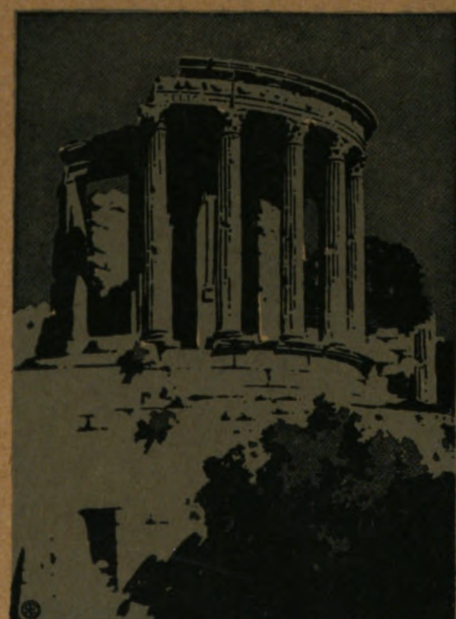
THE ARCHITECTURAL FORUM



JULY
1919

THE ARCHITECTURAL FORUM

AN ILLUSTRATED ARCHITECTURAL MONTHLY DEVOTED TO THE ART, SCIENCE AND BUSINESS OF BUILDING

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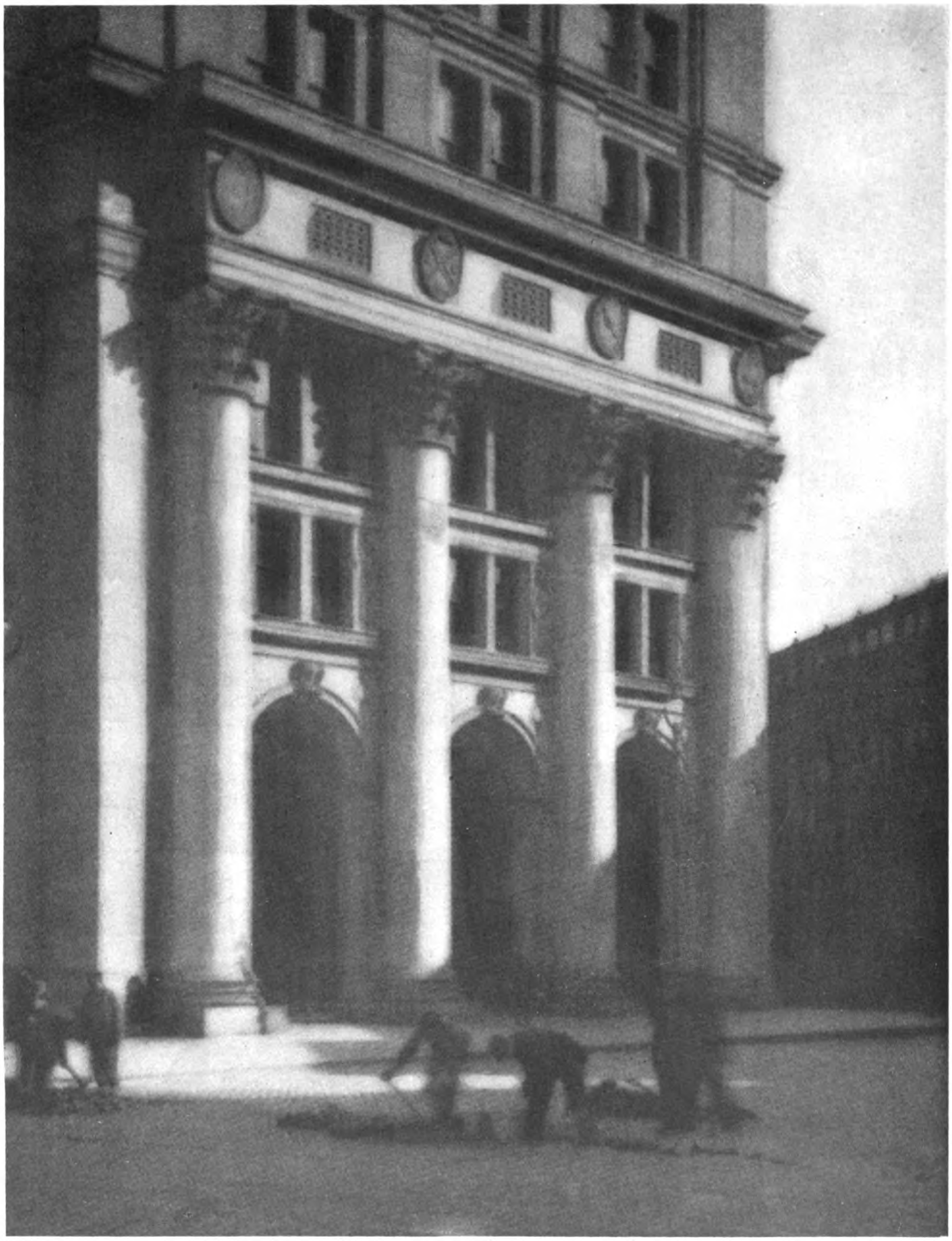


DETAIL OF LOWER STORIES
MUNICIPAL BUILDING, NEW YORK CITY
McKIM, MEAD & WHITE, ARCHITECTS
From photograph by John Wallace Gillies

THE ARCHITECTURAL FORUM
FOR QUARTER CENTURY THE BRICKBUILDER

VOLUME XXXI JULY 1919 NUMBER 1

Architecture of the Dalmatian Coast

PART I

By HAROLD DONALDSON EBERLEIN

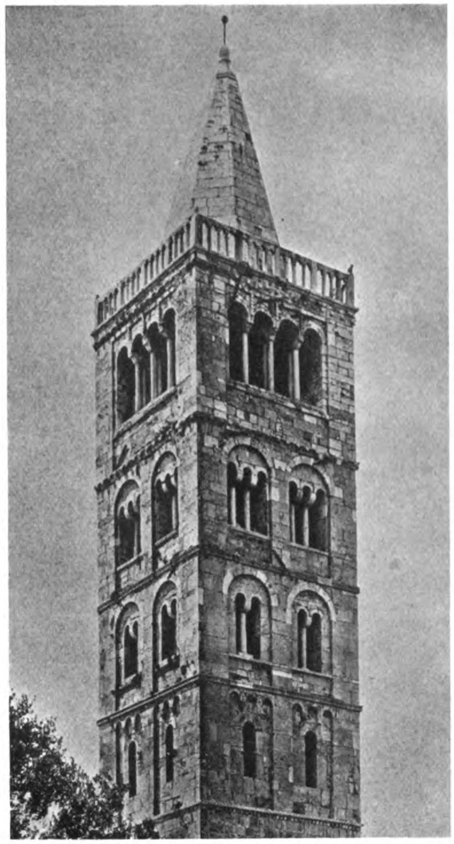
ONCE upon a time there lived an architect, in one of our large Eastern cities, who stedfastly refrained from crossing the water for fear he might unconsciously be influenced by the things he would see and that the individuality of his style would thus be contaminated! Would that he had gone, and would that his style had become *contaminated.* In thirty-odd years posterity has not got used to nor ceased continually to suffer from the monstrosities the *uncontaminated* style of this gentleman evoked.

This true fable — if one may be permitted to call a fable true — has a bearing upon our subject, as we shall by and by perceive. There are three kinds of architects in present evidence: first, enlightened men who know precedent and sanely make use of it as a foundation and guide; second, rigid purists who know precedent and follow it with slavish scrupulosity; and, finally, the group of self-satisfied individuals who know not precedent and endeavor to compound their ignorance by damning what they neither understand nor appreciate.

This third class we have to thank for many of the stupidities daily committed, a set who would make of their studied disregard of precedent a masque to cover their ineptitude and lack of training. The rigid purists who shackle themselves with their pedantic veneration for precedent, and might be termed not only the "copy-cats" but also the "'fraid cats" of the profession, make architecture a process of smug archæology and throttle its influence as a vital creative force, susceptible of development. Such architectural pharisees abet the letter in killing the spirit. Fortunately they are not overly numerous.

Palazzo del Rettore at Ragusa

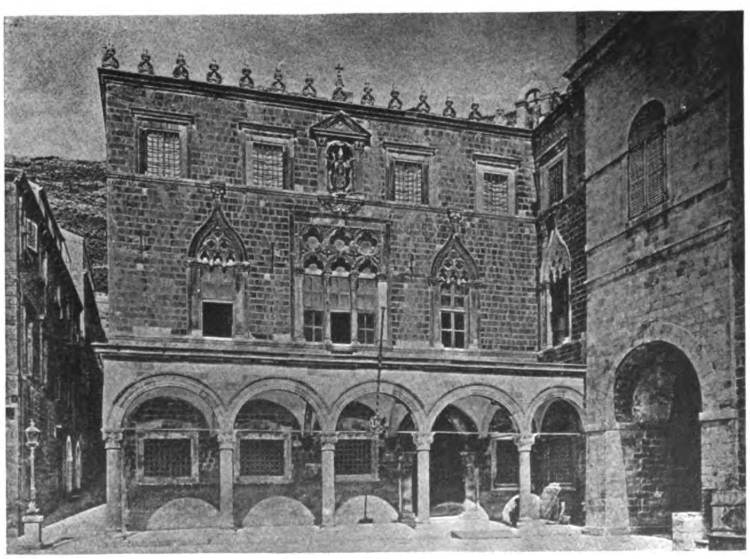
It is upon the first class, the men who use a broad, appreciative knowledge of precedent and, along with it, their imagination and vision, that we must rely for living architectural expressions of permanent value that both meet the practical requirements of the age and also satisfy a discriminating sense of fitness in outward form. To them precedent is not a trammel but rather an inspiration apt for the most elastic interpretation—not an hectoring schoolmistress but a resourceful friend. Whether consciously or not, they have grasped the essence of genuine originality—a quality that means not *revolution* but *evolution*; a quality that involves a catholic and flexible adaptation of precedent to the living needs of the present day. They have acted upon the sound principle that exclusive adherence to a single model is dangerous while from a multiplicity of models one may learn in safety. Incidentally, they have seized upon the fundamental element of *style*, if by style we understand the *direct attainment of the end proposed without distracting irrelevancies.*



Campanile, Cathedral at Arbe

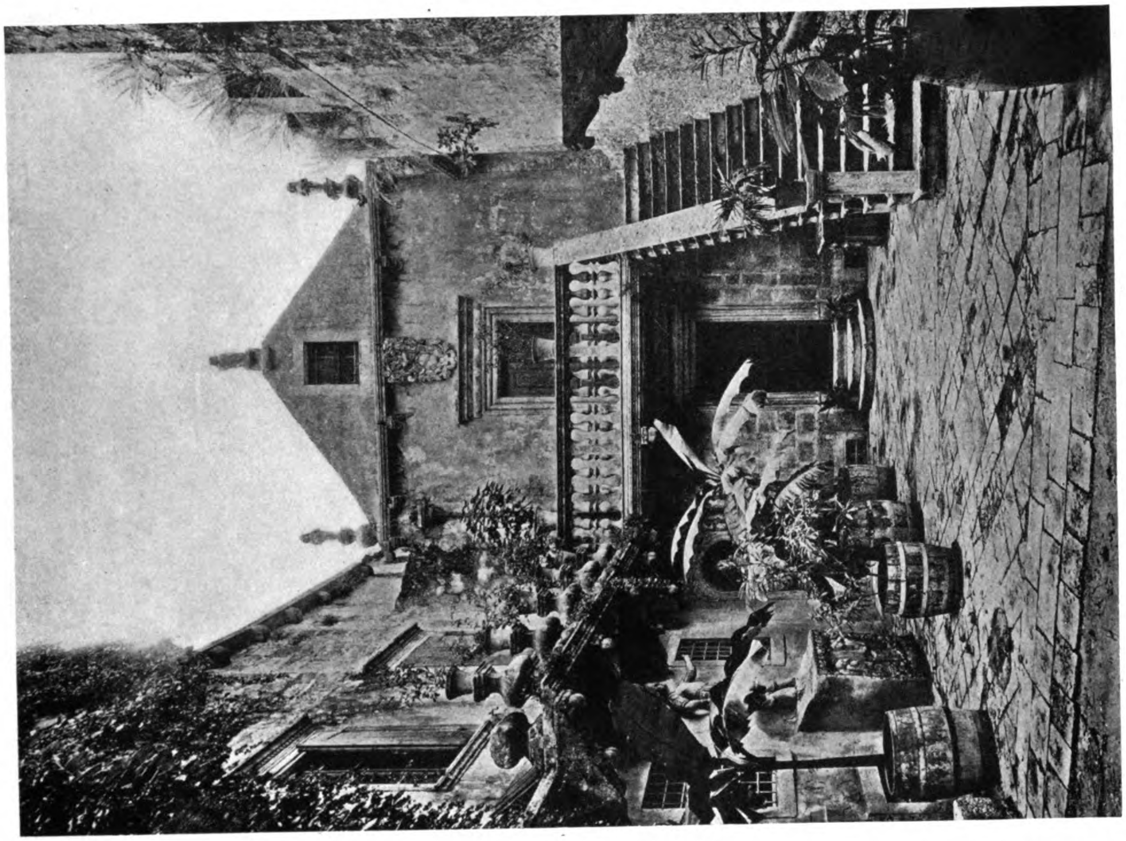
If we approach Dalmatian architecture with this conception of the nature of originality and this rational estimate of the essence of style in the abstract, we shall find that it has much of value to teach us and that its ministry is by no means confined to a mere polite titillation of one's archæological sense. This positive lesson has three aspects that we may ponder with profit. The first touches *composition*, the second the flexible use of *decorative details*, and the third the extent to which *archæology* may be made a vital factor to architectural practice.

It will conduce not a little to our understanding of the spirit of Dalmatian architecture to take a brief survey of its course before entering upon a specific discussion of any particular examples. Its history may be said to begin with the palace of Diocletian at Spalato, built between 284 and 305 A.D. On the one hand, this building may be regarded as "the last effort of the dying art of antiquity, still majestic in its proportions, still dwarfing into insignificance by its huge masonry the puny works of later ages"; on the other, it seems "the new birth of that rational and unconventional mode of building in which the restless and eager spirit of the regenerated and repeopled Roman world found free scope for its fancy and invention," discovering harmony in variety and recognizing "grace in more than one code of proportions." Both views are correct, for this pile "marks the era when the old art died in giving birth to the new." For the ensuing fourteen centuries the influence of Diocletian's Palace was traceable to a greater or less degree in the structures erected throughout Dalmatia.

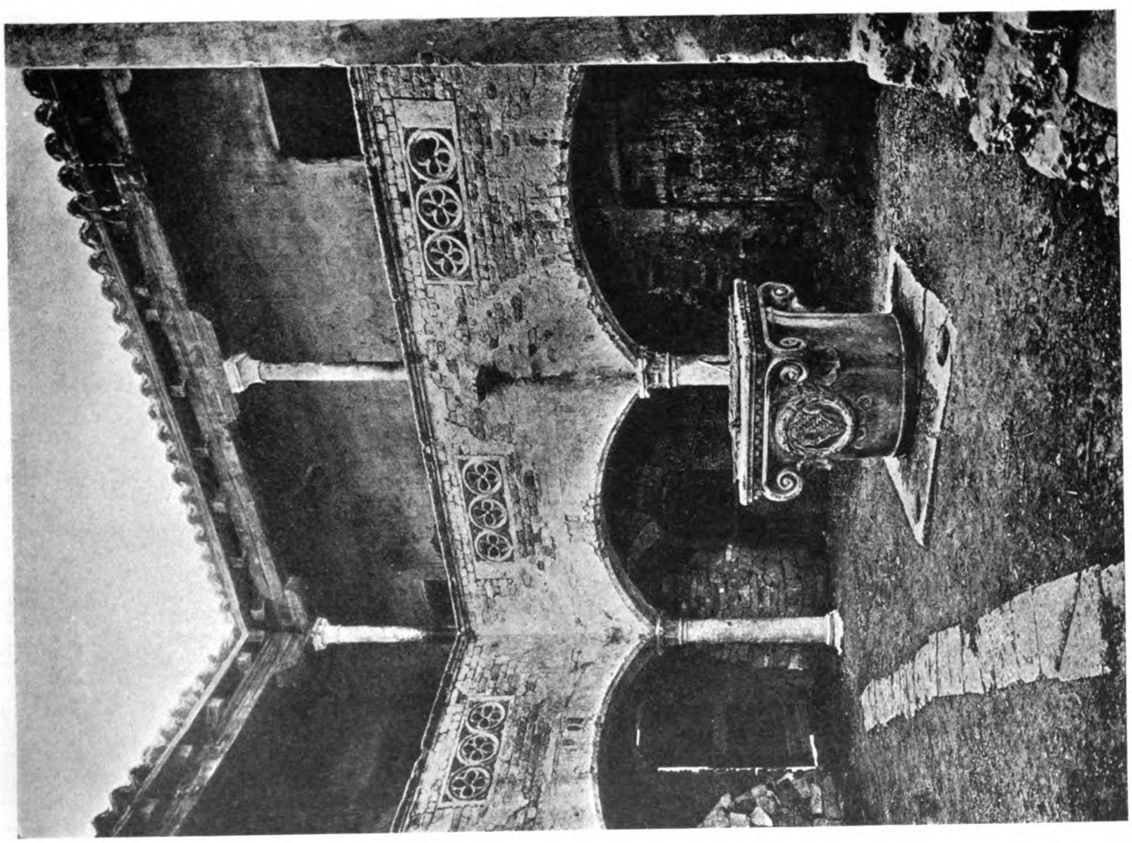


The Dogana, Ragusa

During the next seven or eight centuries Dalmatian arch-



CORTILE DI UNA CASA PATRIZIA, CURZOLA, DALMATIA



CORTILE DI UNA CASA CIVILE, ZARA, DALMATIA

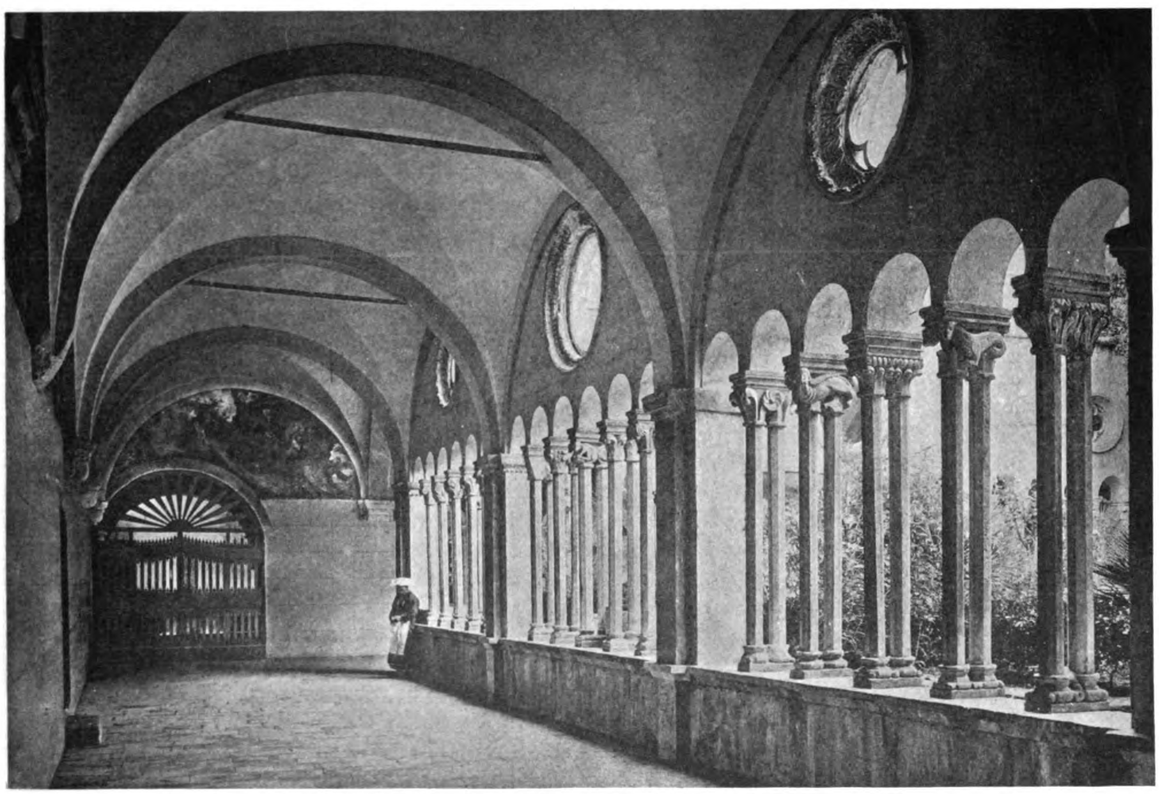

Church of S. Salvatore, Ragusa

itecture displayed a strong superposition of Byzantine influence upon a Roman base. At the beginning of the twelfth century, so far as it is possible to establish an arbitrary date, the preponderant Byzantine influence came to an end and the Romanesque style burst suddenly into life with splendid examples. This style retained its ascendency till very late and, with a comparatively few instances of Venetian Gothic intervening—at least so far as public architecture was concerned—merged rapidly into the round arched Renaissance mode of expression. But the Renaissance mode in Dalmatia shows few examples of an advance to the severe formality of pure Palladianism; rather did it preserve the fluid freedom of the Gothic that permeated and enlivened the earlier phases of Renaissance expression, until the seventeenth century when it was supplanted by the Baroque episode. Later than a few buildings of Baroque *provenance*, Dalmatia has nothing of any architectural significance to show. In domestic structures the Venetian Gothic influence had a more enduring vogue and has left many admirable examples.

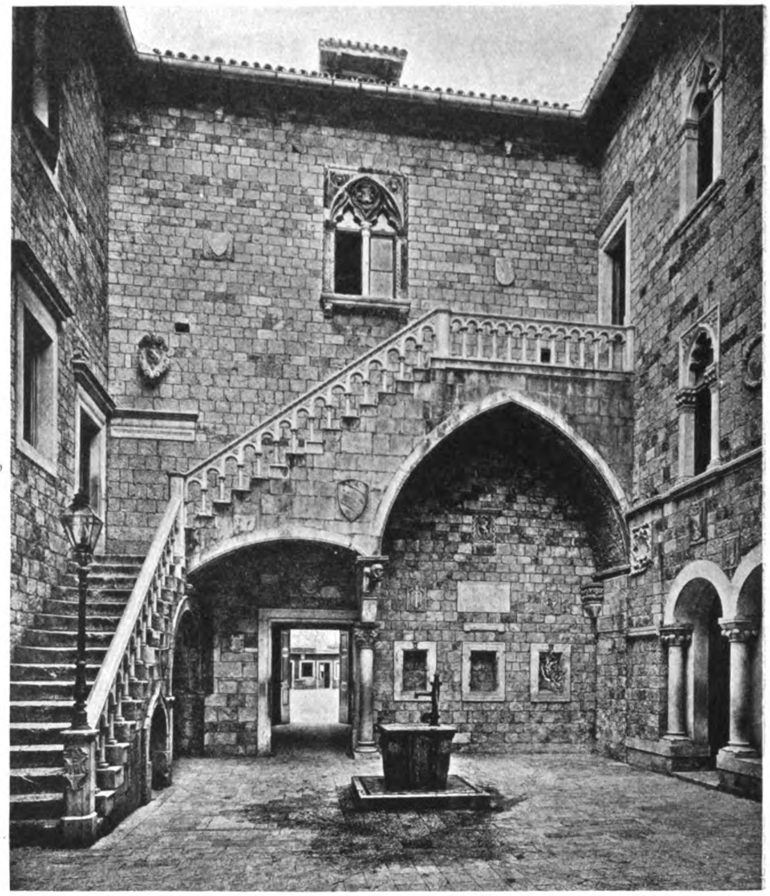
Dalmatian architecture is essentially Italian, as it is but natural it should be. The Dalmatians, whatever foreign racial strains they may have absorbed, were indubitably Italian and so considered themselves. From 1102 to the end of the fourteenth century, although they were politically attached now to Venice and now to Hungary, they were Italian by race and culture. From the beginning of the fifteenth century till the end of the eighteenth, when Napoleon arbitrarily wrenched it away, Dalmatia was an integral part of the Venetian Republic. The architecture everywhere proclaims the Italianity of the country beyond all question. And yet there is so much that is peculiar and distinctive in the Dalmatian type that it deserves to rank as a style by itself. This striking individuality is partly attributable to the potent abiding influence of the remains of Diocletian's Palace at Spalato, partly to the manifold agencies of foreign intercourse through the avenue of Venetian commerce, and partly, though in a far less degree, to whatever French


Interior of Cathedral at Traù

COURT OF THE CLOISTERS, TRAÙ



CLOISTER OF THE FRANCISCANS, RAGUSA



Cortile of the Palazzo Comunale, Traù

or other foreign architects the Hungarians may have brought in during their intermittent periods of control, for the Hungarians, though not an artistic people themselves, freely employed artists from other countries. Latinized Slavs often became more Italian than the Italians themselves; but the Slavic element, as a separate race, has left no appreciable trace upon Dalmatian architecture other than destruction.

The Dalmatians displayed a natural and almost precocious receptivity for Renaissance forms and a peculiar aptitude in making use of them. Giorgio Orsini of Zara, who deserves to be reckoned as one of the leaders of the Renaissance movement, and was commissioned in 1441 to finish the duomo at Sebenico, began to put his plans into execution about eight or nine years before the inception of Alberti's work at Rimini, about forty years before Pietro Lombardo's design for Santa Maria dei Miracoli in Venice, and about forty-five years before the Cancelleria in Rome, was begun. One might add considerably to the list, did space permit, and each addition would serve to show that the Dalmatian architects struck out a path of their own with a good deal of independence and were by no means mere copyists.

To this independence of initiative it seems not unreasonable to ascribe a certain modernity in Dalmatian architecture, manifest through its freedom and flexibility of interpretation. For this reason, too, it is pregnant with suggestion, not only in the matter of method in the abstract, but also in sundry concrete conceptions that might well serve as patterns for emulation at the present day. The Brothers Adam certainly found the work at Spalato, which exercised such a profound influence upon all later Dalmatian design, a veritable well-spring of direct inspiration.

One of the most impressive examples of Dalmatian public architecture is the Rectors' Palace at Ragusa, a building whose composition well typifies a phenomenon of almost prevalent occurrence in Dalmatia — a state of chronic flux and transition due to two causes. Either the architects did not hesitate in the exuberance of their fancy to employ two or more modes at once and weave them together into an harmonious whole, or else successive architects engaged upon the same building partially retained and partially changed their predecessors' designs.

An instance of the first condition is seen in the Romanesque campanile of Arbe *c.* 1200, where sundry features not usually associated with Romanesque work and altogether traceable to local causes are naively introduced. Similar freedom is still more evident in the apse of the duomo at Sebenico, where Orsini divided the rectangular windows by fluted Corinthian shafts and filled the heads of the lights with trefoil cusps and rich Gothic tracery.

The second condition is admirably exemplified in the façade of the Rectors' Palace at Ragusa where Orsini and Michelozzo, in 1464, when repairs became necessary after a disastrous powder explosion, very materially modified the earlier Gothic design of Onofrio di la Cava by substituting a round arched arcade, with distinctly Renaissance details, for Onofrio's Gothic arcade with pointed arches and a wealth of Gothic sculpture.

DEPARTMENT OF ENGINEERING AND CONSTRUCTION

CHARLES A. WHITTEMORE, ASSOCIATE EDITOR

THE line of demarcation between the profession of architecture and the profession of engineering as pertaining to constructional problems is gradually being erased. In the old days the architect confined himself solely to the problems of designing and constructing buildings, depending upon outside assistance for the more complicated engineering problems. About the same period the engineers, with the exception of those who had made a special study of mill construction and industrial building, were interested in the industrial phases of the problem, leaving out the question of the æsthetic value of the appearance of the structure.

In more recent years architects have established engineering departments in their offices, and engineers have established architectural departments under their control. At the present time there are many organizations of considerable ability who style themselves "architects and engineers."

Whether architecture is a more important factor in building construction than engineering, is a question which permits very little debate. Good architecture has as its very foundation problems of good engineering in order that the building may be constructed along sound structural lines, in order that it may answer all of the requirements of the occupancy, and eliminate what is known as "freak" construction.

Engineers likewise to-day lay considerable stress on the architectural character of the building, not alone for the beauty of detail or the refinement of ornament, but in order that the completed structure may be considered as worthy of its time and place.

It might be easily imagined that the architectural firm and the engineering firm, in solving a problem of the same program and on the same lot, would arrive at the same solution of the problem, but with slight differences in the detail.

THE ARCHITECTURAL FORUM realizes the situation as it exists and is publishing in this number, and will continue in succeeding issues, articles of an engineering character which will be of importance and interest to architects. It is the intention to publish articles dealing with certain phases of engineering work with which architects, as a rule, are not familiar, and to place before architects from time to time items of structural interest.

In this current number appear two articles, one by Ernest W. McMullen of Monks & Johnson, Architects and Engineers, Boston, whose experience in engineering construction has been large and who writes on Concrete Industrial Building. The other article is by Joseph W. Parker, who is connected with Charles T. Main, Engineer, Boston, and who deals with problems from the standpoint of "mill" construction.

The Concrete Factory

By ERNEST W. McMULLEN

IN the past, it has been the custom to give considerably less time and thought to the design of industrial buildings than would be accorded to projects of similar magnitude in domestic and other lines of architectural work; but in recent years, due to the enormous impetus given industrial building by the war, architects have been called upon to perform work in a field that was formerly confined to engineering firms or architects who specialized in this form of work. When the architect who is not familiar with this type of work is commissioned to prepare working drawings and specifications for a factory building, he is immediately called upon to solve many problems that are new to him. The first question that arises is as to the type of construction to employ, —shall it be mill construction, steel construction, or reinforced concrete construction? Many factors enter into the solution of this problem, but it is the intention of this article to limit the discussion to the concrete factory building.

Aside from the problems peculiar to concrete construction that offer themselves for solution in a concrete factory building, there are many that are common to the design of any industrial building. The first consideration is the special requirements of the client. The building must be designed to suit his particular needs, with the proper provisions for machine layouts and the handling of materials from raw storage through the different processes, then to finished storage or the shipping point. In some cases, such as spinning mills, weave sheds and plants with large and heavy machinery, the machine layout will determine the column spacing, required floor heights, and general contour of the building; but any attempt to discuss layouts for different classes of industries would be beyond the limits of this article, and therefore only one problem will be discussed, and it is the one that is most frequently encountered in this field, —the multiple story concrete factory.

The design of a plant manufacturing some small article usually resolves itself into a question of providing sufficient floor space on some particular site, with proper provision for heating, lighting, plumbing, sprinklers and proper accommodations for the employees.

One very important consideration in the planning of industrial buildings is the provision for future expansion. This must be kept in mind in planning the layout of elevators, stairs and toilet facilities, as well as making provision in the structure to carry any proposed additions.

The type of concrete construction to use in the design is a vital consideration, and the architect should not be influenced too much by various economical claims made for different types of floor construction. This can only be determined by obtaining actual prices, and in some cases such prices will vary considerably from those quoted before the plans are completed. There are three recognized kinds of general concrete construction: beam and girder construction, flat slab construction, and steel skeleton frame with concrete floors, with the steel fireproofed. In the steel frame construction there are different types of floors, such as hollow tile construction and other patented types. These types are also sometimes used with the beam and girder construction.

In recent years practically all of the factory buildings have been designed in the flat slab construction, as this offers many advantages over the other types. However, there are places where the beam and slab construction is more economical, such as irregular shaped panels or long spans. The most economical design in such cases can only be determined by preliminary comparative design and estimates of both types. Some of the most important advantages of the flat slab construction are as follows:

First. This type is most economical for buildings with square or nearly square bays, as the floor form work is simple and the interior column form work is also very economical.

Second. A flat ceiling, besides having the advantage of appearance, offers no obstruction to the passage of light across the building; and as the sash in this type of construction extends to the ceiling, the maximum light is obtained.

Third. A saving in the total height of the building is made with this type of construction, as it is usually necessary to have the same clear height under the beams in the other types.

Fourth. A more economical installation of automatic sprinklers can be made with the flat slab construction than with other types, and this is usually true of the electric lighting system.

Fifth. Shafting and other piping can be erected with the minimum of trouble and expense.

The high cost of structural steel shapes of late years has prohibited the use of structural steel frame buildings, and the flat slab has the same advantages over this type of construction as it has over the beam and girder construction.

With the required amount of manufacturing space determined, and the type of construction decided upon, the final layout is the next logical step. It has been pointed out that the square bay is the most economical in the flat slab construction; and as experience has demonstrated that the width of factory buildings should be about 60 feet, with approximately 12- to 13-foot story heights and two rows of columns equally spaced, this would point to a 20-foot bay as desirable. This spacing of columns in the exterior walls will also lend itself well to architectural treatment. The exterior walls can be made of either brick or concrete, and some excellent effects may be obtained with these materials. It is not the intention to make the claim that such a spacing is the most economical, as that can only be determined by making comparative estimates of different spacings for the same loading conditions; and this is the only method to pursue in the design of concrete storage buildings or warehouses, where the column spacing is not such an important consideration. The most economical spacing might result in a building with the bays too narrow for good results, or a building too wide to obtain the most satisfactory lighting and ventilation.

In a building 60 feet wide, with two rows of columns, excellent light and ventilation are obtained in the exterior bays where the manufacturing is carried on, and the central bay is used for moving and storing material. The position of adjoining buildings is an important consideration in the question of lighting, and sufficient space should be provided to obtain the light on the lower floors of the building. If the building is over five or six stories in height, and the loads are excessive, the columns on the lower floors might be so large that they would occupy valuable space. This can be obviated by using structural steel cores and reducing the size of these columns.

Toilets, lockers and elevator wells should be placed in separate ells outside of the building, keeping the floor space entirely free and clear from end to end of the building.

It has been common practice to cast the roof slab level and build up the pitches with cinder concrete. Recently, however, in flat slab construction, the slab has been pitched and the expense of putting on extra concrete eliminated. If by any chance beam and slab construction is used, however, and the slab is 3 or 4 inches thick, trouble will very likely be experienced with condensation, particularly if there is any moisture in the building. In this case it is better to cast the slab level and use cinder concrete to form the pitches, which will also insulate the slab against condensation.

Any article on concrete factory design would not be complete without some remarks on the question of floor finish. Until comparatively recently it was generally supposed that concrete floors were injurious to the health of the employees, but of late this matter has not been an important factor in the selection of the kind of floor finish. Some owners have had experiences with poor types of cement top surfaces, and as a result they are prejudiced against this type of finish. The improved method of laying these floors has obtained such good results that practically all concrete buildings built to-day have granolithic floors; and in office portions linoleum is used for the sake of appearance, and to lessen the disturbance to office employees caused by the noise of other people moving about.

A granolithic floor, if properly laid, will not cause any trouble from dusting or cracking. The floor finish should be specified to be placed after the skeleton of the building is finished, so that proper provision can be made for the laying and the protection of the floor. The granolithic finish can be bonded to the slab by chipping or picking the entire surface, removing all laitance, dirt and grease, and then washing with dilute acid, and finally with lime water. The ordinary granolithic finish is specified to be 1 part cement and 2 parts sand, but this is generally the cause of the dusting problem. If a 1 part cement, ½ part sand and 1½ part of ½-inch stone (absolutely free from dust) is used, no trouble should be experienced from wearing or dusting. The sand can be omitted from this mixture and a 1 part cement and 2 part clean stone used; but this finish will show riffles, caused by troweling, which are only objectionable from the standpoint of appearance as they do not affect the wearing qualities of this kind of floor. After laying and finishing, and sufficient set has been obtained, the entire floor must be protected with wood chips sawdust or sand, and kept wet for at least ten days. No ruled joints should be called for as trucking will start to break down the finish at these joints. If the floor is one that is laid on the ground, sand joints can be called for in the lower course, but no joints should be allowed in the top finish.

In most every case steel sash is the most economical and practical for the modern factory, and it is also possible to obtain the maximum light and ventilation — which cannot be accomplished by using double hung or counterbalanced wood sash. In order to obtain economical results, stock sash should be used throughout, and a great many architects have made the mistake of insisting that the steel sash be made to fit certain sized openings. Stock sash can be obtained to fit practically every opening, within 2 or 3 inches of what is desired, and the results obtained from using special sash do not justify the extra expense to the client. Some difficulties may also be avoided by specifying that the steel sash contractor set the sash, and in this way the liability is reduced to one party and no counter claims can be made by the general contractor and the sub-contractor for faulty work in this respect. The lower lights of all factory sash should be plain glass; and on all sides, except the north side, ribbed glass should be used to diffuse the rays of the sun.

Some Prominent Features of Mill Construction

By JOSEPH W. PARKER

MILL buildings of the slow-burning type have been built in this country for nearly one hundred years, and were first introduced in the cotton and woolen mills of New England. Great credit is due the fire insurance companies for many valuable suggestions toward the development and perfection of this type of construction since the early days of the industry. The type at the present time has reached a very high stage of development and has clearly demonstrated its value, when properly designed, both from the standpoint of durability and fire resistance.

DEFINITION. Mill or slow-burning construction, in its most approved form, may be defined as a certain class of building construction in which the floors and roof are constructed of heavy timbers, so designed and laid out as to have large, smooth timbers spaced as far apart as possible, consistent with good design, and supporting heavy planks planed smooth; the interior columns constructed of heavy timbers planed or turned smooth, and the exterior walls constructed of masonry.

WOOD *versus* CAST IRON FOR COLUMNS. In mill buildings, several stories in height, the interior columns in the lower stories are frequently cast iron on account of the large sizes which would be required in timber. This is especially true of buildings which are used for storage purposes, where the loads are usually quite heavy. From the standpoint of fire resistance, cast iron columns, when unprotected, are not as desirable as heavy timber columns. The principal advantages of timber columns are: (1) economy, and (2) greater reliability in case of a prolonged fire. The principal advantages of cast iron columns are (1) less floor area taken up, and (2) less liable to deteriorate with age or with unfavorable conditions.

STANDARD MILL CONSTRUCTION. The so-called "standard mill construction" has heavy wooden floors and roof supported directly by heavy wood columns for the interior, and substantial brick walls for the exterior. The floor and roof beams extend crosswise of the building; are spaced from 8 to 12 feet on centers; and are supported directly by the columns and the exterior walls. These beams support heavy planks laid flat, and the columns are spaced from 16 to 25 feet on centers, crosswise of the mill. On the floors, a top flooring is commonly laid for a wearing surface, and on the roof, five-ply tar (or asphalt) and gravel (or slag) is most common for covering. A point worthy of attention here is that joisted construction is decidedly *not* standard mill or slow-burning construction.

MODIFICATIONS OF THE STANDARD TYPE. There are several modifications of the standard type which may be described as follows: (1) same floors and roof as standard type, but with cast iron columns in lower stories; (2) steel beams in floors and roof, supported by wooden columns in upper stories and cast iron columns in lower stories; (3) planks in floors laid on edge (the so-called laminated floor), supported by steel or wooden beams spaced from 12 to 16 feet on centers and with cast iron or wooden columns spaced from 16 to 25 feet on centers, crosswise of the mill.

Another type, which is quite different in the floor and roof framing from any of the above, is one which has the planks supported directly by moderate sized wooden beams, spaced from 4 to 10 feet on centers, which in turn are supported by heavy wooden or steel girders, spaced as far apart as the general layout and design of the building will permit. The columns in this type may be heavy timber or cast iron, spaced from 16 to 25 feet on centers, crosswise of the mill.

REASONS FOR MODIFICATIONS OF THE STANDARD TYPE. There are a number of reasons which have been advanced for using the various modifications of the standard mill construction. Cast iron columns have been used for a great many years in all kinds of industrial buildings, although they are a great deal more expensive than wooden columns of equal carrying capacity. The chief reasons for their use are their comparatively small size for relatively large carrying capacity, and they are practically indestructible under ordinary conditions. They are especially well suited for basements or other places which are very damp. An objection to their use lies in the fact that during a fire, streams of cold water from the hose lines, striking on the hot cast iron columns, are apt to crack them seriously, causing failure.

Steel beams have come into use in recent years in slow-burning construction, due largely to the constantly increasing difficulty of securing heavy timbers which are dense and of sufficient length to provide for an economical arrangement of columns and beams. Also, steel beams will provide a stiffer floor than wooden beams, which is especially important in manufacturing buildings. Here again the steel beams are much more durable under ordinary conditions than the wooden beams. Against their use, however, may be mentioned the following: (1) if unprotected, they will fail by buckling or bending during a fire of any considerable duration, resulting in a collapse of the floor or roof much quicker than with heavy wooden beams of equal carrying capacity; (2) the height of the building may be increased, due to the nailing pieces fastened to the top flanges of steel beams, which may add about 6 inches to each story.

Laminated floors have been introduced in recent years with a considerable degree of success, particularly in the Middle West and in Canada. The principal reasons for their use have been the desire to obtain very stiff floors for manufacturing purposes and to eliminate as many interior columns as possible. Also, an important feature is the higher percentage of window area obtained, due to the wider bays with this type of floor. Two possible objections may be mentioned in connection with this type of floor: (1) unless the planks are thoroughly seasoned when laid, there is greater possibility of dry rot starting than in the case of an ordinary floor, due to the relatively large number and area of joints between planks; (2) the floors are considerably thicker than usual and therefore would probably increase the height of the building.

The use of intermediate beams supported by heavy girders has been adopted very extensively through the Middle West. The reasons for the selection of this type are the same as those for the selection of laminated floors. From the standpoint of fire resistance, this type is not as desirable as the standard mill construction, as there are a larger number of corners exposed to the action of fire, and the intermediate beams also prevent a most efficient use of sprinklers or fire hose during a fire.

Another objection to the use of this type is that the exterior windows cannot be placed as high as in standard mill construction. For a building of given width, this would probably mean greater story heights than with standard construction. The intermediate beams also obstruct the rays of light considerably and do not permit any appreciable reflection across the building, as in the case of crosswise girders with no intermediate beams.

Whenever this type is used, the intermediate beams should rest on the girders, instead of being suspended from them by stirrups, which are likely to fail rather early in a fire of some duration.

IMPORTANT FEATURES OF STANDARD MILL CONSTRUCTION. In the best examples of standard mill construction there is an entire absence of concealed spaces. All parts are fully exposed, so that in case of fire the spray from sprinkler heads or the streams from lines of fire hose will reach every portion. The floor framing is such that the most economical arrangement of sprinkler heads and piping can readily be made. From the standpoint of the sprinkler layout, the ideal width of bay is 10 feet, as the requirements of the fire insurance companies are such that a given number of sprinkler heads will cover a maximum floor area for that particular bay width. Bays as narrow as 6 or 7 feet are very uneconomical in this respect.

All stairways and elevator shafts are enclosed with incombustible walls, and the number of openings in the floors is kept down to a minimum. Wherever such openings are necessary, they are protected by fireproof enclosures or automatic hatches. Large floor areas are sub-divided by means of fire walls, and any necessary openings in these walls are equipped with automatic fire doors on both sides of walls. In this connection it is of interest to observe that the National Board of Fire Underwriters, in their regulations governing standard mill construction, require double the number of fire walls for a building without sprinklers that they require for one equipped with sprinklers.

The best practice in that section of the United States where the slow-burning type has been used the most and for the longest period, namely, New England, indicates that the columns in each story should not pass through the floors. Instead, the load from one column should be transferred to the column in the story below by means of a cast iron pintle. This pintle acts as a short column and very effectively carries the load from one story to another. Due to the high compressive strength of cast iron, especially in short columns, the pintles seldom run more than 4 to 5 inches in outside diameter, and therefore a comparatively small hole has to be bored in the wooden beams. In this construction the beams are butted at ends over interior columns, a small hole being bored out, half in each beam, to allow space for the pintle. The pintles are so comparatively small in diameter that there is sufficient room for two wrought iron dogs, or ties driven into the top surfaces of the beams, one on either side of the pintle, to tie the two beams securely together. Near the top and above the beams, the pintle widens out so as to form a base for the column above. At the bottom the pintle bears directly upon the center of a cast iron cap for the column below. With wooden beams the cast iron pintles, as well as the wrought iron dogs, are surrounded by a considerable thickness of wood, which is a very desirable arrangement from the standpoint of fire resistance. An important feature of this construction is that the beams bear directly over the columns and do not depend upon the projecting seat of the column cap for support. These projecting seats are apt to crack and fail during a prolonged fire, especially when they are supporting any considerable load. In the past it has been the custom to bore a vertical hole through the center of each wooden column, extending from top to bottom, and with connecting horizontal holes near top and bottom for ventilation. It was thought that these holes would prevent checking in columns to a considerable degree, but experience with this method has shown that it is not a success and its practice has been generally discontinued. In the opinion of experts holes are really very objectionable, for the reason that they are natural breeding places for dry rot fungi.

Wooden floor beams rest on cast iron beam boxes or cast iron plates with lugs at the exterior walls. The beam boxes are so designed that they will be well anchored into the walls, and the beams are anchored to the beam boxes by means of lag screws. The ends of beams at exterior walls should be cut on a bevel, so that in case the beam fails during a prolonged fire, it can fall without pulling a portion of the exterior wall with it. In all cases an air space of at least one-half inch should be left around beams where they enter the walls for purposes of ventilation. Where cast iron wall plates are used for floor beams, they should have lugs for anchoring the beams to the walls and also for anchoring the plates to the walls.

Wooden roof beams usually rest on plain cast iron or steel plates at the exterior walls and are anchored directly into the brickwork by means of wrought iron anchors. These beams usually run through the exterior wall, projecting far enough to support the overhanging cornice.

Where it is difficult or impossible to secure single beams of sufficient size, two beams placed side by side are frequently used. Where this is done, each pair of beams should be placed in contact and securely bolted together. The contact surfaces should be treated with a wood preservative, in order to prevent the action of dry rot.

Floor planks, when laid flat, are commonly grooved for splines and vary in width from 5 to 10 inches. The splines should be made of hardwood and should fit tightly in the grooves, in order to distribute any concentrated loads and to aid in stiffening the whole floor. The planks are usually laid continuous over two bays and are so arranged that there are not more than 3 to 4 feet of continuous joints over floor beams. Adjacent to exterior walls one plank should be left out until the building is closed in and the floors dry, to avoid any possibility of the exterior walls being pushed out by the swelling of the planks as they absorb moisture.

In laminated floors the planks are dressed on all four sides, and two edges beveled for appearance on the ceiling, and are laid on edge close together, each plank when laid being securely nailed with 60 D. wire nails to the adjacent plank. With laminated floors the spans are frequently so long that it would be difficult to obtain planks of sufficient length to span two bays. In such cases the planks are ordered in one-bay lengths and the joints are commonly made at the center lines of beams or at the quarter points of spans, being alternated so that every third plank joints at the beams, thus avoiding continuous joints across the floor and at the same time securing a strong floor. Two planks adjacent to exterior walls should be left out until the building is closed in, for the same reason as stated in the preceding paragraph.

Roof planks are ordinarily laid flat with grooves for splines or tongued and grooved. They are laid continuous for two bays, as in floors, and break joints in the same way. The range in widths of planks is the same as in floors.

Before the top floors are laid it is advisable to place on the plank floors one or two layers of tarred paper or, preferably, waterproof felt covered with an elastic compound. The object of these layers of paper is to keep dust and dirt from working through the floor and also to make the floor as nearly waterproof as possible.

Top floors are usually maple or birch, ⅞ of an inch or more in thickness. They should preferably be laid diagonally with square-edged stock, dressed on four sides. The advantages in laying a top floor diagonally are that it is far superior as a wearing surface and will make a stiffer floor. Top flooring is commonly 5 inches wide and should not be less than 6 feet in length. The nails should be set and the floor planed smooth.

Important Factors Affecting Economy. In designing a mill building, after the most efficient arrangement of machinery has been made, there are many ways in which the cost can be kept to a minimum figure by a careful study of the principal features of the building. Some of the more important of these features are as follows: (1) for the same general construction a wide building costs less per square foot of floor area than a narrow building. In this connection, Mr. Charles T. Main, in a paper entitled, "Approximate Cost of Mill Buildings," writes as follows:

"An examination of the diagrams shows immediately the decrease in cost as the width is increased. This is due to the fact that the cost of the walls and outside foundations, which is an important item of cost, relative to the total cost, is decreased as the width increases."

(2) A one- or two-story building costs more per square foot of floor area than a three- or four-story building.

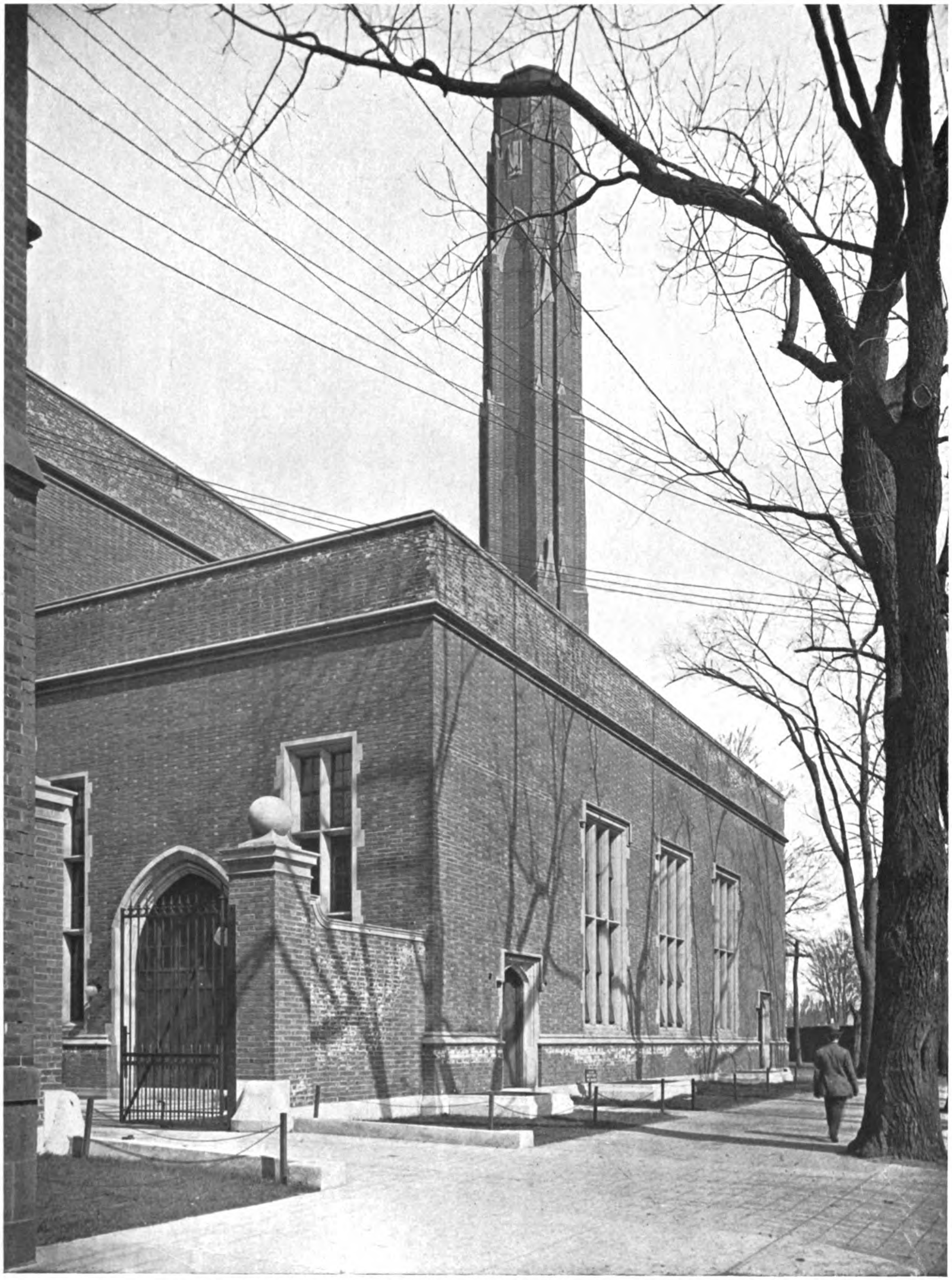
Again, quoting from Mr. Main's paper:

"The diagrams show that the minimum cost per square foot is reached with a four-story building. A three-story building costs a trifle more than a four-story. A one-story building is the most expensive."

In his paper Mr. Main shows diagrams for mill buildings, varying in length and width, and from one story to six stories in height. He assumes the heights of stories as follows: 13 feet high if 25 feet wide, 14 feet if 50 feet wide, 15 feet for 75 feet, 16 feet for 100 feet and over.

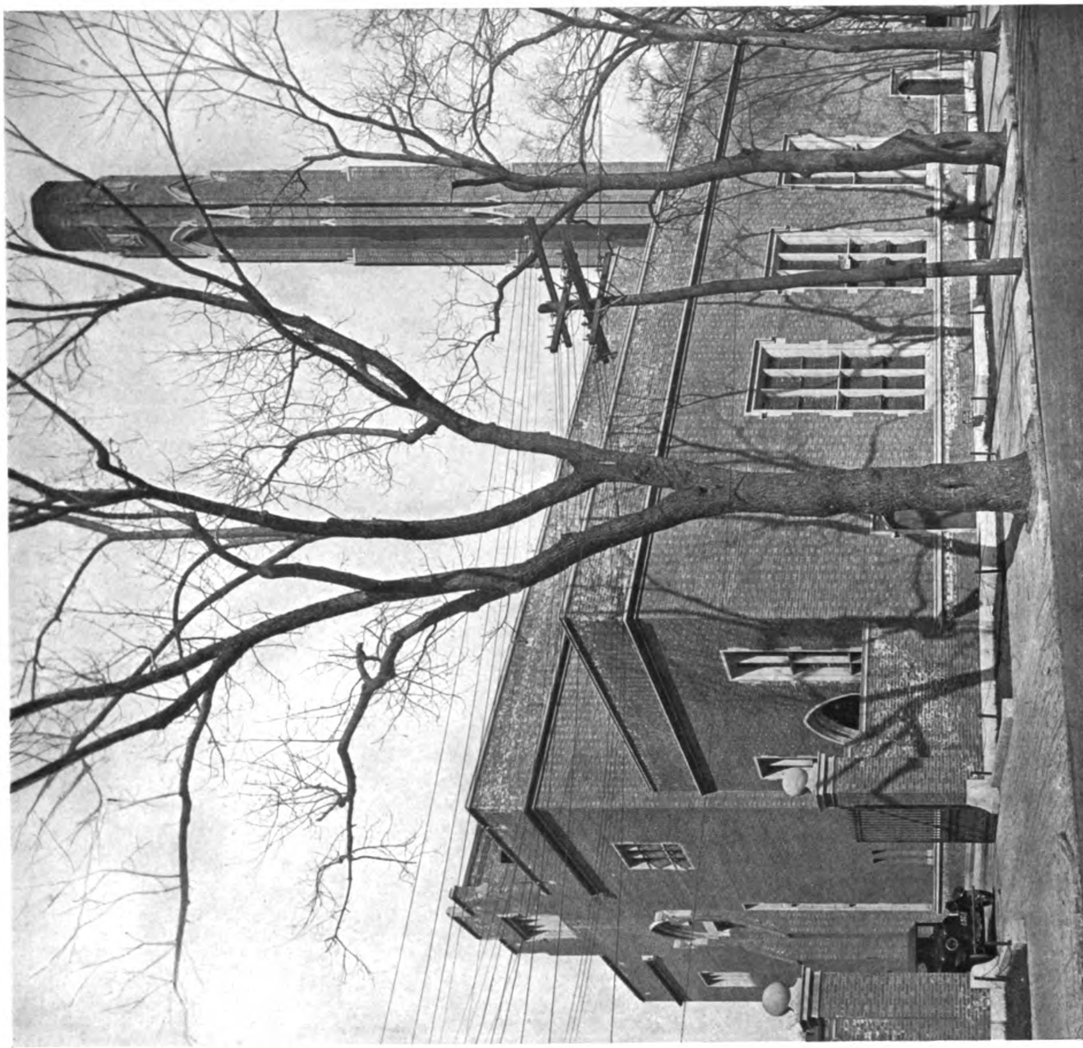
(3) The cost of a building may be kept down by using standard lengths and sizes of timber wherever possible. In laying out the building this factor should be constantly kept in mind. (4) The cost of the sprinkler system may oftentimes be reduced to a minimum, when other factors will permit, by a careful selection of the size of bay. (5) Building ordinances and insurance regulations frequently fix certain minimum sizes of beams and girders and thicknesses of floor plank. Economy may be obtained by laying out the floor framing in such a way that these minimum sizes will be utilized to their full working strength. (6) The exterior of the building may be simplified and unnecessary ornamentation eliminated. The average mill building, for manufacturing or storage purposes, does not require a great deal in the way of architectural features to make it harmonize with its surroundings and with the purpose for which it is to be used. Good proportions, a wise choice of exterior wall material and its proper handling will produce architectural character with practically no increase in expense.

Fire Insurance on Mill Buildings. On account of the many factors which have a part in controlling the insurance rate on any particular mill building, such as: (1) nature of occupancy; (2) proximity and type of adjacent buildings; (3) nature of fire protection; (4) type of construction, etc., it is impossible to give any definite rate which would apply to mill buildings of the slow-burning type, as a whole; but there are some general comparisons which can be made, as follows: (1) other things being equal, the insurance rate on mill construction sprinklered appears to be about the same or slightly higher than the rate on fireproof construction sprinklered; (2) a sprinklered building of the mill or slow-burning type is considered a much safer risk by the fire insurance companies than a non-sprinklered fireproof building, and the same thing applies to the contents of such buildings.



POWER AND HEATING PLANT, YALE UNIVERSITY, NEW HAVEN, CONN.

DAY & KLAUDER, ARCHITECTS
HOLLIS FRENCH & ALLEN HUBBARD, ENGINEERS



POWER AND HEATING PLANT, YALE UNIVERSITY, NEW HAVEN, CONN.

DAY & KLAUDER, ARCHITECTS
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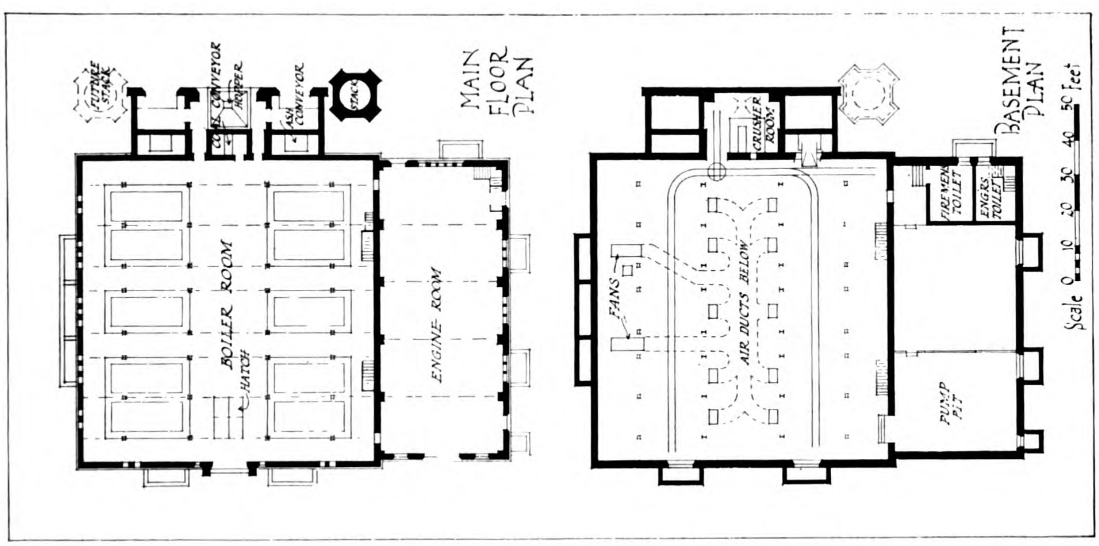
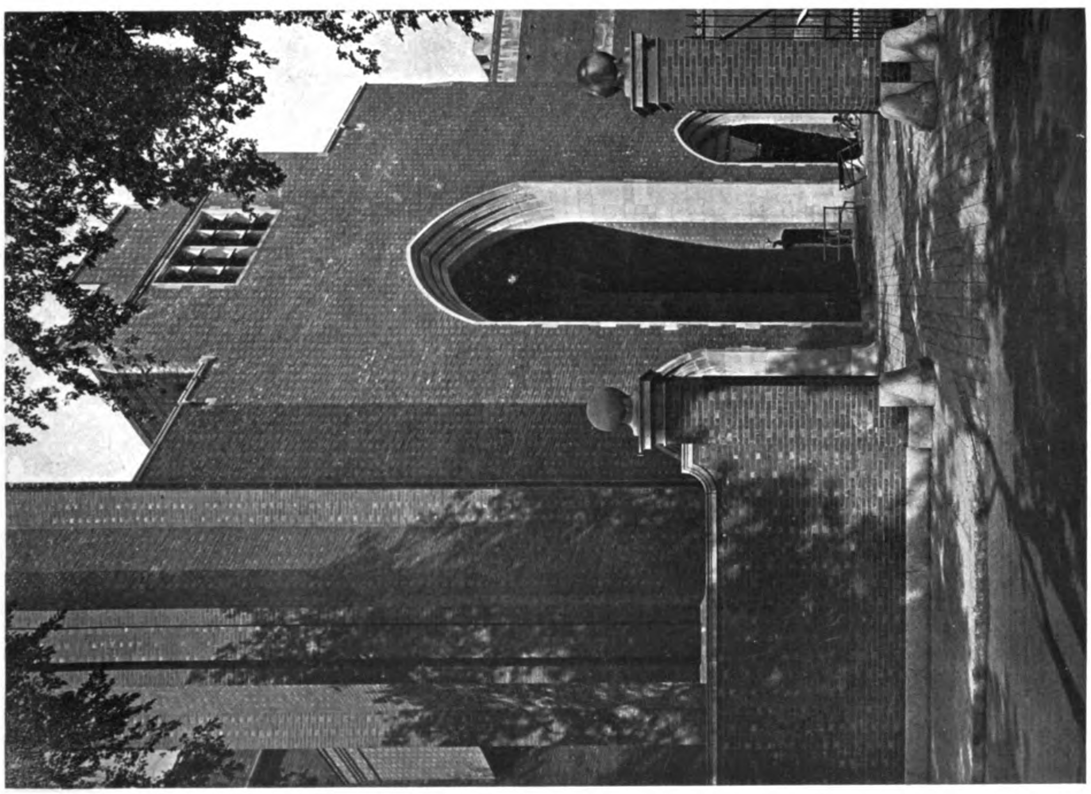
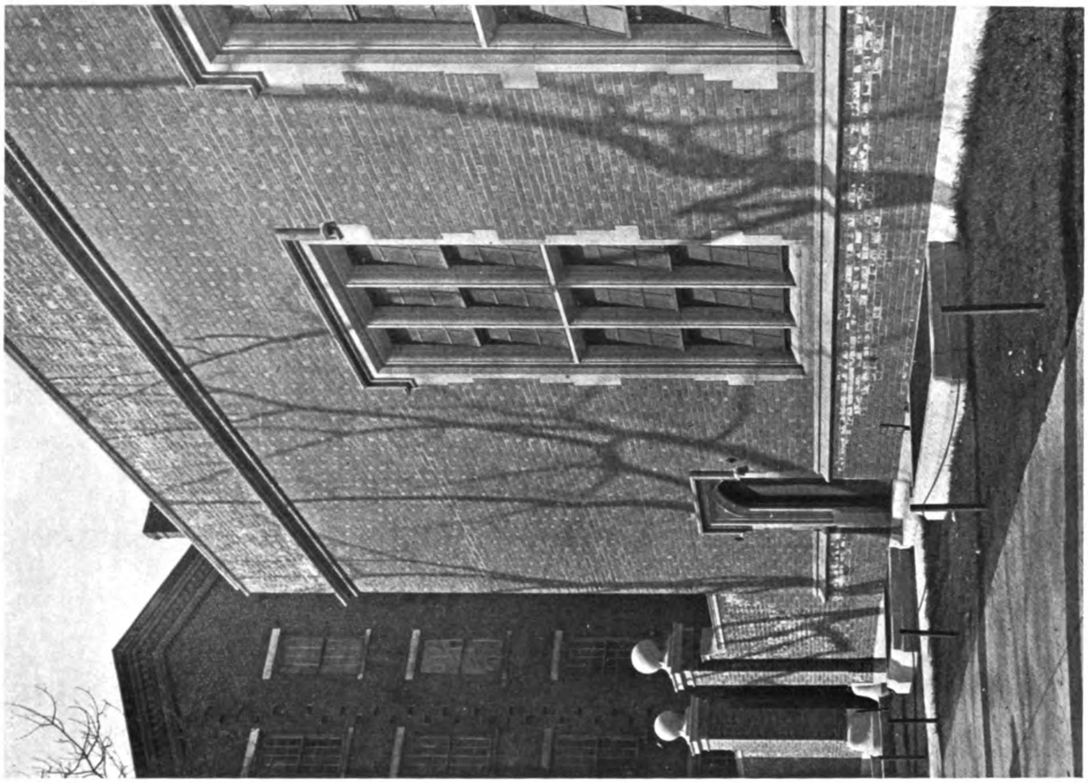




DETAIL OF ENTRANCE TO HOPPERS

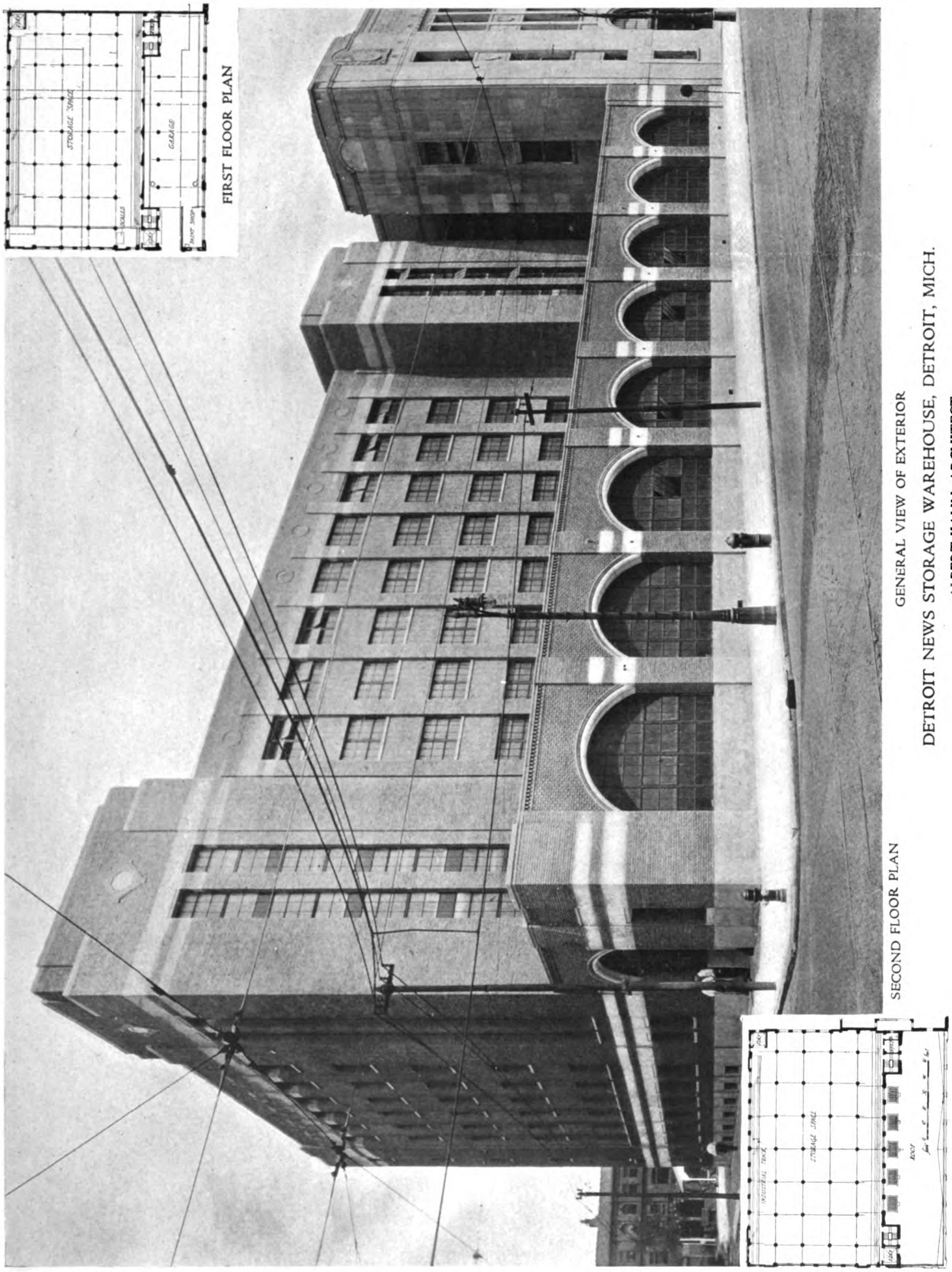


DETAIL OF YORK STREET FACADE

POWER AND HEATING PLANT, YALE UNIVERSITY, NEW HAVEN, CONN.

