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THE ARCHITECTURAL FORUM

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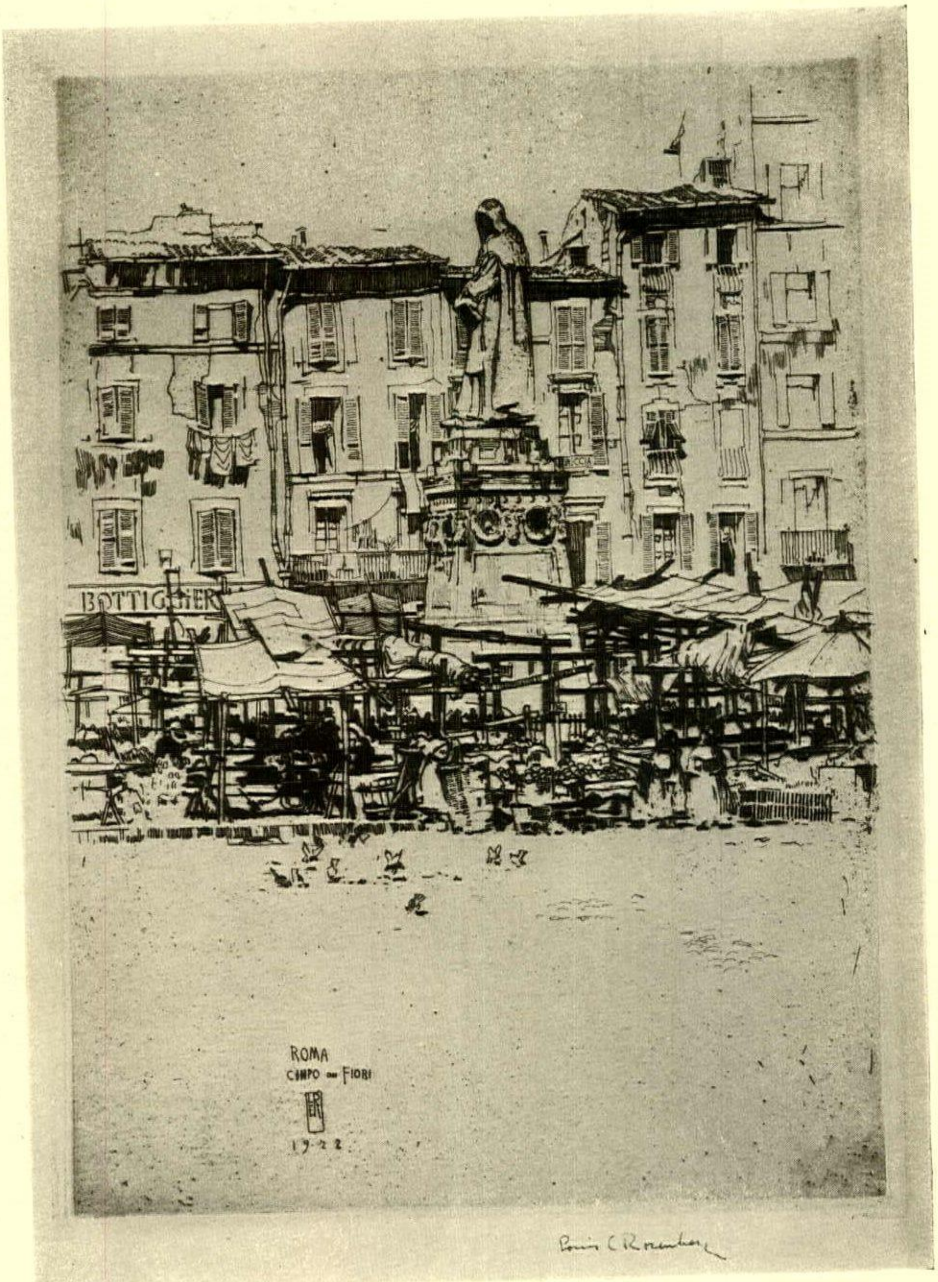

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The
ARCHITECTURAL
FORUM

Volume XL JANUARY 1924 Number 1

The Public Library Building Plan—I

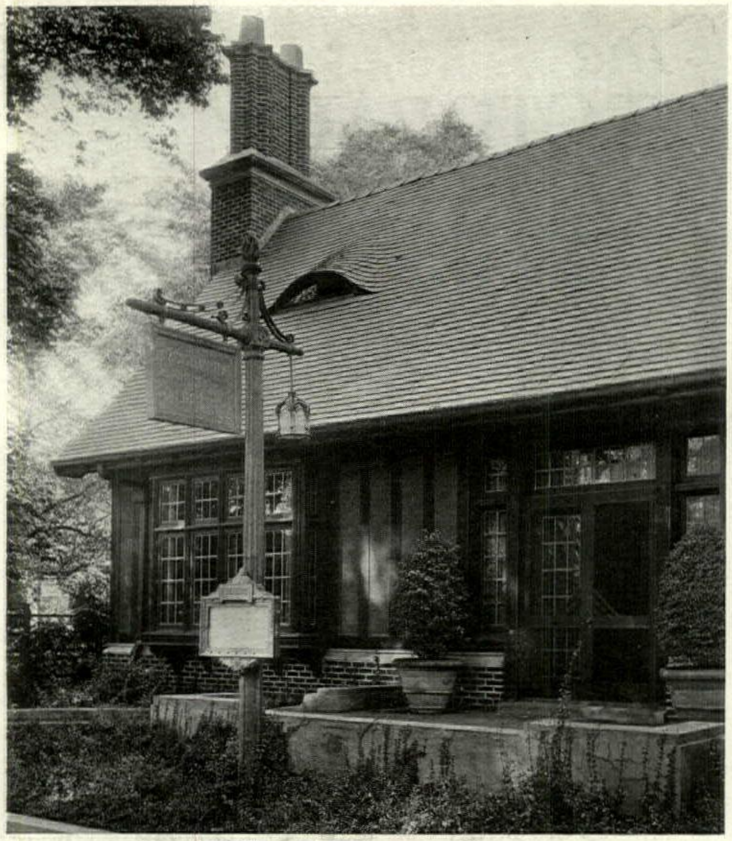
By JOHN ADAMS LOWE
Assistant Librarian, Brooklyn Public Library

THE successful public library of today is not one carelessly planned in a chimney corner of the drafting room of a great architect's office; nor is it one designed by an apprentice to whom the problem has been thrown as a solace for tedious routine accomplished elsewhere. Nor is it one patched together by donor or trustees from features bodily stolen, by the scrapbook method, from more or less successful buildings. The successful plan is one evolved by sympathetic architect and librarian who have studied and understand the community, who know what a library is and what it does, and who have the skill to create in wood and stone a building which shall express the spirit and render the service possible.

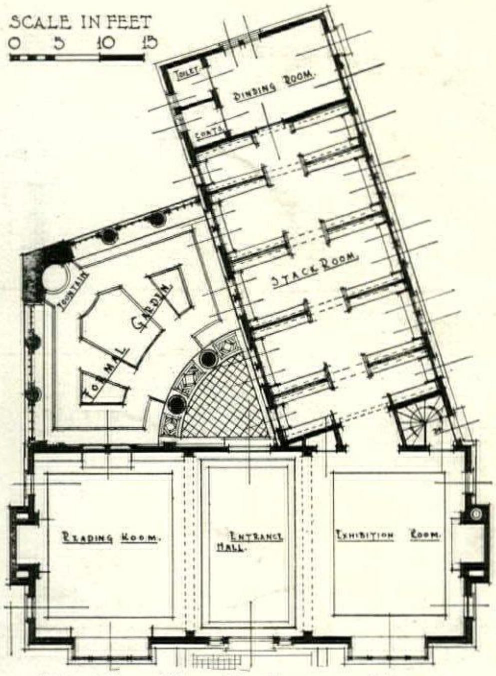
Time was when a library building was considered the plaything of a privileged few, a treasure house, a storage vault, a monument. Mausoleums and tombs have been designed as library buildings, with the result that the books deposited in them became a collection of dead things and remained buried within. The tradition of its being the confined realm of spinster librarianship and the home of a novel-lending agency is past. Today such a building houses a plant organized for rendering trained information service, for distribution of books intelligently selected for recreation and inspiration, for offering a common intellectual meeting ground to the entire community without racial, political or sectarian distinction, for teaching the value of print and encouraging the use of it, for helping people to be capable and moral citizens. And by one means or another the details of its plan must be adapted to these functions and made to express them.

In buildings to be erected in small rural communities and in the large towns and cities it will be necessary to plan adequate space for books accessible to the public, for the clerical work of drawing and returning books, for an adults' reading room and another for children, for reference and study purposes, for a librarian's office, a workroom and a staff rest room, for a meeting place for lectures, for study rooms and club rooms, and possibly for exhibitions and a local historical museum, in addition to the usual appointments for heating and janitor service. Even in small rural libraries today library service touches the interests of every individual who can read. Aside from the ordinary fiction reader, the farmer, the merchant, manufacturer, teacher, doctor and preacher come for books for study purposes. Teachers gather in the building in groups to learn for themselves about the book resources and to have their pupils taught by the librarian how to use books in school work. The librarian conducts story hours for children, and book review and current events meetings for busy adults. She organizes reading clubs for boys and girls, and forums for men and women. Not infrequently Boy Scouts and Girl Scouts hold their meetings here and make books a part of the program. Lectures on all kinds of subjects that may interest the people of the community are held in the auditorium. Picture collections are made available for schools or other study purposes. Such exhibitions as "Art in Advertising," or those dealing with birds and bird houses, textiles, local industries, town history, the fauna and flora of the vicinity, are part of the regular routine. Groups of foreign-speaking citizens meet in classes to study English, sewing, cooking and manners and customs of America. Any activity or interest connected with books or print becomes a legitimate part of library service. On the other hand, the library cannot be expected to house a gymnasium, amusement rooms, moving picture theater, fire engine house and similar apparatus, town offices, and various other worthy enterprises for which space is frequently demanded. Anything which is not essentially concerned with the use of print has no place in a library building. The same type of service is rendered in small towns and large cities. The chief difference lies in the amount of service given. One building suffices in a small town, whereas in cities branch buildings are necessary in order to render the same service to scattered neighborhoods or congested districts.

No hard and fast laws have been laid down for a

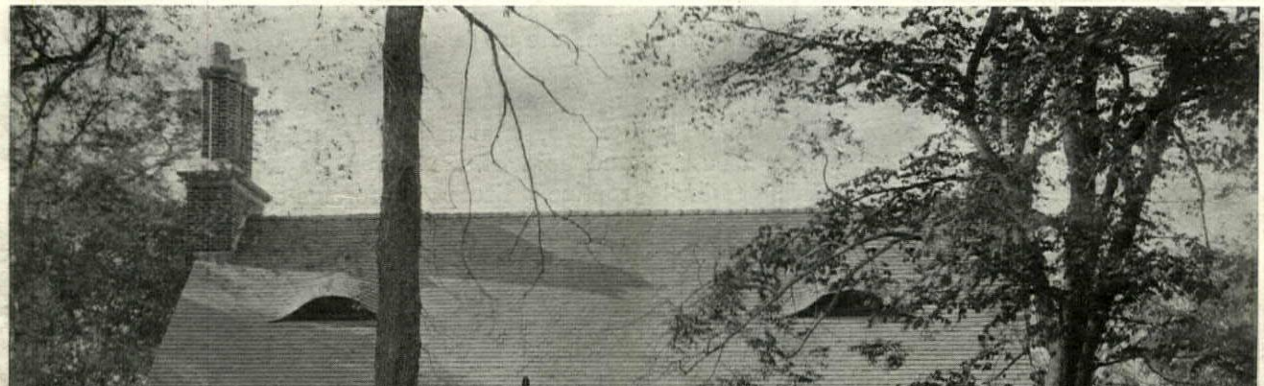


Detail of Front, Easthampton Free Library



First Floor Plan, Easthampton Library
Aymar Embury II, Architect

library building plan. In the past the conventional plan was conscientiously copied, and the single-storied building over a high basement has become general. It is agreed that the greater part of the work must be conveniently arranged for one floor, and wherever land is available it is deemed unwise to build into the air. Whenever a second story is demanded, the rooms less frequently used by the public may be planned there. There is a close relationship between several of the units, but it is not so close as precedent would seem to indicate, and there is everywhere a willingness to try arrangements which shall preserve essential relations, but increase the use and meaning of the integral parts. Partitions are almost entirely done away with because they prevent rearrangement of



Easthampton Free Library, Easthampton, N. Y.
Aymar Embury II, Architect

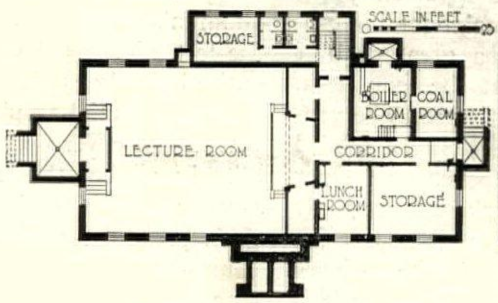
space, increase expense of oversight, and restrict light and ventilation. Bookcases are used wherever it is necessary to indicate divisions.

Space on the main floor of a small library building. having an area of approximately 2,000 square feet might be divided in these proportions: delivery room, 225 to 275 square feet; general book room, 400 to 450 square feet (book capacity 2,000 to 2,500 volumes); adult reading room, 375 to 425 square feet (book capacity 2,500 volumes, seating capacity 20); reference room, 275 to 300 square feet (book capacity 1,000 volumes, seating capacity 10); children's reading room, 475 to 500 square feet (capacity 2,000 volumes, seating capacity 20); librarian's office and workroom, 175 to 200 square feet (capacity 500 volumes). By "room" is meant space devoted to the purpose designated rather than an area enclosed within partitions. An auditorium with a platform and small dressing room (1,000 square feet, seating capacity 150) and a local historical museum (400 to 450 square feet) would presumably be included in such a building. These, however, are not to be considered features but rather incidentals, and would probably never be placed on the main floor, usually in an upper story.

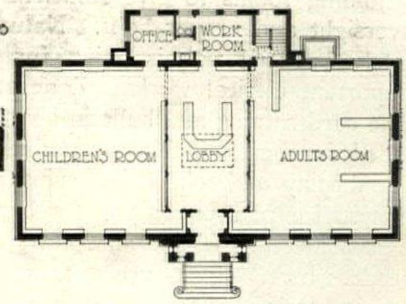
In larger buildings the spaces would be increased essentially in the same proportions, with possibly a study room, a staff rest room, a workroom and a club room or two added to the general requirements. A word should be said about club rooms. Theoretically, work with clubs is interesting and important, but practically it cannot take an important place in the routine of most libraries because the staff is too small. The size of staff and the probability of club work being carried on should be carefully considered before space is cut up into club rooms. It may be more urgently needed for some other part of the work.

The delivery room is the "salesroom," the business center of the library. In small buildings it is simple to plan this space and to arrange the loan desk in such an alluring, compelling, welcoming manner that it shall become more nearly the soul than the heart of the place. In larger buildings this element seems often to have been forgotten. Many a building might be cited in which this room might have been planned as acceptably for a Roman bath or for the waiting room of a railway station.

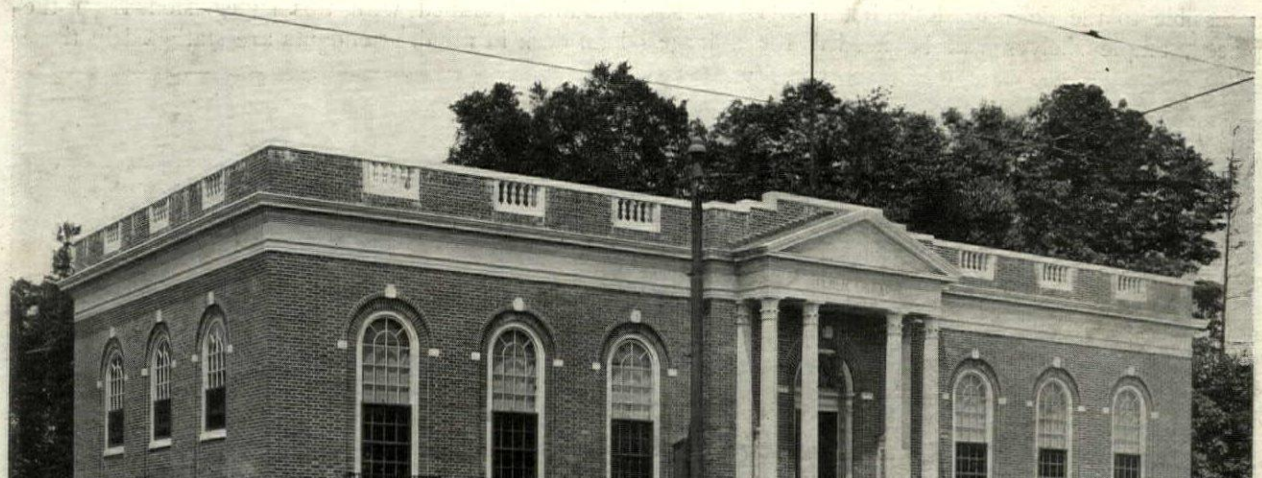
The West Roxbury Branch Library is constructed of waterstruck brick and pre-cast concrete stone trim. Floors are reinforced concrete finish on the first floor with ½-inch cork tile, and granolithic in the basement. Heating is by steam. Cost complete was $55,530, and including furniture and grading $59,566.66. The cubic foot cost was 42 cents, and 45 cents including the furniture, in 1921.



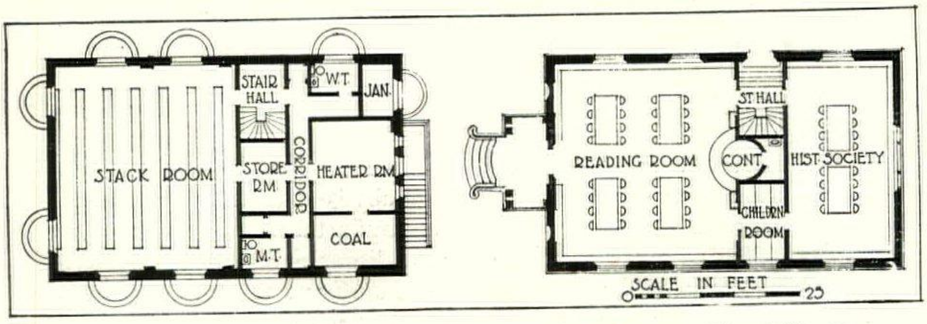
Basement Floor Plan



First Floor Plan



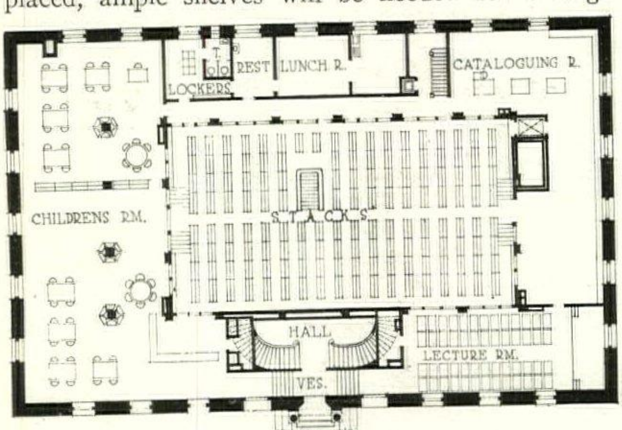
Branch Library for City of Boston, West Roxbury, Mass.
Oscar A. Thayer, Architect



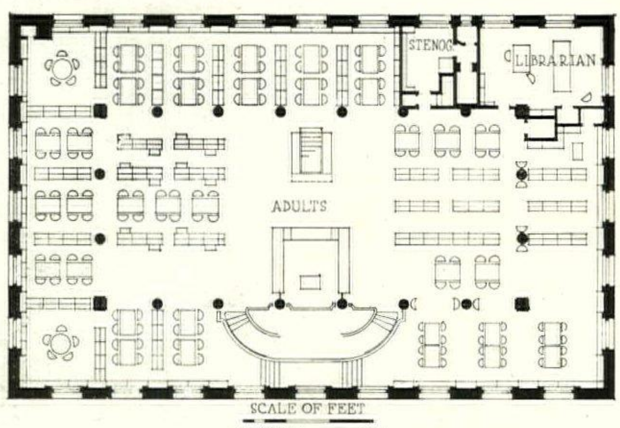
This plan violates the essentials of a good library arrangement. The children's room is little more than a closet. The main book collection is placed on stacks in a dark, damp basement, inaccessible to and inconvenient for both public and librarian. Casual borrowers and children must all pass the reading room tables to reach the delivery desk. The librarian has no workroom or even a place to hang her hat.

Several factors come into the problem of planning the delivery room space, location, administration and light being chief. The location is more or less determined by its necessary proximity to the entrance. It should be sufficiently separated from reading and reference rooms so that noise and confusion caused by people returning and drawing books will not disturb readers. A wide, open space will be required between the delivery desk and all adjoining rooms to give sufficient opportunity for oversight and proper light. Natural light is absolutely essential at this point, for a great deal of important clerical work is done at the loan desk. The card catalog and bulletin boards are to be provided for here. Tables or shelves will be needed for display of books only, and a bench or a chair or two for persons waiting for books may possibly be considered. It is not necessary to allot space for readers here. Books are necessary in the delivery room. It is a question, to my mind, whether it is wise or feasible to make the entire book collection accessible to the delivery desk, but if it is not so placed, ample shelves will be needed for a large and constantly changing collection of books. One might as well expect to get a thrill when the nursery door is thrown open disclosing no happy children playing there as to do so when the library door is pushed in, revealing no books luring and beckoning.

When it comes to the matter of administration the solution is not so clear. In the small building the librarian will be at the loan desk during the hours the library is open, and should have an unbroken view of the entire floor, delivery space, reading room, children's room and reference room. She will in all probability be close enough to render assistance when needed and to maintain discipline. Many larger buildings have been designed as an amplified one-man plan, and the result is illogical and incongruous. Think of the usual type of library with its delivery space in the center, the children's room to the right and reading room to the left. They tell you it was planned so that the entire building can be supervised by one person. It is most essential to plan for a small staff, but one person can cover only about so much ground after all. In all but the smallest libraries during busy hours all the attention of an assistant, several of them probably, will have to be focused upon the demands of the loan desk. They cannot then be responsible for work or discipline in the reading rooms. Moreover, as a matter of practice, even in buildings planned with this supervision from the loan desk in mind, attendants are stationed in these



Ground Floor Plan

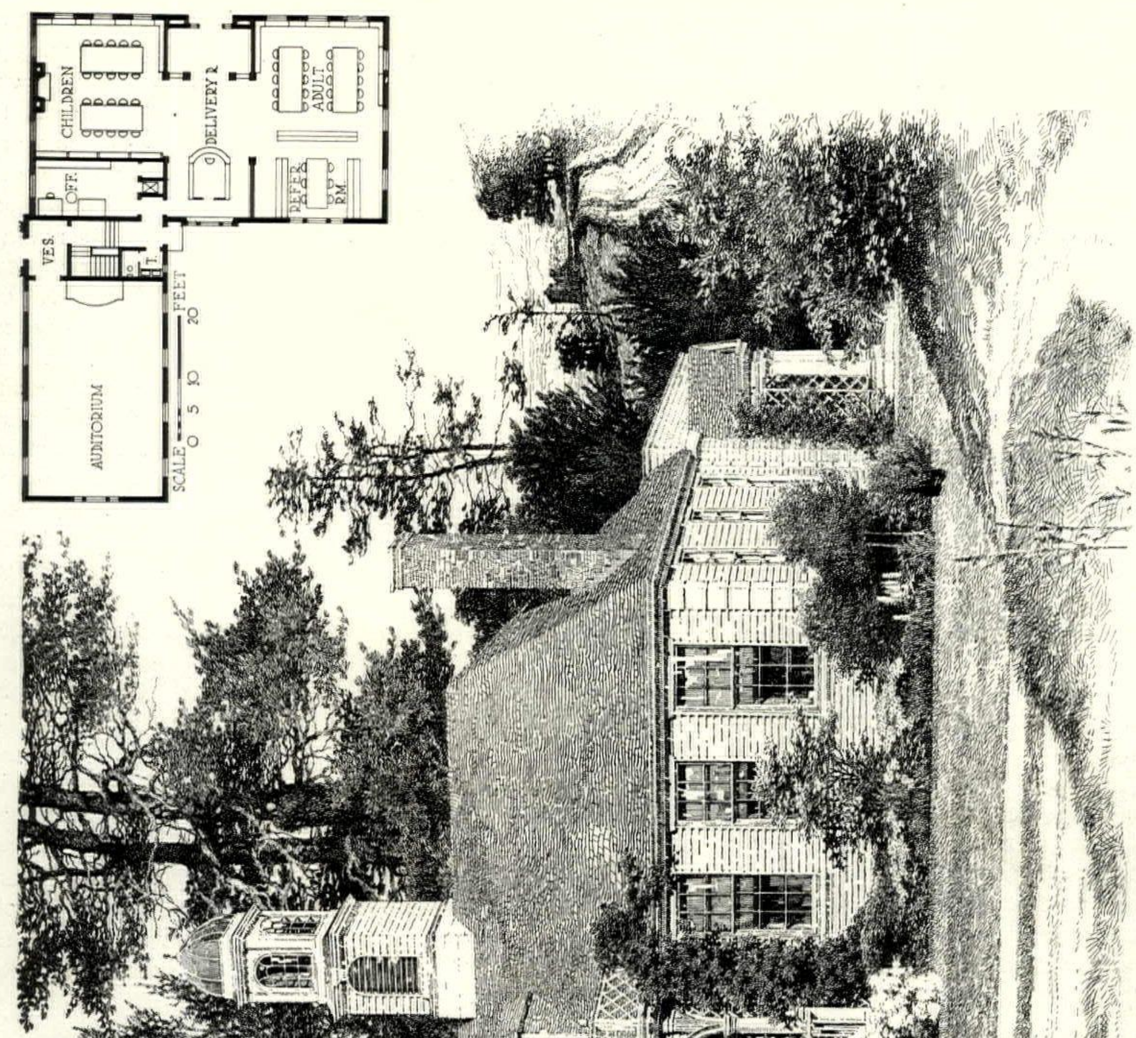


Main Floor Plan

This library, built in 1914 at a cost of $125,000, is situated in a city of 97,000 people. A staff of 40 serves the library, and the stackroom has a capacity of 120,000 volumes, while 25,000 are contained in the open shelves of the book room and reading room.

The stackroom's being at the center of the ground floor makes possible ample light, ease of access and ready supervision of the different departments, and workrooms are so carefully planned and correlated that processes and work travel are reduced to a minimum. The children's room (seating 66) and the lecture room (accommodating 150) are entered directly from the vestibule. The librarian suggests that the charging desk in the children's room be turned around, so that the attendants may face the room and not be obliged to turn their backs on the entrance. The library circulates about 500,000 volumes annually.

Public Library, Somerville, Mass.
Edward L. Tilton, Architect



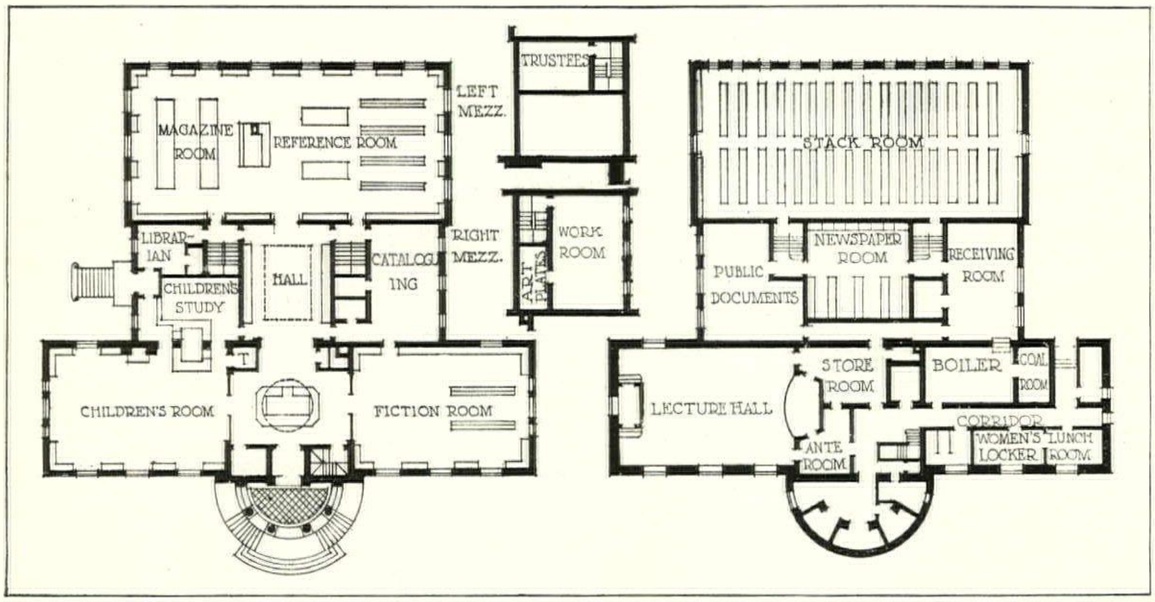
FIRST PRIZE DESIGN FOR A RURAL LIBRARY BUILDING
SUBMITTED IN COMPETITION BY RICHARD M. POWERS AND ALBERT C. MACLELLAN

Reproduced by Courtesy of The White Pine Series of Architectural Monographs rooms during busy hours. Why not then be frank enough to face the issue if there is any advantage to be gained in separating these rooms? An adequate staff being available, why not consider the delivery space as a separate unit and plan it in such a manner that book circulation can be most effectively done? Librarians are contemplating changes in the general scheme of this room. Some would subordinate the loan desk to merely a place to register, to return and draw books, and would relegate it to an inconspicuous position at the side of the main entrance. This may be suggested by the function of the cashier's desk in certain types of cafeteria. Other librarians would turn the delivery space into something closely akin to the most fascinating bookshop ever devised, with live and important books carefully selected, judiciously grouped and attractively displayed on counters and tables, making ample provision whereby accounts of books drawn and returned can be carefully recorded. The delivery room, which is going to be crowded during certain hours, will be planned solely with the purpose of handling a crowd quickly and without confusion and noise. It has been found expedient in such places to direct people in at one side of the desk, where books are returned, and out at the other side, where books are drawn.

