than in the book mentioned above.

Check List For Public School Building Specifications, Lee Byrne, Teachers College, Columbia University. The checking lists contained herein are complete, and cover schools of many different capacities.

For Better Schoolhouses, Compiled for Geo. Peabody College. Perspective sketches, floor plans, suggested specifications and contract forms for schools of from 1 to 14 teacher capacity.

Planning School Building Programs, N. L. Engelhardt and Fred Engelhardt, Teachers College, Columbia University. A comprehensive treatise on all phases of school plan analysis, treating critically and completely the techniques and principles involved in school planning. It covers such items as site selection, the relation to city planning, costs, financing, and many other phases of the work.

Rural Schoolhouses, F. B. Dresslar and H. Pruett, Superintendent of Documents, Washington, D. C. Like most other government publications, this one contains an abundance of practical useful data for small schoolhouse architects and builders. It contains data on all phases of the rural schoolhouse problem, and is unusually informative on schoolhouse planning, construction and equipment.

The Junior High School, L. V. Koos, Ginn & Co. Although not intended primarily for architects, Mr. Koos's book contains much of administrative problems with which school architects should be familiar. It indicates adequately the relation between school activities and school buildings, which is, of course, an all-important relationship in planning.

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The March, 1928, Reference Number.
- Artificial Lighting of Schools, D. J. Frandsen, p. 459.
- Checking Schedule for New School Buildings, J. O. Betelle, p. 421.
- Construction of School Buildings, C. B. J. Snyder, p. 417.
- Costs and Construction, I. T. Catherine, p. 471.
- Details of School Buildings, W. H. Kilham, p. 441.
- Fundamentals in Planning School Buildings, W. B. Ittner, p. 305.
- Heating and Ventilating the School, A. Kellogg, p. 453.
- The Architect and the Board of Education, J. O. Betelle, p. 337.
- One-Story Schoolhouse, E. Sibley, p. 409.
- The Private School, C. G. Loring, p. 413.
- Recreational and Athletic Facilities in Schools, J. C. Llewellyn, p. 435.
- Sanitation for School Buildings, A. R. McGonegal, p. 463.
- School Financing and the Architect, C. S. Taylor, p. 469.
- School Growth in Southern California, J. C. Austin, p. 389.
- Schoolhouse Maintenance and Materials, G. F. Womrath, p. 447.
- Notes on Junior High Schools, R. C. Sturgis, p. 361.
- Special Rooms in High Schools, D. H. Perkins, p. 425.
- Specifications for the School Building, C. E. Krahmer, p. 475.
- Standard Arrangements of School Cafeteria, A. E. Merrill, p. 433.

Cheltenham High School, Elkins Park, Pa., Davis, Dunlap & Barney, architects, Aug., 1927, p. 141.
The 1928 Common Brick School Competition Awards, April, 1929, p. 565.
William Hood Dunwoody Industrial Institute, Minneapolis, C. A. Prosser, July, 1929, p. 81.
School Construction and Modern Education, J. C. Morrison, Feb., 1929, p. 267.
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How 94 Schools Divided Their Floor Area, J. H. Goldthorpe, N. S., Sept., 1931, p. 51.
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School Planned for Economy and Flexibility, A. S. B. J., Oct., 1931, p. 46.

Schoolhouse in the Functional Style, A. S. B. J., June, 1931, p. 76.
Schoolhouse Planning, A. B. Moehlman, N. S., June, 1931, p. 78.
Development of the Junior High School in Chicago, R. W. Yardley, Arch. Record, May, 1931, p. 433.
Common Errors in High School Building Layout, K. D. Waldo, S. E. M., Aug., 1931, p. 547.
Making A Scientific School Plant Survey, T. C. Holy, N. S., April, 1931, p. 21,
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School Buildings That Meet The Needs of The Platoon Organization, W. H. Holmes, Official Report to N. E. A., 1931, p. 226.
Peculiarities of School Buildings in The South, R. P. Dewitt, Proceedings of Nat. Assoc. of P. S. B. O., 1930, p. 179.
Adapting Architectural Precedent to American School Design, E. G. Hutchings, N. S., March, 1929, p. 27.
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Abbreviations: *N.S.—The Nation's Schools; A. S. B. J.—American School Board Journal; N. E. A.—National Education Association; P. S. B. O.—Public School Business Officials; J.-S. H. S. C. H.—Junior-Senior High School Clearing House; J. of E.—Journal of Education.*