DAY & KLAUDER, ARCHITECTS

HOLLIS FRENCH & ALLEN HUBBARD, ENGINEERS



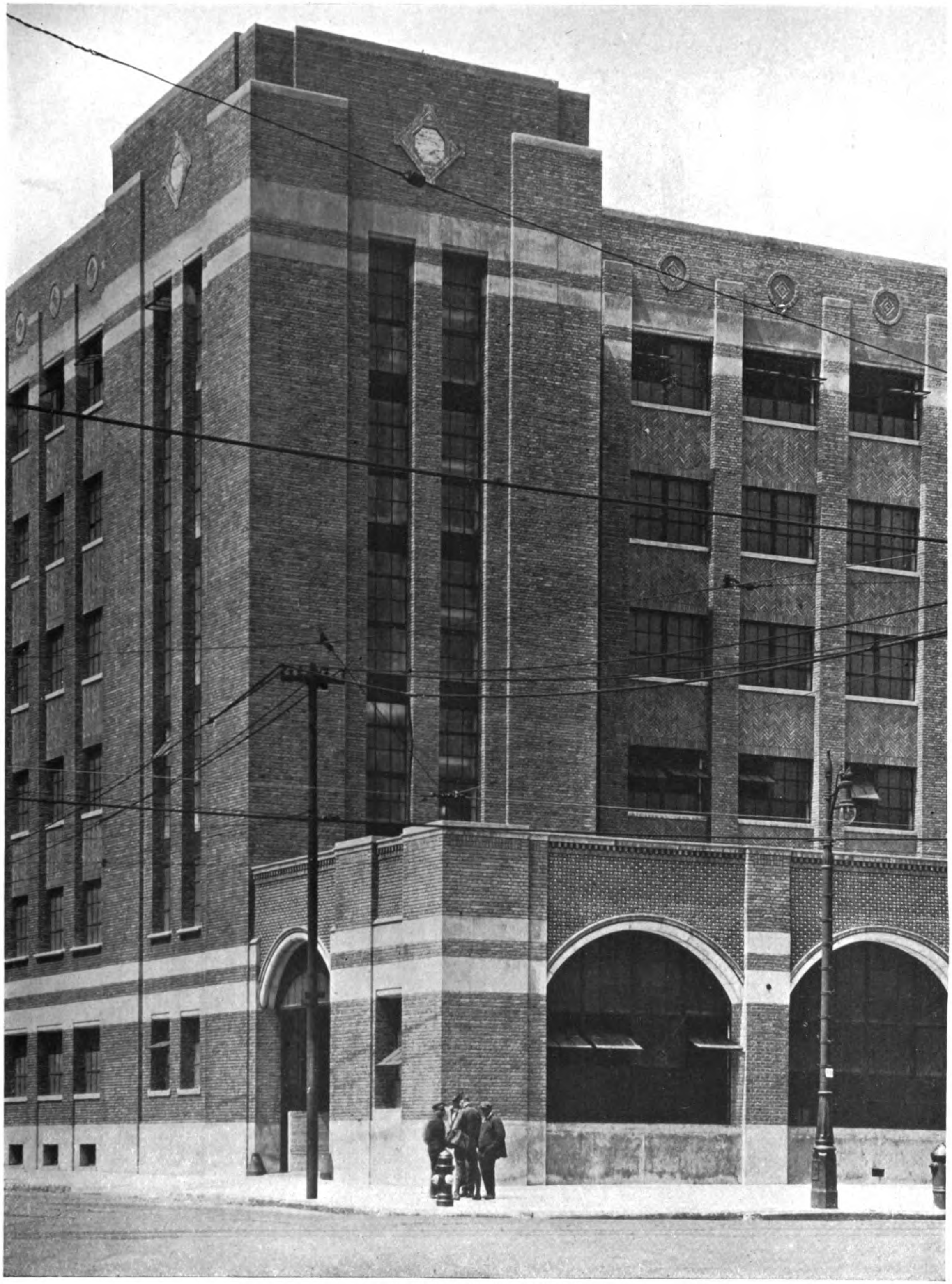
FIRST FLOOR PLAN

SECOND FLOOR PLAN

GENERAL VIEW OF EXTERIOR

DETROIT NEWS STORAGE WAREHOUSE, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

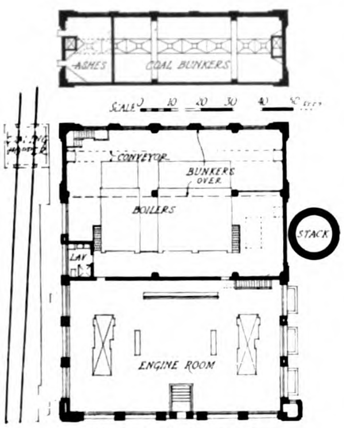


DETAIL OF CORNER PYLON

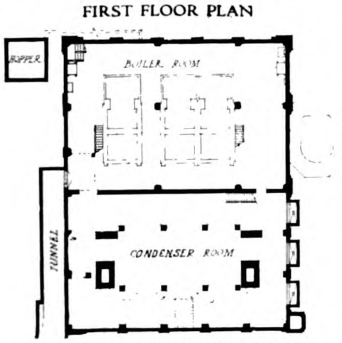
DETROIT NEWS STORAGE WAREHOUSE, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

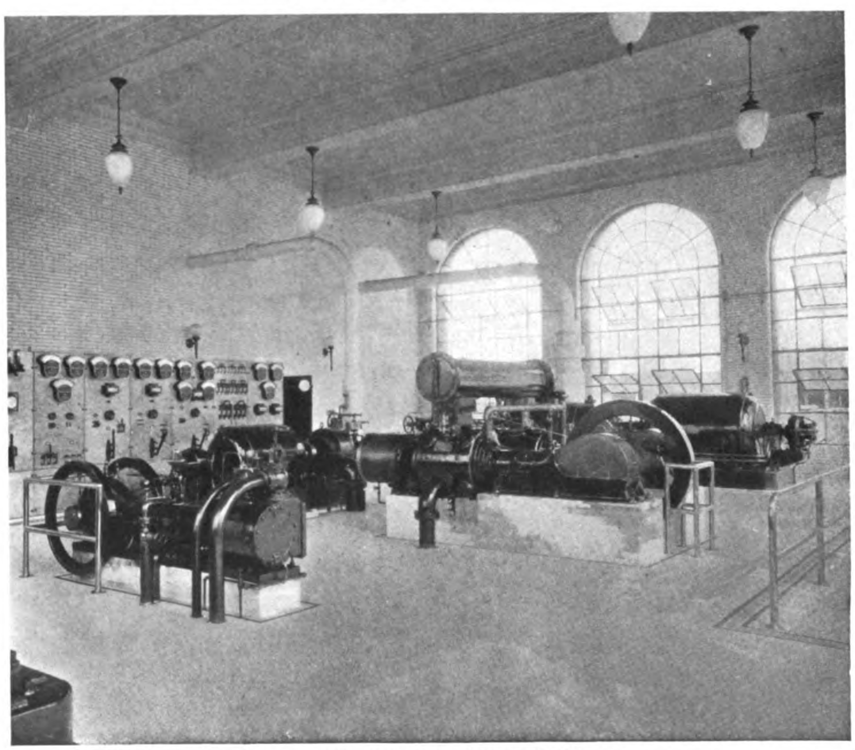
GENERAL VIEW OF EXTERIOR



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN



INTERIOR OF ENGINE ROOM

POWER PLANT, BURROUGHS ADDING MACHINE COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

CORNER PYLON

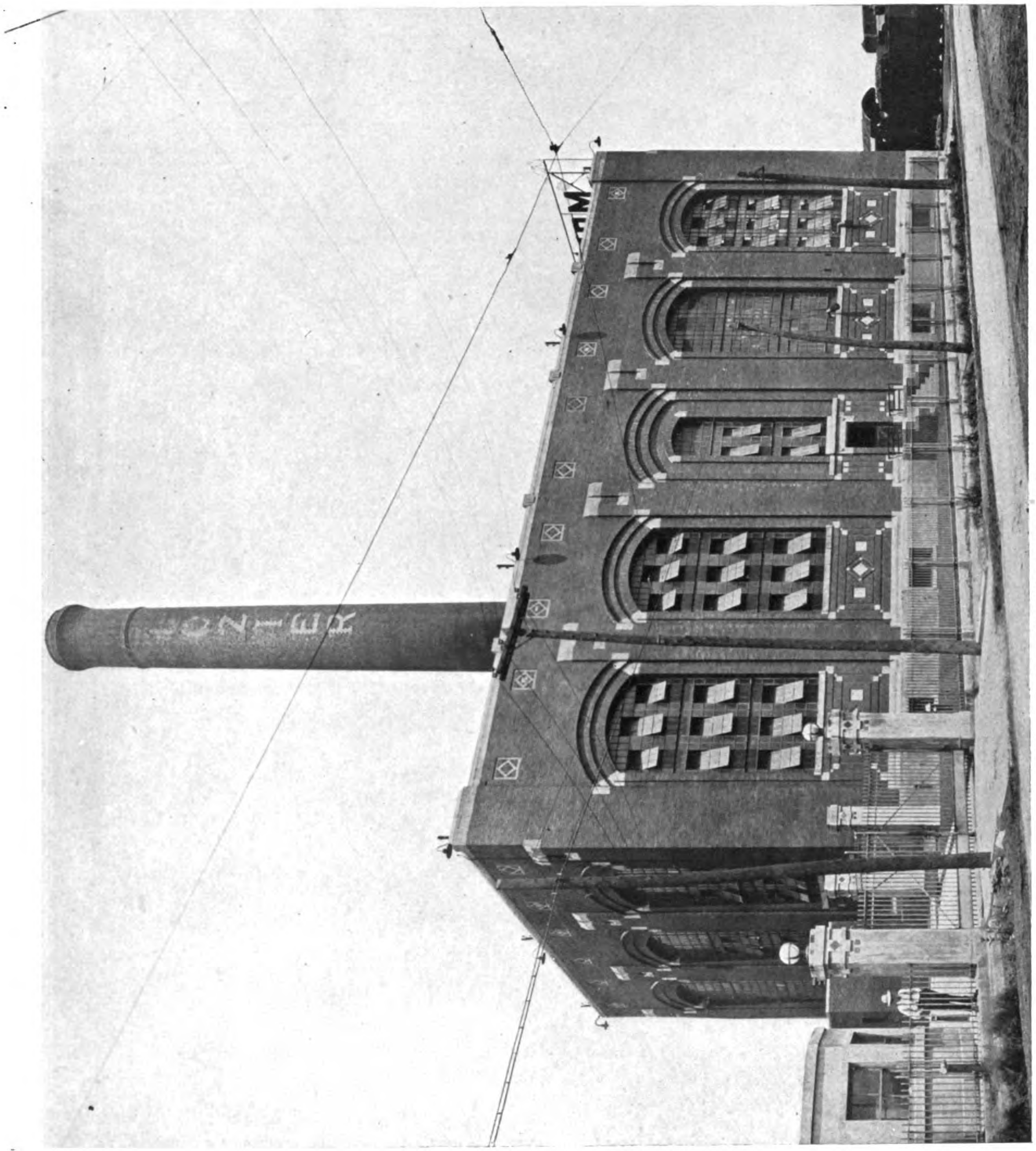
HUDSON MOTOR COMPANY PLANT, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

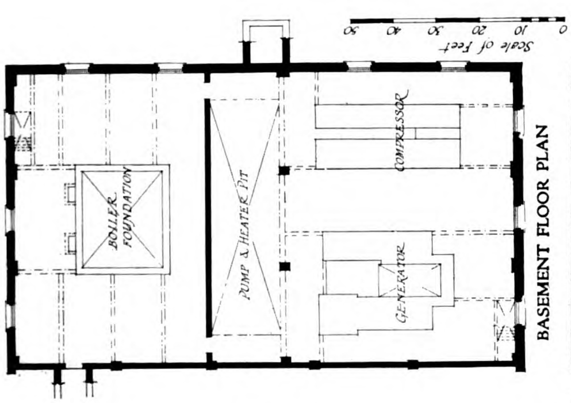
ENTRANCE DOORWAY

POWER PLANT, BURROUGHS ADDING MACHINE COMPANY

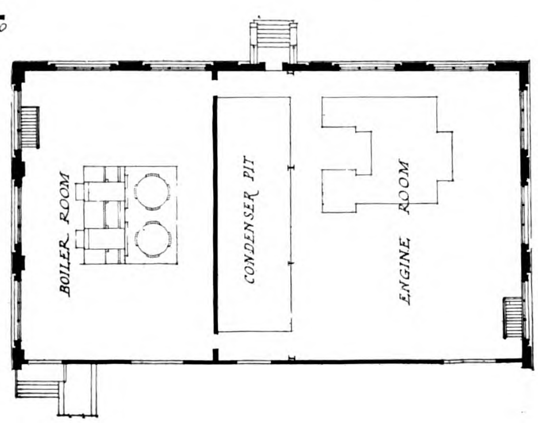
ALBERT KAHN, ARCHITECT



GENERAL VIEW OF EXTERIOR
POWER PLANT, LOZIER MOTOR COMPANY, DETROIT, MICH.
ALBERT KAHN, ARCHITECT

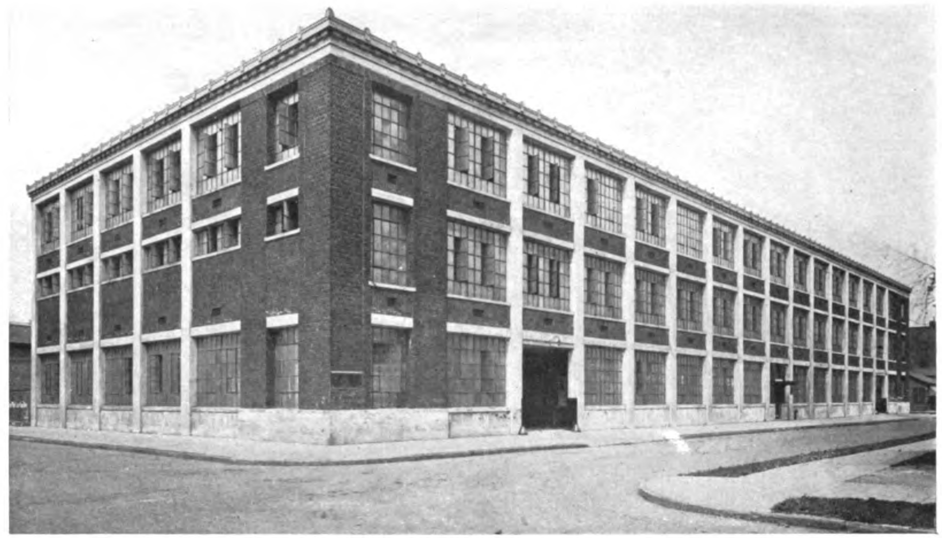


BASEMENT FLOOR PLAN

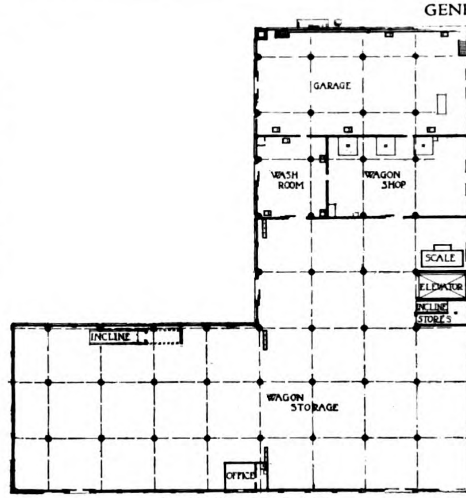


FIRST FLOOR PLAN

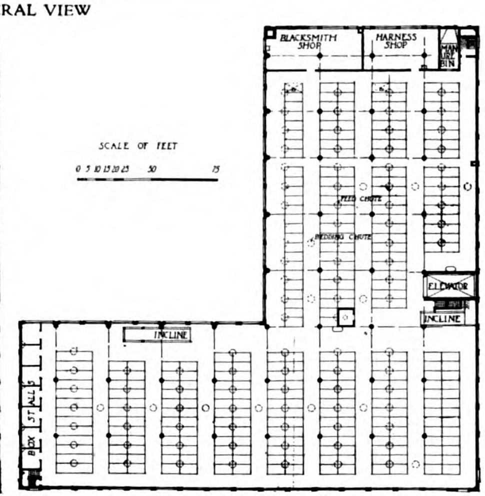
DETAIL OF FACADE



GENERAL VIEW



FIRST FLOOR PLAN

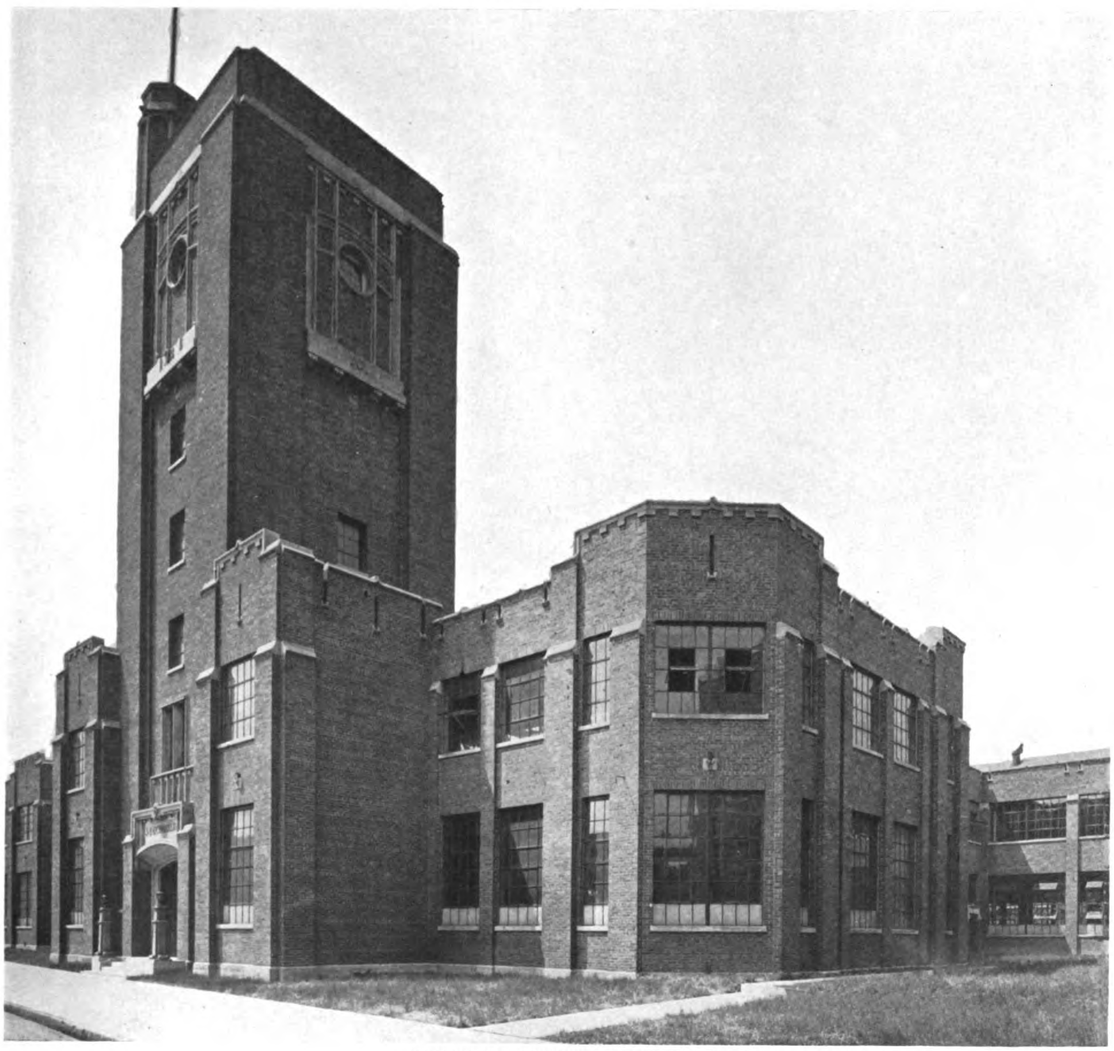


SECOND FLOOR PLAN

STABLES FOR DETROIT CREAMERY COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

VIEW OF SIDE

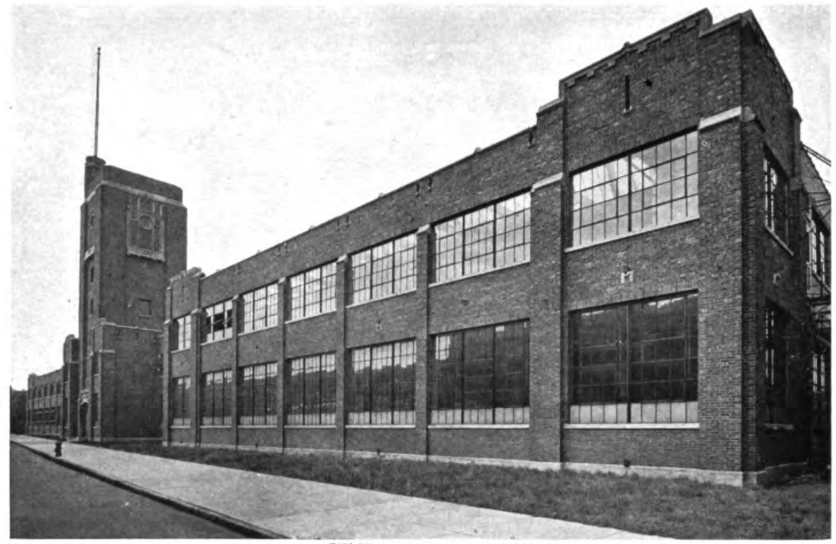


DETAIL OF CENTRAL BUILDING

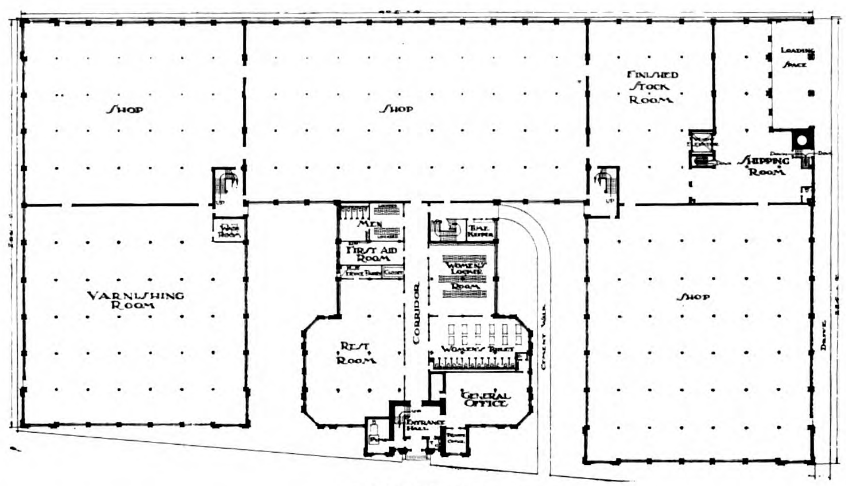
MANUFACTURING BUILDING OF A. B. DICK COMPANY, CHICAGO, ILL.

S. N. CROWEN, ARCHITECT

DETAIL OF ENTRANCE



GENERAL VIEW OF FRONT

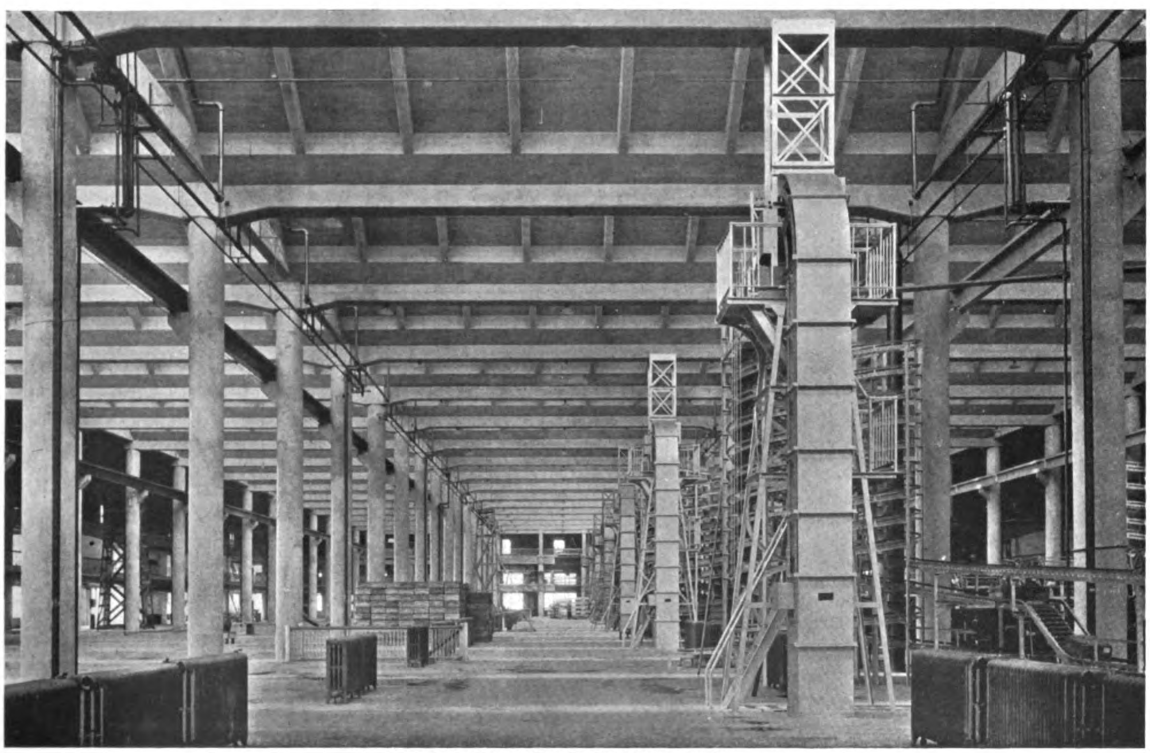


FIRST FLOOR PLAN

MANUFACTURING BUILDING OF A. B. DICK COMPANY, CHICAGO, ILL.

S. N. CROWEN, ARCHITECT

GENERAL VIEW OF SIDE FACING TRACKS

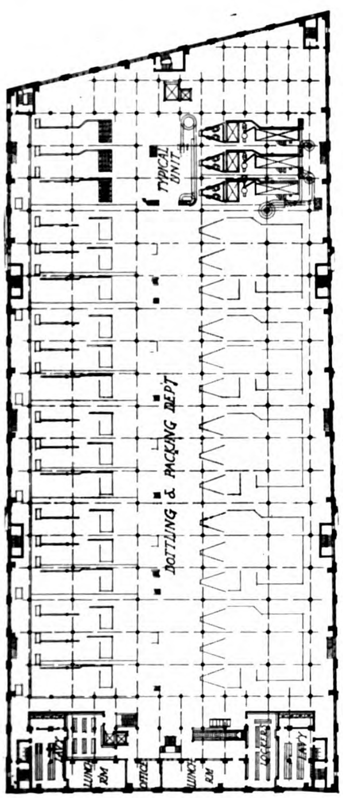


INTERIOR VIEW OF SIXTH FLOOR

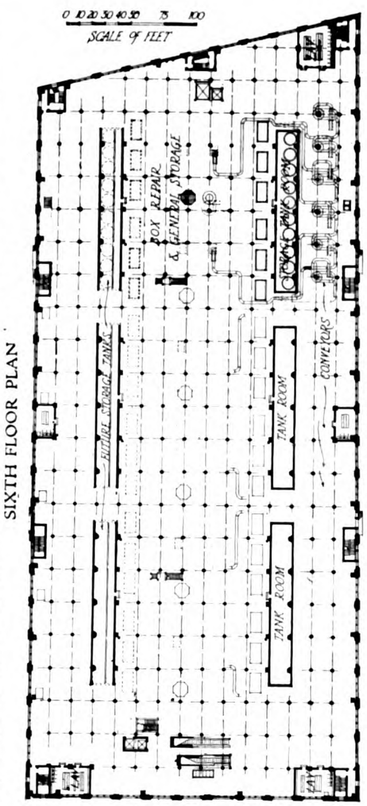
BEVO BOTTLING PLANT, ANHEUSER BUSCH BREWING ASSOCIATION, ST. LOUIS, MO.

WIDMAN & WALSH AND KLIPSTEIN & RATHMANN, ASSOCIATED ARCHITECTS
F. C. TAXIS AND W. K. KNIGHT & CO., ASSOCIATED CONSULTING ENGINEERS

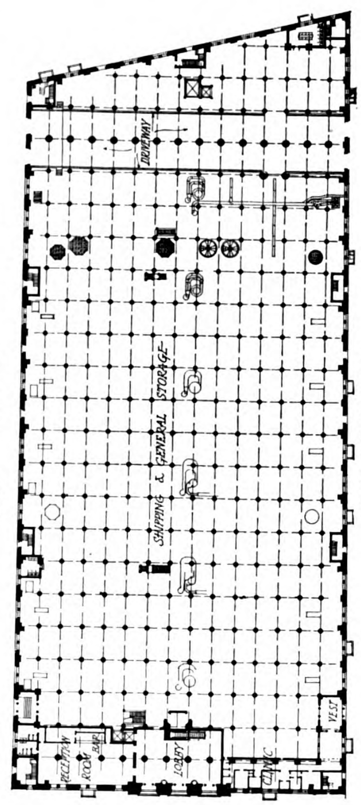
DETAIL OF MAIN ENTRANCE



SIXTH FLOOR PLAN



FIFTH FLOOR PLAN

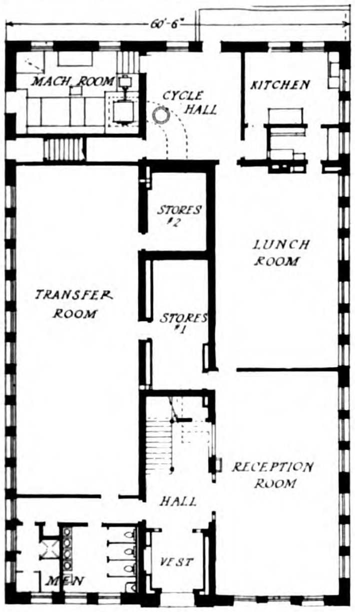


FIRST FLOOR PLAN

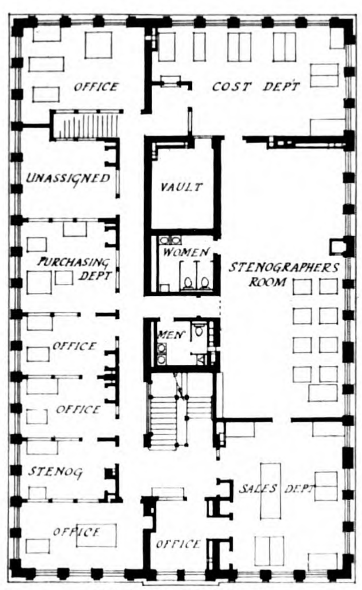
BEVO BOTTLING PLANT, ANHEUSER BUSCH BREWING ASSOCIATION, ST. LOUIS, MO.

WIDMAN & WALSH AND KLIPSTEIN & RATHMANN, ASSOCIATED ARCHITECTS
F. C. TAXIS AND W. K. KNIGHT & CO., ASSOCIATED CONSULTING ENGINEERS

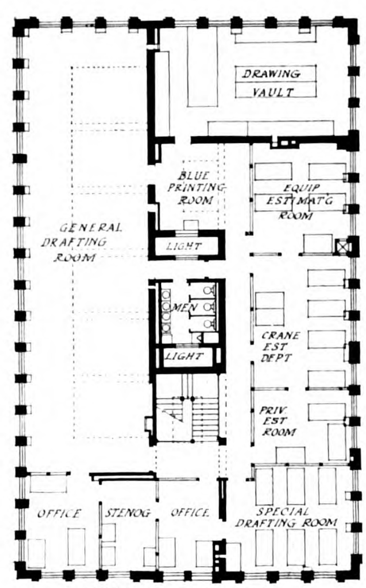
GENERAL VIEW OF EXTERIOR



BASEMENT FLOOR PLAN



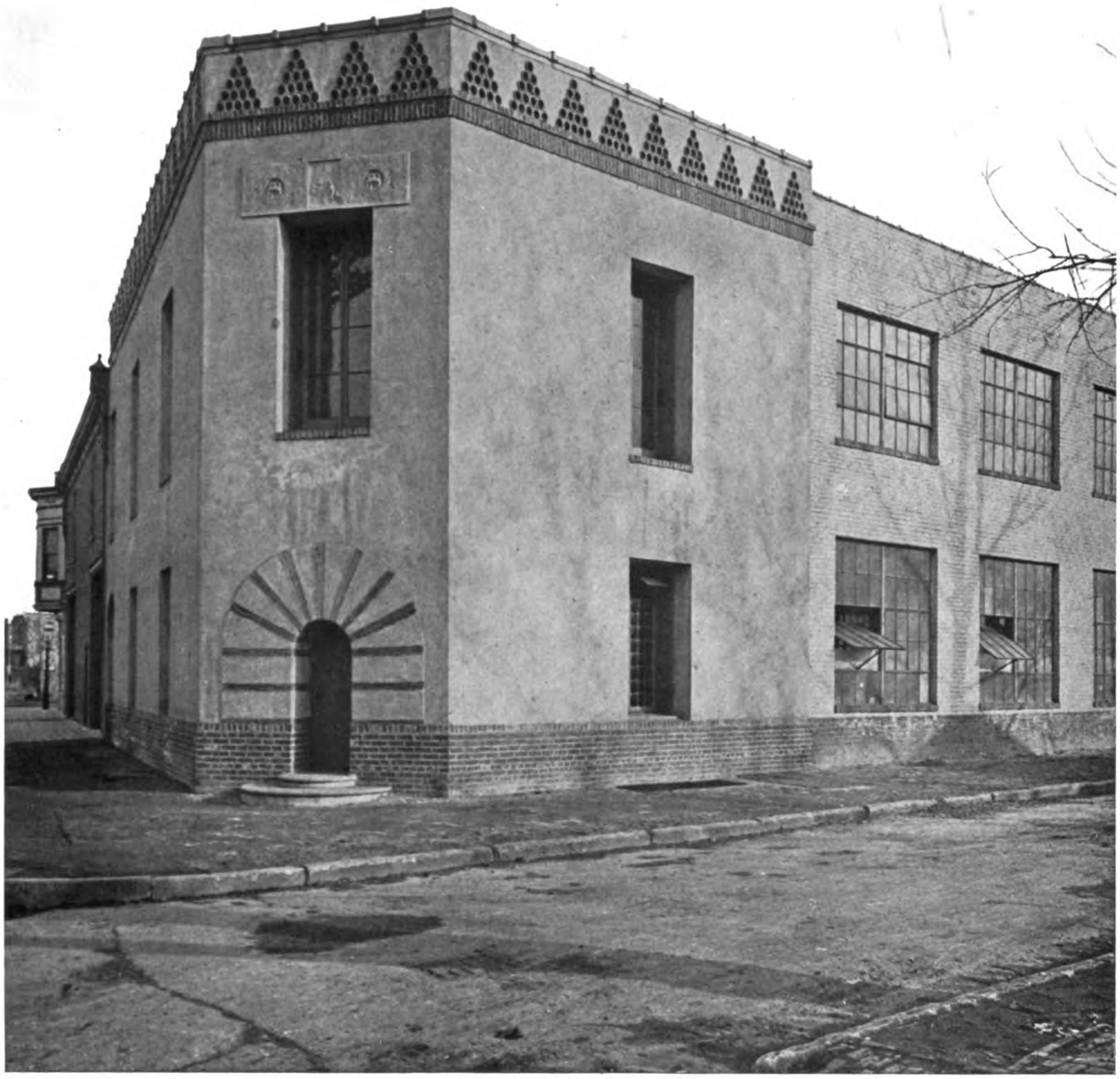
FIRST FLOOR PLAN



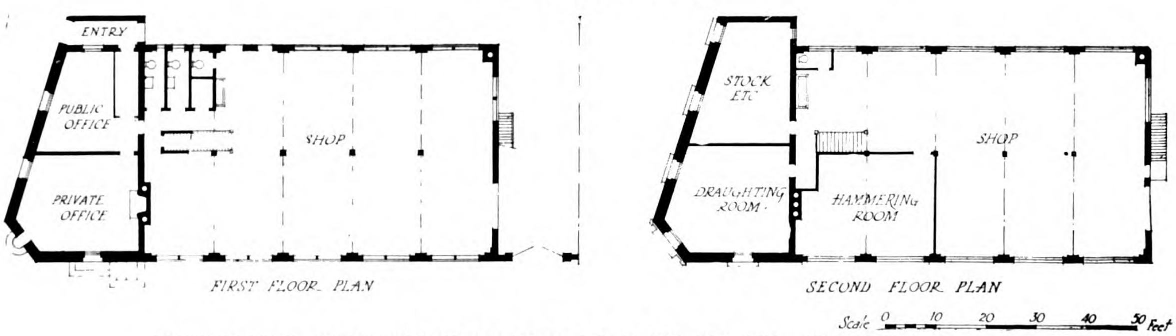
SECOND FLOOR PLAN

OFFICE BUILDING, WHITING FOUNDRY EQUIPMENT COMPANY, HARVEY, ILL.

CHATTEN & HAMMOND, ARCHITECTS

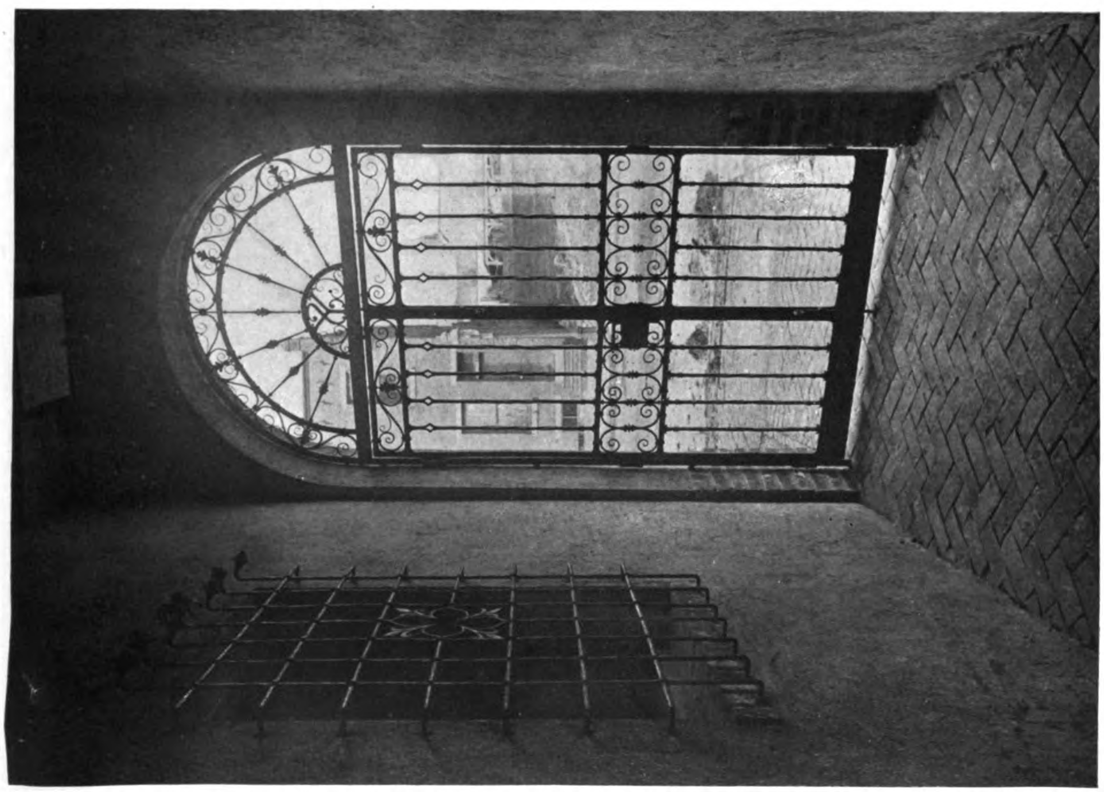


VIEW OF OFFICE PORTION

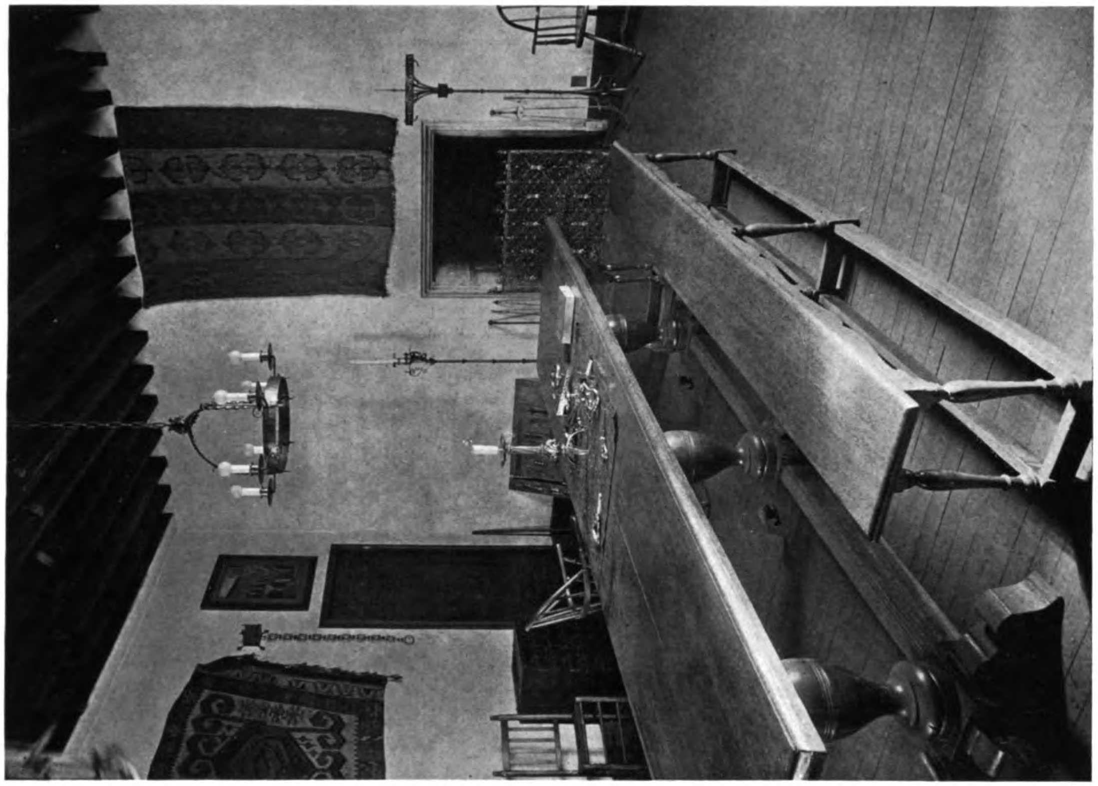


ORNAMENTAL IRON WORKSHOP OF SAMUEL YELLIN, ESQ., PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS



WROUGHT IRON ENTRANCE GRILLE



VIEW OF PRIVATE OFFICE

ORNAMENTAL IRON WORKSHOP OF SAMUEL YELLIN, ESQ., PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS

Description of Industrial Buildings Illustrated in the Plates

HEATING AND POWER PLANT, YALE UNIVERSITY, NEW HAVEN, CONN. Plates 1–3. Increasing demands had rendered inadequate the central heating and lighting plant located between High, York, Elm and Library streets, and on that site being determined upon for the new Dormitory Group a new power plant became an imperative need of the University. Through the generosity of the Harkness family the University was enabled to erect and equip a plant at York, Ashmun and Grove streets.

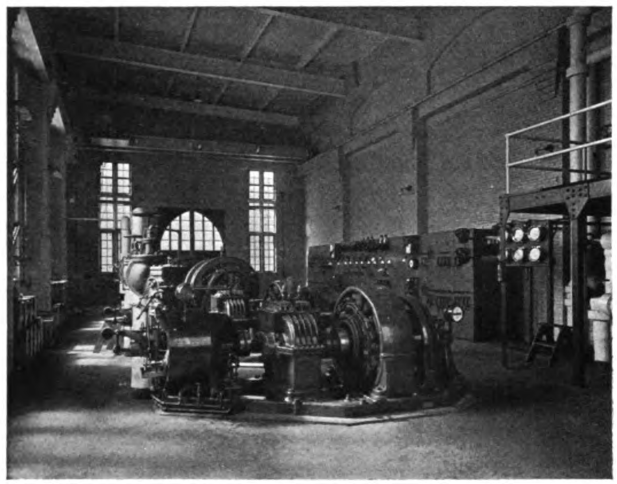
When the requirements were laid before the architects, they were quick to grasp the opportunity presented to produce a design which would have true architectural merit, and yet meet in all ways the practical requirements of the engineers. Without doubt, as erected, the building as a power plant is perfect; and yet the architectural qualities are such that, from all points of view, it is remarkable for its distinction from the ordinary structure of this type, and to the architect and layman alike, in scale, design and texture, it is satisfactory and pleasing in the extreme.

The greatest care was exercised in the selection of the brick to be used as well as the bond and thickness of joints. Numerous samples of wall were built showing various types before the final approval of the masonry was given by the architects. The adoption of Gothic for the style of the building has been fully justified by the result. The design is restrained, yet has many various and interesting motives, notably the great arches at the ends, the walls of which serve as screens to the mechanical appliances located behind them. The great scale of the interior and the disposition of the openings, of which few were required, were distinctly helpful to the architects in their successful study of the problem.

The chimney stack is unique; its great height, the unusual qualities of design introduced, the interesting variations of plan at different levels, attract and hold the attention of the observer. The departure from and the improvement over the hitherto generally accepted type of design for a power house stack is evident from all points of view.

The building replaces not only the old University heating plant, but also a smaller heating and power plant formerly located in the basement of the University dining hall, and so supplies electric light and power for a large part of the University and College buildings, including power for the University shops. The new plant also supplies heat to all the College buildings, comprising about thirty-five large structures, located in an area equivalent to eight blocks.

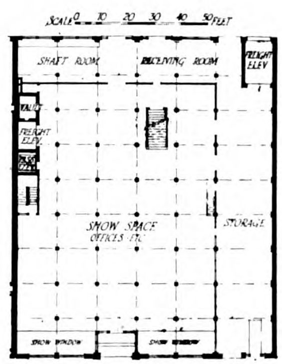
The main body of the building, about 88 feet square and 53 feet high, houses the boiler room and is adjoined on the south by a lower wing comprising the engine room. The roofs are flat behind the parapet walls with occasional crenelations. In the center of the west and east façades the parapet rises to form a frontispiece concealing the roof monitor. On the eastern side two stacks were designed besides the coal hopper and ash bunkers. Each chimney is to serve five boilers, but as only this number of boilers is at present installed, one chimney has now been completed, the other left for the future. They are of 8 feet inside diameter and are 150 feet above the boiler room floor.



Engine Room in Power and Heating Plant, Yale University New Haven, Conn.

The structure is entirely fireproof. A self-contained skeleton of steel not only carries the roof, but provides the support for coal hoppers and other apparatus, walkways, landings, stairs and the like. The boiler room is 86 feet 2 inches by 82 feet 7 inches, and the columns are the only interruptions to this space. The exterior walls are constructed of brick produced eight miles north of New Haven and laid with wide concave joints in dark colored mortar. The trimmings of the walls are of Indiana limestone. Brick walls along the frontage of the property not occupied by the building enclose service yards. In one of these coal is received by auto truck, where it is weighed, dumped into a hopper, crushed and elevated by bucket conveyer to overhead concrete bunkers of 500-ton capacity, whence it gravitates through chutes to the stokers. Ashes are collected from

THIS building provides sales and storage space for the business of a machinery and machinists' supplies house. The first and mezzanine floors contain the executive, selling and accounting departments, and all floors above are used for carrying stock. The construction is steel frame enclosed in brick walls, the floors are of reinforced concrete in part, but generally of the laminated joist type. Window sash is steel and the trim of Indiana limestone. The building was completed in 1915 and cost approximately 20 cents per cubic foot.



FIRST FLOOR PLAN

THE CHARLES A. STRELINGER COMPANY WAREHOUSE, DETROIT, MICH.
DONALDSON & MEIER, ARCHITECTS

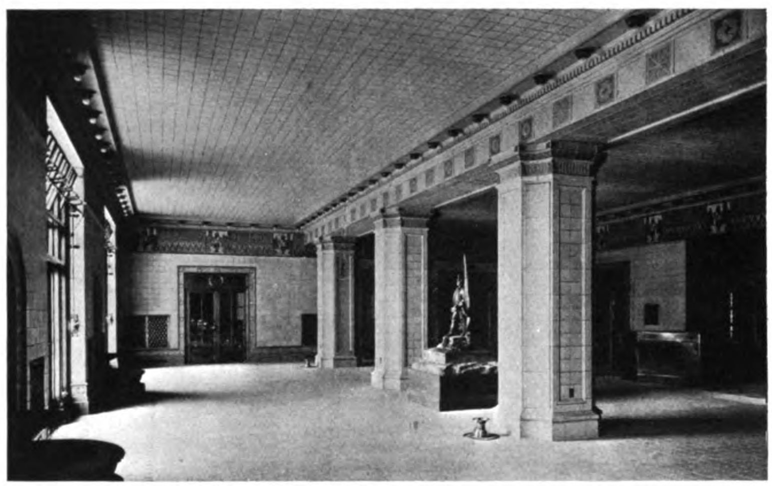
the boilers into cars which deliver their contents into a chute, whence the ashes make their way by bucket conveyer to an elevated ash bunker and from that are hauled away by truck.

Five 500 H.P. boilers are now installed and are equipped with automatic stokers, soot blowers and conveyers, steam flow meters and balanced draft apparatus. Forced draft is obtained by means of 7½-foot and 5½-foot fans and concrete ducts for air distribution under the basement floor of the boiler room.

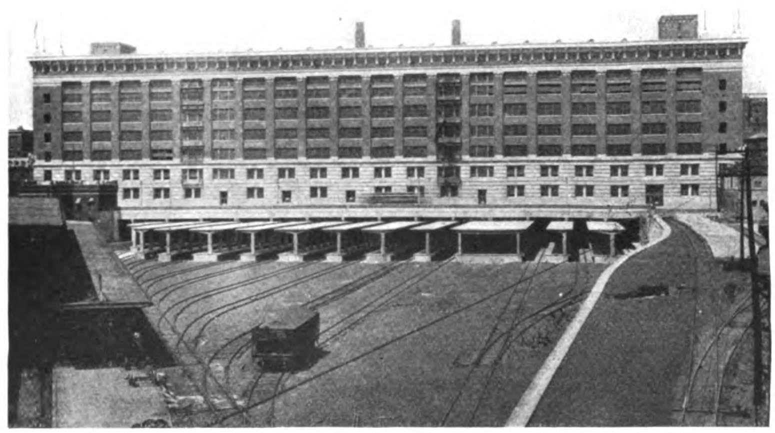
In the engine rooms are two new 300 K.W. turbine units and two old engine units of 75 and 150 K.W. capacity, the latter formerly in use at the old dining hall plant. There is space also for a third turbine unit; a 5,000 H.P. heater meter, two feed pumps and other apparatus are accommodated in the engine room, and over all there is a 10-ton traveling crane. In the basement of the engine room are two large steel tanks which receive the return water from the various buildings and whence it is pumped to the feed water heater. The apparatus was selected and the plant designed with a view to its being used for the instruction of students of the Sheffield Scientific School.

Manufacturing Building for A. B. Dick & Co., Chicago, Ill. Plates 10, 11. This building was constructed in 1918 as a war need for the manufacture of mimeographs for the Government. It is 405 feet long and 225 feet deep, having a total floor area of 162,000 square feet. The average height is 35 feet 5 inches and the cubical contents is 3,217,865 cubic feet. The building is of standard Underwriters mill construction, with factory type steel sash glazed with plate glass. The first floor is of concrete placed on the ground, and the finished surface of the second, maple, the floor load being 150 pounds per square foot. The building contains a complete mechanical equipment, including an automatic sprinkler system, the tank for which is concealed in the tower. The unique feature of the structure is that the first floor is devoted to storage and heavy manufacturing purposes, and the second floor to light manufacturing. This floor has been given special attention so as to provide 100 per cent daylight, evenly diffused. To accomplish this, sawtooth roofs have been used, the sash being placed in a vertical plane and the backs of the skylights covered with white roofing to assist in the diffusing of light. Throughout the second floor there is an even distribution of light without shadows. The cost of the building was $464,660.40 — $2.99 per square foot or 16 cents per cubic foot.

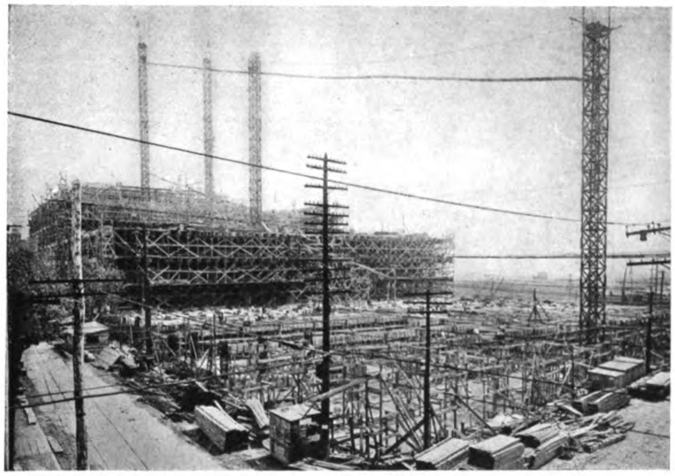
Bevo Bottling Plant, St. Louis, Mo. Plates 12, 13. This huge warehouse and bottling plant has a total floor area of over a million square feet, each floor having an area of 144,872 square feet. The height of the building from the track level to the top of cornice is 146 feet 7 inches, the tracks being approximately 30 feet below grade.



Public Entrance Lobby



Freight Handling Facilities on East Side, Bevo Bottling Plant, St. Louis. Mo.

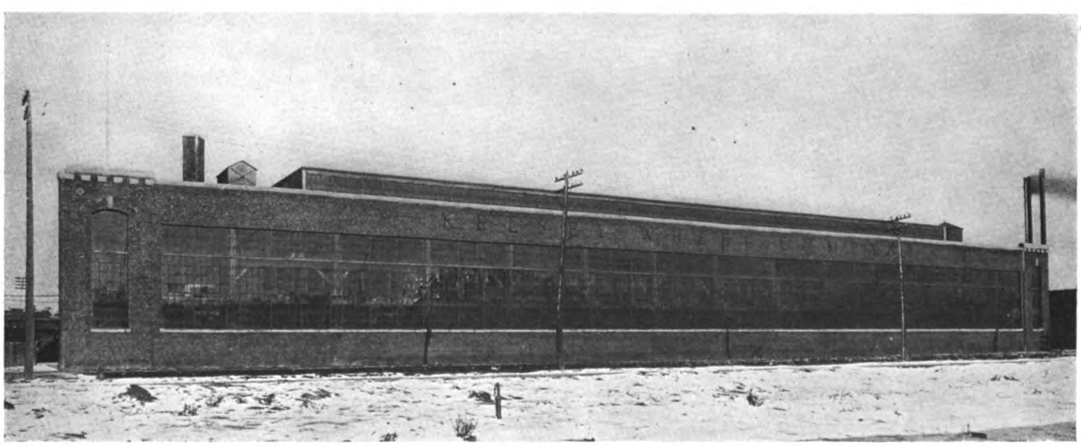


Extensive Form Work Used in Construction of Bevo Bottling Plant

The construction is of reinforced concrete, the columns having spiral reinforcing. The live floor load throughout the building is 275 pounds to the square foot. The typical column spacing is 16 feet 6 inches by 25 feet. Two expansion joints occur in the building and each is arranged in the center of a span, the floor at either side being supported by cantilevers.

The bottling and packing are done on the top floor. This floor has a height of 37 feet 6 inches, and the columns supporting the roof are spaced 25 by 49 feet 6 inches through the central portion to accommodate the large mechanical equipment. Two mezzanine floors at each end of the building provide space for toilets, lockers, lunch rooms, etc. Daylight is provided by means of sawtooth roof skylights. The fifth floor contains a series of storage tanks enclosed in partitions, and the center of the floor space is used for repairing boxes and general storage. The remainder of the floors below the fifth and including the second are for general storage. There are nine enclosed stairways located along the outer walls with entrances from the various floors through two doors. The interior walls of all floors are lined with enameled brick. A complete conveyer system is installed for handling the product from the top floor to the shipping platforms in the basement. A sprinkler system is installed throughout. The main portion of the first floor is devoted to shipping and storage. At the main entrance there is a large lobby, the walls, floor and ceiling of which are finished in colored tile. Adjoining this lobby at one end is a visitors' reception room with tile floor and wainscot, and at the other a series of rooms forming a clinic. These have finished floors of cork tile. The lower stories of the exterior are faced with Indiana limestone and the body of the building is brick with a terra cotta cornice.

Office Building of Whiting Foundry Equipment Company, Harvey, Ill. Plate 14. This building is of fireproof construction: the floors of reinforced concrete with a composition surface finish; all windows of steel sash with wire glass, and interior partitions of glass and metal. The building was planned to fit the special needs of the company; the entrance is in the basement, on which floor is a reception room made attractive with leather couches and easy chairs and where photographs of executed work are exhibited. Because of the building's location in a manufacturing district where there is much soot and dirt, all air is washed before being supplied to the various rooms, and this has added materially to the health and comfort of the office force. The building was erected in 1916 and cost 21.8 cents per cubic foot.



Kelsey Wheel Company, Detroit, Mich.
Albert Kahn, Architect

The Post-War Committee on Architectural Practice

SOME COMMENTS FROM ARCHITECTS RELATING TO QUESTIONS ASKED BY THE COMMITTEE

THE Post-War Committee on Architectural Practice appointed by the American Institute of Architects to inquire into conditions surrounding the practice of the profession has had a ready response from architects throughout the country, and many suggestions have been submitted to it. Since it began its labors, conditions in the architectural world have become more nearly normal, and many of the causes which lead up to its appointment are not now so apparently prominent; but this should not cause any lessening of effort on the part of architects in co-operating with the committee. There still remains the need of studying the profession and its activities, so that new lines of endeavor may be pointed out that will aid the architect in playing his proper rôle in the period of great development the United States is now entering.

The future of architecture is brighter than any period of its past; there is greater evidence of a desire on the part of a larger number of people for buildings of good architectural character than ever before; the standard of living among working people is constantly rising, and with means of education available to all, increasingly better homes will be demanded. With this period of prosperity for architects there goes, however, a greater sense of responsibility. The architect has been the factor of greatest importance in raising the standard of our public buildings and in creating a finer regard for architecture among people of culture. His influence must now, however, be extended to wider fields; he must provide a service greater than designing buildings; he must be aware of sociological questions influencing our civilization; he must recognize the economic conditions of the present and devote his energy toward securing the most efficient use of labor and material that the cost of construction may be kept at a moderate figure. His work should not be regarded in the light of an added item of cost; it must be made so valuable that it will be indispensable in every building project. This can be done and must be done to safeguard his own interest; the tendency of the day is toward the creation of larger units that promise greater efficiency, and the field of building is not without interests that attempt on this score to appropriate the architect's rightful function. Constant and intensive study of to-day's problems, lively co-operation with all agencies working for the improvement of the building industry, must be carried on in order to maintain and protect the high standards of architecture that have been built up.

We are privileged to present herewith some interesting letters on subjects contained in the Post-War Circular; others will follow in the nest issue, and we will be pleased to print brief comments submitted by architects on any of the topics being considered by the committee. — THE EDITORS.

Editors, The Architectural Forum: Of all the subjects referred to in the Post War Circular, I suppose none will appeal more strongly to the profession than the vital topic of its relations with the contractor. His is the essential function which finally produces the building, and without his earnest and willing co-operation the best of plans can only produce a failure. Under the old régime, which now shows signs of passing, a sort of lord and vassal relation existed, accepted complacently by the architect and tacitly, though sometimes rebelliously, by the builder. The latter was expected to defer to the architect's convenience at all times, accepting thankfully such details of information about the work as fell from the drafting table, and to wait, hat in hand, no matter how long, for the architect to see him after every one else had received attention. He was expected to supply what additional strength was needed after the conventional "6 x 8" suddenly turned out to be insufficient, to remember to include in his estimate all the missing links of the specification and in general to "put it up stout and strong" and make it good if he failed to do so.

In the good old days when the builder kept a half barrel of English Portland cement in his barn and doled it out in teaspoonsful where extraordinary strength was required, when the calculation of "sand piles" and "flitch plate girders" formed engrossing chapters in the hand books and fireproofing, even firestopping, was unknown, this system for some incomprehensible reason seemed to operate; but with the advent of highly developed and patented building materials the builder suddenly transformed himself into a well equipped business man, often with an engineering training received at a first-class school, and not infrequently with a college education besides. After this process the old business of vassalage no longer seemed to fit, and while the architectural schools were still turning out graduates trained perhaps in the design of Roman entrances and state drawing rooms, but innocent as an unborn babe of how to choose the psychological moment to substitute a flat slab for a beam and girder construction, the engineer-contractor calmly "eliminated the middle-man," in this case the architect, and did the whole job himself.

I hold that both of the above situations were and are wrong. The building trades, to produce a result which will be the best in every sense, need the planner, the architect, and he should be a man endowed with imagination, ingenuity, vision and a quiet mind, free from *ambition* to form a great office "organization," though success may force him to do so. He should not attempt to take on the contractor's function of the actual operations of construction, and conversely the contractor will best fulfil his mission if he confines himself to producing buildings of honest quality and prompt execution.

If all the architects, as many actually do, will honestly endeavor to master the business and technical details of their job, trying to produce as good plans and specifications as they possibly can, and if the builders will co-operate by trying to meet the honest specification with equally honest construction, eliminating the "just as good" business, future occasions for such discussions as this will never appear, and I firmly believe that more frequent meetings, outside of business hours, of well intentioned architects and builders, will do much to bring about such a consummation.

Much of the above applies equally to the engineers. More frequent interchange of ideas between modern minded architects and progressive engineers must result in the greatest benefit to both. Less introspection, more thought on the work in hand and perhaps for the present less time spent on abstract "uplift" will soon put the profession in a healthier condition than ever.

WALTER H. KILHAM.

Boston, June 2, 1919.

Editors, The Architectural Forum: You have asked me for an expression of opinion as to how the public may be reached "architecturally"—that is, I take it, as to how the public can be educated up to a proper appreciation of the functions of the real architect, and thus to a proper regard for the profession as such and for the individual practitioner as representing a valuable profession.

I am setting it down as indisputable that the architect's functions are valuable to the public, and am taking it for granted that they are performed primarily for that reason, and only secondarily for the personal pleasure which is incidental to the performance of worthy architectural service, or to worthy accomplishment in any of the arts. The public must be made to realize the high function of the architect and must be taught that the wide difference between building and architecture lies in the fact that mere building is intended primarily to serve physical needs, while architecture ministers primarily to the needs of the spirit, serving at the same time, and equally with building, the needs of the body. Does the profession of architecture realize fully that it is a preaching and teaching profession as well as a building profession, capable of preaching and teaching through the medium of its building endeavors? When the profession comes fully to appreciate its priestly function and sincerely to exercise it, the public will readily enough recognize its validity, and the great step in the education of the public through the intervention of the architect will have been taken. But the architect must be the first to recognize his own high office.

Before the architect intervenes, however, the first step is to be taken by the educators and moralists. In the primary grades the process must be begun, continuing from rostrum, platform and pulpit. The value of beauty as ministering to the spiritual side of life must be emphasized in the mind of the child and the man. "Worship the Lord in the beauty of holiness." Worship and holiness are not sufficient in and of themselves; the act and the impulse must shine forth in beauty. Children, youths, adults, in all stages and in all strata of society, must be given a new conception of beauty, a new conception of art; must be taught that beauty for itself is worth striving for, and that art is the means of its accomplishment. Art must be taught as action in every field of human endeavor—action directed by spiritual impulse toward perfection of accomplishment. Beauty must be taught as residing intrinsically in the act performed or in the object produced, and not in the superficial application of unrelated or extraneous forms. Art must be taught as a necessary factor of everyday, commonplace existence; not to be considered as for the elect, to be acquired for the elect alone, but to be insisted upon as an office to be performed and a right to be exercised by every member of society, from the highest, if such distinction can exist as to art, to the most lowly. Lessons in school, games on the playground, social contact in the home—all must be considered as fields in which art is to be assiduously practised and in which the spirit of beauty is to be constantly evoked; in which is to be developed that love for doing the appropriate thing beautifully which later shall lead to an appreciation of architecture and to a comprehension and understanding of the subtle message embodied within its forms.

But the architect need not leave the entire burden of educating the public to the educator and the preacher. He may educate and educate through these as well as directly. He, however, needs must hold ideals and know his own mind. If the architect himself is not well equipped and well balanced as to ideals and definiteness of aim, let him not complain that a disinterested public evinces no appreciation of himself or his product; if there is not some community of aim and idealism in the profession, let it see first to the beam in its own eye.

The architect worthy of the name knows and will teach that beauty costs and is well worth paying for. Ugliness is cheap in material measure, but fearfully expensive measured spiritually. The idea should be enforced that church and school buildings which are not to be considered as factors ministering to the physical comfort of a community perform a spiritual office; and, as they are necessary as ministering to the spiritual, that ministration should admit of no curtailment and these structures should be made as beautiful as possible and at any necessary expense. (I say as beautiful as possible, not as elaborate.) The architect may well teach his committees that there is no excuse for ugliness in buildings serving altruistic purposes; indeed, that ugliness defeats their purpose.

And if this applies to purely altruistic buildings, how deeply should it apply to the factory, to the office building, and the workers' home — types of buildings which touch the common life on the practical, every-day side and should tend to elevate it. Here is a fertile field for architectural enlightenment by architects, educators, preachers; in the office, on the platform, in the pulpit; but the architect may well direct. If the architect does not or cannot direct, or at least show the way, he has no vital message to impart, and need not be concerned with the public's opinion of his work. But the matter of beauty and its ministration to the spirit is vital and of general import and in time will be a factor in public education and in the common life.

IRVING K. POND.

Chicago, May 14, 1919.

Editors, The Architectural Forum: One of the inquiries raised by the Post War Committee at the Nashville Convention of the American Institute of Architects was, "In what manner can the service of the architect be extended?"

One does not have to look far afield to discover one opportunity for increasing the architect's service, which is well worth while from every standpoint, and that is for architects generally to undertake to do all kinds of industrial buildings.

In spite of the fact that this period in which we live is preeminently an industrial one, comparatively few architects have undertaken to solve the practical building problems involved in factories, warehouses and the various utilitarian buildings of commerce.

Because of this fact the impression is maintained by the public generally that architects are not qualified to solve these practical problems. There is probably no more unfortunate situation to-day so far as the architect is concerned, because it cuts him off from doing his share of what is regarded as the most important work of our times.

This is particularly regrettable because the architect, by virtue of his training and experience, is best qualified to do this kind of work. Moreover, this same utilitarian work is now more than ever offering increasing opportunities for artistic and beautiful design, and thereby opening up that particular side of the practice of architecture which is the most interesting to the majority of architects.

It has already been demonstrated by numerous instances that an industrial plant can be architecturally designed so as to make it attractive and often beautiful by a comparatively slight increase of expense over the cost of the unsightly, utilitarian structure usually produced. In fact, it has been found that the most ornate examples of factories, warehouses, etc., whose cost has been analyzed, have in no case exceeded the cost of the ugly utilitarian type of buildings by more than 5 per cent of the cost of such buildings.

As a general rule, it will be found that in most cases factory problems have some excess land not covered by the building, which gives the opportunity for breaking up the façade of the building and also the opportunity for a green foreground, which may be planted and often landscaped, thereby giving the building a beautiful setting of flowers, lawns, trees and shrubbery. There is also usually the sprinkler tank to be installed, which makes a proper occasion for a beautiful tower to dominate the whole composition. The usual requirement for dividing up the building into its different departments and expressing these in the exterior, and the various forms of construction that may be applied to meet the different processes of manufacture, give rise to very interesting features of the exterior. These are only a few of the opportunities offered for the proper and useful application of the artistic capabilities of the architect. But perhaps the most useful part which an architect can play in the solution of these problems is the employment of his particular faculties and experience in determining for the manufacturer the best plan and arrangement for his building. By reason of the architect's special training, which develops his imagination for the purpose of creating architectural design, he is particularly fitted to plan and work out the difficult problems of arrangement and construction which are essential to secure the most logical and economic method of production. The designer who possesses a highly trained imagination, such as the architect, is in a position to invent and create new arrangements in plan and new constructions in the building that may entirely revolutionize old methods of procedure in the operation of such plants. The ability needed for solving the hardest problems of the industrial building is not so much the exact knowledge of mathematics, science and engineering, as it is the inventive genius of the trained architect.

Then in addition to this are the great opportunities offered for solving the many problems involved in the care and welfare of the employees of such plants. The solution of these problems, outside of sanitary matters, depends largely upon an artistic treatment of the problems rather than upon a scientific one.

These are only some of the opportunities open to architects in the industrial field that would greatly extend the service of architects, if the members of the profession generally would undertake to perform what seems really to be their share of this important work of our times.

GEORGE C. NIMMONS.

Chicago, May 20, 1919.

Editors, The Architectural Forum: We know the worst. The inadequacy of the architect is at last revealed. He was well enough for the tolerant and somewhat dull world before the war, but he must not presume to impose himself upon the alert and superior public which has to be reckoned with henceforward. If the architect of to-morrow have anything to "put across," he may catch this amazing public by the coat-tails, for he must no longer expect to be pursued to his traditional retirements. He is now to be of the sidewalk. Nor is his interest to be flattered by the old deference for its claims to fine art or any of that sort of rubbish. Art must look to be cried in the marketplace, like other commodities.

As to architecture, that we believe is to be reduced to a more or less respectable element in the adventures of contracting or real estate. Whether, in this event, the real estate man or the contractor shall fuse himself in the architect, thus achieving a sufficiently formidable sort of person; or another shall assume to dominate the trinity, or whether all shall agree to be effaced, in the interest of an invincible engine of industry, is the only question that remains to be settled.

It is clearly ordained, in the least of these destinies, that the post-war architect will be "up to snuff." It is no less obvious that if he is to have hope of surviving in the new atmosphere with anything like his historic consequence, he must become a very monster of efficiency. How fortunate it is for those who, like myself, feeling the sun upon their backs, may smile at revolutions! But our sensibilities persist. The raucous industry of a certain professional journal in proclaiming the new dispensation has at times humbled me with such a sense of my individual incapability as almost to provoke me, out of very decency, to seek out some honester livelihood. Cowardly, however, I stilled the uneasy conscience by cutting off my subscription.

Perhaps I should bring a more serious spirit to this topic, but I am more affected by its amusements. Are we expected soberly to believe, because we have been obliged to pass a brief year or so in doleful contemplation of our bare drawing-boards, that the world has irrevocably forsaken us? In the national extremity, we were not needed, it is true; the engineer rather than the architect was pronounced for the emergency. This was discouraging, of course; it was thought even to be humiliating, and there was loud and bitter protest. But there was no real humiliation except that which came from the exhibition of chagrin and bad temper at the preference for a profession which has had its historic place in military science and tradition and was obviously more available, whatever we say, to the hour and the task.

Partly from this new direction there developed under the stress of war preparations new combinations and new constructive agencies which in the circumstances made for occasionally impressive results. And now it is feared there will be such a general demand for the extension to normal building enterprise of this highly organized efficiency as hopelessly to submerge the individuality of the architect who, it is proposed, may yet save himself if he only fling overboard the useless *impedimenta* of old fashioned convictions and ideals which are no longer reverenced. In blunt speech, he may cling to his job by the act of making a business of his profession. The moral surrender implied in this idea is, I believe, thoroughly understood by its advocates; but notice has been served that the times will no longer tolerate the old flabby ideal of professional individuality. They demand efficiency, and this despite the opportunity we have had in the last few years to regard the fortunes, and finally to witness the deep damnation of certain giant efficiencies which were too contemptuous of the spirit. It was a lesson which should be a warning to civilization for a century. Is it a principle beyond our heeding here?

A few weeks ago, as I reclined during a spell of apprehensive idleness in a dentist's chair, I sought distraction by making inquiry if all were well with that energetic interest. "Doctor," said I, "is your profession in any way troubled about itself these days? Is it, for instance, quite satisfied that it is thoroughly attuned with modern life?" He looked anxiously at me, as if he had carelessly trifled with some nerve which communicated with the regions of gray matter. "Let me put it this way: are you dentists playing up to your business opportunities?" "Ah, now I get you," he said with an air of relief. And then after a pause, "I hear this sort of thing. A friend of mine has been trying to persuade me that I am several kinds of a fool because I refer my surgical cases to the dental surgeon and my mechanical cases to the dental mechanic, virtually putting good money in other pockets which I might, by merely engaging a couple of qualified assistants for that service, easily put in my own. But I call that a pretty commercial proposition, don't you? One's personality, after all, is worth the keeping." Here is our own case in all its crudity. Thus stated, one would hope from our profession as clear a perception of the moral issues and as swift a verdict.

They are free to forsake architecture who perceive more alluring prospects. But no comfort should be extended to those who, in the name of a new day, seek official sanction for a debased professional standard. There is something base in the suggestion that we owe it to the war, and therefore to the victory, that we abandon the spiritual principles and restraints of a noble profession, and that, too, in face of the fact that there has never been a time in our history when its accomplishment had even approached the distinguished level of the present hour, or when it had contributed so notably, through its men of genius, to the varied activities of the national life.

It is no part of the materialistic program I observe to remove real professional disability. I refer to the demoralizing practice of competition, which, whatever may be said for it as a method of selecting an architect in the case of public work, has wrought incalculable harm to the profession. Is it not absolutely certain that the main, if not the whole, difficulty in gaining public acceptance for a reasonable minimum charge for professional services was that in actual practice we were demonstrating that our minimum charge was really zero?

I neglected to ask, but I should dearly like to know, how dentistry gets along without competition? Particularly how has it continued so docile a constituency?

I venture to say that not even the architect with a toothache would dream of making a condition of his patronage that half a dozen dentists gratuitously exhibit their skill for him. Instead, he meekly submits like the rest of mankind to the imperativeness of a piece of pasteboard which calls for his prompt presence at a given day and hour in the dental antichamber.

We have not, I fear, brought up our clients the right way. And the young men? When I speak my mind to brother architects about competition, I usually encounter the idea of the young man. Where, in heaven's name, do the young doctors and lawyers come from? Two dentists on our office floor are mere youths. And there are young architects—I have seen them and have been one myself. There would be no less of them if competition were abolished forever.

I have tried to see something more in the institution than the erroneous principle (which we have fixed so definitely in the public mind to our disadvantage) that in order to develop five ideas you must have five architects. We are more resourceful than that, really. I am at pains, always, to assure the merely possible client that any intelligent architect can solve a problem in five different ways. "Try letting us compete with ourselves!" On the new public I should serve notice that an architect demands such share in the blessings of the democratic dispensation as shall appear in his receiving equally with the hod carrier an inevitable wage for an honest day's work.

CHARLES D. MAGINNIS.

Boston, June 30, 1919.

A City House Façade, New York, N. Y.
Frederick J. Sterner, Architect

Victory Loan Decorations in Chicago

THOMAS E. TALLMADGE, A. I. A., ARCHITECT-IN-CHIEF

THE three essentials of pageantry according to Claude Fayette Bragdon, and stated in his rather startling letter to the *New York Tribune* annent the recent New York decorations, are light, motion and color. To Chicago architects, Bragdon with his democratic vision speaks *ex cathedra*, so it was particularly gratifying to them that they had anticipated the dictum of the distinguished critic, and had based their entire conception of the scheme on the development of light, motion and color. It was also gratifying that the Liberty Loan Organization of the Seventh Federal Reserve district, realizing that the floating of the loan depended on its advertisement, decided first that the major advertising should be in decorating a certain part of the city where all festivities should be centered; and secondly, that a commission of architects should have absolute control over the arrangement and design of the decorations. The opportunity was magnificent as the site chosen comprised the entire length of Michigan Boulevard from Randolph to 12th street, one of the greatest streets in the world, over a mile in length, flanked on one side by grandiose and picturesque architecture, and on the other by Grant Park with the azure waters of Lake Michigan beyond.

The scheme as developed in plan was twofold: first the decoration with architecture, sculpture, trophies and flags of Michigan avenue named after its New York prototype, "Victory Way"; and second, the decoration in similar manner of Grant Park over an extent of two squares on the axis of Congress street, which thus was made the center of the entire conception.

The entire scheme in this manner conceived and carried out was lighted at night by the most extensive installation of decorative lighting since the Panama Exposition in San Francisco in 1914. The final result, especially at night with the wind moving the flags, was symphonic in its rondo of light, motion, color and form.

The decorative scheme of the Victory Way consisted in lining the west side of Michigan avenue with obelisks 45 feet high, each placed on the axis of an impinging street terminated by the avenue. The obelisks bore huge shields and were lined with vertical divisions filled between with small trophies. The permanent lamp-posts, 170 in all, were treated each with a figure of victory, 5 feet high, poised on the finial and in the center with a basket filled with greenery and flowers and draped with cross flags and a victory shield. From the top of each lamp-post to the fourth story window sills of the adjacent building stretched a sagging line from which were suspended 6-foot flags. The flags formed a bower or arcade the entire length of Victory Way, and were extremely effective.

The decoration of the "Forum," within Grant Park, consisted of great pylons 55 feet high, a pair of each, bearing trophies, figures and shields, opposite Van Buren and Harrison streets. These were connected by curved colonnades to pavilions bearing globes with eagles and cauldrons, and ornamented with painted curtains. The pavilions were connected by isolated piers, each bearing a flagstaff with pennants and connected by heavy swags of cedar and by hedges of box and evergreens.

The central feature of the Forum, in

One of the Four Fifty-five Foot Pylons

The "Altar of Victory" in Projected Light

fact of the entire decorative scheme, was the "Altar of Victory." This structure consisted of two towers, 85 feet in height, 60 feet apart; between them hung the jeweled curtain composed of Novagem jewels, from the tower of jewels of the Panama Pacific Exposition. The jewels covered not only the screen itself, but the face of the towers as well. Between the towers was a huge stage 110 by 50 feet, equipped complete with dressing rooms, curtain, lighting, etc. Here daily and nightly entertainments were given during the drive.

In style the structural portions of the decorative scheme plainly expressed its transitory character, and its humble materials — wood and canvas. All profiles were entirely of straight lines so that the mouldings could be built up of flat boards with the greatest possible expedition. There was no millwork whatsoever required, the reliance on color for final effect was determined at the outset so plain surfaces rather than detail were emphasized. The color scheme recognized the inevitable presence of red, white and blue, but built up a counter scheme of three shades of green, wine color and light buff. The latter formed the ground color for all structures. The field of all shields was vermilion, as was also the globes on which rested the little victories in the Forum, which of themselves were gold. Blue was used sparingly; red, white and blue were used in bands on the pavilions and on the wine colored curtains. The color scheme bordered on the riotous, but was kept in place by the greater extent of the buff ground and the wide expanse of the decorative scheme.