In my opinion too little thought is given to planning the adult reading room. Location, light and general atmosphere are important considerations that a study of many buildings reveals as being determined carelessly. Economy of staff seems to have been the determining factor in placing it where it could be supervised from the loan desk. Its relation to the other units is not close. When it comes to studying the light problem in these rooms, most plans would suggest that any space readily accessible had been designated "reading room" and that ended it. Many rooms have a southern exposure with huge windows and even something similar to "French doors," with the resultant blinding glare. Some reading rooms in which wall shelving was necessary have been lighted by large windows chiefly on one side, and by small windows over the bookcases. A north light is good for a reading room, and this is excellent if it can be tempered with a northeast or a northwest exposure. It is a mistake to allow direct sunshine to fall on a reader or his book, and curtains and draperies should be used to soften the light when an ideal exposure cannot be had.

But what about atmosphere, book atmosphere or reading atmosphere, in the usual public library reading room? Many a one suggests so much the arrangement of a restaurant that it is only necessary to install a counter and serve food to complete the illusion. Intruding pillars with gaudy capitals and wall spaces filled with meaningless decoration have been employed until, it would seem, it had been entirely forgotten that books and book illustrations, maps and prints are the best of all decoration for a book room or a book house. And while atmosphere may be a matter of decoration and furnishings rather than plan, it is difficult to create the right atmosphere when the fault lies in the plan.

Some day a clever architect is going to do more than he appreciates for the cause of helping people to learn to read and to become book lovers by daring to create a public library reading room which is wholly a genuine reading room.



FIRST FLOOR PLAN BASEMENT FLOOR PLAN

Excellent features of this plan are adequate supervision and circulation of books and all business kept separate and distinct from the reference and study parts of the building. Stacks for storage are located in the basement and are not open to the public. Note the proportionate amount of space given to children and adult readers and the separate entrance for the younger people. Lecture room has separate entrance.

Floor Plans of Public Library, Waltham, Mass.
Loring & Leland, Architects

BUSINESS & FINANCE

C. Stanley Taylor, *Editor*

1924—Another $5,000,000,000 Building Year

THE year 1923 has added to the history of building construction one of its most interesting chapters. The total investment in new building construction in 1923 was well over $5,000,000,000, and much of this expenditure represented better class buildings involving the use of architectural service.

In the last issue of THE ARCHITECTURAL FORUM, December, 1923, a review of construction activity during 1923 and the two preceding years was presented with graphic charts giving a comparison in money and volume of activity in seven types of building construction. On the second page of the Service Section in this issue it will be found that some of these graphic charts have been established as a permanent feature to indicate the monthly variation in totals of contracts let in the seven types of construction, including residential, commercial, industrial, hospital, school, church and recreational building.

At the present time interest naturally turns to a consideration of conditions which may be expected during the year 1924. The Research Department of THE FORUM has just completed the Annual Building Survey and Forecast for the year 1924 as based upon confidential reports received from 1,668 architects, listing projects now being planned or under serious consideration with clients. In January of 1922 and again in January of 1923 a similar Survey and Forecast was presented as based upon the reports of architects, and it is interesting to note that in both instances the actual figures justified the forecast figures in a surprisingly close manner.

The forecast for the year 1923, as published in January of that year, indicated a $5,000,000,000 building year and presented an allocation of activity in the various building types as established in the form of a percentage table covering the United States in six geographical divisions of the country. The actual figures for the year 1923 have been reported through several channels, and these statements and comparisons will serve to show how closely THE FORUM's forecast established a sound measure of the activity of the following year.

In the December 7, 1923, issue of The New York *Times* this item appeared:

"The end of 1923 will see a $5,000,000,000 building year in the United States, or an increase of 25 per cent in building over last year, when approximately $4,000,000,000 of construction was erected, according to estimates issued by S. W. Straus & Co."

On January 1, 1924, the Copper & Brass Research Association issued this statement:

"The Copper & Brass Research Association's annual survey of building construction, made public today, places the total expenditure during 1923 at $5,922,900,000; the largest single year in the history of the building industry, and bringing the total volume of construction for the past two years to the astounding total of $11,000,000,000.

"During 1923 the expenditure for residential buildings, including dwellings, apartments and hotels, amounted to $2,302,240,000, so that nearly 40 per cent of the total expenditure went to relieve the acute housing shortage which still existed at the beginning of the year. As a result of the past two years of record-breaking construction, the shortage in all classes of building brought about by the war has been steadily reduced. July 1, 1921, saw an estimated building shortage of $8,084,985,000, and construction during the remainder of that year reduced this figure to $6,363,835,000 on January 1, 1922. Construction in 1922 reached the total of $4,910,000,000, of which $3,125,000,000 represented the normal yearly demand for new construction, so that the shortage was relieved during 1922 by $1,785,000,000. Total construction of $5,922,900,000 during 1923 has contributed further to relieving this building shortage by a total of $2,617,900,000, leaving a shortage on January 1, 1924, of $1,960,935,000.

"The total expenditure for building construction during 1924 is estimated by the Copper & Brass Research Association at $4,835,935,000, of which amount $3,125,000,000 represents the expenditure necessary for normal building requirements:

July 1, 1921, estimated shortage		$8,084,985,000
Construction, balance of 1921		1,721,150,000
Shortage, January 1, 1922		$6,363,835,000
Construction in 1922	$4,910,000,000	
Normal increment, 1922	3,125,000,000	
Shortage relieved in 1922		1,785,000,000
Shortage, January 1, 1923		$4,578,835,000
Construction in 1923	$5,922,000,000	
Normal increment, 1923	3,305,000,000	
Shortage relieved in 1923		2,617,900,000
Shortage, January 1, 1924		$1,960,935,000
Normal increment, 1924		3,125,000,000
Total shortage		$5,085,935,000
Less carry over to 1924		250,000,000
Construction in 1924		$4,835,935,000

This survey by the Copper & Brass Research Association is accompanied by a list showing percentages of activity in different classes of buildings. This list of percentages is presented here, together with the percentages from the 1923 forecast of THE ARCHITECTURAL FORUM which will serve to indicate how closely this type of forecast interprets future building activity.

Forecast and Fact

In January, 1923, THE ARCHITECTURAL FORUM issued its Annual Building Survey and Forecast, *predicting* new building construction in the year 1923 as $5,116,544,000

In January, 1924, the Copper & Brass Research Association *reported* new building construction in the year 1923 as $5,922,900,000

Percentage Allocation of New Building in 1923

Reported by Copper & Brass Research Association in Survey at end of year:	Per Cent	Forecast by FORUM (Annual Building Survey and Forecast) at beginning of year:	Per Cent
Apartments	16.00	Apartments (including club bldgs.)	18.4
Churches	6.77	Churches	6.4
Dwellings	12.	Dwellings	9.2
Banks (not classified)		Banks	3.
Hospitals	7.6	Hospitals (including welfare bldgs.)	6.1
Hotels	10.87	Hotels	10.4
Industrial	12.63	Industrial (including automotive)	12.8
Office Buildings	10.26	Office Buildings) (including bank offices)	13.3
Public Buildings and Schools	23.87	Public Buildings and Schools	23.4

On the third page of this article will be found a tabulation of the forecast for 1924 which shows over $5,500,000,000 to be invested in new building construction and promises that the year 1924 will be as active as the year 1923. For purposes of comparison, the figures for 1923 as presented in January of that year are given in a corresponding table. With this information comparisons may be made to determine which types of buildings will be more or less active than during last year.

Building Material and Labor Costs

During the last three or four months of 1923 there was a seasonal recession in the cost of building materials, which if one refers to the chart on the first page of the Service Section in this issue will be found reflected in the falling line, indicating the cost of building. It is not anticipated that this decrease in the cost of construction will continue, as it is already being affected by a heavy and unexpected volume of winter building. In studying the chart referred to, it will also be noted that the line indicating plans filed (contemplated construction) has continued upward in November, promising a heavy volume of contracts to be let during the winter for spring construction.

All signs point to the fact that there will be an extremely heavy demand for building materials appearing unusually early in the year, and it is quite probable that with the letting of a great volume of contracts for spring building prices will increase again, and difficulty may be encountered in obtaining delivery of materials. In other words, it looks very much as though history would repeat itself in 1924 and that conditions will remain exactly similar to 1923 except that transportation facilities are somewhat better, and with a warning to speed up production, manufacturers may be in a better position to meet an unprecedented demand. It is probable also that a buyers' strike will again be threatened, and that the late spring will show a sharp falling off in a number of new contracts let. The so-called buyers' strike of 1923, which threatened much but did not develop, was prevented by the reestablishment of public confidence in the building situation, due to several factors which included the unshaken confidence of mortgage interests, the upholding of rental schedules, and the checking of building cost increases which in the late summer threatened a return to abnormal peaks.

The one condition which may possibly upset this forecast of an abnormally large volume of building construction during 1924 is this factor of public confidence. If building costs are driven too high, with the consequent withdrawal of large amounts of mortgage money, it may be that a buyers' strike which threatened in 1923 would become a fact in 1924. It is strongly advised, therefore, that wherever possible the undertaking of new building projects be put over until later than usual, and even deferred until the fall of 1924, so that the total volume of demand for materials and labor may be spread out in the hope of avoiding a critical condition in the early part of the year. It is also highly important that serious consideration be given to the possibilities of winter building,—either to start immediately or in the fall and winter of 1924.

In the Digest Section of this issue of THE FORUM will be found a number of interesting facts regarding the scientific development of winter building and the possibilities of cost saving and the economy which are offered. Building labor will evidently not be cheaper in 1924, and in fact may cost more.

The measure of prosperity in the building industry is closely related to general economic conditions throughout the country, and for this reason it is interesting to consider the opinions of leading economists not only in the building field but among bankers and commercial and industrial leaders. Recent forecasts made by banking organizations reflect sound optimism for the year 1924 and indicate that American industry faces an interesting prospective period of prosperity. No boom period is forecast, but a continuation of good business conditions with logical and sound expansion which will first appear in the early spring months. The National City Bank says that "as the year end approached, evidences have multiplied that instead of running into a quiet period the industries are likely to continue through the winter at a good rate of operations, and there is little doubt that spring will give a renewed stimulus to all activities."

FORECAST OF NEW BUILDING CONSTRUCTION FOR 1924

Based upon actual figures obtained in the most comprehensive survey of projected building construction ever attempted in the construction industry. Full explanation will be found in accompanying text.

BUILDING TYPES	N. EASTERN STATES	N. ATLANTIC STATES	S. EASTERN STATES	S. WESTERN STATES	MIDDLE STATES	WESTERN STATES	U. S. A.
Automotive	$18,736,400	$47,916,700	$4,002,100	$8,878,400	$52,991,400	$13,798,100	$146,323,100
Banks	29,871,600	76,083,300	7,052,500	6,844,800	65,406,900	15,906,100	201,165,200
Apartments	33,445,900	198,849,500	18,333,400	22,183,600	170,214,800	125,822,800	568,850,000
Apartment Hotels	30,783,000	94,441,500	4,609,700	4,185,000	184,211,300	39,137,500	357,368,000
Clubs, Fraternal, etc.	22,955,500	68,528,600	13,826,000	20,711,100	148,896,100	38,929,800	313,847,100
Community, Memorial	3,022,500	25,472,700	1,553,100	8,484,700	20,797,900	22,471,900	81,802,800
Churches	21,461,300	74,982,800	15,338,800	26,861,500	103,763,200	46,766,600	289,174,200
Dwellings (Under $20 000)	17,471,600	99,677,400	8,463,000	16,169,600	60,477,900	24,992,200	227,251,700
" ($20,000 to $50,000)	11,736,600	46,655,00C	5,359,900	9,650,300	31,610,700	9,176,000	114,188,500
" (Over $50,000)	8,726,500	29,549,200	1,953,000	7,021,500	17,558,400	10,750,800	75,559,400
Hotels	26,021,400	150,362,400	52,855,000	65,320,100	254,240,300	86,595,400	635,394,600
Hospitals	14,464,600	90,619,200	7,765,500	26,669,300	135,612,600	36,037,500	311,168,700
Industrial	35,008,300	157,941,900	10,567,900	10,645,400	165,633,000	36,316,500	416,113,000
Office Bldgs.	19,291,300	109,848,500	15,934,000	53,850,100	200,120,500	105,052,800	504,097,200
Public Bldgs.	9,827,000	20,537,500	6,060,500	24,700,800	60,747,600	25,271,200	147,144,600
Schools	77,937,100	203,325,900	43,285,300	44,038,600	334,831,000	98,840,400	802,258,300
Stores	7,554,700	34,552,600	3,828,500	4,901,100	68,094,600	21,262,900	140,194,400
Theaters	30,209,500	29,192,700	2,055,300	18,848,000	81,003,000	18,513,200	179,821,700
Welfare, Y.M.C.A., etc.	4,371,000	11,801,700	1,038,500	6,169,000	13,748,500	11,516,500	48,645,200
Total Value of New Buildings	$422,895,800	$1,570,339,100	$223,882,000	$386,132,900	$2,169,959,700	$787,158,200	$5,560,367,700

Total Value of New Building in Forecast for 1924—$5,560,367,700

AN interesting comparison and interpretation of the building outlook for 1924 may be had through a study of the figures presented in the tabulations on this page. It will be noted that the forecast figure for 1924 is over $500,000,000 greater than the forecast (and actual figure) for 1923. A full explanation of this forecast will be found in the accompanying article. These tables show for six geographical divisions the building types in which architects may expect activity.

Forecast for 1923 as published in January, 1923, issue of THE ARCHITECTURAL FORUM

BUILDING TYPES	N. EASTERN STATES	N. ATLANTIC STATES	S. EASTERN STATES	S. WESTERN STATES	MIDDLE STATES	WESTERN STATES	U. S. A.
Dwellings (Under 20,000)	$16,622,000	$86,465,000	$12,825,000	$12,084,000	$59,160,000	$34,925,000	$222,081,000
" ($20,000 to $50,000)	11,668,000	41,828,000	8,587,000	10,552,000	33,468,000	12,757,000	118,860,000
" (Over 50,000)	6,045,000	27,481,000	2,031,000	6,113,000	21,077,000	10,444,C00	73,191,000
Apartments	56,020,000	237,296,000	25,392,C00	34,323,000	229,552,000	80,302,000	662,885,000
Hotels	33,589,000	141,146,000	27,683,000	40,765,000	205,332,000	60,475,000	508,989,000
Clubs, Fraternal, etc.	15,888,000	58,221,000	13,268,000	28,784,000	109,700,000	50,406,000	276,266,000
Churches	17,577,000	128,120,000	15,128,000	25,519,000	82,903,000	43,688,000	312,936,000
Community, Memorial	14,620,000	27,401,000	1,950,0C0	6,209,C00	46,509,000	21,099,000	117,788,000
Welfare, Y.M.C.A., etc.	3,295,C00	15,702,000	2,576,000	3,302,000	15,680,C00	9,688,000	50,242,000
Hospitals	13,594,000	54,166,000	6,972.000	27,438,000	105,096,000	52,148,000	259,414,000
Office Bldgs.	21,157,000	88,877,000	18,089,000	26,359,000	190,486,000	82,603,000	427,570,000
Banks	17,608,000	54,328,000	8,835,000	18,783,000	154,482,C00	38,669,000	292,705,000
Schools, Public Bldgs.	65,159,000	158,165,000	41,515,000	31,930,000	383,036,000	190,228,000	870,034,000
Theatres	9,573,000	34,847,000	2,759,000	7,381,000	29,388,000	17,943,000	101,891,000
Stores	11,113,000	35,383,000	6,826,0C0	7,480,000	58,361,000	27,723,000	146,887,000
Industrial	29,859,C00	162,762,000	38,824,000	25,231,000	241,871,000	49,488,000	548,037,000
Automotive	11,988,000	35,942.000	2,799,000	8,386,000	52,464,000	15,190,000	126,768,000
Total Value of New Buildings	$355,375,000	$1,388,130,000	$236,059,000	$320,639,000	$2,018,565,000	$797,776,000	$5,116,544,000

Railroad expenditure in 1924 may slow down a bit, the review says, as the roads have placed their equipment in good shape, but "other construction work is likely to go forward on a scale little if any below that of 1923. The issues of building permits in recent months indicate that such operations will be up to the capacity of the building trades." Another important business asset of the nation has been the development of the use of electricity. As for the automobile industry, the review suggests that "the outlook at this time, judging by the reports received by the principal producers from their agencies, is for the maintenance of this (the 1923) volume of sales in the ensuing year."

In its study of business conditions the Mechanics and Metals National Bank finds that "reasons for optimism are well founded," and that the "factors which are operating most positively in favor of the country are of course the energy and ability of the American people and their extraordinary facility for production and distribution." A number of problems before the country are enumerated, among them "the unreasonably burdensome scale of national, state and municipal taxes, the hostile attitude of certain groups of politicians to corporate interests, and the insistence upon extending Government help where it should not go."

Francis H. Sisson, Vice-president of the Guaranty Trust Company of New York, believes that business will steer a safe, middle course in 1924 as indicated by his statement: "The bearing upon the future course of business of the adverse conditions prevailing, such as disproportionately high production costs here and there and unduly low prices for some commodities, should not be ignored. But these conditions are not new. They obtain always in some measure. Besides, in recent months a significant degree of correction of such conditions has been effected, and meanwhile they have not prevented a continuance of prosperity. With due allowance for further necessary readjustments, both in prices and in production, the general business outlook for 1924 is favorable. Neither an approaching boom nor a general depression is now indicated, but rather the continuance of a more wholesome middle course."

E. G. Grace, President of the Bethlehem Steel Corporation, makes the statement: "On the whole, however, the year is starting with so many favorable earmarks that the adverse political possibilities can, to a certain extent, be ignored when we consider their improbability of realization. It must be remembered that the country, as a whole, is in a much better frame of mind than that which prevailed at the middle of last year, when there was talk of another serious readjustment such as that of 1920. Buyers are more confident in arranging for future commitments, and even though some lines of industry are not prosperous, the country as a whole is in a favorable position."

From the viewpoint of architects 1924 should prove to be an exceptionally good year except in those districts affected by adverse business conditions and where little activity is reflected in the accompanying survey. A review of the individual reports which have been received in the office of THE ARCHITECTURAL FORUM indicates that the average building project is somewhat larger than in 1923 and that the average character of proposed new buildings is somewhat better, requiring even more specifically the service of architects.

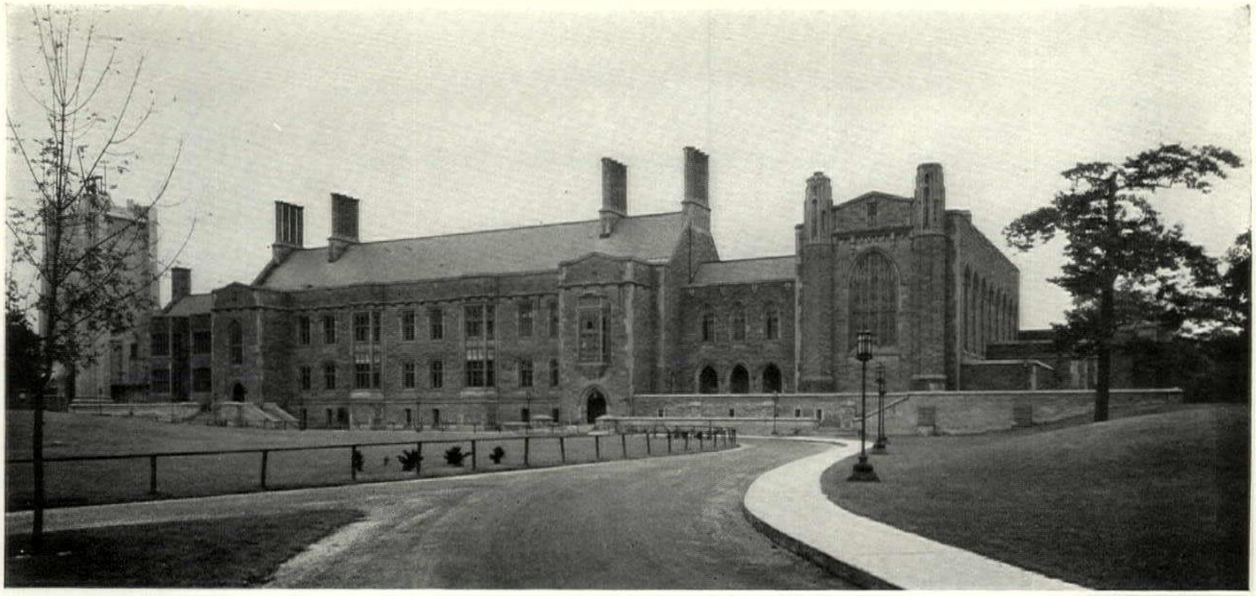
Appreciation of the economic value of architectural service is growing rapidly and spreading not only among the investing public but through specific business groups, including bankers and owners of buildings of special types. The average architect is learning to definitely develop the economic phases of his service. He is learning to analyze his client's building problem from the viewpoints of promotion, financing and investment, and consequently his plans are being more specifically adapted to the evident purposes of the structure.

It is quite obvious also that the architect who is able to impress an owner with his general knowledge of local real estate and business conditions and who can assist the owner in solving his problem is certain to have a busy office when others who merely provide what the owner asks are not developing the type of good will which goes with the broader form of service. There has never been a time when the architect's position has been more important in the community, and it is very definitely his responsibility to influence the wise expenditure of time and money in new building projects. It must be remembered that every building which is successfully planned encourages the building of additional structures, and that the difference between economic waste and efficiency in the field of building construction lies primarily in careful planning to meet established objectives.

Features of The Forum's Service Section

The Service Section of THE ARCHITECTURAL FORUM is located in the yellow pages toward the back of the magazine. Here will be found a monthly review of the building situation, and on the second page a new feature begins this month which is a record of activity in each of seven basic types of building construction. The personnel and purpose of the Consultation Committee is explained in this section, following which there will be found a careful digest of information important to the architect as selected from publications in other fields.

To read the Service Section each month is to know the general building situation, and it affords an excellent source of information for use in discussions with clients.



Hart House, University of Toronto

SPROATT & ROLPH, ARCHITECTS

By J. B. BICKERSTETH, *Warden of Hart House*

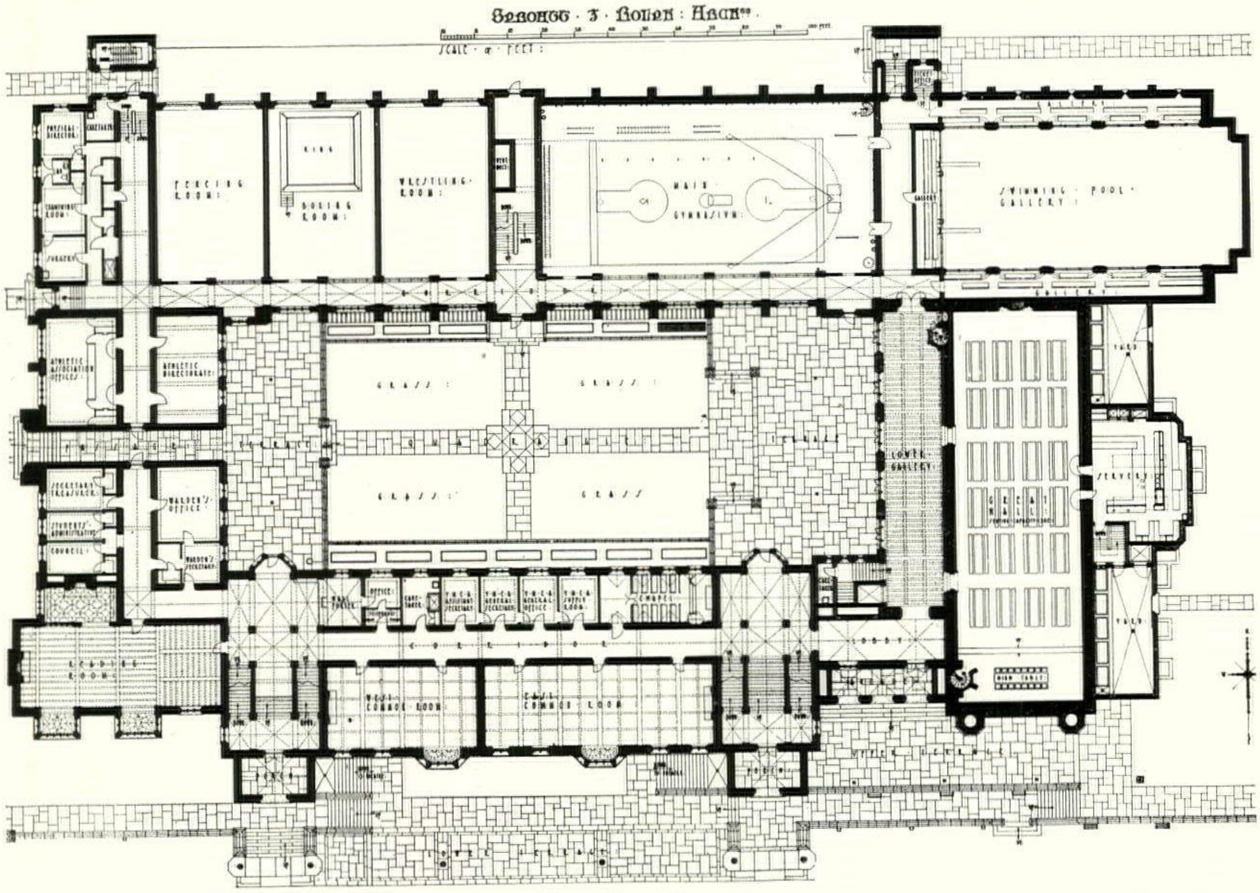
HART HOUSE is so called in memory of the late Hart Massey. Begun in 1911, it was completed in 1919 and presented, fully equipped, to the University of Toronto by the trustees of the Massey Foundation. To Vincent Massey, Vice-chairman of the Massey Foundation, is due the idea of Hart House as well as the form it assumed under his personal supervision. Owing to the war the building developed slowly, but the enforced delay of five years, during which time construction was reduced to a minimum, afforded valuable opportunity for widening the scope of its activities.

From the autumn of 1914 until November, 1918, it was used for military purposes, and within its walls thousands of men were trained for service overseas. On the first anniversary of the Armistice —November 11, 1919—Hart House was formally opened by His Excellency, the Duke of Devonshire, who was at that time the Governor-general of Canada. The architects of the building were Henry Sproatt and Ernest Rolph of Toronto. Their object was the creation of a work of art in the true sense, but they never failed to strike a fine balance between beauty of design and utility of purpose. Owing to the generosity of the Massey Foundation, the vision of Vincent Massey and the skill of the architects, there is no question that the University of Toronto possesses a building which comes as near to meeting the requirements of the ideal house for student activities as any on this continent or perhaps in the world.

In its widest interpretation, Hart House, which is for the use of men and is non-residential, seeks to provide for all the activities of the undergraduate's life which lie outside the actual lecture rooms. Architecturally of great beauty and built round a quadrangle, Hart House is unique in that it houses under one roof a finely proportioned hall, common rooms of every description, a library, lecture room, music room, a small chapel together with rooms for the use of the Student Christian Association, a studio for painting and sketching, photographic dark rooms, billiard room, senior common rooms and dining rooms for both faculty and graduate members, an upper and lower gymnasium, both admirably equipped, separate rooms for boxing, wrestling and fencing, an indoor running track, a large swimming pool, racquet courts, an indoor rifle range, extensive locker rooms, offices for the athletic and medical staff, a few bedrooms for guests, and the office and private rooms of the warden. Below the quadrangle is a fully equipped theater with foyer, green room, dressing rooms, wardrobe, and the office of the director of the theater.

Every male undergraduate of the university is required to be a member of Hart House, toward the upkeep of which he pays a moderate annual fee. At the moment there are some 3,600 undergraduate members. The graduates or alumni, of whom there are about 400 members, also pay an annual fee, as do faculty members, numbering some 250. The house has no endowment, and these fees are its chief source of revenue. To the warden, who is directly responsible to the president of the university, is entrusted the general supervision of the whole house, but to a large extent it is managed by the students themselves. At least 80 men, annually elected by their fellows, serve on the various committees.