The night lighting was grandiose and truly magnificent: 180 flood-lights of 250,000 candle power each, located along the parapets of the buildings, lining the entire west side of Victory Way, bathed the area with a soft sea of light, while four giant anti-aircraft projectors of 200,000,000 beam candle power each made the jeweled screen a coruscating gossamer of flashing fire. From the tops of the towers, and from the giant cauldrons on the pavilions steam was emitted which was illuminated and colored by concealed light. Local flood lighting at special places illuminated greenery, statuary, etc., while far in the rear on the axis of the curtain seven great search-lights of 8,500,000 beam candle power each, made a fanlike background with auroral shafts of colored light.

To what extent the decorations actually augmented the sale of liberty bonds cannot of course be ascertained, but the reaction on the spirits of the vast crowds that were attracted was immediate and obvious. The joyousness, the spirit of triumph, the élan of the crowd was evident and owing manifestly to the pageantry, and only to that. This dispelling of the gloomy mood, with many the aftermath of war, and with many a chronic condition, made worth while many times over the labor and expense of the celebration. Moreover, the architectural disposition of the masses and units were designedly such as to keep before the

The "Altar of Victory" with Screen of Jewels

General View of Grant Park and Michigan Avenue

people's minds the greater glory of the city plan to come, with its proposed improvement of Grant Park. The decorations were of such magnitude as to furnish the Commissioners of the South Park Board a full-size model and a splendid criterion of scale for future work.

Thomas E. Tallmadge, of Tallmadge & Watson, was architect-in-chief and director of works. Assisting him actively in the design was Earl Reed, Jr., and in an advisory capacity, Pierce Anderson, of Graham, Anderson, Probst & White. George H. Maher was the member of the committee in charge of the lighting. Emil Zettler, sculptor, supervised and actually modeled most of the sculpture. Oliver Dennett Grover represented the painters, and to Herman Rosse, head of the department of design of the Art Institute, is due the color scheme. Elmer Jensen had charge of contracts and engineering. W. D'A. Ryan, of the General Electric Company, was the consulting lighting engineer and the lessor of the jewels. The lighting scheme as carried out is essentially his design. The committee worked without remuneration.

The history of the project is interesting as illustrative of what can be done in a short time. The architects were informed of their responsibility and their committee was organized on Tuesday, March 25. The drawings and specifications were made, competitive figures taken, and the contracts let except for the lighting on the following Sunday morning.

The loan drive opened on Monday, April 21, and on that day the Victory Way and Forum were dedicated, entirely complete, except for the demolition of the scaffold of the jeweled Altar of Victory, used in erecting the decorations.

The successful co-operation of the United States Government with a committee of architects, sculptors and painters, and the recognition on the part of the Government of the necessity of the fine arts in successfully consummating a huge enterprise, is one of the most encouraging signs of the new era.

At the close of the Liberty Loan Drive the city of Chicago took over the decorations for the welcoming of the home-coming soldiers. The Forum has been filled with stands and the flags now flutter welcome to the soldiers, and the little victories pipe unheard pæons of praise, and the pageantry of light, motion and color goes on, now as a mark of devotion to our boys and their work "over there."

Detail of West Pavilion and Curved Colonnade

Developing Speculative and Investment Homebuilding Projects in American Cities

AT the present time probably the greatest single interest in the building field is being evidenced in connection with the building of large numbers of moderate cost homes in and near the more congested districts of cities. The speculative builder is again becoming active, and it is interesting to note that as never before he is studying the question of design and planning features which involve not only economy in construction, but the provision of more attractive homes and their grouping to provide architectural unity from the community viewpoint.

The reason for this increased interest is apparently twofold: first, because the home-buying public is exercising more discrimination in the purchase of dwellings; and second, that as the builder has studied the operations of recent years he has found that houses and communities of better than average design have been the more successful and have maintained values in a manner unknown to the monotonous stock-plan community. In representative cities of the country the wave of buying activity in the dwelling field has invariably started in the more attractive districts.

Therefore, in promoting city-housing operations which involve the construction of a number of houses for quick sale, careful study is being given to features outlined in following paragraphs:

Has the Architect a Service to Render in These Projects?

Before entering into a consideration of the various important factors in the promotion and development of these projects it may be well to clearly determine what service the architect has to render, and whether or not he can create sufficient saving or additional value to warrant the additional cost represented by his commissions. The value of architectural service in such projects depends entirely upon the architect's capacity for all-round service.

If his contribution is merely designing houses which have a degree of architectural merit, he has at this time no really valuable contribution to make. To be valuable to the builder the architect's service must include the ability to translate into the terms of home design all the needs and preferences of the type of families who will constitute the prospective buyers. He must assist in the financing of the operation by the presentation of attractive and practical designs, together with a careful study of equipment. Costs must be accurately determined in advance and every possible step taken to demonstrate to loaning interests the soundness of the project as collateral for loans which are difficult to obtain at the present time.

Owing to the difficulties of material production and shipment the architect will be called upon during various stages of building to provide logical substitutes for materials specified but unobtainable within reasonable time for one reason or another. It must be realized that time is the essence of profit in such a building operation and that if there is delay in waiting for materials, the cost will run beyond all bounds. It is evident that sound knowledge of the building material market is more necessary to-day than ever before — not only a knowledge of quality and price, but particularly of availability before specifications are drawn.

It will be seen, therefore, that the architect who is equipped not only with designing ability but with a knowledge of the business factors which enter into such a project has a valuable contribution to make.

Homebuilding Projects in and Near Cities

In foregoing articles the various phases of suburban homebuilding operations have been discussed, and later the question of apartment houses and multi-family dwellings will be taken up. In this issue interest will be confined to the one-family house, individual and group, particularly to operations within easy commuting distance of the business centers of the larger cities, consequently involving more or less congested districts and comparatively high land values.

The promotion and development of homebuilding projects involving the construction of a number of houses are usually carried out by an individual or corporation having in view a sound speculation with fair profits which may be earned without the investment of too great sums of money. This type of speculative building investment is usually and properly carried out on a margin basis — that is, through a system of financing involving building loans and permanent mortgages.

It is generally found that money is more easily available for housing developments in cities rather than in suburban districts, and at the present time financial interests are beginning strongly to encourage the provision of relief from the general housing shortage by providing building loans.

The financing of these operations usually entails the provision by the owner of an amount of cash equaling about 30 per cent of the cost of the operation. The first step is to obtain the land free and clear of mortgage or other encumbrance. Plans and costs are then completed and application made for a building loan from individuals or institutions which have money available for this purpose. Building loans are usually granted for a period of one year or for a period to cover the time of building and an agreed time after completion such as six months or one year. Based on eastern United States mortgage charges, the interest on a building loan is usually 6 per cent. The cost of obtaining the loan, in addition to the interest for the entire period (deducted from amount loaned), varies according to the source from which the loan is obtained. Where the loan is obtained from institutions of good standing, the charges in addition to interest vary from 1 to 2½ per cent of the principal amount. This charge is to cover the cost of overhead and handling chargeable to the transaction and a banker's profit. As most loans are obtained through mortgage brokers, this service constitutes a similar additional cost.

When building loans are obtained from individuals, a more liberal loan, sometimes up to 70 per cent of the cost of the operation, may be obtained. Generally, however, this involves the payment in one form or another of a bonus which in some instances brings the cost of obtaining the loan as high as 15 per cent, including bonus, broker's fee and other charges. At the present time there is no direct method of controlling extortionate building loan cost charges. It is clearly a matter of *caveat emptor*.

Another and more satisfactory type of financing the building operation is that known as a building and permanent mortgage. As the title implies, this is constituted by an agreement between the mortgagor and mortgagee through which financing is provided during the building operation, and an agreed amount is finally left as a regular first mortgage against the property. The loan of this type represents less actual cost to the applicant, as instead of two operations with separate costs and brokerage fees one agreement covers the entire transaction.

Building loans are usually provided in three or four installments as the work progresses and certificates are issued. The first payment is generally made on each house as the cellar excavation is finished and foundations completed. The next payment is made when the roof is on and final payment after rough plaster work or the building is finished.

At this point it might be well to refer to a new type of building and permanent loan, particularly applicable to city housing operations and which has many points in its favor. This is what is known as the amortization mortgage, and its general adoption as a method of financial building operations is at present being strongly urged by many loaning institutions. In many recent instances large loans have been made on this basis.

The general principles involved in the amortization mortgage are: (1) a more liberal loan; (2) extension of the mortgage for a longer period than usual; (3) annual payments in reduction of the mortgage until it has been paid off. Often when it has been brought down to approximately 60 per cent of the value of the property it is transferred to another loaning institution such as a savings bank. This is usually done by an assignment of the mortgage.

There are many arguments in favor of this form of financing building operations. Through the medium of the amortization mortgage sometimes as high as 80 per cent of the cost can be obtained on a first mortgage loan. This makes easier the financing and developing of a building project and places the burden of reducing the mortgage principal against the rental income, and in many cases against the increment in value of the building.

House Types and Allotment of Land

Having purchased a tract of land, of varying dimensions depending upon the size of the operation, the prospective builder immediately faces the dual problem of house type and location on the land. Aside from the profit which may ultimately be shown in the increment of land values on unbuilt sections of the property, the builder has to look for a reasonable and quick profit on his operation which may result from the immediate sale of the houses built. The obtaining of building and permanent mortgage loans on the houses is in one sense a preliminary sale of the buildings, — that is, the builder, in order to obtain his financing, must be able to present his plans in a manner which will convince financial institutions of the feasibility of the project. At this point, therefore, the services of a good architect to carefully lay out the entire project will prove of important value.

From the viewpoint of the speculative builder and the real estate operator, the question of allotment of land to each house is determined largely by land values. It is well known that to be economically sound the cost of the improved land unit must not exceed 20 per cent of the cost of the house. This is the basis upon which the average building loan association makes its valuations, and the reason is fairly evident. If land of greater value is used for the erection of moderate price dwellings, such value has usually been created by intensive use and by the development of business buildings and multi-family houses in the neighborhood. As soon as the land is used for an individual dwelling, its potential value is in one sense destroyed, — that is, it cannot be used for any other purpose until the increase in land value in that neighborhood brings the value of the land used for dwellings up to a point where the value of the building on it can be discounted or charged off as part of the real land value. It can be seen, therefore, that once a house is built the land value becomes only relative. If land, bearing too great a proportionate value to the cost of the house is used, a percentage of the present value is destroyed, while taxes and interest on land investment bring up the cost of maintenance to a point too high for the living space provided.

The Row or Group House

We find, therefore, that the successful method which is used in our larger cities to keep the ration of land value in its proper relationship to the cost of the building is the construction of row or group houses. The determination as to type is made in the following manner, based upon definite cost figures:

If we assume that a builder is considering three tracts of land, all of which have been purchased at various prices determined by general conditions and the character of the neighborhoods in which each is located, the various necessary improvements, such as streets, sidewalks, sewers and other mechanical improvements having been made and charged to the cost of the land, the square footage of each plot is determined, and by division into the total cost of the plot a unit cost per square foot is established. We may also assume that these plots of land available for building are located in neighborhoods where realty values show a considerable variance, owing to varying ratio of congestion and class of occupancy.

In figuring the square foot land cost in each plot, we may find for example that in plot "A" (a fairly congested district) the unit land cost is 60 cents a foot; plot "B," 40 cents a square foot and "C," 30 cents a square foot. In analyzing the general characteristics of the neighborhood in which plot "A" is located the builder determines that the type of house which will sell in this neighborhood must not exceed $6,000 to $6,500 as the asking price. This determination is based upon various factors, including the average earning capacity of those who live in and may be expected to buy homes in the particular section where plot "A" is located. At this price, after deducting the builder's profit (usually figured at about 20 per cent) and the cost of the land, it may be seen that there is left about $4,000 to be spent in the construction of the house. To keep the cost of land in fair ratio to that of the building it may be seen that such cost should not exceed $800 to $1,000. Having $800 to be applied to land cost, at a unit value of 60 cents per square foot, the builder finds that he should allot to each house less than 2,000 square feet, or a lot less than 20 by 100 feet in dimension. This condition at once limits the type of building to the row house on lots of 18- to 20-foot frontage and varying depth, or the use of more land for a more expensive dwelling if the character of the neighborhood permits.

In one of the more successful row housing developments of New York City the unit land value, using 100-foot lots 20 feet wide, was found too high. This was overcome by cutting short streets at intervals through a long block and allowing a lot only 20 by 60 feet for each house. Houses were faced on alternate short streets instead of on the long avenue, thus providing narrow roads at the rear of each lot to be used for delivery and garage entrance. In this manner additional facilities were provided and the unit cost of lots cut down to a sound basis.

It will be seen that the less the unit cost per square foot of improved land the greater can be the area of land allotted to each house of equal cost. There can therefore be established in each instance a safe maximum of land allotment to each house of given cost.

From the viewpoint of selling value, the group house offers a particularly interesting problem and one which the architect may be instrumental in solving. The day of the monotonous row house is passing and there is an increasing demand for architectural treatment which may provide unity of mass and a certain element of æsthetic value which will give a touch of individualism to the community and to each house.

Selling Value of Interior Equipment

Through a careful analysis of many city housing development projects, particularly those involving the row house, it has been found that from the business viewpoint the more successful houses are those where careful study has been given to interior design and equipment. This means study not only from the average viewpoint of design, but from the specific viewpoint of the type of family that will be interested in purchasing the houses.

It is interesting to note that there exists a definite form of social activity among people having fairly comfortable incomes resulting from the payrolls of commercial and industrial institutions.

This is particularly true in neighborhoods populated by people of foreign extraction, which represent the second or third generation of family development in America. Social activities in this class are confined largely to the home and are contributed principally by the woman of the family. Therefore in purchasing homes it was found that the woman's interest largely governed the situation, and that that interest was influenced strongly by the potential opinion of friends rather than the immediate demand of family comfort.

Two features which influenced purchasers were in the equipment of the kitchen. Here a highly attractive and interesting gas stove was provided, together with porcelain sink and porcelain tubs with white enameled covers. The kitchen floor under the stove and sink was tiled and all the apparent features of convenience and sanitation which would show most effectively were included. These kitchens sold more houses than any other feature. Again the bathroom was made a special feature, being more than usually large and having tiled floor and side walls with special shower compartment separated from the rest of the room by a large marble slab. It is a strange but interesting fact that in some classes of dependable home buyers social status is largely set by the equipment of the kitchen and bathroom. In these houses the electric fixtures were of simple and inexpensive design, and through the medium of simplicity considerable money was saved in order to offset the extra expenditure in bathroom and kitchen.

The Individual Garage as a Selling Feature

No city housing development is complete today without some provision for garage space. At the rate of present production, at the end of this year, there will be about 7,000,000 automobiles owned by families in this country. This means that one out of three families possesses a motor driven vehicle, and a very large percentage of these are inexpensive cars which are maintained only by careful economy. The maintenance cost of an automobile, therefore, is entering into the budget of many of our average American families, and in purchasing a home there is certainly an interest in garage space in view of the high cost of public garages and because of the interest of the average man in having a place where he can keep his car and care for it.

There are several interesting methods for providing them in extensively developed residential sections. The first is setting aside a plot of land near the houses on which a large number of small unit garages are built in rows with an entrance grade. In some cases it is found that this operation will be handled by some person in the garage business who will also maintain a small repair shop and a gasoline station on the property. The second method is the provision of alley entrances and placing the small garages in the rear yards. A third method is the provision of individual garages for part of the houses at the end of lots where room can be found, which are sold and maintained on a co-operative basis by home owners in the community. The latest and perhaps a more practical method of providing garage space is to actually place the garage in the cellars of row houses. The average row house for purposes of economy is placed well up on a foundation, requiring excavation of probably not more than 3 or 4 feet. Ground is usually terraced up for small yards in front, and window openings are provided in foundation walls to light cellars. It has been found within the scope of the average building code to place the garage at the rear of the cellar with the roof of the front portion of the garage extending some 4 or 5 feet out of the house and forming a back porch. A driveway from the rear entrance and having a slight grade down to the cellar floor level makes it possible to drive the car directly into the garage underneath the house. This method represents a saving in cost, using cellar space which otherwise is of little value.

It is safe to say that garage space adds, at least, $10 per month to the rental value of a house, which means that it adds $1,000 to the value of the house. It is evident that by an additional expenditure of $500 on a house costing $5,000 a garage may be provided which offers a sound investment both from the speculative and home-owning viewpoints.

The Organization and Administration of an Average Real Estate Development Company

PRACTICALLY all suburban and city residential developments are carried out by companies (usually incorporated) and created specifically to carry on activities of this nature. In view of the rapidly increasing interest in building and development projects of this nature, it will be of interest to follow through the organization of such a company and to touch briefly on various important points of administration.

In the first consideration, if a building development of residential type, or a land subdivision project of any size is contemplated, there will undoubtedly be times when it will be necessary to approach various financial institutions for building and permanent loans. It is important, therefore, that the operation be handled by a corporation, rather than an individual or partnership, as loaning institutions always prefer to do business with the former. In loaning on individual bond and on property owned by an individual, there are many times that the death of the individual or other complications which may be of a business nature will tie up the property and cause various legal complications.

Therefore, for the handling of a realty development, it is well to incorporate in order to establish a better basis for business relations. Through the medium of incorporation and issuance of stock, additional funds may be provided for use in the activities of the company.

Perhaps the easiest manner in which to describe the organization of such a company is to select and detail the actual experience of one successful organization, an average realty operating company such as might interest the usual type of investor.

The particular corporation in question, which we may call the City & Country Realty Co. was formed for the purpose of buying acreage property, dividing it into lots, putting in improvements, building houses and selling lots or houses in accordance with the wishes of purchasers.

The manner in which the company came to be formed was as follows :

A real estate broker, located in a large city, was offered, by the owner, a farm of 100 acres located near a residential town within a few miles of the city. At the time, the railroad which connected the residential town with the city was getting out plans for the electrification of the intervening trackage, which meant that within a comparatively few months excellent transportation service would be established. A trolley line from the station in the town passed directly by the farm in question and as the asking price for the farm was only $300 an acre, the possibility of ultimately developing the land into a residential section for commuters from the city appealed strongly to the real estate man.

After discussing the matter with several friends, arrangements were made by which each of three men contributed $10,000, making up a total of $30,000 for buying the land. This was done and the title taken in the three names, the property being clear of mortgage or other encumbrance.

Several months passed, and when work was definitely started on the electrification of the railroad it was decided to proceed with the development of the property. As none of the three owners had sufficient capital, the organization of a development company was undertaken.

Accordingly the matter was taken up with an attorney and arrangements made to incorporate for $150,000 in order to provide for the purchase of the land by the new company, the improvement of a portion of the land, and the construction of some houses to add interest to the operation. The company was duly incorporated for $150,000, made up of 1,500 shares of common stock, non-assessable, at a par value of $100 per share. For the purchase of the land 500 of these shares, representing a par value of $50,000, were immediately given to the three owners, and title to the land was transferred to the new company. At this point the condition of the City & Country Realty Co., Inc., was as follows :

Capital stock 1,500 shares @ $100	$150,000
Stock issued for land 500 shares @ $100	50,000
Stock available for sale 1,000 shares @ $100	100,000

The various formalities having been carried through, such as the first stockholders' meeting, the election of a board of directors and the election of officers, the three original owners of the property occupied the respective positions of president, treasurer and secretary of the corporation and constituted the board of directors.

In order to get operating capital it was decided to offer for immediate sale 500 shares of the stock and to retain the balance of 500 shares as treasury stock to be sold later when additional development was contemplated. It was found, as is often the case, that in the sale of this first block of stock, before improvements had been made to the land or any real activity started, a stock bonus or a commission must be given as an added inducement for the first cash investment. A stock bonus of one share for every four shares purchased was therefore offered the first investors.

Immediately then before offering any stock for sale an application was made to a local financial interest for a loan of $16,000 on the free and clear property owned by the company. This loan was obtained and the cash placed in the treasury of the company to begin operations. The next step was the retention of a landscape architect to lay out the streets and lots, together with various parking and planting features. After careful study this was done and an illustrated prospectus was prepared showing method of subdivision ; approximate cost of improvement and sales prices of lots together with other data which might interest an investor.

The first issue of stock was then offered for sale to various investors with whom the officers of the company came in contact, and in a few weeks the entire 500 shares were sold, netting to the company, after deducting bonus, the cash sum of $40,000, to add to that already realized on the mortgage which had been placed on the property.

It might be noted that this mortgage was in the form of a release-clause mortgage. This meant that arrangements had been made to pay off on short notice the principal sum of the mortgage as it applied to any lot in the subdivision. In other words, the mortgage was distributed over all the lots and could be paid off to render any of them free and clear when desired.

The condition of the City & Country Realty Co., Inc., at this point, was as follows:

Owner of 100 acres unimproved property paid for in stock and mortgaged for $16,000 (release-clause mortgage).

Stock still in treasury and available for future sale; 500 shares		$50,000
Cash in bank ready for development purposes; proceeds of mortgage	$16,000	
Proceeds of stock sale	40,000	
Total cash		$56,000

(From which must be deducted items such as cost of obtaining mortgage and operating expense to date.)

At a special stockholders' meeting, held for the purpose of having two additional directors elected from among the new stockholders, this action was taken and the board of five directors then decided to proceed immediately with the first stage of the development. Small salaries were voted to the officials who were called upon to give considerable time to the business of the company.

The next action taken was to stake out the first section of lots near the entrance to the property. Work was immediately commenced on road building and mechanical installation in this section. A small sewage disposal plant was built, as there were no sewers near the property, and water and electricity were brought in. The construction of ten houses was started near the entrance to the property and an active sales campaign begun.

The available operating cash of the company was used in approximately the following manner:

Cash available	$56,000
On sewer installation for first section of the property, grading streets, etc., there was spent	28,000
Ten houses were constructed at a cost of $6,000 each — 60 per cent of which was borrowed on mortgage. To do this the release-clause mortgage was paid off the property built on, the sum of $2,000 being paid on the principal of $16,000. The net cost of this operation to the company was	26,000

In the meantime electrically operated train service had been installed from the town to the city. With some judicious advertising considerable interest in the property had been aroused, so that lots were selling where improvements had been put in. As payments were made and the houses sold additional sections were improved and some further building done in the new sections. Arrangements were made with financial institutions so that the further inducement of available building and permanent mortgage money could be offered to lot purchasers. As a result many of the buyers began construction on their own account.

It was found that after taking out land for streets and parking spaces an average of seven good sized lots were available for sale in each acre. These were placed on the market after improvement with streets, etc., at a price averaging $850 per lot, or a total of $595,000. The cost for roads, sidewalks, sewers, water, etc., with the original cost of land, was about $550 per lot, leaving a gross profit of $210,000 when all the property was sold, out of which the selling and administration costs were deducted. The actual profit on this operation netted to the company about $100,000 in three years, or an average of over 30 per cent per year on the $100,000 worth of stock originally issued.

When the operation was well under way the additional $50,000 worth of stock which had been retained in the treasury was sold for the purpose of purchasing two large adjoining tracts of land before the price was greatly increased. After a year, when the original development was showing rapid growth, one of these tracts was sold outright at a profit of well over 100 per cent, and the other tract was sold to another development firm at a still greater profit but on the following basis.

No cash was required for the purchase of this property, but the buying company agreed to take title and give back a release-clause mortgage against the property for an amount practically three times the original cost to the City & Country Realty Co. This could be done because the rapid building up of the first development had greatly increased the value of the surrounding land. It was further agreed that the purchasing company instead of putting up any cash for the purchase of the land would agree to spend a certain amount in putting in streets and other necessary improvements, which would become the property of the mortgagee in case the agreement was not lived up to in any manner. In this way, as lots were sold by the new company, the City & Country Realty Co. received their *pro rata* payment for releasing the lots to the new purchaser.

In regard to the stockholders in a development company of this nature, it is wise to refrain as far as possible from selling stock in small blocks. The small holder usually has less business vision than the larger investor; is more prone to cause trouble over fancied wrongs and in general will impede and block progress because of a very great solicitude for his small investment.

In many of the successful realty development companies the principal investors are men whose very business activities or professions make possible valuable contributions to the success of the company. Illustrative of this fact is that one of the most successful realty development companies of which the writer knows has as its principal stockholders and directors a real estate broker, a banker, a builder and an architect.

The Standardization of Building Materials

By D. KNICKERBACKER BOYD, F.A.I.A.

ONE sometimes hears a captious critic or "conscientious objector" decry standardization as a fetish worshiped by efficiency fanatics. Such a one speaks as though every standard was expressive of finality — a check to individual accomplishment, a stifler of creative imagination.

These are misconceptions — so far as standardization of building construction is concerned — which I earnestly desire to see set right. Standardization in its application to the erection and equipment of modern structures is as essential to successful results as is the standardization of time, weights and measures.

The results to be attained through standardization of materials and methods used in building, and of sizes and space requirements, might be broadly summarized as follows:

The elimination of a tremendous amount of individual effort, time and expense in specification preparation and detail drafting.

The saving of lost motion and waste in the extraction, production and application of materials and the manufacture of equipment.

The permitting of industries to keep production well in advance of demand and assuring more constant employment of workmen.

The reduction in the variation of types, sizes, patterns and finishes which together with carrying needlessly large stocks play an important part in contributing to the high cost building.

The appropriate use of materials conforming to known characteristics, or limitations in their nature, methods of production and manufacture.

The proportionate lessening of cost of construction and reduction in maintenance through knowledge of such suitability.

The wider use, through such economy, of materials and buildings best adapted to improve living and working conditions, lessen fire risks and lower rentals.

The assurance of a high, uniform degree of safety and efficiency during and after construction, including adequate day lighting, artificial illumination, sanitation and all other factors which make for the health, comfort and convenience of the occupants of buildings.

The making possible of a closer co-operation between architects, engineers and other constructionists, and the men who produce, furnish and install material and equipment.

Architects have all too frequently not sought the co-operation of industries and associations of manufacturers in the solution of problems of production and application, and have not sufficiently recognized established trade customs, classifications and terms, or encouraged their wider use and improvement.

On the other hand, many industries and manufacturers have not sought the co-operation of architects and other constructionists to the extent that they should. They have, it is true, often tried to please architects by catering to the whims and caprices of some without ascertaining the real needs or desires of all.

This, often combined with needless variation in type or pattern made only in the effort to afford "selling talk," has caused whole branches of the building industry useless expense and many difficulties in the merchandising of their product, has filled stores and shelves with surplus stock and contributed to the high cost of building.

Prior to action by the Government during the recent war in curtailing the production of certain building materials and in standardizing others, there were in existence several established standards for certain basic building materials, and in some cases for their safe and efficient application.

These had been developed through years of study and strenuous labor on the part of organizations, institutions and other bodies, including: the American Society of Civil Engineers and other engineering societies, the governmental departments, technical institutions and schools, fire prevention and safety associations and commercial bodies.

Many of these were finally embodied in standards put forth by the American Society for Testing Materials, as to materials; by the National Fire Protection Association, as to fire and life safety, and by the National Safety Council, as to safety in industries and in general. Architects should familiarize themselves with these standards, together with those of the Illuminating Engineering Society and others, as their use will be of the greatest possible advantage to all concerned.

With respect to building materials, any standardization should take into account the following factors:

1. Geologic Origin and Availability.
2. Extraction, Production and Manufacture.
3. Suitability for Intended Use.
4. Methods of Application, Alone or Combined with Other Materials.
5. Maintenance and Preservation.

Architects have been and always should be the leaders in newer and more effective uses of materials and their wider application to various forms of building construction. But these uses should be not for appearance only, but should be considered in combination with utility, appropriateness, economy and permanency.

The necessity of a better knowledge of building materials and broader understanding of their source and application became more pronounced through war demands. The activities toward standardization then inaugurated, it is hoped, will be taken up and carried forward by architects as leaders in times of peace.

The unfortunate practice of calling for all materials, notably the products of nature or those dependent upon heat for their hardening or transmutation, "to be of first quality only, free from imperfections, blemishes, defects, etc.," works an economic hardship all along the line. Trite as it may sound, it seems, nevertheless, necessary to reiterate this fact without going into details of the many phases of the subject. These begin with building code requirements and extend themselves through housing and sanitation laws, rendering improvements in existing conditions more costly and difficult, affecting fire prevention and safety, and eventually increasing the cost of buildings and maintaining rentals at higher levels.

If only hard burned bricks, as an example, were to be used in building construction, approximately one-quarter of all the bricks produced would have to be thrown away. In the process of burning that proportion of bricks, being necessarily remote from the fire, cannot be otherwise than "light burnt" or "salmon" bricks which are suitable for backing up, for non-bearing interior walls and for other places where not exposed to the weather or subjected to great weight. The question of size has been, and is being, worked upon; but brick machines "wear large" before they become worn out, and some bricks burn smaller than others so that, even though standards of size have been established which, however, are not conformed to as yet throughout the country, the jointing becomes a determining factor. Eventually diagrammatic illustrations will portray the various jointings and bonds so that it may be none the less desirable to use a "Flemish" bond, an "English" bond or any other, because it has become standardized beyond peradventure of dispute. Mortars, as well as joints, instead of varying in almost every city of the country, may surely, within climatic ranges or geographical zones, be prescribed according to standard formulæ, so that varying individual judgment shall not prevail nor need to be given under customary conditions.

Similar comments might be made as to lumber, except that here associations and large organizations throughout the country have worked out many standards, chiefly known as "Grading Rules" which are gradually converging into few standards. Great need exists, however, for bringing all of these into harmony, and for standardization in the matter of nomenclature alone.

What opportunities unfold themselves to the millwork industry and to architects co-operating with it! If the odium attaching to the word "stock" in this industry can be overcome, it will be because the industry as a whole will accept from the architects, if they will give it, such co-operation as will make commonplace only that which is good in the way of doors, windows, trims, cupboards, dressers, mouldings and other millwork.

What an economic saving will surely result to all concerned — not losing sight of the betterment in taste on the part of those who do not, or feel that they cannot, employ an architect — when the above, in addition to mechanical features like window boxes, have been standardized. In that case, the country over, a mill could turn out a suitable frame for a given type of construction with choice of moulds, but without a separate detail being made in every architect's office, involving variations and increased cost in every office and mill.

Take as another illustration slate and its uses. According to the U. S. Geological Survey: "It has been suggested that a failure to recognize a certain minimum thickness for slates has been unfavorable to the industry; that some producers are in the habit of splitting their slates too thin, and that the insistence by architects and the general public on thicker slates would result in much less breakage, a higher standard of splitting and sorting slates, and the marketing of a product of higher grade. The minimum suggested is 3/16 of an inch."

This thickness has now been established as standard by the slate industry, and together with a standard 3-inch lap should be insisted upon by architects and owners. As for sizes of slate, one might think that standardization would require the use of one size on any given roof. Quite the contrary, for it is desirable, in view of the varying sizes of rock from which slate is produced, that all available material be consumed and that, therefore, say three sizes of slate be specified for a roof, beginning at the eaves with the largest for about one-third up and so on. This refers to the "commercial" gradings of slate as distinct from the variegated and graduated "architectural" roofs, but indicates that through proper understanding of materials, effects may be obtained which might otherwise not be considered as possible of accomplishment. It is also a fact that when the wishes of architects are more thoroughly appraised, it will be found that materials may be produced for which the æsthetic need has long existed, as in the case, for instance, of the gray slate recourses in Pennsylvania, from which rough and most attractive textures can be obtained and in colors which weather quite different from "black," which name has erroneously been applied to slate roofing from this section.

In the case of slate used for structural purposes requiring a closer and more compact grain than roofing, it has been too frequently the custom to specify the slate to be "free from veins or ribbons," or to say that "a few ribbons not detracting from the appearance will be acceptable." In marble, selections are commonly made to secure the most veinings; but in slate because some rock, only about 20 per cent of the total, however, can be cut from between the "ribbons," or veinings, the custom of specifying "clear" obtained to a considerable extent in the past. This is changing, however, on the same principle that it is sound economics to order sirloin steak for general consumption and tenderloin only on special occasions.

In slate fixture work the machinery and customs of the trade have established standards of finish which should be appropriately specified to avoid unnecessary labor and expense of providing "honed" finish when the standard sand rubbed finish is quite adequate for the purpose intended.

In the case of arrangement, size, thickness and details of construction for shower bath and toilet room enclosures, and other such fixtures where slate or other materials might be used, the standards established by the U. S. Government, through the Board on Uniform Plumbing Specifications, could well be followed to the economic and practical advantage of all parties. Not only could these be referred to in specifications by plate numbers, affording equable conditions in estimating; but if these, supplemented by any necessary data of the structural slate-producing industry could be settled upon as definite standards, it would place architects in the position of contributing to the stabilization of industries and eliminating delays.

With such standards to follow, the quarriers and artisans in the slate industry, likewise in other industries affected, could proceed with production uninterruptedly (instead of laying men off, as sometimes has to be done), so that material accumulating could the more promptly fill orders later.

In the matter of tile work, no one who has not actually visited a tile plant and kilns can begin to realize the enormous amount of hand work, burning, handling and sorting which is bestowed upon the regulation white tile, which when finally in the wall or on the floor has such a machine made and uniform appearance.

One cannot but wonder when viewing the large force of people sorting tile why the slight variations in shade, said by some to be over forty, should not be taken advantage of on the score of appearance alone, instead of causing this labor and expense to be put into a process that custom seems to have established as necessary. Does the end justify the means?

And if it were understood what countless numbers of bases, corners, angles and other parts must be made to accompany each size and shape of tile, the present range of choice in the units comprising a plain white field would be reduced to the rejoicing of all concerned.

And just as it is impossible to produce all perfect specimens and uniformity of size in any product resulting from concentrated heat, so would the situation be immeasurably helped if so-called firsts, standards and seconds in tile were to be appropriately used, assisted by the industry in making possible the proper identification after classification of each grade. Truly it is a waste of energy and money to use the best specimens of kiln production in lining an elevator or other shaft or similar features in a building, or portions where light and sanitation are as well served by using the grades remaining after the selection of those more nearly approaching perfection has been made.

Many specifications, some of them governmental, call for the metal lath on all suspending ceilings and for all cornices, beam work and false work to be "supported and secured in a rigid, thoroughly satisfactory and workmanlike manner to approval." In consideration of this all too frequent practice it is no wonder that equitable conditions do not always prevail even in the estimating, and that controversies arise as to the interpretation of these words and other terms which are used instead of definite instructions or direct reference to a standard to be followed.

For such work there are standards in existence which might be followed for the suspending of ceilings; for instance, one of them is part of the latest Building Code of New York City, which contains as complete and fully detailed requirements for this construction as could be found anywhere.

An association of manufacturers has issued a handbook which also illustrates and describes this form of construction. Local associations of the Building Trades Department of the American Federation of Labor have issued "Uniform Lathing Specifications," in which are incorporated some excellent provisions for such construction. With these and other available standards for this type of construction, so important from the standpoint of durability and safety, why should not every specification make definite reference to one of these as the method to be followed?

EDITORIAL COMMENT

THE field of commercial and industrial building is one of particular interest to architects at this period of reconstruction for several reasons: the resumption of building in this type of structure took place sooner and on a larger scale than in any other; the tremendous demand for increased manufacturing space during the war prompted the invention of simple and quickly erected methods of construction; the rapid progress in manufacturing methods to meet modern conditions of business has brought about greater changes in a similar space of time in the planning and equipment of industrial buildings than in any other type of building, and the successful architectural treatment of many recent factories has made it evident that the opportunities for the development of this type of structure have been largely neglected by architects.

The fact that more industrial buildings have not been designed by architects is largely due to the lack of interest the profession has shown in the work. As a consequence this very fertile field of design has been served by the engineer or contracting engineers, the latter virtually contractors, who have built up in many cases large and powerful organizations from the profits of this type of work exclusively. With the growing importance of industrial building and the increasing numbers of people who gain their livelihood from industrial pursuits, the physical character of these buildings, because of their important influence in the community, is a matter of considerable concern.

Industrialism is one of the dominant notes of our modern life, but so far, architecture, which in past ages recorded in permanent form the dominant characteristics of its time and people, has not exerted any marked influence in the buildings housing our modern industries. The opportunity is no less favorable than those of earlier days. It needs only a realization of its possibilities by architects of to-day to develop application of architectural principles that will be a strong bond in uniting the profession and business interests.

Commercial design is not such a simple matter that it can be handled offhand by any architect, and it cannot be thought that it requires no particular skill. It demands a type of service of a most exacting character, and success cannot be counted upon without an energetic study of the problem in all its phases, and an extensive and sympathetic understanding of manufacturing methods.

Industrial buildings entail primarily practical requirements, — safe, permanent and economical construction, and the efficient installation of mechanical equipment. They are investments which must show earning capacity to be successful. Appearance is incidental from the manufacturing viewpoint; it is, of course, eminently to be desired, but efficiency of the structure cannot be sacrificed for it, nor can it justify any appreciable addition to the cost of the building.

These conditions present an opportunity for service that the architect is especially capable of rendering. He has the type of mind that can grasp the problems connected with planning a building to fit the operations of manufacturing, and through the possession of a better appreciation of structural forms than the engineer, he can provide interest and beauty to the walls and mass of an industrial structure. There are, however, many features of the engineer's handling of the problem that architects may study with profit, for it is in those respects that corporations have been impressed more favorably by engineers than by architects. Good business methods, speed in construction, directness in securing results, are the contributions engineers and contracting concerns have made to industrial building, and it is only by a combination of these qualities with architectural planning and design that architects can be successful in industrial work.

During the war a new conception of the responsibility of manufacturers to their employees took definite form, and the general acceptance of the principle, that good working conditions, well lighted buildings, opportunities for social activities and proper housing are essential to satisfactory labor conditions, holds great promise for the future of American industry. Good architecture in the buildings which house so vast a proportion of our population during working hours will likewise exert an influence of great benefit to industry and its workers alike. It must be kept constantly in mind that all industrial work is, however, of a very practical nature, requiring that utility be considered of prime importance and that beauty must come from the structural elements. Good mass, proper disposition of structural members, pleasing skyline and due regard for color and texture of materials will produce interesting buildings at no greater cost than for the usual utilitarian design.

The only way of stopping the encroachment of contracting and other interests is to serve the owner better and more efficiently than do the contractors. If architects can point to buildings better planned and constructed, more economically built and of better architecture than those now produced by others, and carry on the business aspect of the work expeditiously and without friction, they will quickly take the lead.

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CONTENTS for AUGUST 1919

PLATE ILLUSTRATIONS

LETTERPRESS

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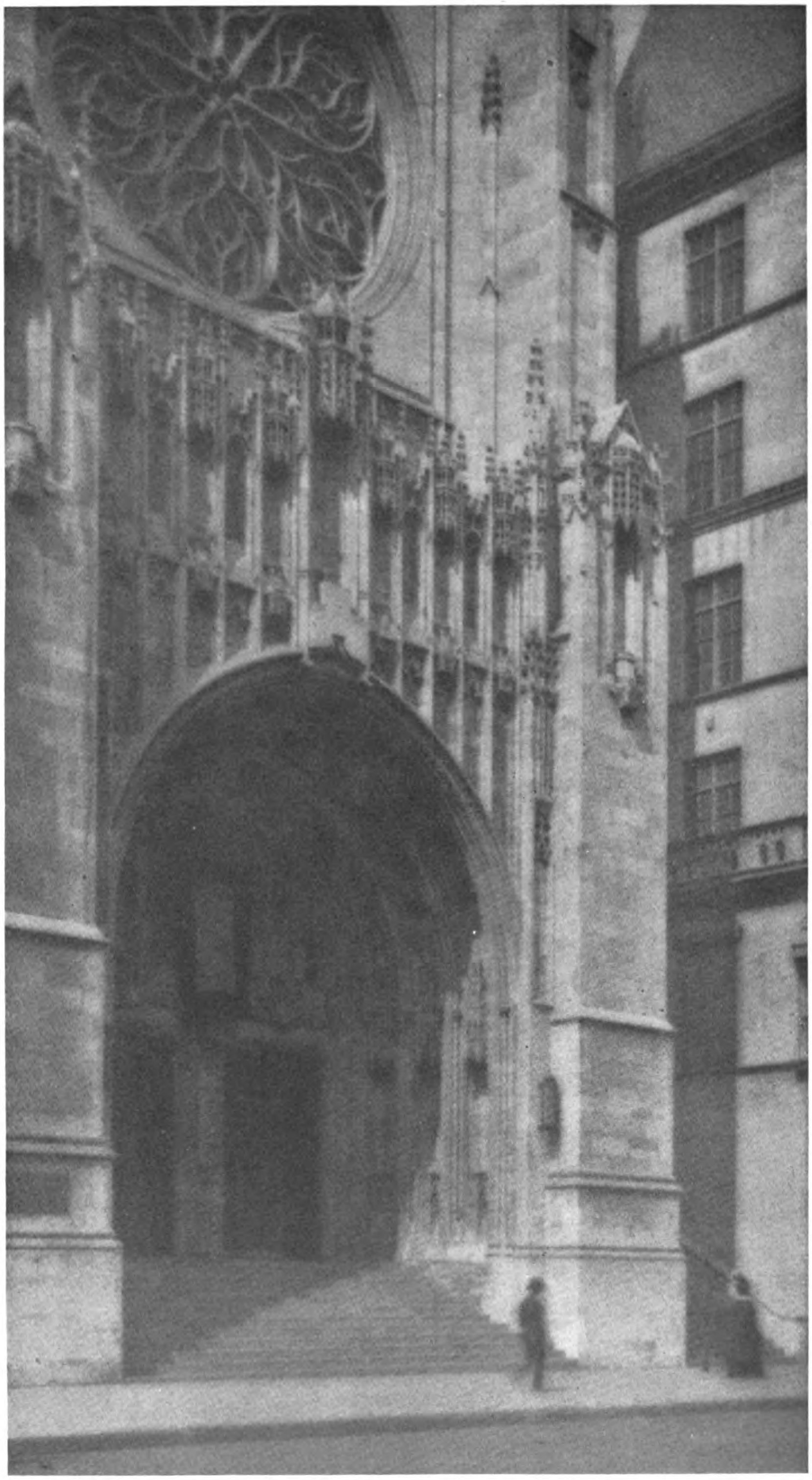


ENTRANCE, ST. THOMAS' CHURCH, NEW YORK CITY
CRAM, GOODHUE & FERGUSON, ARCHITECTS

Photograph by John Wallace Gillies

THE ARCHITECTURAL FORUM
FOR QUARTER CENTURY THE BRICKBUILDER
VOLUME XXXI AUGUST 1919 NUMBER 2

Architecture of the Dalmatian Coast

PART II

By HAROLD DONALDSON EBERLEIN

SUCH freedom of composition and such license in grafting contemporary modes upon earlier bodies, as we noted in the reference to the front of the Rectors' Palace at Ragusa (mentioned in the preceding paper), we find even more strikingly exemplified upon the façade of the near-by Dogana.* The ground floor and first story of this very composite structure belong to the fore part of the fourteenth century or, in all probability, to a somewhat earlier date, judging from the evidence of the double-tiered arcade surrounding the cortile; the Venetian Gothic *front* of the first story, with its two ogee headed windows flanking a traceried square headed window, all of which from their appearance might have been transported bodily from the Canal Grande, dates from the fifteenth century; the loggia of the ground floor and the second story, with its square headed windows, its pilastered and pedimented niche, and the extraordinary crocket-like pinnacles arrayed upon the eaves proclaim Renaissance parentage of the early sixteenth century.

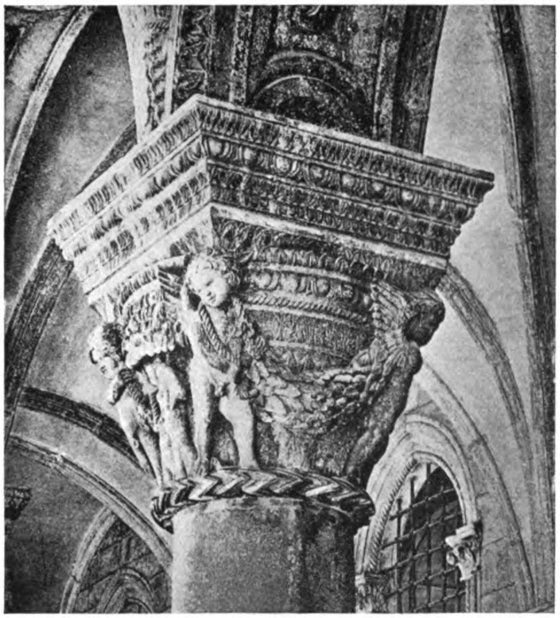
Whatever one may think of the *legitimacy* of such treatment, its *interest* is undeniable. To mention, for the sake of comparison, only one or two similar instances of architectural medley, a number of the French chateaux show the investiture of a palpably Gothic body with Renaissance decoration; likewise, plenty of cathedrals in England and France exhibit the work of successive ages, either by way of completion or repair or else as construction *de novo*, joined on to or incorporated in an earlier fabric. One can almost always say of such cases, without much hesitation, that here the work of so-and-so ended and the work of so-and-so began. But in many of the Dalmatian buildings we discover a singularly fluid blending of the divers elements that endues each completed structure with a perplexing homogeneity; that baffles any attempt at cursory analysis; and yields up its secrets only under the closest scrutiny.

The same felicitous outcome of commingled modes may be found in the Romanesque cathedral of Traù,* begun in the thirteenth century, where the massive piers of the nave and the stilted semicircular arches, almost Roman in their severe and ponderous solidity, comport not ill with the pointed arches and quadripartite rib-vaulting above; we find it again in the cortile of the Palazzo Comunale of Traù, which reminds one so forcibly of the Bargello in Florence. But why multiply instances? The illustrations speak eloquently for themselves. While the inventive genius of Dalmatian-born architects often made itself felt in other parts of Italy outside their own native cities, it is plain to be seen that the influence of Venice was one of the potent forces in the development of Dalmatian architecture. But far more potent than the visible influence of tangible forms and precedents was the influence of the Venetian *spirit*.

The architecture of "La Serenissima" displayed a peculiarly agreeable fresh freedom and unfettered sweep because the men who moulded it dared largely. They were of a venturesome and experimental turn of mind, and not unduly shackled by precedent. Not all of their experiments, by any means, were wholly successful, but many of them were, and the daring of these men went far towards creating the charm of freshness and vitality apparent in their work. The Italians as a race have never been afraid of experimentation in art, and though vigorous champions of precedent were never lacking, there were always plenty of daring spirits ready to blaze new trails. This is one explanation of Italian exuberance of form and fecundity of invention. But, at the same time, we must remember that the insurgents who blazed new trails were not ignorant men unacquainted with precedent, who fell into the ranks of revolution and used innovation as a cover for incompetence. They were bold with the confidence of knowledge and conviction that the novelty they championed would effect improvement and had at least some sound logical basis.

When we come to examine the subject of *detail* in Dalmatian architecture, we find a field of no less fascinating interest. The same ready flexi-

*Illustrated in the first article, July, 1919.



Detail of Capital, Palazzo del Rettore

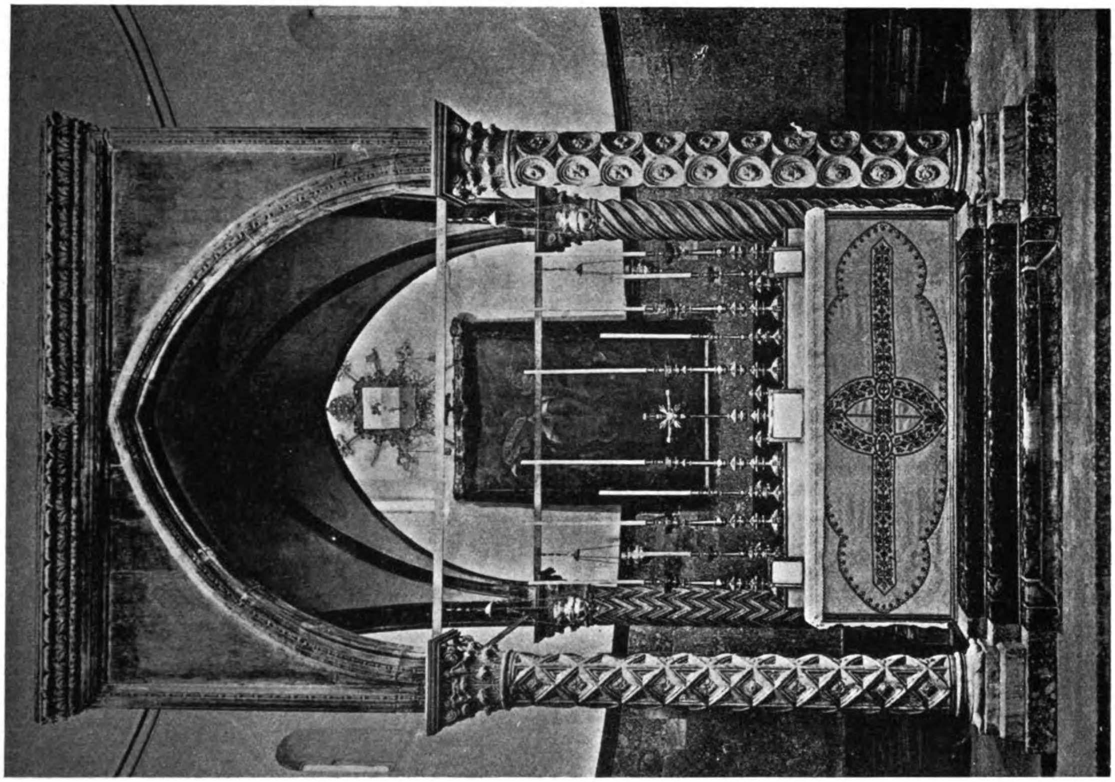
As the original five columns and two terminal half-columns of Curzolan stone were to be used, and also some of the original capitals, the hiatus between the old capitals and the spring of the new arches was adroitly bridged by superposing a *new* abacus upon the *old* abacus. The upper illustration shows one of the new capitals with winged amorini and garlands, in itself an agreeable and diverting conceit of unmistakably Renaissance inspiration, and a heavy abacus with four elaborately sculptured courses of elastic enrichment.

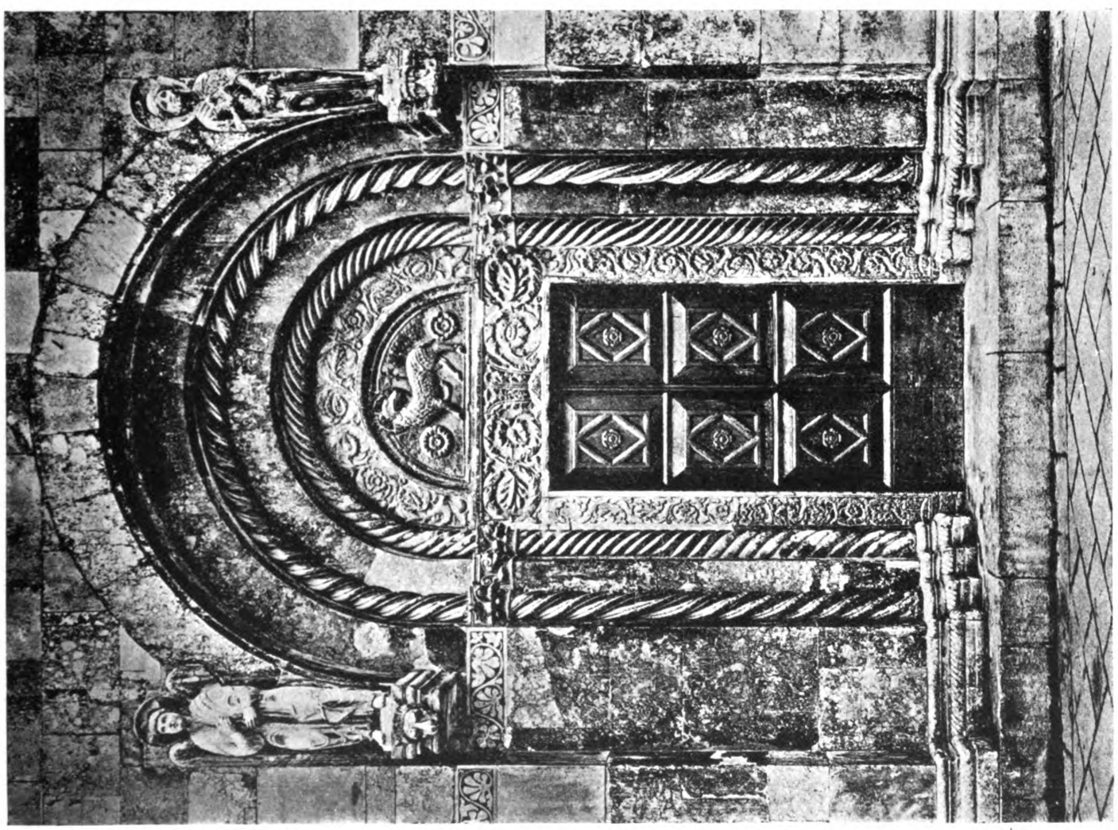
Of the three foliated capitals visible in the lower illustration, two of them, "veritable gems of Gothic sculpture," belong to the earlier date, and here may be seen the operation of Orsini's piecing-out process. The capital nearest, at the left, and the abacus belong together, being both of the newer design. The second capital, a part of Onofrio's work, has its original sturdy fluted abacus, and upon this is set Orsini's new four-coursed abacus with classic enrichment, uniform with that in the upper illustration. The farthest capital at the

bility and rich invention are manifest in the choice and application of *motifs*. The doorway to the garden of the Palazzo Nimira — once the home of that extraordinary man, Marc' Antonio de Dominis, sometime Archbishop of Spalato, Dean of Windsor, and the first to propound the true theory of the solar spectrum and the rainbow — affords a delightful fragment of Venetian Gothic detail, quite characteristic of Arbesan domestic architecture, unalloyed by extraneous elements.

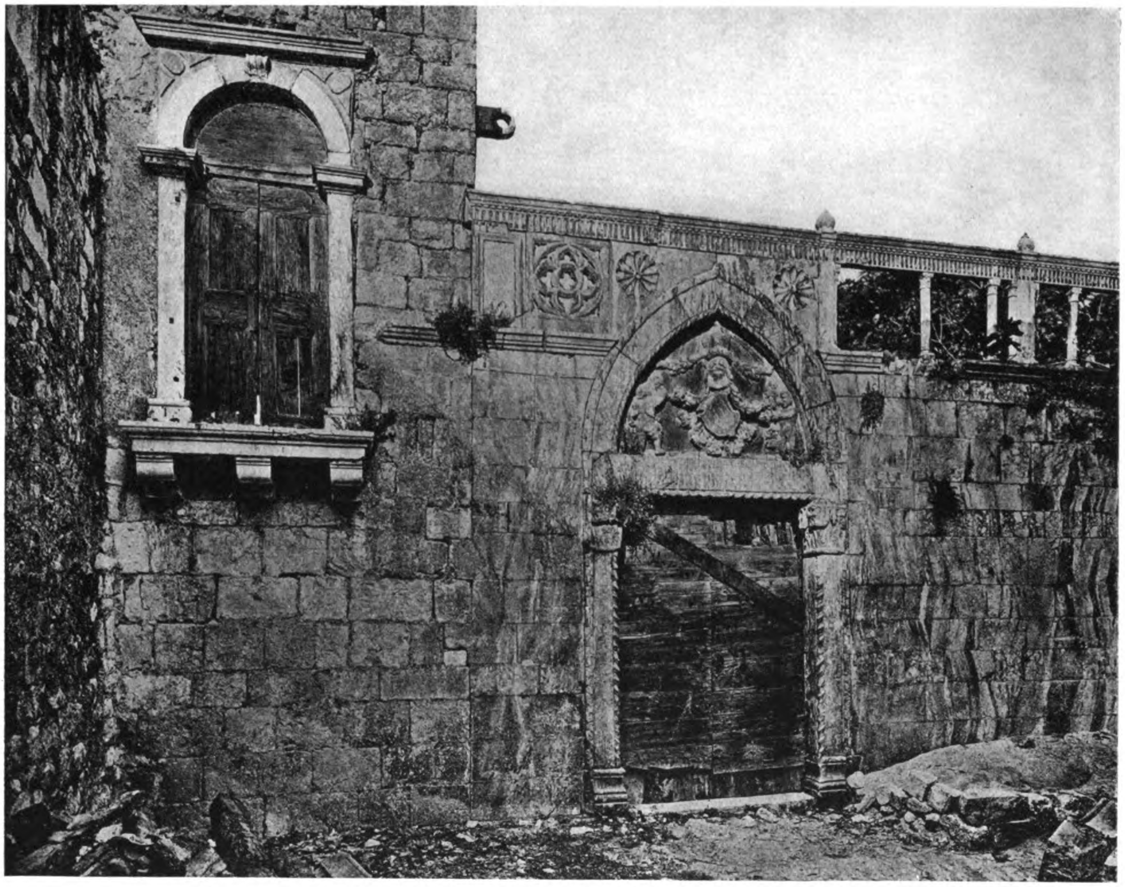
Reverting once more to the Rectors' Palace at Ragusa, one may see a most ingenious accommodation of detail to the exigencies of rebuilding and alteration. When Georgio Orsini and Michelozzo, after the powder explosion, took down the central portion of the façade and replaced Onofrio di La Cava's pointed arches in the loggia by round arches, it became necessary to raise the spring of the new arches to adjust them to the height of the vaulting constructed for the earlier pointed arcading.

Loggia of the Palazzo del Rettore, Ragusa

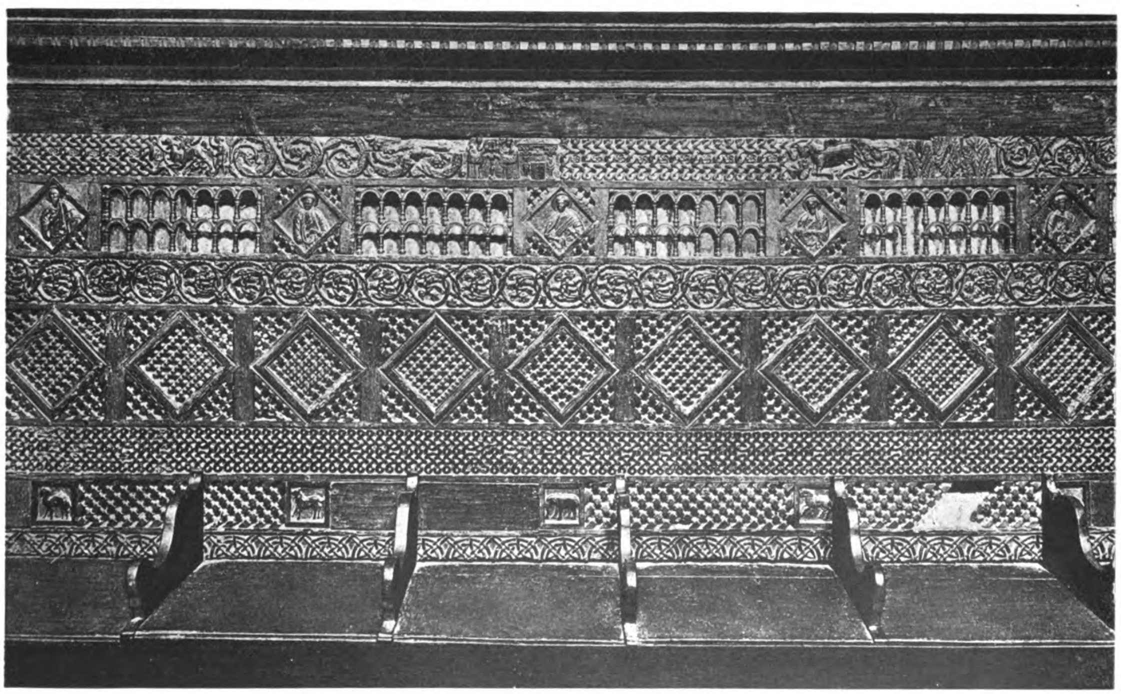




TRANSEPT DOORWAY AND HIGH ALTAR OF CATHEDRAL AT ZARA, DALMATIA



GATEWAY OF A GARDEN, ARBE



CHOIR STALLS IN CATHEDRAL, SPALATO


Choir Stalls in Cathedral, Arbe

end of the loggia, also of the earlier date, has a shallow abacus carved with a band of running leaves which, unfortunately, does not appear clearly, but the superposition of the second abacus is plainly discernible. The imbricated bands of oak leaves fastened with ribbons, and all the other moulded and carved decoration pertaining to the arches, obviously belong to Orsini's design. The mezzanine windows, which may be descried in both illustrations, the ground-floor windows, the carved consoles that carry the vaulting, and the pointed doorway with its carved capitals, stilted imposts and richly wrought mouldings, are all parts of the earlier work.

Considered from an archæological point of view, the combinations and dovetailing of structure and detail in the Rectors' Palace constitute a master piece of ingenuity. Considered on architectural grounds, they form a lasting tribute to the judgment, the perception and the broad command of style that enabled Michelozzo and Orsini to transform the very distinctive work of a former master and harmoniously blend with it their own preferences to create an *ensemble* of consummate beauty.

The cipolin marble columns of the baldacchino above the high altar in the duomo of Zara, with their diapered sunk-work and the rich Romanesque embellishment of the transept doorway in the same church, convey a slight idea of the profusely elaborate detail which the thirteenth and fourteenth century Dalmatians, with truly Italian fecundity of imagination, lavished upon their buildings. The carving of the jambs, lintel and tympanum is distinctly reminiscent of Byzantine ancestry, and one of the refreshing "irregularities" of detail, so characteristic of Dalmatian work, when judged by standards elsewhere prevalent, appears in the horizontal band of incised palmate scroll carving, the incisions filled in with black cement.

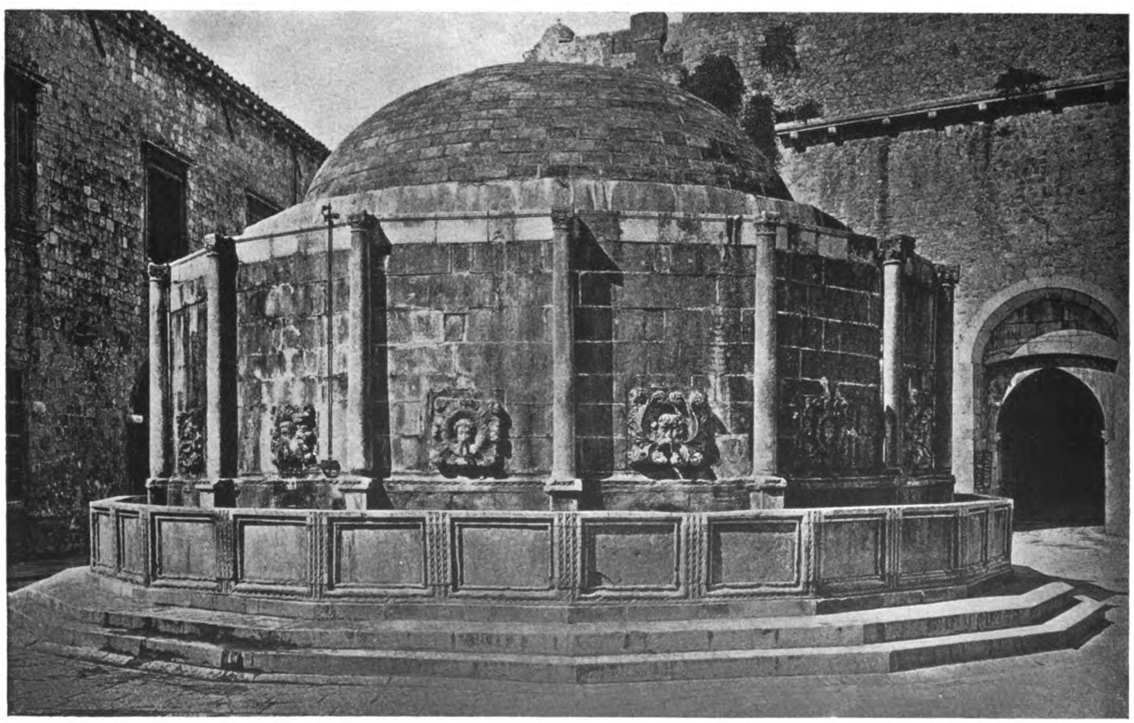
A comparable bit of whimsicality in the handling of detail is to be found in the gable cornice of the façade of the duomo at Curzola, where the unquestionably Gothic trefoil tracery with interlaced monsters is combined with a frill of little arches and Renaissance scallop shells, topped in turn by a Gothic running leaf *motif*. Furthermore, midway the gable the treatment perceptibly changes and different forms appear, although the richness of effect is not diminished and interest is rather intensified than otherwise. This frequent recurrence of whimsicalities in detail and, despite seeming incongruities, the felicity of the outcome, impart to Dalmatian architecture not a little of its naïve charm. The successful exercise of such elasticity of interpretation offers a liberal lesson in permissible decorative freedom. However we classify the outward forms employed, the practice is medieval in spirit and savours of the time when work contained something of the leaven of play, and caprice meant not objectionable eccentricity, but bore witness to a legitimate and pleasure-giving individuality in his work on the

Small Fountain at Ragusa

part of the craftsman. A profitable suggestion therefrom we might draw now when the mania for tight and stupid standardization bids fair to crush all spontaneity and enlivening playfulness, and when the obsession for abject uniformity, even in ornament, reminds us that it has been truly said that the human countenance, if both halves were precisely alike with the center of the nose as a dividing line, would have an expression of complete imbecility.

The choir stalls of the duomo at Spalato exhibit not only a reasonable diversity and engaging asymmetry of decoration, but also testify to the Dalmatians' catholic inclusion and cultivation of decorative influences derived from widely divers sources. Thanks to the all-embracing ramifications of Venetian commerce, Coptic influence played its part in the Renaissance development of this Venetian city, just as it did in the other parts of the Venetian dominions, and left its trace in the reticulated frets or lattices of the stall backs.

The Dalmatians well knew the value of free undecorated surfaces; they understood how much enrichment was enhanced by concentration, and when they concentrated they were often prodigally lavish. But that they also were capable of the most elegant reticence may be seen from the fountain of Onofrio at Ragusa — a work whose just proportions, restraint and distinction of design render it a fit subject for emulation.



Fountain of Onofrio, Ragusa

The Dominion of Canada Housing Loan

By S. T. J. FRYER, ARCHITECT
Deputy Vocational Officer for Ontario, Department of Soldiers' Civil Re-establishment

IN December of last year a committee, known as the Housing Committee, was formed by the Cabinet of the Government of Canada to investigate the need for additional housing accommodation throughout the Dominion, to take up with the Provincial Governments any housing programs they had in view, and to report on general principles to be followed to secure the results aimed at by the Government Order-in-Council P. C. 2997, passed on Dec. 3, 1918. This Order-in-Council set aside as a loan to the Provinces the sum of $25,000,000 for the purpose of promoting the erection of dwellings to relieve congestion of population, advances from the appropriation being in proportion to the population in the several provinces.

A report of this Housing Committee as submitted by its Chairman, the Hon. N. W. Rowell, states in detail that:

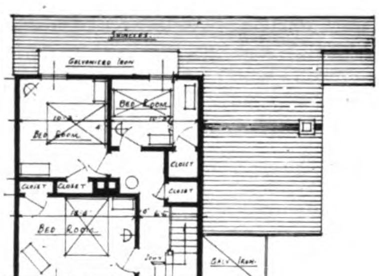
(1) The object of the Government in making provision for a loan of $25,000,000 at 5 per cent to the Provincial Governments for housing purposes is:

(*a*) to promote the erection of dwelling houses of modern character to relieve congestion of population in cities and towns;

(*b*) to put within the reach of all workingmen, particularly returned soldiers, the opportunity of acquiring their own homes at actual cost of the building and land acquired at a fair value, thus eliminating the profits of the speculator;

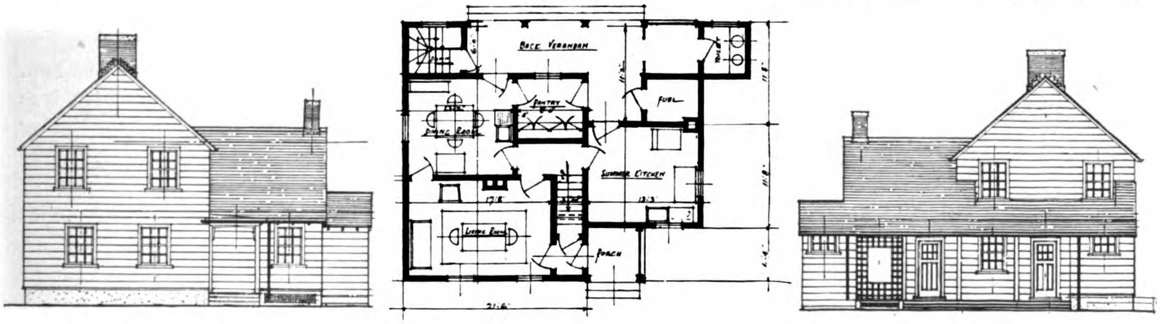
(*c*) to contribute to the general health and well-being of the community by encouraging suitable town planning and housing schemes.

It should be mentioned, too, that other objects the Government had in view in making this loan were the stimulation of building operations during the transition period from war to peace and the providing of employment for returned soldiers.



For these last two reasons, particularly, it is hoped the Provinces will take advantage of this loan as early in the year as possible. The special mention of the returned soldier in clause (*b*) emphasizes an all too apparent fact that the problem of the returned soldier is a big and complex one: indeed, one that affects every phase of national and economic life in Canada. Until industrial conditions are fully settled on a peace-time production basis, the providing of employment for the thousands of returning troops is a serious problem, more readily appreciated when it is remembered that some 550,000 soldier citizens must be absorbed into the civil and industrial life of a country whose total population is less than 8,000,000.

During the four years of war very little building of workmen's dwellings and houses of moderate cost was carried out. With the returning of thousands of troops and their dependents and the natural increase of population, the housing problem has reached an acute stage and one that must be remedied immediately if serious discontent in the community at large is to be avoided. Many, because there is no accommodation reasonably close, have to live at long distances from their work, and even where it is possible to obtain houses the rentals are beyond the means of the average workingman — it has been stated that these are causes of a good deal of the present labor unrest. However, whether it is so or not, there is no doubt that the housing of the working classes is a matter for very serious consideration; it is of national importance, affecting vitally, health, morals and general well-being of the entire community. In this respect the report of the Housing Committee, says: "The provision of



Floor Plans and Front and Rear Elevations of Cottage for Farm Hands houses, so far as it may be regarded as a public duty, is a matter which comes more properly within the jurisdiction of the provinces and municipalities, and in ordinary circumstances, the question of what regulations should be imposed and what policy should be adopted, in regard to the administration of housing schemes, are matters for these Governments. As the Dominion Government will lend the money on the general security of each province, it is not necessary to impose financial regulations as to the means which should be employed to safeguard the loans."

Having regard, however, to the responsibilities incurred by the Dominion Government in providing money, and to the object for which the money is proposed to be lent, loans will be made to the Provincial Governments on the following basis:

(1) Each province shall prepare and submit to the Dominion Government for approval a general housing scheme, setting out the standard conditions to be complied with in connection with local housing schemes, such as the grouping of houses, provision of open spaces, sizes and heights of houses and rooms, provision of light and ventilation, heating, lighting, character of materials, etc., which it is proposed should be enforced as the minimum requirements for health, comfort and convenience.

(2) The object of the Dominion Government being to facilitate the erection of dwellings at a moderate cost suitable for workingmen, particularly returned soldiers, the following has been fixed as a maximum which may be loaned per dwelling, having regard to conditions existing in the various provinces.

(*a*) Detached or semi-detached dwellings with walls constructed wholly or partly of frame, stucco on frame, brick veneer, inclusive of the capital value of the site and necessary local improvements;

With 4 or 5 rooms exclusive of bathroom and summer kitchen, $3,000.

With 6 or 7 rooms exclusive of bathroom and summer kitchen, $3,500.

(*b*) Detached, semi-detached groups of three or more or duplex (cottage flat) dwellings with walls of brick, hollow-tile, stone or concrete and roofing of fire-proof materials, inclusive of the capital value of the site and necessary local improvements;

With 4 or 5 rooms exclusive of bathroom and summer kitchen, $4,000.

With 6 or 7 rooms exclusive of bathroom and summer kitchen, $4,500.

(3) Ownership of land — public money may be advanced for building houses on sites owned by:

(*a*) The Provincial Government or Municipality.

(*b*) Housing Societies or Companies comprising groups of citizens associated to promote good housing, supplied with proper improvements, such societies or companies to have not more than a statutory limitation of dividends payable on stock of 6 per cent.

(*c*) Owners of lots for the purpose of erecting houses for their own occupation.

(4) Terms of years for repayment of the loan: The Federal Loan will be repayable by the Province over a period of twenty years. Provided that in order to encourage the erection of more durable buildings, and to bring the financial terms within the reach of a larger number of workers, the period of twenty years may be extended to thirty years in respect of any portion of the loan which the Provincial Government may decide to relend for thirty years for such purposes as purchasing land or erecting buildings under the above class. Repayments by the Provinces on account of Federal Loans may be made quarterly if so desired, or otherwise as may be agreed upon.

Definite plans are in process of formation by most of the Provinces with the object of taking advantage of the Dominion Housing Loan. Ontario is perhaps more advanced than any of them, having already passed a Provincial Housing Act as the result of careful study and investigation of this problem since 1916. It is one of the most advanced housing measures provided by any government and was passed irrespective of the Dominion loan.

Under the Ontario Housing Act the Lieutenant-Governor in Council may, as considered necessary, borrow money other than from the Dominion Government.

The Province may lend to a municipal corporation the full cost of the land acquired and the houses erected by its commission and all money required on account of loans to housing companies and to private persons.

Municipal councils shall appoint a commission to be known as the Housing Commission of the Municipality, for the purpose of carrying out the provisions of the Act.

This commission may erect on land acquired by it, within the limits of the municipality, and any company may erect on land acquired by it in any municipality to which this Act applies, dwelling houses of a class suitable for the accommodation of persons who have been on active service during the present war with the naval or military forces of Great Britain or her allies and who are residents of Ontario and workingmen of modest means.

The cost of any house shall not exceed $2,500, and the cost of the house and land on which it is erected shall not exceed $3,000. In particular cases or in a particular municipality, with the approval of the director, the cost of a house may be $3,000, and the cost of the house and land on which it is erected may be $3,600.

A Commission may make loans for the purposes of the Act to:

(*a*) A company for not more than 85 per cent of the actual value of the land and house;

(*b*) A private person who desires to erect a house for his own occupation on land owned by him, to the full cost of the house, provided the house is erected according to the provisions of the Act;

(*c*) A private person who desires to erect a house on land owned by the Commission, if he pays in cash the value of the land, or 10 per cent of the total cost.