What was it the Founders had in mind when they caused Hart House to be built? Perhaps this question may be best answered by quoting in full the Prayer of the Founders, which is "That Hart



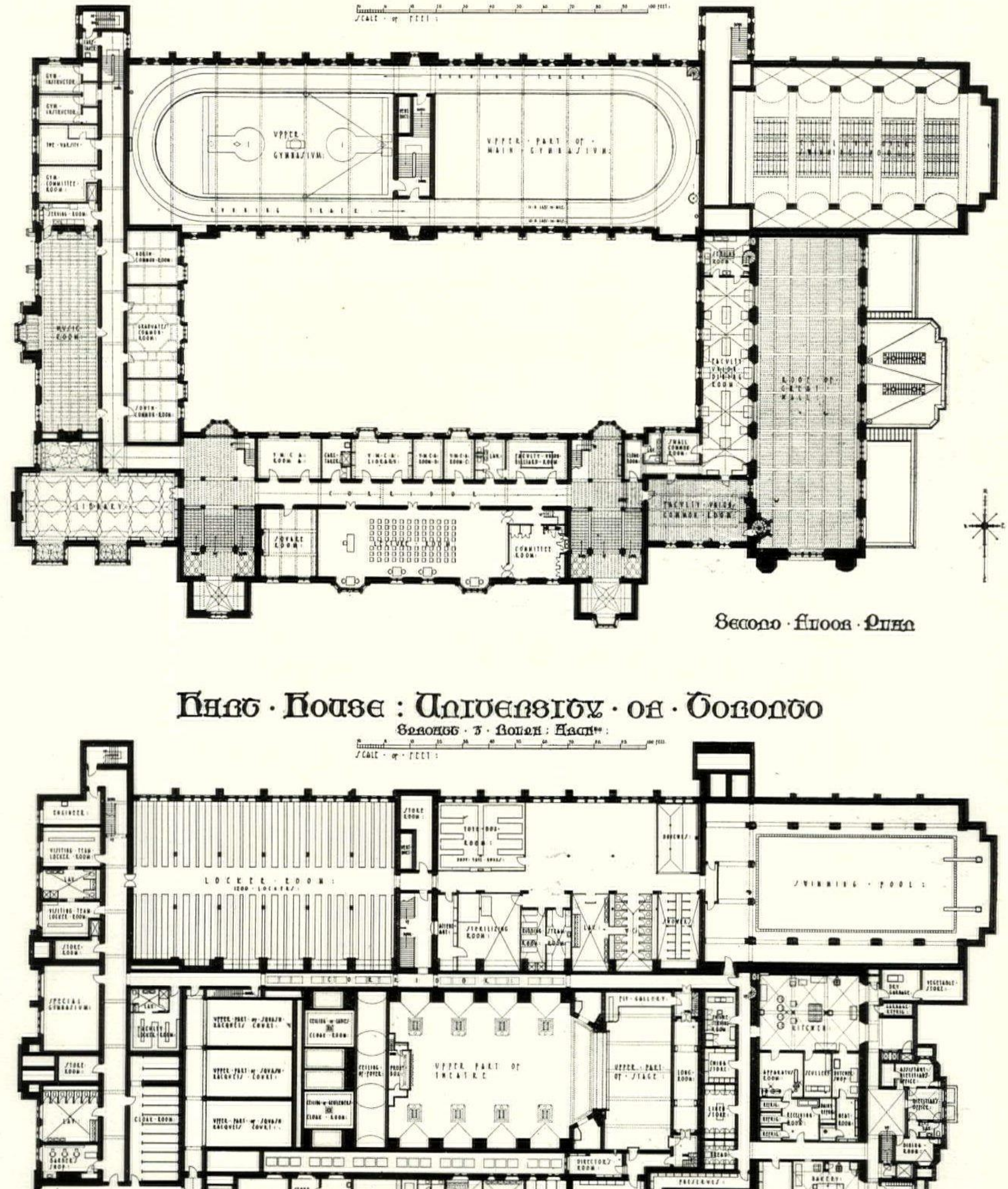
First Floor Plan

House, under the guidance of its warden, may serve, in the generations to come, the highest interests of this university by drawing into a common fellowship the members of the several colleges and faculties, and by gathering into a true society the teacher and the student, the graduate and the undergraduate; further, that the members of Hart House may discover within its walls the true education that is to be found in good fellowship, in friendly disputation and debate, in the conversation of wise and earnest men, in music, pictures and the play, in the casual book, in sports and games and the mastery of the body; and lastly, that just as in the days of war, this house was devoted to the training in arms of the young soldier, so in the time of peace its halls may be dedicated to the task of arming youth with strength and suppleness of limb, with clarity of mind and depth of understanding, and with a spirit of true religion and high endeavor."

The object of the Founders, then, was to erect a building which should not only pay adequate attention to the material comfort of the student but should also make full provision in the widest sense of the word for his spiritual development. How far is Hart House, after four years of existence, fulfilling these ideals? In the great hall, which is as beautiful as the hall of any Oxford or Cambridge college, meals are served to the students at a moderate cost throughout the academic year. At the south end of the hall above the high table the oak panels bear the royal arms and the arms of 51 universities of the British Empire. At the north end the panels bear the arms of 74 universities of the allied nations—France, Belgium, the United States of America, Italy, Russia, Japan, Serbia, Roumania, Portugal and Greece. The use of this hall as a dining room brings the student daily under the influence of its beauty, which would have been impossible had it been reserved for special occasions.

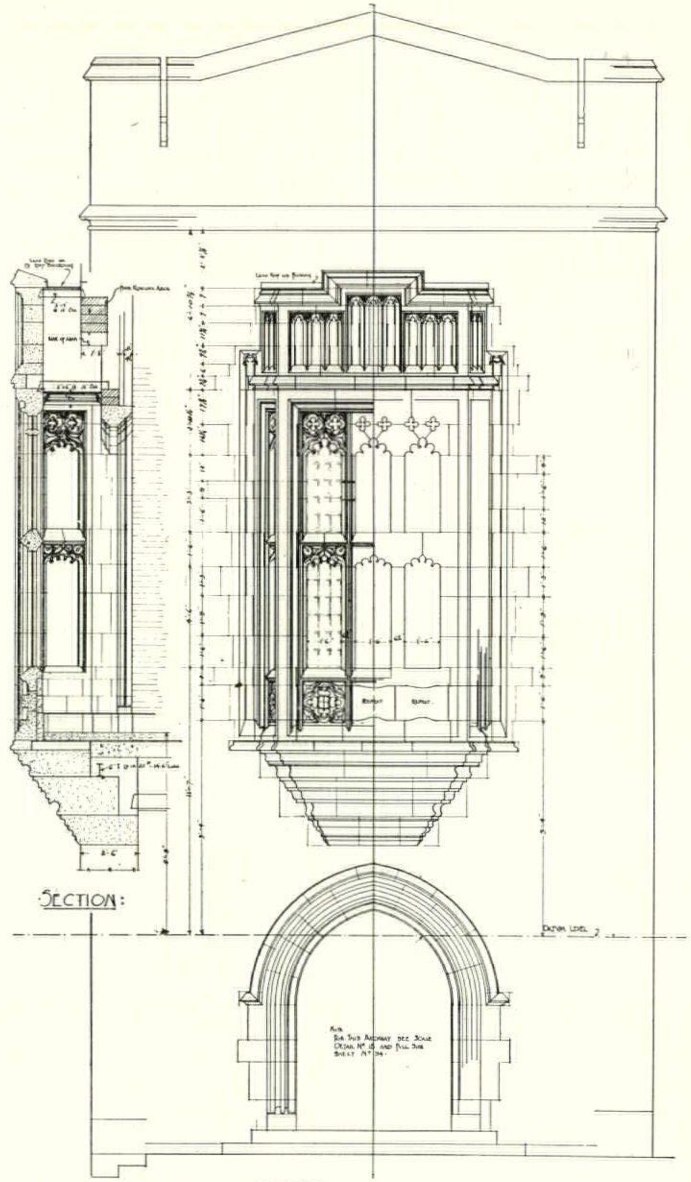
The reading room, the library and the various common rooms, all of which are most comfortably furnished, are thronged daily with hundreds of students. Indeed the use made of Hart House by all members of the university—undergraduate, graduate, and faculty—increases with each succeeding year, and it is becoming more and more a meeting place for students of different faculties, colleges and years. The gymnasium wing, including the swimming pool, is in daily use for the physical training required by the university of all first and second year men, and in the afternoon this part of the building is in great demand by men engaged in every kind of indoor sport.

An interesting development in the musical activities of the house has been the inauguration last year of a series of Sunday concerts in the great hall. These concerts have been held every third Sunday evening, between the hours of 9 and 10, and the leading professional musicians of Toronto have given their services free. During full term time



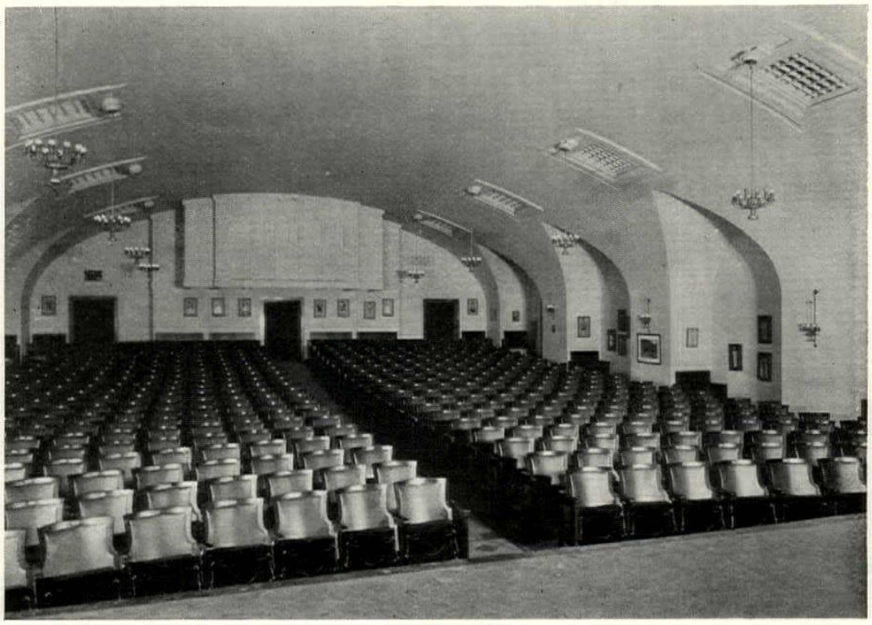
HART HOUSE, UNIVERSITY OF TORONTO, TORONTO

SPROATT & ROLPH, ARCHITECTS



DETAILS OF EAST ENTRANCE ON SOUTH FRONT, HART HOUSE, UNIVERSITY OF TORONTO
SPROATT & ROLPH, ARCHITECTS

recitals are held in the music room every Friday at 5, when professional musicians from Toronto again give their services, and the attendance is very large.

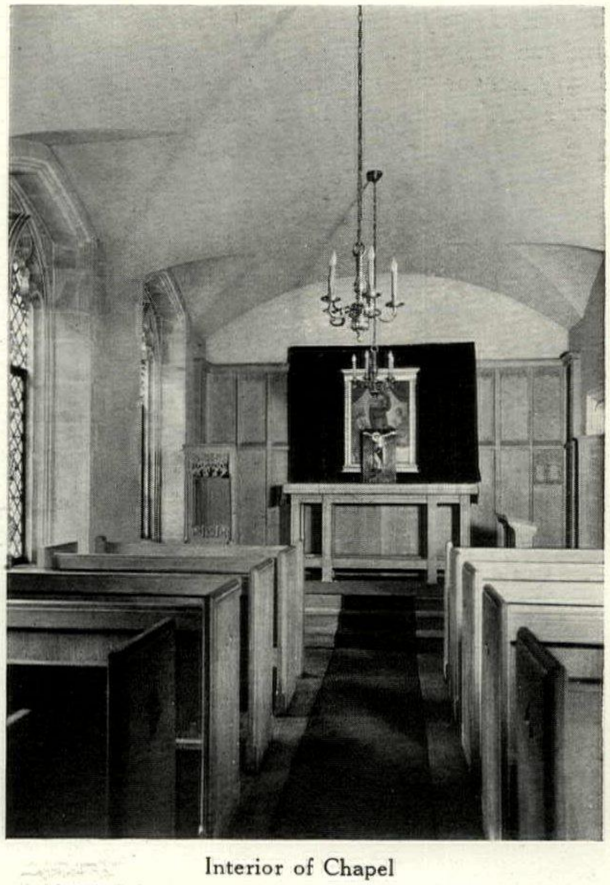


Interior of Theater, from Stage

The activities centering around the sketch room, equipped for drawing and painting, are playing an increasingly important part in the life of the house. Every month an exhibition of paintings is held, sometimes the work of some Toronto artist, or it may be a collection of Japanese prints or Cézanne drawings. In connection with the exhibition, which lasts a week, a lecture always takes place either with particular reference to the pictures then on the walls, or on some general aspect of art. On one evening a week lessons in sketching and painting are given by one of the best known of the Toronto artists. The camera club, which is an active organization, possessing fully equipped dark rooms within the house, holds an annual exhibition in the sketch room.

The religious life of the house centers around the work of the Student Christian Association. The chief function of this association is the promotion of all purely religious activities among the students, and owing to the fact that when the house was being planned the Founders made provision for offices which should be occupied by the men's religious organization, this important side of university life has not been divorced from other student activities. The little chapel, which is of great beauty, is used from time to time for informal services and also for

Theater Foyer

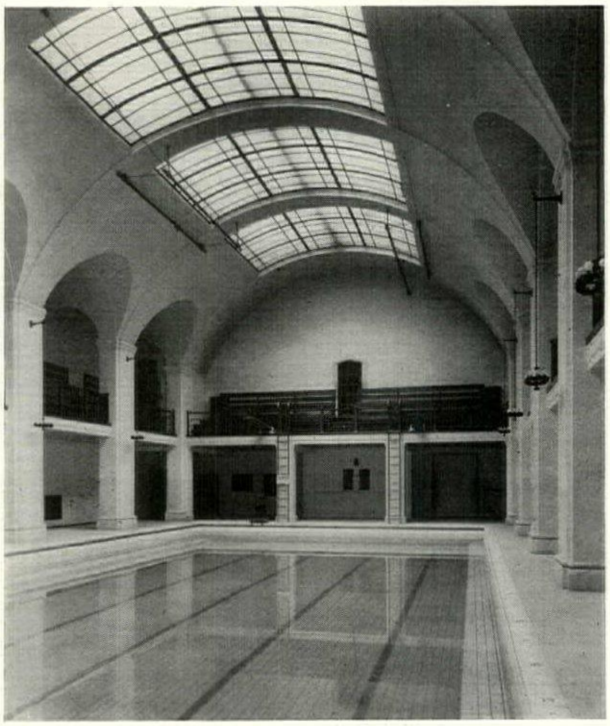


Interior of Chapel

Hart House, University of Toronto

private prayer. The glass in the windows was collected from the devastated areas of France, Flanders and Italy, while over the altar is a Crucifix carved by Eric Gill, the well known English sculptor.

Hart House Theater, cleverly constructed under the quadrangle, seats 500 people. It is reached through separate outside entrances and a foyer. The lighting and mechanical equipment are probably unequaled in any theater of this size. The Director of Hart House Theater, Bertram Forsyth, is responsible for the production of all plays, a different play being acted throughout one week (seven performances) in each month of the academic year. The actors and stage crew are all amateurs, the actors being drawn partly from students and faculty and partly from groups of people in the city who are interested in the little theater movement.



Swimming Pool

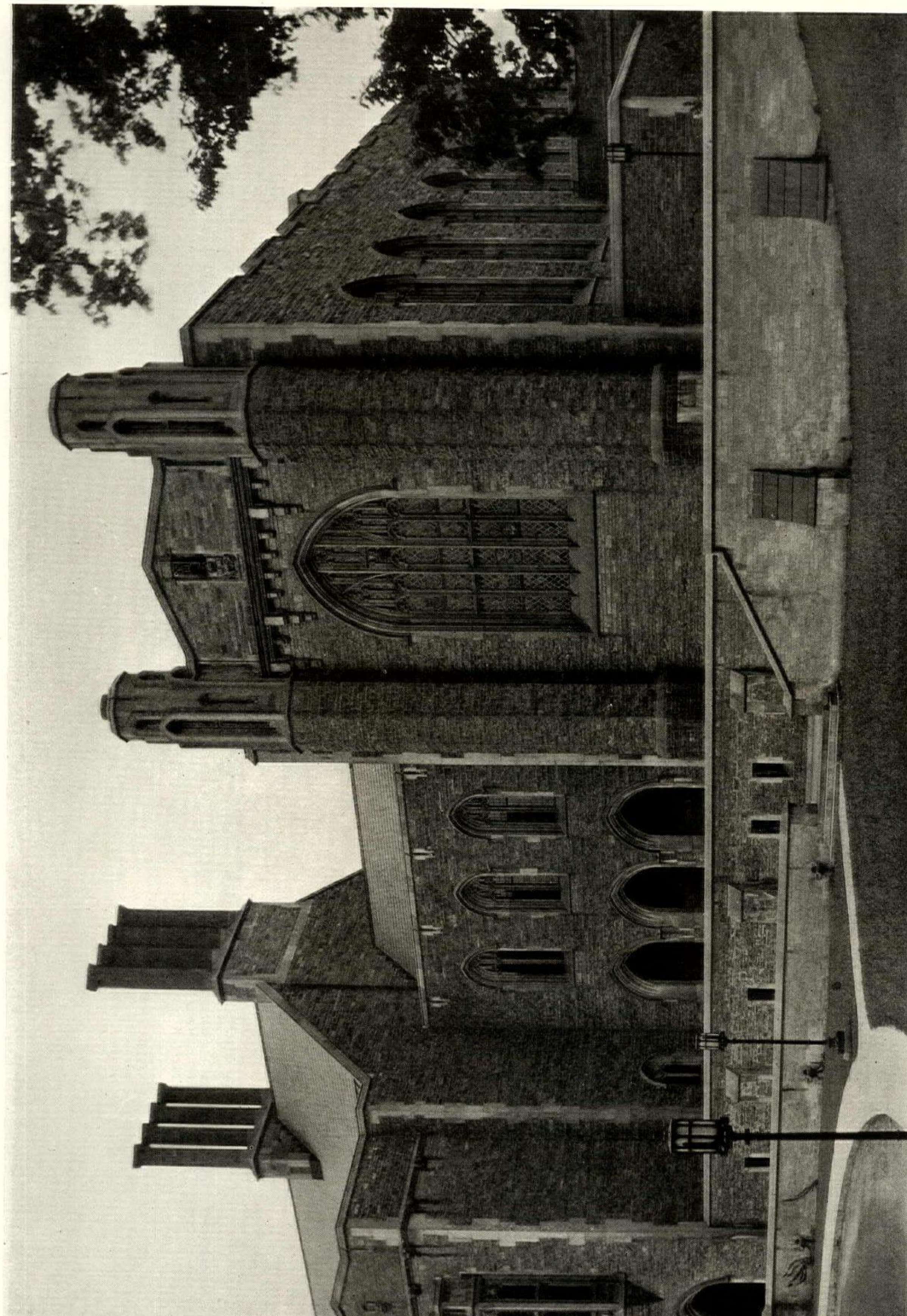
The rubble walls of Hart House are built of a local gray sandstone. The cut stone is gray Indiana limestone. The roof is covered with extra heavy Bangor green slate, the window sash are steel made in England, and terrace flagging, walks, etc., are of gray Ohio stone.

The interior is devoid of elaboration and very simply finished throughout, with the exception of a few of the principal rooms. The great hall has an open timbered roof of American oak. The paneling of Austrian oak is carried up about 13 feet to the stone sills of the mullioned windows. The floor is paved with Italian travertine, as also are all corridors and halls throughout the building, with the exception of the gymnasium section. The faculty common room and the large lecture room and music room have open timbered roofs, the first two of oak and the music room of Pacific coast cedar. The oak floors throughout the house are laid of boards from 4 to 8 inches in width and have stood the change of seasons well. Oak work, timbered roofs, doors, etc., are left in the natural wood without filling or stain. All inside door and window openings throughout the building have moulded stone jambs and heads, no wooden architraves or bases being used except in a few of the minor offices, the use of wood being largely avoided for trim.

Detail of Fireplace at End of Great Hall Showing the Arms of the Universities of the Allied Nations

DETAIL OF EAST ENTRANCE ON SOUTH FRONT
HART HOUSE, UNIVERSITY OF TORONTO, TORONTO
SPROATT & ROLPH, ARCHITECTS

Photos. Paul J. Weber



EASTERN END OF BUILDING FROM APPROACH
HART HOUSE, UNIVERSITY OF TORONTO, TORONTO
SPROATT & ROLPH, ARCHITECTS

DETAIL OF WEST ENTRANCE ON SOUTH FRONT
HART HOUSE, UNIVERSITY OF TORONTO, TORONTO
SPROATT & ROLPH, ARCHITECTS

VIEW IN QUADRANGLE LOOKING WEST

TERRACE AT EASTERN END OF QUADRANGLE

HART HOUSE, UNIVERSITY OF TORONTO, TORONTO

SPROATT & ROLPH, ARCHITECTS

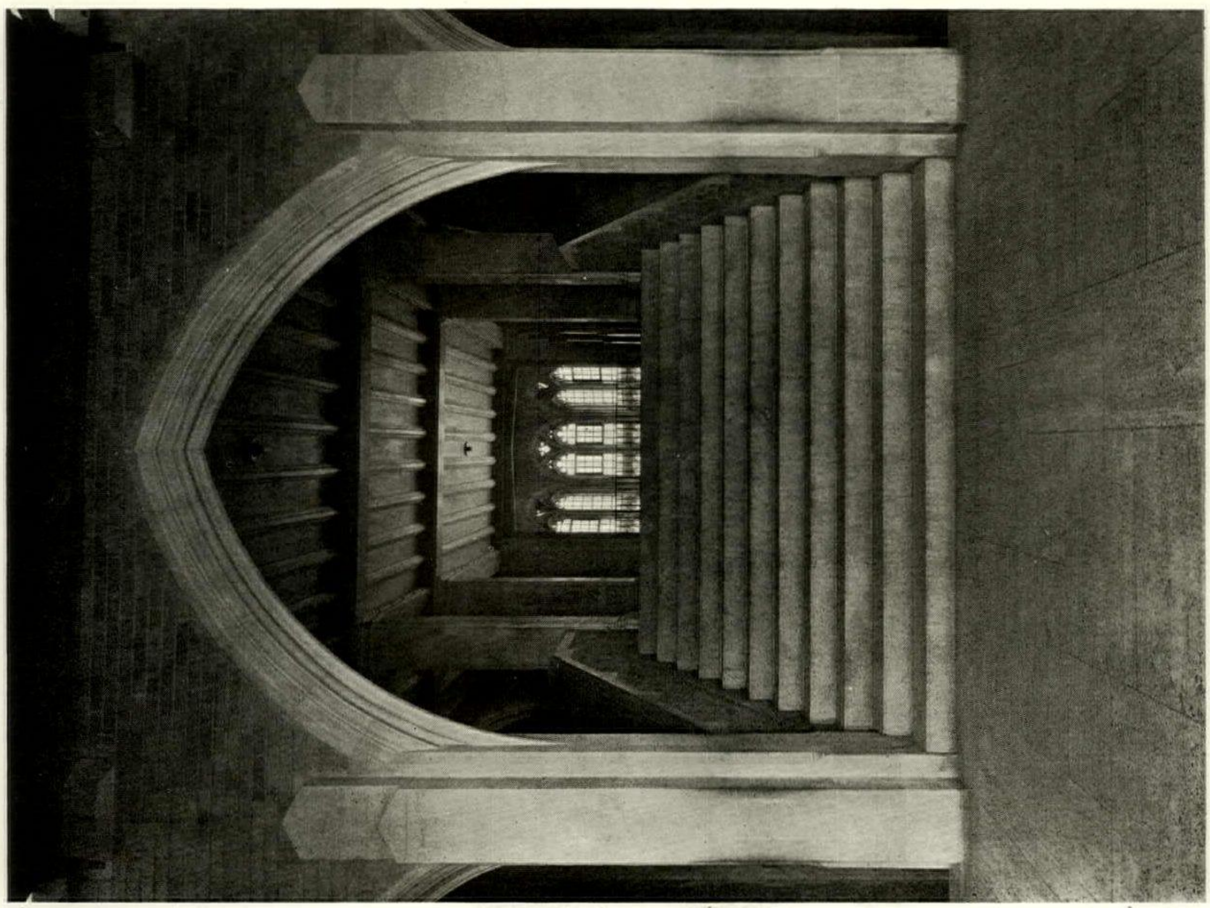
DETAIL AT WEST END OF QUADRANGLE

HART HOUSE, UNIVERSITY OF TORONTO, TORONTO

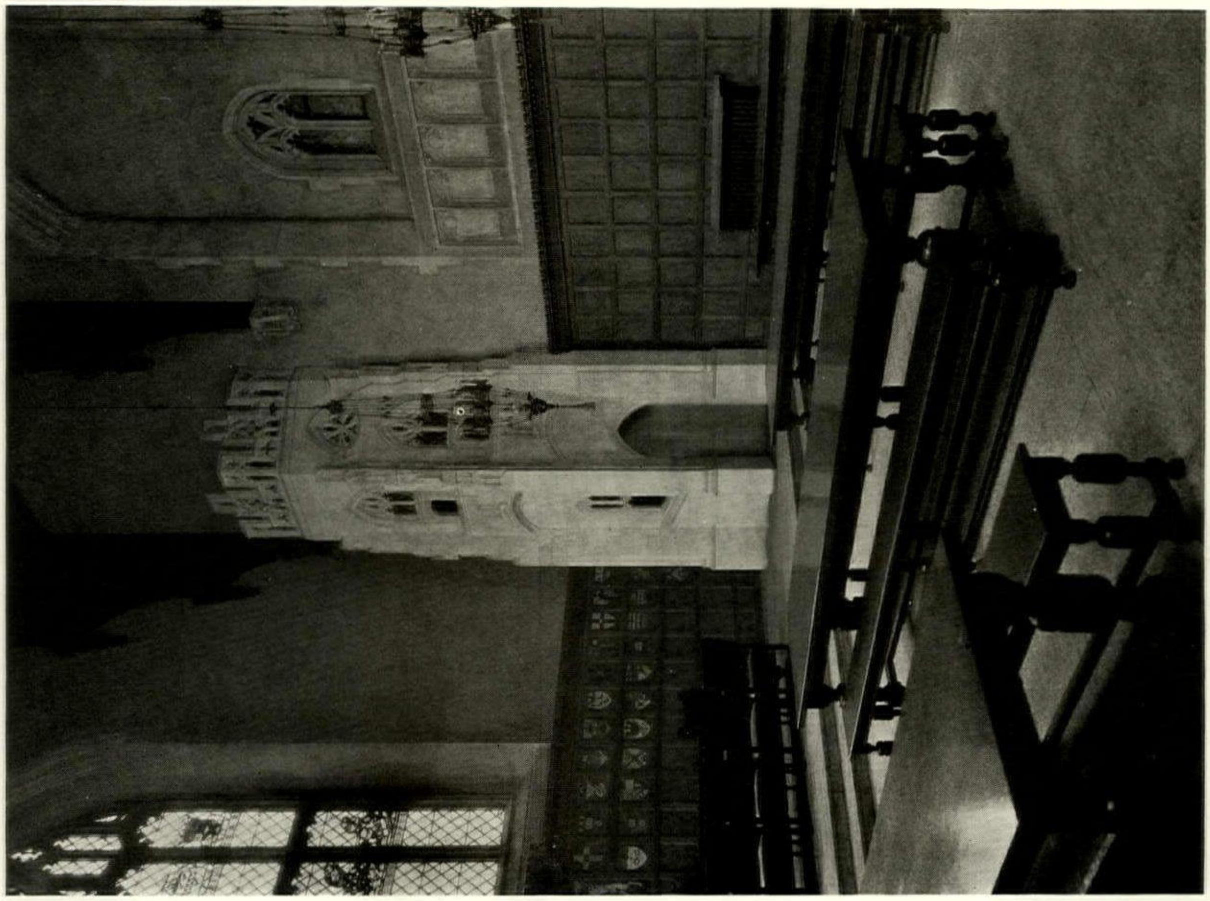
SPROATT & ROLPH, ARCHITECTS

DETAIL AT WEST END OF QUADRANGLE
HART HOUSE, UNIVERSITY OF TORONTO, TORONTO
SPROATT & ROLPH, ARCHITECTS

THE GREAT HALL LOOKING NORTH
HART HOUSE, UNIVERSITY OF TORONTO, TORONTO
SPROATT & ROLPH, ARCHITECTS



VESTIBULE OF ENTRANCE ON SOUTH FRONT

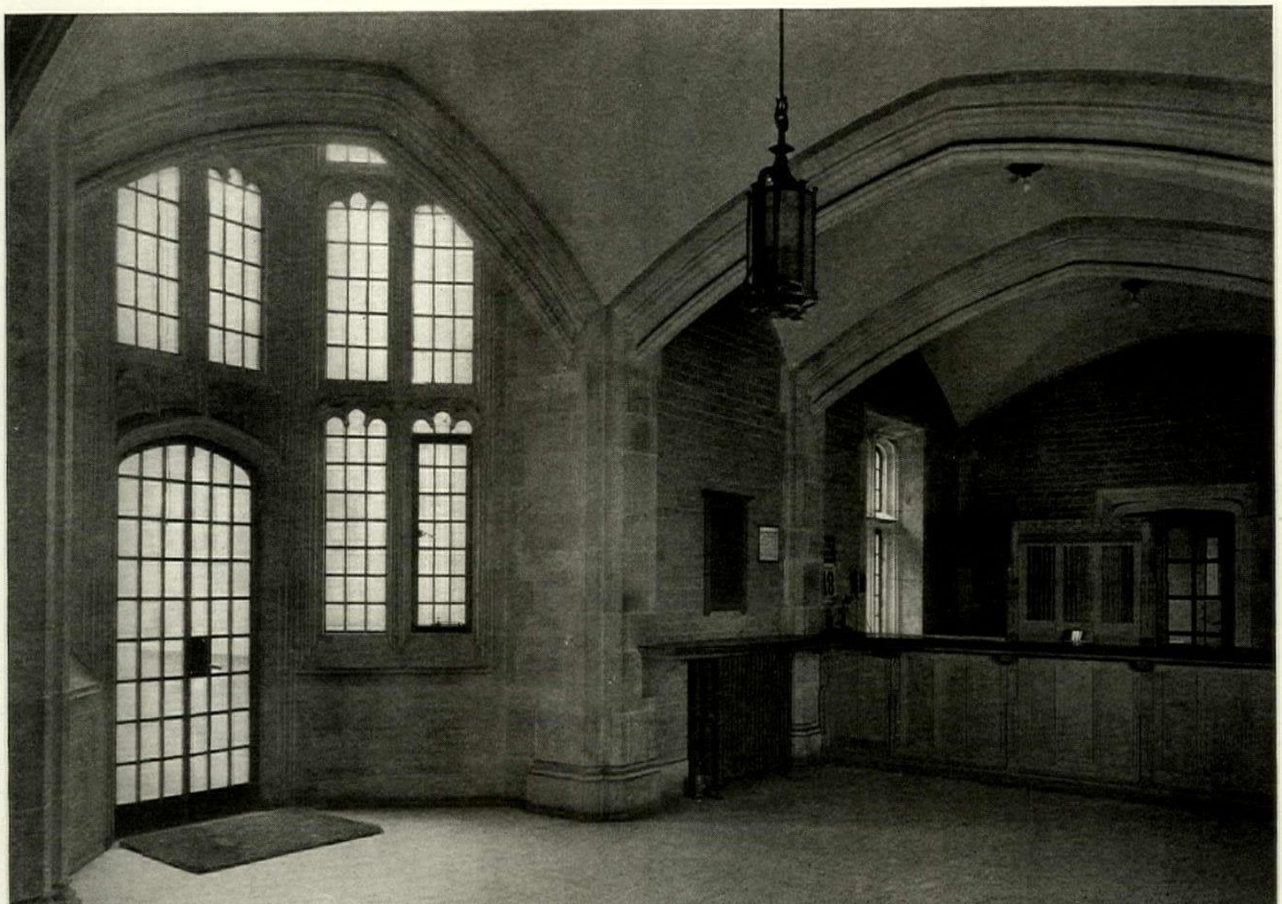


HIGH TABLE END OF GREAT HALL

HART HOUSE, UNIVERSITY OF TORONTO, TORONTO

SPROATT & ROLPH, ARCHITECTS

LOWER GALLERY ADJOINING GREAT HALL



LOBBY LOOKING TOWARDS PORTER'S DESK

HART HOUSE, UNIVERSITY OF TORONTO, TORONTO

SPROATT & ROLPH, ARCHITECTS

FIREPLACE END OF READING ROOM

LIBRARY END OF READING ROOM

HART HOUSE, UNIVERSITY OF TORONTO, TORONTO

SPROATT & ROLPH, ARCHITECTS

Mosaics in the Church of San Marco, Rome

By ALFRED MAUSOLFF

Accompanied by Measured Drawings by the Author

NOT the least of the details which render glorious the old cathedrals and churches of Italy are the floors of mosaic of different kinds, the making of which constitutes an art which has been practiced in one form or another for thousands of years. The art consists, of course, in the use of small fragments of marble or other substances joined to form a pattern or sometimes a picture, which should never be so involved or intricate as to become confused. If a picture be undertaken it should be conventionalized, with as little detail as is necessary for the design and of course with no attempt at perspective, particularly when the mosaic is to be used for covering a floor, where use must be made of design somewhat different from what would be appropriate were the mosaic to cover a wall or the half-domed apse of a basilica.