(*d*) A person who has been on active service during the present war, if he resides in the municipality and did so reside at the time of his enlistment, to the full cost of the house. The same privilege is extended to the widow of a soldier and to his father or widowed mother.

A farmer desiring to erect a house on his farm for his married son or a married man employed by him may obtain a loan to the full value of the house on the recommendation of the director.

A man who buys a house from the Municipal Commission or from a housing company may secure it by paying $300 cash, and the balance in monthly payments of about $18 for twenty years. He may pay the whole or any part of the purchase money at any time during the term of the agreement. The agreement may be canceled on default being made in any payment if the default continues for three months; but the purchaser has the right before default, with the consent of the Commission, to assign the agreement. The purchaser covenants to keep the house in repair and to pay taxes and insurance. The man unable to pay $300 in cash may deposit with the Commission security to that amount, or his employer may guarantee the amount from his salary by special agreement, or some citizen may sign a bond on his behalf.

A man owning a lot may secure the money required to erect a house thereon from the Commission at 5 per cent interest, subject to the provisions contained in the Act.

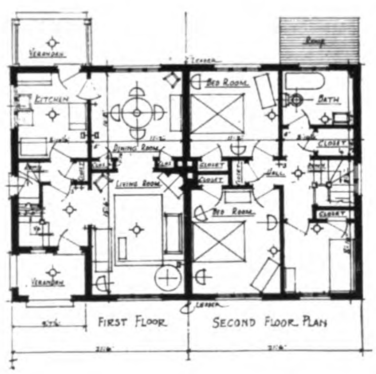
Approved plans at small cost may be obtained at the office of the Commission. Forms of agrement will probably be free of charge, and the searching of the title may be made at a nominal charge. The usual costly and irksome procedure in securing a house will be reduced to a minimum.

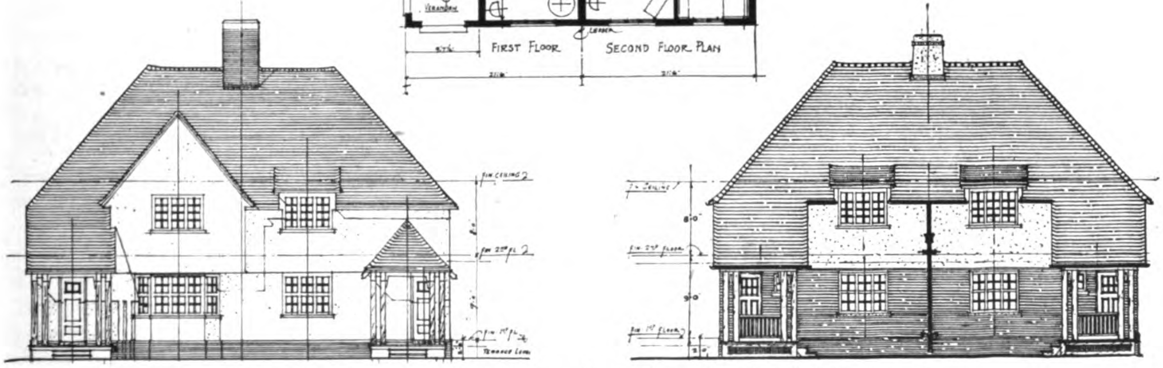
Provision is also made whereby municipalities may grant special taxation as follows:

Houses assessed at $2,000 and less to be assessed at 50 per cent of their assessment; houses assessed from $2,500 to $3,000, at 70 per cent of their assessment; houses assessed from $3,000 to $3,500, at 80 per cent of their assessment; and houses assessed from $3,500 to $4,000, at 90 per cent of their assessment. No reduction on houses assessed at $4,000 and over that amount.

The various municipalities are forming housing commissions; the Toronto Commission, for instance, has already recommended to the city council that municipal land shall be sold at cost for the purpose of erecting moderate priced houses, these houses to be built immediately by the Commission and sold to the private citizen on a twenty-year instalment plan. War veterans and other citizens, in increasing numbers, are availing themselves of the loan for the purpose of building houses irrespective of those actually being built by the municipal and other commissions. The main effort now being the erection of five or six room houses as "The need is for houses and more houses — now, this year," to quote the editorial comment of a Toronto morning paper in emphasizing the present acute shortage, and this applies not only to Toronto but to smaller municipalities throughout the Dominion.

The construction of some five hundred houses in Ontario has recently been started under the Government Loan, and it is expected that before the close of the summer an additional thousand will be under erection. It is estimated that some $10,500,000 will be loaned to municipalities this year, $5,000,000 of which will be actually expended before the close of the year.





Floor Plan and Alternate Elevations for Six-Room, Semi-Detached House

Progress in Toronto has not been as rapid as might be desired, owing to difficulty in procuring suitable sites, although the Province of Ontario as a whole is further advanced in its housing work than others.*

The loan should help materially the growth of some of the smaller townships and also affect the "back to the land" movement. Many of the returned soldiers are somewhat averse to turning to farming, one of the reasons being that they cannot get decent housing accommodations for their families. They were satisfied more or less before the war, but the horizon of their lives has been broadened since going overseas and standards which seemed all right to them before are not good enough now. The farmer, in other words, will have to supply good housing accommodations if he is to obtain good help.

General Principles and Standards Recommended for Consideration in Provincial Schemes.

Subject to the four requirements set forth in preceding paragraphs, the Federal Government does not impose any conditions in regard to the nature of the scheme or the type and character of the dwellings to be erected, but strongly recommends that in framing schemes, consideration be given to the following matters:

(1) Acquisition of sites, etc.: The success of the housing movement depends upon the acquirement of suitable land at its fair value and at a cost which workingmen can afford to pay. It is essential, therefore, that statutory provision shall be made by the Provinces for a cheap and speedy method of compulsory taking of the land required for housing purposes. To facilitate proper planning and to secure economy in connection with housing schemes comparatively large sites should as a rule be chosen so as to permit of comprehensive treatment. Such sites should be conveniently accessible to places of employment, means of transportation, water supply, sewers and other public utilities.

(2) Planning of sites, etc.: Where housing schemes are proposed, the sites as well as the buildings should be properly planned so as to secure sanitary conditions, wholesome environment and the utmost economy. The land should be sold under building restrictions that will ensure its use for residential purposes only, and should it thereafter be desired to utilize any of the lots so sold for stores or other business purposes, the increased value for such business sites should be made available for public purposes in connection with each scheme.

(3) Loans for separate or individuals' houses: In those cases where loans are given to workingmen owning lots, care should be taken to ensure that the site proposed to be built upon occupies a healthy and convenient situation, and that suitable provision can be made in such situation for the erection of a sanitary type of dwelling with adequate provision for open spaces.

(4) Limit of income of persons to be provided with dwellings: In order to ensure that the money shall be loaned to those who most need it, no person in receipt of an income exceeding $3,000 per annum should be eligible as a purchaser or tenant of a house erected with the aid of Government funds in any schemes carried out by Provincial Governments, Municipalities, Housing Associations or owners of lots.

(5) Construction of local improvements to precede occupation of dwellings: In cities and towns, local improvements, comprising necessary sewers, pavements, sidewalks, water-mains and lighting services, should be constructed as far as practicable prior to or simultaneously with the building of houses, and no house should be permitted to be occupied until provided with proper means of drainage and means of sewage disposal and an adequate supply of pure water.

(6) Reservation of sites for playgrounds, etc.: In all new housing schemes, provision should be made for reserving at least one-tenth of the total area of land being developed for building purposes, as open space for playgrounds, etc., and also for reserving suitable sites for such institutes, public buildings and stores as may be required.

(7) Loans to be used for purchasing and developing land and erecting buildings: Advances should be made for: (*a*) The purchase of suitable land for housing schemes; (*b*) the construction of the necessary local improvements on and in connection with the development of such land as part of a housing scheme; (*c*) the erection of sanitary and economical dwellings.

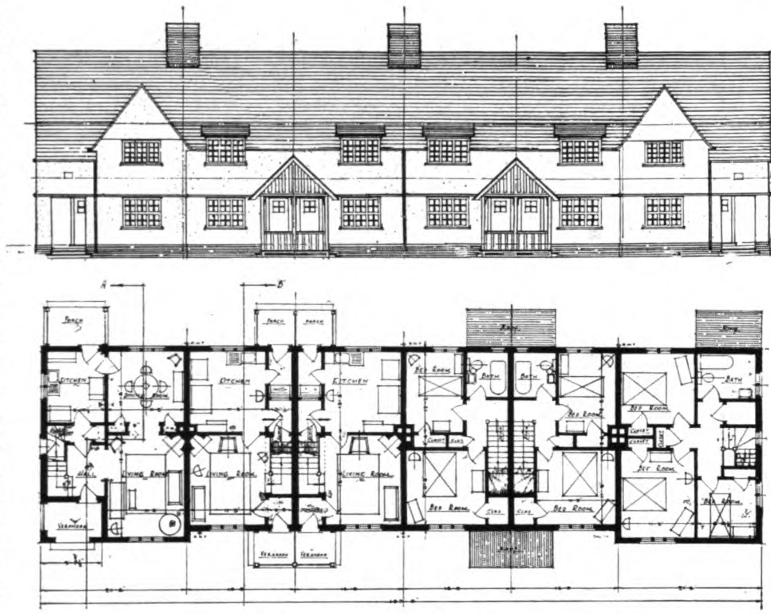
(8) Proportion of cost of land to dwelling: The proportion of the money lent in respect of the capital value of the bare land (*i.e.*, irrespective of all local improvements or other public services provided to adapt the site for building purposes) should not as a rule exceed one-tenth, and in no case should exceed one-eighth of the above gross cost of the dwelling. In computing the value of the bare land under this clause, the cost of such improvements as have been made should be deducted. For instance, the sum of $3,000 might be lent in the following proportions:

Cost of dwelling	$2,400
Cost of land	300
Capital cost of local improvements	300
	$3,000

If the value of the bare land is estimated to exceed one-tenth ($300 in this case), the extra cost should be met by the owner.

(9) Recommendations as to minimum standards in regard to sites: (*a*) Streets; all dwellings erected in cities and towns should face on streets so constructed as to provide dry and convenient means of access to such dwellings, or on approved courts opening on to such streets and in no case on lanes or alleys. (*b*)

* The designs illustrated herewith are selected from a number suggested by the Ontario Housing Committee. They were prepared under the supervision of the Committee by H. R. Dowswell, A.R.I.B.A., co-operating with the firm of Banigan, Mathers & Thompson. In the preparation of the housing standards the Committee was assisted by a committee of the Ontario Association of Architects.



Floor Plan and Elevation for Six-Family Group House

Sanitary provisions: In cities and large towns, sewers and water-mains should be provided to enable connections to be made as buildings are erected; and in small towns, villages and rural areas where no sewers exist, there should be proper sanitary provision for sewage disposal, to the satisfaction of the Board of Health or Sanitary Engineer of the Province. (*c*) Water supply: All dwellings should have connected to them an adequate supply of pure water before occupation is permitted for purposes of habitation. (*d*) Drainage on sites: No building should be erected on a site which shall not have been drained of surface water, or which shall have been filled up with any material impregnated with fæcal matter, or with animal or vegetable matter, unless and until such matter shall have been removed, and the ground surface under such building shall be properly asphalted or covered with concrete or other dry and hard material to a thickness of 6 inches at least.

(10) Recommendations as to minimum standards in houses: (*a*) Space around dwellings: Provision should be made for securing ample garden and air space surrounding the dwellings to be erected. In cities and towns each dwelling should occupy a lot comprising at least 1,800 square feet, and, in villages and rural areas, at least 4,500 square feet. Not less than 50 feet of clear open space in depth should be provided at the rear of dwellings and the buildings should not occupy more than 50 per cent of the lot. Spaces between the gable or end walls of adjacent buildings should be provided as follows:

Between all buildings (single or in pairs), the walls of which are built entirely of wood or partly of wood and partly covered with stucco or brick veneer, or between all buildings which are more than two rooms deep and have side windows — 16 feet.

Between buildings, the walls of which are built of brick, brick veneer, stucco, hollow-tile, stone or concrete, with fireproof roofing material, which do not exceed two rooms deep — 9 feet.

Dwellings erected of stucco or frame or brick veneer must be either detached or semi-detached. (See clause (2), maximum cost of dwellings, etc.). In all cases hollow walls should be provided.

(*b*) Sanitary conditions and ventilation: Baths and water closets should be provided in each dwelling, preferably on the bedroom floor. Baths and sinks should have hot and cold water. Water-closets should never open from a room and should have a window opening to the outer air. Basements should not be used for habitation. Every habitable room should have at least one window opening to the outer air. Each room should have a window space of at least one-tenth of the floor area, and cross ventilation should be provided where practicable.

(*c*) Height and sizes of rooms: Rooms should not be less than 8 feet in height on the first floor and 8 feet over two-thirds of the floor area in bedrooms. One living room should not be less than 144 square feet, and two of the bedrooms not less than 130 and 100 square feet, respectively.

(*d*) Height and type of buildings and character of construction: Buildings should not exceed two and one-half stories in height, except in the case of cottage flats which might be permitted to be three stories if constructed of fireproof materials. Houses should have 4, 5 or 6 rooms, and in exceptional cases for large families 7 rooms, excluding bathroom.

(*e*) Conversion of dwellings into stores, etc.: Provision should be made to prevent dwellings being converted into stores or used for any purpose other than a dwelling, except with the authority of the Provincial Government or other suitable authority, and only then on receipt of a petition of two-thirds of the owners and occupiers in the street in which the dwelling is situated. Brick, hollow-tile, stone or concrete should be used as far as practicable, preference being given to those materials that are produced locally.

(11) Legal and other costs: A special scale of legal costs should be fixed so as to reduce the expense of the transfer of land and houses. It would reduce architectural expenses if the Provincial Governments issued a series of model designs of suitable dwellings, with detailed drawings, quantities and estimates.

(12) Compliance with general scheme, etc.: All buildings should be erected in accordance with a general provincial scheme, and in compliance with standard forms of specification and contract, previously approved by the Provincial Government.

Planning Kitchens for Small Houses

By OSCAR V. VATET, ARCHITECT

THERE is no doubt that the housekeeping scheme of our beloved foremothers was a vast improvement over the naïve methods of the original inhabitants. The earlier American was content to crush maize in a stone mortar, carry a gourd of water from the nearest spring, and boil the mush over the same open wood fire which baked the cakes and roasted the venison. In winter these processes, transferred to the interior of the tepee, were attended with a variety of minor inconveniences doubtless accepted philosophically as being of a disciplinary nature and consequently beneficial to the tribe. So far as can be deduced, the Indians made little advance in housekeeping from the date of their Alaskan immigration until the foundation of the Carlisle School.

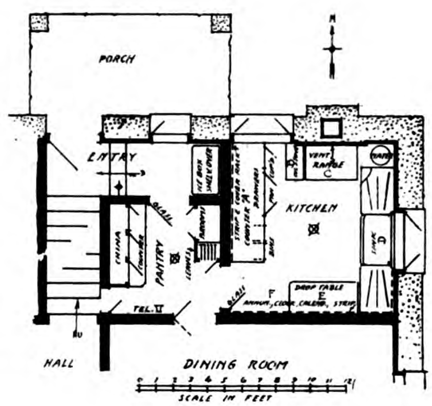
But the beautiful simplicity of Indian methods was not appreciated by our bustling Pilgrim mother. Such ungodly shiftlessness was entirely incomprehensible and quite unsuited to the substantial form of home from which she had been taken. Her cooking was done indoors as soon as ax could fell and hands stack the logs to make cabin and chimney, for she throve in a less smoky atmosphere than that accepted in the best aboriginal practice. She instituted the water barrel and the soap kettle. Her boiling was done on a crane and her roasting on a spit. Bread and cake were baked in an oven tucked into the back of the fireplace. She was occupied from sun-up to sun-down, and her duties were so compelling that she practically lived in the kitchen and as a consequence the kitchen was the living room for the whole family. And what a picture it presented; what richness of ceiling treatment resulted from strings of glossy scarlet and emerald peppers, golden squash and brown gourds, hams, bacon and aromatic yarbs hanging overhead; the big wheel whirling, the roast sizzling in the great, glowing fireplace, and a pile of brown, crusty loaves newly drawn from the oven!

The household function of manufacture was so essentially the great concern for the women that it established the entire program for lives in which "society" occupied a very small place. An uncomplex social schedule permitted great simplicity in the arrangement of the house; the center of the plan was the kitchen and all other portions were subordinate to it.

So it was in the North. In the South a variation in factors wrought somewhat different results. Slave labor and the milder climate resulted in the detachment of various manufacturing departments from one another and from the main house, and there developed such extensive domestic "plants" as that of Mrs. Washington's at Mount Vernon.

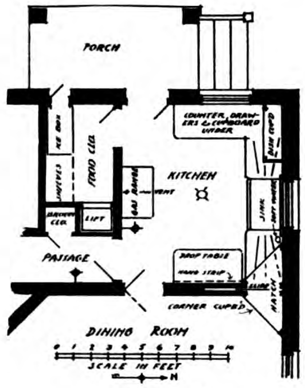
* * * * * * *

It is not long in years since these conditions prevailed, but in point of progress and in change of customs and manner of living it is a cycle. The introduction of coal, the harnessing of steam and the piping of water led to the development of steam-power factories and gave a great impetus to the invention of machinery. The subdivision of labor and specialization in the wholesale production of household necessities resulted in a decline in home manufacture that gradually released the housekeeper and her female relatives from the kitchen. As ready made supplies became more numerous, the household crafts decayed faster and faster; as a more complex social life developed, the mistress and her relatives withdrew from the kitchen, and it slowly sank in importance to become the obscure dominion of hired help whose intelligence demanded little in the way of efficiency or comfort. Homes were slow to reflect the economic revolution; habit continued to design the kitchen as large as the old living room, but without its former claims to precedence in importance. Unimaginative iron ranges, succeeding the living room open fire, were jammed into a sort of fireplace of painted brick; greasy iron and soapstone tubs and sinks were located inaccessibly amidst the shadows out of deference to the limitations of the feeble plumbing system, which was periodically on the verge of nervous collapse. Kitchen fauna were sympathetically provided with congenial habitats of centerbeaded ceiling-board wainscots and splash backs. There was no special concern about light nor air nor saving of steps nor convenience of working. Numerous narrow lofty doors divided the



Plan No. I

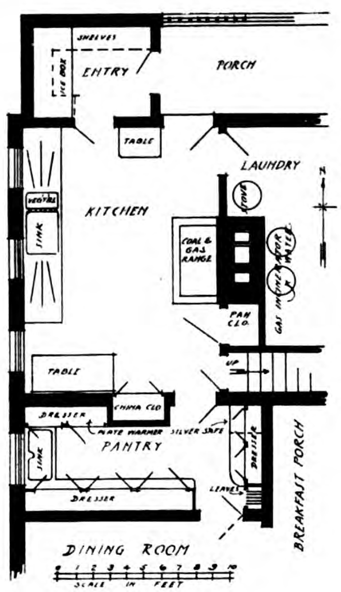
green painted walls and revealed cavernous pan and food closets and mysterious passages to obscurity. The word "efficiency" had not yet run its short, swift race. The degradation of the kitchen was complete; the old time cheerful, savory, bustling center of home life had reached its nadir as a darksome haunt of hired "furriners" and native pestilential bugs.



Plan No. II

This depressing picture might hold good to-day but for a further turn of the economic wheel, which brought an urgent need for the adaptation of home arrangements to a scheme of servantless living. The better kind of apartment house plan, jealous of high priced square feet, led the way in kitchen improvement, and there evolved for this type of wholesale home the well arranged kitchenette — a diminutive household workroom intended for just one purpose, — the preparation of food. Quantities of food came ready to serve, some half ready and a little in a raw state. There was no manufacturing to do but to render these materials edible, so the kitchen was resolved into a food laboratory, equipped with heat, water, refrigerator and storage space.

This type of kitchen came to be recognized as specially successful in bridging distressful periods of maidlessness and was adopted with obviously a greater chance for usefulness for the detached house. When the speculative builder gave the matter any thought at all, he combined sink, range and cupboard according to his Scandinavian folk habits, and the result did not exactly fit American conditions. But when the stimulating hand of personal experience drew the attention of many a young architect to conditions behind the double swing doors, the needed impulse was obtained and this humble but worthy domain began to receive its share of competent attention in the planning of the house.



Plan No. III

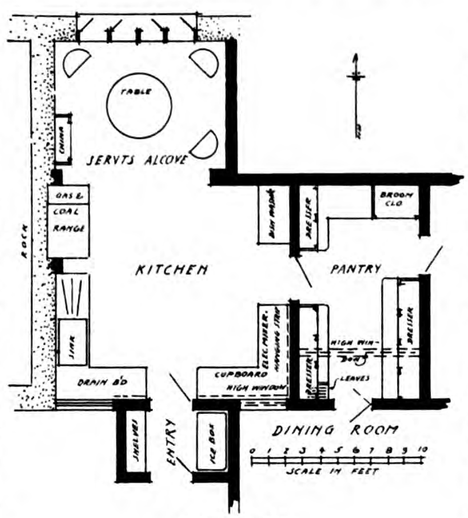
Please note the difference in principle between the successful old time kitchen and the successful modern kitchen: the former was a factory whose operatives were all the females of the family and whose function was the preparation of an endless variety of finished household products from the raw materials; the latter is a laboratory for the preparation of food only, by one or a couple of more or less skilled food scientists.

The ideal kitchen arrangement will probably never exist for various reasons, such as unalterable personal prejudices of clients, the necessity for deferring to the more conspicuous rooms of the plan, the exigencies of site and orientation, etc. Through a fortunate absence of such obstructions, however, a reasonably close approach to the writer's ideal was possible in Plan I, necessarily within the limits of a very low cost. In this plan are found basic elements which, applied to the smallest possible practical complete kitchen, may apply and develop along obvious lines according to the requirements of more extensive households, as indicated in the references which follow. The plans accompanying these notes are intended to illustrate particular features; for the reasons mentioned above, they differ in varying degrees from the ideal arrangement. In examining any plan for a feature indicated it would be well to compare the other plans as to the same detail. The various features of the plans are not described in great detail, as the scope of these notes is purposely limited to a recital of *principles* only.

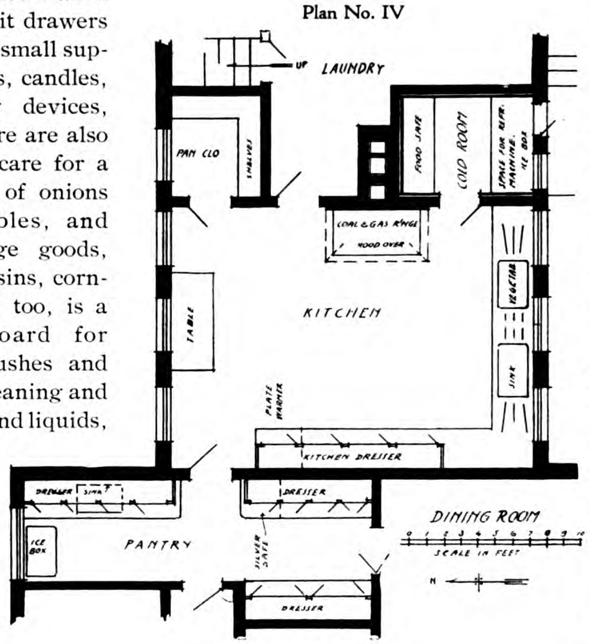
Naturally, the first principle to be observed is that of a convenient and adequate reception of supplies. In Plans I, III and V note how the so-called entry fills this function. Market perishables are unloaded from grocers' and butchers' baskets into the ice box, and the dry stores, such as canned goods, soap, candles, cleansing powders, etc., are placed on shelves above or near the ice box for further distribution or for storage. Here, too, is a screened meat-safe, where cooked food is protected while cooling before placing in the ice box. A second principle is herein observed in thus locating the ice box in that it is accessible for icing and also accessible from the kitchen, yet it is thoroughly guarded from the kitchen heat which otherwise creeps into hastily opened refrigerator doors and through carefully insulated refrigerator walls. No ice man respects a clean floor; the damage done by his careless ways may be minimized by confining him to the entry — or, better, as in Plan II, excluding him from the house altogether and icing from without directly into the box, which must be specially arranged for that purpose. The ice box becomes dignified in the more extensive Plans V and VI, and by its location in a separate cold room a development may continue indefinitely along lines too obvious to describe.

In Plan I the entry opens into the pantry. In any small house the pantry is the storage place for china, glass, silver and table linen: these must be kept out of the kitchen to avoid the greasy dust which pierces glass doors and accumulates on china stored in kitchen cupboards. Of course the servants' china, limited in quantity so as to be cleaned frequently, can be kept in the kitchen, if convenient, as in Plans II and III. A spacious counter shelf provides a work place and beneath it drawers provide storage for small supplies, such as corks, candles, scales, sharpening devices, etc. In Plan I there are also small bins, which care for a small daily supply of onions and root vegetables, and shelves for package goods, such as cereals, raisins, cornstarch, etc. Here, too, is a convenient cupboard for brooms, mops, brushes and vacuum cleaner, cleaning and polishing powders and liquids, and a place for telephone and fire extinguisher, with a special cupboard for table leaves.

The dishes thus located in the pantry are equally accessible from the dining room and from the kitchen. In the more extensive plans, pantries are supplied with sheet metal sinks wherein are washed the glass and silver as in Plans III and VI. When plate warmers and silver safes are necessary they, too, may be installed in the pantry, although the former may be found in the kitchen. As in Plan I, an attempt is always made to provide two doors between the kitchen and the remainder of the house as a seal against the spread of smoke and cooking odors; this is a most important feature often overlooked. A checking floor pivot on the double swing dining-room door, which will stand open at 90 degrees, and ordinary hinges on the kitchen door allow of one or both to stand open, if desired, and overcome an objection to two doors sometimes met with. Sometimes a hatch is insisted on, although not usually advisable; a double door arrangement, as in Plan II, treated on the dining-room side as a Colonial corner cupboard, meets the need successfully.



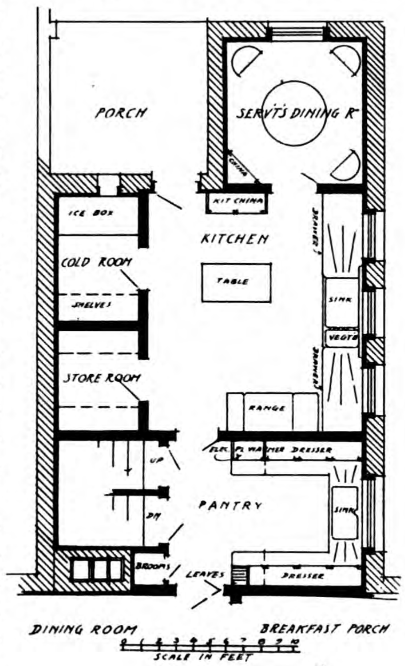
Plan No. IV



Plan No. V

Another most important principle is borrowed from factory practice. It is the minimizing of rehandling materials and a continuity in their progress through the processes of preparation. Strict adherence to this principle would give us as an ideal condition an uninterrupted working plane, which obviously cannot be realized as doors are rather indispensable. In Plan I, however, there is fortunately but one interruption in the plane which extends around the room as follows: Counter "A" is the top of a dresser containing meal bins, drawers for utensils, and cupboards for pots and pans of comparatively infrequent use. Above this dresser is a narrow shelf for condiments, a rack strip for pot covers, and a hanging strip for constantly used cooking utensils. This top is level with the top of the auxiliary oil stove "B," the French range "C," the sink "D" and its drain boards, and the drop table "E." One advantage of an uninterrupted working plane is to permit of plenty of wall space for the hanging strip which carries implements in daily use. The towel rack next the hot water tank is convenient to the sink and allows quick drying. Roller towels, food and coffee grinders, and even pencil sharpener are conveniently located on the walls; drawers for cook books, string, bills, note pads, etc., and enameled bread and cake boxes, sugar, oil and vinegar are found on counter "A." Annunciator, alarm clock and calendar are in plain sight at "F."

A further important principle observed in this plan is that of avoiding as far as possible legs and supports which run to the floor and obstruct mopping and cleaning; the hot water tank shown is an exception in the plan under consideration, but elsewhere conditions permit the tank to be suspended above the range or in the cellar below or in the adjoining rooms, as in Plan III. Again, for an avoidance of backaches and splashing of aprons, the working plane is raised above the usual height. Although some slight variation might be justified, at least 32 inches from floor to edge of sink is desirable. This height may be achieved by hanging the sink on concealed brackets, by building a course of brick underneath the range and by detailing the counter shelves properly. If the floor is fireproof, as in Plan I, it is wise to omit the hearth. The French coal range — plain, capacious and even tempered — is indispensable in this particular household for its sterling cooking ability; it is also the sole source of hot water. In other plans, water is heated variously by automatic gas heater, by separate coal heater, by capacious laundry stove or by coils in the house heater. In some a combination of two methods is effected by cross-connecting, allowing of either being used at will. In Plan I the oil stove (gas is better when obtainable) is used only for emergencies. In Plan II only a gas range was desired and in others of the plans combination coal and gas ranges are seen. Former objections to the coal range are removed by dumping the ashes directly into a chamber in the base of the chimney, as in Plan I, or into a covered ash can in the cellar, whence they are removed every fortnight or so. The superiority of the coal range over any other cooking device is so generally held by competent judges that the writer believes it wise to provide a suitable flue for one even when the client requires a gas range only.



Plan No. VI

One most important consideration is that of light — plenty of light exactly where needed, light for comfort and efficiency, light as purifier and germicide, light for cleanliness and cheerfulness. There is seldom good reason for insufficient or improper natural lighting; only under the most discouraging conditions should overhead or artificial lighting be relied on. The casement windows shown in Plan I provide ample light where needed and plenty of cross ventilation, and both of these necessities are provided as fully in Plans II and V. Natural ventilation should be positive and insensible; in summer weather large openings are most desirable, a requirement met most completely by casement windows whose heads are flush with the ceiling. Their broad sills are useful and have distinct ornamental possibilities in connection with geraniums and such vanities. In addition to good natural ventilation there is imperatively needed a positive and quick-acting means of removing fat smoke and steam. The not uncommon hood and vent-flue arrangement is not successful unless aided by a power-driven fan — a piece of machinery too troublesome for the households under discussion. The sluggish draft in the vent-flue adjoining the smoke flue, induced by the warmth of the latter, is found principally in the pages of technical fiction; it is very imperceptible in reality and is entirely inadequate to clear the air during a fire of fat or while boiling cabbage, in addition to which the unsightly hood catches dust and obstructs light. A device proven valuable by daily use — simple, clean and almost instantaneous in action — is the tilting iron plate let directly into the *smoke* flue at the ceiling. A blaze in the frying pan or a cloud of black smoke — a pull on the ventilator chain, and the air is clear in a minute.

When only one sink is to serve, it should be large, deep and high. The drain boards must be generously large, well distributed and not pocketed in corners. In Plan III is seen a good type of sink with special compartment for washing vegetables, which operation required a separate sink in Plan V. Plan II is peculiar in that a supply of soft (rain) water was needed in addition to the regular hot and cold. This plan likewise required a lift from the cellar, where a dry storage room was provided because of the necessity for receiving all household supplies in unusually large quantities.

The table in Plan I was hinged to allow of being dropped when more than two persons found it necessary to work in the kitchen at one time. Notwithstanding the small size of this kitchen, due to the fact that all distances were proportioned to make it a "one-maid kitchen" and to save steps and time, this table has never been dropped, although three persons have worked therein simultaneously and comfortably. This table is also the dining table for the maid; Plan IV shows the next development of this requirement in providing a dining alcove for two servants, which in Plan VI is developed further into a separate dining and sitting room.

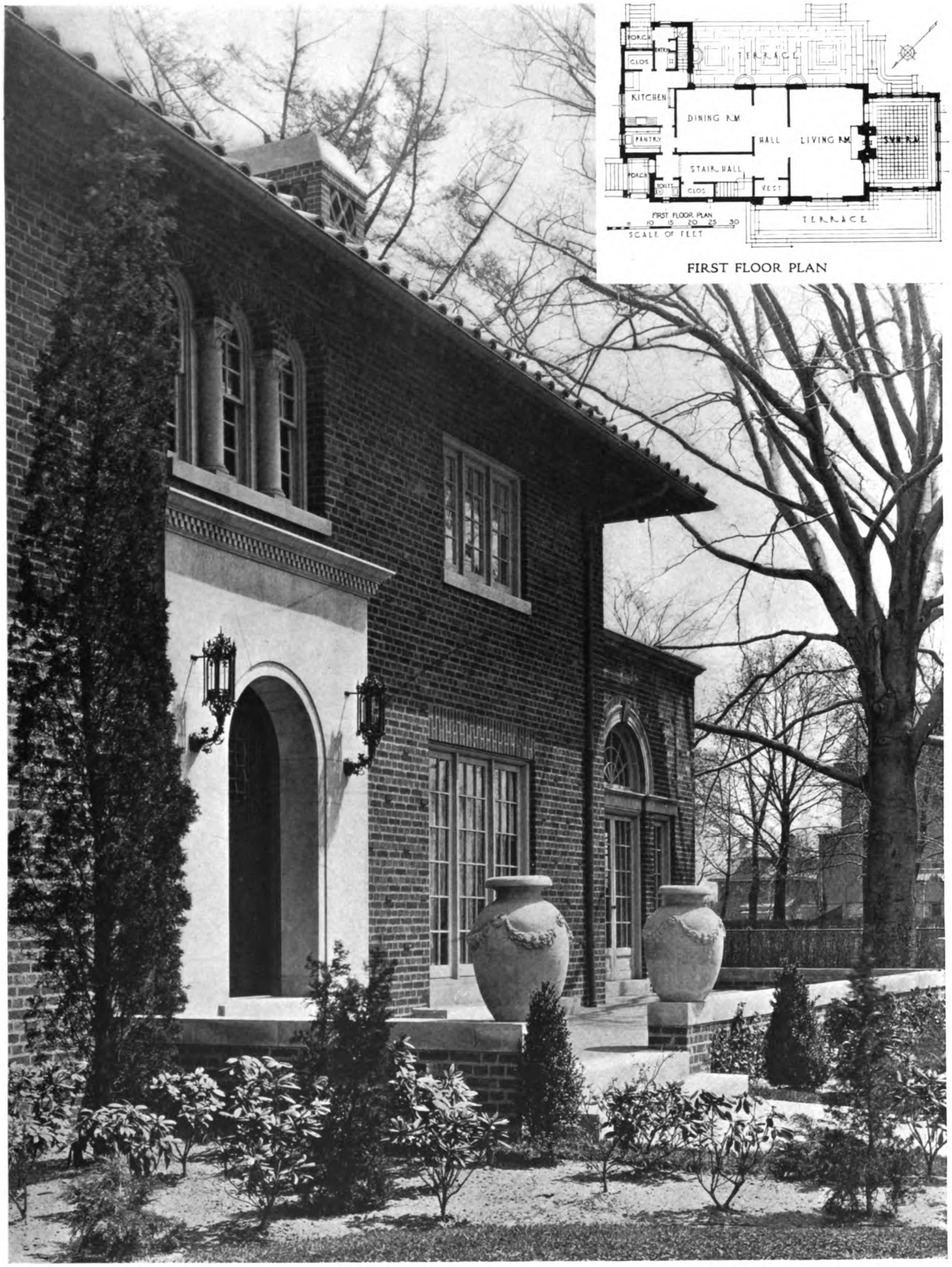
So far we have touched upon only the elements of kitchen arrangement as applied to various executed plans; personal requirements on the part of the various clients and necessary sacrifices of principle to other factors of plan, situation, and to cost have in some of the examples submitted produced results quite different from the ideal. The writer's application of a majority of his principles to his own dwelling (as far as possible within a very moderate cost limit) shown in Plan I has been abundantly justified by the experience of mistress and maids, not to mention visitors who come to sniff and remain to experiment; and while he subscribes heartily to that sound principle which adjusts any treatment according to a careful diagnosis of each separate case, be believes firmly that this laboratory type of kitchen represents the best solution of modern needs, and that a reversion to the old style living-room type occasionally seen is a luxurious affectation unjustified except as a sentimental indulgence.

A few words will suffice for such additional mechanical equipment as must be provided for by the architect.

An incinerating chamber may be built into the chimmey. It is fed from the kitchen, using combustible rubbish as fuel and cleaned from the cellar. Plan III shows a gas-burning refuse consumer in the adjoining laundry. Both types have merit. Electric appliances commonly provided for, other than those used on the dining-room table, are not so numerous as they will doubtless become in the future. The electric range is comparatively uncommon, on account of the high cost of operation; its specialization in the form of an insulated electric oven with automatic time and temperature control-devices is a combination of great promise. These apparatuses require no more foresight than convenient space and current. Electric plate warmers require a special circuit and a pilot light; steam plate warmers in small houses are connected to the heating system and are, therefore, cold six months out of twelve, which fact is sometimes overlooked. Both sorts are useful and may be located in the kitchen or the pantry.

In a family of six or less, the mechanical dishwasher is at a disadvantage compared with washing by hand; but in larger families the several electric varieties are time and trouble savers. They require an ordinary electric wall receptacle and are best connected to the hot and cold water supplies and to the waste pipe like any other plumbing fixture. A meritorious household power unit consists of a motor, which operates a revolving chuck; this machine beats, stirs, whips, grinds, buffs and polishes. It requires only a place to stand and a wall or base receptacle for current. The electric refrigerator machine is coming in to its own. There are small household sets which are automatic in action and within reach of many purses. They are inexpensive to run and extremely successful. Ordinarily they are connected to the lighting circuit, water supply and waste line. These comprise the mechanical devices of some merit not uncommonly found, although the list may be longer or shorter, depending on the results of one's experience with them.

One word more regarding the finish and finishing materials of kitchens. The suite shown in Plan I met the basic requirements of cleanliness, durability and cheerfulness in an inexpensive way. The windows have rounded plaster jambs, the door trim and cupboards are cypress, and the counter shelves and drain boards ash. All woodwork is finished in the best of spar varnish. All plaster work of walls and ceiling is enameled with a glossy, leadless enamel. The floor is plastic mineral cement continuous with a rounded base 6 inches high. This material is non-combustible, impervious and durable and has no cracks nor crevices; it is almost as resilient and comfortable to the feet as wood. The range is set against a margin of white enameled brick with rounded edges. In various scales of cost, the above materials may be varied widely; trim and cupboards may be white enameled, either on wood or on steel; counters may be thick polished glass, aluminum, white metal or marble. There is probably more diversity of opinion regarding floor material than any other part of the finish; there are preferences for Portland cement, cemented linoleum, oiled maple or ceramic tile, with possibly a glazed tile wainscot. Sinks may be of tinned copper or other sheet metal, enameled steel or porcelain. But the great desideratum is that all surfaces be non-absorbent, easily cleaned, durable and of attractive appearance; the floors should be, in addition, quiet and "easy on the feet."



FIRST FLOOR PLAN

DETAIL OF ENTRANCE FACADE

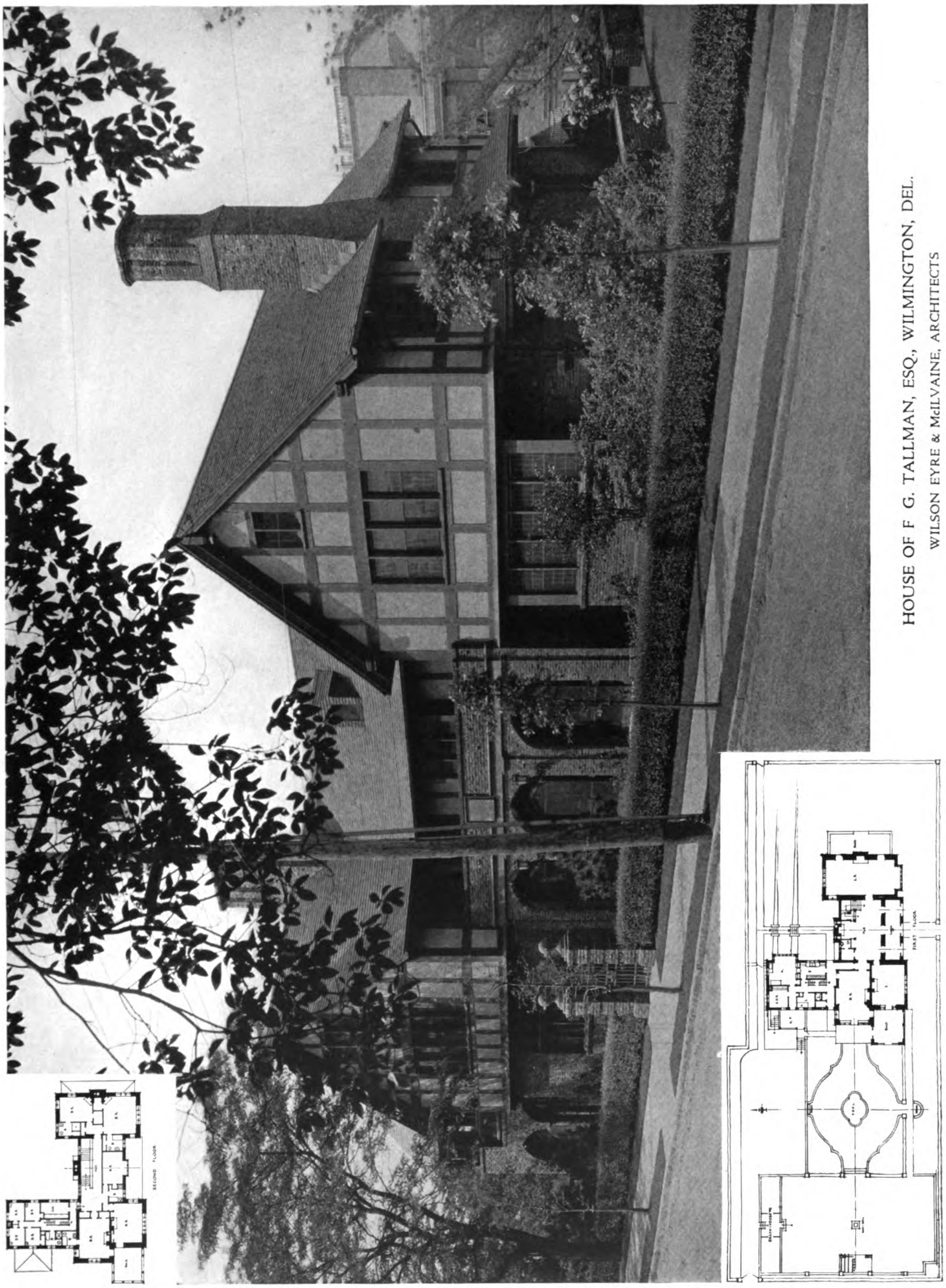
HOUSE OF JAMES C. FRANCESCONI, ESQ., BROOKLYN, N. Y.

SLEE & BRYSON, ARCHITECTS

SECOND FLOOR PLAN

HOUSE OF JAMES C. FRANCESCONI, ESQ., BROOKLYN, N. Y.

SLEE & BRYSON, ARCHITECTS



HOUSE OF F G. TALLMAN, ESQ., WILMINGTON, DEL.

WILSON EYRE & McILVAINE, ARCHITECTS

VIEW OF GARDEN FRONT ON GARDEN AXIS

VIEW OF GARDEN FRONT LOOKING ALONG PATH

HOUSE OF F G. TALLMAN, ESQ., WILMINGTON, DEL.

WILSON EYRE & McILVAINE, ARCHITECTS

DETAIL OF COURT ON NORTH SIDE

DETAIL OF ENTRANCE LOGGIA

HOUSE OF F G. TALLMAN, ESQ., WILMINGTON, DEL.

WILSON EYRE & McILVAINE, ARCHITECTS

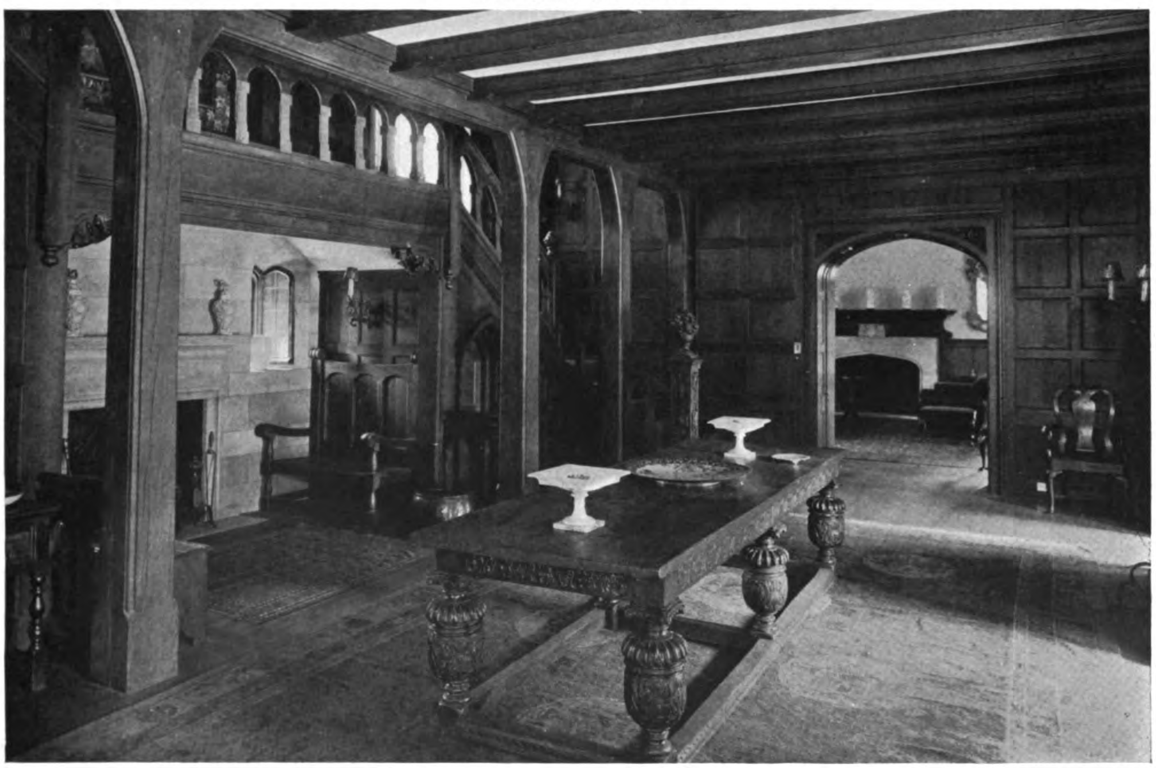
VIEW OF LIVING ROOM

VIEW OF LIBRARY

HOUSE OF F G. TALLMAN, ESQ., WILMINGTON, DEL.

WILSON EYRE & McILVAINE, ARCHITECTS

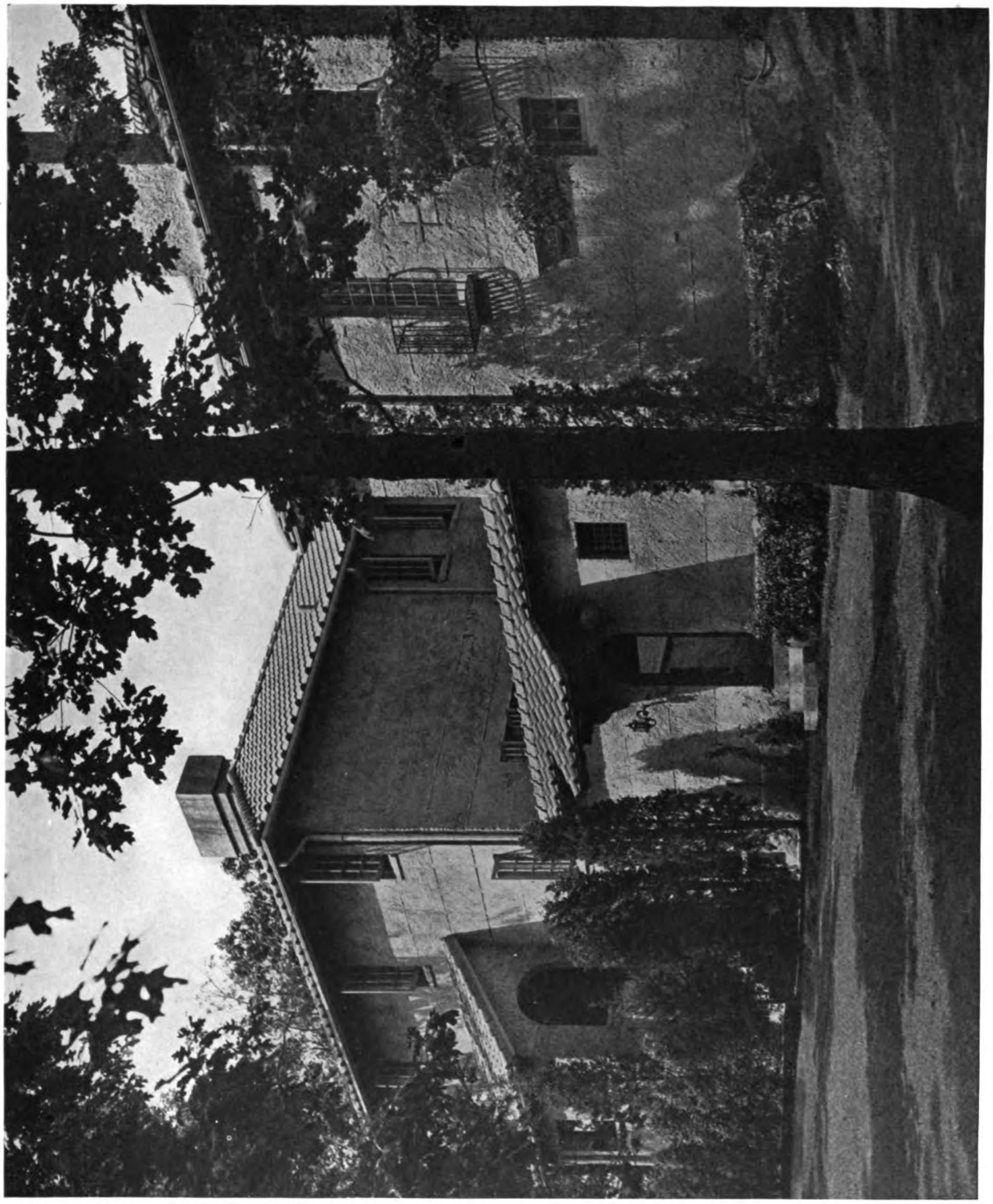
VIEW OF DINING ROOM



VIEW OF HALL

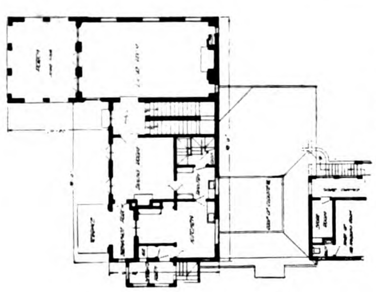
HOUSE OF F. G. TALLMAN, ESQ., WILMINGTON, DEL.

WILSON EYRE & McILVAINE, ARCHITECTS

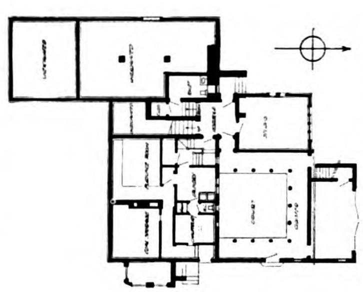


HOUSE OF W. F. PAYSON, ESQ., DARIEN, CONN.
HOWARD GREENLEY, ARCHITECT

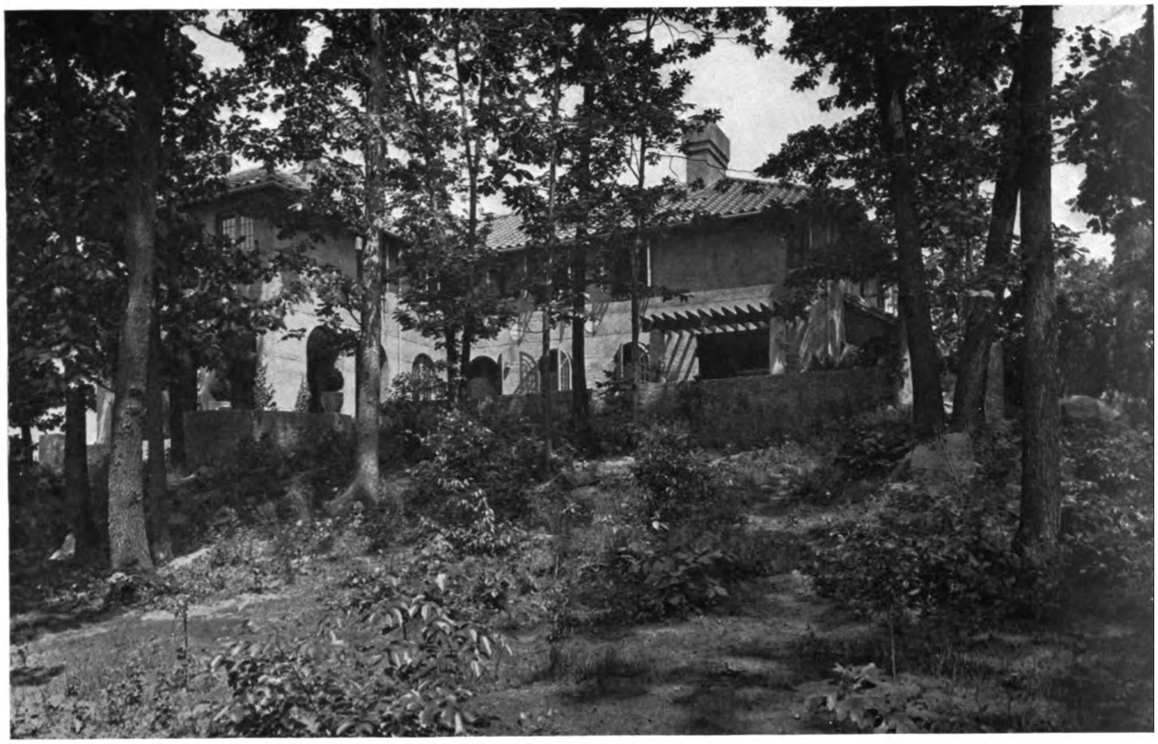
SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN



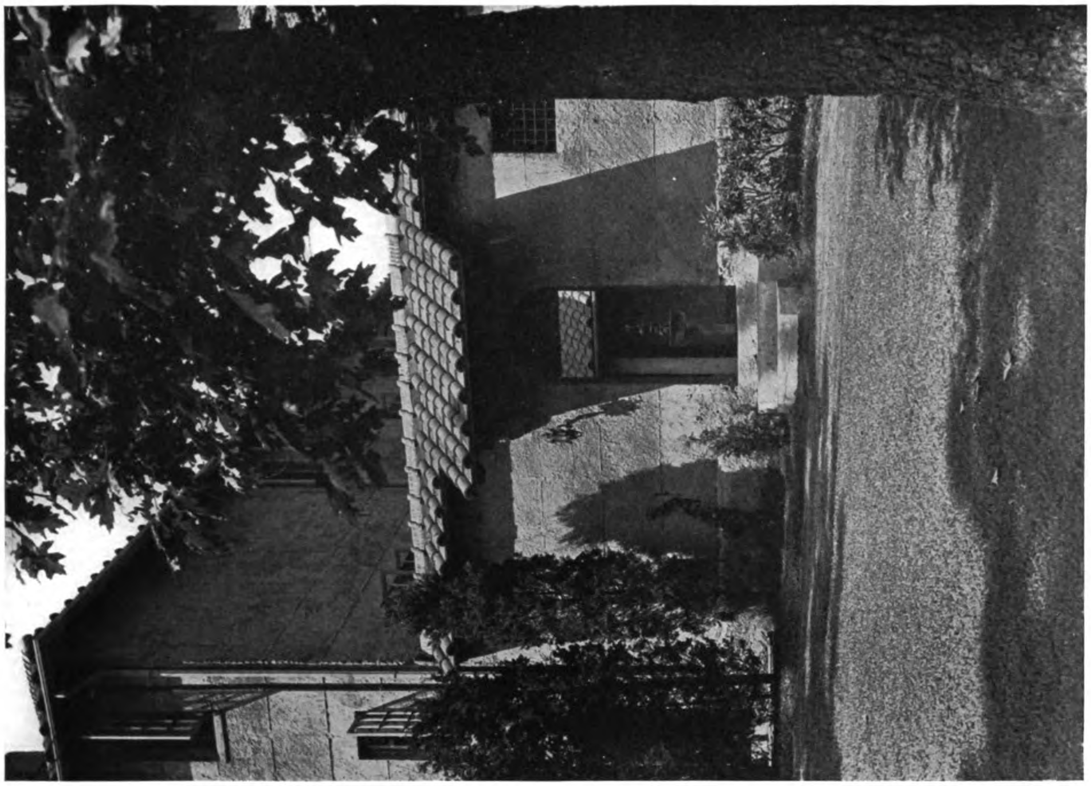
GENERAL VIEW FROM THE SOUTH

DETAIL VIEW OF SOUTH TERRACE

HOUSE OF W. F. PAYSON, ESQ., DARIEN, CONN.

HOWARD GREENLEY, ARCHITECT

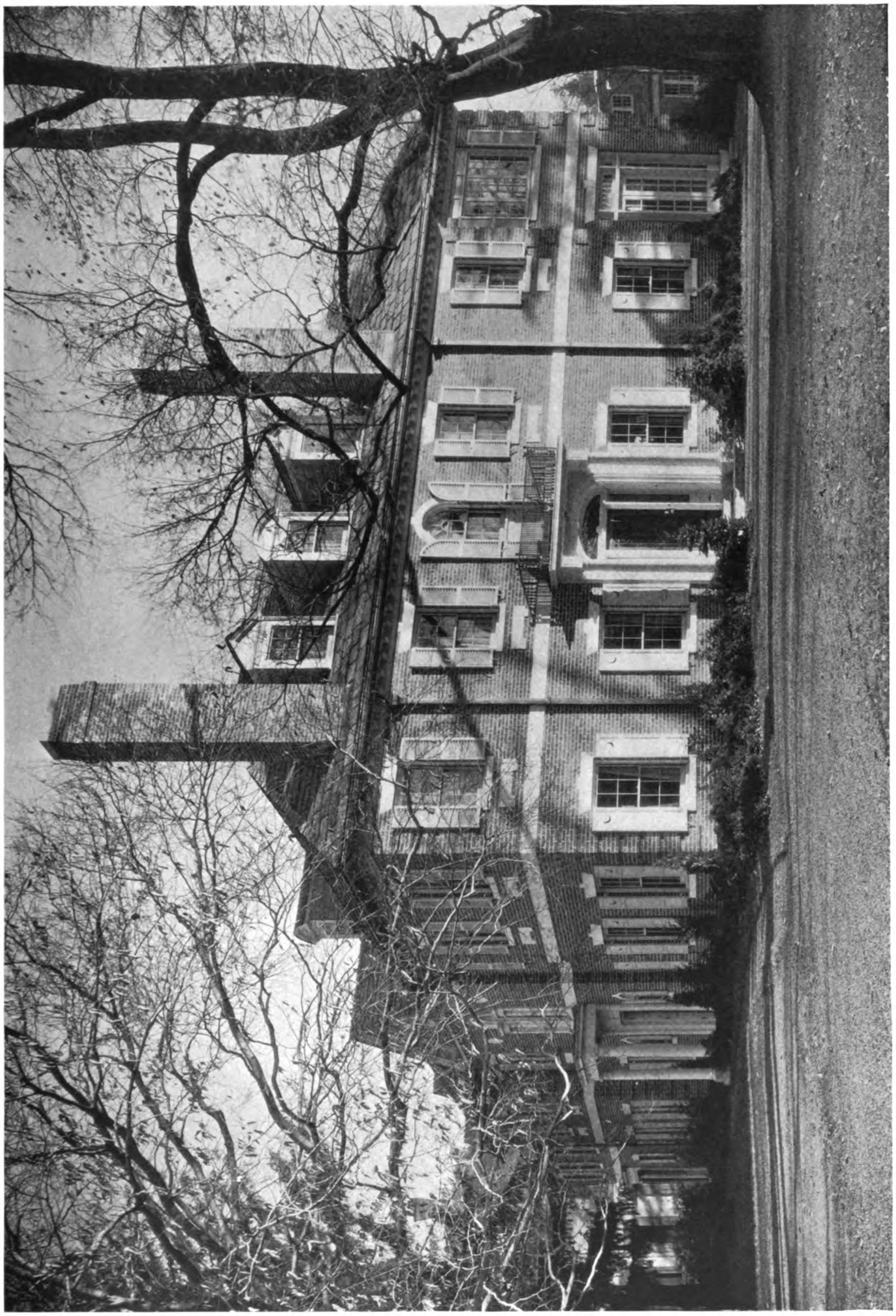
DETAIL OF SOUTH FACADE



DETAIL OF ENTRANCE TO COURT

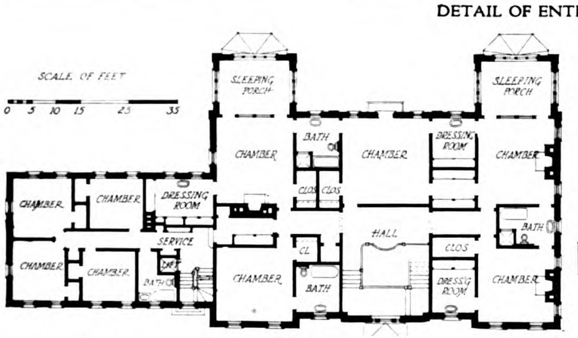
HOUSE OF W. F. PAYSON, ESQ., DARIEN, CONN.

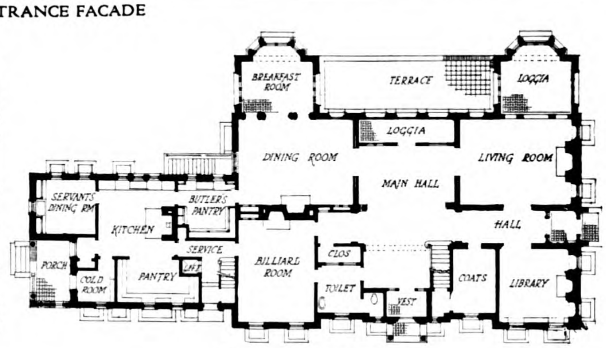
HOWARD GREENLEY, ARCHITECT



HOUSE OF E. H. ELLISON, ESQ., NEWTON, MASS.
KILHAM & HOPKINS, ARCHITECTS

DETAIL OF ENTRANCE FACADE



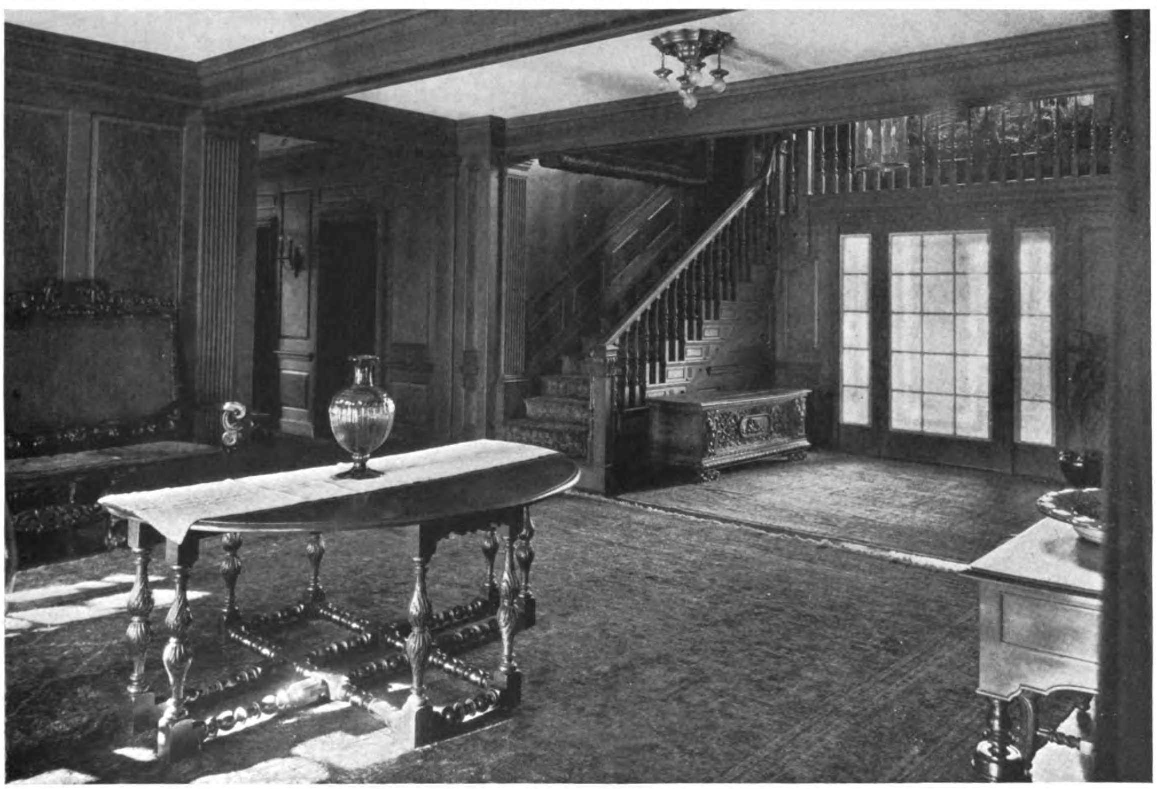


FIRST FLOOR PLAN SECOND FLOOR PLAN

HOUSE OF E. H. ELLISON, ESQ., NEWTON, MASS.

KILHAM & HOPKINS, ARCHITECTS

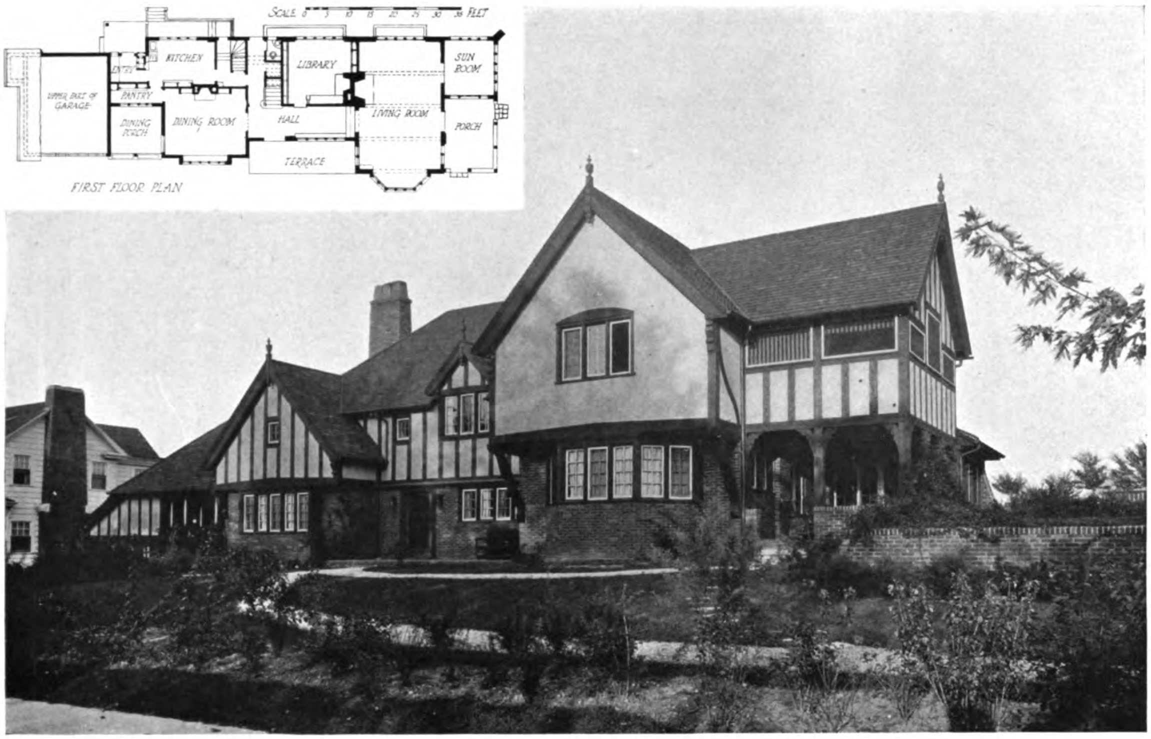
VIEW OF GARDEN SIDE

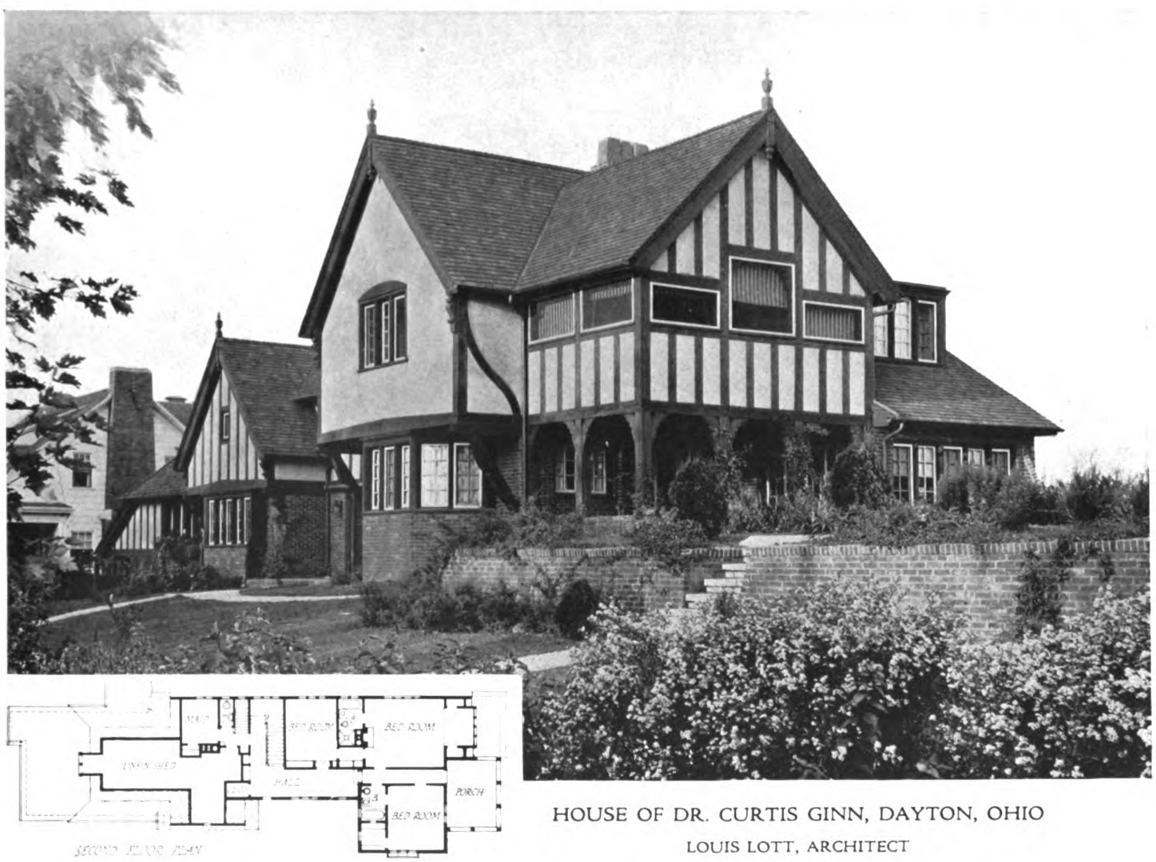


VIEW OF MAIN HALL

HOUSE OF E. H. ELLISON, ESQ., NEWTON, MASS.

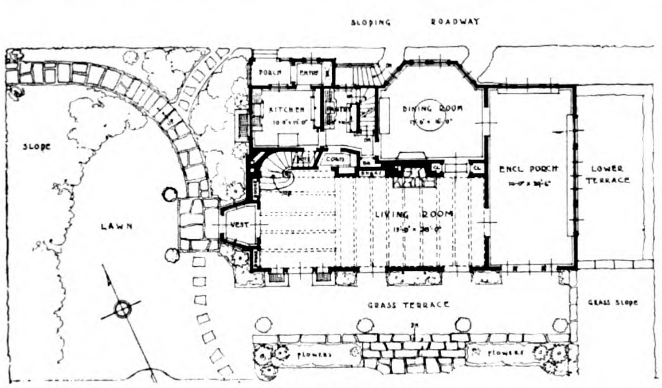
KILHAM & HOPKINS, ARCHITECTS



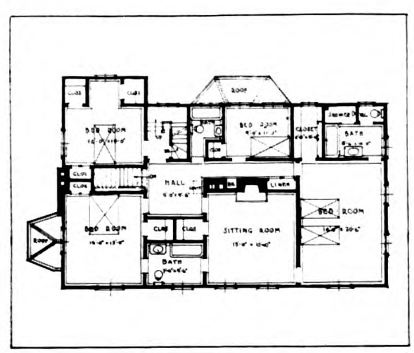


HOUSE OF DR. CURTIS GINN, DAYTON, OHIO

LOUIS LOTT, ARCHITECT



FIRST FLOOR PLAN



SECOND FLOOR PLAN

HOUSE OF FRANCIS A. NELSON, ESQ., UPPER MONTCLAIR, N. J.

FRANCIS A. NELSON, ARCHITECT

VIEW FROM ENTRANCE PATH

DETAIL OF TERRACE SIDE

HOUSE OF FRANCIS A. NELSON, ESQ., UPPER MONTCLAIR, N. J.

FRANCIS A. NELSON, ARCHITECT

Three Recent Conventions of Interest to Architects

By D. KNICKERBACKER BOYD, F.A.I.A.

At these three conventions held in Atlantic City during the closing days of June, many reports were presented, addresses given and discussions held that have undoubted interest to individual architects and to the profession at large, and it is hoped that the brief summary of events that follows will sufficiently cover the ground to enable readers to single out points of value on which they may individually wish to secure detailed information. — EDITOR.

12TH ANNUAL CONVENTION NATIONAL ASSOCIATION OF REAL ESTATE BOARDS

THIS convention lasted four days and those sessions at which the writer was present were attended by what appeared to be over a thousand persons — all intensely interested in the many matters constantly unfolding themselves in accordance with a completely arranged program.