Mosaic depends for effect almost as much upon its color as upon its directness and simplicity of design, and both are impaired when too much is attempted in the way of shading to create perspective or when over-elaborate detail is worked out by the use of varied colors of marble.

It was not until rather later than the golden age of mosaic that excessive elaboration brought a loss of virility and directness. Mosaic and stained glass have much in common, and the masterpieces in both these fields of art are the result of appropriate use of materials which are themselves comparatively simple, the success of the work depending upon careful drawing and upon skill in the use of detail which included full knowledge of the value of restraint. Mosaic paving was borrowed from the Greeks by the Romans who developed it to a high point of perfection.

There are four major types of mosaic paving, which are thus described:

1. *Opus tessellatum,* which is made up of cubes or *tesseræ* of stone or marble about ¾-inch square, laid to form simple geometrical patterns. *Tesseræ* of this form are of course sometimes used in other kinds of mosaic, but the work should not be called *opus tessellatum* unless its units are entirely of this square shape.

2. *Opus vermiculatum,* made of *tesseræ* of irregular shapes to conform to the pattern desired and of sizes of from ½- to 1/20-inch. Such mosaic in a background treatment or in large areas of one color somewhat resembles a mass of worms, which explains the name. This type of mosaic is generally of a pictorial character.

3. *Opus sectile.* Mosaic of this kind is made up of *secta* or units cut from marble or stone of many colors, and so laid that it is really a kind of marquetry worked out in marble and made to produce color as well as pattern.

4. *Opus Alexandrinum.* Much the same as *opus sectile,* excepting that the pattern would be geometrical and the units or *tesseræ* cut to forms which are triangles, oblongs, squares and hexagons.

Opus Alexandrinum Floor in Santa Maria in Cosmedin, Rome, Similar to Floor in San Marco

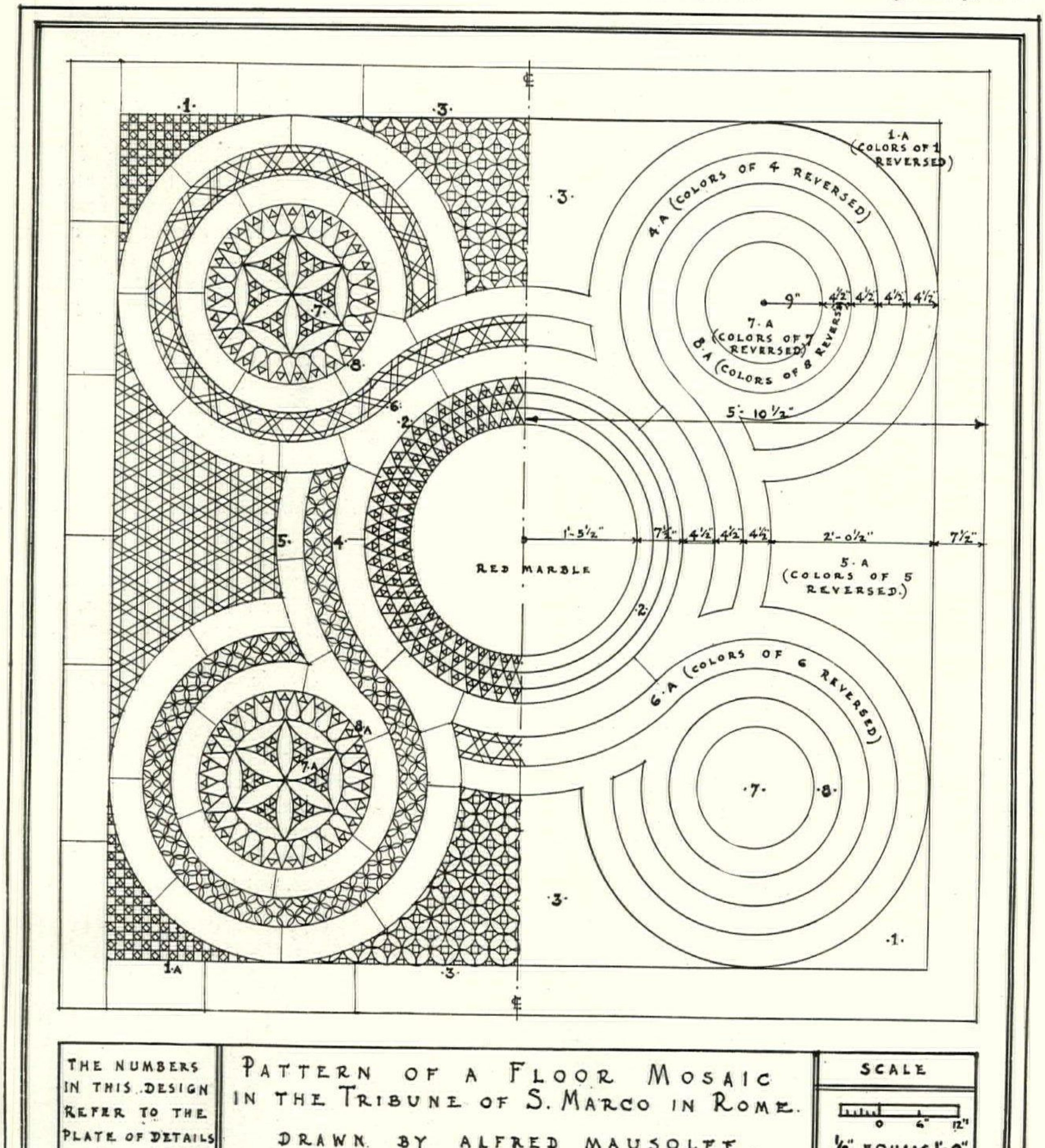
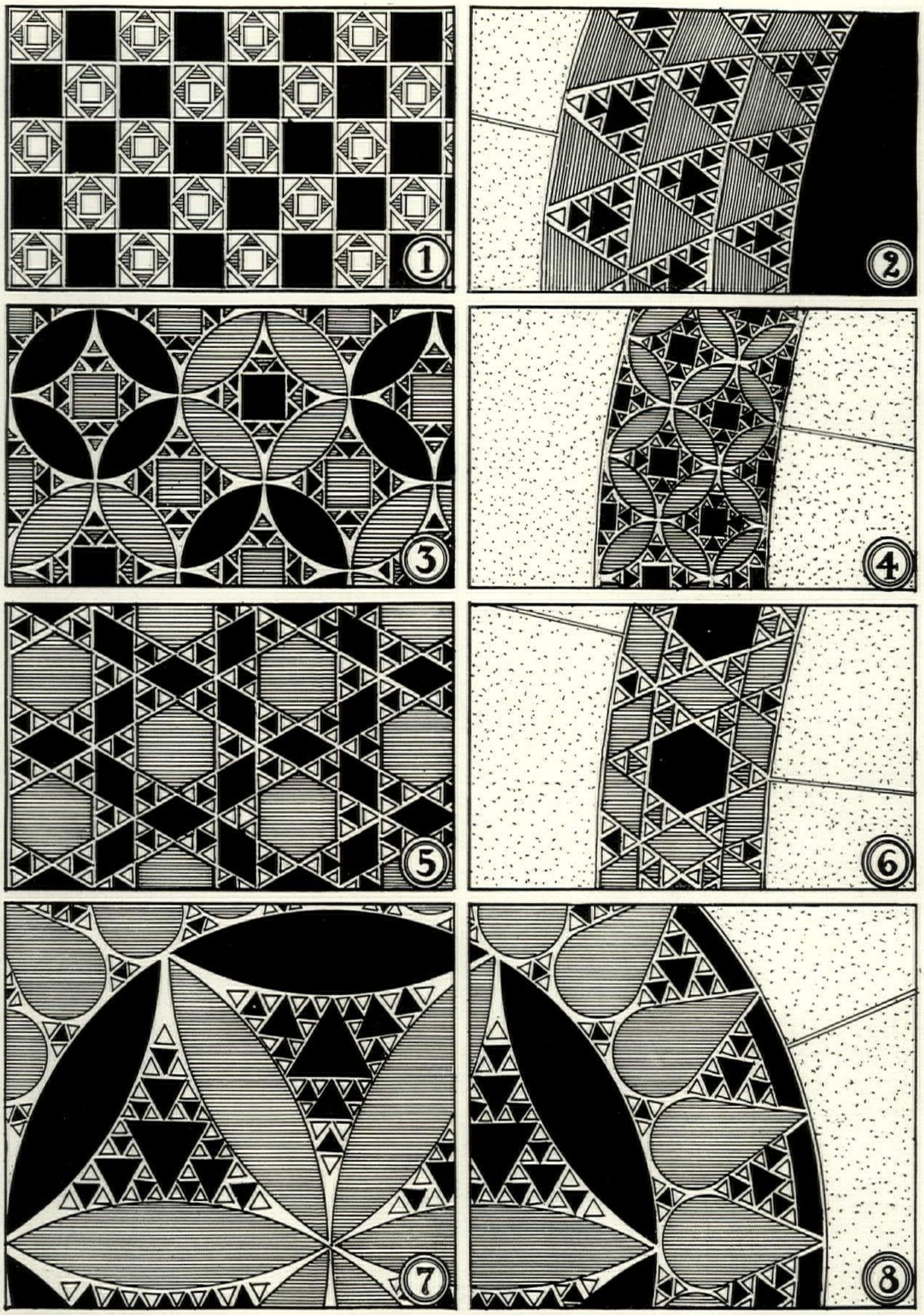


PLATE I

The mosaic floor patterns illustrated in these pages are from the Church of San Marco, which is built into the south wing of the Palazzo di Venezia in Rome. The entire floor of its tribune, which lies several steps higher than the nave, is beautifully treated with the form of mosaic known as *opus Alexandrinum.* Plate I shows the general scheme of the central design at the high altar, clearly outlined by the bands of creamy white marble. Plate II gives details of the mosaic patterns which fill in the fields between these bands of the major design.

The usual red porphyry, verd antique, and creamy white marble make up the color scheme. The reds and greens are in actuality very nearly identical in color value, and fairly dark. This permits them to be exchanged in opposing fields of the design without disturbing the coherency and balance of the whole. The cement used is grayish white in color, with joints varying from ⅛- to ⅜-inch.

In general, the cream bands are dull and soft in appearance, whereas there is a certain polish and gloss to the red and green pieces, and the floor as a whole does not possess the harsh regularity and stiffness of many of our modern examples.



COLOR KEY		DETAILS FROM A FLOOR MOSAIC IN THE TRIBUNE OF S. MARCO IN ROME.	SCALE
	WHITE		0 1" 2"
	GREEN		3" EQUAL 1'-0"
	RED	DRAWN BY ALFRED MAUSOLFF	

PLATE II

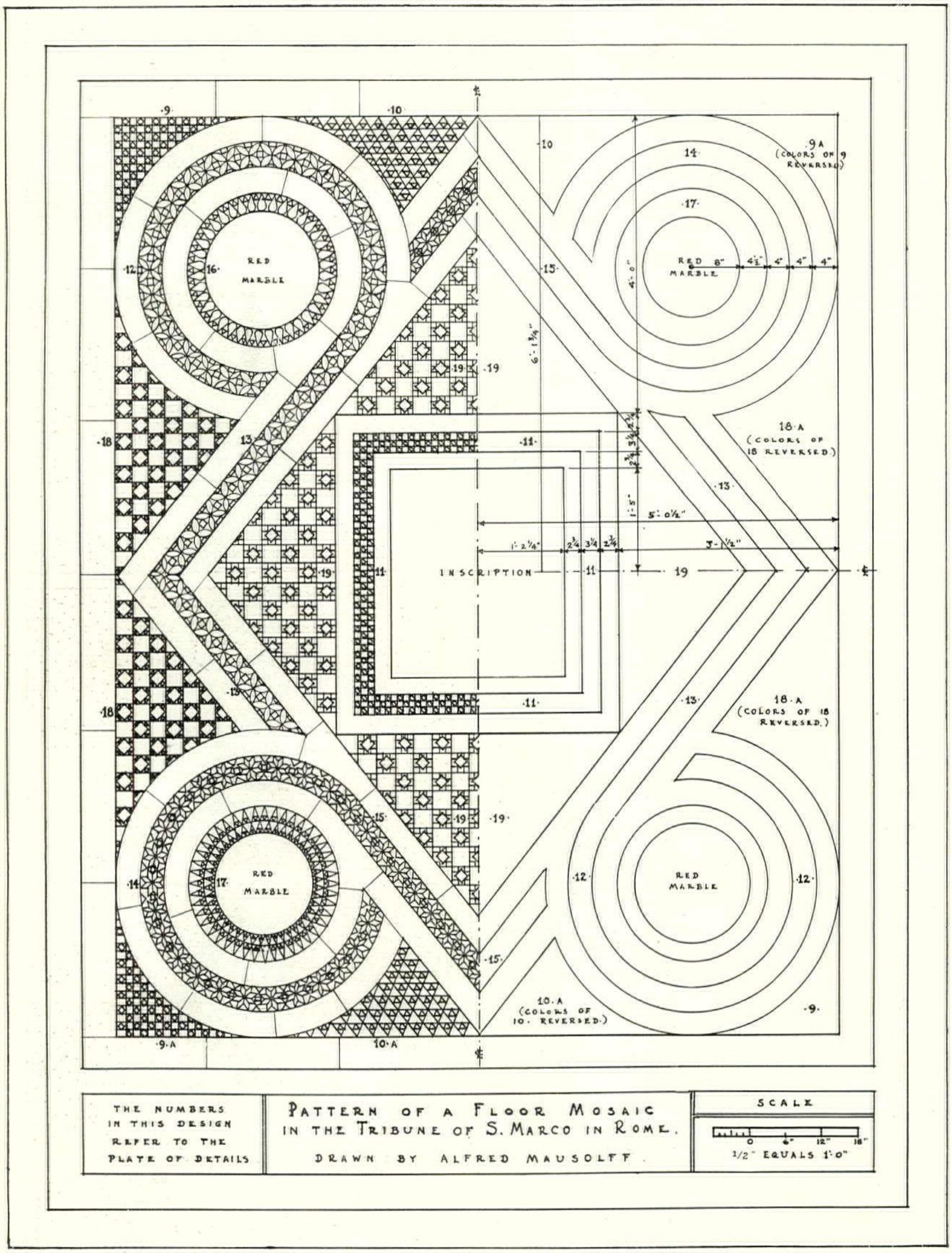
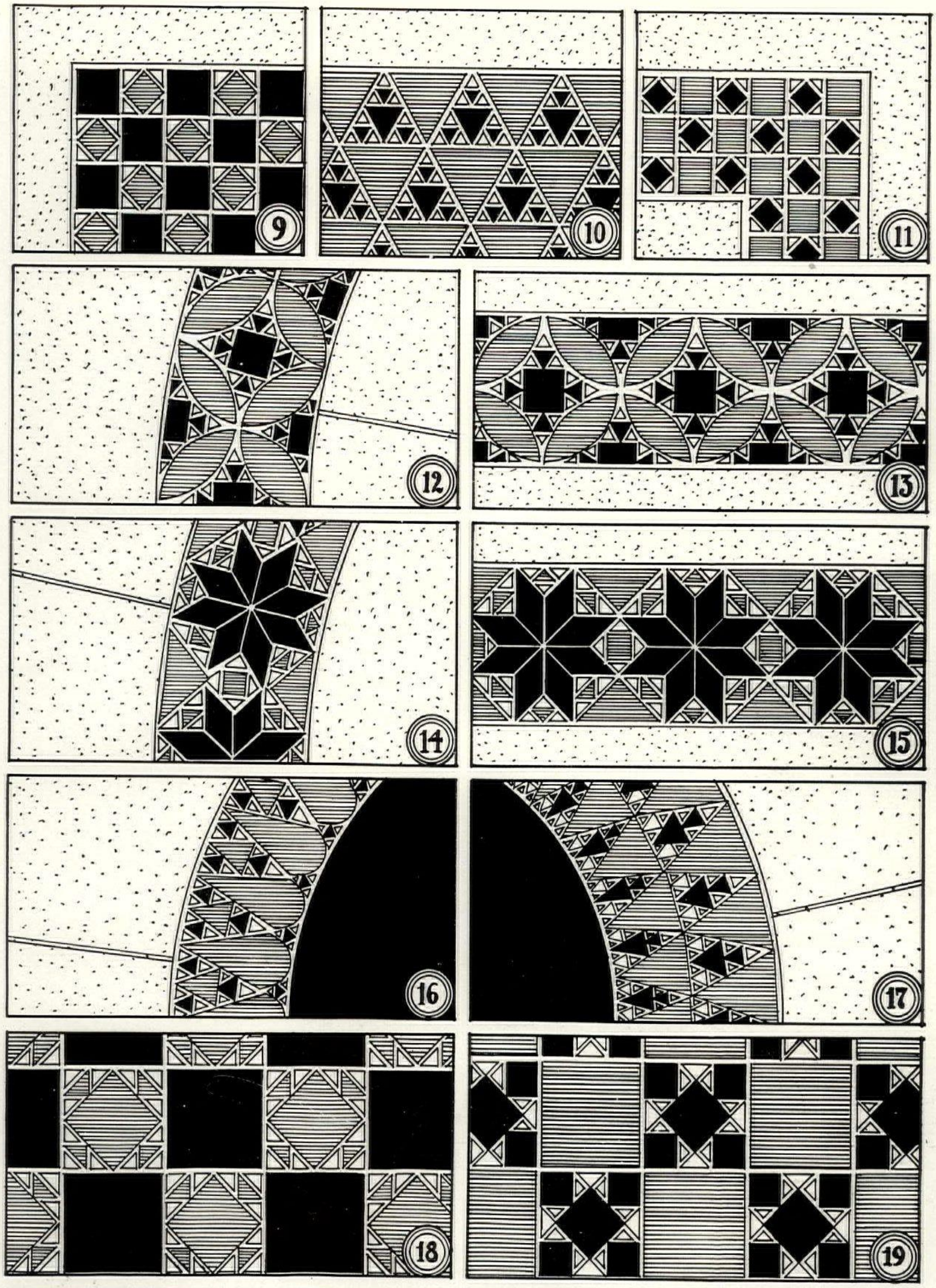
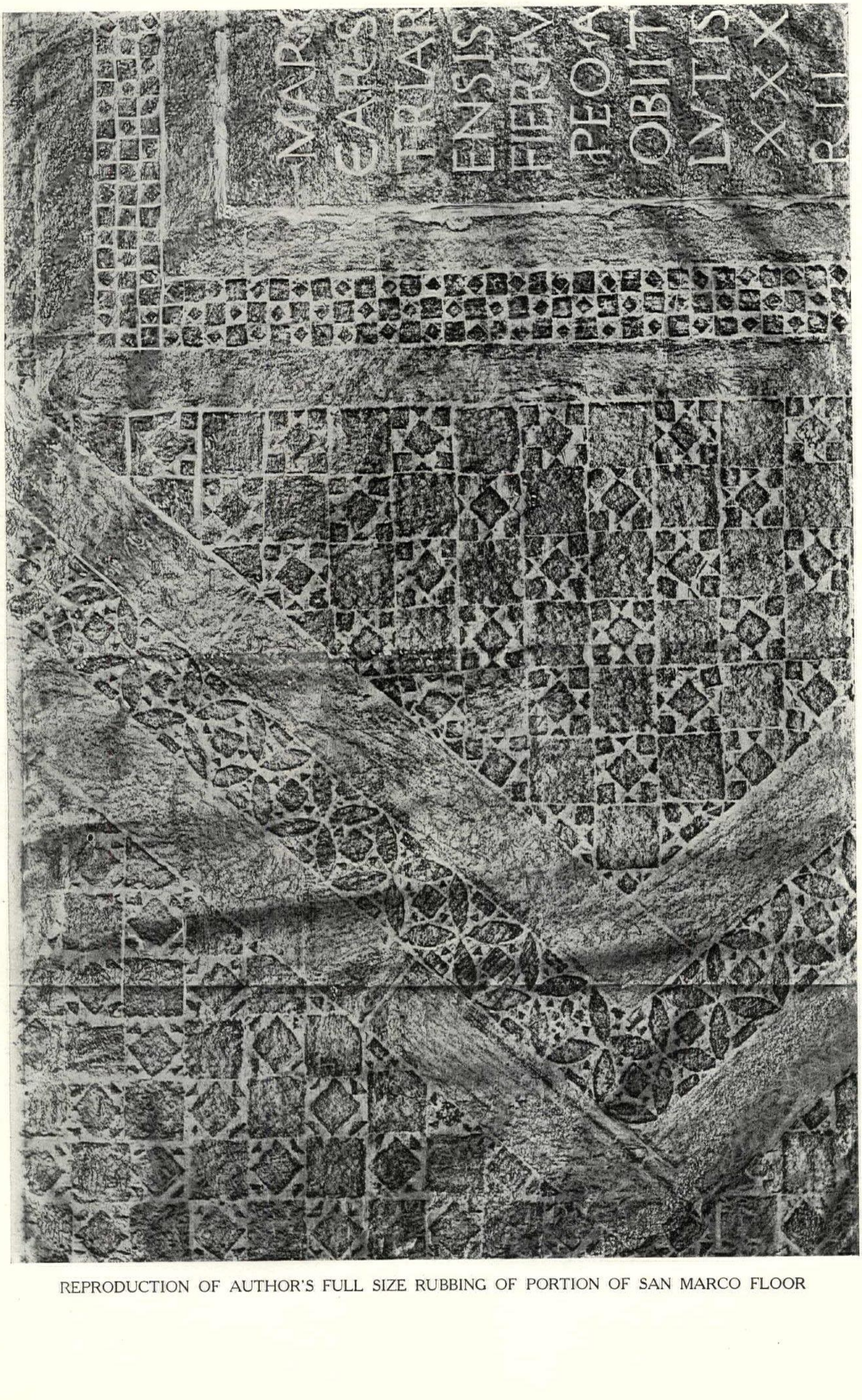

RED MARBLE
RED MARBLE
RED MARBLE
RED MARBLE
INSCRIPTION
9A (COLORS OF 9 REVERSED)
18·A (COLORS OF 18 REVERSED)
18·A (COLORS OF 18 REVERSED.)
10·A (COLORS OF 10· REVERSED·)
THE NUMBERS IN THIS DESIGN REFER TO THE PLATE OF DETAILS
PATTERN OF A FLOOR MOSAIC IN THE TRIBUNE OF S. MARCO IN ROME.
DRAWN BY ALFRED MAUSOLFF.
SCALE
1/2" EQUALS 1'-0"

PLATE III



COLOR KEY		DETAILS FROM A FLOOR MOSAIC IN THE TRIBUNE OF S. MARCO IN ROME.	SCALE
	WHITE		0 1" 2"
	GREEN	DRAWN BY ALFRED MAUSOLFF.	
	RED		3" EQUAL 1'-0"

PLATE IV



REPRODUCTION OF AUTHOR'S FULL SIZE RUBBING OF PORTION OF SAN MARCO FLOOR

Recent English Tenement and School Buildings

A REVIEW OF HOUSING WORK BY THE LONDON COUNTY COUNCIL

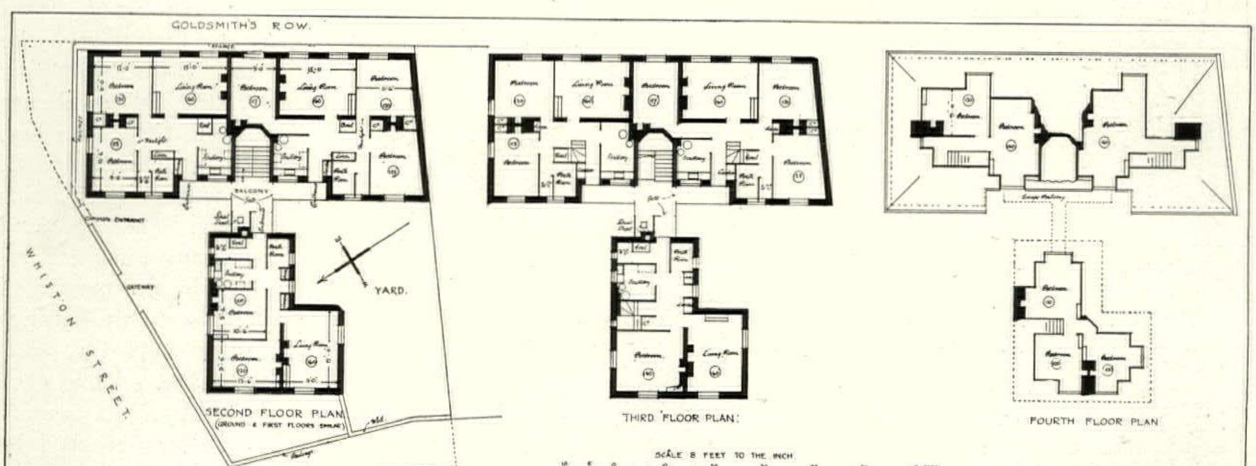
By H. J. BIRNSTINGL, A.R.I.B.A.
Late Assistant Architect, Ministry of Health

IN a former article certain recent housing developments of the London County Council were discussed, but these, important as they are, represent only a portion of the council's contribution towards improving the housing conditions of its area. The other important aspect of the matter is concerned with the improvement of unhealthful areas. In November, 1921, the council reported that there were about 1,900 groups of three or more houses that required to be dealt with as being unhealthful within the meaning of the housing act. In addition to this there was, of course, an immense amount of overcrowding. For instance, the recent census showed that there were 20,000 families of three persons, 7,000 of four persons, and 2,000 of five persons, who occupied one room per family.

Now the problem of dealing with unhealthful areas in a city of such magnitude is not so straightforward as it might at first appear, for it cannot be solved by providing accommodations elsewhere for the surplus population, many of whom, such as market porters, dock workers, postmen and firemen, must live in close proximity to their work; and even to move the remainder to the outskirts is only to add to the transportation difficulty. Moreover, it is highly undesirable that London should continue to encroach indefinitely upon the countryside. Further development around London must be in the nature of self-contained, satellite towns, such as that now being developed at Welwyn.