In addition to the features which one would expect to find included, such as the development of land subdivisions, returns on land investments, agency contracts, licensing, taxation and other real estate problems, standardized appraisals were discussed and every phase of the Own Your Own Home Campaign was considered.

"The Building and Management of Apartments at High Level War Prices," bringing out a spirited discussion that lasted nearly two hours, was read by Harry Wardman of Washington.

A matter of exceeding interest to architects as well as other citizens and one of significance to be taken up by real estate interests was covered by the address of Everett L. Millard, President of the Municipal Art League of Chicago, on "What Realtors Can Do to Abate the Sign Board Nuisance." In this a new avenue of approach was suggested by Mr. Millard for minimizing the public nuisance of the outdoor billboard.

He stated that the matter of these disfigurements was not merely an æsthetic one, but that in practically every large city these purveyors of information to an unwilling public very seriously affected private real estate values and net return, and also detracted heavily from the value to the people of municipal investments in parks and boulevards. There was not a dissenting voice when this subject was put to vote, and the meeting unanimously indorsed the proposal to create a National Committee of the Association for warfare against the systematic defacement of property.

The whole morning of the third day was given over to a conference on housing, the session being opened by reading a letter from Louis A. Moses of Cleveland, Chairman, in lieu of a report of the Committee on Housing. This letter presented for action the suggestion that the fundamental need is for legislation by Congress, giving proper recognition to real estate securities and home ownership.

The reading of this letter was followed by the addresses of Wm. E. Shannon, Washington, Ex-Manager Real Estate and Commandeering Division, U. S. Housing Corporation, on "Some Observations in Government Housing, Abroad and at Home," and of B. J. Treacy, Manager, Real Estate Division, U. S. Housing Corporation, on "Some Present Real Estate Problems of the U. S. Housing Corporation."

The Committee on Resolutions presented resolutions which were acted upon, indorsing a national system of highways, calling upon the Government to dispose immediately of all dwellings built by the Government during the emergency and stress of the great war on the best terms and prices obtainable and terminate any Government activities in building or owning homes.

The Committee called special attention to Senate Bill 1469 known as the Calder Bill, a bill to create a Federal Home Loan Board and Home Loan Banks for the purpose of aiding in financing the construction of homes, and recommended, in view of its importance, that a special committee be appointed to study this measure and work in conjunction with the Legislative Committee.

The Resolutions Committee also recommended referring to the same special committee several resolutions to the following effect:

"Deploring as indications of national decadence the gradual increase in tenantry throughout the United States (estimated by some at the rate of 3 per cent each ten years), together with the falling off in native birth rate (estimated in one of our important states at 40 per cent in ten years), there is viewed with gravest concern the cumulative shortage of homes, housing and building, occurring as it has simultaneously with the transfer of capital for building purposes to the field of short time loans.

"The Association believes that local standing committees should at once be appointed and be especially charged with creating a widespread popular understanding of the actual present conditions as well as the consequence of drifting.

"Such local standing committees should be points of contact with the Government and with the committees of the Y. M. C. A., building and loan associations, National Federation of Building Industries, and other trade and civic organizations.

"Such standing committees should co-operate with the Department of Labor, the American Federation of Labor, the American Institute of Architects, the Engineering Council and other organizations in order that the Board of Jurisdictional Awards may promptly and impartially bring about adjustment of jurisdictional controversies.

"Such standing committees should co-operate with the committees of the American Institute of Architects, the National Federation of Building Industries, the American Society for Testing Materials, etc., in order to bring into more general and popular use standard materials and sizes, and thus decrease the cost of building without decreasing its durability."

The Secretary of the National Association of Real Estate Boards is Tom Ingersoll, Andrus Building, Minneapolis, Minn.

22D ANNUAL MEETING AMERICAN SOCIETY FOR TESTING MATERIALS

THE four day and evening sessions were held beginning June 24, 1919, the last night being the joint session, with American Concrete Institute on cement and concrete.

While the program was made up of many reports of important committees and of papers dealing with scientific subjects and technical matters, not relating directly to building construction, one or more of these reports or papers at each session dealt with structural materials having a close bearing upon the practice of architecture. Among these, listed in order of presentation (and numbered accordingly), might be cited the following:

8. Committee D-1: On Preservative Coatings for Structural Materials. P. H. Walker, Chairman.
9. Paint, a Plastic Material and Not a Viscous Liquid. E. C. Bingham and Henry Green.
13. Annual Address by the President, Guilliam H. Clamer: "Standardization."
14. Committee A-1: On Steel. J. A. Capp, Chairman.
15. Committee A-2: On Wrought Iron. H. E. Smith, Chairman.
19. Committee A-5: On Corrosion of Iron and Steel. S. S. Voorhees, Chairman.
20. The Influence of Very Low Percentages of Copper in Retarding the Corrosion of Steel. D. M. Buck.
22. Committee E-1: On Methods of Testing. G. Lanza, Chairman.
33. Committee B-2: On Non-Ferrous Metals and Alloys. William Campbell, Chairman.
36. Committee C-3: On Brick. Edward Orton, Jr., Chairman.
37. Committee C-6: On Drain Tile. A. Marston, Chairman.
40. Committee C-7: On Lime. D. Knickerbacker Boyd, Chairman.
43. Committee C-2: On Reinforced Concrete. Richard L. Humphrey, Chairman.
44. Committee C-4: On Clay and Cement Sewer Pipe. R. Hering, Chairman.
45. Committee C-11: On Gypsum. R. J. Wig, Chairman.
50. Committee C-1: On Cement. R. S. Greenman, Chairman.
51. Committee C-9: On Concrete and Concrete Aggregates. S. E. Thompson, Chairman.

Discussions following these papers were enlightening, but in them the voice of the architectural profession was unusually silent. These matters of so much moment to it were presented, discussed and adopted without the active participation of the profession largely concerned and assisted. When individual service and interest combined with official representation and attendance would so readily discharge a reciprocal obligation, should it not be forthcoming?

The writer, as chairman of the Institute's Committee on Basic Building Code, discussed with members of the Executive Committee of the A. S. T. M. the possibility of co-operation between the Institute and the Society. It was pointed out by these representatives of the Society that its contribution toward a Basic Building Code could only be the opportunity afforded, by the formulation of its standards, for their incorporation into a national code, as has already been done with municipal codes. That the activities of the Society had always been open to participation by architects in the formation of these standards was also pointed out, and that they had singularly failed to make their especial knowledge, their skill and the results of their experience available to the Society through service on its committees, concerned with structural matters, was to be conceded.

On the basis that the real means of co-operation between these important organizations lies in co-operative service for the common good, the writer desires to lay before each chapter of the Institute the suggestion that as many of the chapters as are able, interested and willing shall join the Society and designate one of its members to assume committee service, receive the Society's literature, and make known to Chapter members the results of the Society's contributions toward the solution of practical problems affecting the practice of architecture.

This brief account cannot go into details of the reports and papers submitted further than to indicate, by reference to two or three of them, the value of the material to be found in the others. It is well to point out that members receive volumes containing everything including discussions, and that those not members may secure copies of separate reports and papers from the Secretary of the Society at a very nominal price.

The report of Committee A-5 on Corrosion of Iron and Steel embraced sixty-four pages of text, tables and illustrations, all relating to this most important factor in building construction. Results are given of the continued inspection of sheets of base metal exposed at Fort Sheridan, Ill., Pittsburgh, Pa., and Annapolis, Md., all of varying metal content, including some with copper mixtures. This latter treatment of steel was also covered in the paper on the "Influence of Very Low Percentage of Copper in Retarding the Corrosion of Steel," the conclusions differing apparently in accordance with the locality in which the tests were made.

This work taken in connection with that of Committee D-1 on Preservative Coatings for Structural Materials should be followed by architects and others interested in the various stages of progress pending final developments and conclusions. Any enlightening instances coming under observation in practice, especially in demolition of old structures, should be communicated to these Committees.

The report of Committee C-3 on Brick, which was adopted, fixed a definite initial standard of size for building brick. This is 2¼ by 3⅞ by 8 inches, which it is assumed will now replace former standards and be followed as fast as manufacturing conditions permit. It also now sets a definite method and value for testing brick and classifying them according to absorption limits and compressive strength as follows:

Grade of Brick	Absorption Limits Per Cent		Compressive Strength (on edge), Pound per Sq. In.		Modulus of Rupture, Pound per Sq. In.	
	Mean of 5 Tests	Individual Maximum	Mean of 5 Tests	Individual Minimum	Mean of 5 Tests	Individual Minimum
Vitrified	5 or less	6.0	5000 or over	4000	1200 or over	800
Hard	5 to 12	15.0	3500 or over	2500	600 or over	400
Medium	12 to 20	24.0	2000 or over	1500	450 or over	300
Soft	20 or over	No Limit	1000 or over	800	300 or over	200

The standing of any set of bricks shall be determined by that one of the three requirements in which it is the lowest.

Committee C-7 on Lime reported in addition to the results of an active year, that it had secured the building codes of the U. S. and was working upon specifications for plastering for later submission to the Society.

Committee C-2 on Reinforced Concrete reported that inasmuch as the preparation of standards for this type of construction involved engineering design, it recommended that the co-operation of the bodies comprising the "Joint Committee" be sought in establishing complete standards. These bodies are: American Society of Civil Engineers, American Railway Engineering Associations, American Society for Testing Materials, Portland Cement Association and American Concrete Institute.

The writer raises the query: Are there not in the American Institute of Architects enough members familiar with the use of this important material in its application to modern structures to warrant the inclusion in the above group of the American Institute of Architects?

The Secretary of the American Society for Testing Materials is C. L. Warwick, University of Pennsylvania, Philadelphia.

15TH ANNUAL CONVENTION AMERICAN CONCRETE INSTITUTE

THIS meeting lasted two days,— June 27 and 28,— the first of which coincided with the last day of the A. S. T. M. Convention.

The following reports and papers are listed as those having especial significance to architects:

Committee on Treatment of Concrete Surfaces — J. C. Pearson, Chairman.
Investigation into the Economic Possibilities of Light Weight Aggregate in Building Construction — A. W. Stephens.
Committee on Reinforced Concrete and Building Law — E. J. Moore, Chairman.
Sub-Committee on Regulation for Strength Tests of Floors.
Committee on Reinforced Concrete Highway Bridges and Culverts — A. B. Cohen, Chairman.
Committee on Building Blocks and Cement Products — R. K. Havlik, Chairman.
Committee on Concrete Roads and Pavements — H. E. Breed, Chairman.
Fuel Oil Tanks — H. B. Andrews, H. E. Walton, J. C. Pearson and G. E. Smith.
Committee on Concrete Sidewalks and Floors — J. E. Freeman, Chairman.
Committee on Nomenclature — W. A. Slater, Chairman.
Report of Committee on Fireproofing — W. A. Hull, Chairman.
Paper — Fire Tests of Concrete Columns — W. A. Hull.

In the order of presentation as above given, and perhaps of the most general interest as a complete document of conclusions and recommendations, comes the report on *Treatment of Concrete Surfaces*, which as a matter of fact is this year completely devoted to *cement stucco*.

Every architect should put himself in possession of the report of this committee. A great proportion of its fifteen pages is given over, as very properly it should be, to discussion and recommendations concerning the background to receive stucco and to features of design. While it is to be remembered that the subject of this report is cement stucco, and not lime stucco (the terms here apply to the predominance of the material used), the sections relating to design, structure, masonry walls, frame walls and materials would largely apply with equal force to the use of either kind of stucco coating. No better idea of the nature of this document can be obtained than quoting from the Report which as adopted becomes "Recommended Practice for Portland Cement Stucco to Supersede the Present Standard Specification."

"One of the fundamental considerations in successful stucco work is a suitable design of the structure for stucco. The architect does not always realize that an exterior plaster of any kind merits whatever protection can legitimately be given it; that for the sake of appearance it needs more protection against leakage and drip than brick, stone or even wood exteriors. Thus it must be recognized that stuccoed copings, cornices and horizontal or nearly horizontal surfaces are more exposed to deterioration than vertical surfaces; that attention to details of chimneys, down spouts, gutters, window sills and overhead flashings will avoid much unnecessary staining and unsightly cracking."

The report of the Committee on *Reinforced Concrete and Building Laws* was also of special interest and timeliness. It consisted in the offering of "Proposed Standard Building Regulations for the Use of Reinforced Concrete." These elicited much discussion and in view of the action taken by the A. S. T. M. with respect to the report of its Committee on Reinforced Concrete, namely, to arrange for joint conference with other bodies, this report of the A. C. I. was received and ordered printed for reference and study.

The report of the Committee on *Fireproofing* and the paper on Fire Tests of Concrete Columns consisted of accounts of the series of fire tests made by the Bureau of Standards on over fifty full size concrete columns, as supplementing the tests being made at the Underwriter's Laboratories in co-operation with the Associated Factory Mutual Fire Insurance Companies and the Bureau of Standards. The report concluded thus:

The following recommendations are made, pending further developments:

1. That for fire-resistive construction, limestone, trap rock, blast furnace, slag and burned clay be given a preference over highly silicious gravels.

2. That in cases where gravel aggregate is to be used with no additional protective material over the concrete, round columns be given a preference over rectangular ones.

3. That where gravel aggregate is used all columns, but especially rectangular columns and round columns with spiral reinforcement, be given the additional protection of approximately one inch of Portland cement plaster either on metal lath or reinforced by light expanded metal.

Mr. Hull's paper contained the following conclusions:

"The results reported at this time afford additional evidence in support of the conclusions reached last year, especially as to the important differences in the fire-resistive properties of concretes from different aggregates. The results of tests of gravel concrete columns are consistent with those of last year, and the conclusion that gravel concretes from gravels of a number of different types are inferior, in point of fire resistance, to concretes from a number of other aggregates, is obvious and unavoidable. Due to differences in age and possible differences in conditions of aging, the results shown by the trap rock and the slag concrete columns are not strictly comparable with those of the tests of limestone columns previously reported. The observation that neither the trap rock nor the slag concrete appears to have any tendency to spall or any other malignant tendency under the conditions of these tests is important and reassuring.

"Conclusions as to possible methods for providing satisfactory protection for gravel concrete columns can be made more satisfactory in a later report, after additional work has been done along this line."

The Committee on *Sidewalks and Floors*, which last year recommended the elimination of cinder or other fills under sidewalks, this year submitted merely some few changes in the former Proposed Revised Specifications and reported this item of interest:

"Plans are nearly complete for the series of wear tests of concrete floor mixtures and methods of finishing, mentioned in last year's report, to be undertaken at the Structural Materials Research Laboratory at Lewis Institute, Chicago. These tests will cover a wide range of mixtures, sizes of aggregates and consistencies, besides those commonly employed in concrete floor construction, and the wear tests will be made with the Talbot-Jones rattler which has been used for similar tests covering concrete road construction. The results of this investigation, together with those of service tests now being made at the Bureau of Standards on a number of methods of floor surface treatment, should provide valuable material for a report on the wearing resistance of concrete floor surfaces, the treatment of unsatisfactory floors and methods of securing the best results."

The present and former reports of the Committee on *Concrete Roads and Pavements* should be read for valuable data on the size of turns for automobiles, radius and camber of roads, construction drainage and other features.

The series of papers on *Fuel Oil Tanks* contributed much information on the subject of design, construction and characteristics of concrete containers in general.

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ARCHITECTURAL AND BUILDING ECONOMICS DEPARTMENT

C. STANLEY TAYLOR, ASSOCIATE EDITOR

A Time for Leeway in Specifications

THE uncertain character of the material market at present calls for particularly careful study in the writing of specifications. The architect must realize the problems of the builder in getting materials of certain kinds — a problem affected by high local cost, uncertainty and difficulty of delivery, and in many cases the fact that specific brands or types cannot be had at any cost.

Price quotations are not dependable or binding and there is a vast difference in actual purchase cost of materials as compared to general cost estimates. To hold down material bills to-day requires all the skill and buying knowledge of experienced builders.

In consequence the materials buyer should not be held to rigid specifications — not even to types of roofing, siding or to certain specified kinds of lumber, brick or tile. It is better now to write specifications in a sufficiently broad manner that every advantage may be taken of a market fluctuating both in price and ability to deliver.

In many instances it will be found that local material market conditions will influence æsthetic elements of design involving material colors and textures, and that the artistic sense of the designer must be subject to the elements of material cost and time of delivery. This is particularly true in the case of medium cost dwelling construction.

Another important element which should influence both design and specification writing is the question of local labor conditions. In certain localities it will be found that there is a dearth of carpenters but that mason labor is readily available. This leads to serious consideration as to the advisability of building of frame construction when a saving of time and money through the employment of masons is evident, provided plans call for a masonry building.

At other points a reverse condition will be found and it is evident that a study of local labor conditions and the material market for deliveries is now called for before final plans are made. Specifications should be written broadly enough to take the best advantage of all conditions.

The Need for Practical Garage Design

MILLIONS of dollars are being spent at the present time in the expansion of the automobile manufacturing business. In and near Detroit, plant extensions and new manufacturing units are being erected to meet an enormous demand for motor-driven vehicles. At the present time it is estimated that nearly one and a quarter million new machines are needed annually to offset depreciation and to replace automobiles which are scrapped.

The public garage and repair and accessory business is entering a period of great activity, presaging a demand for service buildings in every part of the country.

The design of the average public and even private garage is entirely inadequate and far from efficient. Very few architects have any definite conception of the practical requirements of such buildings. In fact, very few owners know exactly what they need.

It is interesting to realize that of all classes of business the success of the public garage and service building probably depends to a greater extent than any other on the practical design and arrangement of the building.

Owing to the character of the business, which is not usually successful if carried on in a very small way, the investment in service buildings varies from $25,000 to sums ranging in six figures.

Here is one opportunity which may be taken advantage of by many architects. The general lack of knowledge on the subject, even on the part of owners, is evidenced by the fact that for several years the automobile journal having the greatest circulation among garage owners and dealers has carried on in its service department a garage design advisory division. Hundreds of garages have been built through this service, which is far from complete from the architectural viewpoint, and many garages have been placed on a paying basis through recommended structural changes.

It would seem advisable, therefore, for architects to make a special study of the problems of the garage, public and private. Recently, as one of many instances, the ability of an architect to design a practical private garage brought him an attractive commission in residential design.

This will be found an interesting and profitable field of activity and one in which a reputation can be quickly built. A study of the requirements in such buildings is not difficult as there are no indefinite quantities to deal with.

Building Now — From the Investor's Viewpoint

AT the present time a large proportion of the business in the average architect's office is in what might well be termed a planning stage. There is, of course, considerable activity in the erection of moderate cost dwellings, both as private and as speculative operations, and considerable public work is now proceeding; but in the field of investment building no real activity is taking place and there is a noticeable tendency on the part of prospective owners and investors to put off the actual commencement of construction work on apartment houses, office buildings, hotels and similar structures.

Since the close of the war has released building activity, as far as Government restrictions are concerned, there have been two definite reasons advanced for not beginning construction in the field of investment building. The first of these reasons relates to financing in the form of building and permanent mortgages. The second reason is apparent fear on the part of investors that buildings constructed now, at the present high level of building material prices and labor costs, will show a too great depreciation in value at such time as there may be a general decrease in building costs.

It is quite true that mortgage money has been difficult and expensive to obtain in the period following the armistice. The first noticeable release of pressure in this respect followed immediately after the floating of the Victory Loan. Since that time there has been a gradual opening up of the mortgage market, and the conclusion of peace, with a definite reopening of world credits on a sound economic basis of commercial relations, has brought into the field a considerable quantity of mortgage money. For the first time in some years mortgage brokers and loaning institutions are advertising the fact that they have money available for sound building operations.

The general attitude of loaning institutions is now distinctly favorable to real estate and building operations. In the Borough of Manhattan, New York City, mortgages approximating $8,500,000 were renewed in January of this year as opposed to $2,800,000 in January of last year. Mortgages are now generally being renewed without demand for a reduction of principal, which is a fact significant of the confidence of experts in the maintenance of future values in real estate.

We find, therefore, that the first reason for hesitancy in starting construction, namely, the difficulty and cost of financing, has been largely eliminated. There remains, then, for serious consideration the one principal obstacle now standing in the way of actually building apartment houses and office buildings. This is the question of the soundness of investment at high costs and possible greatly lessened reproduction values in the more or less distant future.

To fairly and seriously consider this question, there are certain essential facts which must be determined in order that by their interrelation a basis may be established for the guidance of those who are at present considering building investments. The average architect will find these related facts of value in discussing with clients the feasibility of carrying out immediately projects which may be under consideration.

In making this analysis we shall take into consideration, not only the facts and figures relating to construction costs and building income, which have been gathered and correlated by THE ARCHITECTURAL FORUM, but also the result of a careful investigation which has been made along these lines by the Division of Public Works and Construction Development of the United States Department of Labor.

The facts which must be determined are as follows: (1) increased cost of land for building operations over prevailing costs during the pre-war period, (2) relation of land costs and increment to a present-day building investment, (3) increase in building material costs over the pre-war period, (4) increase in building labor costs over pre-war period, (5) increased annual income, (6) increase of maintenance cost, (7) estimated period of years until building costs decline to pre-war level, (8) establishment of a method of meeting any such depreciation through the creation of a sinking fund.

Land as a Factor in Building Investment

The pet phrase of the real estate broker to-day is, "Everything but land has gone up in cost — land is next to rise — buy now!" This is sound advice as it pertains to any section of a city where good transportation conditions predicate rapid growth in supplying a demand for housing in multi-family units. It is sound advice also in relation to any land available for office and business buildings. In other words, real estate available now, or in the near future, for any type of investment building, is cheap at its average cost.

The value of such land is naturally determined by the law of supply and demand. During the war the demand for such land was small, owing to the curtailment of building operations. Now we are at the beginning of a period of increasing demand, owing to the general encouragement of building.

Land cost in any investment building project usually represents from 20 per cent to 30 per cent of the total cost of the operation. We find, therefore, that one-fifth to one-quarter of the cost of a building investment can be had at pre-war price or less, and that here we have a definite increment or potential increase in value.

Translated into figures, based on general land value increases in good investment neighborhoods, we find that the increment represents at least 10 per cent a year for the first ten years — or 20 per cent of the total investment over this period. In many cases the increase in land values is relatively much greater. It is evident, therefore, that an important point in the present-day building investment is the selection of a site so located that it shows every evidence of a fairly rapid increase in value.

The question of the actual increase in building material costs has been given careful investigation by the United States Department of Labor. Experts of this organization have found that at the close of the war building material prices (not including steel) had risen to 61 per cent above those of 1913; while general commodities were 113 per cent higher. The average increase in wages in building industries in 41 cities was 29 per cent.

If we consider for the purpose of figuring the general increased cost of building that the pay-roll represents 40 per cent of the operation, we find that two-fifths of the cost of a building has risen 29 per cent, and the remaining three-fifths has risen 61 per cent. This gives an average increase since 1913 of approximately 50 per cent of the cost of the building.

How Long before Costs Reach Former Levels?

The next question of interest is — how long a period will probably elapse before material and labor prices decline to equal those of the pre-war period? In other words, how fast will the value of a building constructed to-day depreciate because of lessening reproduction value?

Turning to conditions following the Civil War, we find interesting comparisons. In both wars building material prices rose, but they did not at either time reach levels as high as those of other commodities. It was thirteen years after the Civil War before general prices returned to the pre-war level, but the index figure of building materials remained higher than other products for about twenty years.

After the Civil War the principal cause for a final return to pre-war price level was the rapid development of new and more economical production methods — both as to machinery inventions and improved business organization. The chances of offsetting higher prices by improved production methods in the present period are not particularly interesting. The possibility that entirely new price levels have been established by the economic influences of the world war is becoming apparent to all. Certainly, economic forces seem to have operated in stabilizing prices at a high level from which they are not likely to fall for many years.

The attitude of labor also bears importantly on a general forecast of building conditions. Labor forms a large proportion of the activity in the manufacture of building materials and in actual construction work. Unionized labor has apparently adopted a platform of wage scale maintenance at present levels, and this condition will naturally help to maintain prices at higher than pre-war levels.

Judging from the various points brought out in the foregoing paragraphs, it is evident that building costs will not for many years come back to former levels. The demand in this field incident to forced construction (to make up for slackness in the past few years), together with a call for certain building materials for export purposes, will allow of no great reduction in present prices. At the most, it is apparent that the greatest drop which can be expected in the next ten years will not exceed 25 per cent of present cost of building.

We have, therefore, a condition indicating during the next ten years an economic or reproduction depreciation averaging not more than 2½ per cent annually on the cost of building; or, considering land value at 20 per cent of the entire operation, the greatest depreciation to be feared, as far as replacement value is concerned, would be an annual average of 2 per cent of the total cost of an investment operation over a period of the next ten years.

The next point in favor of carrying on investment building immediately is the opportunity to make desirable leases at high rentals. In many cities the demand for space in office buildings and multi-family houses is so acute that rentals have risen as high as 50 to 60 per cent above pre-war rates. Reports from owners of investment buildings now under construction show large proportions of rentable space leased from plans at favorable rates. Many business concerns are now in course of expansion and desire new quarters. Thus we find office, warehouse and loft space in demand.

Rentals will undoubtedly be maintained for many years on a higher basis than we have heretofore experienced. There is a general tendency on the part of the people in American cities to live under better housing conditions than in years past. For this reason, and as local experience at many points has shown, even when the housing shortage has been met, there will be a steady demand for better class apartments with all modern improvements. The same condition holds good in relation to the housing of business activities.

Disproportionate Increase in Cost of Maintenance

In spite of the contention of many landlords who have been asked to explain the reason for rapidly increasing rentals, the cost of maintenance in the average apartment house and office building has not increased in proportion to the rental value of space in investment buildings. On the other hand, it is quite evident that rental values have increased generally to a point where at least the same gross percentage of return on the total operation cost of a new building can be expected.

Briefly analyzing building maintenance and operation costs, to see why they have not increased in proportion to the average increase in the value of rentable space, we find the following elements entering into such cost, together with approximate percentages of gross rental:

Operation Cost Elements	Relative Percentage of Gross Rental Income
(1) Interest on first mortgage	23%
(2) Interest on second mortgage	5%
(3) Vacancy allowance and repairs	10%
(4) Light, heat and power	6%
(5) Taxes (land, building, water, etc.)	12%
(6) Insurance	3%
(7) Service (superintendent, janitor, etc.)	20%
(8) Net profit	21%
	100%

Considering the above elements which enter into the administration costs of the average investment building, we find that on the mortgage interest items, (1) and (2), there has generally been an increase of not more than one-half per cent, if any, since before the war. On item (3), vacancy and repair, there has been and will be for some years in the average investment building little if any charge for vacancy, owing to the demand for space. This more than offsets the increased cost of repairs so that on item (3) we find no increase.

On item (4) the increased cost does not average over 20 per cent.

On item (5) there has been little increase in assessment values or tax rates affecting the average investment building — not over 10 per cent increase at most.

On item (6) no increase.

On item (7) 30 per cent increase.

Estimating the above analysis, we find that maintenance costs have increased approximately 11.5 per cent of the former gross rental, while rental values have increased at least twice as much.

Protection against Decreasing Reproduction Values

Two distinct factors which will operate to protect the present-day investor against loss through depreciation in reproduction values are: (1) high rentals making possible the establishment of a sinking fund; and (2) the general upward tendency of the real estate market, insuring an increment in land values which in itself practically constitutes insurance against loss.

An interesting phase of the building investment field to-day is the possibility of building and leasing to one responsible party for a long period of years. Such leases are usually made on a basis of 50 per cent of the value of the land and 6 per cent of the cost of the building as an annual rental payment. On a similar basis to this New York City's two new hotels, the Pennsylvania and Commodore, have been built and leased. In the case of the Commodore lease, an additional 2 per cent of the cost of the building was provided, undoubtedly as a sinking fund.

Establishing a Sinking Fund

It is certain that such investment buildings as may be undertaken at this time can be located in sections where demand has placed rental values on a high basis. The buildings can be advantageously leased to one or more tenants for periods of from three to twenty-one years, depending upon the character of building and occupancy.

When rental prices are being fixed, careful consideration should be given to the establishment of a sinking fund which may return directly to the owner over a period of years an amount of money to equalize any investment depreciation due to decrease in replacement value of the building.

The amount of this sinking fund should be calculated by percentage and should be sufficient to return at least 20 per cent of the cost of the building within ten years after its completion. It is evident, therefore, that the percentage amount of the sinking fund will be determined by the character of occupancy and the length of leases.

In a $100,000 operation, of which $25,000 represents the cost of building, the sinking fund should amount annually as follows (minimum):

$3,750 (5%) for 4 years or less
$3,000 (4%) ,, 5 ,,
$2,250 (3%) ,, 7 ,,
$1,500 (2%) ,, 10 ,, ,, more

The various classes of buildings which come under the general heading of investment structures are then: multi-family dwellings (more than three families), loft and warehouse buildings, office buildings, leasehold buildings (hotels and mercantile structures for single tenants such as large corporations).

Month-to-month rentals in any such buildings are, of course, out of the question; but the length of the lease term varies in a fairly definite manner in each class. Thus we find apartments and office space leasing for periods of from one to three years; loft and warehouse space from five to ten years (except buildings constructed for single tenant on longer term leases); public garages and stores are leased for periods averaging from five to ten years; and structures built specially for long term leases, such as hotels and various classes of mercantile buildings.

It is evident that the approximate annual sinking fund charge for each class of buildings is determinable. Referring to the preceding table and in view of short term leases, a sinking fund amounting annually to at least 5 per cent of the cost of building should be added in determining rental charges for office and apartment space. At the present time there is in practically every section of the country a shortage in such space which has resulted in high rental rates. This shortage, with consequent high rents, will last for several years until the supply meets the normal demand.

It is during this period that the investor in short term rental buildings should receive sufficient income to provide his sinking fund for future years.

If upon analysis of rentals being offered in any given neighborhood, it is found that the income from rental space, as shown by the plans of an apartment house or office building, is not sufficient to include such a sinking fund, a better location for investment building should be sought.

In classes of investment building involving longer term leases, the provision of a sinking fund, while equally important, is a more simple matter. The amount can be spread over a greater number of years. In such leases, particularly those involving the starting of a new business venture, it is customary to grade the rental charge to make the first years easier for the tenant's growing business.

It is not, of course, necessary or advisable to define the sinking fund as a separate payment in the lease. It should be counted and treated as one of the regular operation and maintenance costs; but on the owner's books the return from this source should be credited against the principal investment.

The Building Labor and Material Market

At the present time the condition of the building labor and material market is at best puzzling, and before attempting any building operation or even design a most careful investigation should be made of local and general market conditions at the point where construction is contemplated.

The material market reports and quotations which are generally circulated through various service media do not seem to have practical application at this time. In many instances such quotations are based on information received from dealers having knowledge of the purpose of the information. There is at present a very great difference in the tentative material prices which are advanced and the actual cost of specific quantities of material in buying. Dealers will not commit themselves for any length of time nor in a definite manner.

For instance, we are informed by a builder operating near New York that in the early part of August common brick in New York was actually selling at $24, while general service quotations placed it at $15 to $17. At the present time the market on common brick in New York is easing down somewhat, owing to large shipments and undoubtedly influenced by decreased takings due to the strike and lockout which is entirely holding up construction in New York.

Among builders there seems to be a clearly expressed opinion that lumber prices are in many cases held up by dealers who are holding plentiful supplies for a still higher market. There seems to be little doubt that in some localities this has been done. The producers of building lumber might well investigate this phase of the building market and take steps to prevent the immediate raising of local lumber prices in towns where new building projects are being started. In one instance coming directly to the notice of the writer a number of dwellings were started in a large town in New York State. Contrary to quoted prices, local lumber dealers asked a considerable advance when actual buying commenced. By the uniformity of price raising it was evident that more than a coincidence was involved. Fortunately estimates had been made on higher prices than quoted in order to provide a safety margin, and a purchase was made in outside territory which made it possible to come within the figure of the contract.

There is another factor which apparently is to affect the cost of building materials, particularly basic materials. There seems to be a rapidly developing export market for many types of building materials. Recently a lumber dealer, finding difficulty in getting spruce and Oregon fir, visited the West and is reported to have seen in Seattle fifty ships loading with this timber for export to Japan. The organization of building material producers under the Webb act shows definite intention of developing the export business during the time that excessive demand cannot be met abroad. From various provisional and staple foreign governments inquiries for many classes of building materials are being received in this country.

It should therefore be evident to the average architect that the present market is one requiring more than ordinary attention and analysis. It will prove of great service to form the habit of discussing costs of labor and materials with one or more active builders in localities where buildings are being planned.

The Question of Labor

The activities of organized labor in the development of demands, including nationalization of important basic industries, is perhaps the most interesting of national questions to-day. This activity is directly affecting the building field and is acting strongly in suppressing building activity. Immediately upon the announcement of any drastic action on the part of powerful labor organizations a reactionary wave seems to pass through other classes of labor, particularly that of the building trades. In estimating costs it is not safe to base them upon existing rates in any given locality, particularly if the building operation is extensive and outside the larger cities. The safest method is to select a point where building of a somewhat similar nature is going on, and to determine the increase in rates which has taken place. A similar increase should be figured as a safety margin, for it seems to be the history of the average building job now that the building is not finished on the same rates upon which it was started.

In the designing of dwellings some architects are cleverly analyzing labor conditions in the locality for the purpose of determining whether masonry or carpenter labor is more easily available. In such cases houses are designed of materials suited to labor conditions. In some sections of the country it is practically impossible to get carpenters, while at other points good masons are scarce.

Cost Plus or Straight Contract?

For many months there has been considerable discussion among members of the building fraternity as to advisable forms under which contracts for building should be undertaken. At least four distinct types of contract have been developed: (1) The straight or fixed price contract, the ordinary form of building contract (involving a guaranteed cost to the owner with payments to the contractor at agreed stages in the progress of construction); (2) the straight cost plus method; (3) cost plus upset price (material bills and pay-rolls paid by owner plus percentage to contractor who sets and guarantees a maximum cost figure); (4) cost plus lump sum contractor's profit (all payments by owner and definite amount of money assigned as contractor's payment for completing the job).

It is not the purpose of this article to point out the relative advantages and disadvantages of these various contracting arrangements. Present conditions in the building labor and material field indicate that except under unusual conditions the straight lump sum form of contract is being abandoned and builders are generally refusing to do business on this basis. In many instances the cost plus upset price contract is being used successfully, but in the last few weeks many large and small contracts have been let on a purely service basis of the cost plus contract.

Reading from the actual experience of builders, the fluctuating cost of materials, difficulty in deliveries and unsettled labor conditions, it is evident that the provision of guaranteed costs by the contractor is not only a plain gamble, but is practically impossible and inducive to constant friction between the parties to the contract. Theoretically, under given conditions, the cost of the building will be the same regardless of the form of contract. The real element for consideration is the efficiency and honesty of the service provided by the contractor. Concerning this question certain facts may be deduced. Paramount, perhaps, is the power of the contract form in its influence on the relationship of the two parties. Under pre-war conditions of well stabilized material cost, the straight contract, honestly administered, created a friendly and satisfactory relationship between owner and contractor. To-day conditions have been practically reversed. After a straight building contract has been made under present market conditions, the tendency is for the two parties thereto to rapidly reach an unfriendly and dissatisfied stage, owing to unforeseen difficulties met by the contractor and the insistence of the owner that the guarantees of the contract be carried out. On the other hand, if the contract form be on a cost plus basis, the problems of both parties become mutual, and the resulting co-operation may be trusted to meet present-day difficulties in a manner impossible under the irritating operation of the straight contract.

It will be found that for other reasons than those of direct financial gain the average builder will respond in a most satisfactory manner to the cost plus contract. This is an opportunity to show a real service. He has a reputation for good work to make or to retain. If his reputation is poor, he will naturally not be retained on this basis. The recognition of the hampering effect of stringent contractual conditions is proving the solution of many difficult building problems to-day.

Palazzo Massimo alle Colonne, Rome

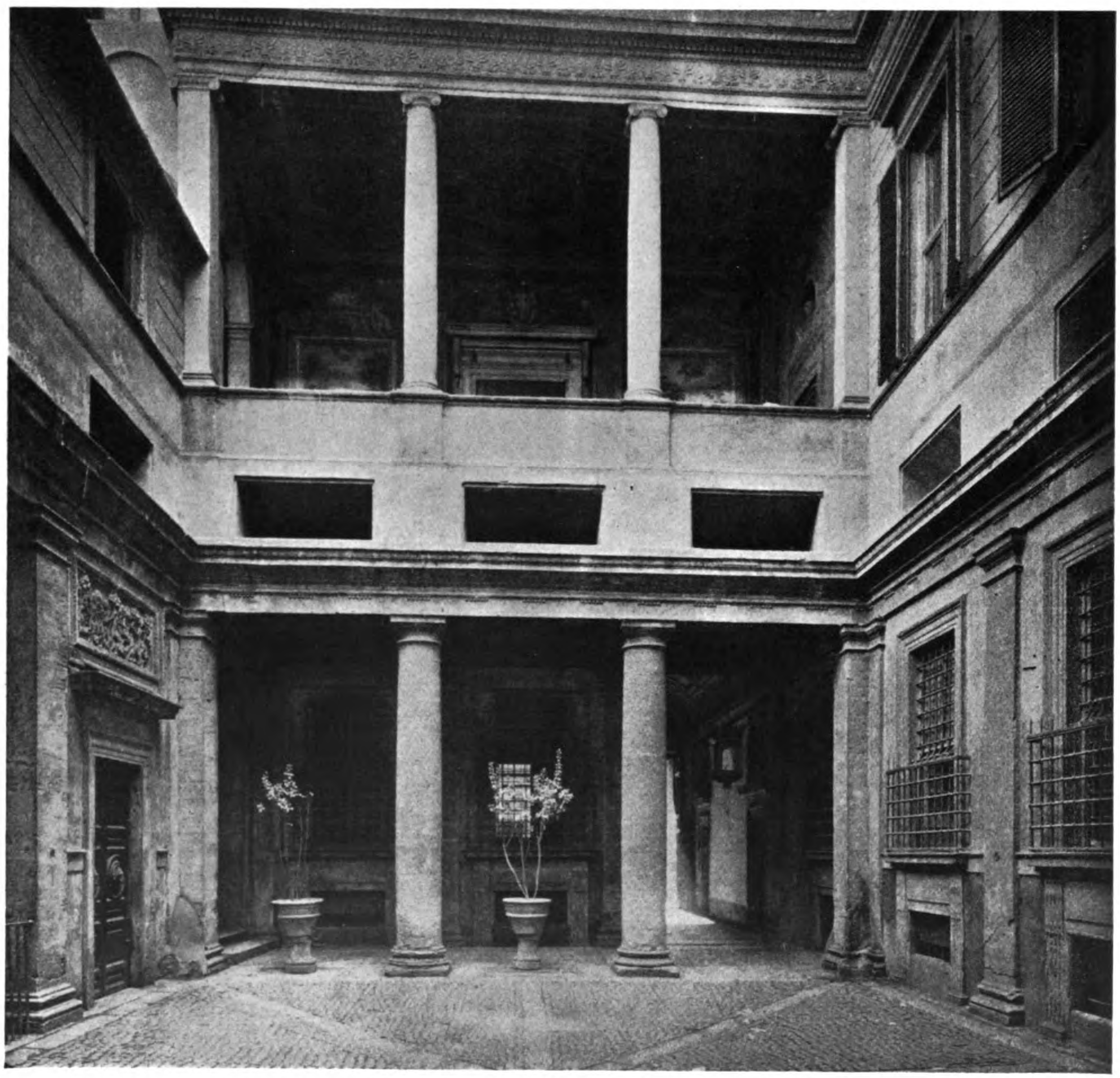
ACCOMPANIED BY MEASURED DRAWINGS OF DETAILS OF THE COURT

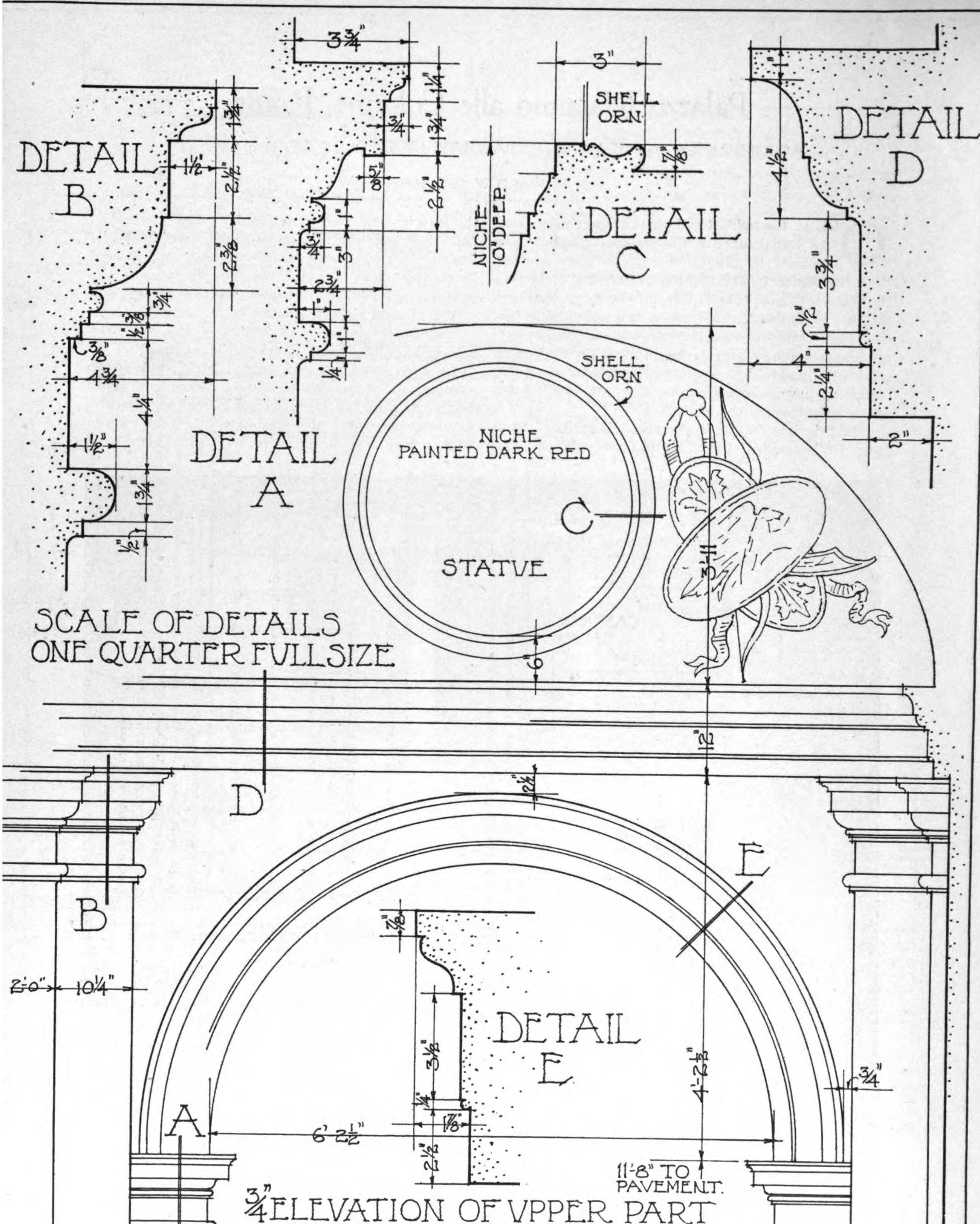
By HOWARD W. GERMANN

ONE of the noblest and most elegant palaces of the Renaissance is the Palazzo Massimo alle Colonne in the Corso Vittoria Emanuele at Rome designed by the Sienese painter and architect, Baldassare Peruzzi (1481–1536), for the Pietro Massimo family. This palace, commenced only a short time before the architect's death, shows considerable ingenuity of adaptation to an irregular site, the arc shaped façade was skilfully designed to conform to the curve of the originally narrow street but has now lost its effect by the construction of the wide Corso.

The principal façade of the palace is enriched by a beautifully detailed vestibule with Doric columns, and the interior court, or quadrangle, which is reached from the Corso by a vaulted passage, is strikingly picturesque with its stone pavement, wall fountain and its flight of steps by which the chief entrance to the palace is gained. The entrance hall has a frieze and ceiling of most elaborate detail.

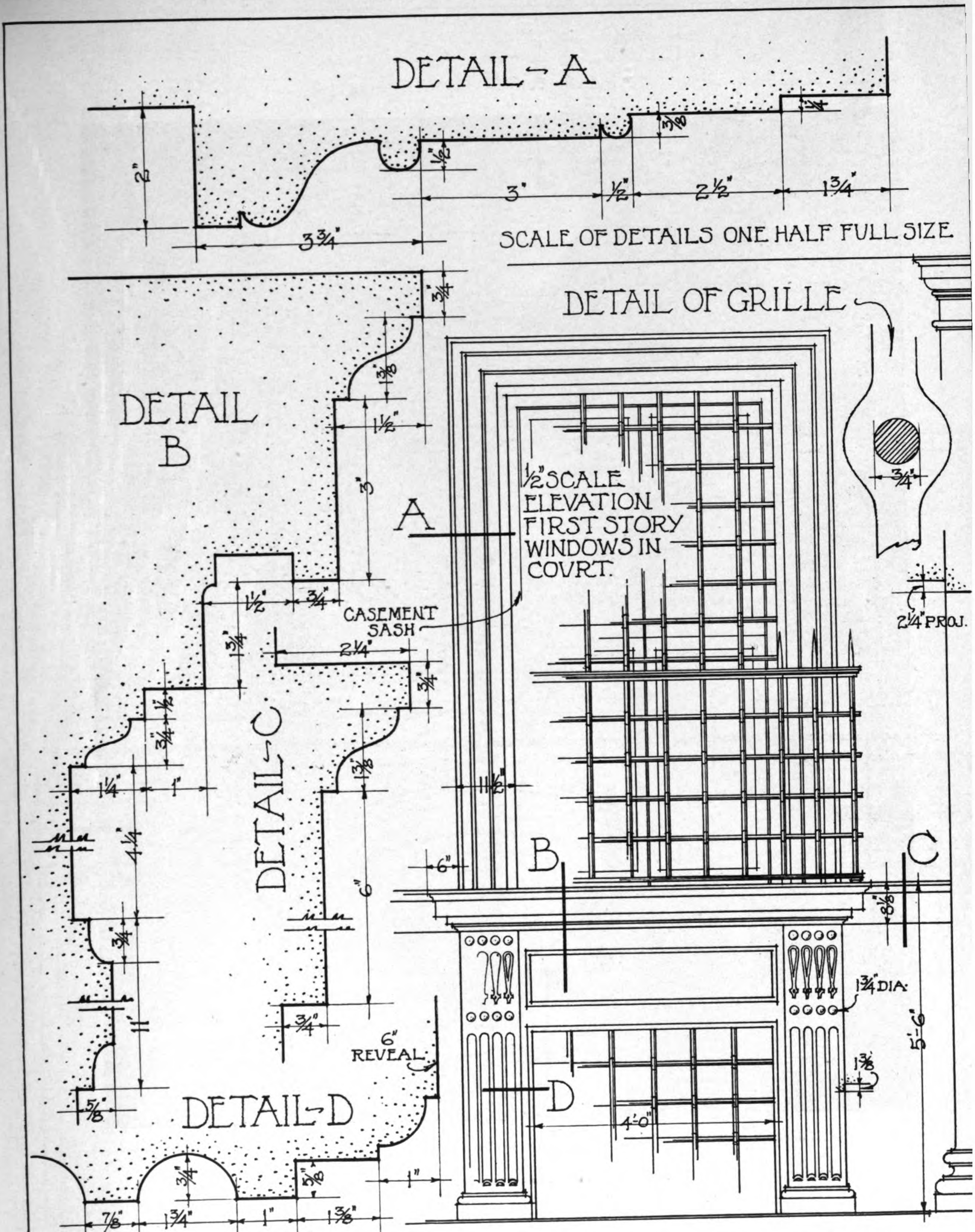
Serlio (1475–1555), with whom Peruzzi was intimately associated and to whom he bequeathed his notes and drawings, says that Peruzzi during the excavating for the first Massimo Palace found many fragments from the Theatre of Marcellus and learned so much concerning this ancient edifice that he was able to make drawings showing its original plan.





3/4" ELEVATION OF UPPER PART OF ENTRANCE TO STAIRWAY

ITALIAN RENAISSANCE DETAILS
PALAZZO MASSIMO ROME



ITALIAN RENAISSANCE DETAILS PALAZZO MASSIMO ROME

DETAIL OF STAIRWAY AND VAULTED PASSAGE AT END OF COURT

PALAZZO MASSIMO ALLE COLONNE, ROME

DEPARTMENT OF ENGINEERING AND CONSTRUCTION

CHARLES A. WHITTEMORE, ASSOCIATE EDITOR

The Relation of Steel Framing to Architectural Design

By E. N. PIKE

(This article, written by Mr. E. N. Pike, chief engineer of the New England Structural Company, is one of great interest to all architects. Mr. Pike's familiarity with steel construction of all sorts places him in a position to present authoritatively an article of interest regarding the relation between steel work and architectural design.—EDITOR.)

IN the beginning of architecture, if that be a proper term to use, the structural features of a work of any magnitude were much in evidence, and much of what we think of as architectural detail has grown out of the attempt to conceal or render less objectionable to the eye some of the essential features of primitive construction. In earlier days, therefore, structural and architectural design were so closely related that they could not be considered separately. It was not until by experiment and by the use and combination of various materials and the gradual increase of ornament to conceal the structural features that it became at all possible to put structural design in a secondary position. The introduction of the steel frame or skeleton into building construction requiring comparatively little room for itself has made it possible to postpone the consideration of structural design to a relatively late period in the preparation of plans and has tended toward specialization, so that to a very large degree the structural designer is not an architect, and the architect need not have more than general knowledge of the requirements of structural design. It follows naturally that the best result will be obtained by co-operation of specialists in the two branches; but the way in which many projects begin to shape themselves makes it impossible to secure ideal conditions, and the structural engineer is often confronted with problems that tax his ingenuity to the utmost and, if solved, may leave much to be desired, if everything were known.

Present-day prices for building work demand, as never before, the reduction of all costs to a minimum consistent with the results to be obtained. It might seem true that a building, the several items of which were obtained at a minimum cost for its special field of usefulness, would be the cheapest to construct. It would be readily appreciated, however, that a building of materials involving large heat losses, even though cheap in themselves, is not necessarily economical, and it is equally true that the design of a steel frame, using the fewest possible pounds of steel, may not result in the cheapest or most satisfactory building. There is so much data available at the present time, in handbooks and trade publications, that it seems a very simple matter to design buildings of considerable magnitude. That it is so often done successfully, speaks well for the value of the literature referred to and the common sense of the user. It is probably true, however, that few designs involving the use of one hundred tons of steel would not have well justified the fee of an experienced designer. Competitive design for steelwork, that is, the attempt to reduce the cost of steel from a preliminary design, regardless of other considerations, is often a doubtful economy, especially if the original designer is not consulted as to his reasons.

The element of time is also one that should be given more consideration. Ordinary every-day problems require only sufficient time to guard against the mistakes that are always incidental to haste. If the problem is more complex and the time too short, it follows that the first passable solution must be used, although it may be unsatisfactory to the designer. Lack of time to consider carefully the relation of steel design to other features of construction often fails to secure the benefit of the experience of the engineer. It follows, therefore, that whether the actual steel design be made at one time or another, it must not be overlooked at any point in the development of the architectural scheme, and that the sooner the steel plans are undertaken the better the results are likely to be.

It is only necessary to note that the erection of steel frame should follow immediately the completion of foundations to indicate the relative position of steel plans to other details. Commercial considerations often deny it the position it deserves. It may be the hope of a drop in prices; it may be the hope of finding a lower bidder; it may be simply failure to appreciate the time that the steel contractor should have; but too often the letting of steel contracts, and sometimes the preparation of plans, is delayed until the steel is actually needed at the building. The first two reasons are too deeply rooted in human nature to be easily removed. The third may often be due to lack of information, and, while perhaps not strictly related to our subject, may deserve brief mention. The lowest prices for steel construction are usually dependent upon sufficient time to secure material from mills cut to length for use without waste. For standard sizes of material in common use and minimum weights, rollings at mills may come at frequent intervals of three to four weeks; while for material less generally used the intervals may be greater, depending upon whether the mill has accumulated sufficient orders to justify it in changing rolls, and sometimes upon the ability of the mills to provide billets of proper size from which the material can be rolled to advantage. Schedules for rolling are usually made up in advance and are often closed so far as additional orders are concerned some time before the date of rolling. This may help to make it clear why such exasperating delays sometimes occur, and perhaps make it clear that ample time for preparation of details and fabrication may not be at all adequate to secure prompt deliveries. It also explains why the experienced designer dislikes to use any but sections most easily obtained, unless the quantity required and the saving obtained will justify the possible delay. If the resulting loss to the owner, due to delay in completion of building, is given a proper value, it will frequently be found that the economy secured in handling the steel contract is of negative value.

The structural engineer would lose much of the joy that should be his if he could have his way in defining hard and fast rules for our subject, and we should doubtless lose much of architectural effect if the architect were handicapped with a sixth sense that would prevent him from asking the impossible of the designer. It is true that the experienced designer recognizes at a glance certain limiting conditions in the average problem that cannot well be overcome, yet he is often held back by recognized limitations of economy to a greater or less degree. Very often the limiting conditions for depth of girders or trusses will not permit of any approach to economy, and it is here that the necessity for co-operation is most evident. Unfortunately many times conditions have been so fixed before the engineer has been consulted that it is well nigh impossible to make any change without serious embarrassment to some one, and the real problem of the designer is to determine how far he may go from the beaten path that others have followed and not invite disaster. The failure of the first Quebec Bridge is a conspicuous instance of what may happen to even the most experienced if too far from conservative practice. It will be found, however, that the majority of failures which might be hastily assumed to come under this head have been due, for the most part, to overlooking or disregarding some of the seemingly less important features of design or detail.

Architectural conditions often invite eccentric loading of columns, or connections that should be avoided or overcome by suitable design or detail. Too frequent splicing of columns to secure an apparent saving of weight are frequent errors of the inexperienced. The use of material not readily obtainable, as before explained, may be a source of vexatious and expensive delay. Zee bar columns, for instance, were for a long time in common use, but for one reason or another have fallen into disfavor, and should not be used under any ordinary conditions, and not at all until the possibility of securing them has been determined. Tradition has apparently fixed in some offices the size of material to be used for certain minor details, as lintels and the like, without much regard to actual needs — not a serious matter, perhaps, when steel is cheap, but well worth saving at any time.

Economical steel design can be obtained only when the designer is in possession of all the data relating to loads and limiting conditions connected with his problem. Frequently some of these items are lacking, and he must either play safe or wait.

If a building is obviously of a type that must require wind bracing, it should be carefully considered in relation to architectural details, and if the problem is at all difficult, the best advice obtainable is the cheapest. Probably no single feature of design invites more discussion than wind bracing, and the designer is usually fortunate if the Building Code provides definitely for requirements that are evidently safe.

Foundations are, of course, closely related to steel design, and the determination of maximum loads is usually a part of the design in which the question of wind bracing may be a considerable item if the building be high and relatively narrow.

The increasing use of Bethlehem or other beams with wide flanges often results in a conflict between structural details and the best conditions for installation of plumbing or other piping. The steel designer, and if he does not, the steel fabricator, will prefer to have all beams frame on center lines of columns where at all possible. The reasons are, of course, obvious, but it may be desirable to place the beam a little to one side of center for convenience of the plumber, or to avoid a plaster beam in the finished ceiling where it would be unwelcome. How much eccentric loading is permissible, or how its effects can best be overcome, is one of the things frequently passed over lightly. Nothing but the additional factor of safety involved in the loading used has prevented much unpleasantness from this cause. Much of the difficulty from this condition could be avoided if taken in time, and it is probable that steel designers have been at fault in accepting this condition as inevitable instead of avoidable.

It may seem that much of what has been said is merely a plea for larger use of the steel specialist. Probably this should be done, but if done efficiently would in time eliminate many of the things that we now do from force of habit, or that we copy as a new idea from whatever source it comes to us. There should be a more careful study of the right relations for economical construction for all trades, so that the plumber or the steamfitter may accomplish his work with a minimum and not a maximum of fittings. There is probably more to be gained in this line of endeavor, at the present time, than one realizes, and in the survival of the fittest that these times will surely bring only those may hope to live who can demonstrate that they accomplish the utmost of satisfactory result at minimum cost.

There is, perhaps, a type of industrial building where the engineer, and not the architect, has been too much in evidence and where the matter-of-fact engineer has felt able to undertake work that did not rightfully belong to him. Much of the ugliness of this class of building may be avoided, at little or no increased cost, if right relations between architectural and structural design are considered instead of mere utility.

It may be asked, whether the architect should attempt the preparation of his own steel plans. The answer should be, that if the amount of work handled in his office will justify the employment of an experienced designer, one who can intelligently and sympathetically work with him, the best results will be attained. Otherwise it will be wiser to retain, as required, the services of the best talent available, giving the structural designer full opportunity and information that he may make his service as helpful as possible.

A New Type of Reinforced Concrete Floor Construction

By EDWIN F. ALLBRIGHT, CIVIL ENGINEER

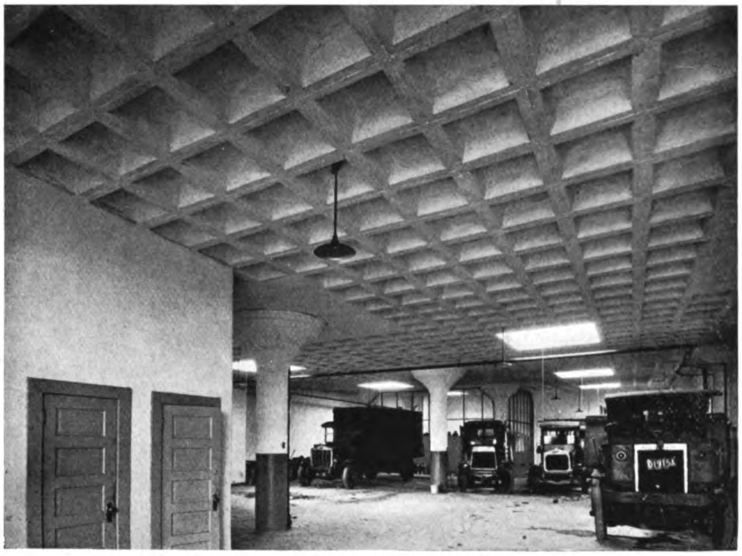
(The system described in this article by Mr. Allbright is, so far as known, the most recent development in the line of concrete construction, and in this presentation is the first description of this system which has ever been made public. THE ARCHITECTURAL FORUM is very glad to present to its readers systems of construction of this sort, particularly when they can be presented before reaching them through other mediums.

We hope later that Mr. Allbright, who is the inventor of this system, will present further details to our readers, as from the standpoint of economy and rapidity of construction — it would seem that this method might readily be adopted.— EDITOR.)

THE cost of buildings at the present time is high, even though construction operations have been far below normal, and it is generally accepted that high prices will continue for a long period. Materials have become fairly stabilized though some classes show even a further rising tendency, but there is a widespread spirit of unrest and dissatisfaction among labor. Strikes have been called with practically no construction work going on. When building operations really get under way on a large scale, as is inevitable within a few months, there will be a shortage of common labor due among other things to the large numbers who have gone back to their own countries and to the lack of immigration into this country for several years. The law of supply and demand and the probability of contractors bidding against each other for workmen may raise the scale of wages for labor even above the present high level.

Under these conditions anything that will cut down the usual amount of material and the number of hours of labor required to produce a certain piece of construction will be welcomed and investigated with keen interest by all having to do with building operations. The new type of reinforced concrete floor construction described in this article is called the "Grid" system, on account of its resemblance, looking at it from below, to the grid or waffle iron. In changing from structural steel to reinforced concrete construction, a great advantage results from the fact that the latter construction is cast monolithic in place instead of being assembled at the building from a number of separate structural members. Of course this has been gained partially by computing for continuity instead of for simple spans; but it would seem that still further advantages should be had. The most economical, and therefore the ideal, type of construction to attain would be that system in which every part of the structure is working up to its capacity or up to its allowable stress under the loading for which it is designed. The new Grid system aims to accomplish this result and is a radical departure from most of the older methods.

The Grid system consists of columns with column capitals, a solid slab projecting beyond the capital with cantilever effect, and a slab with recesses in the under side throughout the remainder of the bays or panels extending to the margins


Detail View of Garage Showing Grid System of Floor Construction

of the solid portions, the ribs between the recesses being reinforced with bars near the bottom, and the solid portion over the columns being reinforced near the top. The recesses are obtained by the use of removable forms. These forms or pans are of sheet steel and are designed so as to permit of simple installation and of easy removal after the concrete has been cast in place.

One of the features of this system is the centering to support the pans. This consists of a simple arrangement of wood members, which allows the pans to be removed in a short time after the pouring of the concrete.

After the wooden centering has been erected and the forms placed the reinforcement is laid. The concrete may be poured from buggies operating on runs or a spouting system may be used. When the concrete has set sufficiently to carry its own weight on the short span between shores, the centering with the exception of the shores may be removed. The forms are oiled before the reinforcement is placed and they come out very readily. The shores are left up in their original position with an undisturbed support to the concrete until the concrete has set up enough to be self-supporting, or if the building is going higher the shores for the next floor may be placed directly over those below.

The first question an owner, architect or contractor asks about any new type of construction is, "Has it been used in actual construction work or is it merely on paper?" The first building in which the Grid system was used was constructed in the spring of 1918 under the very trying conditions then prevailing for all contractors doing private work. A second building was completed the following winter, and the third and fourth building in which this construction is being used are now under way.

In the early part of 1918 this type of construction was presented to the Army Engineers at Washington, offering the use of this system for warehouses, etc., which were in urgent demand especially near the seaboard. The merits of this new construction were generally recognized by them, both from the standpoint of speed in construction and from the economies effected. But due to the sudden termination of the war, which caused an abrupt ending of all building operations carried on by the Government, it was not used in any of their buildings.

The first contract in which the Grid system was used embraced an area of 11,000 square feet. It was difficult to get materials, carpenters and common labor, but the real difficulty arose in getting the removable steel forms made. A manufacturer with the necessary presses and a supply of the proper gauge sheet steel was finally located. Two sets of dies were made and carried to the presses. Just at this time the manufacturer received an order from the Government for a large quantity of trench periscopes. This order received precedence and delayed further work on the pans for four or five weeks. When the pressing was finally started it was found that the metal on hand was too hard and brittle to draw down, and no other could be obtained. The pans were finally made of a lighter gauge metal by a different process. These pans, although considerably lighter than was thought necessary, have stood up very well. Under all these difficulties the merits of this construction were so great that the building was carried through successfully with a remarkable saving.

The advantages of this system of floor construction are: saving in concrete — the portion of the floor in which the pans are used is about five-sixths of the total area. The depth of pan to be used and the thickness of concrete over the pans depends on the span, live load and use to which the floor is to be subjected. It has developed that a pan 8 inches deep works out nicely for a considerable variety of spans and live loads. From a number of designs made the saving in concrete amounts to between 20 and 30 per cent over the usual flat slab construction. This saving amounts to between 30 and 45 pounds per square foot.

Saving in dead weight, — the above saving of 30 to 45 pounds of dead weight of construction affects the columns and column footings. Smaller columns and footings may be used or a less number of piles. In a 6-story building with bays about 22 feet square and a live load of 150 pounds per square foot, there would be a saving of two concrete piles, or about 15 square feet of area on a soil with bearing value of four tons per square foot. There is a wide variety of opinions as to the proper live load reductions to make on columns, but any saving in the dead weight of floor construction is a definite and positive saving in the columns and foundations.

Saving in steel reinforcement, — there is a saving in the amount of reinforcement required on account of the decreased dead load. In some cases it has even been found economical to make the total depth of construction more than the thickness of the usual flat slab. For instance, where a 9-inch slab and a 2-inch dropped panel or plinth would be required, an 8-inch pan with 3 inches of concrete above the pan has been used, making the bottom of the ribs flush with the bottom of the plinth. This arrangement produces a construction weighing approximately the same as a 7-inch solid slab, but with a total depth of 11 inches as against a total depth of 9 inches for the usual flat slab. If the clear story height is taken to the under side of the plinth, as is often done, this arrangement does not require any increase in the height of the building over the usual flat slab construction. Comparative designs show the saving in steel to be between 10 and 20 per cent.

Longer spans may be used, — on account of the saving in dead load and a deeper and therefore stiffer construction, as explained above, longer spans than are usually laid out may be used. Economies have been effected up to 30-foot spans thus far.

Saving in centering, — the uprights or the shores may be spaced further apart on account of a less amount of concrete to support. With the exception of the batter boards only dimension lumber is used, and there is a good salvage value in this kind of lumber, the removable pans eliminating the usual waste in the board decking in the ordinary flat slab construction. Higher buildings may be constructed on account of the saving in dead weight.

Appearance, — the ceiling appearance is attractive, the dull effect and board marks of the ordinary flat slab are lacking. The coffered effect of the ceiling is very pleasing to the eye. The illustrations show the character of the ceilings in this type when no special attempt has been made to obtain any finish beyond the condition as left by the forms. It will at once be apparent that by applying a plastic surface to the beams and coffers an attractive, interesting result may be obtained.

Although the illustrations show the construction as applied to a garage building, the system obviously is applicable to any type of building project where long spans are an essential.

The concrete construction and the means used in producing these results are the subject of Letters Patent and applications for Letters Patent.

Construction View of Garage Showing Grid Floor System

EDITORIAL COMMENT

"AMATEURS" *vs.* PROFESSIONALS

THE daily papers report that at the recent meeting of the National Association of Real Estate Boards at Atlantic City, Mr. William E. Shannon of Washington, first manager of the real estate division of the United States Housing Corporation, created a stir by saying that while the personnel of the Housing Corporation during the war was composed of men who were leaders in their respective businesses and professions, they were, with certain exceptions, amateurs in the business of industrial housing. "They were," he is reported as saying, "in the main full of theoretical European ideas, always looking to England and Germany for examples, and not realizing or appreciating the fact that the American-born industrial worker resented being patronized by his employer or subsidized by his Government. They seemed to think more of what Germany had done, or what England was going to do, than what America had already accomplished, and this made it doubly hard for experienced realtors to direct them into the right channel."

As the personnel, both of the Housing Corporation and of the Bureau of Housing and Transportation of the Emergency Fleet Corporation, was largely composed of architects, the above statement has a direct bearing on the part played by the profession in the war. It is necessary to concede that the avalanche of housing work found many of the architects unprepared, and even their co-professionals who were conducting the respective bureaus have complained bitterly that window boxes, garden walls, oriel windows and lattices seemed to take precedence in some minds over the hard facts of cubage, economical plotting of lots, and strict adherence to ready-make detail work; while specifications often seemed to be more appropriate for the prospective home of a stock operator than of a munition worker. But conceding all this, it is not clear upon just what meat this Cæsar of realty has been feeding that he hath grown so great, and before hastily condemning the creators of American war-housing as "amateurs" let us examine a little into the progress made before the war by the experienced "realtors," a designation which we take to be a euphemism of Mr. Morris Perlmutter's "real-estater" of delicious memory. When we consider that the principal achievements of the latter during a century or so of activity began with the "dumbbell" tenements of New York City, and ran the gamut of the two-story "rows" of Philadelphia and Baltimore, the jerry built cottages of the Middle West and the wooden three-deckers of Boston, and that every effort of far-sighted reformers to eliminate dark inside rooms and common water closets, to reduce the fire hazard and render even a little sun and air available to the tenement dweller, was met with the wail of the real-estater that it "wouldn't pay," we might as well remember that among the thousands on thousands of dwellings built by the Government there is not a single dark or inside room, not a house without proper plumbing and drainage, and hardly one without a bath; that overcrowding on the land does not and cannot exist in the villages laid out by the Government's town planners, and that the standard of æsthetic effect (of no account to the real-estater, it is true) has been fully met in every project. Faults of detail occur, and grievous mistakes were certainly made, but in the final balance we are willing to weigh the hasty work of the "amateurs," even if influenced by English or German models against, for example, the building up of the Dorchester district of Boston; or, although in a different class, even such a masterpiece of the realtor's art as the development of the Borough of Queens, New York.

We question also the value of Mr. Shannon's slur on English and German work and his allusion to the "resentment" felt by the American worker against being subsidized by the Government. The American worker may not like to be subsidized, but judging by his recent attitude he has no objection to getting from the Government unlimited compensation for a very mediocre return in labor. American labor will do well to reflect upon the proposition of a nation which works half-heartedly eight or less hours per day, five days in the week, competing with European nations whose people work hard twelve or fourteen hours a day, six days in the week.

As for the value of German attainments in industrial housing, it is certainly the poorest sort of business not to avail one's self of useful material, even when it is the work of an enemy, and to shut one's eyes to German attainments in any form is as idiotic as the attitudes of those Boards of Education which have discontinued the teaching of the German language.

The architects and town planners employed by the Government during the war worked hard and faithfully for a modern standard of housing. Costs of materials and labor were beyond their control, but we believe that their work has set an example of the greatest value which will have the most beneficial effect on the future of industrial housing in America.

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VOLUME XXXI NUMBER 3

CONTENTS for SEPTEMBER 1919

PLATE ILLUSTRATIONS

LETTERPRESS

ALBERT J. MacDONALD, Editor

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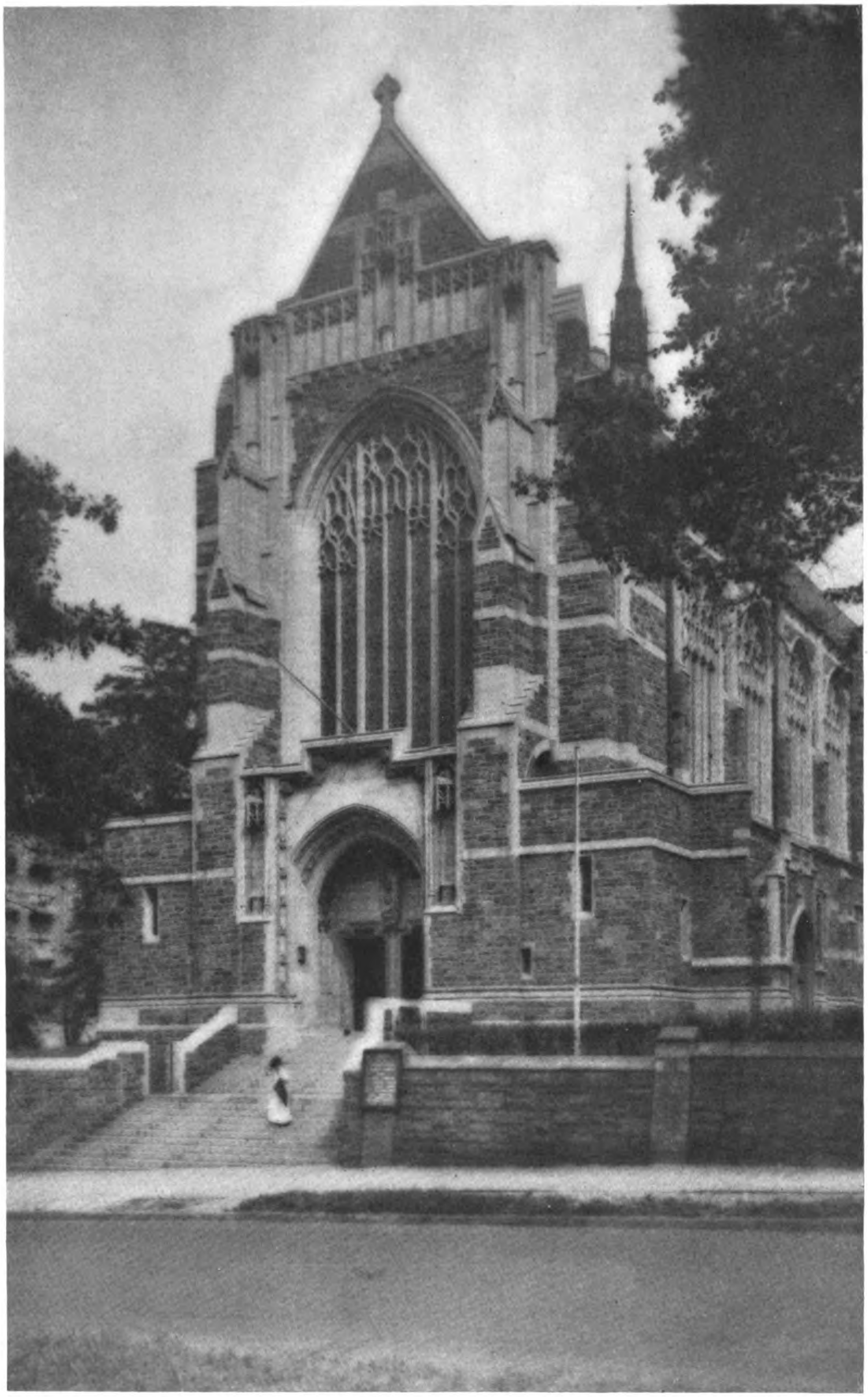


CHAPEL OF THE INTERCESSION, NEW YORK CITY
BERTRAM GROSVENOR GOODHUE, ARCHITECT
Photo by John Wallace Gillies

THE ARCHITECTURAL FORUM
FOR QUARTER CENTURY THE BRICKBUILDER
VOLUME XXXI SEPTEMBER 1919 NUMBER 3

The New University of Colorado Buildings, Boulder, Colo.

DAY & KLAUDER, ARCHITECTS

By AYMAR EMBURY II

THE sensible way to erect any great group of buildings is to determine in advance a program or group plan for its development as far as this can be foreseen, whether the buildings to be erected immediately are few or many; but unfortunately most American universities have not taken this course of action, and in consequence are housed in helter-skelter collections of buildings, of architectures as miscellaneous as the periods in which they were built, and arranged without regard to convenient interrelation of functions or to the collective picture which they would present.

It is probable that the earliest American universities did, at least in a small way, think of the buildings as a group; certainly this was the case in the University of Virginia; and, a Princeton man myself, I happen to know that at Princeton the small group of eighteenth century buildings was planned as a group when the college was begun; it is probable that other of the older American universities did have group plans intended to care for what seemed to the men of that day the needs of the universities for a considerable time. One cannot blame the trustees of, let us say, Harvard University for not foreseeing in the eighteenth century the development of the University to-day; but as practically every college and university in the country during the nineteenth century built its buildings for the most part without regard to what had gone before or what might come after, the average American university is an architectural mess, and only now are the universities endeavoring to remedy the mistakes which have been made during the last one hundred years. At Princeton, for example, the original small group was almost swallowed up during the years between 1850 and 1890, and when at the one hundred and fiftieth anniversary of the founding of the college a new group plan was considered, it was necessarily not a development and continuation of the original group plan, but was based upon a fundamentally different conception of the grouping of college buildings. Even the original style of architecture of the university was ignored when it was determined that any future buildings should be based upon the English collegiate Gothic. To my mind this was something of a mistake, and I should have liked to have seen Princeton developed in a more or less colonial style with the remaining old buildings as a basis; but the Gothic buildings which have been erected around Princeton have been for the most part of such excellent character that I have been steadily growing weaker in my belief that a mistake was made, and finally, when I saw for the first time, this spring, the new Freshman dormitories and the dining hall group, designed by Day & Klauder, I realized that Gothic was being used no longer as a tradition but as a modern and living

General View of Model
Looking toward the West

View Showing Administration Building from Pennsylvania Avenue

architectural style. The firm of Day & Klauder has been notable for the excellence of their collegiate buildings, but I can recall no other which approaches the magnificence of design, the richness and beauty of detail, and the careful attention to material of the dining halls at Princeton, and when Mr. Klauder brought into my office the drawings of the new buildings of the Colorado University, I was prepared to find perhaps nothing better than the dining halls at Princeton, but at least a development of similar character.

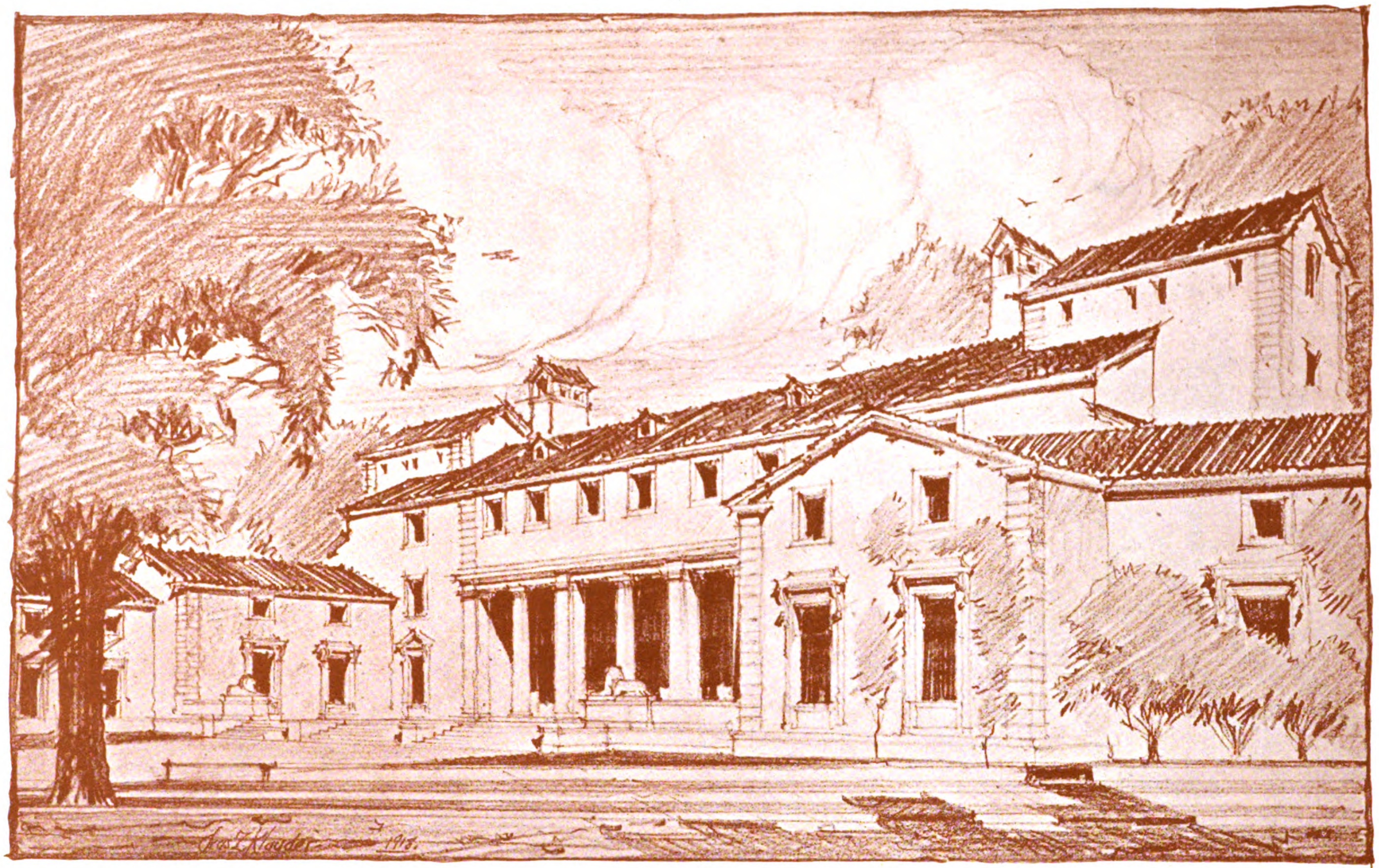
At the time of the architects' study of the development plan the trustees of Colorado University asked if the English Gothic style could be used as a keynote or motive for their new buildings; but upon Mr. Day's visit to the site after the completion of the preliminary scheme it occurred to him that another style would be better fitted to the conditions. With further study of the problem it was not difficult to convince the trustees that the English Gothic style was not necessarily the only one for a university, and was probably not the best which could be devised for the southwest part of the United States. In Colorado the architect has a freedom which he would not find elsewhere. In so far as any really traditional architecture exists, it would be the flat roofed adobe of the Spanish Mexican settlements; but the examples, within the limits of the state, are so insignificant as to be negligible, and the new buildings built in the state have been, as elsewhere in the United States, of every conceivable style and of all possible materials.

However, there are certain guiding elements in the choice of a style which have led to the design shown in Mr. Klauder's drawings. These are, as nearly as I can determine them: The university is in the country; the style should therefore not be urban. As a university is made up of a multitude of small units,—class rooms and living quarters for the students and faculty,—a monumental style for the whole is unsuitable. As the university is in the Southwest, an architecture suggestive of its location should be adopted. As the site is irregular and as the new development must conform to the spaces not already occupied by buildings, the style must be flexible.

Now it is obvious that these conditions could be met by a brand new style of architecture, if any one were able to invent a new style; but as no one is, and as Mr. Klauder is wise enough to know that no one is, he cast about in his mind for a prototype which should meet these conditions and found one, surprisingly enough, in the free, country-town architecture of northern Italy.

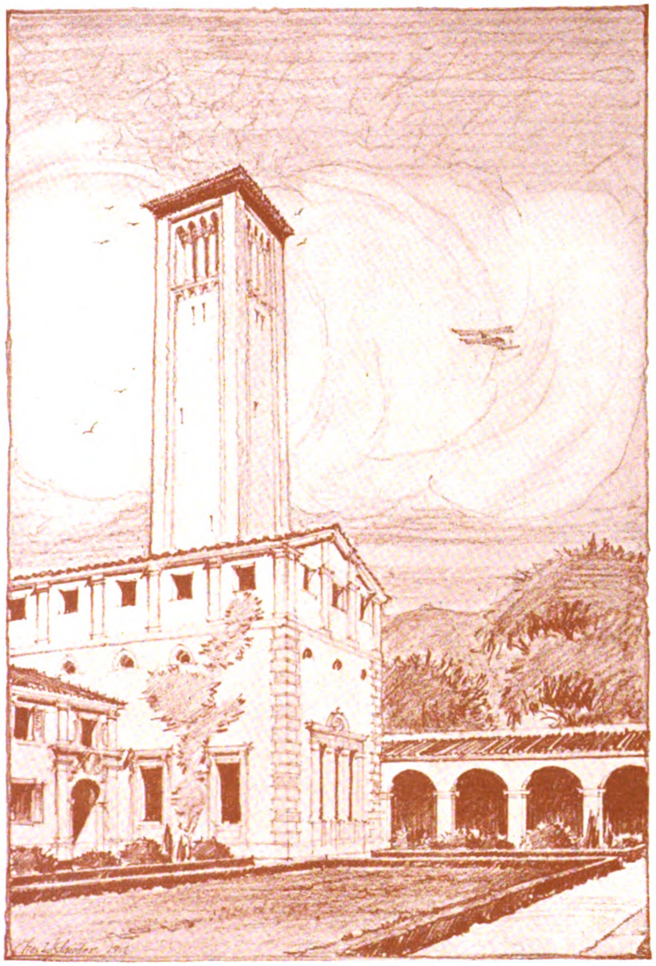
Personally I do not believe that he tried all other architectures and found them wanting; but that, knowing as he does, how informal, how free and

View of Administration Building across Central Court



Administration Building

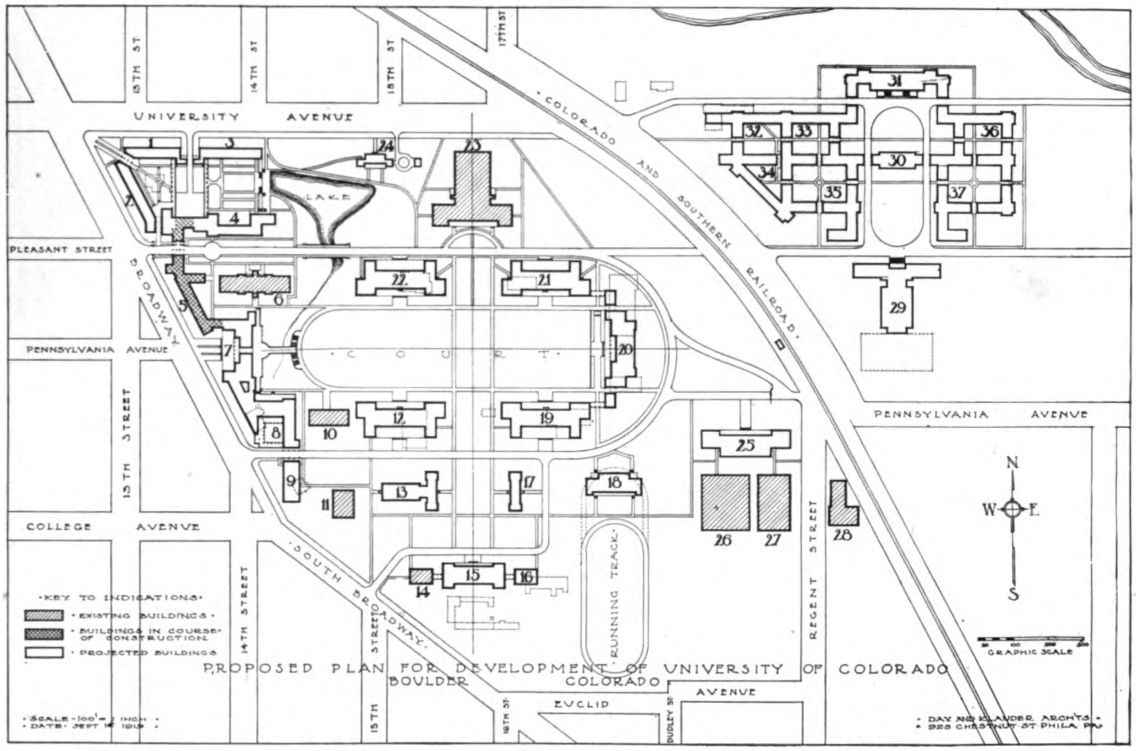
Colorado University Buildings, Boulder, Colorado
Day & Klauder, Architects



East Court, Women's Dormitories

Administration Building Terrace

Colorado University Buildings, Boulder, Colorado
Day & Klauder, Architects



Development Plan for University of Colorado, Boulder, Colo.

1–3, 5. Women's Dormitories
4. Dining Halls
6. Hale Science Building
7. Administration Building
8. Social Center Building
9. Theater
10. Guggenheim Law Building
11, 12. Science Building
13. Medical Buildings
14. Dennison Memorial Building
15–17. Medical Buildings
18. Women's Gymnasium
19. Science Building
20. Library
21. Physics Laboratory
22. Liberal Arts Building
23. Mackey Auditorium
24. President's House
25. School of Engineering
26–28. Shops
29. Men's Gymnasium
30. Kitchen Building
31. Dining Halls
32–37. Men's Dormitories

how plastic this style is and also what delicious combinations of the simple, the mannered and the dignified can be made, he chose the style and argued for it, not so much because he thought it was the only thing which could be used, as because he liked it and believed in it.

The average American architect experimenting with Italian motifs produces almost invariably a building based on a selected few of the many buildings of the Renaissance which are to be found in Italy. We look upon symmetry, balance and the orders as being the root, trunk, branch and blossom of the Italian style; yet when we think back over what we have seen of Italy, or indeed of any part of the south of Europe, we realize that nothing is further from the case. Much Italian architecture, even of the Renaissance, is as irregular, as picturesque and as flexible as the collegiate Gothic of England or the Renaissance of the Loire, and the motifs from which this picturesqueness is built are few in number, simple in form and of very ancient conception. We all know that when we experiment with the Italian style we are very apt to produce something rigid, formal, almost monumental; while we also know that the genuine Italian architecture, except in certain of the villas, rarely will possess any of these qualities. Personally I do not know whether the little southern European villages are more picturesque and charming than those of northern France and England. Some of us prefer the one and some the other; most, I think, prefer whichever they have seen last, yet the point is that from both the impression we carry away is one of picturesqueness and of charm, not of dignity and symmetry, nor of balance and formality.

Such a style is then particularly adapted to the needs of a university where all buildings are of nearly equal importance, although of different uses, and where no buildings can justly be assumed to dominate the group. The average group plan chooses one building as its center and designs others to form a setting for it. The administration building usually is chosen as this center, and yet the administration of a university needs very little space and is in many ways of lesser importance than others of the university functions. Certainly the administration building

View of Library across Central Court with Physics Laboratory at Left

will not have the enormous rooms or tremendous heights which are needed to give scale to the center of a monumental scheme.

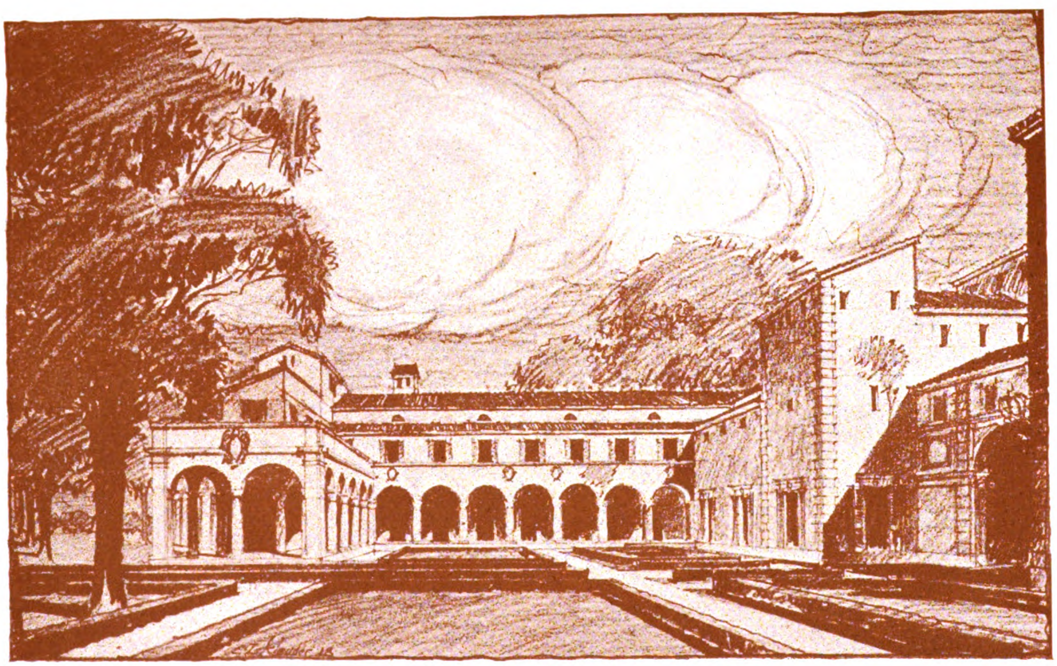
McKim, Mead & White, when they designed Columbia, chose for their central feature the library. As erected, it is an excellent center for an architectural scheme, but I think that no one would recognize its purpose from an examination of its exterior or even of its plan. There are, after all, only one or two buildings forming a part of the university group which need enormous central halls: the gymnasium for one and an auditorium where commencements can be held for another. Certainly no one would make a gymnasium the central feature of a group intended primarily for mental training, and as the auditorium in the average university is used but a very few times a year, it has become a mere frill upon the academic robe and is often dispensed with or reduced to proportions which will not demand an expense incommensurate with its utility.

Yet in every university certain of the buildings are naturally of small scale, as the dormitories; and others of larger scale, as the class-room buildings, the difference being not very great and yet not negligible. In the design, then, of adjoining buildings to house such diverse collegiate functions, the architect is liable to error either in conforming the types of building exactly and rendering his architecture inexpressive, or, by changing the scale and character of design, to lose the group harmony which must exist. This is especially true in buildings of the classic type, as, for example, in the University of Virginia, where certain of the new buildings, even those by McKim, Mead & White, do not accord in scale or in character with the old, although the same classic motives are employed in both. One of the advantages of Gothic collegiate architecture is that a single scale is employed in practically all the buildings of Gothic type, size and importance being indicated by multiplication of small windows rather than by the enlargement of single openings, and by piling up mountains of small details to form great masses instead of by magnifying single motives.

Of course it is exactly in a college group where the differences in scale are not too great that the flexible style of architecture, such as that chosen for the Colorado University buildings, can best be employed. One is at liberty to omit the orders in the smaller buildings and to keep the fenestration about the same throughout, so that the character of the work remains unchanged, although the relative importance of particular units is easily emphasized by the use of the orders and the beautification of openings or by an increase in the amount of ornament.

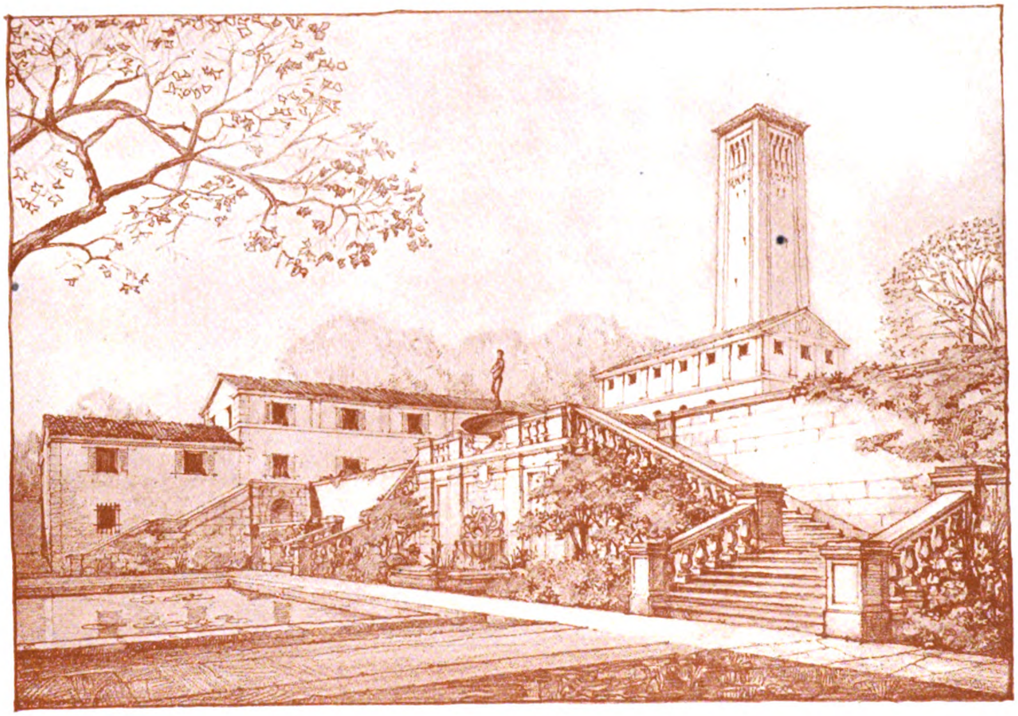
Now it is very easy to sit down and say, "My design is going to be free, and I am not going to be hampered by my preconceived ideas about symmetry and balance and things of that sort." It is quite another thing actually to work with such freedom, so I can imagine that had Mr. Klauder been less familiar with Gothic work he would almost inevitably have chosen a plan which would have resulted in formal buildings; but the plan has apparently been laid out, first with convenience and accessibility in mind; and, second, with a view to picturesque grouping rather than with the primary object of one grand *coup d'œil*, in which a magnificent central plaza should be flanked by smaller but similar buildings and terminated by a monument to the architect and something else incidentally. As a matter of fact, most plans in which the center has been strongly emphasized have been by no means as successful when erected as they appear to be on paper, because no one can quite grasp a very big scheme at one time, and if a large number of buildings form part of this center, the scheme is inevitably big. Even in the rather modest proportions of the University of Virginia, one fails to realize on the ground the beauty of the scheme as one does in the drawings of the plan, and in larger developments the fact that there is a

West Entrance, Women's Dormitory Group

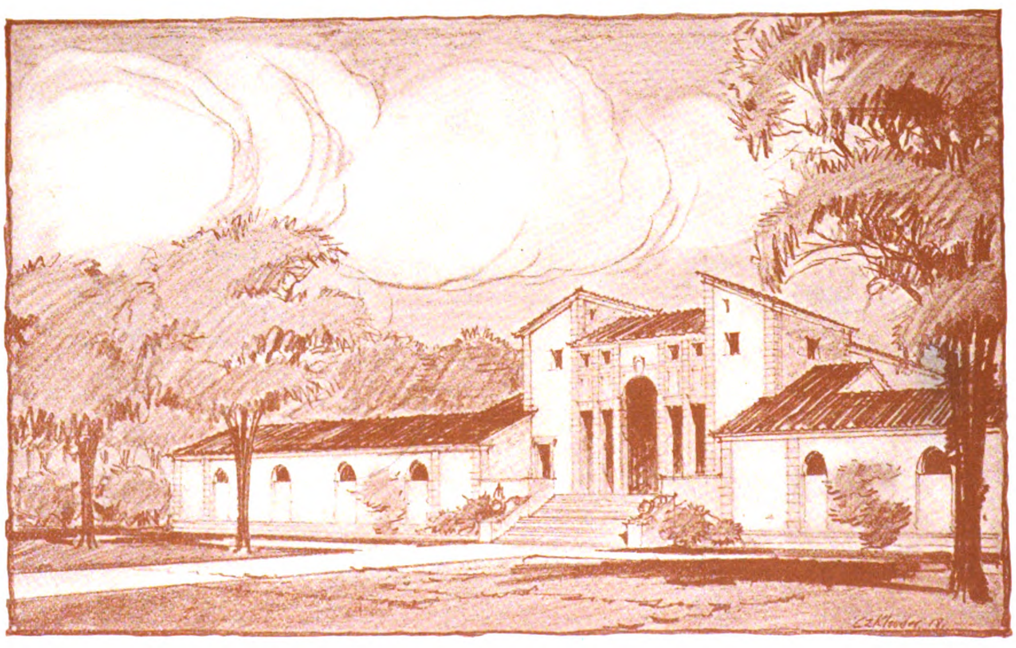


South Front, Social Center Building

Colorado University Buildings, Boulder, Colorado
Day & Klauder, Architects



Women's Dormitories, East Court

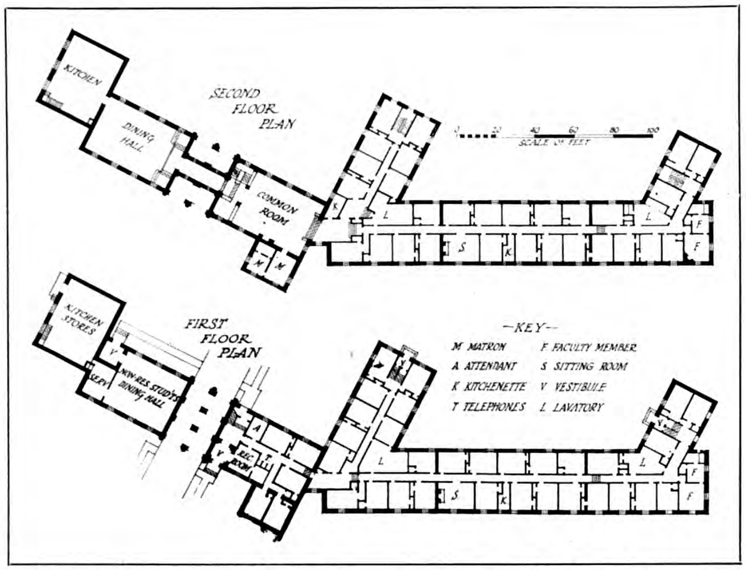


Gymnasium Building

Colorado University Buildings, Boulder, Colorado
Day & Klauder, Architects

scheme at all is very apt to be lost. Therefore, when buildings are necessarily of modest proportions and of small scale, as is the case in the university group, picturesqueness of silhouette and small and intimate groupings are rather to be sought than monumental plan.

In the Colorado University group plan a beginning had already been made for a monumental scheme and this could not well be abandoned, but the new plan places the buildings as close together as is practical, introduces small courts, and especially in the dining hall and dormitory group diminishes the scale, not of the buildings, but of the openings between the buildings, to that of the familiar English university plan; and, further, the buildings have been placed in general conforming to the boundaries of the property as well as indicating through their forms the "sense" or axis direction of the original grouping. This has produced a plan full of delicate complications and susceptible of an infinite variety of interpretations in elevation. Of these the most has been made. The administration building is placed at the main entrance to the whole group center, but is also attached by low wings to the dormitory groups and the social center building or community club house. A number of studies both in drawing and in model show what interesting results can be produced by such a set of determining conditions in the hands of a skilful and intelligent designer.



Floor Plans of First Unit of Women's Dormitories and Dining Hall, Now Under Construction

The main entrance to the group cuts directly under the administration building, and the treatment of this entrance and the combination of columns and pilasters against piers is sufficiently impressive to indicate its function as the principal entrance without losing the scale of the building. Of course this is only possible because of the naturalness and simplicity with which the adjoining buildings are handled. After all, architectural treatments of main entrances and principal rooms have as their basis the same principles which apply to advertising. Where a street is filled with blatant signs, the sign which will attract attention has to be enormous; but in a street in which all the signs are small and modest, a slightly more ornate treatment of even a small sign at once attracts attention.

I like this sort of thing; perhaps I am wrong, but I have felt for a great many years that here in this country we architects have striven to outdo each other by increasing the size of our orders and by the use of more costly materials, and I don't believe that this is either necessary or sane. Just as every new hotel erected in New York tries to have a bigger lobby, a more expensive dining room, brighter gilt, redder plush, so in public buildings we have tried too long to use the biggest columns, of the whitest marble, instead of forgetting the size or cost and focusing our attention upon design. Not only has Mr. Klauder in this group of buildings given us the best of value in his design, but he has given us design of a type I have personally never seen used before in this country in classic building. His thought seems to be primarily for an interesting silhouette rather than for a dominating order, and classic architecture used in this way appears to have a new meaning and vitality.

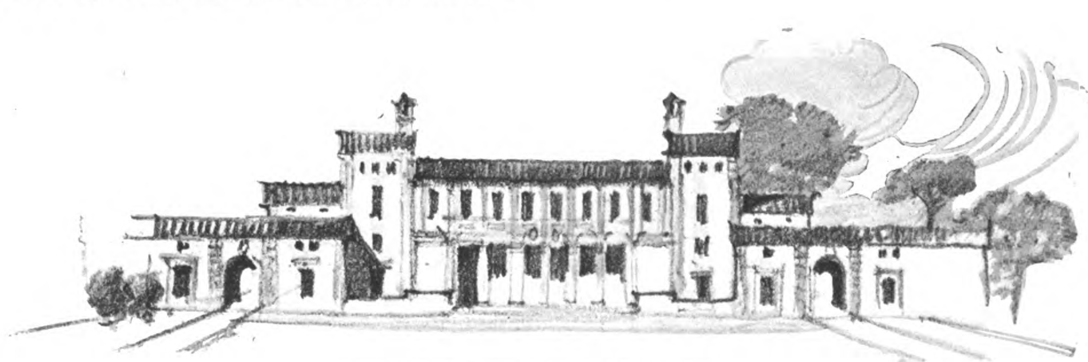
I wonder how many of us who have traveled in Italy and through the south of France (where the architecture is after all not very different from that of northern Italy) have carried away the silhouettes of roofs rather than the details of orders. To me it has come almost as a revelation that what I like about Italian architecture is not the Renaissance detail but the picturesque agglomerations of roofs of various heights and pitches and intersections that one finds throughout the old work, and so seldom in the new.

As to the plan of the University itself, without attention to the details of the various buildings, there is not much that need be said. No outside architect, unfamiliar with the property and without acquaintance with the wishes of the board of trustees, or whatever the guiding body may be, can form much of an idea of the problem which confronted the designer. There is a considerable number of old buildings at present on the property; some of these are ugly and some of them passive, but there are no two of them which look anything alike or which are related in scale, in mass or in location. It is inevitable that the investment they represent must be utilized in some way; some of them may perhaps be torn down, but it is too much to expect that any university will at once or even within a few years throw away several million dollars' worth of buildings simply because they are ugly and unsuited to any university development, when they are possible for use as class rooms or dormitories, and I do not suppose that the universities can be blamed for accepting the situations as they are. The study of the proposed group plan reveals the fact that these buildings have been masked so far as possible by the new structures, and if they remain as blemishes in the finished group, they will not be conspicuous blemishes.

Much might be said of the designs for the prospective new buildings and of their plans, but after all they are at present tentative, and detailed criticism, either favorable or the contrary, is very little to the point. The one thing which is of supreme interest is the adoption of a style for them which, as far as this country goes, is as novel as the Aztec, and the surprising discovery that it seems to be eminently fitted to the needs of the country American university. Of course the beauty of the old Italian work is to an almost realized degree dependent upon the surface texture of the walls, the irregularities of the slopes of the roofs, the color of the tile, and the similar miracles which time has performed. If this group should be completed substantially from the sketches as they stand, its appearance would be greatly influenced by the successful imitation in new work of the age quality of the old work. Having in mind the wonderful texture of the roofs and walls of the work of Day & Klauder in other styles, one feels fairly well assured that the result will here be satisfactory. The material chosen for the walls is a stone which splits naturally into long, horizontal pieces and which varies in color from pale yellow brown almost to purple. With such a stone laid up in wide cement joints the texture of the surface can hardly fail to be interesting. My one fear is that for such a large group it may prove to be monotonous; however, it would be by no means difficult to change the material to brick or even to stucco in several of the buildings, should this prove advisable. Likewise in the roofs, Mr. Klauder may be trusted to produce the delicate nuances of line and color that age has accomplished in the old Italian buildings, without striving for the effect of age as an end.

Of course the difference between what is legitimate in the architectural treatment of wall surfaces and roofs and what is mere scenery is that in the one case the qualities which age has produced in the old work are reproduced, and in the other case the more or less realistic appearance of age is the end sought for. We are so blinded in this country by our passion for "antiques" that we forget that a thing is not necessarily good because it is old, but that age is very apt to bring a lovely patina to surfaces which when new were ugly. There is all the difference in the world between stage scenery and good design, and yet many of us do not seem to realize that the superficial effect of age is not the aim of architecture; or that, conversely, if we wish to produce new buildings as lovely as the best of the old buildings, we must refine our designs as the old buildings were rarely refined.

That is only by the way: the important thing is that Mr. Klauder has made a new happy use of old precedent — one which will be in his hands successful, and one which will help to lift the heavy curse that lies upon us all, by which we seem compelled forever to think only of symmetry and the orders.



Sketch Study for the Library by Mr. Klauder

Architecture of the Dalmatian Coast

PART III (*Concluding Paper*)

By HAROLD DONALDSON EBERLEIN

As art is eternal and as architecture is the queen, the visible union and consummation of all the decorative arts, it is only reasonable that the architect should take cognizance of archæology, which is a treasure-house of past art and a never failing spring of inspiration. In this field Dalmatia has much of value for us in the remains of early art endeavor.

Fragments from Byzantine Period

In his "Man in Art," Philip Gilbert Hamerton quotes an amusing instance of an archæologist neighbor of his who stoutly maintained that "as each period of history had its own forms of art, it was wrong to attempt any revival." This same gentleman would buy a carved oak cabinet if it was three hundred years old, but deemed any attempt to revive oak carving as a form of artistic expression little better than a kind of forgery. His jealous archæological instinct impelled him to mummify and pigeonhole each and every past form of art rather than that it should live anew in rivalry with its own earlier productions.

For those who may be disposed to sympathize with Mr. Hamerton's archæologist neighbor's point of view and question whether Dalmatian remains have any calculable value for us, it should be sufficient to call attention to the vast store of very lively inspiration that Robert and James Adam derived from Spalato alone.

Fragment from Roman Period

The strictly archæological remains of Dalmatia, as distinguished from the Medieval and Renaissance work discussed in the two preceding papers, fall into two categories,—Roman and Byzantine. Of the work of the Roman period, the palace of Diocletian at Spalato is in itself an exhaustive museum and exemplar. The word "exemplar," rather than "example," is used advisedly, for this building exercised a powerful and pervading influence upon Dalmatian architecture so long as any creative work was essayed.

Both in structural forms and in decorative detail Dalmatian architecture was self-contained to an unusual degree, and Dalmatian architects, of whatever date or of whatever stylistic allegiance, seem never to have wearied of harking back to Spalato for inspiration or precedent. Giorgio Orsini, as already noted, from the little Temple of Æsculapius, now the Baptistery of the Duomo, derived his scheme for the roof of the Duomo at Sebenico; Andrea Buvina, or Guvina, who carved the thirteenth century doors of the Duomo at Spalato, which deserve to rank amongst the finest examples of medieval wood carving in existence, drew the *motif* for his stiles and rails from the ornament surrounding the door of that same Temple of Æsculapius.

It is both refreshing and suggestive thus to see local tradition utilized, vivified and developed from century to century, not in a spirit of stereotyped, slavish pedantry, but with a freedom of understanding conducive to vital individuality.

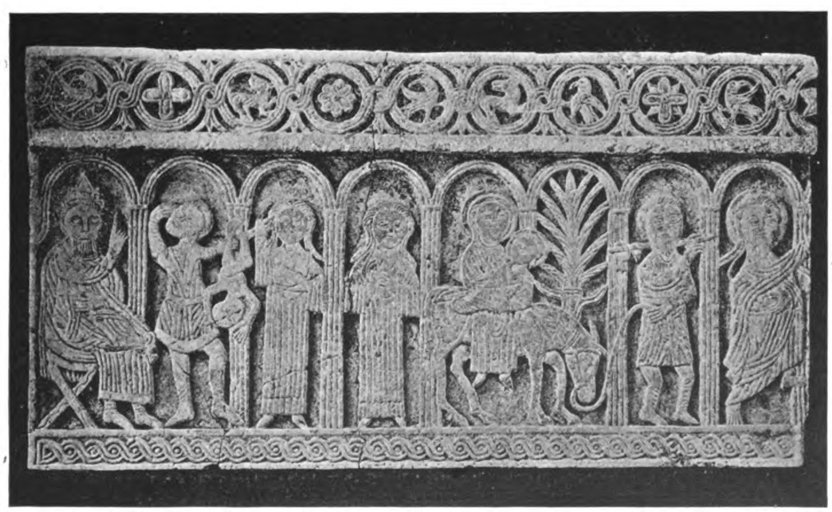
This breaking away from long established convention and precedent, this relaxing of the accepted architectural rules of antiquity into "irregularities" that presaged later Byzantine and Romanesque practice, may be detected in the numerous liberties taken in changing the character and proportion of members hitherto accorded a certain prescriptive fixity, or in the arbitrary omission of them altogether.

Roman Fragment in Museum at Spalato

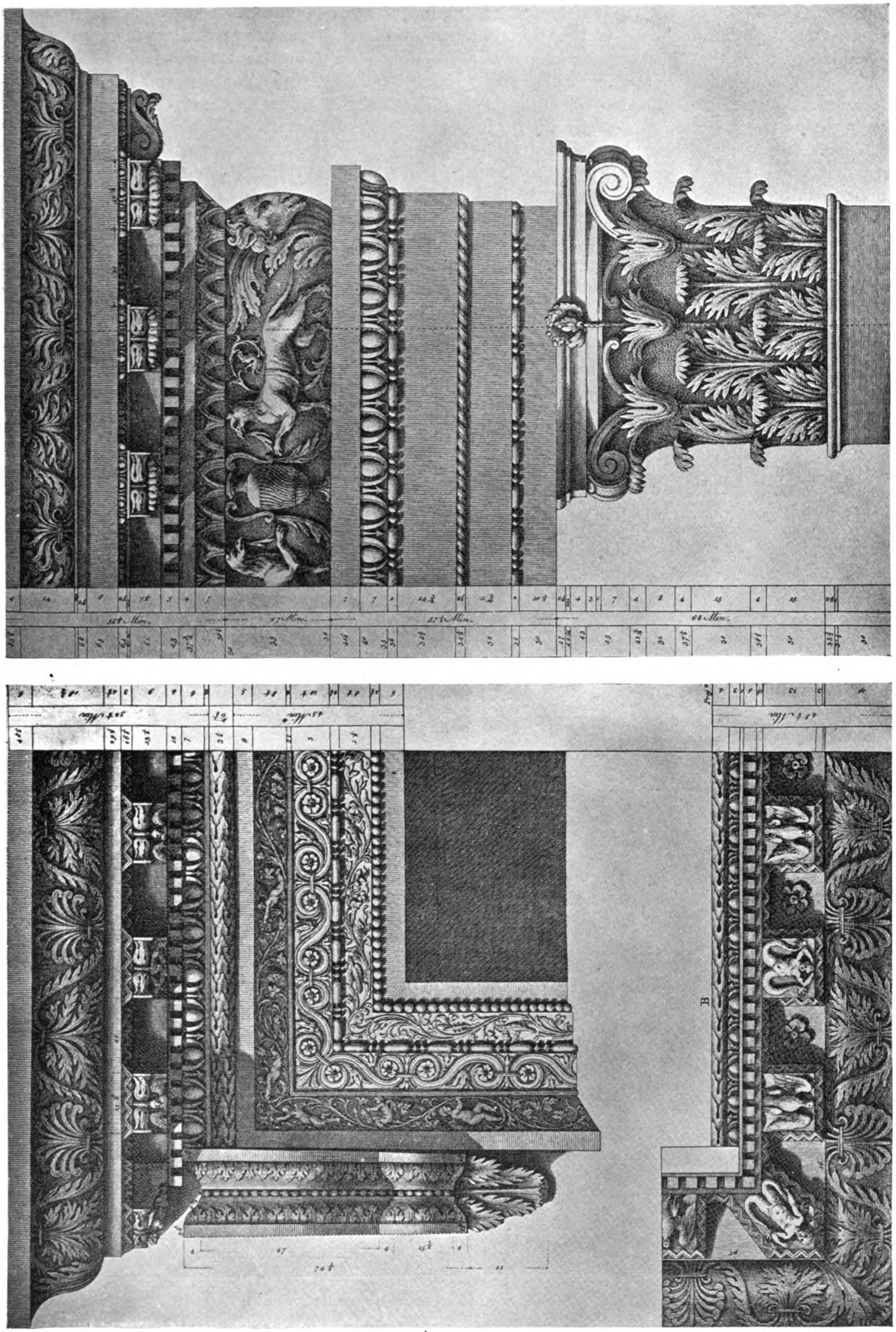
One of the most significant of these departures appears in the doorways of both temples (now the Duomo and the Baptistery), which have only architrave and cornice, the frieze being altogether omitted. The illustration also shows upon the architrave an array of scrolls, foliations and arabesques whose affinities seem to be with the work of a far later period rather than with the earlier Roman usages. The delicacy of the design and the crisp refinement of execution suggest Greek agency.

Tablet at Spalato

Other important innovations are the absence of frieze and of any distinct architrave in the cryptoporticus; the springing of the whole vestibule entablature boldly into an arch; plain bell and abacus capitals clearly foreshadowing twelfth century northern Romanesque work; new profiles for mouldings; the appearance of the chevron or zigzag and other new *motifs;* the miniature arcading of the Porta Aurea as the prototype of an ornament destined to play a conspicuous rôle in later Roman and Gothic work and only a short remove from the arcading on the thirteenth century façade of the Duomo at Zara; and the corbeling of colonnettes and returning of string-courses to form corbeled supports for superposed



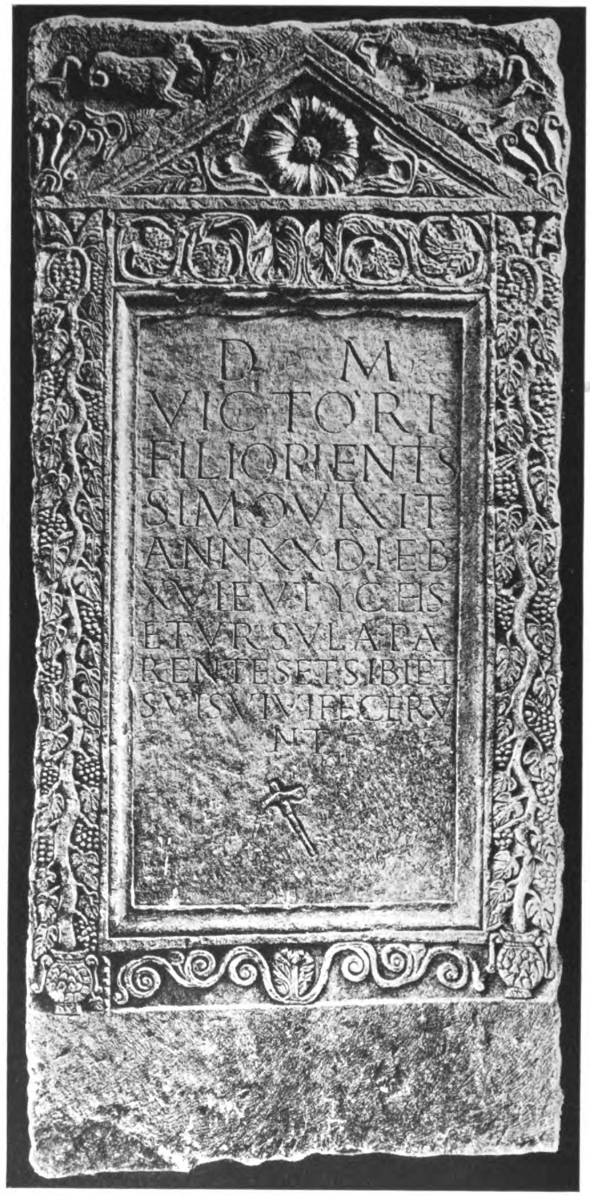
Fragment from Byzantine Period in Museum at Zara



DETAILS OF TEMPIO DI GIOVE, SPALATO, NOW THE DUOMO attached columns. Above all, the peristyle arches, springing from column to column without any relic of entablature, mark the "final emancipation of the arch" and the abandonment of trabeated *forms* of construction that had outlasted the *principles*. Whether this "greatest step ever taken, the beginning of all later forms of consistent arched architecture, Romanesque or Gothic or any other," was original with the architect of the palace at Spalato, or whether the building merely embodied the workings of a contemporary leaven of experimentation, does not affect its epochal quality.

Numerous other Roman remains and fragments yield valuable detail studies. Archæological remains of the Byzantine period are incorporated in many buildings, and not a few detached fragments are gathered at Spalato, Zara and in one or two other places. Almost without exception they are of vigorous design and of incisive, virile execution.

Archæology has unquestionably been a potent force all through the development of Dalmatian architecture, as the most visible evidences and obvious comparisons on every hand attest; but Italian creative ingenuity and flexibility of manipulation have made of it not an agent of archaical affectation but an instrument of abounding life.



Fragments from the Roman Period in the Museum at Spalato

The New Haven Post Office and Court House

JAMES GAMBLE ROGERS, ARCHITECT

By GEORGE NICHOLS

WHEN the pioneer settlers of New Haven established quarters for their first winter in the new colony, they located them upon the bank of a small creek, which was the natural approach to the new town site, lying about where Commerce street now exists. Tradition has it that the settlers' first architectural efforts were little more than dugouts in the sheltered, northerly bank of this creek, which, as will appear, was to be a determining factor in the lay-out of the present street system of the city.

The colonists arrived in the year 1638, and the following summer, John Brockett, their official surveyor, set off a base line one mile in length, in the rear of the dwellings on the creek bank, and parallel to its course. Upon this base line he developed a parallelogram one mile square. Dividing each side into three parts there resulted nine city blocks, which were separated and surrounded by streets. Lots in the eight outlying blocks were apportioned among individual members of the colony, while the central square was reserved as "common ground" and dedicated to communal activities.

Such was the origin and scheme of the first city plan to be conceived in America, in which a large and centrally located public square formed an organic part. This public square, later known as The Green, became and has always remained the center of New Haven's activities. As many chronicles record, "the history of New Haven is the history of The Green." The Green has come down through nearly three hundred years to the New Haven of to-day, sanctified as the first and continued place of public worship, hallowed as the final resting place of founders and patriots, and rich in historic association with every important event in the life of the city which it now endows with the beauty and distinction of a spacious park.

Dominating the square by reason of their isolated position in the center of its sixty-odd acres of greensward, stand three old Colonial churches, outlined against a background of trees, through which appear glimpses of the vine-clad college buildings. In front stretches an open parade ground surrounded by an avenue of young elms, replacing the century-old veterans which in their time had borne the standard of the "City of Elms." Facing The Green on the surrounding streets are the city hall, county court house, public library and other structures of importance.

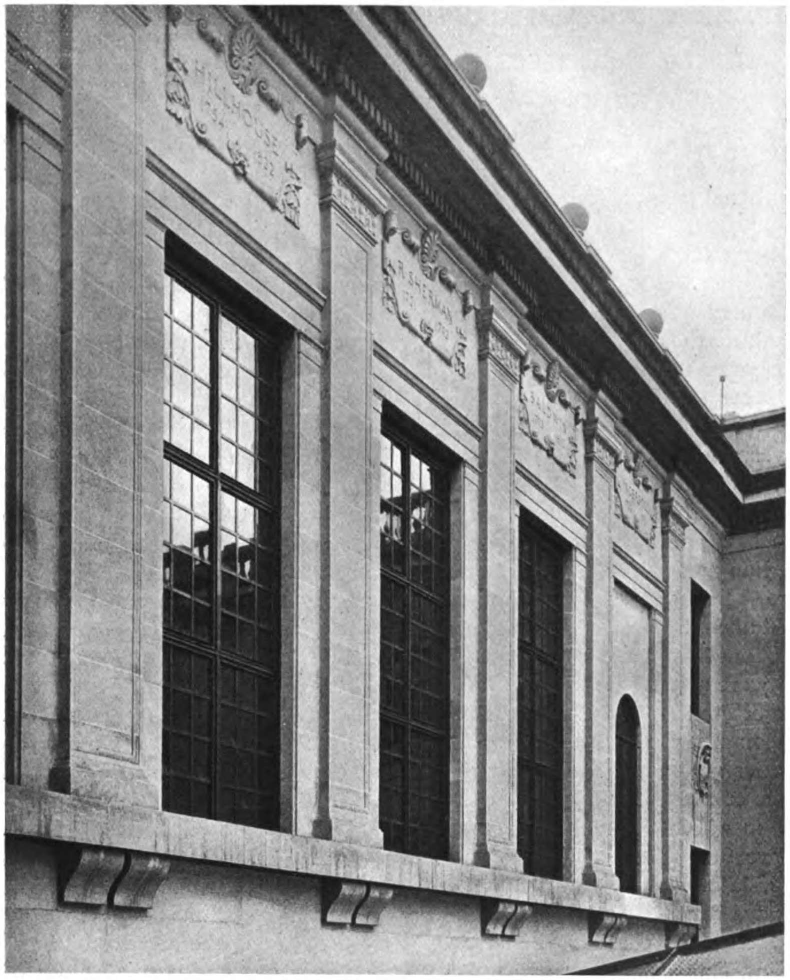
Every consideration of past history, present-day necessities, concern for the city plan of the future, and the continued importance of its focal center demanded the location of the new federal building upon a site facing The Green, which was eventually secured on the southeast corner of Church and Court streets on the easterly side.

Congress has recognized the unique character of the site in large additions to the first appropriation, because of its surroundings and their historic associations. It is interesting to note that upon the greater part of the site stood the old Tontine Hotel, built in 1828, in the basement of which the first post office in New Haven was opened in 1831. The new post office is the last Government building to be designed by an architect selected as the winning competitor under the terms of the "Tarsney Act," repealed a few years ago.

The site is a truly magnificent one in many respects. The open foreground of The Green permits unobstructed views of the principal front from all points within its boundaries. The more distant viewpoints are unfortunately somewhat above the level of the first floor of the building, but the disadvantages of being looked down upon rather than up to have been fairly well overcome. It was impossible to elevate the first floor above a convenient height for service by mail wagons in the rear driveway, but by the use of as many dark granite steps of moderate height as possible before the portico, by closely spacing the portico columns, and otherwise accentuating the vertical lines of the façade, the handicap of low elevation has been lessened to an appreciable extent.

Previous to the erection of the new public library, development of the city plan was vigorously agitated. The advice of expert counsel resulted in a determination to limit the height of future buildings around The Green to a few stories and their style to Colonial motives. It was found impractical to legalize such severe restriction, but an ordinance was passed limiting materials to white stone, or white stone combined with red brick, with the former predominating in the lower stories.

The exterior architectural treatment of the new post office has been nicely calculated to harmonize with the Colonial churches which face it, without sacrificing that monumental character to be desired in an important Government structure. This would have been perhaps more difficult to accomplish had purely Colonial motives been closely adhered to. The presence in the immediate vicinity of several high commercial buildings, and especially of the huge white marble court house, does not prevent



Upper Wall of Court Showing Court-Room Windows

harsher tones surrounding it. It is particularly delightful under the late afternoon sun, when its marble walls are suffused with a rosy glow, the dark golden bronze in the openings under the shallow portico serving admirably to produce the effect of depth of shadow required for proper accent in the façade.

The building as a whole justifies the belief of its architect in the effectiveness of restrained design well executed in fine material. It is simple and practical in plan and has clear architectural expression of the function and importance of its parts. The studied simplicity of many of its features insures permanency of style and continued harmony with its surroundings.

The building has a frontage of 140 feet on Church street and 200 feet on Court street, with a rear driveway for mail wagons 37 feet wide continuing around the building to Church street with a width of 18 feet. It is three stories high. The lofty first story accommodates the post office, portions of this story containing an intermediate floor on which various related departments are located. The second story contains the federal district court-room, surrounded by offices for judge, clerk, district attorney, marshal, witnesses and juries. Upon floor also are located offices for the collector-of-the-port and the customs house. The third story provides accommodations for the army and navy recruiting service and engineers, department of justice, internal revenue officials, weather bureau, steamboat inspectors, farm bureau and bureau of animal industry. In the basement are located storage and stock rooms for the post office, and toilet and rest rooms for its clerks and carriers; appraisers' warerooms and examination rooms, and the heating plant and other machinery.

Above the first story the center of the building becomes an open court, which lights the post-office workroom beneath and is the sole source of light for the courtroom, which is thus effectively isolated from street noises.

the structure from duly asserting itself. Its elegance and repose, due to careful proportioning and to extreme restraint in the scheme of architectural embellishment, endow it with a distinction adequate to its purpose and clearly express the dignity and grandeur appropriate to a public building.

The beauty of the building will undoubtedly be greatly enhanced when the masses of unhewn stone in the pediment and other spaces allotted to sculpture have been carved and made to add their intended and requisite expression to the composition.

Color in design is a very essential consideration with Mr. Rogers, and while the chosen style of this building does not present an opportunity for the employment of a wide color range, the color scheme both of the exterior and interior has received careful study. Pink Milford granite, pink Tennessee marble and a special and particularly pleasing color and finish for the bronze work lend a softness and warmth to the building in all lights, and distinguish it among the predominating

The building is of steel frame construction, resting upon spread steel grillage footings. All floor and roof construction is hollow terra cotta arch-end type. All steel is solidly encased in brick or terra cotta. The exterior walls are of pink Tennessee marble, with a sand finish resulting in a warm light gray color. The interior court walls are of Indiana limestone. The main roof is paved with terra cotta tile. All portico windows, with their sash, grilles and revolving door enclosures are of bronze, of a special dull finish, with nearly natural color. All other exterior window frames and sash are of wood, bronze covered.

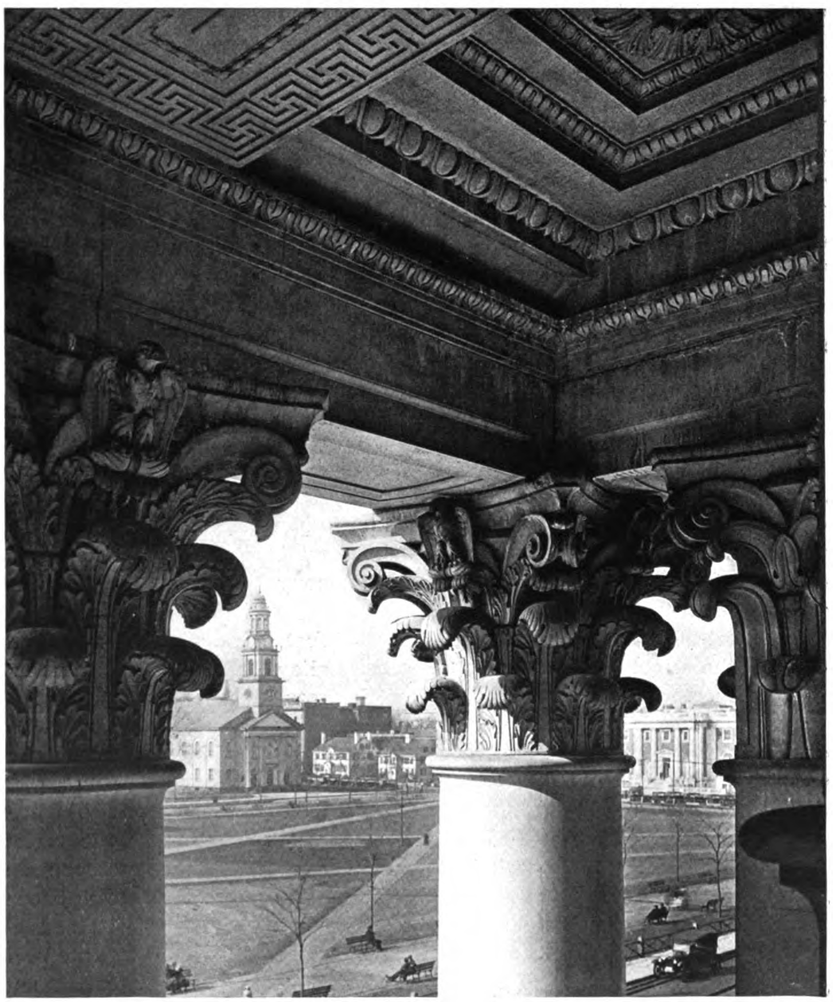
The first two stories are combined within a single order of pilasters of slight projection, carrying a well modeled cornice, above which the third story is treated as an attic and crowned with a carved marble chêneau. This chêneau is beautifully and simply modeled, and a conspicuous example of the restraint previously alluded to. On the principal, or Church street, front of the building is a shallow portico of ten Corinthian columns with plain shafts in drums and finely carved capitals, slightly varied in detail, the whole crowned with a pediment, whose tympanum carries at present the rough blocks for a future sculptural group. Other uncarved panels in the attic of the corner pavilions are to be similarly treated.

The foliation of the pilaster capitals is modeled with fine distinction, avoiding both unfeeling plainness and a too ornate treatment. The capitals of the portico are appropriately richer but still duly restrained. Additional importance is given the portico by slightly increasing the projection and enrichment of the cornice.

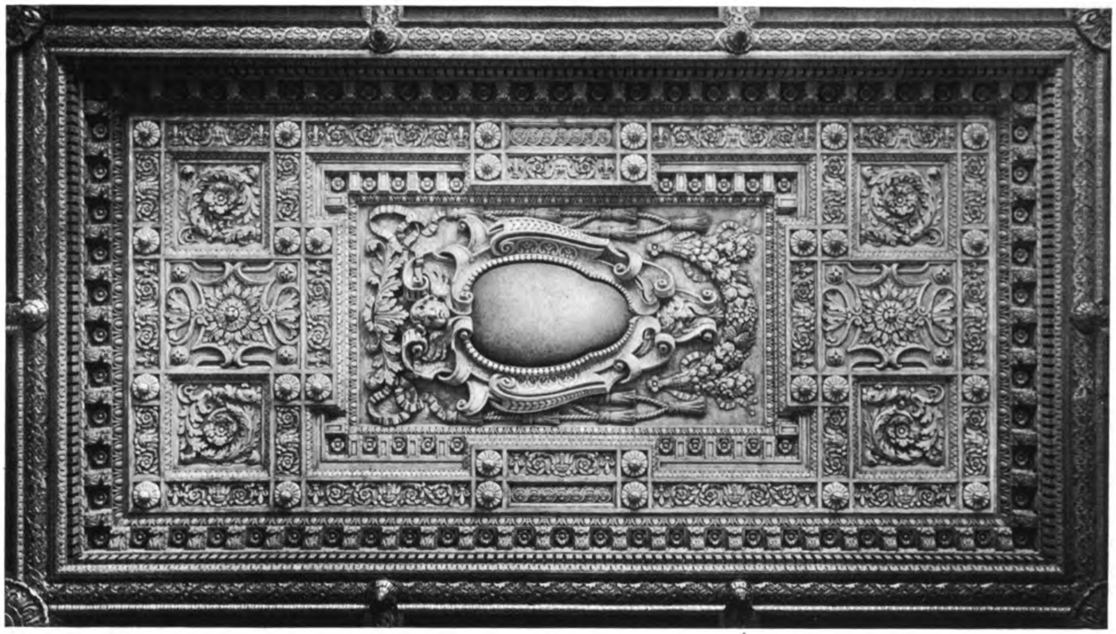
Contrasting color and scale in the portico roof are well avoided by the use of large interlocking tiles cut from the same marble as the building. Bronze frames between the pilasters extend without interruption to the architrave of the order, all windows above the lowest level being masked by grillework, creating dark panels contrasting with the marble emphasizing perpendicular lines, and lending color and depth to the portico. The ceiling of the portico is of marble, coffered in classic form.

The staircases which occupy the corner pavilions of the front have been lighted by skylights, fortunately avoiding the necessity of breaking these pleasing masses of wall, which form a frame and foil to the portico and emphatically terminate and solidify the façade.

Through the portico one enters the main lobby, 91 feet long and 20 feet wide, whose richly coffered ceiling is carried by travertine stone pilasters, carved capitals and architrave, 25 feet above the marble pavement. Smaller lobbies leading off at each end are 10 feet wide and 86 feet in length,



Detail of Column and Pilaster Capitals of Entrance Portico



Detail of Center Panel of Court-Room Ceiling

and of lesser height. The post-office screen, which fills twenty-eight spaces between the lobby piers, is of bronze, as are the writing desks, radiator grilles, window frames and other furniture. The walls of the small lobbies are also of travertine stone, the ceilings of plaster, treated with glazed gold leaf.

The ceiling of the main lobby is especially worthy of note. The ornamentation is interestingly intricate, good in form and scale, and a sufficient variety of models for the coffer rosettes is employed so that no two alike are seen in proximity. The color of the ceiling is a close approximation to the general effect of the travertine walls, and has been accomplished by repeated applications of buttermilk and rottenstone, each coat being wiped off the high lights of the ornament until an effect of softness and age in perfect harmony with the walls was secured.

The post-office working space is 133 by 170 feet, open to the street on one side, to the service alley on the other, and to the wagon space at the rear. It is thus directly lighted on three sides and also from the court above through a ceiling skylight 61 by 84 feet. The space above the glazed ceiling receives the natura [illegible] from the workroom in summer and a mechanical exhaust in winter. The portico window sash in the main lobby are all fitted to open, as are also the intervening sash behind the bronze grilles above the post-office screen. Open air ventilation of the working space on all sides is thus accomplished and abundant daylight is received in every part of the great room.

From each end of the main lobby, staircases and elevators rise to the mezzanine and two upper stories. These stair halls and stairs are finished in the same pink Tennessee marble as the exterior, with a honed finish, and showing a little more pink than the exterior stone. The elevator fronts and grilles are of bronze. All ceilings over the stairs are vaulted in plaster overlaid with glazed gold leaf, the same treatment being carried through the stair hall ceilings as well.

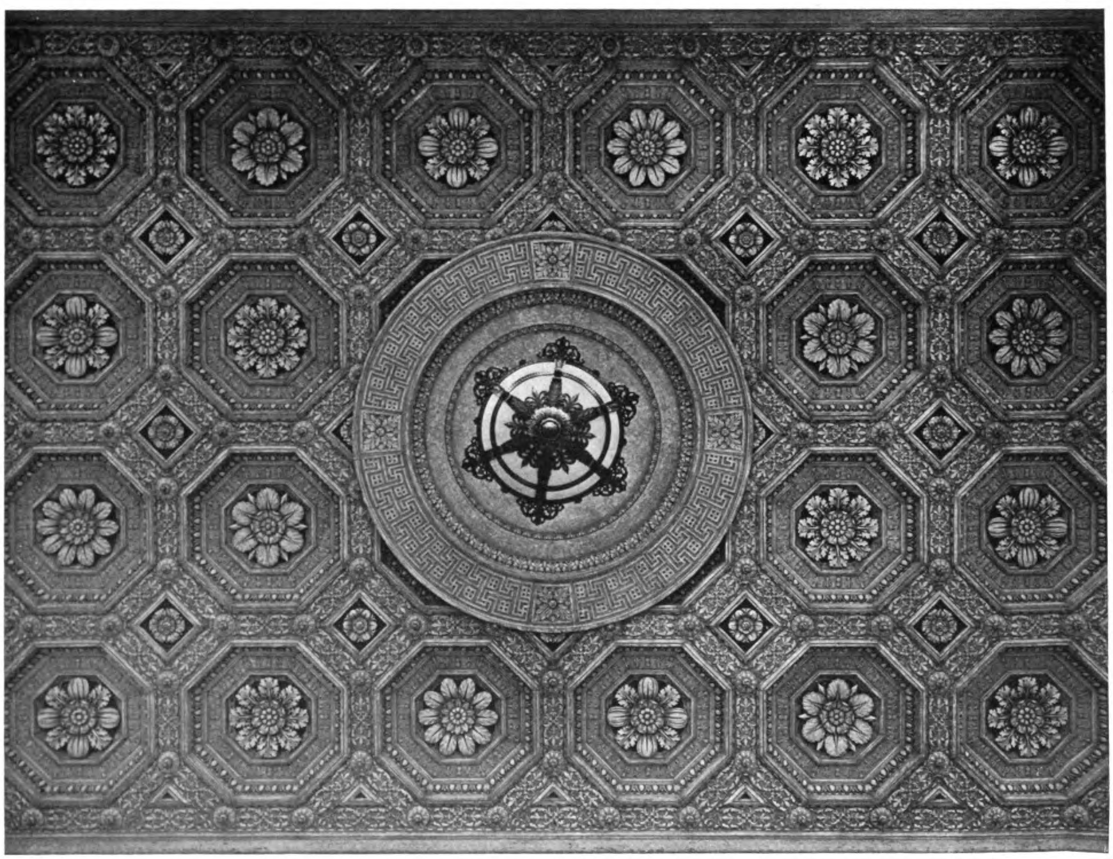
Directly over the main lobby on the Church street front is the court-room lobby, 90 feet long and 20 feet wide, intended to give ample space for waiting lawyers, clients and others attending court. This idea has been further worked out in the architectural treatment of this room; twenty free-standing, monolithic, pink Tennessee columns with bronze capitals divide the wall spaces into convenient recesses in which benches will be placed. The walls between the columns are wainscoted 4 feet high with the same marble as the columns. The spaces above are of plaster, as is the cornice and coffered ceiling, which has been harmoniously treated in lighter shades, repeating the colors of the marble, and glazed with the colors of the bronze work to a greater or less degree, as demanded by the various surfaces.

In the courtroom a rich wall treatment of panels and pilasters is executed in quartered white oak, fumed and stained a light olive color, and the highly ornamented ceiling and cornice are of plaster. The cornice and ceiling beams have been treated to resemble the oak of the walls, with ornament picked out in antique gold. The ceiling panels have been glazed to the effect of old stucco work. A dignified, sumptuous room of perfect acoustic qualities has been attained.

The judges' chambers and other important offices have received special treatment and finish, the woodwork being butternut slightly stained and waxed. The wall panels of the judge's private office are hung with pigskin. The walls of the postmaster's office have a particularly charming high paneled wainscot of early English Renaissance feeling, the stonework of the fireplace being echoed in the stone walls showing above the wainscot. An antique ivory tinted ceiling corresponds in period to the paneling. The standard office and corridor woodwork is of East Indian mahogany, stained English brown and rubbed to a dull polish. The grand jury room has a pilaster and paneled wall treatment executed in hard plaster with painted wood trim, the whole treated in tones of ivory, café-au-lait and yellow to enhance the light, which is here somewhat reduced by the proximity of adjacent buildings.

All the special offices, the jury room and the courtroom have floors of compressed cork tile in strips 3 by 18 inches laid in parquetry herringbone pattern. All other offices have concrete floors covered with battleship linoleum.

The treatment of the office corridors, which surround the open court on the second and third floors, is a noteworthy attempt at permanence and cleanliness. The floors are of pink Tennessee marble dallage, and the walls are wainscoted with white Vermont marble with slight greenish and black veining, laid as ashlar blocks to a height of 7 feet 4 inches in the second story, and in vertical slabs to a height of 6 feet 2 inches in the third. The walls are plain plaster above and terminate with a simple cornice. All architectural mouldings in marble are eliminated. At the doorway recesses solid corners, rounded to a 3½-inch radius, are used, and the window sills are plain solid slabs 3 inches thick with slightly rounded edges. At the floor angle is laid a 1-inch cove of black slate, on this a plain plinth of gray Tennessee marble, and the wainscot is terminated by a plain 4-inch cap of same marble. A similar cove at the base is carried through all toilet rooms, the fields of these floors being of 4-inch vitrified, light gray tile. In furtherance of the desire for easy maintenance, a



Detail of Ceiling of Post Office Public Space

4-inch black slate base is used in all other finished rooms throughout the building, except where marble or stone walls occur. In ordinary rooms the radiators are set exposed in wall recesses below the window sills, which are plain slabs of Tennessee marble 3 inches thick with slightly rounded edges. The radiators in all principal rooms are similarly set, but behind plain steel grilles with moulded steel window sills above. In the offices receiving special decorative treatment these radiator enclosures are of bronze.

Special care has been taken in determining the colors used in plain wall and ceiling painting. In the post-office workroom a color easy on the eyes, and still having a strong light reflecting quality, was obtained after many experiments. At the same time this color is harmonious with the rather difficult color of the natural yellow pine woodwork of the working spaces. Green is grateful to the eye but a light absorbent; yellow is the opposite. By experiment a satisfactory, fundamental warm gray color was found, to which special varieties of blue and yellow and green pigment were added until the present pleasing result was obtained. In the easterly offices subjected to strong sunlight a rather cold French gray wall color was used. In the offices receiving a cold north light this color was warmed with red. The offices at the easterly end of the south side are more or less sunny, and toward the west they are more and more shaded by near-by buildings. Beginning at the easterly office with the cold French gray, more yellow was added in each successive office until in the darkest room a very strong yellow resulted. As all office rooms are trimmed with a chair rail, the dado below was painted the same color throughout, a very dark reddish brown being found to harmonize with all wall colors and the mahogany woodwork.

The building is heated by two horizontal return tubular boilers with smoke consuming furnaces of the down draft type. Electric power from outside sources is used. All rooms have direct radiation, with vacuum return, and in addition forced warm air supply, which is filtered and moistened, and mechanical exhaust ventilation. A filtered and cooled drinking supply is provided by the house refrigerating plant, and is piped to all lavatories and to drinking fountains in the corridors. The usual fire hose and standpipe systems are installed. The building is lighted by electricity, with emergency gas piping in all public halls and staircases, and with combination gas and electric fixtures throughout the post-office workrooms and basement. The beauty of all decorated rooms in the building has been enhanced by excellent and effective lighting fixtures designed by the architect. There are two electric passenger elevators and one electric freight elevator. Two mail chutes deliver direct to the post-office workroom. Telephone and bell conduits, and conduits for watchmen's service and vault protection, are provided. Vacuum sweepers' outlets are located in all corridors.

The cubiture of the building above the basement floor is 2,028,300 cubic feet. Its total cost was $1,212,000, or about 60 cents per cubic foot.

Although unwise counsels have succeeded in blocking, it is to be hoped only temporarily, the proposal to open a monumental avenue of approach to The Green by widening Court street on the north side, from a suggested new railroad station and plaza fronting on State street two blocks east, the city is fortunate in having so located its new federal building that it will occupy a prominent and suitable place in this extension of the city plan whenever it may be accomplished. It is to be hoped that the city will acquire the opposite corner of Court street, add it to the existing City Hall plot, and so make possible the placing of a complementary monumental building opposite the post office as a beginning of this proposed avenue of approach. Such an esplanade, from a station plaza on State street to The Green, would furnish the city with a dignified gateway and suitable sites for an imposing group of public buildings. It may be observed that the extreme parsimony with which the present new railroad station project is being carried out warrants the hope that in more prosperous times to come this splendid scheme may be realized.

POST OFFICE PUBLIC SPACE

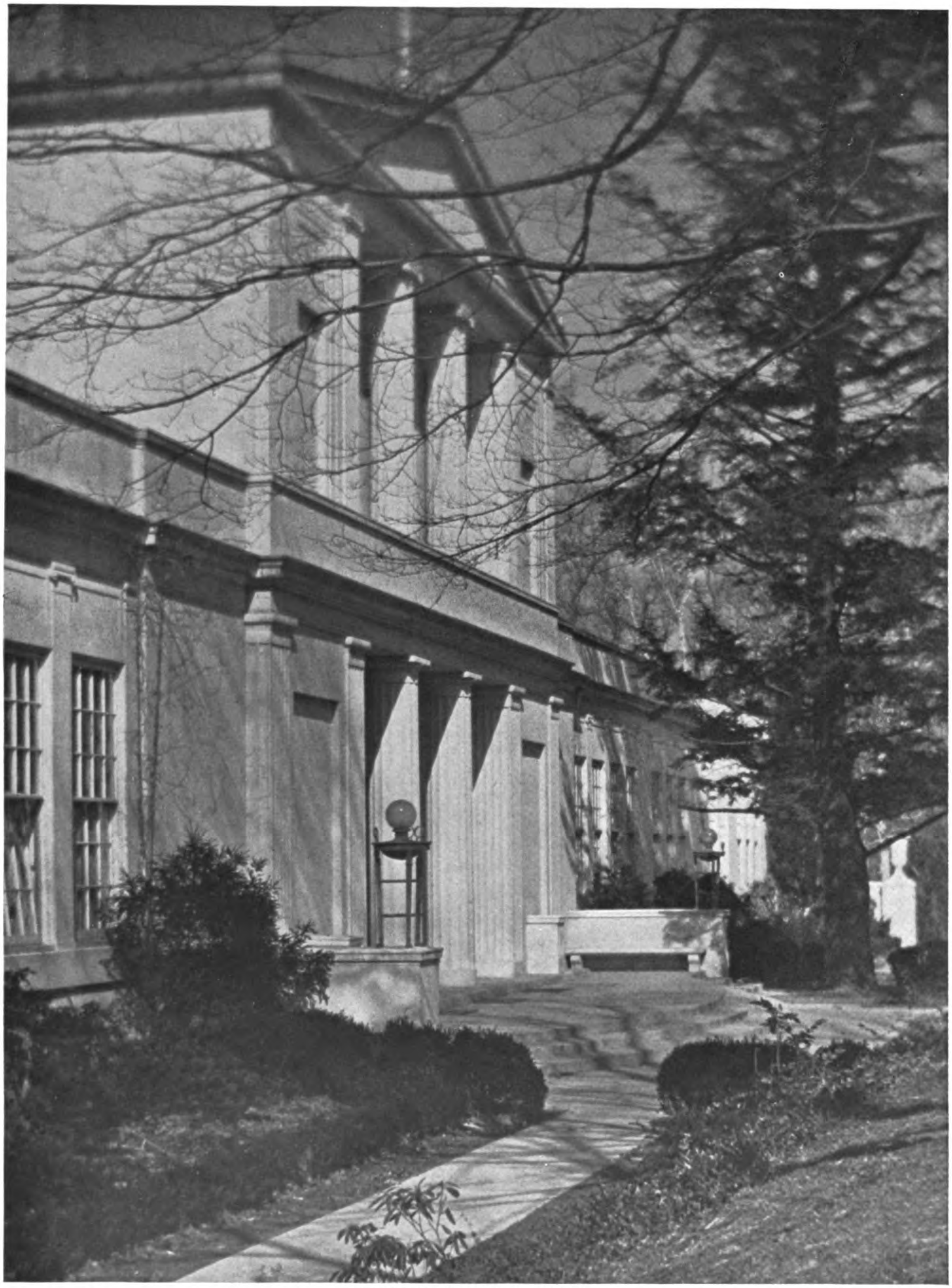
UNITED STATES POST OFFICE AND COURT HOUSE, NEW HAVEN, CONN.

JAMES GAMBLE ROGERS, ARCHITECT

DETAIL OF COURT ROOM

UNITED STATES POST OFFICE AND COURT HOUSE, NEW HAVEN, CONN.