Exterior of Whiston House, London

One of the worst areas in London to be successfully dealt with was known as the Brady Street area. Its new name is the Collingwood Estate. In this development, 1,600 persons, representing 85 per cent of those displaced, were re-housed on the area. An all-important matter to be decided was the type of dwelling best suited to the circumstances. The traditional English home is the cottage type, but there are occasions when modern conditions render its adoption quite impracticable. On the other hand, tall buildings are also objected to, and it must be remembered here that London is a northern city (700 miles farther north than New

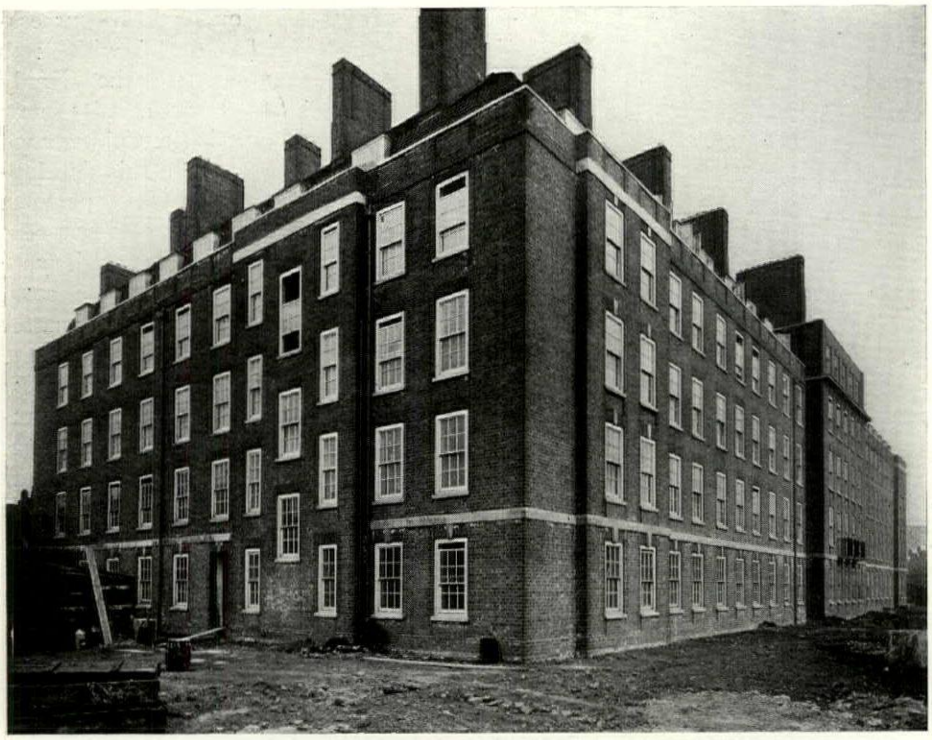


Whiston House, London. A Working Class Tenement House
G. Topham Forrest, Architect to the London County Council

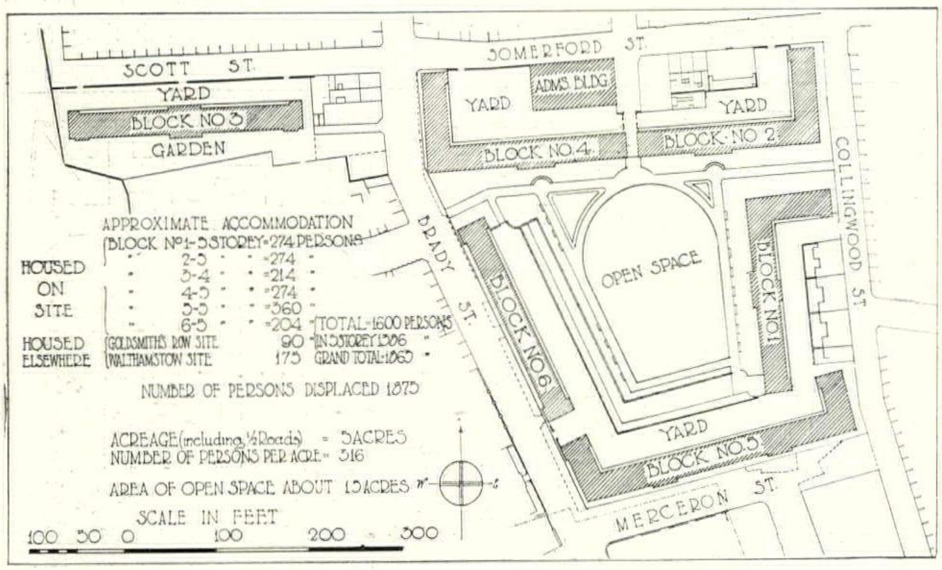
York), so that the average angle of the sun with the horizon is only about 40°, and therefore comparatively long shadows are cast by even low buildings. This fact, however, affects the matter both ways. Thus, supposing an area is developed with low buildings, they will not, provided there be no overcrowding, interfere with each other; but should the surrounding land become covered with large industrial and commercial buildings, the houses would find themselves at the bottom of a well, as it were. In dealing with the Brady Street area a number of different type buildings were considered, and various experimental plans were produced. Thus with 23 cottages to the acre, 800 fewer persons could be accommodated; with three-story cottage flats, about 380 fewer, and with four-story blocks about 400 fewer than with the adopted type of five-story blocks. The remaining 15 per cent of the displaced population were housed on a site about three-quarters of a mile away, in a building attractively named "Whiston House, Goldsmith's Row." And for sheer beauty this dwelling must rank high among the council's architectural achievements. It shows the beauty which is the outcome of using simplicity, straightforwardness, fine proportions and good materials.

Another typical development is that known as the Tabard Garden Estate. Here the buildings are grouped in a series of blocks, each housing from 250 to 600 persons. Altogether about 2,500 persons are accommodated. This estate is situated in the heart of London, but nevertheless, a very large proportion of the site is devoted to open and recreational spaces. These are to be laid out as tennis courts, bowling greens and large central playing fields, the whole surrounded by rows of trees. These facts will give some idea of the manner in which the County Council is handling its responsibilities as the most important housing authority in the country.

Now as to the accommodation of the buildings, here, too, there have been changes in ideas and standards. They contain dwellings or "lettings," as they are called, with varying accommodation of from two to five rooms, the term "room" applying only to bed or living rooms, the scullery, bathroom, food-store, and water closet being common to all types and not included in these figures. In the matter of approach to the lettings a new departure has been made. Along each of the upper floors there is a balcony reached by one or more common staircases, and from this balcony access is



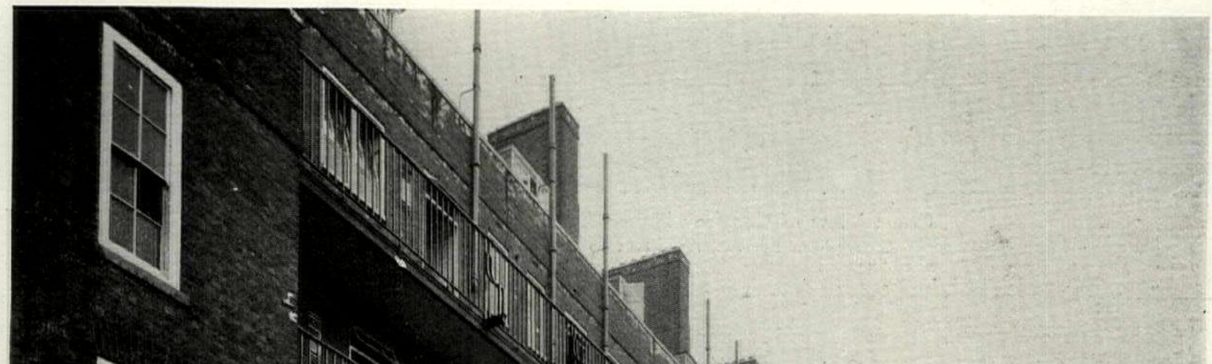
Bullen House (Block No. 1), Collingwood Estate, London



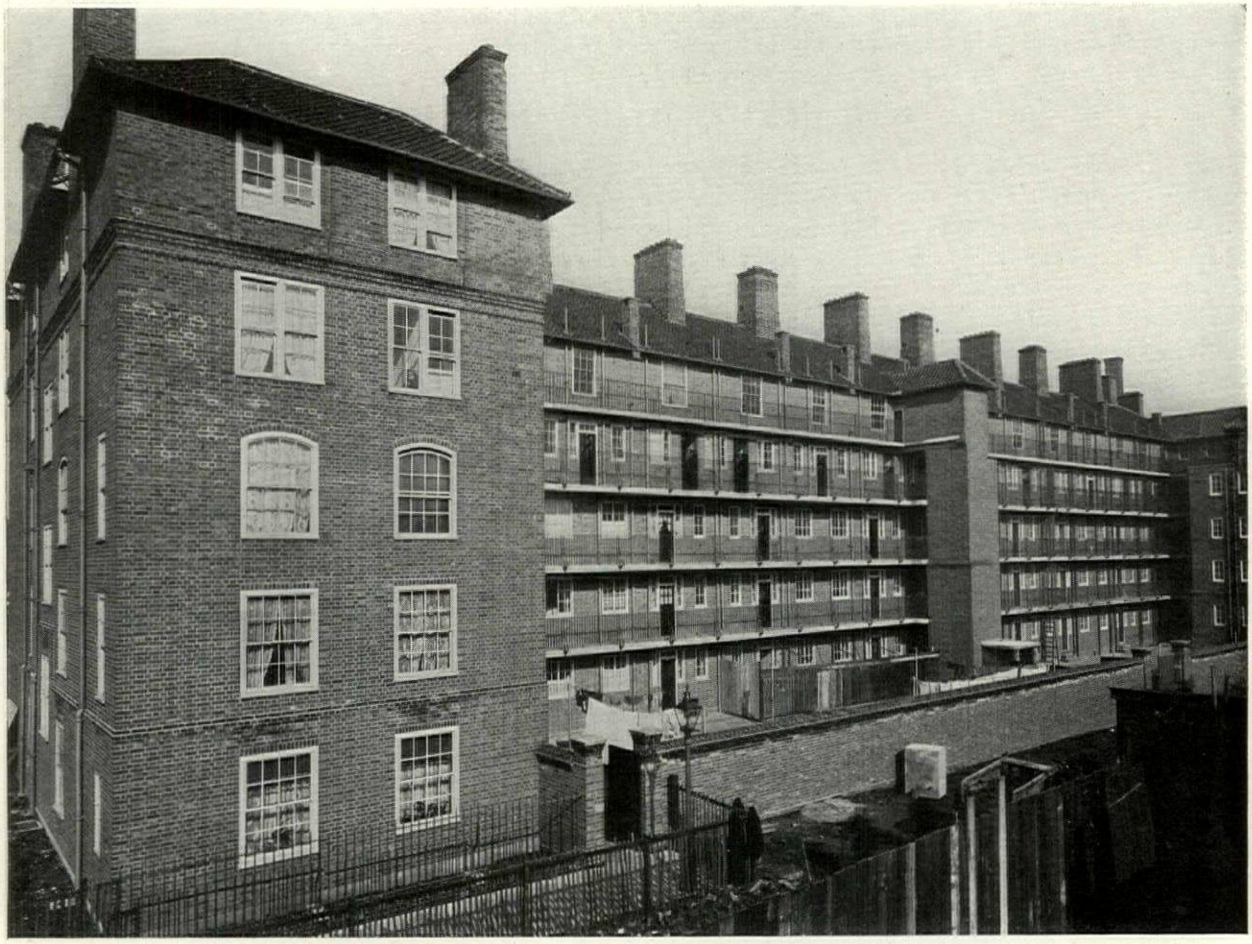
Plot Plan of Collingwood Estate, London
C. Topham Forrest, Architect to the London County Council

obtained to the various lettings. This system has a two-fold advantage; it does away with the necessity of having a number of staircases, which are costly to construct, which constitute waste space, and are difficult to keep clean, and, moreover, the continuous balcony makes it possible that babies and small children be in the open air while still under the supervision of their mothers. There is a prejudice against the continuous balcony, for it is said to militate against privacy and to darken the rooms. With skillful planning, however, both these difficulties can be successfully overcome. The other chief innovation is with regard to the internal arrangement of the lettings, which are planned with a ground floor and four superimposed floors. Of these the ground, the first and second floors contain flat tenements, but the third and fourth floors are combined into cottage tenements, each having the living rooms and kitchens on the lower floor with the bedrooms above, and each dwelling, of course, having its own internal staircase. The common staircases, therefore, are not carried above the third floor. There is a further economic advantage from this method of planning. With the old type of tenement building the rents for the top floor were less than for the lower, while now by combining the two upper floors the rent for the lower floor is obtained throughout. The planning is so arranged that the living rooms have the best aspect, while the scullery, bathroom, etc., are placed towards the balconies. The sizes of the rooms of course vary, but the minimum sizes of rooms in the council's dwellings are: living-rooms 160 square feet, main bedrooms 120, and other bedrooms 100 square feet.

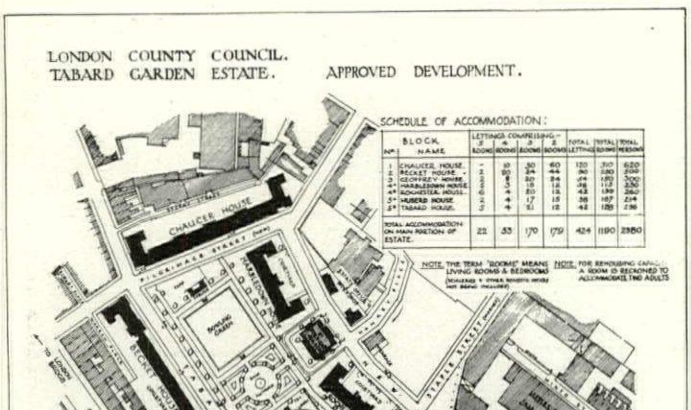
The building activities of the London County Council have not, however, been confined to the provision of dwellings. A very important branch of its work is connected with school building, and here very interesting changes in design have taken place. In order to appreciate these it will be necessary to follow the trend of thought during the last few years. About 1910 greater prominence was given in the school curricula to singing and to drilling, and it became necessary to plan halls so that these activities could be carried on without disturbing those at work in the classrooms. Moreover, the undesirability, on account of ventilation and dust, of having the classrooms opening out of these



Rear View of Bullen House Showing Balconies Giving Access to Tenements
G. Topham Forrest, Architect to the London County Council



Court View of Geoffrey House, Tabard Garden Estate, London
G. Topham Forrest, Architect to the London County Council



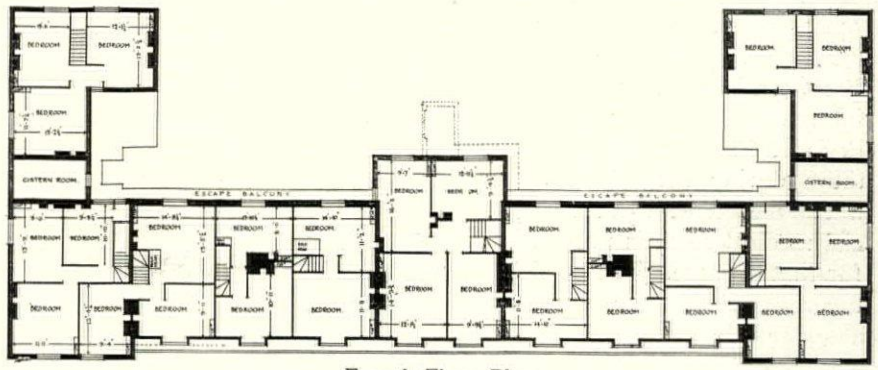
Plot Plan, Tabard Garden Estate, London

halls was realized. About the same time the immense value of fresh air and sunshine for growing children was appreciated. All these tendencies received support in the regulations issued by the Board of Education in 1914. Now there are certain types of building which are dependent for their efficiency upon conformity with modern ideas of hygiene. But whereas the effective life of a properly constructed building may be a couple of hundred years, ideas of hygiene are in a state of constant flux. It therefore happens that a building such as a hospital or a school becomes obsolete within a few years of its erection. The most perfect type of building, therefore, for these purposes, would be one which could be adapted in some degree and at no great cost, to these constantly changing standards. This it is at which the County Council is now aiming in certain of its school buildings, and the enforced economy which is the outcome of the war has without doubt suggested a method for achieving this object. What is wanted is a building, the *effective* life of which shall approximately coincide with its *useful* life, and which shall be low in first cost. During the war there was an immense impetus in all kinds of temporary and semi-permanent construction. In the trains of the divers armies temporary buildings were erected for men and stores, for hospitals and offices, for the purposes of manufacture and recreation, and every available piece of spare land, and even the roofs of many of our buildings, were utilized for the same purpose. Many of these buildings were extremely efficient, and it is along these lines that the County Council is endeavoring to meet the particular requirements of the school building.

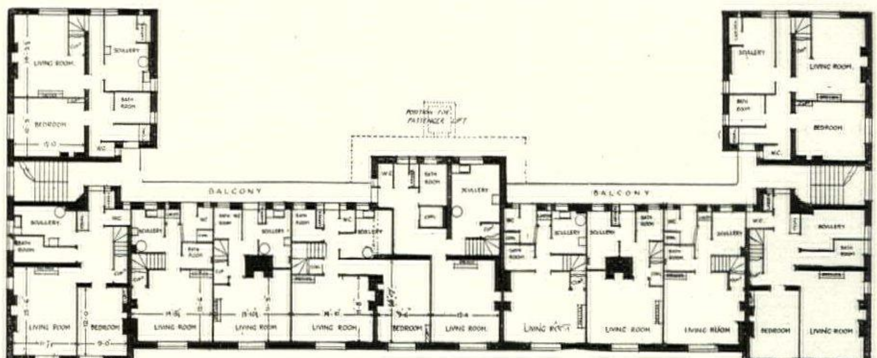
All these factors, then, have led to the erection on the County Council's estates, at Roehampton and Bellingham, the housing schemes of which were dealt with in the December FORUM, of a new type of school which somewhat resembles in plan a sanatorium. There is a central or administrative portion which contains the assembly hall, teachers' rooms, storerooms, etc., and the classrooms extend as wings. Such a type of building requires lateral space, since the classrooms are essentially one-story structures. Fortunately, on these estates the council was able to reserve large sites. On the Roehampton Estate two acres have been allotted for elementary schools, six acres for a secondary school, and four acres for an open-air school. The central or administrative block is built of permanent construction, since experience has shown that the changes in requirements affect only the classrooms, and these are of a light construction, and can be regarded as variable, moderately flexible units, and thus made to conform to whatever new developments may arise.

The new elementary school at Roehampton is divided into three departments, for boys,

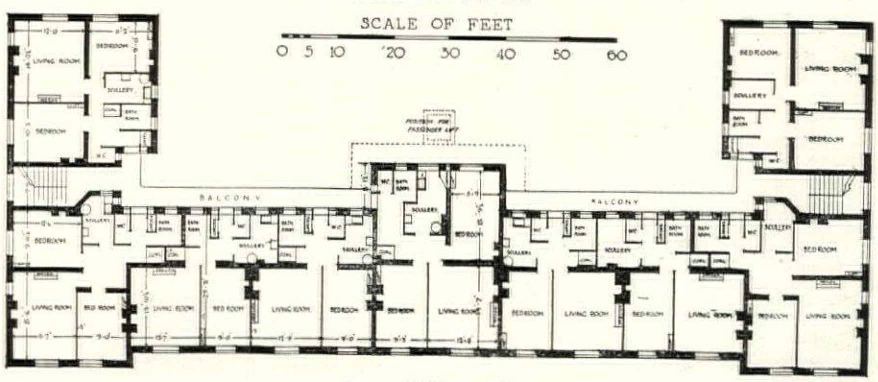
Harbledon House, from Recreation Ground



Fourth Floor Plan

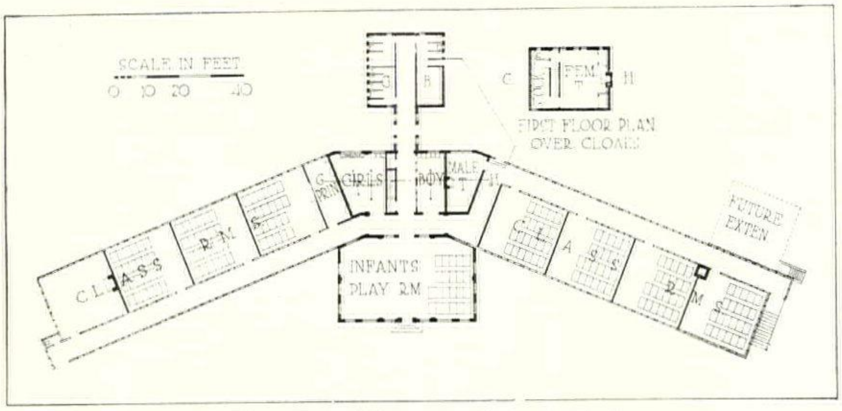


Third Floor Plan



Second Floor Plan

Harbledon House, Tabard Garden Estate, London
G. Topham Forrest, Architect to the London County Council

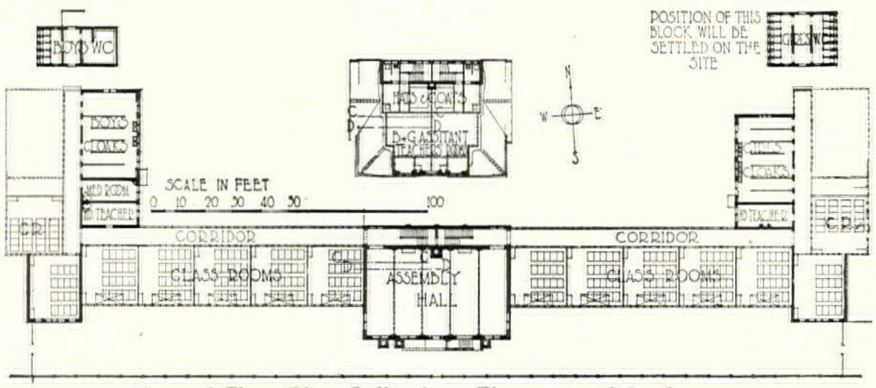


Ground Floor Plan, Elementary School, Roehampton
This building also accommodates a kindergarten

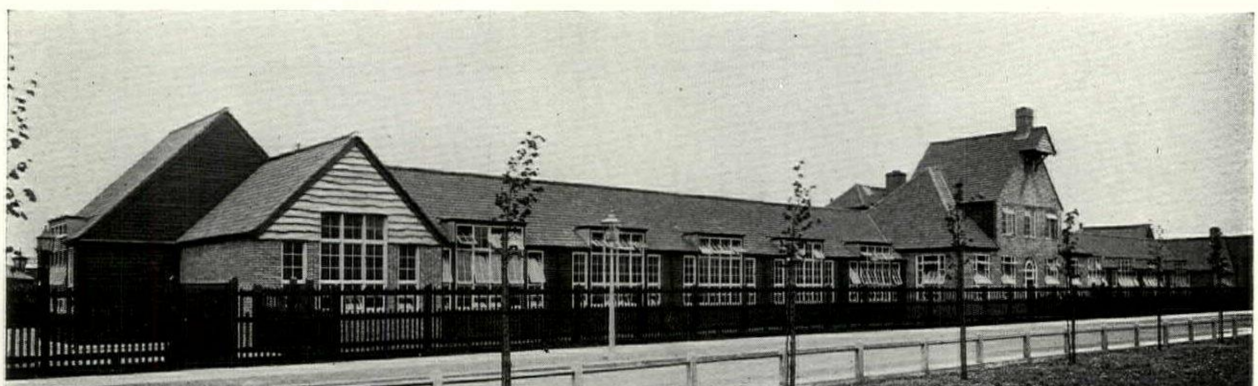
girls, and infants. Each of these consists of a one-story building of classrooms. Connected with each of the senior departments is a large hall, having an area of 4½ square feet per child, and for the infants a playroom having about 4 square feet per pupil. The area of the classrooms is about 400 square feet for the seniors and 430 square feet for the infants, accommodating 40 and 48 children. Provision is also made in the boys' and girls' school for rooms for instruction in practical hand work. Periodical medical inspection of every child, three times during the school career, being obligatory under the act of 1907, a special medical room is provided for that purpose. The pupils' toilets are no longer placed in a separate building as heretofore, the improvement in sanitary arrangements making this inconvenient precaution unnecessary. They are now placed in the main building, but separated from it by a cross-ventilated lobby. Another advantage arising from this method of construction is that during the summer months the classrooms can be thrown open so that they become semi-open-air schools, and this will have a vastly beneficial effect upon the physique of the children.

In the secondary schools laboratories form an important part of the accommodation, and certain general principles have been formulated for their design, of which the most important is that they must be capable of modification and expansion. For this reason glazed tiles and bricks for the walls, although ideal in certain respects, are now considered impracticable, because they do not admit of the ready alteration to fittings.

Lighting and illumination are matters that have received much attention of late. The relation of window space to floor area is at least as one is to six. Left-hand lighting is the accepted principle. As to artificial illumination, here the aim is the securing of an even distribution both downwards and obliquely, and a broad diffusion which shall avoid too sharp contrasts of light and shadow. There is also a tendency towards simplification in ventilation.



Ground Floor Plan, Bellingham Elementary School
Solid walls indicate permanent construction; open, temporary



Elementary School, Bellingham Estate of the London County Council
G. Topham Forrest, Architect to the Council

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

Paint and Paint Specifications

By FRANK H. NUTTING

WHAT is paint? This question is not really so simple to answer as it may seem. Broadly speaking, paint, and it is meant here entirely in its relation to general building construction, is a medium composed of pigments for coloring, metallic or mineral base for covering, and a vehicle for binding these elements together and making the composition suitable for use with a brush. Paint has two general functions,—protection and decoration.

We use paint to cover the surfaces of wood, metal, plaster or other materials, and to protect them from the action of gases and atmospheric conditions. This is accomplished by filling the pores of the wood, for example, and making it impossible for dampness to penetrate and thus cause swelling or warping, and to aid in preventing the complete evaporation of the moisture content of the wood. Wood is never thoroughly dried out, even as it comes from the air-drying or kiln-drying process. There is always a certain amount of moisture which keeps the cells of the wood fiber alive, and when this moisture does completely disappear the action of dry rot, if the surfaces are not protected, will probably take place. It is important, therefore, to see that all of the surfaces of the material are protected in order to assure oneself of the maximum longevity of the wood. This is true whether the wood is for outside or inside use.

Most architects and engineers realize, of course, the importance of having wood finish painted on the back, but the real importance of this is not so fixed in their minds that they insist on the practice for the greater part of the work. This should be done, however, not only for the purpose of protection, as already described, but also to prevent moisture from dampening the plaster, and for protecting the wood back of the finish from the same swelling, warping or twisting.

There is a wide variance in architects' specifications on painting. This is, without doubt, due to various theories maintained by the proponents of the different paint methods. For example, one architect will specify on new work for interior painted finish four coats of lead and oil and two coats of enamel rubbed down,—sometimes three coats of enamel rubbed down, and specifications have come from architects and engineers calling for at least five coats of paint on outside woodwork. Another type of specification is one which calls for finish of the exterior woodwork with not less than three coats of white lead and oil, and for interior work, where enamel finish is to be used, three properly prepared undercoats with one coat of enamel. The difference between these two forms of specifications is not merely in the number of coats or the quantity of material applied, but is of far deeper consideration than either of these.

The first coat of paint applied to exterior woodwork, and that is true also to a certain extent on interior woodwork, is used as a protective and penetrating cover. The oil, or whatever vehicle is used in the first coat, is supposed to penetrate the pores of the wood, filling up any small interstices and carrying with the vehicle some of the pigment as well as the base. This "priming," as it is sometimes called, is usually very rich in oil and very low in covering quality. The second coat to be applied is, as a rule, the real covering coat. This coat is not so rich in its oil content, but is richer in the proportion of the base and pigment, so that after the second coat is applied the surfaces should be entirely covered, and no bare spots on the wood should be visible. The third coat, in order to insure good work, should be very rich in oil. When this third coat is applied the oil penetrates through the second and the first coat into the pores of the wood and forms a binder for all three coats to the material to which it is applied. The putting on of more coats on new work, more than the three coats, is merely in the nature of additional covering, and in some cases if the superimposed coats are less rich in oil the binding is not so complete, and in fact the bond of the first coats may be destroyed to a certain extent, which will result in peeling.

The oxidation process of the oil, which is analogous to the hardening of cement, takes place gradually, and in some cases the oil has been known to be in a more or less elastic state for a period of years. In order to secure a thoroughly firm, hard base on which future painting may be applied, it is, therefore, advisable to paint new work with only three coats, as already noted, and to allow these three coats sufficient time to harden between applications, and also to plan for a re-painting with one additional coat say the following year.

One can readily see that this additional coat, when applied, being fairly rich in oil, has a firm base in which the oil has partially hardened as the application surface. The oil may penetrate in this base. In the meantime the base itself has been practically homogeneous, and the addition of the new coat does not destroy the bond previously established, but acts as a further binder, filling in any pores of the original woodwork. There is no doubt that some will consider this theory unsound, but in actual tests it has demonstrated its validity.

There is probably nothing in the sphere of materials mentioned in architects' specifications which can be so easily adulterated as paint. An architect may specify that Blank's white lead shall be used; that it shall be mixed a certain proportion to the gallon of oil; that it shall be applied with a certain type of brush. His inspector may go on the work and see the can with Blank's name on it, but unfortunately this means nothing. In many cases a painter will buy a few cans of the specified material, not a third enough to do the work, and then will mix up his own material from whatever paints he elects, due primarily to a decreased cost to himself, and finish the work in this way. When a definite brand of prepared paint is specified, unfortunately this same process takes place. In some instances the specified brand will be bought in small quantities and the cans continually filled from a general supply base which the painter himself has prepared, and which bears no more relation to the specified brand than the painter himself bears to the reliable painters, of whom there are so many.

In speaking of this adulteration process, it is not with the idea of condemning painters in general, because this is far from being the case; it is merely to suggest to the minds of architects and engineers the possibilities when an unreliable painter is selected for the work. If the architect really desires to insure the highest grade of workmanship and results to his client, it is very apparent that it is quite as necessary to be as sure of the honesty of the painter who is to figure and of the quality of his work as it is of the selection of the proper material;—even more important, since with a good painter he has positive assurance that the results will be to the advantage of his client, even though an error may have been made in the selection of the proper materials in the specifications.

It is not necessarily a part of this discussion to speak of prices, but so often architects are called upon to reduce estimates, or called upon to get low bids, and the tendency is then to make cuts all along the line, that a word is included. One of these cuts naturally falls on the painter, and generally he is prepared at that time to reduce his price, which obviously must come out of the work somewhere. Use of this adulteration process is one of the first steps, although reliable painters, in the majority of cases, refuse to be a party to this form of change. Frequently bids will be received in which the painters' estimates are at a wide variance. A figure may be received from a man with whom the architect is unfamiliar, but who has had a reputation for doing good work. This figure may be far below any of the other estimates. The natural tendency would be to check up the man's reputation, look over some of his work, and see if the work has "stood up" satisfactorily. It is not advisable to stop there. The specifications should be carefully checked, and the work and material specified should be analyzed from the standpoint of the manufacturer's representative if possible. The manufacturers of the standard brands of paints are always ready and willing to coöperate with architects in checking up the quantities of their material furnished for the various jobs, and notifying them if the quantity of material specified is ordered for the work. In this way the first check on adulteration can be readily made.

The can of paint or varnish on the shelf of the hardware store, in the paint shop, or on the job is familiar to us all. Little change is noted as the years have passed. It is better labeled, neater in appearance, but after all the same old can. But, let us look inside. What a difference! Twenty years ago it seemed as if most manufacturers were trying to get the most profit out of the can rather than into it. Then came the realization that it was better business and more profitable to increase the quality, until the time has arrived when one is confident that one is getting a paint or varnish of the very highest quality. White lead and oil are still the important ingredients. New materials are being used, and the laboratories of the paint and varnish industries are continually working to improve their products.

The users of paint and varnish, as well as the architects who specify them, should be better informed as to the value of the different ingredients, thus assuring themselves that the proper material is selected for each surface. Lithopone is a comparatively new base for paints. It has many peculiar qualities that make it a valuable pigment. It is the foundation of nearly all flat wall paints. Its "covering" or "hiding" qualities are greater than those of any other pigments. It should never be found in a paint designed for outside work, as it turns gray when exposed, but it cannot be excelled for interior wall finish, either in white or in tints. When used in this way the vehicle is a flatting oil in which China wood oil forms an important part. Lithopone is unsuited for use in an undercoat for enamel, as it is very porous and permits the finishing coat to sink in, resulting in flatting.

High grade enamel undercoatings are now on the market, made by manufacturers who wish to insure the most satisfactory surfaces on which to apply their enamels. The undercoat for enamel, as well as all other work, plays an important part. It is too often slighted or neglected, and many an apparently fine job is ruined and lacks durability because the under surface is not suitable for the work. If the painter is to make his own undercoat for enamel, let him use the highest grades of lead and zinc, employing the right quantity of thinners, and, of course, plenty of sandpaper and hard work.

An excellent specification for enamel undercoating is, for the first coat, white lead and pure linseed oil, with sufficient dryer to harden; second coat, white lead and turpentine; third coat, one-half white lead and one-half pure zinc oxide with turpentine. If a fourth coat is to be applied, let it be zinc oxide and turpentine with the addition of a small amount of white enamel. Sandpaper each coat. Strange as it may seem, it is quite as important to rub or sandpaper the paint *off* as it is to put it *on*. Sandpapering between each coat insures a smooth, hard, durable finish on the last coat, which will wear for years without cracking or checking. Be sure that each coat is dry.

French process zinc is one of the most durable and whitest of pigments. It is extensively used in the manufacture of enamels, and in connection with lead for both interior and exterior paints. It gives a hard, firm surface, not porous, and holds its pure white appearance. Too much zinc in connection with lead, as used in outside paints, is apt to result in peeling.

While it is true that the so-called "inert" materials were once used as adulterants, many have been found of real value, and are now introduced by the paint maker to improve the durability of the paint. A reasonable amount of magnesia or asbestine is undoubtedly desirable. This material not only helps to keep the paint in suspension while in the can, because of its fibrous nature, but its particles sift into the minutest spaces between the particles of lead and zinc, thereby resulting in a more uniform metallic film, keeping the oil from soaking into the wood, as well as keeping moisture out. A percentage of asbestine is obviously better than an overabundance of zinc, but for high grade paint it should not exceed 20 per cent. It is used in flat paints largely so that the paint may be kept in suspension, but when used to excess it not only cheapens the cost but spoils the hiding qualities.

High grade enamels bear but little resemblance to former so-called enamels, which were made from zinc mixed with damar varnish and thinned with turpentine. Such an enamel was very difficult to apply, and, while very white, was inclined to be tacky because a varnish made with damar gum never dries thoroughly hard. White zinc of the very highest grade to which treated bleached oils are added now produces high grade enamels. While more likely to turn yellow if kept in the dark, they are fully as white as ordinarily used. They are easily applied, no matter how large the surface, flow freely, avoid brush marks, and they are far more durable.

The painter is now being educated to the fact that a quart of high grade enamel, mixed with a gallon of pure lead and oil paint, not only produces a better and more lasting white, but actually adds to its durability. It also has the advantage of retaining its gloss.

No material has been found as a thinner which can take the place of turpentine. High grade turpentine substitutes, which contain petroleum, can be used to advantage in flat paints, producing better flowing qualities because of their slightly oily nature, but they are most unsatisfactory as thinners for either Japan colors or varnish.

Dryers of the very highest grade should be specified and used. A cheap dryer has very little drying quality, and, being composed largely of rosin and benzine, it injures the paint. Only enough dryer should be used to dry the paint, and, as only a good painter is familiar with the work, it is always economy to employ the best. The perfect dryer must be finely balanced. It must not start drying the paint from the bottom, as that would leave the surface moist for so long that it would gather dust or be ruined by sudden rain. Neither should it dry from the outer surface in. Paint in which a dryer of this type is used, while dry on the surface would never thoroughly harden, as the dry outer film would prevent further oxidation of the oil. The perfect dryer dries uniformly all the way through.

No material plays a more prominent part in present-day varnish making than China wood oil. This oil, produced from nuts which grow extentively in China, has been known for years, but only comparatively recently has it been used successfully, because of lack of knowledge of its qualities. Its principal advantage is in its waterproof qualities, and it will be found in all the quickly drying spar and all-purpose varnishes. A former adulterant of varnish,—rosin,—must now be used in connection with China wood oil. The use of all-purpose varnishes is not to be recommended for the best results. Use a varnish which is made expressly for the work in hand. Linseed oil and fossil gums, the ingredients of all the best old style varnishes, still play an important part. While China wood oil makes a waterproof varnish, linseed oil gives a more durable and elastic film and will be found in the best floor and spar varnishes. Good qualities of fossil gums for varnish making are constantly more difficult to obtain, and were it not for China wood oil, which requires very little gum, the prices of varnish would be almost prohibitive.

Shellac should never be used as an undercoating for varnish on floors or exterior woodwork. It not only lessens the wearing qualities of the varnish used over it, but is generally the cause of a good floor varnish's turning white from water, or scratching badly. Build up the surface entirely with the best quality of varnish.

The floor problem is perhaps the hardest with which the house owner has to contend. Shall it be waxed, shellacked, or varnished? Each has its advantages and disadvantages. Wax is easily applied, dries quickly and gives an excellent appearance, but it spots with water, and, although easily refinished, is not to be recommended in rooms where it is likely to be affected by water. Shellac has the advantage of drying quickly, which certainly is an advantage in an occupied house, but it also is affected by water, and scratches easily. However, when rubbed with pumice stone and oil, it makes a very durable and attractive floor. Use of varnish presents none of these objections and undoubtedly varnish makes the best wearing surface for hard wear. Its only drawback is the time necessary for drying, which frequently does not permit its use where the room must be occupied daily. Today we have very excellent floor varnishes which dry with a soft, dull finish, equaling in appearance the finest old waxed floors. Avoid the use of flat varnishes containing wax, as they are not so satisfactory, and require removal when the work is to be refinished.

Cold water paints and kalsomines are very much of the same nature. The original cold water paint was made from whiting with casein used as a binder. The manufacturers made a very strong attempt to replace lead and oil on the cheaper class of work with this material for exteriors, but without a great deal of success. Its use now is confined almost entirely to interior walls and ceilings. Either of these materials applied to walls or ceilings is very pleasing in effect, but it lacks durability as such paints cannot be properly cleaned. As a suggestion for obtaining the best results by use of kalsomine on the ceilings of the better class of buildings, try first a coat of lead and oil paint prepared so as to dry with an eggshell or nearly flat surface. Cover this with one coat of kalsomine. The result is a perfect ceiling, without a spot or blemish, but its principal advantage is more apparent when the ceiling is to be washed off and re-finished. The undercoat of lead makes it extremely easy to wash off the old kalsomine, at the same time offering a good surface for re-coating with freedom from suction.

For iron girders, structural steel, etc., a good red lead for the first coat is generally accepted as the standard for durability and covering. This forms an impervious coating, effectually preventing rust, and to a large degree resisting the action of gases. This red lead primer should be given a second coat, either of graphite and linseed oil or of a paint composed of carbon black and oil.

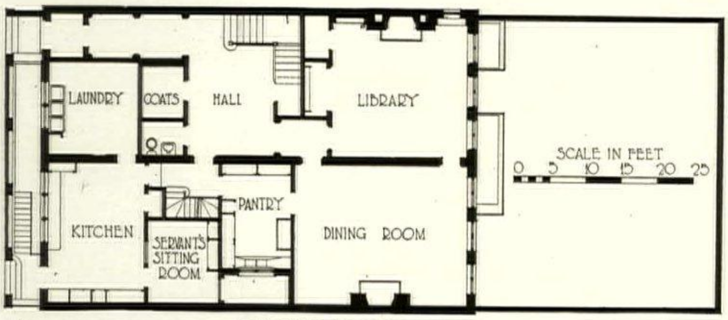
While in a large degree the use of shingles for roofs is limited because of fire hazard, shingles are extensively used on the walls of some of our most attractive houses. When so used they should not be painted, but given one or more coats of either an oil or a creosote stain. The better method is to dip the shingles two-thirds their length, and after they are laid apply a brush coat of the stain. The dipping not only protects the under side of the shingle, which is the first to decay, but as the shingle shrinks it does not permit white streaks to show between the shingles. The objection to paint for use on shingles is not only on account of the glossy surface it would present, but because from its very nature it would form a little dam at the butt of the shingle, thus retaining moisture beneath, thereby hastening rather than preventing decay.

A comparatively new problem now confronts us, due to the use of concrete and stucco for industrial plants and residences. Here a paint containing linseed oil is out of the question, for the action of the oil on the cement would disintegrate the compound, but a coating of some kind must be used to prevent moisture from passing through the walls. Fortunately there are on the market many well known cement coatings of proven worth. These can be had in many attractive colors as well as white for either inside or outside use.

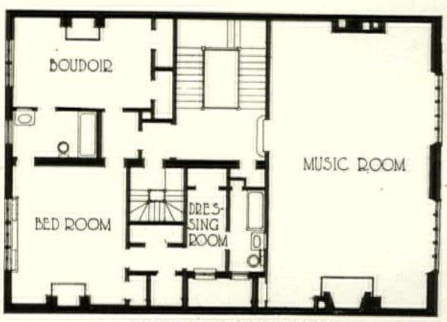
On cement floors of office buildings and factories great difficulty has been encountered through the "dusting off" of the surface. Here is an opportunity to use the cement coatings either in flat or gloss as a preventive. A coat of flat followed by a finishing coat of gloss gives a harder and more durable finish, and one that can be more readily washed and kept in sanitary condition.

To sum up, don't neglect the painting either to save time or expense. It is the one thing that not alone prevents the rapid deterioration of the buildings, but adds to the beauty of the structures. Specify the best grade materials you can afford. Select those of proven worth made by manufacturers of the highest integrity, but don't rest here. If you are to be responsible for the work, notify the agent of the manufacturer whose paint, varnish or enamel you have selected and let him follow up the painter. Give the work to the painter you can trust. Don't hurry the job at the last. Have pity for the poor painter who is last on the job. He is often expected to put on four coats where he barely has time to apply two coats with proper time for drying. Don't expect him to give his best example of workmanship when he has to do his work amid the dust of the carpenters whom he is following up. His duty is to cover the defects in the work of those who have prepared the surface for him, to increase the beauty of your design, and to secure a protective coating against time and decay. Surely it is worth while to give him a fair chance to do his best.

GENERAL EXTERIOR VIEW



GROUND FLOOR PLAN

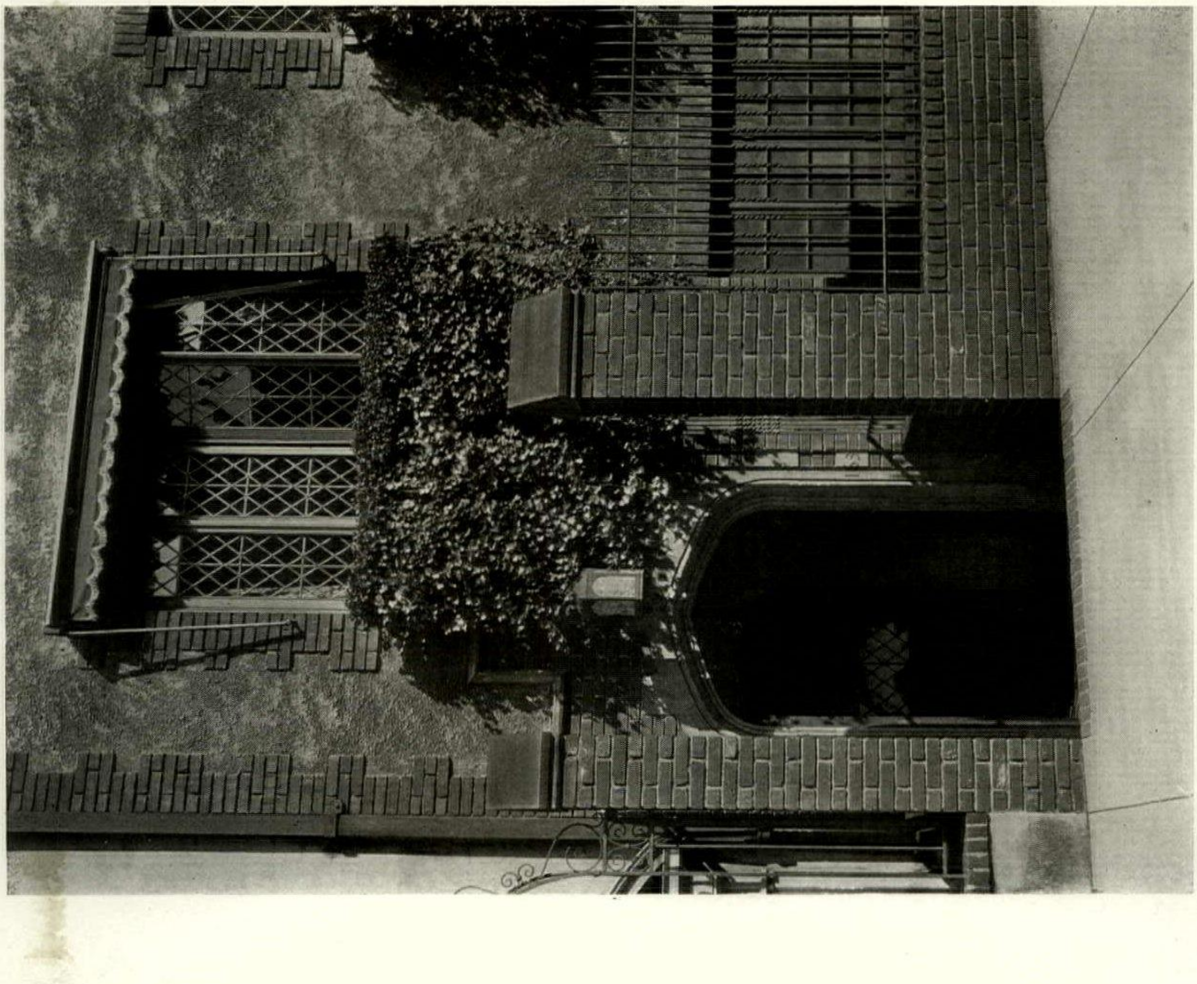


FIRST FLOOR PLAN

HOUSE OF MAURICE BRILL, ESQ., NEW YORK

FREDERICK STERNER, ARCHITECT

Photos, Schuyler Carteret Lee



DETAIL OF ENTRANCE

DETAIL FROM GARDEN

HOUSE OF MAURICE BRILL, ESQ., NEW YORK
FREDERICK STERNER, ARCHITECT

MUSIC ROOM

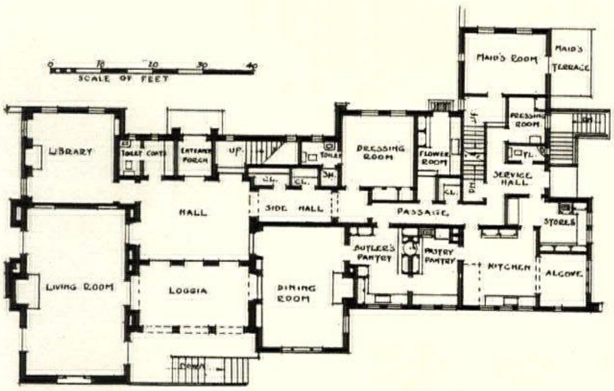
DINING ROOM

HOUSE OF MAURICE BRILL, ESQ., NEW YORK

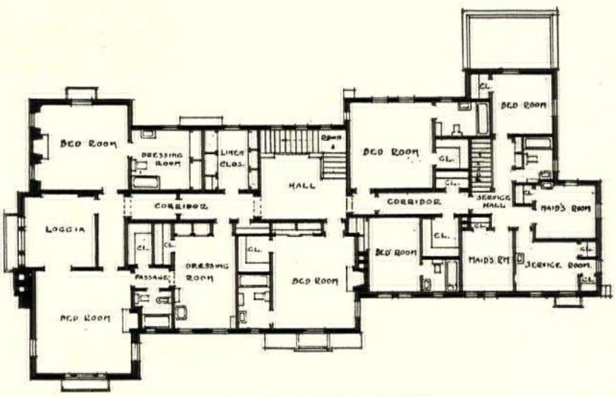
FREDERICK STERNER, ARCHITECT

TWO VIEWS OF LIBRARY
HOUSE OF MAURICE BRILL, ESQ., NEW YORK
FREDERICK STERNER, ARCHITECT

VIEW OF GARDEN FRONT FROM LAWN



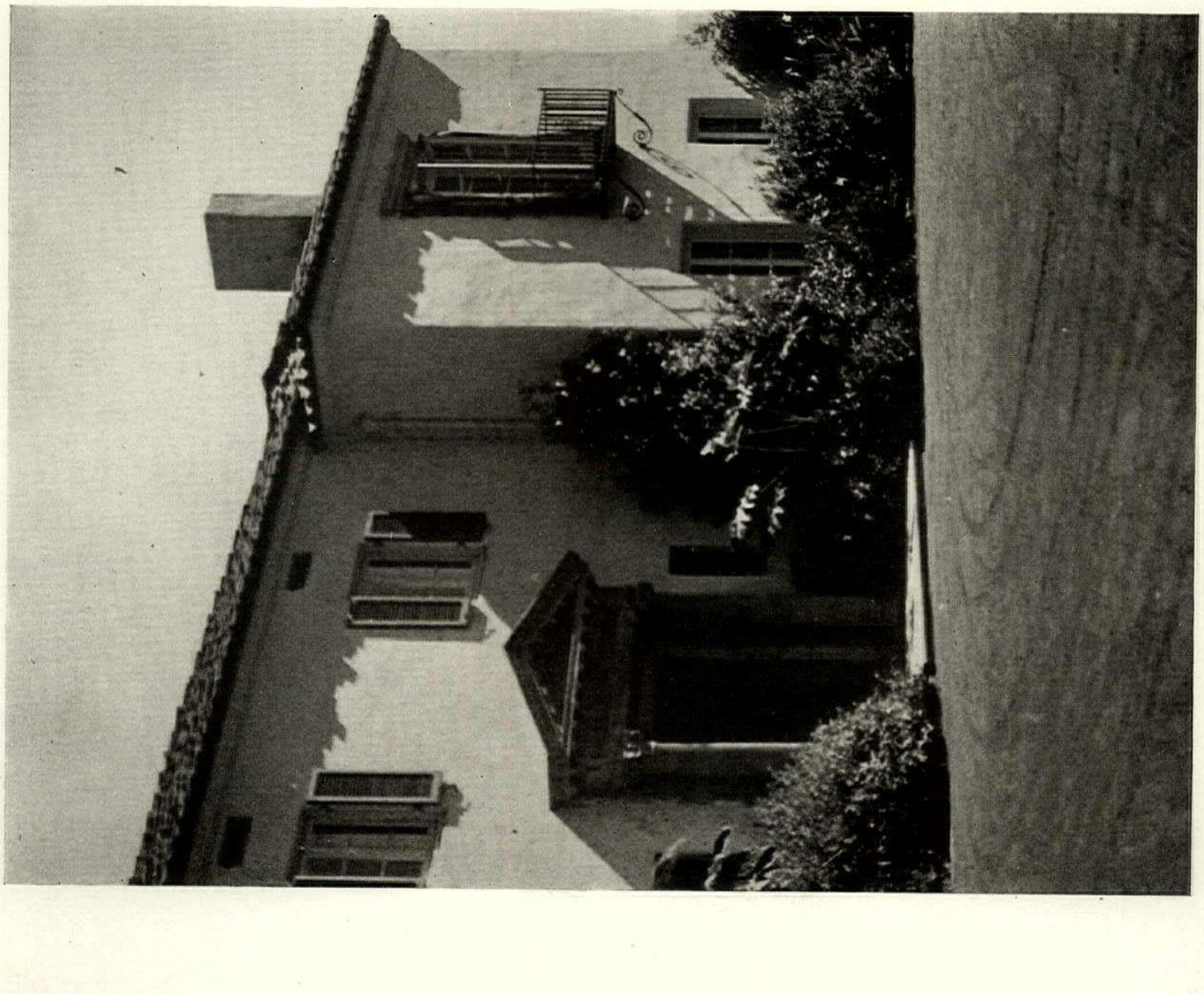
FIRST FLOOR PLAN



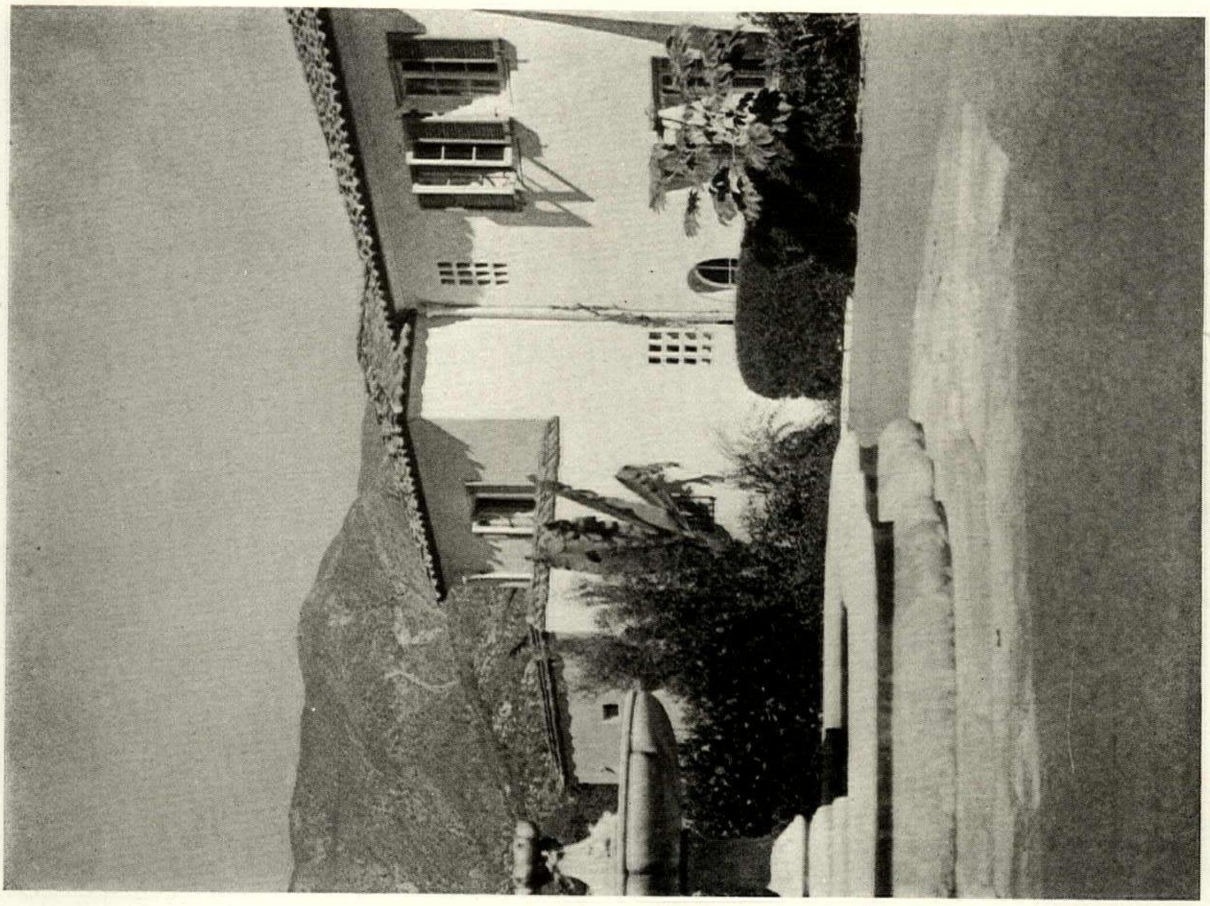
SECOND FLOOR PLAN

HOUSE OF EDWARD LOWE, ESQ., MONTECITO, CALIF.

JOHNSON, KAUFMANN & COATE, ARCHITECTS



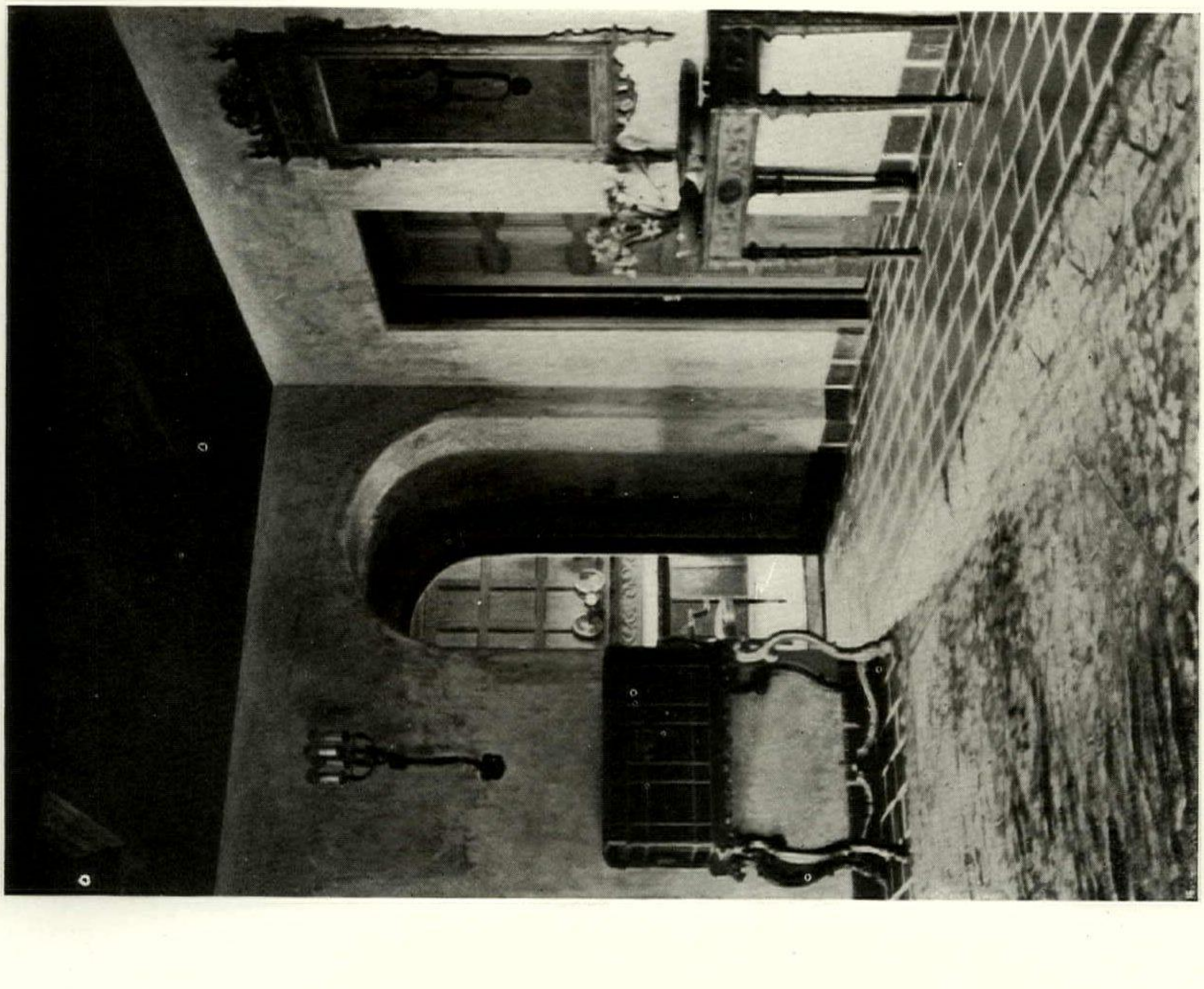
DETAIL OF ENTRANCE FRONT



VIEW OF ENTRANCE FORECOURT

HOUSE OF EDWARD LOWE, ESQ., MONTECITO, CALIF.

JOHNSON, KAUFMANN & COATE, ARCHITECTS



HALL LOOKING INTO LIBRARY

MANTEL IN LIVING ROOM

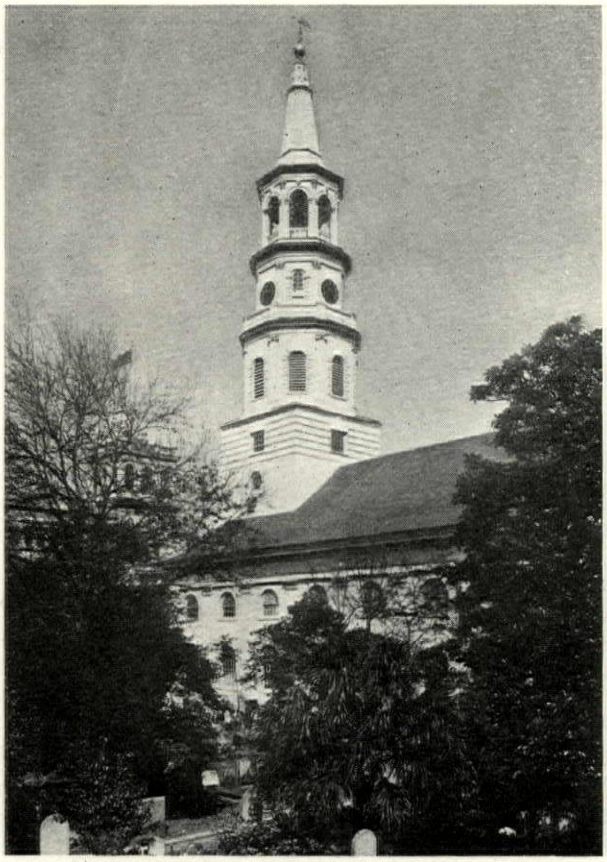
HOUSE OF EDWARD LOWE, ESQ., MONTECITO, CALIF.

JOHNSON, KAUFMANN & COATE, ARCHITECTS

The Development of Charleston Architecture

PART III—CHURCHES

By SAMUEL LAPHAM, JR., AND ALBERT SIMONS



St. Michael's Episcopal Church, Charleston (1752)

WE have followed, in the earlier articles of this series, the growth and trend of the architecture of the community in the domestic and civic types of buildings. In tracing the development of the ecclesiastical architecture we find a greater activity. Most of the religious bodies have lived through two, three or four generations of buildings. In the outlying settlements the original structures have survived in some instances, but in the mother settlement this has not happened. The first phase of ecclesiastical architecture was, in most cases, a small wooden structure, and decay, coupled with the rapid growth from a colonial outpost to the fifth city of the country (1670-1770) completely destroyed the primitive, non-permanent type of ecclesiastical building.