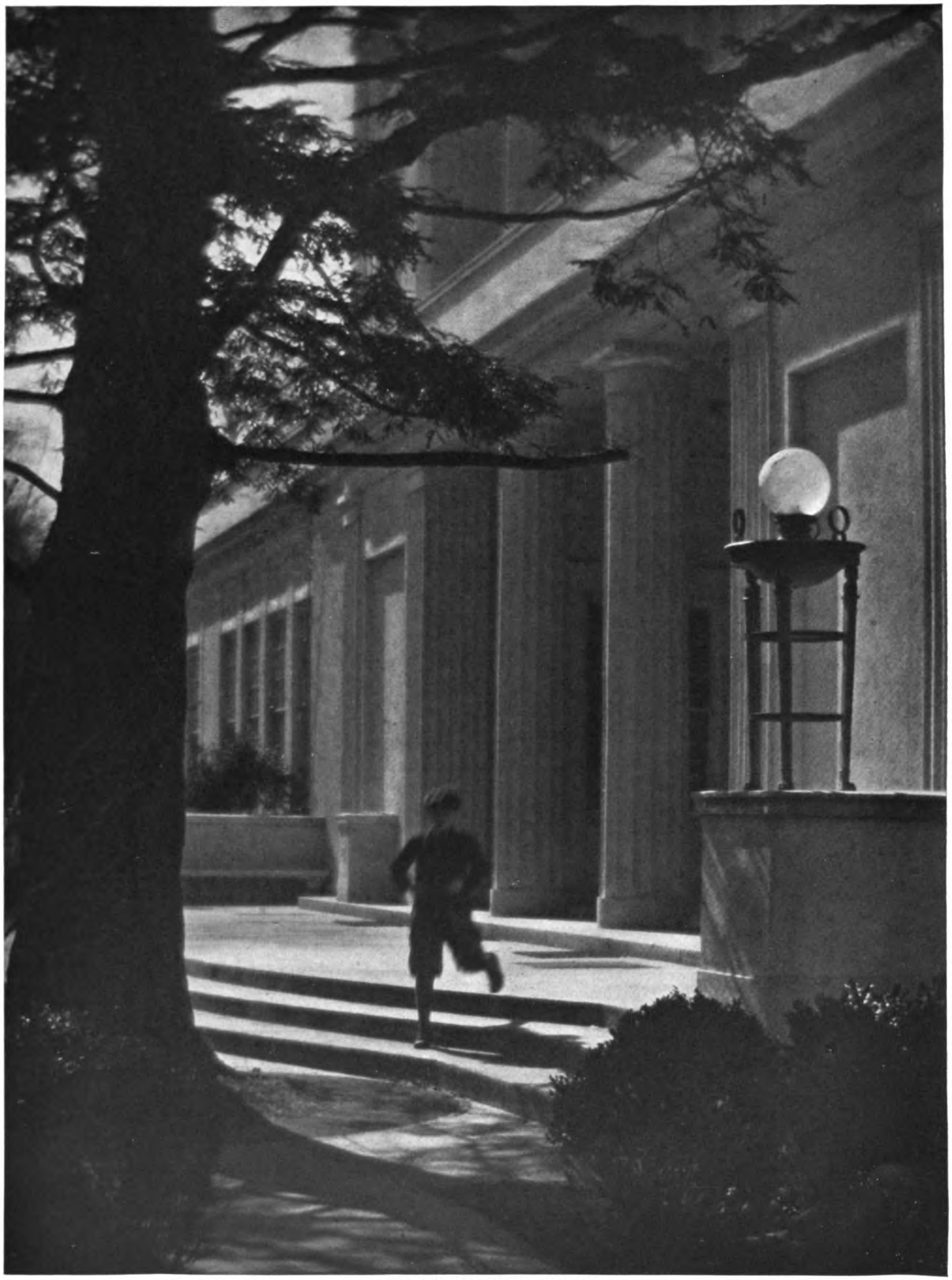
JAMES GAMBLE ROGERS, ARCHITECT



VIEW OF PRINCIPAL FACADE

PRIVATE SCHOOL FOR FRANK A. VANDERLIP, ESQ., SCARBOROUGH, N. Y.

WELLES BOSWORTH, ARCHITECT



DETAIL OF ENTRANCE PORTICO

PRIVATE SCHOOL FOR FRANK A. VANDERLIP, ESQ., SCARBOROUGH, N. Y.

WELLES BOSWORTH, ARCHITECT

DETAIL OF ENTRANCE GATE

DETAIL OF CLASS ROOM WING

PRIVATE SCHOOL FOR FRANK A. VANDERLIP, ESQ., SCARBOROUGH, N. Y.

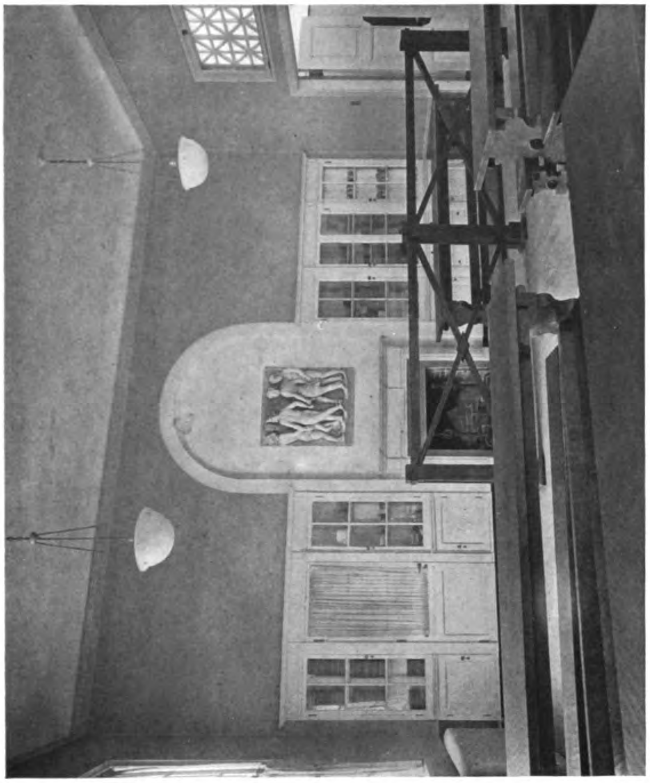
WELLES BOSWORTH, ARCHITECT

VIEW OF AUDITORIUM FROM THE STAGE

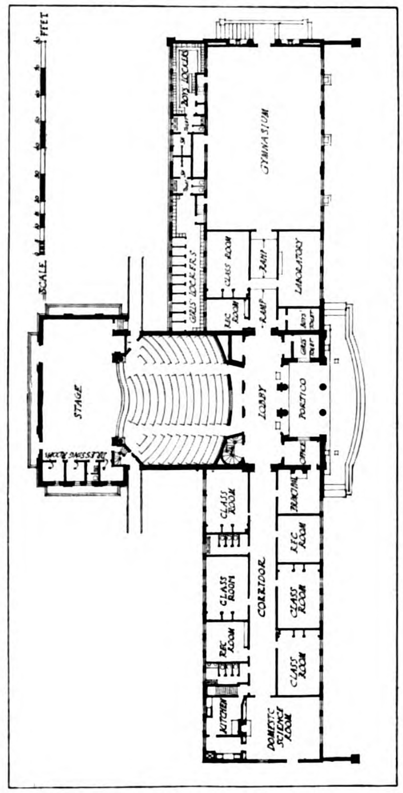
VIEW OF STAGE

PRIVATE SCHOOL FOR FRANK A. VANDERLIP, ESQ., SCARBOROUGH, N. Y.

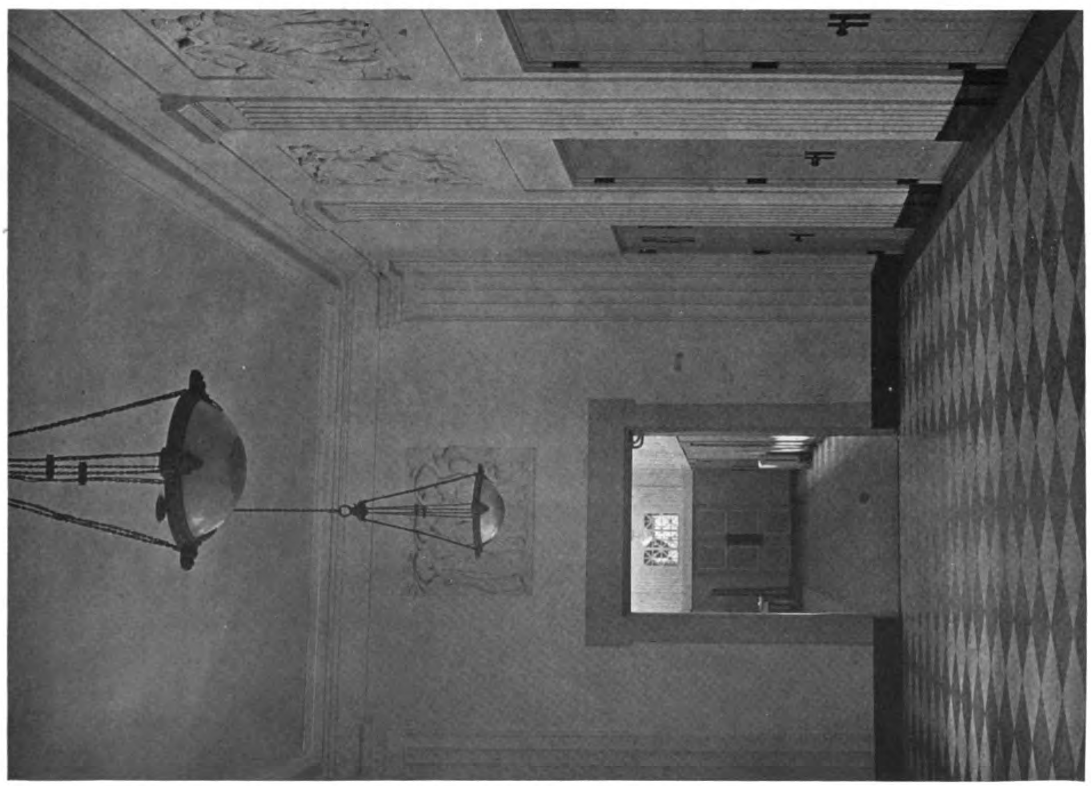
WELLES BOSWORTH, ARCHITECT



DOMESTIC SCIENCE ROOM



FIRST FLOOR PLAN



ENTRANCE LOBBY

PRIVATE SCHOOL FOR FRANK A. VANDERLIP, ESQ., SCARBOROUGH, N. Y.

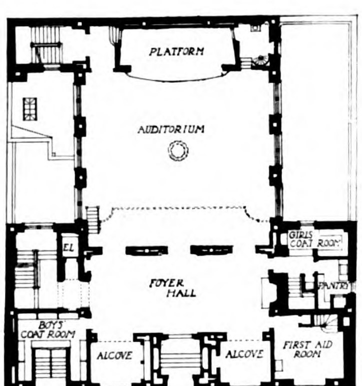
WELLES BOSWORTH, ARCHITECT

GENERAL VIEW OF EXTERIOR

GREENWICH HOUSE, NEW YORK CITY

DELANO & ALDRICH, ARCHITECTS

DETAIL OF ENTRANCE



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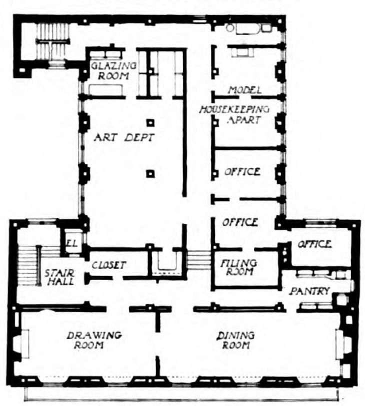
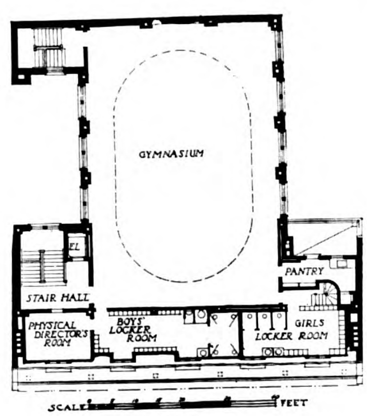


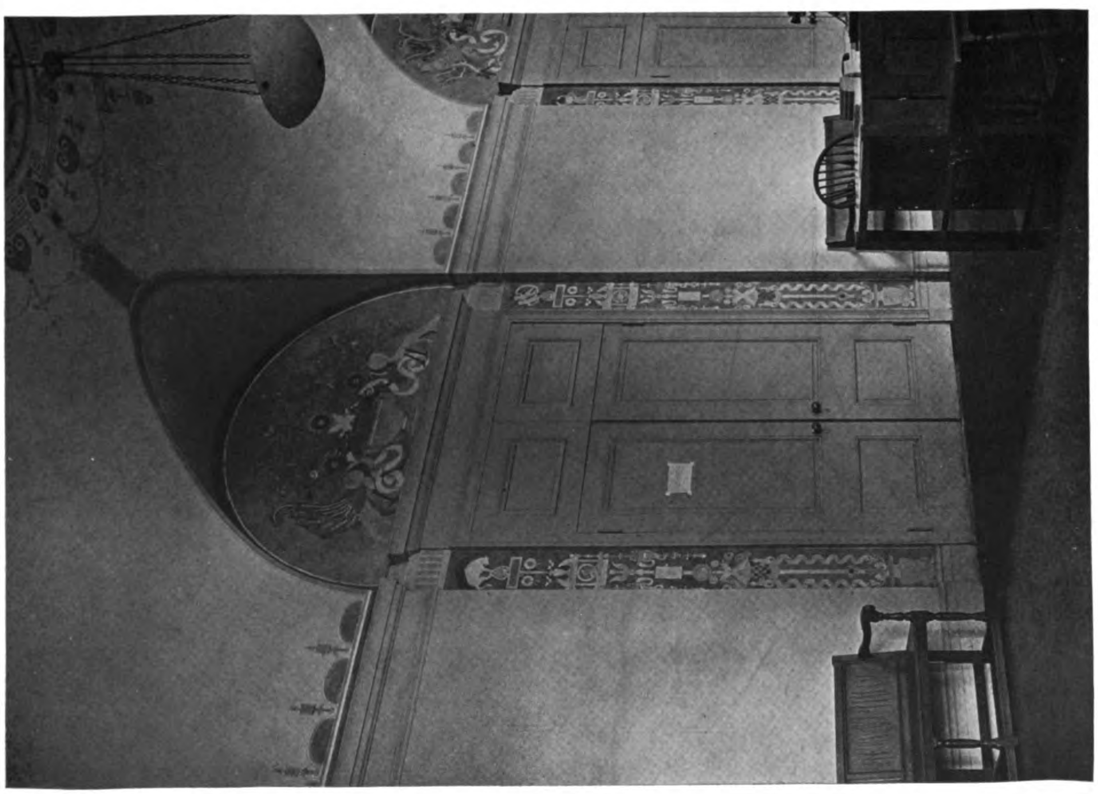
SECOND FLOOR PLAN



SIXTH FLOOR PLAN

GREENWICH HOUSE, NEW YORK CITY

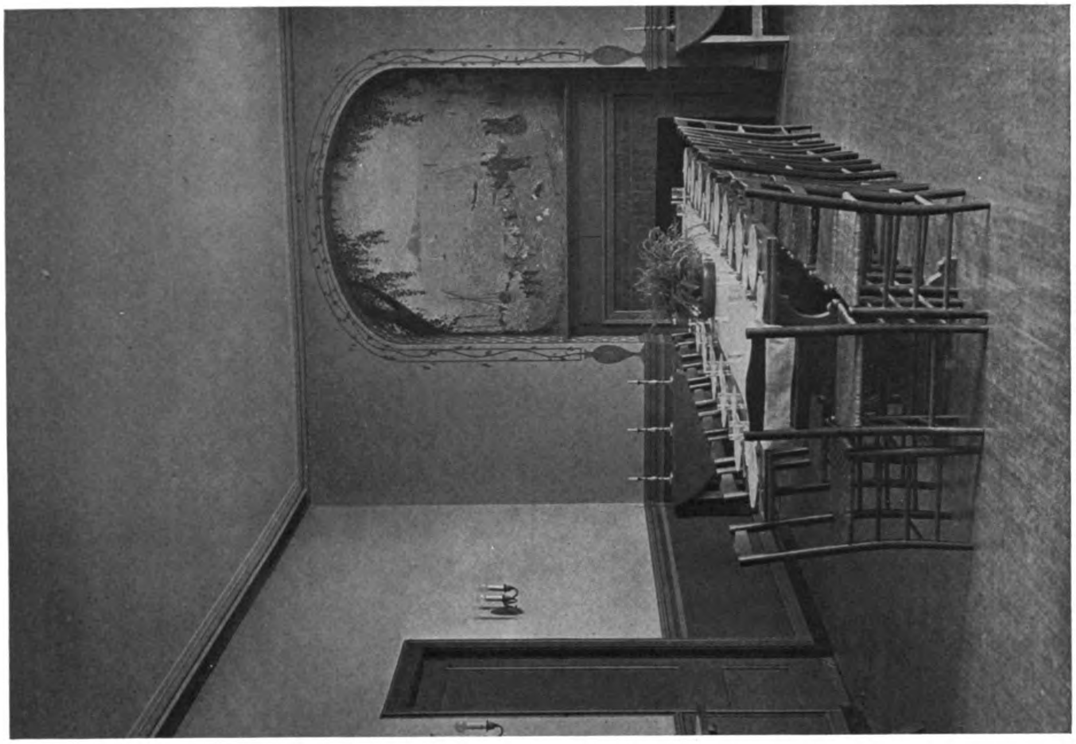
DELANO & ALDRICH, ARCHITECTS



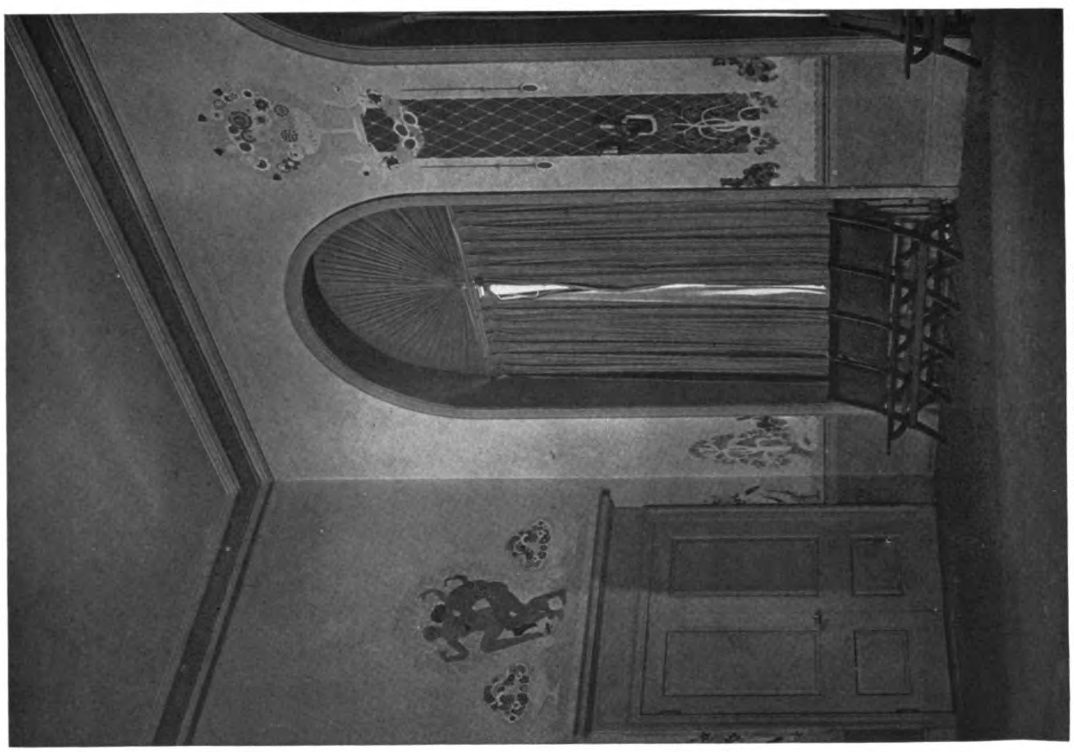
VIEWS OF FOYER HALL SHOWING WALL DECORATIONS BY ARTHUR CRISP

GREENWICH HOUSE, NEW YORK CITY

DELANO & ALDRICH, ARCHITECTS

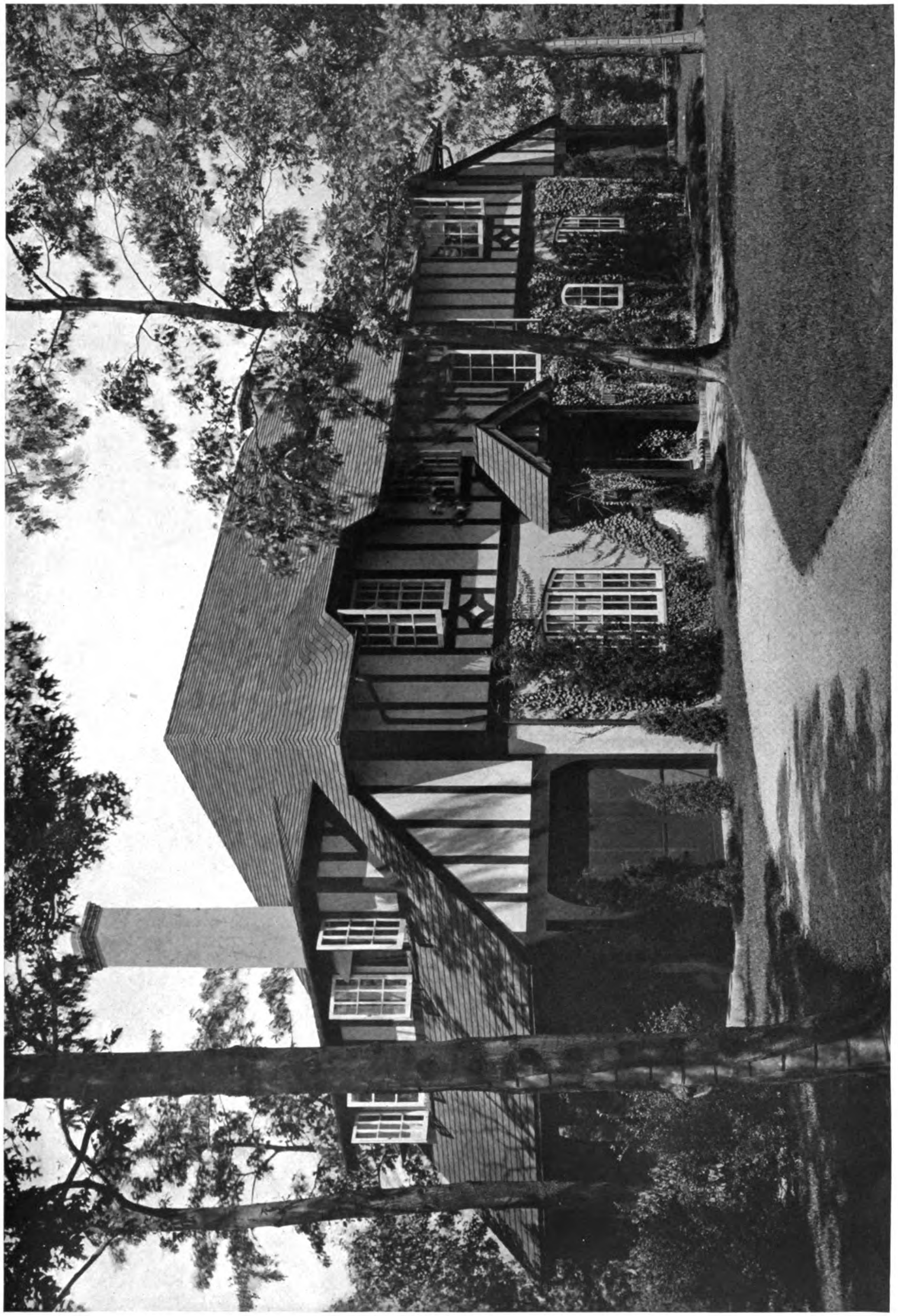


VIEW OF DINING ROOM



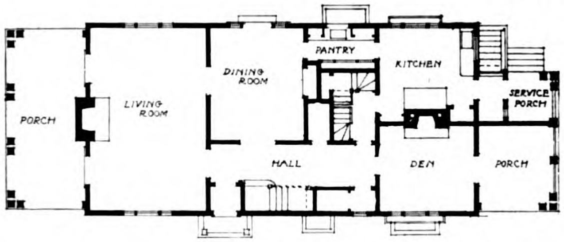
DETAIL OF AUDITORIUM

GREENWICH HOUSE, NEW YORK CITY
DELANO & ALDRICH, ARCHITECTS
DECORATIVE PAINTING BY ARTHUR CRISP

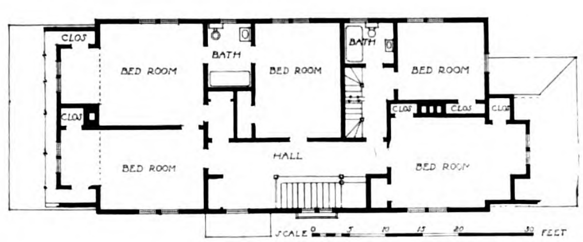


HOUSE AT BELLE TERRE, LONG ISLAND, N. Y.
TOOKER & MARSH, ARCHITECTS

DETAIL OF ENTRANCE FRONT



FIRST FLOOR PLAN



SECOND FLOOR PLAN

HOUSE AT BELLE TERRE, LONG ISLAND, N. Y.

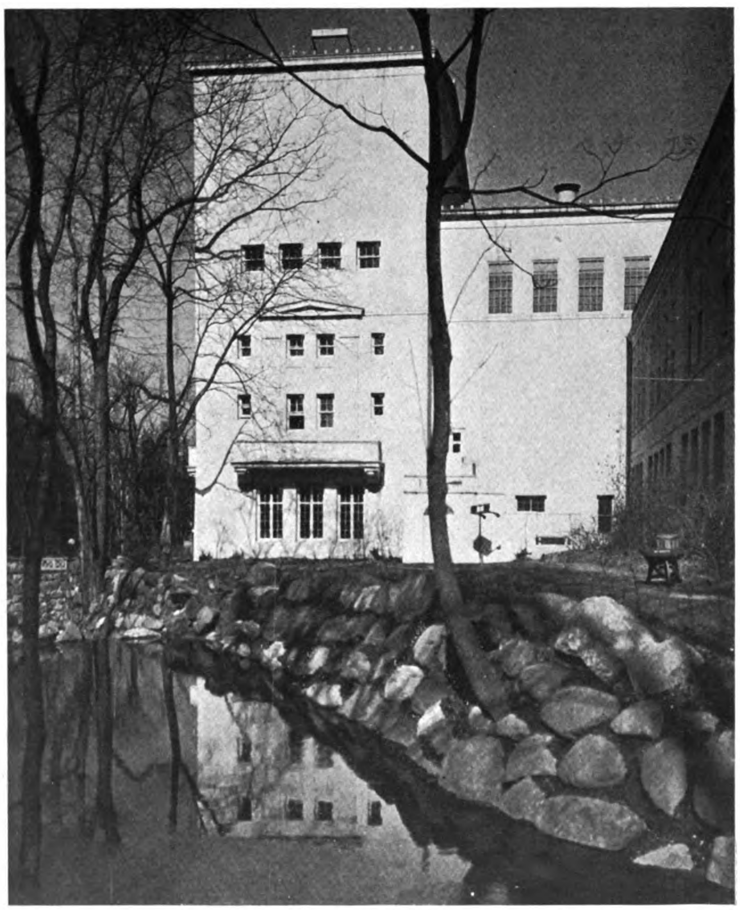
TOOKER & MARSH, ARCHITECTS

Description of Buildings Illustrated in the Plates

PRIVATE SCHOOL FOR FRANK A. VANDERLIP, ESQ., SCARBOROUGH, N. Y. Plates 38–42. At Scarborough-on-Hudson, New York, is located the home of Frank A. Vanderlip, one of the remarkable men of the day, noted for his vivid power of imagination and aggressive energy to carry out his mental visions. He is an enthusiastic supporter of the arts and is acquainted with the best the world has produced. His ideas relating to qualities necessary to American citizenship are well known and his ability to put them into practice are perhaps not better illustrated than by the provisions he has made for the education of his children. These center about the school building illustrated, in which his ideals have been expressed. In it his children and those of the community at Scarborough, which Mr. Vanderlip has been instrumental in building up, will receive their training.

The building is situated on a sloping site with its entrance façade near the main highway. To the street it presents a long, low elevation of a single story except for the center motif which rises two stories, having a pediment supported by superimposed columns — Doric for the lower order and Ionic for the upper. The building is partially concealed from the roadway by a high stucco wall with an interesting gateway. The contour of the land is such that the rear of the building is made two stories high. The plan is composed of a deep central block containing an auditorium and stage, flanked by shallow wings given over to class rooms and gymnasium. The upper floor of the central portion is occupied by a library and teachers' room. The building faces northeast and to afford sunlight in the front row of class rooms, the wings are designed with a clerestory treatment over the central corridor, pierced with windows that admit the sunlight and also greatly aid in affording good ventilation. At the outer end of the classroom wing is a domestic science suite which is also used in providing luncheon for those children whose homes are too distant to permit them lunching there. The right wing is largely occupied by the gymnasium with adjacent locker, toilet and shower rooms for girls and boys. Owing to a further slope of the land in this direction the gymnasium floor is 4 feet below the level of the entrance lobby, and the class room and laboratory midway between these levels, the corridor having a sloping floor to connect the various grades. The locker rooms are a few steps below the gymnasium, affording direct light to the gymnasium from windows located above the locker section. Below these dressing rooms are garage accommodations. A workshop equipped with various manual labor devices is located in the corresponding portion of the class room wing basement.

A theater is incorporated as part of the school equipment necessary in Mr. Vanderlip's opinion for the completion of a child's training. Each pupil is required to take his turn on the stage at frequent intervals, with the other children comprising the audience. The auditorium is quite

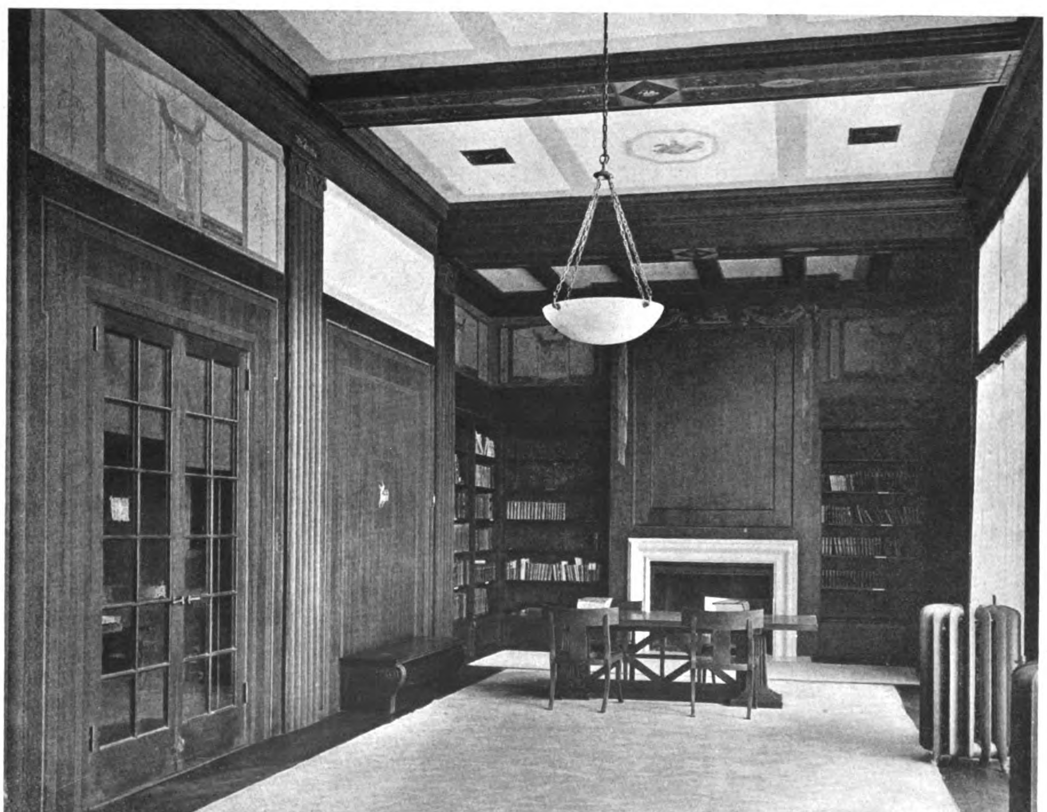


View at Rear of Scarborough School Showing Stage Loft large and as professional in atmosphere as a city playhouse. It has a seating capacity of three hundred. The stage is 25 feet deep and is provided with all the modern equipment of mechanical devices so that regular companies of professional players may be accommodated as easily as in their own theaters. A motion picture booth is located over the entrance at the rear.

The walls of the auditorium are rough plaster carried out in the Greek spirit of polychrome decoration. The lobby giving access to the theater is particularly charming in its color scheme and is strikingly architectural. The walls are French gray, ornamented with plaster casts from the Parthenon friezes set in panels, the floor is of black and white marble tiles and the lighting fixtures of alabaster, suspended by chains of green bronze.

The school provides an ideal environment for the full development of both body and mind of the pupils and fulfils admirably a second function of community house for the entire neighborhood.

Greenwich House, New York City. Plates 43-46. This building provides community facilities for the people of a congested section in the older part of New York City, and for the education of boys and girls after school hours in useful pursuits. The first floor is chiefly occupied by the large assembly hall where the principal activities of the neighborhood are carried on. A small first-aid room near the entrance serves as a local dispensary. The second floor is given over to a dining room and class rooms for instruction in various crafts and household arts. Adjoining the art department is a room for pottery-glazing. The third and fifth floors, plans of which are not shown, are occupied by club rooms in the rear for girls and boys respectively. The front portion of the third floor has a common room and series of bedrooms for the resident workers and the fourth floor has additional bedrooms for them, together with a suite for the managing director and a group of two guest rooms. Each of the floors is provided with a serving pantry connected with the kitchen in the basement by a dumb waiter and each of the bedroom floors has a large trunk room and closet for linen storage.



View of Library Over Entrance, Private School at Scarborough, N. Y.
Welles Bosworth, Architect

CHARLES A. WHITTEMORE, *Associate Editor*

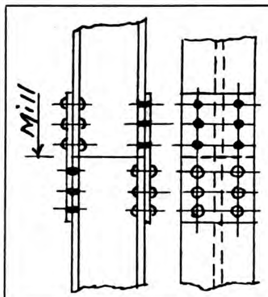
Details of Construction and Structural Design

By E. N. PIKE, STRUCTURAL ENGINEER

THE relation of details of construction to the design of steel has not always been given the attention it deserves, and too frequently a final decision is not reached until so little time remains that it is difficult to make any possible saving in the steel design. It is not strange that this is true. For example, there are so many types of floor construction making broad claims for economy and efficiency that even an expert may be at a loss to choose wisely. The mistake most readily made is the adoption of some construction based solely upon its apparent cost, regardless of its adaptability to all conditions it should satisfy. The requirements of present-day buildings call for an ever increasing number of conduits and pipes of all kinds to be concealed in the floor construction. It is perhaps fortunate for the peace of mind of the designer that he does not know of the almost unavoidable things that are done as the work progresses.

Like the quest for perpetual motion, there seems to be ever the hope that some one may find a construction that is cheaper and stronger than anything yet known. There is no desire to discourage endeavor in this direction, but it might be more clearly understood that, given the same limiting conditions and maintaining the same factors of safety, there can be little to choose between well considered designs that will bear careful analysis for both cost and strength. While variations in market prices, increasing labor costs and prejudices of contractors may affect somewhat the cost of construction, the architect will not go far astray who settles for himself certain forms of construction which he finds best suited to the class of work in hand and establishes, so far as he may, typical details to be used whenever applicable. These will, of course, be revised from time to time, as improvements are suggested, but they will serve as an excellent basis for structural design.

The construction of interior partitions should not be left to chance. If we assume the average interior column to support 20 linear feet of partition, a reduction in weight of 5 pounds per square foot will save theoretically something over a ton of steel in an 11-story building, and in many cases there may be an equal reduction in the weight of beams. Taking the columns alone, it is fair to assume one-half the theoretical saving may be realized — a saving of perhaps $40 per column. To offset this, the heavier partition should be two cents per square foot cheaper, or have intrinsic merits that make it preferable. The same line of reasoning should apply to all details of construction where any appreciable saving in weight is possible. Possibly a structural engineer is somewhat out of his province if he suggests that the heavy cornice at the roof of many buildings has little, if any, excuse except that of tradition. Frequent splicing of columns which is often done because of an apparent saving in weight is on the other hand not to be commended. Figure 1 gives an illustration of a typical column splice, and the tabulation of weights indicates that the column in long lengths should be used except under certain limitations.



Typical Column Splice, 10″ Bethlehem Column

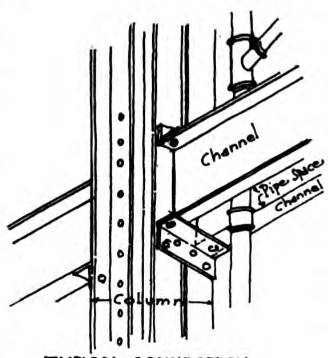
The limitation in height of buildings, as fixed by the various building laws, is resulting in conditions that do not, in some cases, allow economical steel design or floor construction. It is possible with modern methods and material to have in many cases one or more additional stories above the street than formerly was considered possible under the legal limit. It would be no very evident evil if the present limit of 125 feet in Boston, for example, which will permit 11 stories cramped for head room, should be revised to permit 11 stories of 12 feet each. Increased rental value may often justify the sacrifice in economy that must be made; whether anything can justify the legal handicap the owner bears is another question.

If architects are more or less bound by tradition, it is to some extent true of the structural engineer. The typical column splice in almost universal use is an example of what is done from force of habit.

There are few cases where this detail could not be reduced one-third or more. It may be heresy to suggest that in many buildings there is little if any reason why all field connections might not be bolted instead of riveted. This is especially true of buildings of monolithic floor construction with concrete surrounding the beams and enclosing all connections.

In a previous article, reference was made to the difficulty which the plumber, the steam fitter and other trades experience because too little thought has been given to their needs. It is perhaps easier to recognize the conditions than to suggest any satisfactory remedy, but it is too often the case that no thought was given to the problem. The structural designer may often excuse himself on the ground that he had no data regarding these items, but too frequently lack of experience and observation of actual construction is the reason.

The designer naturally likes to locate all beams on column centers, but the use of two channels, properly spaced to allow pipes to pass between and be enclosed in partitions above and below, would save much annoyance at very little added cost of steelwork and in reality a net saving in total cost to all concerned. Then, again, instead of placing beams directly under partitions, they may be placed sufficiently to one side to accomplish the same purpose. Cutting holes in the webs of beams, which is now done so easily with the acetylene torch, or blocking the flanges, will often greatly simplify the plumber's work. It is cheaper, of course, to do this as a part of the shopwork, but if done in the field, should be under competent supervision to prevent unnecessary or unwarranted weakening of an important member.



·TYPICAL CONNECTION·
·FOR CHANNELS SPACED·
·FOR PIPES (under Partitions)·

What is true of steelwork applies equally to reinforced concrete, and perhaps with more force, as very often it is not so evident how serious the damage is. It may be said that to provide all the data required by these suggestions would be quite out of the question in the preliminary stages of a project, especially if it is not certain to be carried to completion. While this is true, probably much more might be done if the architect and engineer should give such items more serious consideration in the early studies of the plans.

It is probable that no question gives the steel designer so much anxiety as the determination of the absolute limit of over all dimensions to which he may go, and there is a peculiar joy that comes to him if he finds that, unwittingly perhaps, he has been allowed ample space. Right here is where the advice of the engineer should be most valuable in the preliminary stages. It is frequently less embarrassing to ask him to keep within certain limits than to change contract drawings so as to provide furring to cover a projecting column or girder flange whose unwelcome presence had not been foreseen.

It may seem easy to give rules which should govern the depth of girders and trusses. If economy were the only consideration, we might say that a depth of from one-tenth to one-twelfth the span would, under ordinary conditions, be ample. To attempt, however, to fix a ratio that could not be reduced, would invite debate and suggest possibilities that should be invoked only as a last resort and by an expert. Judicious placing of columns and sometimes transferring a portion of a troublesome load at another level may frequently help to keep within the desired limits.

While it will be recognized that much of what has been said relates especially to the modern office or hotel building, it is in general equally applicable to any type of building. Many theaters have been designed and leases made before any more than passing thought was given to the possibilities of securing in the steel design the things that had been guaranteed to the lessee. That all the recognized standards for economy must go by the board in order to accomplish results under these conditions, may explain why estimates based upon a square foot or cubic foot basis are sometimes so wide of the mark. A problem of this sort that had been given up as impossible by an engineer of no little experience was afterward solved by him; but was more an example of what ought not to be than what should be. Probably two days' time in consultation at the beginning would have made it a perfectly simple problem with no sacrifice of architectural effect, since all the conditions, except for minor details, were unusually favorable. But these seemingly minor details were exceedingly costly to secure.

Within the scope of structural design should be included reinforced concrete. Within proper limits its usefulness is unequaled. Fortunately the time is passing when it could compete unfairly with steel, due to the extreme liberty with factors of safety which some of its promoters have dared to attempt. That it has its limitations will be generally admitted. It should be recognized that when used for the entire construction of a first-class building it usually involves the sacrifice of more or less architectural detail that the architect would be reluctant to eliminate in connection with a steel frame. In the combination of steel frame and concrete we have a constructive medium that in the hands of an unprejudiced designer leaves little to be desired. It is not uncommon to find cases where steel has been used to support a concrete section that might have been self-supporting if properly reinforced. The fireproofing of floor beams frequently requires sufficient concrete to come within this class. The steel designer is often confronted with conditions of this kind where something must be provided to tie the steel frame together in erection; economy and safety are best secured if floor and steel are designed together.

Another point that is very easily overlooked, is the case of an exterior column tied back into the building by a member that is not designed to carry any other strain. While this may be readily provided for in the floor construction, it is hardly safe to assume that it will be, and care should be taken that whatever tie is supplied, be not mistaken for a supporting beam and loaded inadvertently in a manner not intended.

The design of foundations, and especially those requiring the use of cantilever construction or grillages, sometimes involve conditions that are not generally understood. In many buildings it must be assumed that there is to be some slight yielding of the column footings under the loads imposed; it frequently is a matter of considerable importance to determine conditions that will make this as nearly uniform as possible. For example, an interior column with a large percentage of live load must be treated differently from an exterior column carrying a large percentage of dead load. The results obtained are, of course, wholly dependent upon the accuracy with which the probable live load has been foreseen.

It is probable that the reader will admit the truth of most that has been stated; perhaps the suggestion of the frequent lack of right relation between architectural plans and structural design may call attention to a condition that can be remedied to some extent. It has to a great degree grown out of a willingness on the part of both architect and engineer to give a certain amount of service free. There is little, if anything else, so free and it is doubtful if a resolute purpose to stop this gratuity would result in pecuniary loss to any one, and least of all to our clients.

Observations on Waterproofing of Concrete

By CHARLES A. WHITTEMORE

THE subject of waterproofing concrete is as yet to many architects a closed book, but on account of the ever-increasing use of concrete, both plain and reinforced, this very important phase of construction should be more generally understood. Concrete in itself as generally used is not waterproof, but on account of the number of buildings built which are constructed with a portion below the water level, and on account of running water and springs it is vitally essential to have some method for preventing the surrounding water from getting into the structural part of the building, as well as keeping the water out of the occupied premises. In many cases, buildings are built without any special provisions of this character being made.

The study of waterproofing of cement and concrete is a very complex and exhaustive one, and may be freely accepted as a basis of wide divergence of opinion among chemists who have carefully studied concrete waterproofing, and also among other authorities who have found that scarcely any other branch of the building industry needs more careful consideration.

It will be our purpose, therefore, to consider the various types of waterproofing in more or less general use, and without prejudice, to present to readers various items of interest on these types, leaving for their own further investigation the determining of which will best suit their needs.

The field of waterproofing falls naturally into three divisions: the integral method, the membrane method and the surface coating. Integral waterproofing consists of a powder, liquid or paste which is incorporated with the concrete ingredients when they are being mixed. Powders are usually mixed with the dry cement, while the liquids and pastes are added to the water used in mixing the concrete. Concrete leaks because it is porous, that is, it contains voids and these voids are interconnected, forming ducts which allow the passage of water. If there were no voids in a given quantity of concrete, the solid material would weigh 165 pounds, but the actual weight averages 140 pounds. Consequently the voids are 25 parts in 165 or about 15 per cent. In the field, due to improper grading of aggregates and carelessness or difficulty in placing, the voids may easily run more than 20 per cent.

The integral method is sub-divided into three definite groups: inert fillers, water repellants and chemical combinations. In any of these types, in order to get waterproof concrete, extreme care in grading, mixing, and placing of the material should be insisted upon. This is necessary in order that the waterproofing medium may thoroughly fill all of the voids. It is possible by careful grading, mixing, and placing of the concrete to secure a waterproofing combination without the use of any other medium, but this would necessitate extremely laborious and costly operations, and in view of this fact other methods which entail considerably less expense are generally used.

A number of integrals are admitted to be only inert fillers, that is, the purpose is solely to fill the voids in the concrete without chemical reactions. Hydrated lime falls in this class and has had a large use. It is a valuable addition to concrete not because it is a waterproofer in itself, for it really absorbs water and is a solvent, but because it makes the mass "work" or slide easier, which is important in completely filling the forms.

Clays also are inert fillers, but clays have a weakening effect on concrete. In lean concretes they have assisted in filling voids, but they are ineffective in the richer concretes. Fine sands and fine feldspar are also inert fillers used to fill voids with varying degrees of success.

The second large class of integrals are the "water repellents." These have principally as a base hydrated lime or magnesia lime to which has been added a small percentage of fatty acids. The lime, of course, is inert, but the acids, in most cases stearic acid, react with the lime to form a lime soap, which is not readily soluble in water and which also tends to repel the water.

The liquid and paste waterproofings stand a better chance than the powdered integrals of being mixed through the mass, but the ever-present poor workmanship with its attendant dry batches and separation of coarse and fine aggregates nullifies in large measure this advantage. In this combination of liquid and paste waterproofing type there is a distinct chemical reaction which takes place with the cement which produces a new chemical composition having distinct waterproofing features. Not only does this combination fill the voids, but it also acts in some cases as a new chemical which assists greatly in the hardening of cement.

Integral waterproofing has been used where distinct water pressure is noted with varying results. It must be borne in mind that in this method, as with any other method, the integrity of the wall itself is of prime importance, as any cracks developing in the walls will obviously destroy the waterproofing value. It is true that the cracks can be repaired and the wall restored to its original tightness, but the first consideration in waterproofing is to have some method which will eliminate all these difficulties. As yet, this problem has not reached its ultimate solution.

It is also necessary with integral waterproofing, as with any other method, that one must be particularly careful about the "day joints," that is, where the work of one day leaves off and the work of the next day begins. In such cases the surface of the previous day's work should be carefully prepared by picking, scouring or washing with an acid.

Membrane waterproofing consists of a seal coat surrounding the structure to be waterproofed. It is made up of alternate layers of felt or paper, and tar, pitch or asphalt, applied on the finished structure. To be successful the concrete must be dry and preferably warm. First, the hot liquid is put on; this later cools and solidifies; while still soft a layer of the membraneous fabric is applied. This forms one ply. Usually three to five plys are required. Ordinarily membranes are put outside the walls and under the floor. In order to get at the outside of the walls additional excavation is required and consequent refilling is necessary, but the principle involved is to keep the water from getting into the concrete at all.

One serious objection to the membrane that usually does not apply to the inside surface coatings is the trouble involved in repairing a leak. Leaks are due to a variety of causes, stones breaking the seal when thrown back as refill, hot pipes or hot water near the membrane melting the tar or asphalt, unequal settlement of the structure, etc. When the leak is noticed, it is a question where to locate the trouble as the break in the seal may be opposite the dampness, or quite likely it is far removed, and the intruding water has worked between the membrane and the concrete to the point where the concrete has sufficient voids to allow the water through. It is difficult to repair the leak in the membrane method as well as to locate the cause of the trouble. Extremely careful workmanship is of prime importance in installing this system.

One advantage of the membrane over most of the other systems is the amount of elasticity in the felt or paper. This enables the membrane to bridge over minor cracks, though on large cracks such as those due to settlement, the fibers of the fabric may be stretched too far, thus breaking the sealing pitch. The common impression is that the substances between the fabric give the elasticity. These substances are usually asphalt, petroleum, residum or coal-tar pitch, which are not extremely elastic at ordinary temperatures when they are solids. Fabrics are therefore used to provide the necessary elasticity. If proper attention is given to the construction of expansion joints in such work as retaining walls, tunnels, etc., the element of elasticity is not so important.

In the "bitumens" class there are included asphalts, heavy petroleum oils and wood tar. These are the articles most used in the membrane method above described, where the use of fabric is resorted to in order to give them some elasticity, as they are solid at ordinary temperatures. When applying these compounds the surface should be dry and it is better to heat them upon application. Where the coating is exposed and appearance counts, the dark color may be objectionable. This difficulty may be readily overcome, however, by painting and finishing the surface with a good paint, which will not chemically react with the waterproofing medium.

Paraffins are watertight under ordinary temperature but under higher temperatures they melt and lose their effectiveness in filling the surface pores of the concrete. When applied to a wet wall paraffin will not adhere.

Compounds of petroleum oil give water repellent surfaces due to the oil particles getting into the surface pores. When applied on the side adjacent to the water pressure, this repelling action assists in keeping out water, but on the side from the water, a slight head may force the oil out of the surface pores. A few years ago the United States Government recommended this form of waterproofing even under fairly high pressure, and the writer knows of one building which was waterproofed in this manner a number of years ago. As yet no visible defect has appeared in this building.

Soaps have long been used as waterproofing coatings. In one method which uses soap in conjunction with alum, the concrete surface is first washed with hard or soft soap solutions following which is applied a solution of alum. This method depends for its success on the formation in the surface pores of insoluble soaps.

In connection with the discussion of surface coating, it should be borne in mind that, many of the integral compositions can be used in the cement mixture which is applied as a surface treatment. There is an advantage in this system in the fact that the surface treatment put on the wall, has the same chemical character as the wall itself and a reasonably satisfactory result should be expected.

The surface troweling, however, must be carefully done as too much or too little troweling is detrimental. In this surface treatment the walls should be picked so as to get a good bond.

This surface may be used on floors as well as on walls, but a wearing surface should be applied after the waterproofing is finished.

A dozen or so years ago it was found that a finely pulverized iron would oxidize on a concrete surface, in the presence of salammoniac and water. The particles of iron are carried into the surface pores by the water and oxidization slowly ensues.

In changing from pure iron to an oxide the particles swell, complete oxidization practically doubling the size of the particles. By so enlarging, the iron oxide fills and becomes solidly embedded inside the surface pores, a number of brush applications of the iron are required to fill all the pores, the number depending entirely on the condition of the surface. Each coat has to be well oxidized before the succeeding one is applied, otherwise the additional swelling would be apt to disrupt later coats.

One criticism is that the iron simply rusts and soon falls away from the concrete. While the iron does go first into the rust stage, which is a yellowish red, it soon passes on to the reddish brown stage, when it is fully oxidized. The chemical analysis at this latter stage shows Fe_2O_3 plus some H_2O. It will be noted that this is the same formula as the iron called limonite, which is exceedingly resistant to the action of air and water. It seems, therefore, that the resultant surface is an iron ore, an entirely inert substance capable of as great life as the concrete itself with which it has become permanently embedded.

Objection to the reddish oxide color is obviated by the use of a cement wash, containing a small amount of iron, over the pure iron coats. Cold-water paint of any desired shade may be applied with success over the pure iron coats. On walls the coating is left exposed, but on floors due to the thinness of the coating, which is only as thick as one's fingernail, it is put under the granolithic finish.

A particularly important feature of the iron system is that it can be and has been a number of times employed successfully on walls and floors that were running with water and were chilled. Dampness and cold do not affect the application, whereas in many of the coating systems and in the membrane these elements make it difficult or impossible to succeed.

In connection with the waterproofing of concrete it is well to consider that in order to obtain a thoroughly satisfactory cure the architect should carefully weigh the advantages of different types.

The claims of the various methods are strong and in many instances undoubtedly each different system could prove its own worth, but there are occasions where one system, due to unfortunate circumstances might fail and another might prove itself eminently satisfactory. There is no doubt but that with the increasing use of concrete a still further advance will be made in the waterproofing of cement.

Expansion Joints in Masonry

By **FRANK H. CARTER, Assoc. Mem. Am. Soc. C.E.**

HAVING occasion to investigate the matter of expansion joints in masonry sometime ago, the writer collated what information he could find on the subject with particular attention to the matter of expansion joints in masonry which is designed to hold water.

The five most interesting and perhaps the most nearly practicable types are shown in the illustrations below.

The expansion joint used on the Waterbury, Conn., pressure sewer is shown at upper left. An ordinary dovetail type of joint was made with concrete. This was rendered waterproof, acting somewhat as a bellows by means of the insertion of a piece of sheet lead 1/32 inch in thickness and weighing 2 pounds per square foot.

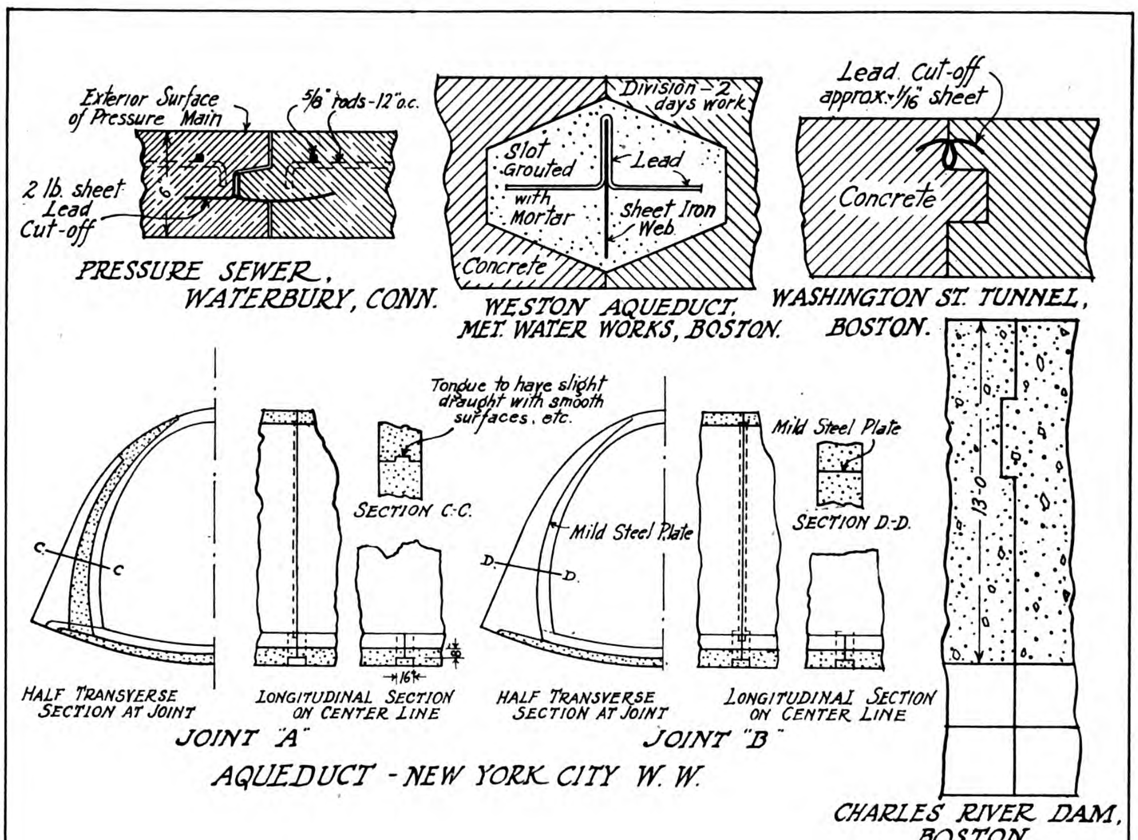
On the Weston aqueduct near Boston, Mass., the joint was formed in the concrete with a piece of sheet iron over which a bellows-like piece of sheet lead was folded and both in turn surrounded with mortar grout.

On the Washington street tunnel, Boston, a dovetail joint similar to the Waterbury sewer joint was used except that the 1/16-inch sheet lead cut-off was inserted to one side of the middle portion of the joint.

On the New York aqueduct an elaborate type of joint with a mild steel plate as a further preventative against leaks was used.

On the heavy and massive section of the Charles River dam at Boston, Mass., a dovetailing joint filled with asphalt was resorted to with reported success.

The writer is not informed as to the success attending the construction of the first, second and fourth joints, but understands that the third type used in the side wall of a sewer, which in turn formed the side wall of the Washington street tunnel of the Boston subway system, in a location where any small leak would at once be only too apparent, has proven all that could be desired in the way of water tightness.



The Post-War Committee on Architectural Practice

AN OPINION ON COMPETITIONS

By EGERTON SWARTWOUT

Editors, The Architectural Forum: Only one thing is certain about a Convention of the American Institute of Architects, and that is that some attempt will be made to change, alter or otherwise improve the Competition Code, and the Fifty-second Convention was no exception to this rule. A proposition was brought forward by one of the Chapters and referred to the Post-War Committee, which shows on the face of it such a complete misunderstanding of what the code really means, and such a lack of appreciation of the evils which it attempts to correct that it is inconceivable the Post-War Committee will give it any serious consideration. At the same time as it represents a misconception which is rather widely prevalent, it is perhaps worth while to consider it for a moment here.

It is, in effect, a proposition that all competitions in which no remuneration is paid to the various competitors shall be considered as falling under the present code; but that if the competitors are paid, then the code does not apply—in other words, the Institute would be then put in the position of saying that as the result of long experience it has become convinced that unrestricted competitions work unfairly to the interests of the client and the architect, and that therefore, after much thought the Institute has formulated certain rules for the guidance of its own members that will safeguard the interests of both parties, and that it is unprofessional for any member of the Institute to enter an unapproved competition; but if, on the other hand, the client is willing to pay the competitors, the Institute will forget its rules of fairness and allow the same old scramble that was such a disgrace in the past. A fine proposition truly to be put before the Post-War Committee, which, as I understand it, is supposed to have been formed to make architecture safe for democracy. A client who cannot afford to pay his competitors is bound by certain rules, but the richer client can have everything his own way.

Of course I don't for a minute mean to imply that the gentlemen who proposed this change looked at it in that way at all. They probably had not considered the matter very carefully, and were governed entirely by a feeling of dissatisfaction with the restrictions of the code when applied to smaller propositions or to such cases where one or two architects are asked to submit sketches for some operation in which the owners are unwilling, through ignorance of the real conditions, to comply with what they believe to be reflections on their right of choice.

It is also probable that the proponents of this proposition had either forgotten or perhaps had never been cognizant of the real conditions which led to the adoption of the Competition Code; and yet the code, as it at present exists, is a comparatively recent institution, which was gradually formulated by the most prominent and experienced men in the profession in this country, to correct certain abuses which were becoming rapidly worse and worse, and which threatened seriously the whole structure of architectural practice.

The principle of competition has been inherent in architecture since the very beginning. It has long been an established method in school instruction, and as far as our records go, the commissions for most of the great buildings in history were awarded as the result of some form of competition. Glen Brown in his History of the Capitol at Washington gives an account of the competition that was held for that building, and there are in existence interesting old drawings that were submitted for various other public and semi-public buildings in the early period. One of the first large competitions in recent times was for the Cathedral of St. John the Divine, and this was followed by those for the New York Customs House, the Public Library and various Government competitions held under the Tarsney Act. In general these competitions did not depart radically from the code as it is now written. There was a definite program carefully prepared, and the jury was generally composed of architects, and there was a distinct effort on the part of those in charge to promote perfect equality and fairness, both to the competitors and to the owners.

Gradually, however, there had sprung up in the architectural profession a vicious practice of submitting sketches and schemes without remuneration and with only a vague hope of securing the commission. In general, these were either for small public or semi-public buildings, such as schools, banks, libraries, etc., whose directors were either unwilling to accept the responsibility of a direct appointment or who, through the urgency of conflicting claims, felt it necessary to ask several architects to submit sketches; or else for purely private operations, for which a competition was not only unnecessary, but most undesirable, the action in the latter case being usually due to the architects themselves. If a commercial building or even a fair sized house was to be erected, the owner was bombarded with requests to submit plans from every architect who knew him slightly or from many who didn't know him at all, and he naturally concluded that he was doing a favor to the architects by allowing them to make more or less elaborate drawings, although it often afterwards turned out he had already made a decision, and that some architect had the working plans half completed.

When I began independent architectural practice in 1901 this system was almost universal. I remember a particularly distressing experience of my own. A good friend of ours, one of the directors of a certain bank, asked us to submit some sketches for their new building. He said that the committee was undecided as to the scheme, and that all that was necessary was some fragmentary pencil sketches that would show our idea of the type of building the bank should build. We gladly submitted what we thought was a well presented scheme, and were afterwards informed that the commission had been given to a local architect who, with the assistance of a contractor, had submitted a large and very complete plaster model at three-quarter scale of the entire elevation. I remember another instance in which we submitted some very large and elaborate drawings, also for a bank, and discovered not more than two or three weeks after our drawings had been sent in that the contract for the erection of the structure itself had been let, and that at the time we had been asked to submit drawings the bank was actually in possession of complete working drawings, which the board of directors had unanimously agreed to adopt. One or two other experiences along this line convinced us that from a business point of view the unrestricted competition game was not worth the candle, and that those who voluntarily submitted drawings could be divided into two classes: the first, a very small class, who had been definitely promised the job and who only submitted drawings as a matter of form; and the second, a very large class, who wasted an enormous amount of time and money on drawings, without a Chinaman's chance of securing the commission.

There was also an occasional instance in which the owner had the best intentions in the world, and did his best to have everything done with perfect fairness and equality, but in which totally diverse information was given to the various competitors, in some cases by the same official. I can again illustrate this point from an experience of my own. We were awarded the commission for a certain building, and I had a long interview with the chairman of the building committee, who told me in detail what were the general requirements and what his ideas were on the subject, and we prepared sketches along these lines. On presentation of the sketches a week later I was told that the day after I saw him he had an interview with a friend of his and had radically changed his ideas, and that he intended to let me know, but had forgotten to do it, and that what he really wanted was an entirely different building. Now, suppose this information had been given not to one man, but to two competitors, each one would have gone away convinced that he had the right information, and yet the first man would have no chance whatever when the award was made.

It was to correct these evils surrounding competitions that the code came into existence. The Institute realized it could not say to the owners that they must conduct their competitions along certain lines that the Institute suggested, because that would be an infringement of personal rights; but the Institute could say to its own members that a state of competition existed when two or more men submitted drawings for the same project at the same time, and that no member of the Institute could enter a competition which did not have the Institute's approval. The formulation of the code was a slow and gradual process naturally, and was subject to rather frequent revisions.

The code was primarily designed to afford perfect fairness to the owner and to the competing architects. It was decided that the client was in need of a professional advisor, who could guide him in the selection of competitors and in the outlining of the scheme, and who could formulate this information in a manner that would be intelligible to each competitor. It was felt there should be a jury composed either entirely or largely of professional men. It was felt there should be absolute uniformity in the information given to the competitors, and uniformity in the submission of drawings, and that absolute anonymity should be preserved. One of the most important things in the code was that the program itself constituted an agreement between the owner and the competitors that one of the competitors would be selected as architect of the building, and this idea has gradually been expanded until most programs now contain a definite contract between the owner and the successful architect. The value of this document agreed on in advance cannot be overestimated. Until a few years ago there was also a requirement that the fee was to be 6 per cent, and that all engineering services ought to be paid for by the owner. This requirement has, I am sorry to say, been withdrawn, the argument given for this withdrawal being that competitions were often held for buildings for which 6 per cent was either too high or too low, and that conditions varied in different parts of the country, that the code was supposed to be an ethical statement, and a sordid mention of percentage should not be a part of it. This argument is all very good in its way, but like many other arguments based on ethical principles, falls in the test of practical experience. This is particularly so in the case of competitions for public buildings. There is usually a building committee or commission, the members of which are apt to be political appointees or public officials *ex officio*. These gentlemen invariably take the stand that it is their duty to their constituents to have the building designed at the lowest possible rate. They say, with some justice, "Why should we pay 6 per cent when John Smith from our own town is willing to do it for 5 per cent, and Tom Jones will cut the rate to 3½ per cent? If this was our own money, we would, of course, look at it from a broad point of view and pay you gentlemen any amount that you say is right; but we cannot go back to our constituents and stand accused of the charge of extravagance. Of course," they add, "if you can show us some documentary evidence — some clear statement — that we will be obliged to pay 6 per cent or else forego the participancy of the most prominent members of the architectural profession in this country, why then we will be entirely willing to agree to 6 per cent, and we will allow a certain amount for engineering services and traveling expenses; but if you cannot show us certain definite rules, we will be obliged to take the lowest rate." This has happened to my own personal knowledge several times in competitions for public buildings, and I am afraid is bound to happen still more often in the future, and I sincerely hope that some method will be arrived at to obviate this very serious difficulty — by what means I cannot suggest here, possibly some schedule which would apply to different conditions in different sections of the country.

It was, as I have said, to correct the evils caused by the wild scramble for work and the injustice often done by unrestricted competitions that the competition code came into being. In considering it, let us freely acknowledge that it is an impossibility to frame a code that will meet satisfactorily every condition, or which will be suitable for every section of the country. The code as drawn is not perfect, perhaps, and the form in which it is issued is entirely too cumbersome and formidable to meet ready acceptance on the part of the client. To my way of thinking it could, and should, be simplified. The whole matter could, I think, be compressed into one short page, which would briefly explain the reasons for its adoption and the few fundamental principles which are essential. If this simplified form were accompanied by a personal explanation, I do not think there would be one case in a hundred in which the owner would not see the fairness of it and promptly agree to the Institute's requirements. After the owner has agreed the present code and circular of instructions would be primarily for the guidance of the professional advisor.

The essential requirements are really very few. First, there must be a professional advisor; in other words, it is recognized that no one but an architect is capable of expressing the wishes of the owner and the particular requirements of the building in a way that will be intelligible to the competitors and to the jury. It is conceivable, of course, that some laymen might be perfectly competent to write a satisfactory program, but the code cannot recognize particular instances, but must be general in character.

Secondly, there must be absolute uniformity in the instructions given to every competitor, and there must be absolute uniformity in the presentation of the scheme by each competitor. Certainly this requires no argument. It is the only way in which perfect fairness can be obtained. Third, perfect anonymity must be preserved. Here again no argument is possible. Fourth, the jury should contain at least one professional architect, who preferably should not be the professional advisor, and the jury should consist of at least three members. It has been found from practical experience that no jury of laymen is capable of understanding the intricacies of a plan, and the presence and vote of some professional man is necessary. It is generally advisable not to have the professional advisor a member of the jury, for the reason that it often happens in the preparation of the program that he has formed a preconceived idea of the solution, and does not come to the judgment with an open mind. Fifth, the owner must employ one of the competitors as architect of the building, and the program should contain a form of contract between the owner and the successful bidder. This means that if the owner decides he must hold a competition, and does hold it under Institute rules, he cannot, after the competition drawings have been received, refuse to award the commission to any of the competitors, and declare the competition null and void. In brief, that is all there is to the celebrated Competition Code. The rest is mere amplification, and there is nothing whatever in these simple requirements to which any owner can reasonably object. I personally know of no case in which an owner has objected, provided the matter was put before him in a simple, straightforward manner. On the contrary, I know of at least a dozen cases in which a perfectly hopeless disagreement has been quite easily overcome by a personal interview from some one qualified to explain the position fully. In order to lighten the burdens of a small operation, many of the Chapters have standing committees, and provide at little or no expense competent persons to undertake, in simple cases, the task of professional advisor and juror.

Competitions exist from two causes: first, because in most operations of a public or semi-public nature it is obviously impossible to make a direct selection of an architect, without incurring a certain amount of criticism, which all committees are anxious to avoid. In such cases I have found that the committees usually welcome the advice and backing of the Institute. Second, because the owner is unwilling to take the trouble to make proper investigations and determine to whom he shall award the commission, or being a busy man, the easiest way is to allow any one who has made application to submit a scheme. In this case, if the owner does not wish to take the trouble to make a direct selection, he should be willing to give proper consideration to those who are willing to relieve him of this trouble.

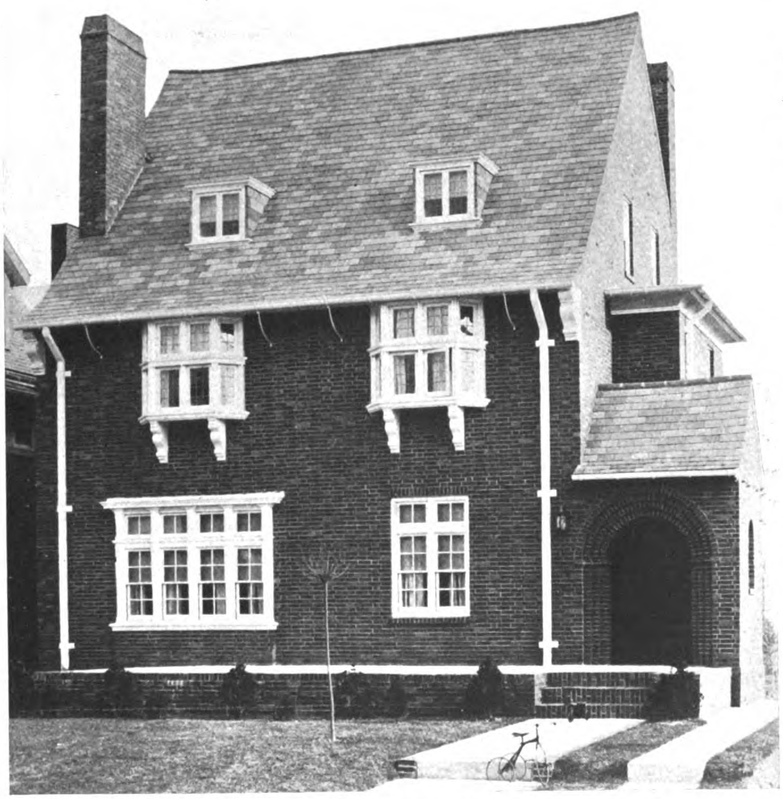
My criticism of the competition code, based on somewhat extended experience, both as competitor and as professional advisor and juror, is that there should be a simplified preliminary statement, as outlined above, and that more definite instructions should be given for the guidance of the professional advisor and jury. In my opinion, much of the dissatisfaction caused by competitions has arisen from the fact that the professional advisor was neither a practising architect nor had any previous experience in competitions. The programs are apt to contain cubage requirements that are quite impracticable and which result from a lack of experience in such matters, and the requirements are either so minutely and metriculously given, that no choice in the selection of a scheme is allowed the competitor, or else they are so loosely drawn that no competitor knows exactly what the essential features of the structure really are. Then, too, it often happens that although the professional advisor is told by the owner that certain requirements are essential, he has the opinion that these requirements should be carefully concealed, so that each competitor can use his own judgment and arrive at his own conclusions. This often results in the elimination of a number of schemes that are really better than the winning design, which has been selected solely because it contained an idea of the owner's that had not been expressed in the program.

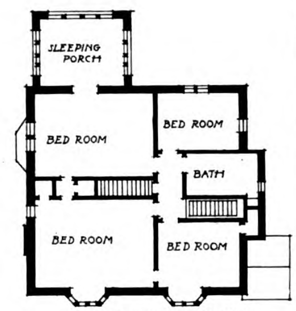
The professional members of the jury are all too often men who have had little or no experience with competitions and are prone to make a decision based on certain ideas of their own, or on suggestions which have been unconsciously conveyed to them by the owner or by the professional advisor, and not on the requirements as set forth in the program. The jury members should clearly be made aware of the great responsibility which rests on them, and that they are in a similar position to a jury in a court of law. Their decision must be based entirely upon the evidence and nothing else. They must understand that the competitors have no knowledge of the requirements other than that contained in the program, and the judgment of the competitive designs must be based on the program alone.

And again, another point which, while it applies to the judgment of all competitions, applies particularly to the larger competitions held for public buildings, is, that a decision involving a commission based on millions of dollars is placed in the hands of a few men, and this decision, while honestly made, is one which would perhaps be reversed by another jury, equally competent, on the next day. Too often personal taste and predilection govern in preference to the weight of the evidence submitted. It always has seemed to me that in the case of a large competition it would be a very desirable thing to have, say, three juries of three men each who would render separate judgments. If these three judgments were identical, the matter would be absolutely settled; but if, as is possible, each jury made a different selection, then the three juries would meet as one jury of nine, and arrive at the final conclusion. This method is a little more cumbersome perhaps and possibly more expensive than the one usually adopted, but it seems to me that the advantages to be gained from it considerably outweigh the trouble and expense. I would very much like to see it tried.

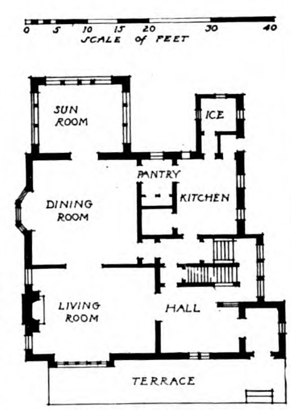
EGERTON SWARTWOUT.

New York, June 5, 1919.





SECOND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE OF JOHN H. MOONEY, ESQ., ST. LOUIS, MO.
GUY STUDY, ARCHITECT

ARCHITECTURAL & BUILDING ECONOMICS DEPARTMENT

C. STANLEY TAYLOR, *Associate Editor*

Protecting the Owner Under a Cost-Plus Building Contract

OWING to the unusual conditions in the building material and labor market a strongly developing phase of the contractual relations between builder and owner leads to the necessity of more serious consideration of forms of contract and the possibilities of the cost-plus method of building.

During the past few weeks it has become evident that in practically every section of the country contractors are refusing to give guaranteed prices on building operations or are introducing a protective safety factor which is making building costs prohibitive. The question of the cost-plus building contract has become insistent and in many localities is past the stage of argumentation. The sensible solution of the problem, therefore, is to analyze the cost-plus method of building to see if it is not possible to develop certain lines of protection for the owner so that injustice will be worked on neither side, and better building service under unusual conditions be made possible.