These primitive structures were replaced with the second phase of buildings—a permanent type as far as their materials would allow and built with the idea of lasting for generations. Today, however, many of the buildings are of the third phase—replacements, due to the destruction of the second phase by disaster,—fire, storm or earthquake. Five great conflagrations (1700, 1740, 1778, 1838, 1861), ten or more West Indian hurricanes, and the earthquake of 1886 have taken toll of all types of buildings. Also, besides the acts of God, the growth of the body politic within the church has often destroyed its own temple that it might build better for its needs. In addition, congregations have seceded, forming separate bodies, as well as rebuilding their original houses of worship, thus creating what may be termed the fourth phase.

This classification is not a fixed rule as regards time or details. Sects were established at different times, and cults varied in power at the times of their incorporation. It is given, as an attempt only, to outline broadly the general course of events as regards ecclesiastical structures, and in it are factors that are variables of the highest degree.

Turning now to the denominations and the oldest existing churches in the city today, we find that we can form the table given herewith. The dates given are, as far as possible, those of the laying of the corner stones.

With this table, limiting ourselves to the churches of today built before 1860, we see that the city has one church from the eighteenth century, seven of the nineteenth century from 1800 to 1840, representing in various degrees, the English renaissance type, and seven from the 1840-60 period, representing the classic and Gothic revivals. Other churches should be added to this list in its later periods to make it

Church and Denomination of Today	1st Phase	2nd Phase	3rd Phase	4th Phase
St. Philip's Episcopal.......	1681–90	1712	1835	....
St. Michael's Episcopal.....	....	1752(a)	....	....
St. Paul's Episcopal........	....	1811(a)	....	....
Grace Church, Episcopal....	....	....	....	1847(a)
French Huguenot	1681–90	1805–28	1844	....
Congregational (b)	....	1729	1804	1867
St. John's Lutheran.........	1759	1816	....	....
St. Mary's Catholic.........	1789	1793	1838	....
First Baptist................	1699–00	1746	1822	....
Hasell St. Synagogue.......	1750	1792	1840	....
First Presbyterian...........	1734(c)	1814	....	....
Second Presbyterian.........	....	1811(d)	....	....
Westminster Presbyterian....	....	....	1850	....
Bethel Methodist............	....	1797(e)	1853	....
Spring Street Methodist.....	....	....	1858(e)	....
Unitarian	....	1772(f)	1852	....

(a) Offshoot of St. Philip's Episcopal.

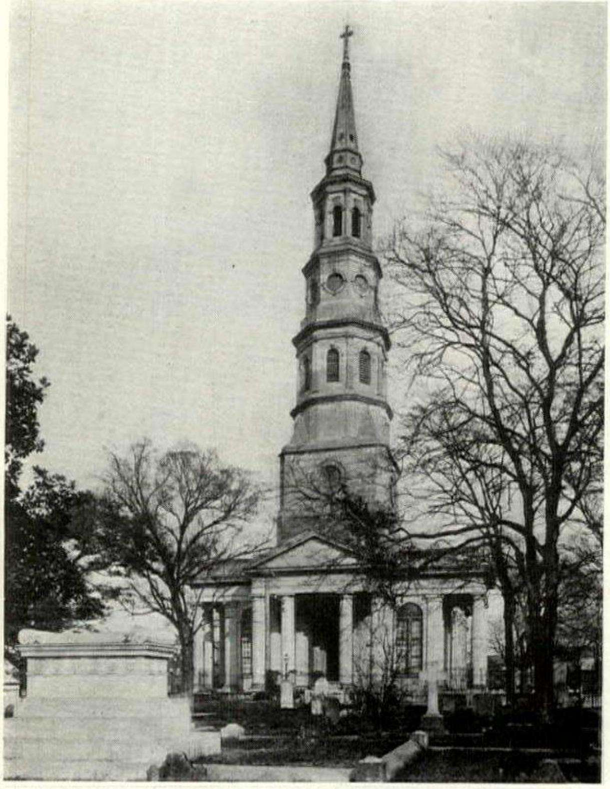
(b) Originally Presbyterian, becoming Congregational with withdrawal of Presbyterians in 1734.

(c) Formed by withdrawal mentioned under (b).

(d) Offshoot of First Presbyterian.

(e) Descendant of Cumberland Methodist Church (1787), third phase of which was burned in 1861.

(f) Originally branch of Congregational Church.



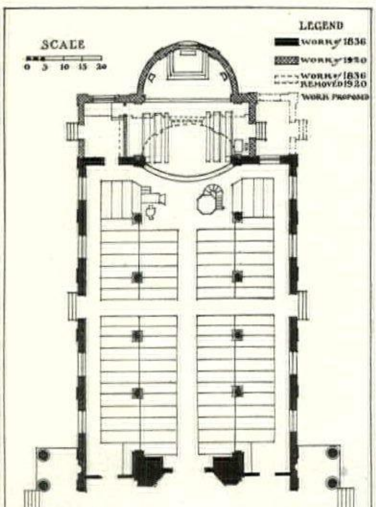
St. Philip's Episcopal Church, Charleston (1835)

a full summary of the ecclesiastical architecture, but the present table is intended to be representative and nothing more.

Of these 15 churches, St. Michael's is the oldest, being built in 1752-61. Its history is so entwined with that of St. Philip's as to demand explanation, and therefore the architectural history of the two churches of today will be treated in sequence.

The original parish in which the town lay was given the name of St. Philip's Parish, and on the site of the present St. Michael's, the first St. Philip's Church was built between 1681 and 1690. Of black cypress on a brick foundation, it was in a state of decay by 1720. The Church of England being established by law, the assembly therefore ordered the construction of a brick church—the second St. Philip's—on a site three blocks to the northeast of the first church. This was started in 1712, opened in 1723, and the first St. Philip's torn down in 1727. The site of the latter was left vacant and, for the next quarter-century, the St. Philip's of 1723 was the established church of the colony. But the growth of the population made a second place of worship of the Church of England necessary, and in 1751, by act of assembly, the southern portion of the town was taken from the Parish of St. Philip and made into the Parish of St. Michael, and a church authorized for the parish, to be erected on the vacant site of the first St. Philip's Church. Here the history of the origin of the two ends, and we will first consider St. Michael's Church, leaving the St. Philip's of 1723 and its descendant of today to be dealt with afterwards.

It took nine years to complete St. Michael's Church. The assembly authorized it on June 14, 1751, and the corner stone was laid on February 17, 1752, by the Royal Governor Glen, assisted by the board of commissioners for the building, on which appear the famous revolutionary names of Rutledge and Pinckney. The *South Carolina Gazette* of February 22, 1752, gives us an insight into the ceremony of the laying of the corner stone, which if practiced today would do much to smooth the path of the architect and the building committee. We find that the governor laid the corner stone, then each of the commissioners and each of the gentlemen accompanying the governor laid one stone



Plan Showing Changes

Interior of St. Philip's Episcopal Church, Charleston

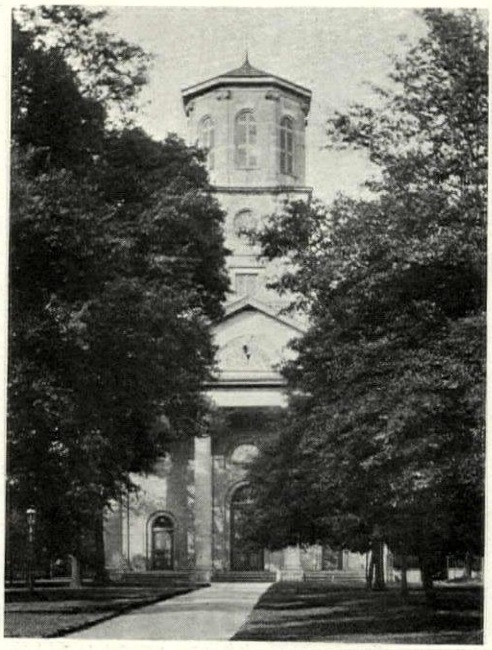
Main Church, J. Hyde, Architect, (1835); Choir and Chancel, Simons & Lapham, Architects, (1920) apiece. After this exhausting work, the company adjourned to Mr. Gorden's (a tavern), "where a handsome Entertainment was provided by the Commissioners." The bill is preserved, and the items which made up the total are of interest:

Feb. 17, 1752—The Commissioner of the Church Bill

Dinner	20:0:0
To Tody	1:10:0
" Punch	5 :0:0
" Beer	5:10:0
" Wine	5: 5:0
" Glass Broak	5:0
" 8 Magnum Bonos of Clarret	24: 0:0
	61:10:0

Apr. 13, 1752. JOHN GORDEN.

The *Gazette* continues . . . "Dinner over, His Majesty's Health was drank, followed by a Discharge of Cannon at Granville's Bastion; then the Healths of all the Royal Family and other loyal Toasts; and the Day was concluded with peculiar Pleasure and Satisfaction."


Second Presbyterian Church (1811)

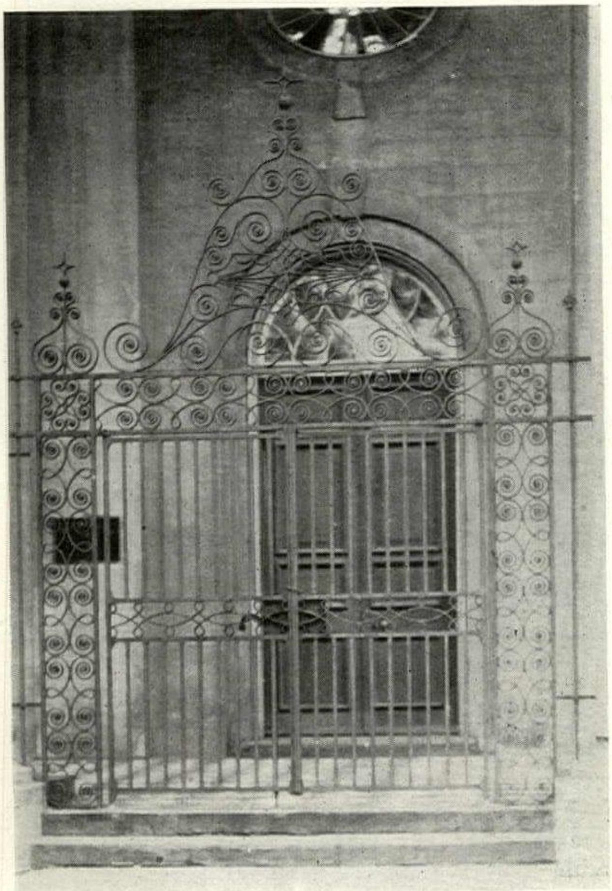
In regard to the architect, the *Gazette* says further . . . "The Church is built on the Plan of one of Mr. Gibson's Designs. . . ." The Gibson mentioned has sometimes been confused with James Gibbs, the English architect; but records in the possession of descendants prove conclusively that this Gibson was a Scotch engineer who had not long previously come to this country. The building is too well known and has been too often dealt with to warrant describing its details here. Its plan, etc., will be found in "The Georgian Period." In size, 60 by 130 feet, of stucco-covered brick, it has survived storm, fire and cannon shots. After the earthquake, by comparison with measurements taken in 1832, it was found that the 186-foot steeple with its huge brick foundations had sunk 8 inches. Great rifts were torn in the walls and in the pediment roof of the Doric porch where they joined the tower, but all retained their equilibrium and could be joined together again. The final cost in 1761 is given as £53,535, equivalent to $32,775. Documentary papers of those days show that in values of today bricks were then $3 a thousand, mechanics got $1.40 a day, and laborers 70 cents a day.

Returning to the St. Philip's of 1723, we find that with its completion it became the heart of the colony. Within its walls elections were held for the commons assembly, and municipal offices were given to its vestry by virtue of their position as vestrymen. Beside its walls today lie most of the glory, the pomp and the strength of our colonial past—for there are the undisturbed graves of commissioners of the Church of England, governors and councilmen and simple citizens who faced the Spanish attack of 1686, the French fleet of 1706, and the buccaneers of 1718.

Of the church itself, on whose foundation the present building stands, we have Dalcho's description of the interior (1819), the paintings now hanging on the vestibule walls of the church of today, and two old engravings of the exterior. Rich in tradition, the second St. Philip's stood for 112 years. The great fires of 1740 and 1778 spared it; twice in 1744 lightning struck it without doing much injury. In 1835 a small fire in the neighborhood ignited the upper portion of the steeple, and the whole structure burned slowly downwards to the ground to the grief of the whole community, regardless of denomination. It was the cause of public mourning.

A new church on the old foundations was at once started, the corner stone being laid in November of 1835, and the church consecrated in 1838. The architect is recorded as "J. Hyde," the steeple being added later by E. B. White. The new building was at first intended to be a reproduction of the old, but the vestry realized that certain defects had previously existed and should be avoided in the new building. As the result, while the exterior is similar to the church of 1812 with the exception of the spire, the interior differs considerably from the earlier phase.

Suffering from bombardment in 1863 and the earthquake of 1886, the building was carefully repaired each time. In May, 1920, after an interval of 76 years, lightning again struck the church and damaged the eastern end. This occasioned the decision for an extension as well as repairs, and the authors of this article were entrusted with the task. The accompanying plan and illustration show both the old and new work. The shallow elliptical sanctuary, projecting through the east wall, was removed, the great elliptical arch in the wall being given a semi-circular form, concentric with the ceiling curve; an extra bay for the organ and choir was added, beyond which, supported by another great arch, was erected a semi-circular sanctuary. The detail of the old ornament was carefully repeated, the coffers and rosettes of the dome being restudied as the greater curvature demanded more panels. The cherub heads over the new side arches were made by making moulds from one of the existing heads taken down for that purpose. On the back of this head was found a label, showing that at least part of the plaster ornament was imported in 1835-38. Printed on brown paper, it reads: "From



Wrought Iron Gate (1823), St. John's Lutheran Church, Charleston (1816)

Measured Drawing Opposite

Charles F. Bielefeld, Manufacturer, 18, New Road, Fitzroy Sq., London," proving its foreign origin.

The remaining existing churches of the period from 1800 to 1840 are all similarly of the Wren type, varying somewhat in each particular church, but all having colonnaded porticoes and steeples in which the influence of the different London parish churches from the hands of Gibbs, Wren and others is quite apparent. The spires, often added after the completion of the buildings, vary according to the skill and taste of the designer and the extent of the funds of the congregation.

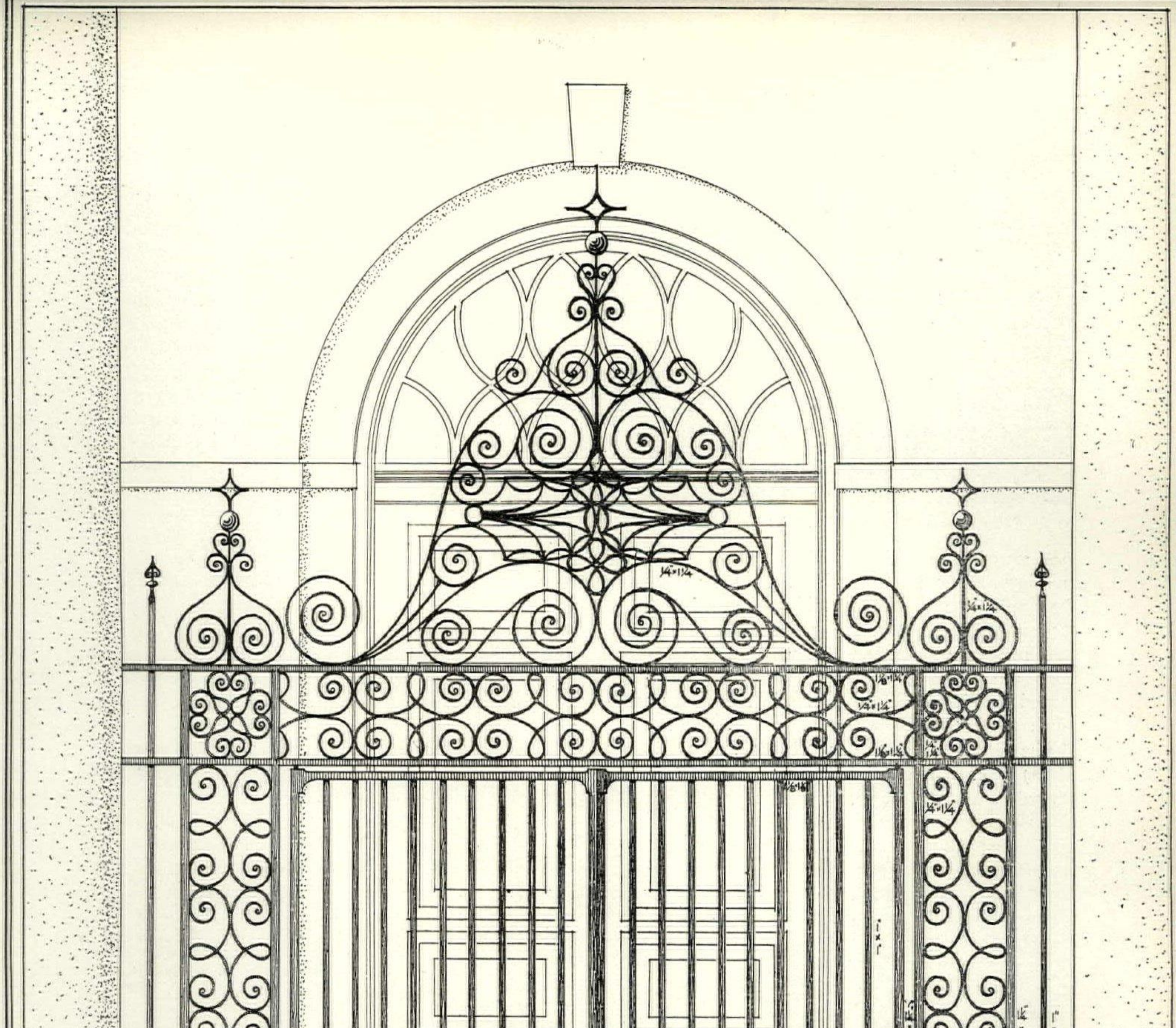
An important step in the sequence of styles has been lost through the burning in 1861 of the Congregational Circular Church of 1804. This was the work of Robert Mills and was probably his earliest individual effort. It was in the form of a rotunda, having a dome and lantern; a square projection abutted on the street side with a portico of six columns and a steeple—added later—similar to that of the St. Philip's of 1835. The building was noteworthy because Mills claims that its was the first dome built in America, and that he recommended Greek Doric proportions for the portico at this early date—a suggestion which, however, was not adopted.

The First Presbyterian Church (1814) is the only representative of the two-spired type. The Second Presbyterian Church (1811) is on standard lines, though its steeple was never carried above the second stage of its height. This stage, like those of St. Michael's, St. Philip's and the First Presbyterian, is octagonal, ornamented with Ionic pilasters. The lack of a spire, while felt, is not entirely a loss, as it gives to the building a feeling of restraint and a severe simplicity in keeping with its lines and purpose. Legend has preserved the rumor that the omission of the steeple was due to the fact that the contractors were paid on the basis of the number of brick laid and that the funds were exhausted in the unnecessarily thick walls by the time the base for the spire was completed. The walls bear out the legend in their extreme thickness, as those of the upper tower stage are of brickwork, 6 feet thick.

St. John's Lutheran Church (1815-18), incorporated in 1783 as "The Lutheran Church of German Protestants," varies the design of its spire from those of contemporary churches. This and its ornamental iron gates (1823) are its chief points of note. The gates were made by members of the congregation, among whom were the best wrought iron craftsmen of the city, and were plainly a labor of love. Although less well known they are the equal of any of the other masterpieces of wrought iron work in the city. The accompanying measured drawing shows one of the three gates of the same design that form a screen between the columns of the portico. Besides these the churchyard is enclosed by an iron fence with a fourth gate of equal scale and richness.

In 1809, a movement was made towards the forming of a third Episcopal congregation, as St. Michael's and St. Philip's were becoming inadequate. This movement was stopped by the operation of the "Embargo and Non-Intercourse Act," but in 1810, a number of the members of the two parishes obtained the use of the "Old French Church" and formed the "Third Episcopal Congregation." They determined to build a new church, and receiving donations of land in the northwest portion of the city, started the erection of "St. Paul's Church, Radcliffeboro." The corner stone was laid November 19, 1811. The brickwork was executed by James and John Gorden, their plan for the church being accepted. The carpenter work is recorded as being by Robert Jackson and Robert Galbraith. The church was consecrated on March 28, 1816.

In the building of the church the congregation was doubtless ambitious to surpass the older churches in size and elegance, the body of the church being 70 by 90 feet. Like them, it was to have a lofty steeple, but after the lowest stage had been erected, some settlement occurred, and the builders considered the bearing strength of the soil insufficient for a tall steeple. The walls of the square truncated tower were, therefore, finished off with battlements and pinnacles and ornamented with quartrefoils moulded in relief. In this rather unexpected change of style to meet an unforeseen situation, we find perhaps one of the earliest adum-



IRON GATES WROUGHT IN 1823
SAINT JOHN'S LUTHERAN CHURCH
CHARLESTON, S.C.

SCALE: 1/2 INCH EQUALS 1 FOOT

MEASURED AND DRAWN BY ALBERT SIMONS

Westminster Presbyterian Church (1850)

brations of the Gothic revival as applied to church buildings. The interior of St. Paul's exemplifies the application of the prevailing Adam motifs to ecclesiastical purposes, the general effect being at once light and spacious. The very slender proportions of the gallery columns and the delicately carved woodwork of the tablets in the chancel add much to the general effect of elegance and scale.

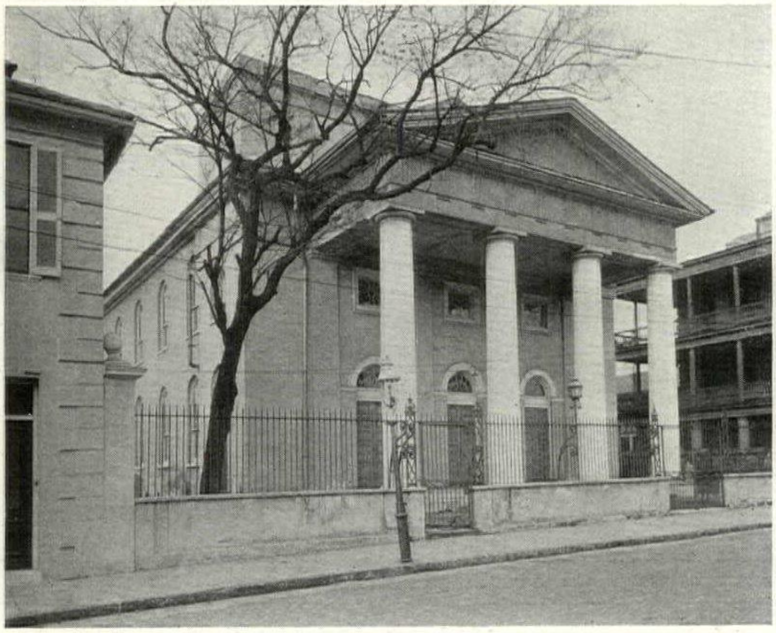
The First Baptist Church (1822, by Robert Mills) gives us in its turn the first hint of the Greek revival, although the body of the church is still English renaissance in its proportions and openings. The Greek influence is found in the omission of the steeple entirely, the encircling of the building with a Greek Doric entablature, and in the giving to the unfluted portico columns massive proportions that were neither Greek nor Roman. Mills was very much pleased with his introduction of the new style and thus records his approval of his own work: "The Baptist Church of Charleston exhibits the best specimen of correct taste in architecture of the modern buildings in the city; it is purely Greek in its style, simply grand in its proportions and beautiful in detail."

St. Mary's Church is more interesting for its history than for its architecture, being the mother church of the Roman Catholic faith, not only for Charleston but for the Carolinas and Georgia. There were but few Catholics, mostly Irish, in Carolina before the revolution, and it was not until 1790 that the clauses excluding them from holding office were stricken from the state constitution.

The ground for St. Mary's was first purchased for Catholic use in 1789. Catholics being few in number, we find that "it was suggested that perhaps either the court of Spain or France might establish in Charleston a Catholic chaplain, since many vessels, carrying the flags of those countries frequently visited here." This was not effected, however. After the French revolution and the Santo Domingo uprising the number of Catholics increased, due to immigration of refugees to the city, and in 1793 a brick church replaced the previous wooden structure and was used until destroyed by the fire of 1838. The present building, 50 by 84 feet, took its place, its corner stone being laid on August 15, 1838. Much havoc was wrought in 1863 by the shells from the federal fleet, throwing down the great picture of the crucifixion over the altar and wrecking the organ.

In the adjoining cemetery of the church, on lichen-covered slabs, Irish and French names appear side by side in marked contrast. Below a coronet and coat of arms we read this epitaph:

"Underneath lie interred the bodies of D'lle Amelie Maxime Rosalie De Grasse, deceased on the 23rd day of August, 1799; and of D'lle Melanie Veronique Maxime De Grasse, deceased on the 19th of September, 1799, daughters to the late Francis Joseph Paul, Count De Grasse, Marquis of Tilly, of the former Counts of Provence and Soverign Princes of Antibes, Lieutenant-General of the Naval Army of His Most Christian Majesty, Commander of the Royal Order of St. Louis, and member of the Military Society of Cincinnati."



First Baptist Church, Charleston (1822)

Thus in the broad fellowship of a common faith, beside the ashes of humbler folk, sleep these noble ladies of the ancient regime.

Heralded by the First Baptist Church, we find in 1840, the classic revival established as the accepted manner for the churches of Charleston. The day of steeples had passed, and the classic temple was always held in mind when a church was under consideration.

Of the more correct Greek Doric examples, the best are the Hebrew synagogue (1840-43), of the Parthenon type, beautifully executed in detail and proportion, and the Bethel Methodist Church (1853), of the more archaic, massive type of church architecture.

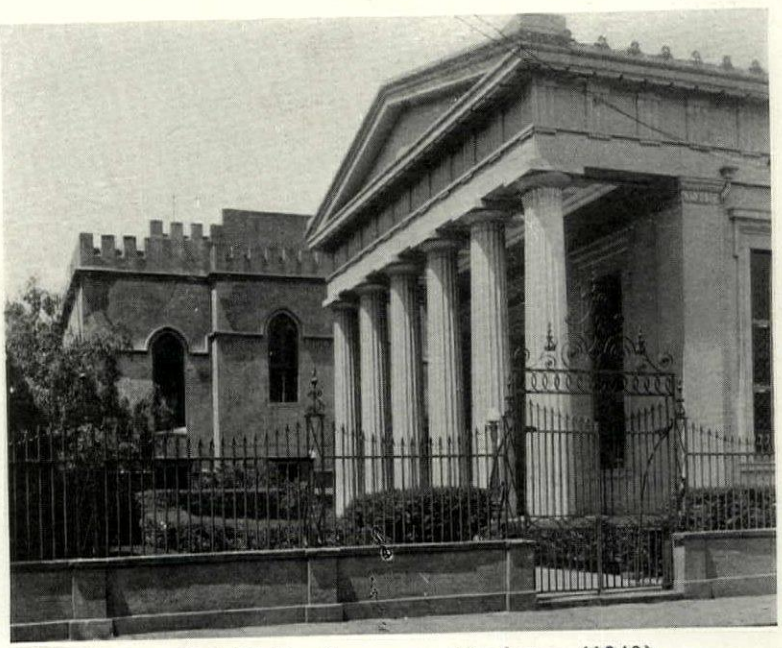
The earliest Jews in the colony came from Spain, and their first recorded meeting in Charleston was in 1750. The name of this congregation was, as it is now, "Kahal Kadosh Beth Elohim," "Holy Congregation of the House of Israel." The members were strictly orthodox, and the mode of service was in accordance with the Portuguese custom. Their first permanent synagogue was built in 1792, "Messrs. Steedman and Horlbeck being the contractors, the building with the ornamental work and cupola to cost $20,000." The corner stone was laid according to the rites of Freemasonry. This building perished in the fire of 1838, and the present synagogue was built the same year. Mr. Warner of New York was the architect, and David Lopez, the contractor. The detail work and finish is particularly fine throughout. The synagogue is 56 by 95 feet, the columns being four feet in diameter; height to the apex of the pediment, 46 feet; the door 18 feet high, 9 feet wide. On the interior, the gallery is supported by an Ionic order modeled after the Erechtheum and the covering for the Ark is supported by ten columns and *antae* of the Corinthian order after the monument of Lysicrates.

The classic Corinthian temple is best represented by the Westminster Presbyterian Church (1850) and the Spring Street Methodist Church (1858). The former is the more carefully proportioned, its great doorway being a magnificent piece of work, and the whole having an atmosphere of sanctity that is seldom obtained in the more severely classic types. It suffers in common with all Greek and Roman temples adapted to church use by the necessity of having side lighting in order to conduct its ceremonies, a requirement that did not exist in the classic prototypes. This problem the designers solved by inserting huge side windows, framed in Græco-Roman mouldings, as the best solution, but it is one that in every case detracts from the structure. The Spring Street Methodist Church suffers even more from this failing, as its podium, in addition to the side walls, is pierced to give light to a basement floor.

In 1844 we have another influx of style — the Gothic revival — whose earliest use is found in the hands of two architects, E. B. White, frequently mentioned in this series, and Frank Lee. Both, however, used Gothic elements more as an outward form producing a more or less closely simulated Gothic architecture than as a system of construction. Behind their ribbed, vaulted ceilings of lath and plaster are the familiar rafters and trusses that had been used in the classic churches. White first introduced the style in his rebuilding of the Huguenot Church (1844), and Lee in the Unitarian Church of 1852. This introduction of Gothic is of interest when one realizes that the dates given are quite as early as those of Trinity Church, New York (1843, by Upjohn), and Grace Church, New York (1858, by Renwick), which designs have generally been regarded as representing the genesis of the Gothic revival in America.

The Huguenot Church was founded by the French refugees in the earliest days of the colony. It has its services conducted in the French language and adheres today to the exact form of the old Calvinistic worship. For this church, in the first use of the style, White did little more than ornament a gable-ended building with Gothic buttresses, crestings, finials and pointed windows, but even with these he created, in the writers' opinion, a far more genuine religious atmosphere than that which surrounds many of the Christian adaptations of the pagan temples that were then ruling the ecclesiastical architecture of the city. Internally, being a small building, there were no piers, the Gothic work being confined to mouldings and to the plastered ceiling, which is in the shape of groined ribbed vaults springing from Gothic corbels on the side walls. Grace Church, Episcopal (1848), on a much larger, conventional scale, was the next church to appear in the Gothic style.

The Unitarian Church was the third to adopt the new mode. This denomination had come into being through secession from the Congregationalists, who, in turn, had been formed by those remaining in the "White Meeting House" Church after the withdrawal of the strict Presbyterians in 1734 to form a church of their own, modeled after the Church of Scotland. The Congregationalists prospered, in spite of the loss of the Presbyterians, and built a second church to accommodate their members in 1772—a gable-ended structure with circular-headed



Beth Elohim Synagogue, Charleston (1840)

French Huguenot Church, Charleston (1844)

windows and a square tower in two stages. With the formation of the Unitarian body in 1817-19, this church was given to them as their share of the corporation assets and served them until 1852, when growth demanded a new building.

Jones and Lee were the architects for the new building—the former apparently unknown save for this mention, the latter a member of the church and architect for several other buildings. Portions of the side walls of the church of 1772 were incorporated into the new building by vote of the congregation for the sake of sentiment, although it was a costly proceeding, and only a few piers could be used. The illustrations give the best idea of the building without and within for comparison with other buildings of the time to determine in how significant a place this church should be ranked in the history of the Gothic revival. The *Charleston Courier* of April 5, 1854, says: "The style adopted is 'perpendicular'—the latest and richest of all the styles of Gothic architecture. . . . The most striking feature of the interior is the ceiling of the nave, being, it is believed, the only work of its kind in the country." Lee plainly derived his inspiration for the ceiling from the Chapel of King Henry VII in Westminster Abbey, but carried it out beautifully, both in design and workmanship.

What has gone before, in Charleston, has left an indelible imprint, and this scant record may be of use to those interested in architectural history alone. We hope, however, beyond the fact of showing one chapter in the history of American architecture that these studies may help in another way. There is the slowly developing tendency of the architects of today to return to historic precedents and tradition of earlier American architecture, adapting them, of necessity, to modern needs and thus expressing the best of the characteristics of the past that have been fused together to make us a nation. To know these characteristics in a human way is, therefore, essential; and of them none better can be found for study than those that exist in the areas from which they first spread—Massachusetts Bay, the valleys of the James, Delaware and Hudson rivers, and the tidewater country of Carolina.

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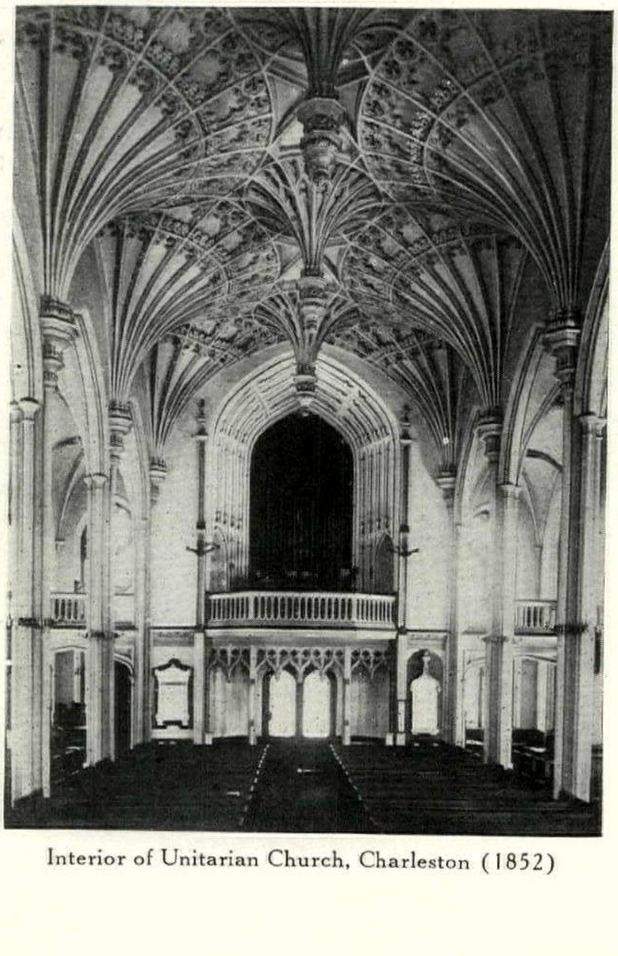


Interior of Unitarian Church, Charleston (1852)

Concreting in Freezing Weather

By E. F. ROCKWOOD, M.AM.S.C.E.

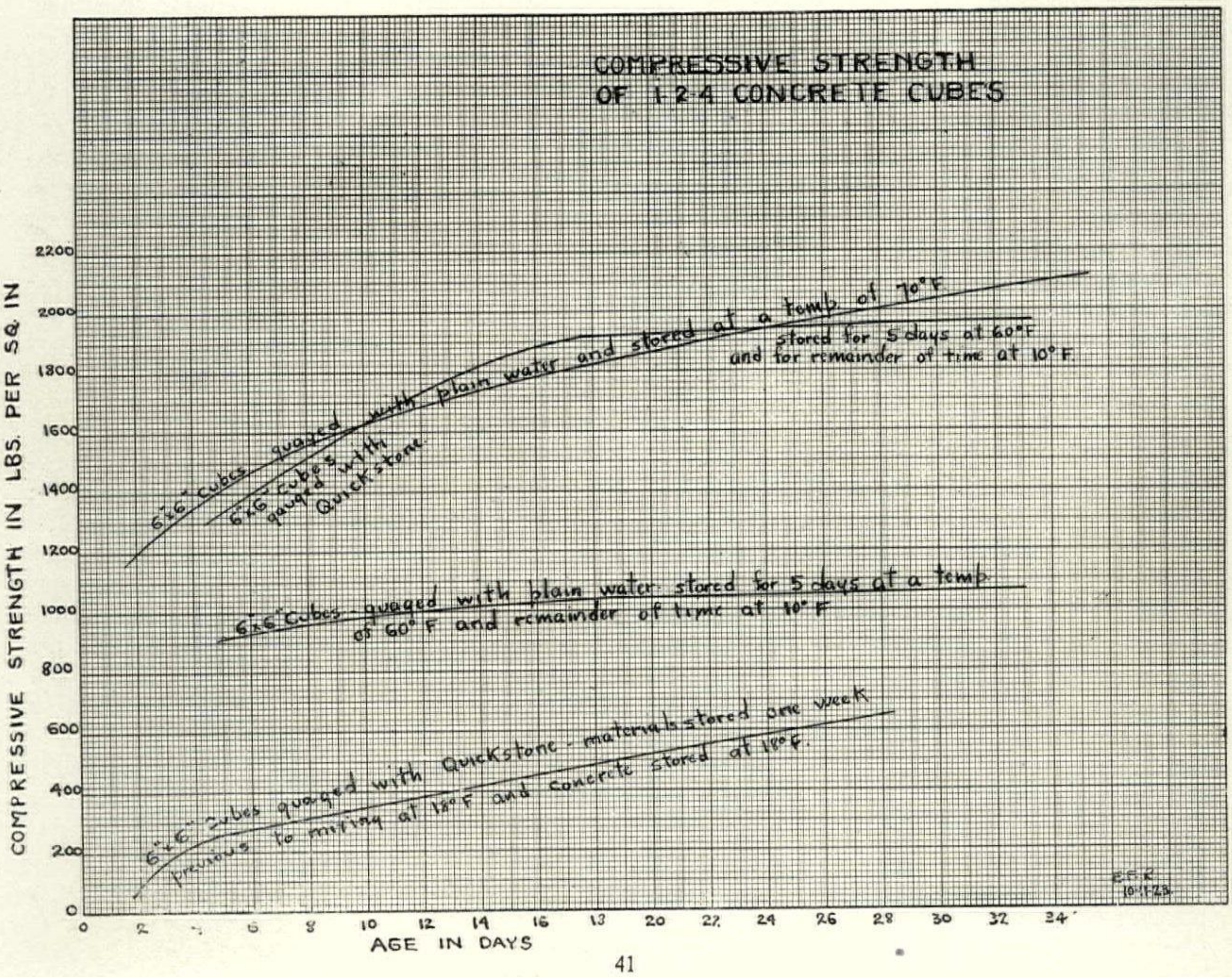
COLD weather slows up the setting and hardening of concrete and may even suspend entirely the activity of the cement. The chart given here shows the increase in strength of a 1:2:4 mortar stored under a temperature of 70° Fahr. From this we see that the average strength at 5 days is 1,400 pounds, at 19 days 1,840 pounds, and at 33 days 2,090 pounds per square inch. In other words, the gain in strength from the 5th to the 19th day is 440 pounds, and from the 19th to the 33d day 250 pounds.

The Henry S. Sparkman Engineering Company of Philadelphia made in 1918 a series of compression tests which show very plainly the effects of low temperatures. These were made on 6-inch cubes of 1:2:4 concrete. All specimens were allowed to harden for 5 days at a temperature of 60° and then were stored at a temperature of 10° until tested. The average strength after 5 days at a temperature of 60° was 917 pounds; after 14 days' storage at 10° it was 1,043 pounds or a gain of only 116 pounds as compared with 440 as shown in the chart. After 28 days' storage at 10° the strength was 1,063 pounds, a gain of only 21 from the 19th to the 33d day as compared with a gain of 250 pounds for concrete stored at 70°. In other words, the low temperature practically suspended the setting and hardening of the concrete.

This suspension of the activity of the cement is not injurious to the concrete, but it will increase the cost of concrete construction. With a temperature of 70° floor forms can be stripped in from 7 to 10 days, but as the temperatures grow lower and lower the forms must be left in place longer and longer. The writer knows of instances where they have even had to be left in place until warm weather came in the spring, and this delays the completion of the building and adds to the cost.

Cold weather has another effect on concrete which may be injurious, i.e., a low temperature may freeze the concrete, and this in turn may injure or destroy it, particularly if it happens after the initial and before the final set. After the final set it is not so serious, although even then alternate freezing and thawing will probably weaken the concrete.

The writer therefore recommends these rules: 1st. Never pour concrete when the temperature is below 40° unless the mix can be brought up to this



temperature and kept there for a period of at least 48 hours. 2d. Keep the concrete properly supported until it has attained sufficient strength to carry all loads that may be brought upon it.

The next step is to find methods of meeting these conditions. The first method involves applying heat and protecting the concrete so as to retain that heat until the final set has been reached. The second method requires either that forms be left in place until the temperature of the concrete rises sufficiently, or that some means be found to accelerate the hardening of the cement without waiting for warmer weather. There are two ways of complying with each requirement. The materials can be heated previously to mixing and the concrete itself can be heated after pouring, or an accelerator and anti-freeze substance can be added to the mix, or a combination of both methods can be used.

With either method the forms and reinforcement must be free from all ice and snow, and the sand, stone and water must contain no ice or frozen lumps. All these would consume heat that should go into setting and hardening the concrete. Then, any or all of the materials may be heated and the concrete properly protected by salt, hay and tarpaulins. In this way the concrete can easily be kept from freezing for the 48 hours recommended. This method, however, will simply prevent injury to the concrete from freezing and will not permit early removal of the forms. This latter can then be accomplished by enclosing the structure with tarpaulins and supplying artificial heat by means of steam pipes, stoves or salamanders. As an alternate, a specially prepared solution of calcium chloride can be mixed with the concrete. This will not only prevent freezing during the first 48 hours but will permit the concrete to gain in strength during the next two or three weeks at nearly the same rate as in warm weather.

We will refer once again to compression tests made on 6-inch cubes by the Henry S. Sparkman Engineering Company. The sand and stone were stored for one week at a temperature of 18°, then taken out and mixed with cement and water and immediately placed again in the cold storage room under a constant temperature of 18°. The cubes mixed with plain water, when removed to ordinary temperatures at 48 hours, 96 hours, 7 days and 28 days, were found to be frozen and upon thawing for a few hours became mushy, indicating that no setting or hardening had taken place. Those made from concrete gauged with a calcium chloride solution were not frozen, as immersion in warm water showed no sign of thawing. Their compressive strength at various periods after one hour immersion in warm water was, according to the records:

48 hours	92.3	pounds per square inch.
96 "	218.0	" " " "
7 days	249.3	" " " "
28 "	643.0	" " " "

Stored 90 days at 18°, then 30 days in ordinary air temperatures (60-70°), 1,554 pounds per square inch for those gauged with the solution, 703 pounds per square inch for those gauged with plain water. Therefore, these tests show that such a solution will prevent freezing. Tests were also made similar to those mentioned earlier in this article, and they showed that while cubes gauged with plain water gained only 116 pounds per square inch from the 5th to the 19th day and 21 pounds from the 19th to the 33d day, those gauged with the calcium chloride solution increased from 1,327 pounds per square inch at 5 days (stored at 60° for 5 days) to 1,911 pounds per square inch at 19 days (5 days at 60°, 14 days at 10°) and to 1,958 pounds per square inch at 33 days (5 days at 60°, 28 at 10°).

Therefore, while either heating the materials or using a calcium chloride solution will prevent the freezing of the concrete, heating the materials alone will not permit the concrete to continue to gain in strength after the first 48 hours, although this solution alone will. On the other hand, there are limits to the effects of even such a solution, and a combination of both methods may be best. The writer therefore recommends this procedure: For temperatures above 28° use a special calcium chloride solution. If this is not available, heat either the sand, stone or mixing water. For temperatures of from 22° to 28° heat any one of the materials and also use the solution. From 16° to 22° heat all the materials and use the solution. If the temperature is below 16° it is probably uneconomical to attempt to pour concrete at all.

In using a calcium chloride solution the commercial grade calcium chloride will not meet requirements, but a special solution made for the purpose must be used and the recommendations of its manufacturer followed. If a calcium chloride solution is used it will not be necessary, from a standpoint of safety, to enclose and heat the building. However, such protection is probably well worth its cost when the average temperature is below 25°, because it will permit the forms to be stripped sooner and therefore fewer forms will be required. All tests show that the solution mentioned will not injure the concrete oı corrode the reinforcement. Salt has been used to lower the freezing point of the concrete, but its use is bad practice and should be avoided, as it weakens the concrete.

If the suggestions given in this article are followed, concrete may be poured safely in cold weather at slight increase over cost in warm weather.

Plate Description

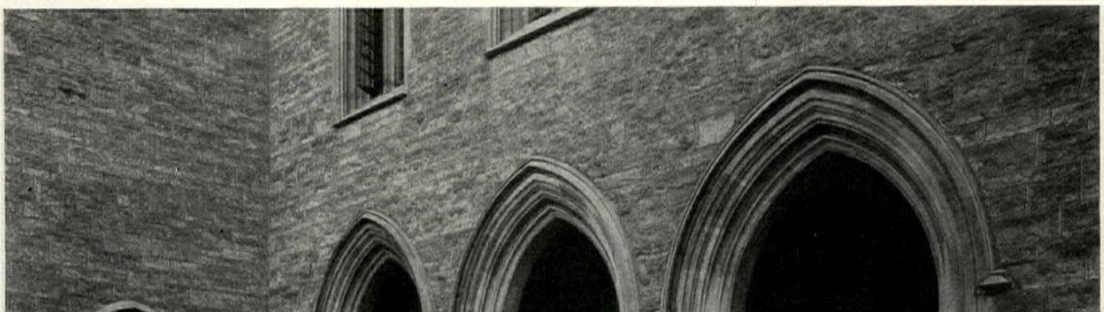
House of Maurice Brill, Esq., 163 East 63d Street, New York. Plates 10-13.—With the growth of apartment house building in New York each year sees the erection of a smaller number of individual residences. The few built, however, are likely to be of size and character which render them particularly interesting. Mr. Brill's residence, of which Frederick Sterner is architect, is quite representative of the modern type of individual New York house. The exterior presents a distinguished facade, even in a block which contains many which are far removed from the ordinary. Brick and stucco are the materials used, and the Tudor character is heightened by the use of steel casements with small diamond-shaped panes and many inserts of stained and painted glass.

The Tudor architecture which characterizes the exterior is perhaps even stronger within, for a number of the principal rooms are walled with old oak paneling of the period, the ceilings being of simple timber and plaster design and the floors of dark red paving tile. The furniture consists to a great extent of antiques, selected and arranged with the taste for which Mr. Sterner is well known. The unusual width of the building has made possible its disposition on the plot in such a way that a considerable part of the property behind the house is available for use as a garden. The facade of the house which faces the garden has been carefully designed, and the garden itself is walled in with brick and laid out with flagged paths, hedges and shrubbery, and adorned with several figures of lead.

House of Edward Lowe, Esq., Montecito, Cal. Plates 14-16.—A study of the contemporary domestic architecture of southern California would lead one to believe that by far the greater proportion of dwellings are being built after the manner of the early Spanish Renaissance,—the simple and slightly austere type of which the buildings erected by the early Franciscans are such excellent examples. Like every form of architecture first used during the settlement of a region, this type is well adapted to its use. A climate always temperate and often warm calls for buildings having walls of rather more than average thickness, while sunny, cloudless days make grateful the shade offered by loggias and in rooms where comparatively little space is devoted to windows and where there are broad expanses of wall.

An instance of the successful use of this architectural type is found in this house at Montecito. The architects, Johnson, Kaufmann & Coate, have designed many California residences in this style, and here as in many other instances are seen their skillful, clean-cut structural lines, the judicious placing of windows, well considered sloping of tile covered roofs and the admirable use of simple wrought iron in balcony rails and of perforations or "reticulating" in the walls at certain places where ordinary window openings were not necessary.

The house is built of hollow tile which has been coated with stucco, the stucco having been slightly colored in mixing to afford a pleasing combination with the tile used upon the low pitched roofs.



Detail of Arcade on South Front
Hart House, University of Toronto, Toronto
Sproatt & Rolph, Architects

EDITORIAL COMMENT

ARCHITECTS PROMOTE BUILDING STANDARDS IN OHIO

PRESENT economic conditions have perhaps exerted a greater influence on building construction than in any other field of business activity. Other businesses, too, are generally better able to adapt themselves quickly to changed conditions, but the building industry is still largely a handicraft, and its methods do not differ greatly today from those of a hundred years ago. Legislative enactments have for many years standardized certain types of construction and classes of buildings. This process is necessarily slow to recognize changed conditions, and when intelligently directed promotes conservatism that is in the long run good for safe building; in times such as the present, when economic necessity urges use of improved methods and new materials, it acts as a handicap, particularly since the subject is of a highly technical character and rests for decision with non-technical bodies.

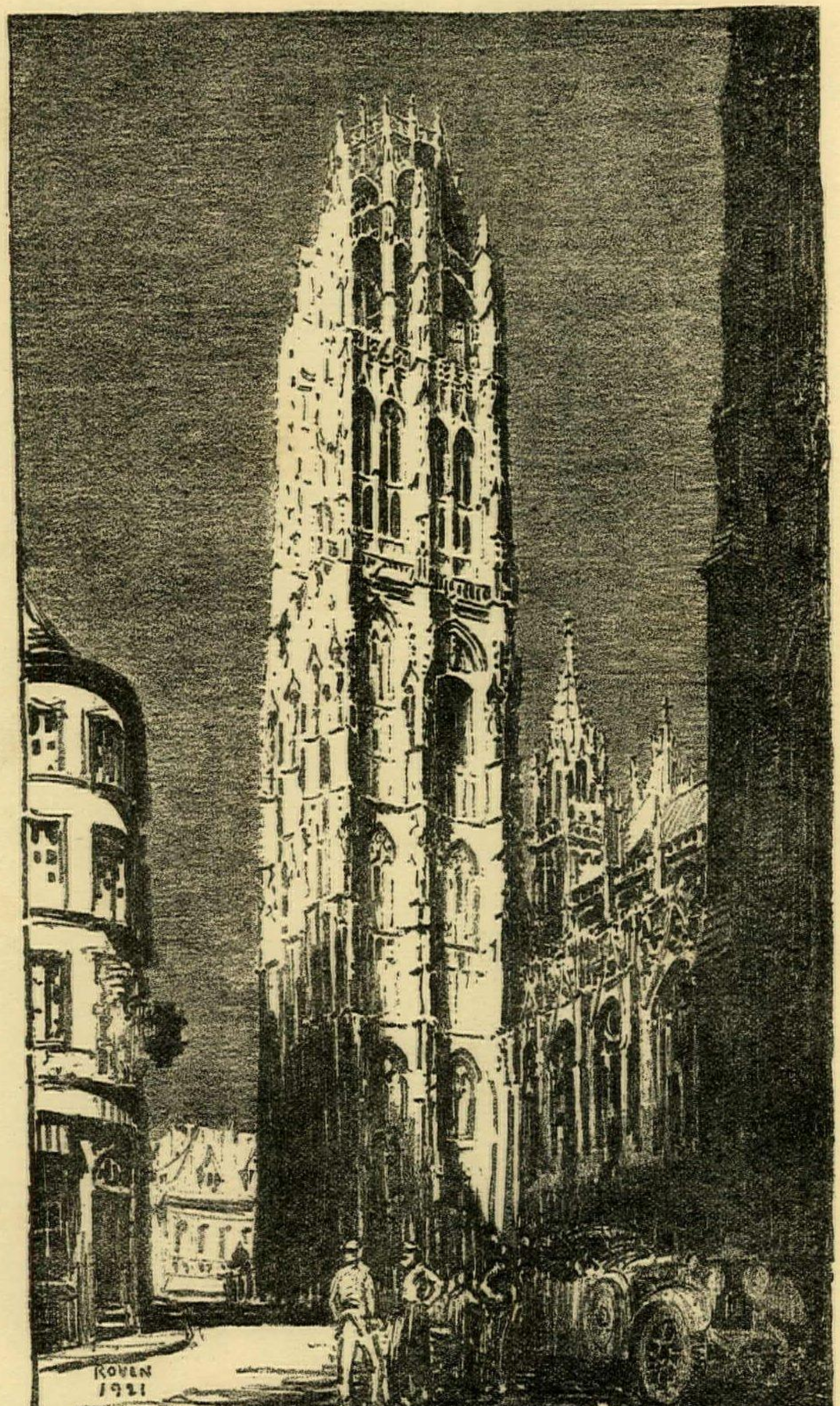
The remedy for existing conditions must originate in the professional bodies allied with the building industry; constructive suggestions can be supplied only by those with a disinterested technical background that permits intelligent discrimination between business expediency and principles.

An example of such progress is the organization of the Ohio Board of Building Standards, which became effective October 23, 1923. The functioning of this board is designed to place legislative restrictions and standards for building on a reasonable, common sense basis that will accord with modern economic conditions and recognize modern technical skill in the production and use of building materials and architectural and engineering skill in the design of structures. The bill which created the board was prepared by and enacted through the efforts of the Ohio State Association of Architects, and broadly speaking it provides: for the revision of the Ohio State Building Code and other state laws regulating buildings and the sanitation and equipment thereof; for making uniform existing lawful requirements imposed by various departments under the police power of the state; for the writing of legislation to regulate the construction of buildings not regulated by the state code or by lawful requirements; for the supervisory centralization of building regulation in one state activity; for the making of building regulation reasonable in its imposed requirements; and, particularly, for creating lawful machinery through which building regulation may be kept abreast of building progress and practice without recourse to legislative action.

The Board of Building Standards law is not a detailed building code. It defines the principles of and is a basic building code. It provides for the prompt determination of present and future code requirements by the board itself. Its defined purpose is that all public buildings used or that may be used for resort, assembly, education, entertainment, lodging, trade, manufacture or repair, storage, traffic or occupancy by the public, and all other buildings, except single and two-family dwellings, within the corporate limits of a municipality or on allotted territory within three miles thereof "shall be so constructed, erected, equipped and maintained that they shall be safe and sanitary, for their occupancy."

The Ohio State Building Code has not been changed or amended in any essential particular since it became a law, 12 years ago. Efforts to amend it and to enact a complete up-to-date code have met the usual fate of technical legislation submitted to non-technical deliberative bodies. The Ohio Supreme Court recently held that the division administering the code has no power to determine equivalents for nor to modify or change any of its requirements, regardless of how archaic they may be, a power supposedly conferred by the law under certain protective provisions. The somewhat uncoördinated administrative provisions have tended toward confusion and inconvenience on the part of those engaged in the construction of buildings. The new board has every prospect of eliminating these conditions, which have acted as a restraint to building construction, because of the power invested in it to determine equivalents for existing and future requirements without resort to legislative deliberation.

The board has a membership of seven, two of whom are state officials and five members by appointment of the Governor. The members and officials are: Herbert B. Briggs, architect, Cleveland, chairman; Thomas P. Kearns, the Chief of the Division of Workshops, Factories and Public Buildings of the State Department of Industrial Relations, secretary; William H. Dittoe, Chief Sanitary Engineer of the State Department of Health; Peter E. Dempsey, attorney-at-law, Columbus; John H. Clemmer, general contractor, Akron; Edward J. Cavan, electrical engineer, Cleveland; William C. Groeniger, sanitary engineer, Columbus. The board is established in the Department of Industrial Relations. It is authorized and instructed to "formulate and report to the General Assembly" amendments to existing building construction and equipment laws and additional legislation "to carry out fully" the purposes of the act creating it, including the coördination of all regulatory functions of the state, and, on petition of any party at interest, to determine and establish equivalents for required, or to be required, fixtures, devices, materials, systems or manners of construction or installation, or to refuse to grant such petition. It is directed to recommend and promote statewide uniformity in building law and ordinance regulation requirements.



TOWER, ROUEN CATHEDRAL

FROM LITHOGRAPH BY J. R. ROWE

Royale Tea Rooms

Rue Royale, Paris

Text and Measured Drawings
by George Leighton Dahl

DUTCH COLONIAL has had its introduction into Parisian life. The facade of the tea shop in the *Rue Royale* is a happy combination of painted wood and polished siena marble. The character of the design is expressive of its purpose as an inviting *patisserie*. The facade is pierced by two flat circular beaded openings, framed in with four colonnettes on a projecting window sill, crowned by a vase and flower ornament delicately tinted in color, with decorative shutters reminiscent of Dutch influence. In ten minutes you will find yourself seated within, at a table with a pot of chocolate, which is evidence enough of the architect's success in creating an inviting exterior !

Recent Necrology

BERTRAM GROSVENOR GOODHUE

IN the recent passing of Bertram Grosvenor Goodhue architecture lost one of its outstanding figures. Mr. Goodhue was essentially a creator, and therefore he was a student,—one who by grasping the fundamentals of a subject and absorbing its spirit was able to carry its development to where it logically led. This strong foundation of understanding furnished support for a soaring structure of achievement. Without ceasing to be original and at times even daring, there was inherent in all his work a high degree of architectural quality—a character which pervaded his work of the most divergent kinds and which stamped it with the mark of his individuality and genius.

Born April 28, 1869 at Pomfret, Connecticut, he was attracted early in life to the profession of architecture. It was before the days when many excellent schools of architecture which now exist smoothed the path which leads to its profession, and the student who aspired to architecture was obliged to enter as a graduate of the school of experience. Mr. Goodhue's architectural training was begun the day he entered the office of Renwick, and it might be said to have ended only upon the day of his death. As a member of the firm of Cram, Wentworth & Goodhue, later Cram, Goodhue & Ferguson he played a powerful part in leading the advance of that firm to a place in the foremost rank of church architects. When the firm was dissolved in 1914 Mr. Goodhue began independent practice which afforded wide scope to his many-sided genius. Without ceasing to be chiefly a church architect and master of ecclesiastical styles, as represented by the Gothic of St. Vincent Ferrer's and the Chapel of the Intercession or by the Byzantine of St. Bartholomew's, he explored more distant fields, among them the Spanish Renaissance, which with his enthusiasm for Spain and things Spanish he used supremely well. In later work he turned toward fields still more distant;—just where his genius would have carried him will never be known, but any feeling of misgiving or tendency to criticise the daring originality with which he sometimes approached a work was curbed when one remembered the unfailing good taste with which Mr. Goodhue solved difficult problems.

Along with his eminently successful practice of architecture went great skill along certain other lines of work which might be called "collateral." His sketches, many of which were published in book form, show a marvelous grasp upon each of the qualities which enter into the making of excellent sketches, and his work, whether in pencil, pen and ink or some other medium was altogether winning and charming, representing a genius for style as characteristic and marked as that which distinguished his work in the more immediate field of architecture.

But to one who knew Mr. Goodhue there will often come a recollection of one phase of his many-sided personality which was particularly his own;—his encouragement of talent where he knew it to exist or where he supposed it might exist, and his kindness and sympathy toward those possessed of little talent, perhaps none at all, but anxious to "do things." Workers in all the many arts which have to do with architecture,—sculptors, woodcarvers, glass painters, metal workers and others,—will testify to the encouragement which they received from him; editors, writers and other workers in magazine or newspaper fields never appealed to Mr. Goodhue or to his office without receiving that courteous coöperation and unfailing consideration which lightened their labors.

LOUIS H. SULLIVAN

BORN in Boston, September 3, 1856; died in Chicago, April 14, 1924." In these few words there might be condensed the obituary of an architect long identified with the progress which the profession in America has made during the last few decades. Louis Henri Sullivan was essentially an exponent of movement and activity. His was not a reverence for architectural styles as such, but rather an interest in what they taught and particularly what could be adapted to contribute to the evolution of a new architectural type which should be expressive of the present age. The believer in views so pronounced and methods so advanced could not but attract to himself the dissent of many as well as the admiration of others, but he maintained to the last his belief in his theories, and to the end he stood forth as the prophet of the school of architecture which had long been called by his name.

Mr. Sullivan's education was received chiefly in the Boston public schools, and his technical and architectural training at the Massachusetts Institute of Technology and the Ecole des Beaux Arts. He came to Chicago in 1880 and began the practice of architecture, first as a member of the firm of Adler & Sullivan and later in independent practice which he continued until his death. The time of his coming to Chicago was during the height of the period in which Chicago, having already recovered from the effects of the Great Fire, was forging ahead to a position among American cities far beyond the wildest dreams of the pioneers who had settled Fort Dearborn, and this expansion created opportunities which architects were not backward in seizing, and Mr. Sullivan was prominent among those whose interest, vision and enthusiasm encouraged the development of the steel-framed building, the use of which is now almost worldwide. Mr. Sullivan received many honors and medals, one being the gold medal of the Union Centrale des Arts Decoratifs.