Digressing for a moment to analyze briefly the conditions in the material and labor field which confront the contractor who is asked to give guaranteed prices to-day, we find that in spite of unstable labor conditions, strikes, lockouts and various attempts at price fixing in the material market, there is an unusual demand for building materials, both for present use and for future use. Plants supplying basic materials in the eastern markets were carrying at the end of August, orders far in excess of those placed in the same month of preceding years. Supplies of material manufactured during the past year are being purchased by far-seeing contractors and dealers who realize that production costs in the coming year are to be still higher and that the new output will undoubtedly come into the market at prices above those now prevailing.

Steel shows a steady increase in orders and in price. The steel workers are negotiating for a general increase which must be paid by the public, and in various lines of supply such as plumbing, electrical material, architectural terra cotta, stone and face brick, generally higher costs may be expected. Supplies of various materials in many lines are completely exhausted and other supplies are being held for advances. The question of building labor is also difficult. On practically all jobs the experience is that when the work is well under way there comes a demand by the workmen for increased pay. In many instances this happens several times during the course of one job.

We find, therefore, that the contractor is seriously perplexed and that there is considerable merit in his statement that he cannot give a guaranteed price at this time.

An Opportunity for Service

This condition should be significant to architects in that it opens up an excellent opportunity for rendering real service to the owner by making it possible to build under the cost-plus system. The architect by supplying a form of controlling service which will keep the builder working in the interests of the owner without running up excessive costs under the cost-plus method of building can meet a distinct need at this time.

The various forms of contract between a builder and an owner may be generally classified as the straight contract and the cost-plus contract. The average builder to-day objects strongly to either the straight contract or the cost-plus contract in which the owner pays pay roll and material bills plus the builder's percentage and in return has a guaranteed figure which the builder will not exceed except at his own loss. The builder claims, with apparent justice, that he cannot safely figure costs and that he cannot, therefore, guarantee the price. On the other hand the owner is usually unwilling to place a cost-plus contract without having some guarantee as to the ultimate cost of his building, and it is, therefore, evident that to meet these conflicting conditions some controlling force must be exercised which may make it possible to utilize the services of a practical builder, paying for such service a percentage of the cost of the work done, and at the same time to satisfy the owner that his interests are protected. The architect is the logical person to do this, and if he is equipped so that he may carry out such service he will not only gain appreciably in the amount of business transacted through his office but will create a well-satisfied clientele.

The cost-plus method of building has been discussed on various occasions both favorably and unfavorably, but there is little doubt that many valuable features become apparent when this form of contract is analyzed. Through the establishment of the cost-plus method of contractual relations the experienced builder may if he chooses become a valuable ally of the owner, supplying the skill and knowledge necessary to take the most advantage of difficult conditions in order to construct a building at the lowest possible cost and without delay or friction other than that involved in the handling of materials and labor.

It is well to realize that the reputable builder is to-day attempting to establish his activities on a service basis and to build a reputation for fairness, careful buying and efficient handling of labor. It is evident, therefore, that if both owner and contractor have the same view in mind, that is, to construct a good building at the lowest possible cost under present conditions, a most advantageous situation is created.

The principal question at issue, therefore, is for the owner to know in some manner that the contractor is working for his best interests and not simply carrying on a percentage job, attempting only in a careless manner to avoid the factors which increase cost. To be certain of the efficiency and dependability of the contractor, the owner should be placed in a position where he is able to back his own judgment by that of a third party interested only in his behalf and having the proper knowledge of building methods and conditions, to know that the work of the contractor is proceeding along proper lines and not exceeding proper costs. Undoubtedly the most logical person to protect the owner's interests is the architect, provided he or his organization is fairly equipped to render such service.

It may be plainly seen that the only architects fitted to render such service are those who by actual experience have a well-rounded knowledge of building methods and conditions, and are closely in touch with the building materials and labor market; or those who have or may create organizations to meet this need.

Practical Method of Protecting Owner's Interests

The purpose of the following paragraphs will be to outline the various factors of protection possible under the cost-plus method of building and a course of procedure which has already been found successful from the practical view point.

The contract which is made with the builder should carry two important elements of protection to the owner as follows: first, that the owner shall have the privilege of discharging the contractor at any time during the course of the job. This protective clause is inserted to make it possible to meet unsatisfactory conditions or methods of handling the work by discharging the contractor before any great waste has resulted. The second protective clause should place the purchase of all building material in the hands of the owner rather than the contractor, and the actual purchasing should be carried out by the architect who is providing protective service for the owner. Through this method the control of building material costs is in the hands of the owner and a considerable saving may be enjoyed. The contract should be made on a cost-plus basis and the fee to be received by the builder should consist of 10 per cent on the cost of labor and 6 per cent on the cost of material; the balance of 4 per cent on the cost of material being paid to the architect for service rendered to the owner in connection with purchasing.

On many elements of cost in the construction of a building to-day, definite contract figures may be obtained from sub-contractors. Thus in the average building operation the builder should obtain and submit to the owner or his agent a definite sub-contract figure on plumbing, heating, painting, millwork, plastering and masonry. The figure on plumbing should include labor and all material and fixtures. The figure on heating should be on the same basis. On the painting sub-contract, plastering sub-contract and masonry sub-contract, the contract figure received from the sub-contractor should cover labor only, as all paint, plastering material and masonry material should be purchased by the owner. The owner, or his agent, the architect, will of course purchase all lumber, brick and other supplies except those provided under the sub-contracts outlined above. The labor on masonry, plastering and painting can be let to small local contractors who handle labor only and have not the capital for general contracting. On large building operations the architect as agent for the owner will have a man on the job in charge of the material yard and will be placed in a position to know definitely what material is being used. In letting sub-contracts for plastering, the labor figures should be obtained per square yard; in stonework, per cubic foot; and in brickwork, per thousand brick. Where poured concrete is used the contractor can carry out his own work, as he has available carpenters for making forms and labor for handling the material.

Through the medium of definite sub-contract figures obtained by the builder, the owner is of course definitely protected. On the purchase of lumber, brick and all supplies, the owner must be protected by the service ability of the architect who is working entirely in his interest. The only important protective factor still left for consideration involves the amount of labor used by the contractor in carrying out carpentry and any other work not definitely contracted through the medium of sub-contract. Here again the architect's organization is called upon for service in carefully supervising the job to see that an excess of labor is not used and that the contractor's management of the job is efficient.

In order clearly to demonstrate the various elements of a building construction job which must be considered in an analysis of protective measures under the cost-plus system of building, the following table is given showing the natural divisions of such work when estimating cost. In this table the items in italics indicate fixed costs. On each of these it is possible to get a definite figure before starting construction. Other items in ordinary type indicate danger points directly under the control of the contractor that must be carefully checked by the architect rendering this service. Further explanation of this table will be found in paragraphs immediately following.

Tabulation of Cost Elements in Cost-Plus Construction (Dwellings)

Items in italics show quantities which can be fixed in price. Items in ordinary type show danger points where cost may overrun estimate.

Materials	Labor
Rough lumber for framing, shingles, lath, etc.	Rough carpenters
Masonry materials, brick, lime, sand, cement, plaster, stone, etc.*	*Masons*
	Bricklayers
	Plasterers
	Common labor
Millwork (Interior and exterior finished trim)	Finish carpenters
	Trimmers
Plumbing supplies	*Plumbers*
Paints	*Painters*
Heating supplies, gutters, leaders, etc.	*Skilled labor*
Electric wiring supplies and fixtures	*Skilled labor*
Excavating, grading, terracing, labor contracts	

It is evident from the above table that the architect's service may be developed to a point to handle purchasing both of materials and of subcontracts (this may be done in co-operation with contractor if desired), and in supervising work to check costs on items shown in ordinary type above. On many of the fixed price items shown in the above table such as plumbing sub-contract, heating sub-contract and similar operations, the fixed price is the result of competitive bidding so that the owner may be sure that in all such elements he is getting minimum cost.

In order to show how definitely information as to costs may be given to the owner before a building contract is let on a cost-plus basis, the above tabulation may be grouped as follows:

*It is of course advisable to get definite prices on masonry material before entering into contract if possible. This depends entirely upon the connections of the purchaser and his ability to get quoted prices which will hold.

Elements Definitely Fixed in Price and Purchased Under Competitive Conditions

Millwork
Masonry

Elements Fixed by Competitive Sub-Contracts

Plumbing materials and labor
Masonry labor
Plaster labor
Painting materials and labor
Heating supplies, gutters, leaders, etc., and labor
Electric supplies and labor
Labor for excavating, grading and terracing

It is interesting to note how, by careful analysis in procedure based on experience, many of the elements which are feared in the cost-plus building system may be eliminated and may be defined before a contract is entered into, provided the owner uses the services of an architectural organization capable of supplying the needed knowledge which must act as his protection.

Returning to the above tabulation we find that the only items which cannot be absolutely fixed in price before entering into a contract consist of the following:

Rough lumber
Rough carpenter labor
Bricklayer labor
Common labor
Finished carpenter labor

In regard to fixing the cost of rough lumber, this item must be left to the skill and judgment of the buying organization whether it be the architect or the owner, but should not be left to the builder except under the supervision of other parties to the contract. In order to keep down the cost of labor as shown in other items in the last tabulation, the architect should maintain close supervision on the job to see that labor costs are not excessive and that the job is being handled in a manner which will result in the most efficiency from labor employed.

A final question which has not been touched upon in this article relates to the definition of cost as implied in the term "cost-plus." It may be plainly seen that "cost of a job" is a broad term which may allow many charges to the owner which to him may not seem fair. For instance, there are the items of building equipment (tools and machinery); changes in working drawings requiring additional service of architect and draftsmen; traveling and field office expenses.

In drawing the cost-plus contract the "cost" should be clearly defined in all its elements. In a later article the factors of "cost" fairly chargeable to owner and contractor will be discussed.

National Prohibition Injects New Element in Building Situation

IN the history of our national legislation no drastic action has had as great an actual and potential effect on real property values and commercial activity as that now developing from prohibition of the manufacture and sale of alcoholic beverages.

A great industry, representing hundreds of millions of dollars in invested and credit capital, has suddenly been paralyzed; and from the great producing institutions along the lines of distribution to the retail units in every section of the country the shock is passing, upsetting realty values; changing building occupancies; bringing difficult problems into the hotel and public amusement business, and diverting to other lines an immense annual expenditure by the American people.

A Constructive Opportunity for Architects

The public is speculating idly as to what is to take the place of the saloon. Business men whose interests have been directly affected are facing the issue squarely and the ramifications of this sudden change are rapidly being felt in unexpected quarters. The owner of the Purple Cat, a restaurant café of Greenwich Village fame, states frankly that without the optimistic and overlooking glow of wine his bare brick walls and tawdry ornamentation will not hold the public long. Just as frankly the head of the great Statler Hotel organization says that if he and his organization had foreseen the coming of prohibition they would have spent $2,000,000 less in building and fitting up the new Hotel Pennsylvania in New York City.

Thousands of the better located business corners in our towns and cities are suddenly made available for new lines of business. Everywhere new conditions have developed; new capital is being provided for investment and building activity is being stimulated by a demand for new construction and alterations to meet the situation.

Active real estate brokers and operators have sensed the situation and its possibilities for the promotion of new business. There is no reason why architects should not do likewise and the purpose of this article is to point out some immediate possibilities for new business which may apply to practically any city or town except those which were "dry" previous to national prohibition.

Hotel Design and Construction

In discussing the general situation with a prominent hotel man, we were recently informed that in his opinion the country "is due for a crop of new hotels." Further explanation brought out the fact that this condition is not due to prohibition, but to lack of accommodation in many growing cities and towns and to the poor and inefficient design of the average hotel built during past years.

If we stop for a moment to think over personal experiences in traveling we will remember that in practically all the smaller cities of the Middle West, the South and many of our eastern states the hotels are old, poorly kept up and equally poor from the service view point. To many of these cities industrial prosperity has come, bringing with it an increase of civic pride and providing capital for investment in new hotels. Again we find that many of the more recently constructed hotels are losing ventures, owing principally to inefficient design.

It is interesting to realize that the new condition of prohibition is accentuating failure in hotel design. Many hotels have made money solely because the necessary margin between loss and gain has been supplied by the bar profits. With these out there has come a sudden realization of the value of proper hotel design, particularly from the utilitarian point of view.

As Mr. Statler says in a recent article:

"Every dollar spent in construction, decoration and furnishing of a new hotel is invested capital on which we must get return!"

It is evident, therefore, that where investment is made in extensive drawing rooms, lounges, writing rooms, lobbies and similar non-income-producing space, the required return must be loaded on the income-producing units of the hotel's business. Certainly this is not good business and the proof is that the average "showy" hotel in our smaller cities has passed through periods of investment loss (failures and foreclosures) until the losses of first owners have cut down capital investment to a point correlative to income-producing possibilities. By careful planning for original construction the amount of public space of non-producing character can be cut down to a proper ratio to provide safe investment.

Note carefully the possibilities offered the architect in this field. A real need for new hotels exists, in which architectural design, æsthetic and utilitarian, shall offset the loss of liquor profits. Further necessities are the elimination of the overhead cost of unbalanced ratio between producing and non-producing space, and reduction to a minimum of the investment in building and decoration without sacrificing atmosphere. The increased cost of building simply accentuates these requirements.

In the case of the Hotel Pennsylvania, where $2,000,000 less would have been invested if prohibition had been foreseen, a difficult problem confronts the management. To meet the cost of financing this hotel, and provide a return for investors, at least 8 per cent must be paid on the investment before profits can be taken. This means that on the $2,000,000 which might be termed an over investment under present conditions, $160,000 must be earned and paid out annually. Knowing conditions, the architect must be able in his design to eliminate overhead charges due to non-earning investment.

It is evident, therefore, that in connection with the promotion and carrying out of the many hotel projects which must meet new and rapidly changing conditions, the architect can and should play an important rôle.

It is to be expected also that many hotels will be remodeled to meet these conditions. Here are commissions which depend solely on the architect's ingenuity and selling ability. It will pay to study the effect of prohibition on hotels in your town or city. The architect who comes forward with a straight business solution involving remodeling, perhaps cutting down public space by the introduction of stores — perhaps remodeling the entire building as an apartment house or for some other occupancy, will find that he has created a commission and, moreover, one which is in the public eye.

Momentum of Activity in Remodeling Buildings

The tidal wave of prohibition is carrying into the market countless buildings of various types available for a different class of occupancy. In many cases these buildings were designed for special purposes, — cafés, road houses, retail liquor salesrooms and contributory activities. For the most part they occupy important business locations which will be much sought by other mercantile lines of business.

Extensive remodeling will take place, involving the services of architects and particularly of those who may make valuable suggestions to the end that property owners shall not suffer by the change in business. Recent real estate transactions in many of our cities evidence the fact that many old buildings occupied by cafés, are to be replaced by new structures. This condition is logical in view of the fact that this class of occupancy has been able to pay abnormal rentals and that old buildings housing such occupancy even on high priced and highly taxed land continued a paying investment until prohibition reduced the income value. As a result new buildings, bearing an economically sound relation to the land value, must be provided to insure a commensurate income for specific and valuable business location.

Many estates and other property holders of long standing will for the first time enter into building activities, adding considerably to the clientele of the architectural profession.

Diverting Millions of Annual Expenditure

It is quite evident that under national prohibition conditions a vast annual expenditure by the general public will be diverted to other channels. Not only the liquor bill of the nation is to be considered, but a great volume of expenditure for amusement in certain types of restaurants, cabarets and similar lines where the cutting off of liquor profits will close the doors.

Where is this money to be spent? Certainly some of it will be saved and of this amount a large percentage will ultimately be invested in homes, mortgages and real estate of various types. An immense sum, however, will be diverted into other channels of amusement and entertainment. The experience of Detroit, which went dry early in 1918, shows certain interesting indications. The candy and soft drink business has greatly increased. Restaurant business is better. The theater business has shown remarkable improvement and a need for new theater buildings is evident.

The significant point to architects is that there has been suddenly released for the benefit of amusement enterprises, other than those dependent upon the purveying of liquor — a large potential income. To induce and handle this business, building alterations, extensions and new buildings of many types are required immediately. It should not prove difficult to make a local analysis of the lines along which this new business will develop in our towns and cities. By constructive co-operation with real estate men and owners of affected property considerable new architectural work is to be developed. New theaters, motion picture houses, club and community buildings will spring up in every section of the country to meet this demand. In Detroit there is a large, recently constructed six-story building given over entirely to commercial amusement, — bowling, billiards and similar semi-athletic and amusement enterprises. This building is proving highly successful.

An Impetus to the Community Building Movement

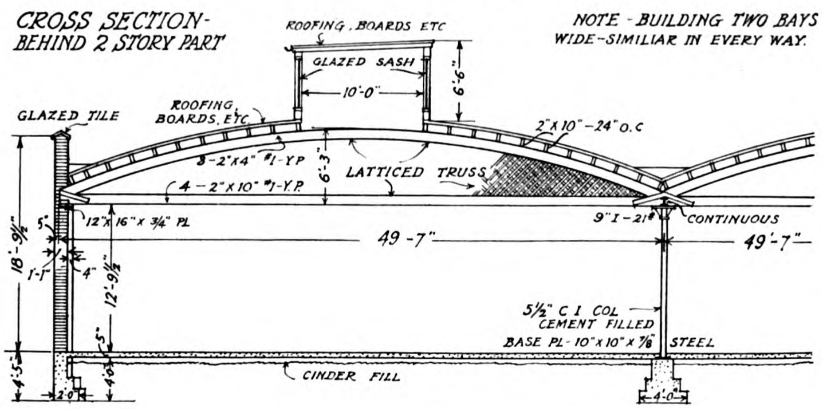
For some months an extended propaganda has been carried on, urging the public to provide war memorials in the form of community buildings. Sensible arguments have been set forth emphasizing the economic waste of monuments and other memorials having appeal to the eye only and without continuing practical use. The memorial community idea has met with but a small degree of practical success as yet — if the number of buildings actually under way may be taken as a commentary.

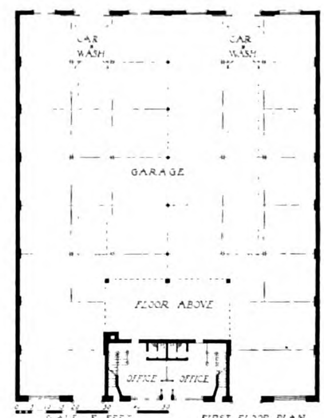
As time passes, however, the increasing success of this movement will undoubtedly become evident; but the coming of prohibition is certain to act as an important stimulus in focusing public interest on this subject aside from the memorial connection. The practical value of providing club facilities for young men; the need of community centers in congested districts; the need for community buildings in colored sections of our cities will more than ever be evidenced under prohibition conditions. The time is coming in the near future when every town and city in the country will maintain community buildings in proportion to the population.

There are many other important phases of the new condition which would bear interesting discussion, but these must be left to the analytical thought of those who may read this article. Its purpose has been to direct thought and discussion to a volume of new business which is to develop for the architectural profession under the changed conditions of national prohibition; and with a view toward emphasizing the importance of taking advantage now of a promising situation.

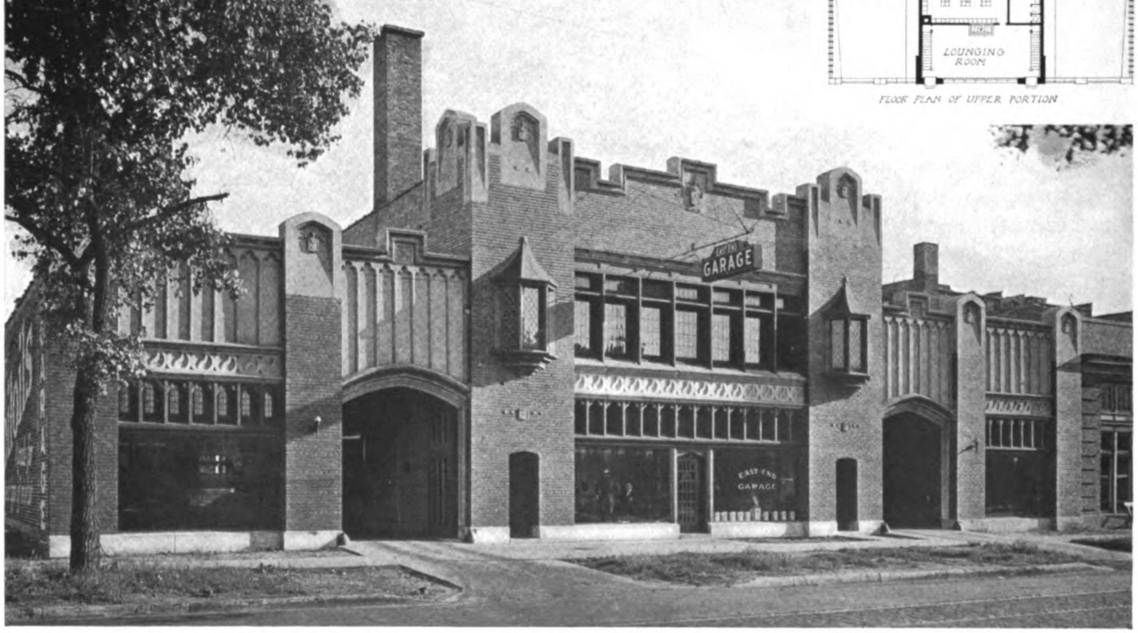
East End Garage, Chicago, Ill.

S. N. CROWEN, ARCHITECT





FLOOR PLAN OF UPPER PORTION



Jurisdictional Strikes

By ERNEST JOHN RUSSELL
Chairman of A.I.A. Committee on Jurisdictional Disputes

THE building industry is usually beset with troubles — some sacred and some profane. Coming under the latter category is the trouble brought on by jurisdictional strikes. This evil has almost unconsciously grown until it now forms about 75 per cent of all strikes in construction work. The consequent waste through loss of time and money runs into millions. Such a waste, even in normal times, is a detriment to the industry, and in these times of high prices it is acting as a determent.

Recognizing this and being exceedingly anxious to get the industry reëstablished, The American Institute of Architects last November appointed a committee to see if anything could be done to eliminate the jurisdictional strike. The committee took the matter up with the Building Trades Department of the American Federation of Labor and were gratified to find that the Department recognized the evil and had previously taken steps to eliminate it. They had secured from the Department of Labor the services of John B. Lennon and had requested him to make a country-wide examination of the situation and prepare recommendations for consideration. They cordially invited architects to assist, and, as a consequence, meetings were held by representatives of labor, general contractors and architects.

A tentative plan was drawn up, submitted to the various organizations for criticisms and suggestions, and was finally approved by the committee which represented the various interested organizations. It was then submitted to the respective memberships, and has been approved by the Building Trades Department, the Engineering Council, the Associated General Contractors of America, and the American Institute of Architects. It was more recently submitted to the Convention of the National Association of Builders' Exchanges and the National Building Trades Employers' Association, both of which met in Atlantic City in July. Its adoption by these bodies will complete the preliminary arrangements.

Briefly, the plan states that all matters of dispute relating to the interests of different trades in work to be performed shall be submitted to the National Board of Jurisdictional Awards of the Building Industry, and the decision of two-thirds of the members shall be binding upon all parties. The Board will be composed of eight members, — three representing labor, three employers of labor, one engineer and one architect. The decisions of the Board shall govern architects and engineers in writing specifications, and contractors in awarding contracts.

Such a step is bound to have a great influence on the building industry. If it works out as its creators hope it will, the influence will be for good and be far reaching because if the Board has the ability to settle fairly jurisdictional disputes, it will undoubtedly be asked to take part in settling other disputes which arise from time to time.

The recognition of the principle of getting together to settle pending disputes and to prevent others from arising in the future is in itself an advance step.

In creating such a Board the building industry recognizes for the first time the fact that it is composed of employees, employers and professional men.

The whole plan seems so sane and healthful that it is bound to be watched with the utmost interest not only by the building industry but the public generally, and should be helpful in encouraging the public to proceed with needed construction work.

So far as the duties of architects are concerned, they are of the simplest character. When decisions have been made by the Board, individual architects will be apprised of them and it will be merely their duty to specify the various materials in the particular branches to which the work has been assigned. Each member of the Institute is under definite obligation to write his specifications in accordance with the decisions of the Board, and, failing to do so, he is liable to suspension in accordance with the terms of agreement between the five organizations. It is, however, an obligation of such simple character and can be so easily fulfilled that there will be little likelihood of architects not observing it.

The first meeting of the Board was held on August 11th in Washington and it will now proceed to hear the cases presented to it for decision. These cases may be brought by the International Unions or the employers of members of these unions.

As soon as decisions have been rendered they will be transmitted to the officers of the five organizations that are parties to the agreement, who in turn will transmit the decisions to their members. It is expected that members of the Institute will receive the first of the decisions in December.

EDITORIAL COMMENT

FIRE PREVENTION WEEK

THE National Fire Protective Association has named the week of October 6th, Fire Prevention Week. The activities of this association in attempting to make the public realize the great need of fire-preventive measures should serve to remind the architectural profession of the very large responsibility it holds in the matter. The staggering sum of nearly $290,000,000 which represents the fire loss in the United States for the year 1918 is evidence enough that we are permitting a steady economic waste which will eventually be a serious drain on our resources. This sum reduced to a per capita basis is $2.63 and compared with 11 cents, the corresponding figure in Holland, indicates in how reckless a manner a large part of our national wealth is needlessly consumed each year.

The main cause of such appalling waste is the flimsy methods of building construction we have long permitted. It is only within recent years we have given serious study to fire-proofing methods and that we have been forced to do because of the necessity of building high structures in our larger cities. This has not affected our domestic work to any appreciable extent, or even such important buildings as schools and factories in many sections of the country. There has been too much thought given to the initial cost of buildings and too little to means of securing permanency and fire-safe construction. The difference in cost between safe and flimsy construction is, however, gradually being reduced and when the longer life of a well-constructed building is considered, there is little reason for continuing our careless methods. The architect in his position of expert adviser should assume the duty of acquainting the owner with the economic benefits of fire-resisting construction. If the best possible general design is employed, the most reliable protection afforded by the use of fire-resisting materials properly applied, and an installation of equipment made to care for incipient fires, a great forward step will have been taken.

EDUCATING THE PUBLIC

ARCHITECTS have long held that education of the public in architecture was essential to a popular appreciation of the art, and many ways of reaching the busily occupied public have been discussed. A method that has met with considerable success has recently come to our attention, but the credit for conceiving it must be given a real estate man of Springfield, Mo., where the work was carried on, and not to an architect.

The feature was called "Tiny Town" and was part of a local "Build Now" movement. Its purpose was to interest the school children in overcoming a housing shortage, and through them reach the entire community. With the aid of the manual training and drawing departments of the public schools, the pupils built a large model of a residential district, comprising thirty-two blocks, complete in all details, at a scale of one-half inch to a foot. About one thousand miniature houses were erected and it is stated that the architectural features were surprisingly accurate. Building contests and prizes made the miniature town a topic of conversation in a great many homes, and upon completion of the work a public exhibition was held.

The interest the idea aroused in the children suggested the use of the scheme as an aid in the teaching of citizenship and civil government, and it is intended next year to repeat the plan on a larger scale and in the open, where a ten acre tract will be developed. The cost of the enterprise including the prizes was about $5,000 which was contributed by people interested in encouraging building. The campaign reached all classes of the population and a decided revival in building has taken place since its close.

WHEN IS A TRUST?

IN the general inquiry into the high cost of living, the building material market has not escaped the eyes of Washington, and Federal activities of an investigatory nature are being directed to the production and price of basic materials. In addition to the many troubles which are disturbing the building material market there have come various rumors of price-reducing activities, and specific attack has been made on the Portland cement industry under anti-trust laws.

There can be no doubt that many phases of the high cost of building should be investigated and that in some cases drastic action should be taken tending toward the reduction of unfair prices. We do not know that the co-operative activities of the manufacturers of Portland cement have reached the proportions of a trust, nor that unfair methods of price fixing have been adopted. We do know, however, that the same co-operative activity which has lead to the Portland Cement Association with its staff of investigators has afforded invaluable contributions to the work of the architect and builder, and a sense of realization of the benefits which have been derived by the building public from such co-operative activities leads us to express the hope that any implication or inconvenience which may be suffered through Federal investigation will in no way retard the progress of the service branch of this industry.

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CONTENTS for OCTOBER 1919

PLATE ILLUSTRATIONS

LETTERPRESS

ALBERT J. MacDONALD, Editor

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Photograph by John Wallace Gillies

THE ARCHITECTURAL FORUM
FOR QUARTER CENTURY THE BRICKBUILDER
VOLUME XXXI OCTOBER 1919 NUMBER 4

Government Housing Work at Bridgeport, Conn.

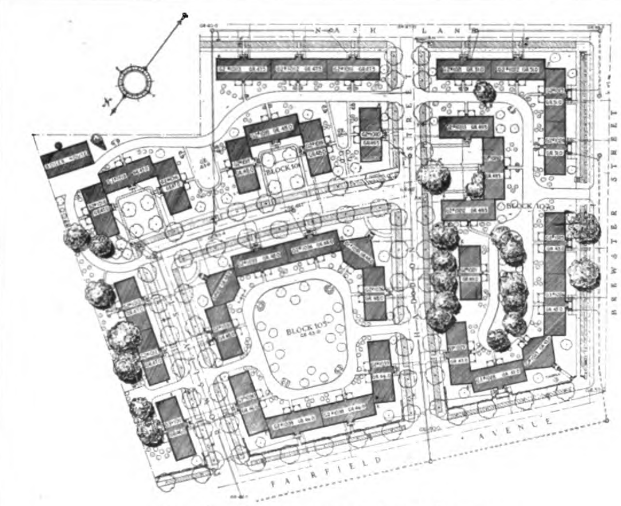
By W. STANLEY PARKER, A.I.A.

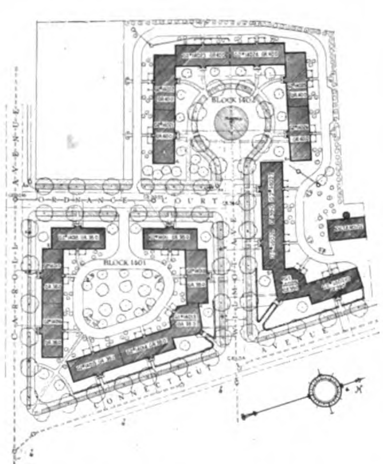
WHEN the Government started its housing at Bridgeport, the Bridgeport Housing Company, composed of a group of leading manufacturers interested in the proper housing of their mechanics, had already constructed a group of two-family houses, compactly planned for varying sized apartments and relatively low rents, on Connecticut avenue, and a higher-rent apartment house on the other side of the city, and also a group of some twenty single and two-family houses just outside the city limits in the town of Fairfield.* This last group of which R. Clipston Sturgis was architect, was the beginning of a larger development interrupted by the war. Here were developed two types later used, substantially unchanged, in the Government work. One of these, called H-3, is shown in plan on page 115, and two types of exterior treatment of it in the illustrations on page 116.

After considering many sites, the Government selected for immediate development, two on the easterly and two on the westerly side of the city. In each case, one was on comparatively expensive land and developed more intensively with three-story apartment buildings while the other was adapted to a development with single and two-family houses. The apartments gave about thirty-one families per gross acre; while the houses gave about ten. Later a fourth site was added to the south of the central part of the city, close to the factories, and adapted to a lower rent development.

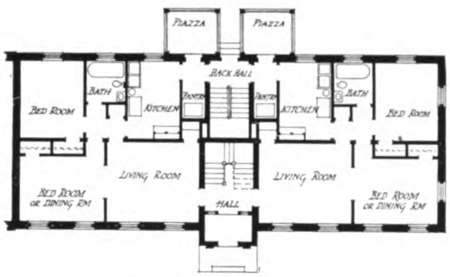
The apartments were developed from a standard four-room unit which had already been developed by the Bridgeport Housing Company and Mr. Sturgis. The plan is shown on page 112. The front and rear stairs in each unit are enclosed in brick walls with Kalomein doors at all openings, the rear stairs themselves being concrete, thus eliminating outside fire escapes. These units, three stories high, accommodating six families each, were combined in various groupings, as indicated by the two-plot plans of the "Black Rock" and "Connecticut avenue" groups. The "Black Rock" group, known as Site 1, has a frontage on Fairfield avenue, a main thoroughfare. It lies near the western limit of the city, and accommodates 216 families. The "Connecticut avenue" group, Site 14, is also on a main thoroughfare, but in the eastern section of the city. It accommodates 108 fam-

*Published in The Architectural Forum, February, 1918.



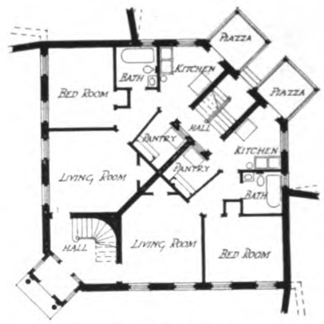


Plot Plan, Site 1, Black Rock Development — Plot Plan, Site 14, Connecticut Avenue Group
Bridgeport, Conn., Housing Developments



Plan of Typical Four-Room Unit

Plan of Five-Room Unit



Three-Room Corner Unit

Views of Apartment House Groups in Black Rock Development, Bridgeport, Conn.
R. Clipston Sturgis, Architect

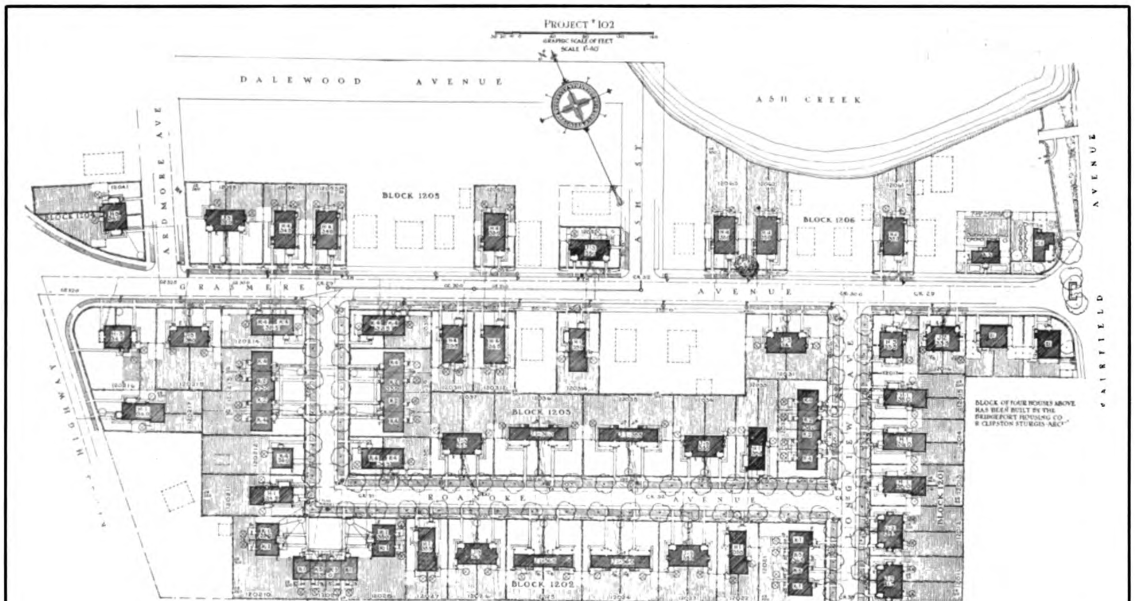
View Looking West Along Howsley Street, Black Rock Development

ilies. Here the units are all four-room units, except the two three-room corner units, but at "Black Rock" a number of five-room units are used along the important frontage on Fairfield avenue. The grouping of these units provides several large enclosed playground spaces for the younger children. Each unit is reached by a service road at the rear and each group is heated from a central plant with pump-circulated hot water.

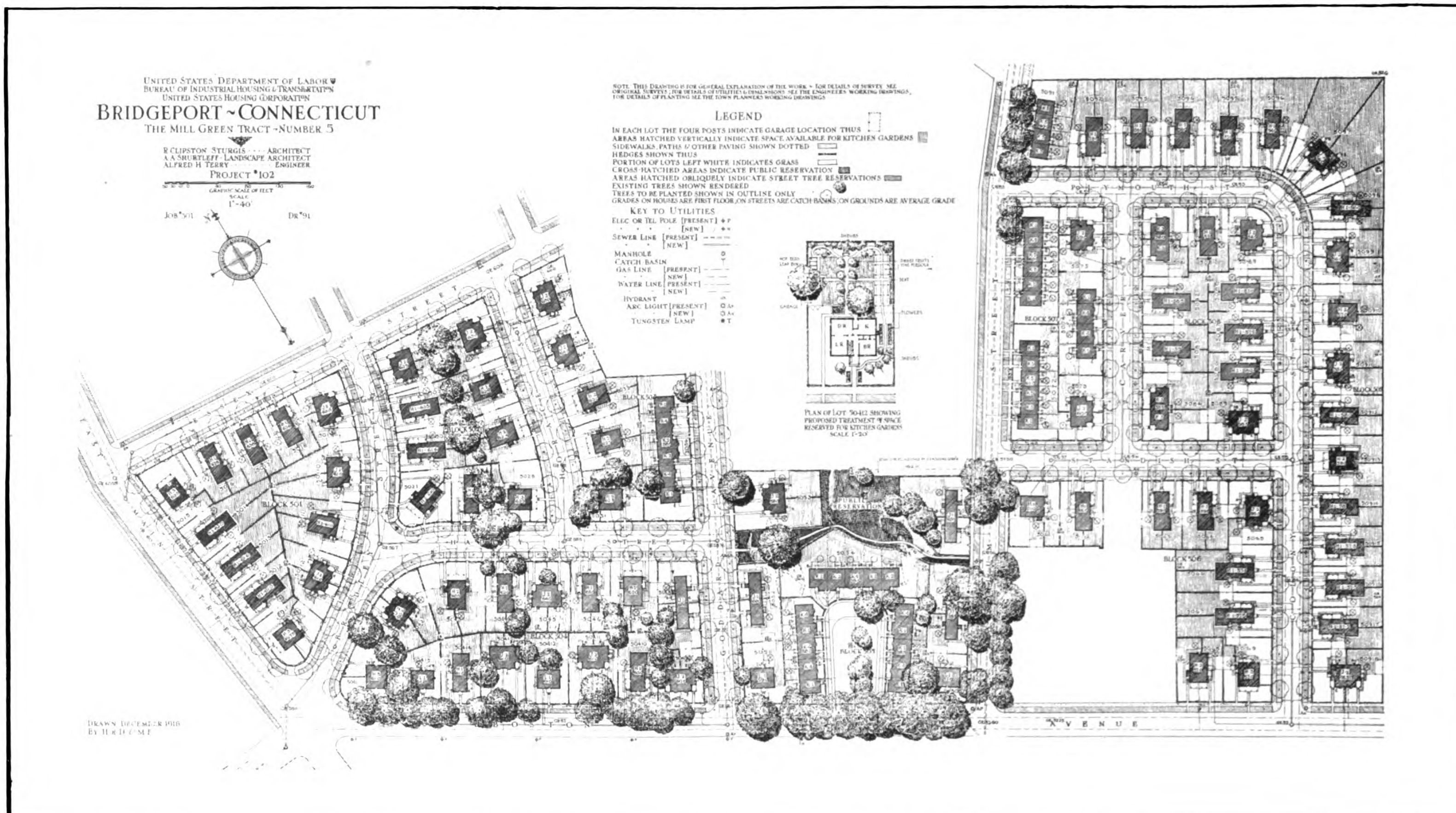
Rear Yards of Apartment House Group

At Site 5, the plan of which is shown on page 114, the development consists of several different types of single, semi-detached and two-family houses, with some row houses.

Types H-1, H-2 and H-3 (see pages 115 and 116) are the two-family houses,—a family on each



Plot Plan, Site 12, Grassmere Development, Bridgeport, Conn.
R. Clipston Sturgis, Architect; Skinner & Walker, Associate Architects

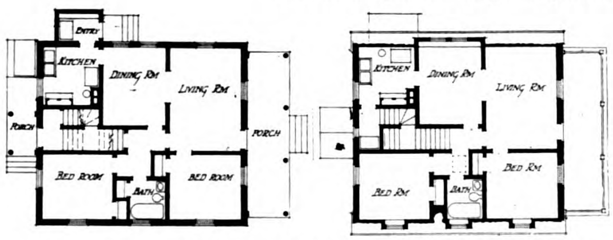


PLOT PLAN, SITE 5, MILL GREEN DEVELOPMENT, BRIDGEPORT, CONN.

R. CLIPSTON STURGIS, ARCHITECT; ARTHUR A. SHURTLEFF, TOWN PLANNER

This development is on comparatively inexpensive land permitting a grouping of single, semi-detached, two-family and some row houses, averaging ten families to the gross acre. The land is comparatively level, but of such awkward shapes that a coordinated street layout was difficult. Several large existing trees were carefully preserved in determining the location of houses, and the resulting effect is interesting and attractive.

View Looking South Along Colony Street in Mill Green Development

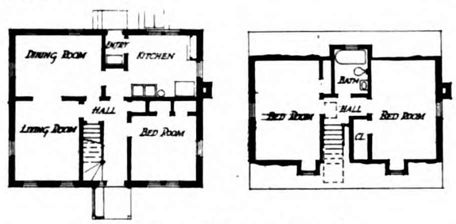


Floor Plans of Two-Family House, H-3

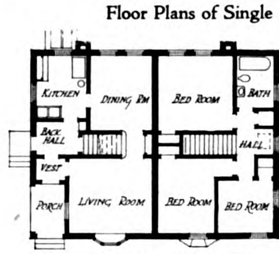
floor. The plan H-1 was developed for narrow lots, 50 feet wide, the typical Bridgeport city lot. Plan H-2 was more compactly planned for a wider, shallower lot, and H-3, with its two entrances at opposite ends of the house, was particularly adapted to corner lots.

Types J-1 and J-2, the plan of the latter, of which many were built, being shown on this page, are semi-detached houses, with a party wall.

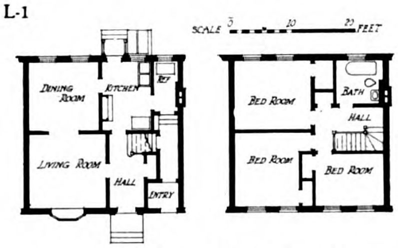
The K type house was planned to permit construction in rows but without rear alleys, the service entrance being at the front. Types K-6 to K-11, inclusive, designed for use on Site 4, have but a single entrance in the front, which is used for service purposes as well. Types K-1 to K-5 are designed for use where such combined use of the front entrance would not be acceptable. In these types there is a separate service entrance in the front wall of the house. A lattice door gives entrance to a service vestibule in which the garbage container is located, and from which access is



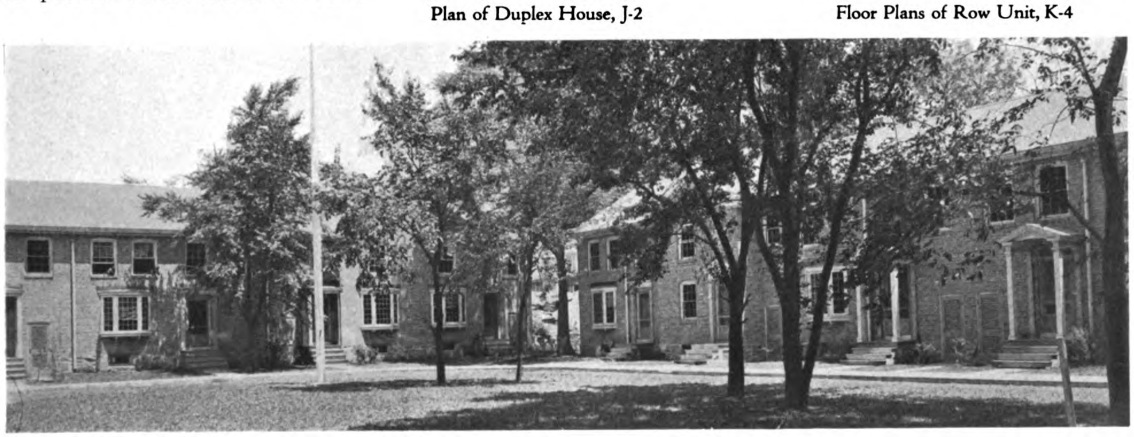
Floor Plans of Single House, L-1



Plan of Duplex House, J-2

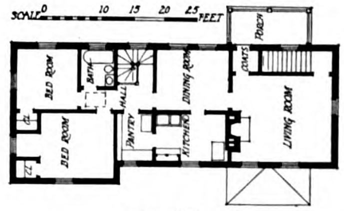


Floor Plans of Row Unit, K-4

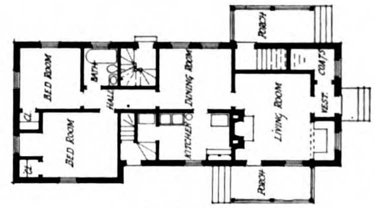


Row Houses (K-1—K-5 Types) around Court on Boston Avenue, Mill Green Development

Duplex House, J-2 in Foreground; Two-Family House, H-3 at Right

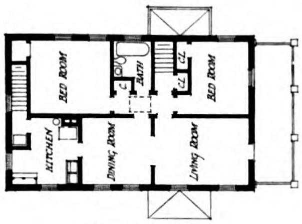


Second Floor Plan



First Floor Plan

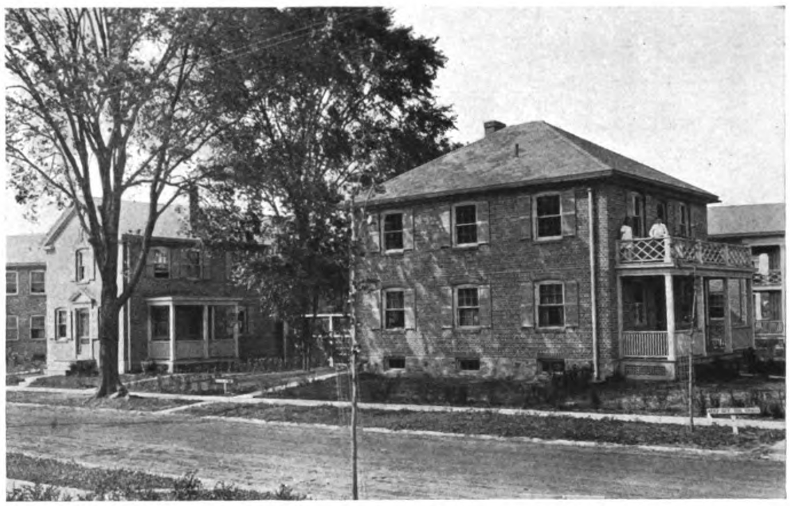
Two-Family House, H-1



Second Floor Plan

First Floor Plan

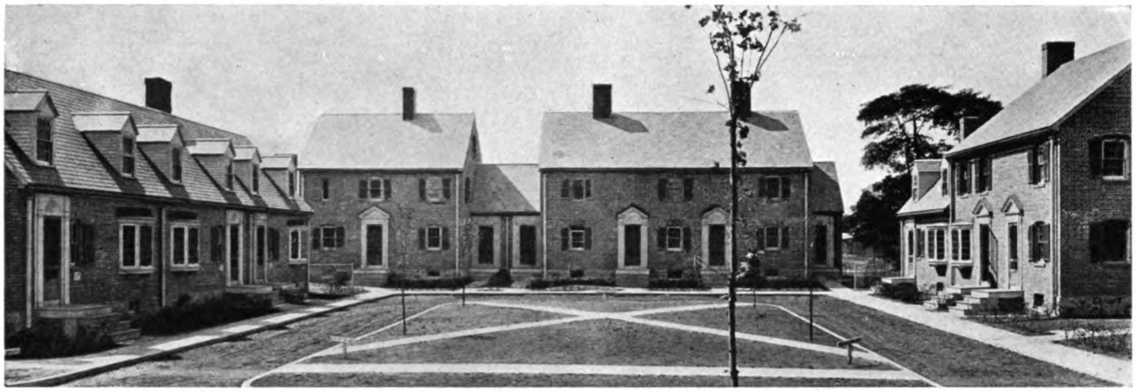
Two-Family House, H-2



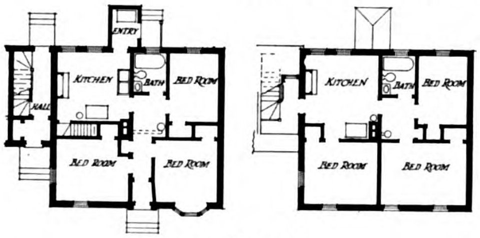
Two-Family Houses, H-1 at Left, H-3 at Right

View Looking North on Roanoke Street to Court, Grassmere Development, Site 12

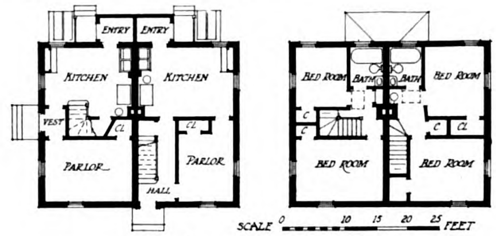
R. Clipston Sturgis, Architect; Skinner & Walker, Associate Architects



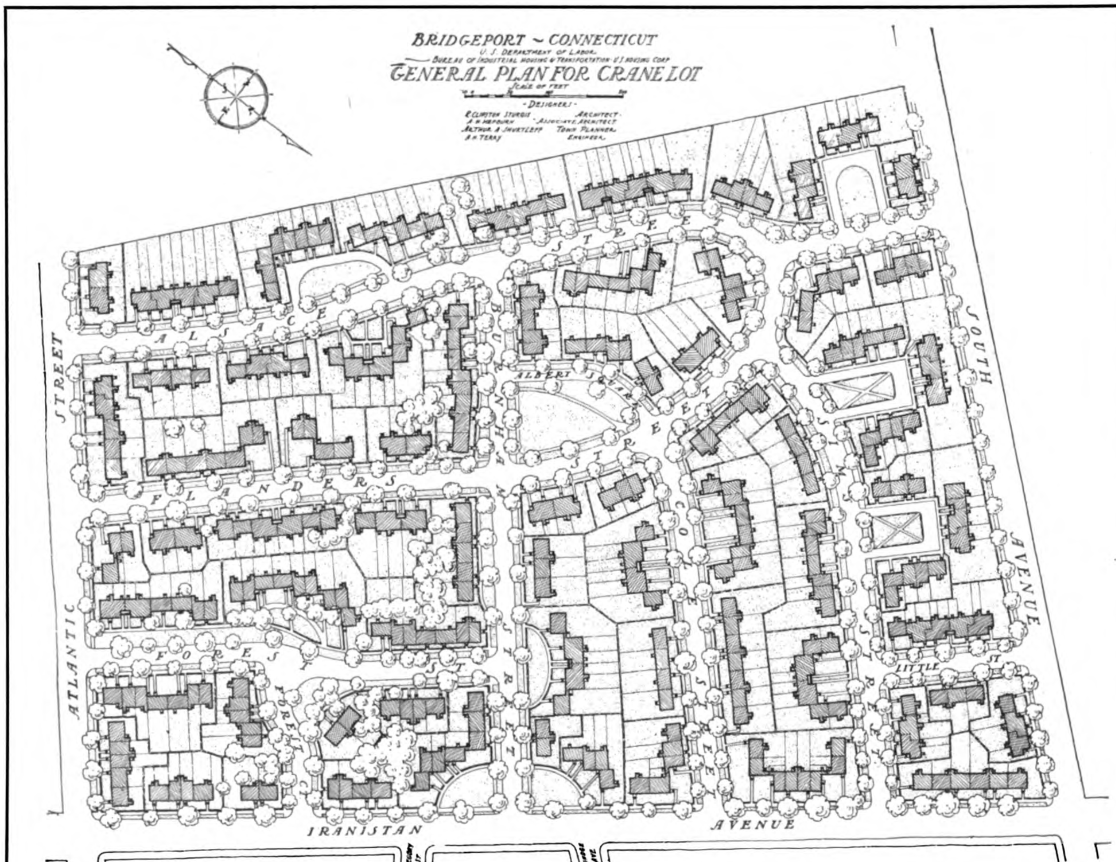
View Looking North Across Green from Burnham Street, Crane Development



Floor Plans of Flats, K-11



Floor Plans of Unit in Groups



Plot Plan of Crane Development, Bridgeport, Conn.

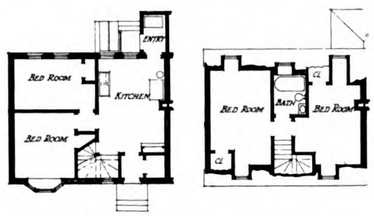
R. Clipston Sturgis, Architect ; Andrew H. Hepburn, Associate Architects

View of Court on Sims Street Showing Flats (K-11) in Center, Crane Development

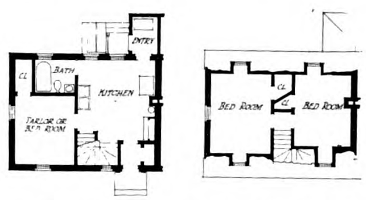
had both to the cellar and to the kitchen. (Plan of K-4 on page 115, also bottom illustration.)

The layout of Site 12 was less unified since it covered a tract already laid out with streets on which some lots were already developed. Messrs. Skinner & Walker were associate architects with Mr. Sturgis in the final development of this site, determining the exterior treatment and the two additional types, H-4 and J-3, used only here.

The layout of the Crane Tract, Site 4, was based on an endeavor to secure picturesqueness of effect, in spite of the original intention to develop this tract as economically as possible for lower rents. The houses included some three-room apartments, and in all cases were of the kitchen-living-room type. Also furnaces were omitted, a coal range in the kitchen furnishing all the heat. In spite of these elements of plan, they are being rented at higher rents, and furnaces have now been installed. The original intention, therefore, of building inexpensively for lower-rent tenants has been departed from, but a picturesque effect of considerable charm secured.

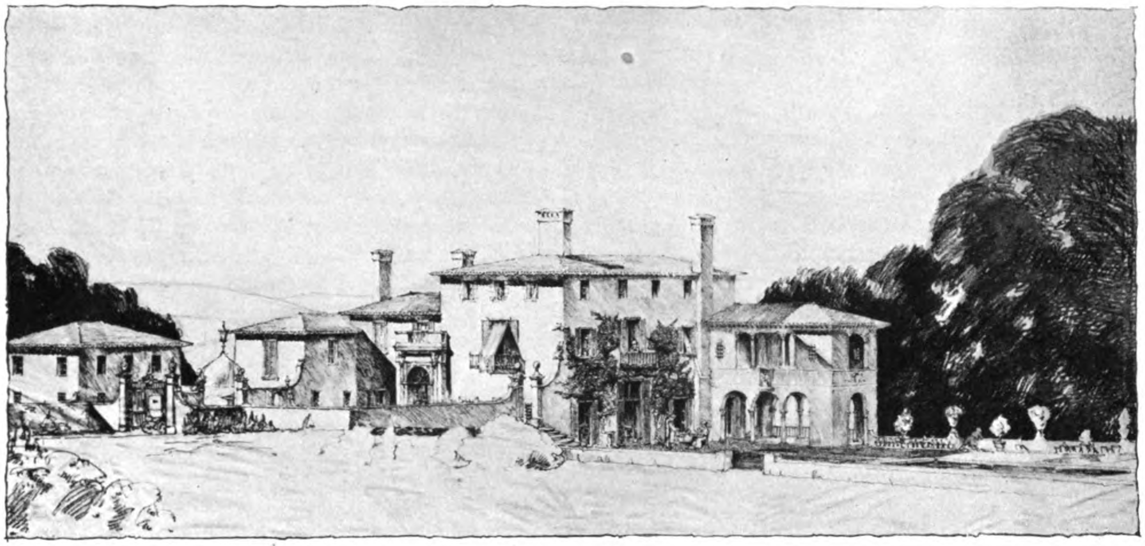


Plans of Single Family Unit Used in Rows



Plans of Four-Room Unit Used in Rows

View Looking East along Flanders Street from Intersection with Sims Street, Crane Development
R. Clipson Sturgis, Architect; Andrew H. Hepburn, Associate Architect



The Design of a House at Chestnut Hill, Philadelphia

THE RESIDENCE OF FRANCIS S. McILHENNY, ESQ.

MELLOR, MEIGS & HOWE, ARCHITECTS

By ARTHUR I. MEIGS

IN the consideration of the problems involved in the design for the house of Mr. Francis S. McIlhenny two principal basic considerations were at once apparent. First, that the house was to be built upon a hill, and second, that the hill sloped towards the northeast, and that the outlook was directly to the north. These two points formed the root and foundation for the whole design Regarding the question of orientation, it was decided that the solution of the problem lay in planning the house in such a way that the principal rooms would look out to the southeast, and this necessitated the creation of the parterre at that point. By this arrangement the living room, the hall and the writing room, on the first floor, and the owner's bedroom and the other two principal bedrooms on the second floor, obtained this valuable exposure. The question of view, to a large extent, was subordinated, but, by the location of the dining room, the bay looks directly at the view, the living room has two windows facing it, and the porch is so placed that it commands both the parterre and the view. In order to get the sun also into the dining room, the sunken garden was created, and while practical considerations make this a necessity, it brought about, as is almost universally the case, when such considerations are successfully handled, one of the pleasantest features of the design.

In fact, this process was followed throughout, and if the finished product has any merit at all, it is entirely due to the plan being born from its situation, and the elevations and outbuildings following as a logical sequence from the *parti* originally assumed. Of all elements of design, this seems to be the most important, and the one that, if faithfully, frankly and logically followed, produces in the end the most successful results. If the *parti* suits the ground, if the house is set at the right level, and if it is set in such a way, with regard to the points of the compass, that the sun gets into the principal rooms, that the places in which one lives outside are both cool in summer and warm in winter; everything else in the design seems to fall into its natural place and takes care of itself. The designer can find ready to his hand an answer to almost any question which may arise, if what he started with was right and suitable and if he can treat what he does afterwards with taste and a sense of the beautiful.

The functioning of a place of this kind is of the utmost importance. The property is about four acres in extent, and of this scarcely two are available for buildings, namely, those which show upon the plan, while the balance of the property extends to the northeast and further down the slope.

The two ramps at either side of the main gates to the forecourt, which show on the plan, but not in the plates, are an interesting illustration of beauty growing out of necessity. They form a pleasant feature and, although built before the greenhouse, they now constitute the only connection between the garden functions of the place and that part of it which lies to the southeast of the sunken road.

Such matters, too often forgotten, show the importance of thinking and designing beforehand, while it is frequently the case that the owner takes the position that he wants from the architect only the design of a house; that the matter of the functioning of his house, and the functioning of the various things that go with it, are considerations entirely apart from the service to be expected from the architect, — the result being in so many instances that the outbuildings are located in a haphazard fashion and, frequently, in wrong and inaccessible places.

With regard to planting, practically all that shown on the plan has been done through co-operation between the owner and the architect, and here again, an opportunity exists which is too often neglected. When the designer creates blank spaces which exist in his mind as covered with vines, climbing roses, espalier fruit trees, or any other such pleasant appurtenances belonging to a country house, and those spaces are treated entirely differently and unsympathetically by an owner quite unconscious of the designer's conception, and aiming at a different object, thoroughly unsatisfactory results may be expected from the two opposing forces.

The levels were such that, in order to get the main first floor at an elevation equal to that of the parterre, formed by cutting out on one side and filling in on the other, this first floor level had to be set five feet lower than the level of the forecourt, thus necessitating the entrance loggia with its flight of steps leading from the front door to the actual entrance to the hall.

The original conception of the house was in the Italian feeling, shown by the first illustration in this article. Both for reasons of expense and because the owner did not feel that the Italian style was entirely suited to either his wants or the locality, it was decided to retain the plan but to change the exterior, as is shown by the following plate illustrations.

It would be quite impossible to classify the house as belonging to any style. Certainly the plan is English in feeling, inasmuch as it is both broken up and irregular, wandering about the property in a haphazard fashion, with no attempt at formality, considerations of orientation having taken precedence at every decision.

Fenestration of the house could be considered either French or Italian, though certain features — such as the entrance loggia — are quite slavishly Italian. As for French influence, — the bricks around the windows and the free use of brick as a color motive around the cornice and various other places might be said to be taken from the French, while the form of the roof is perhaps nearer French than anything else, but the fact of its being covered with shingles puts in an American touch.

An attempt has been made in presenting this house in the plates to arrange them serially, so that one is taken from the front — beginning at the entrance from the highway, through the forecourt, showing various views of the elements there, passing through the gate between the forecourt and the parterre to the southeast façade and, finally, into the hall and the fountain at the foot of the loggia steps.

One year elapsed between the broaching of the original proposition for designing this house and the breaking of ground for its construction. Another year elapsed while it was building, and at the present time the greenhouse and shed are under construction. All the planting, as shown on the plan, is in place, and the drawing of the pool in the text shows the proposed treatment for the parterre to the southeast, including the swimming pool and serpentine wall which bounds the southwest side of the parterre.

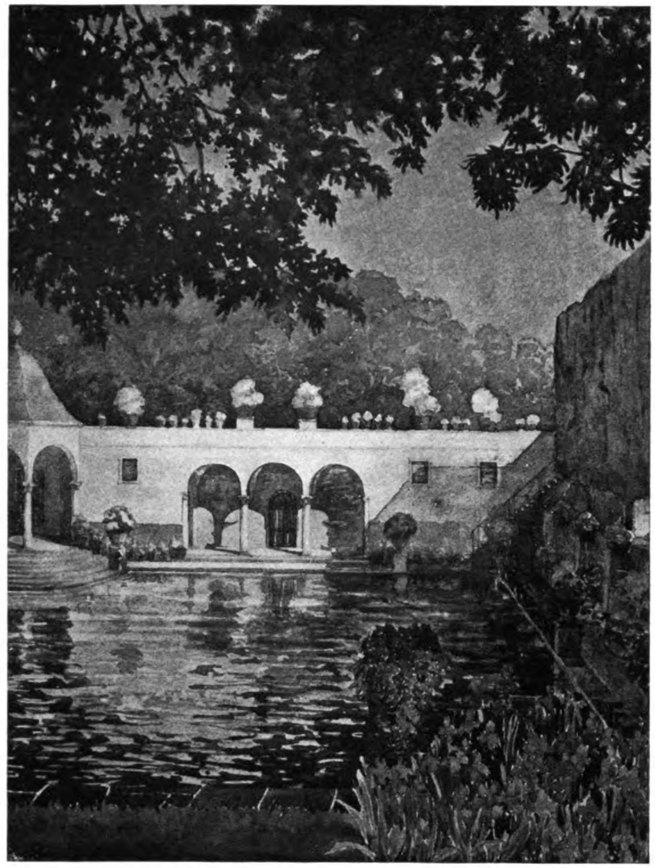
The owner having come to the very wise decision that he expects to live in the house for the rest of his natural life, proceeds slowly with the new features of the place, thereby getting his amusement as he goes along, and conditions such as these are undoubtedly ideal from the standpoint of the architect.

A new experiment was tried with regard to the treatment of the plaster walls in the porch and entrance loggia. The walls in these two places were sand-finish, and it was felt that color was desirable. In the loggia, three main colors were decided upon — yellow, brown and blue, all colors being very strong, and the brown about the tone of Spanish leather. Taking these three colors in three separate pots, the walls were covered in blocks, so that when they were first finished, they looked more like a ship that had been camouflaged than anything else. The colors were blended together by putting blue over the brown, brown over the blue, and both blue and brown over the yellow. A very successful result was thus obtained in which the color starts with yellow at the bottom, blending into brown half way up, and ending in a very rich blue on the vaulted ceiling, though there is no part of the surface that is all one color, as the three colors vary and intermingle throughout the entire surface. The porch walls and ceiling are treated similarly except that the ceiling is a strong yellow, while the walls graduate up from yellow, through a pink orange, into a violet at the top.

The most careful study has been put upon the pool and its surroundings. The matter of landscape architecture is perhaps as much neglected in this country and in the present times, as it is important, and a general idea seems to exist that, compared to the house, it is relatively unimportant, and that the house being finished, there is little else to do.

Design is quite as important in landscape work as it is in architecture, except that it is more evanescent, more difficult to apprehend, and more rare.

Masses of growing things, whether they be trees, hedges or an open lawn, bear a relation to each other quite as important as the relation between the masses of architecture proper, and to suppose that the harmony, or lack of it, existing between the width of a terrace and the wall back of it, the size of an open space and the height of the features surrounding it, or any such elements of proportion — in short, design — are unimportant, is a most profound error.



Drawing of Pool and Surrounding Treatment on Grounds of Francis S. McIlhenny, Esq.

The main idea underlying the pool is that swimming pools are ordinarily considered as things of utility; something to be subordinated and to be put off in an out of the way corner of the property, while in this case an effort has been made to treat it as an important feature of the place with sufficient surroundings and of such proportion as to make it a thing of beauty as well as of utility.

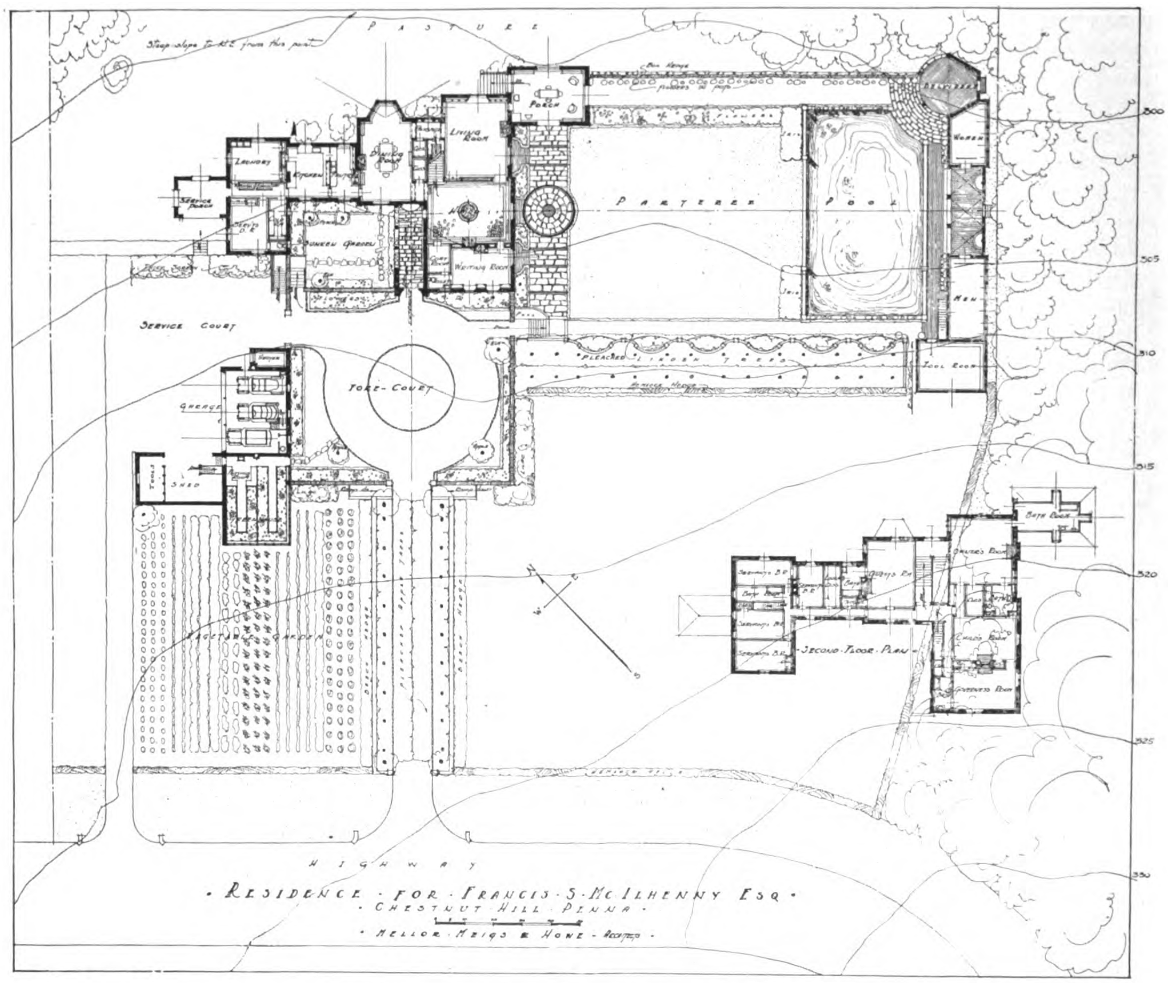
Here, again, the needs of the problem suggest the treatment; the two rooms marked "men" and "women" on the plan are the dressing rooms which have ceilings 14 or 15 feet high, with wall spaces sufficient in size to foil and hold the three central arches; the belvidere at the left is raised, both to give a better view of the pool and the garden and to make it buttress more strongly this corner of the design; the scale is large, and owing to the woods which partly surround it and hang over it, it affords a capital place in which to spend a hot summer morning.

One porch can be habitable only at one time during the day; in this case there is a place to go both morning and afternoon, as the porch in connection with the house becomes shady at about three o'clock in the afternoon. The tool house is for the obvious purpose of containing the garden implements to be used about the parterre and the outside staircase is to enable the gardener to water the plants on the top of the building.

The circulation around the parterre as expressed by the paths has been carefully studied to be continuous, and to afford both variety and interest. The parterre is an element open to the northeast and closed on the other three sides with features of different heights; the house to the northwest, the serpentine wall, capped with pleached trees, to the southwest and the swimming pool buildings, backed up by the woods to the southeast. This circulation runs completely around, beginning with the main terrace of the house, through the porch, along the open side, across the circular steps of the belvidere, thence between the pool and its buildings, and finally back along the serpentine wall. The upper walk through the alley of pleached trees is an additional variation.

To sum up, there were two principal decisions taken before the design was really started, which have created many of the most important features of the house, and the influence of which was so strong that it seems to extend into almost all the details. These were first, the orientation and, second, the level at which the main floor of the house was set.

The entire arrangement of the rooms, the placing of the forecourt, service court, parterre, vegetable garden, greenhouse and swimming pool, resulted from the former, while the sunken garden, entrance loggia, the feature of the parterre itself, and the garden gate with its steps and pool, all followed in logical sequence from the latter. Whether the results are good or bad is open to question, but certain it is that, from the standpoint of the designer, much more pleasure and benefit may be derived from the planning of a house, up from the ground, rather than down from a style.



Plan of Plot Showing also First and Second Floor Arrangement of House

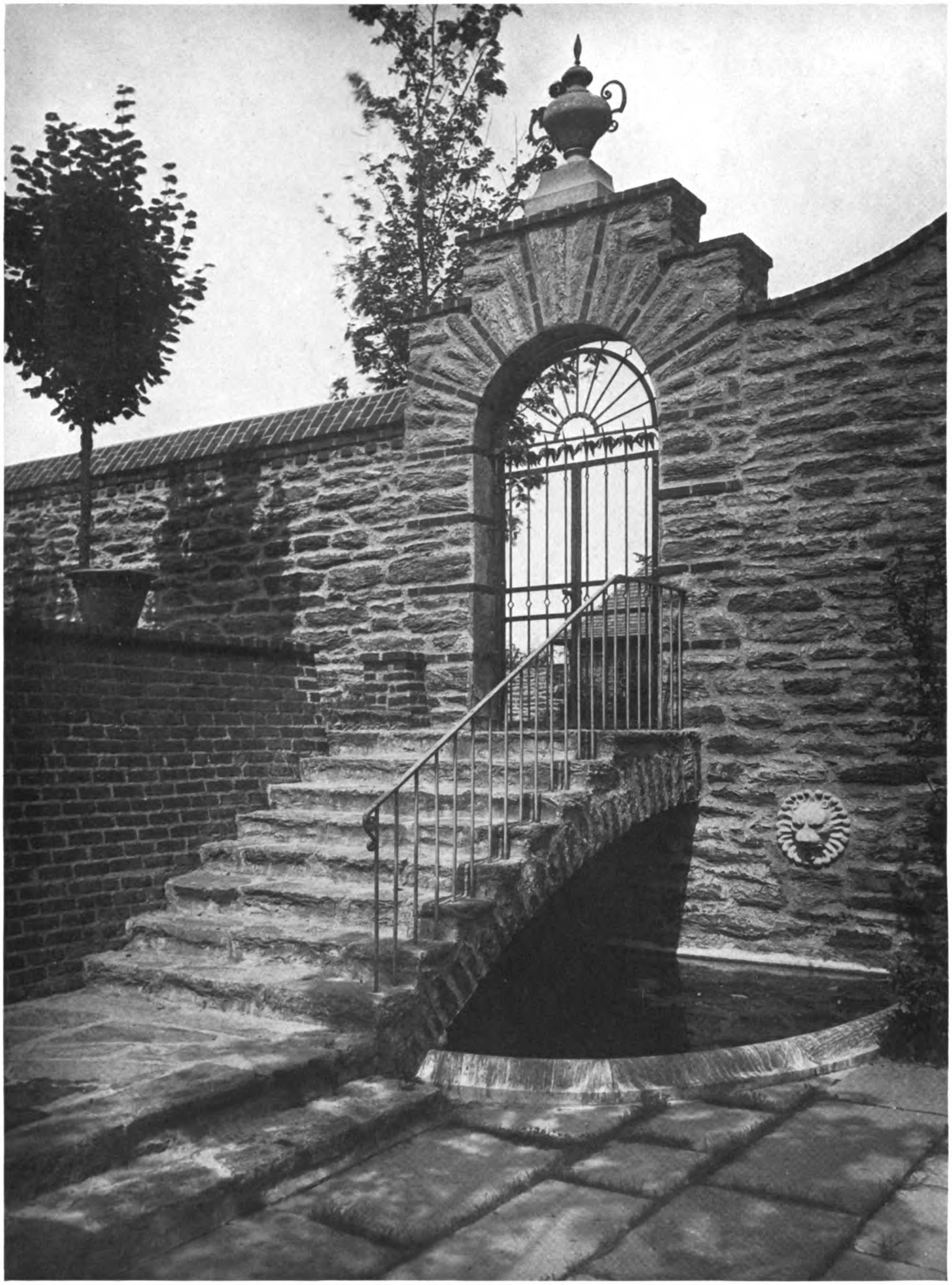
House of Francis S. McIlhenny, Esq., Chestnut Hill, Philadelphia, Pa.

Mellor, Meigs & Howe, Architects

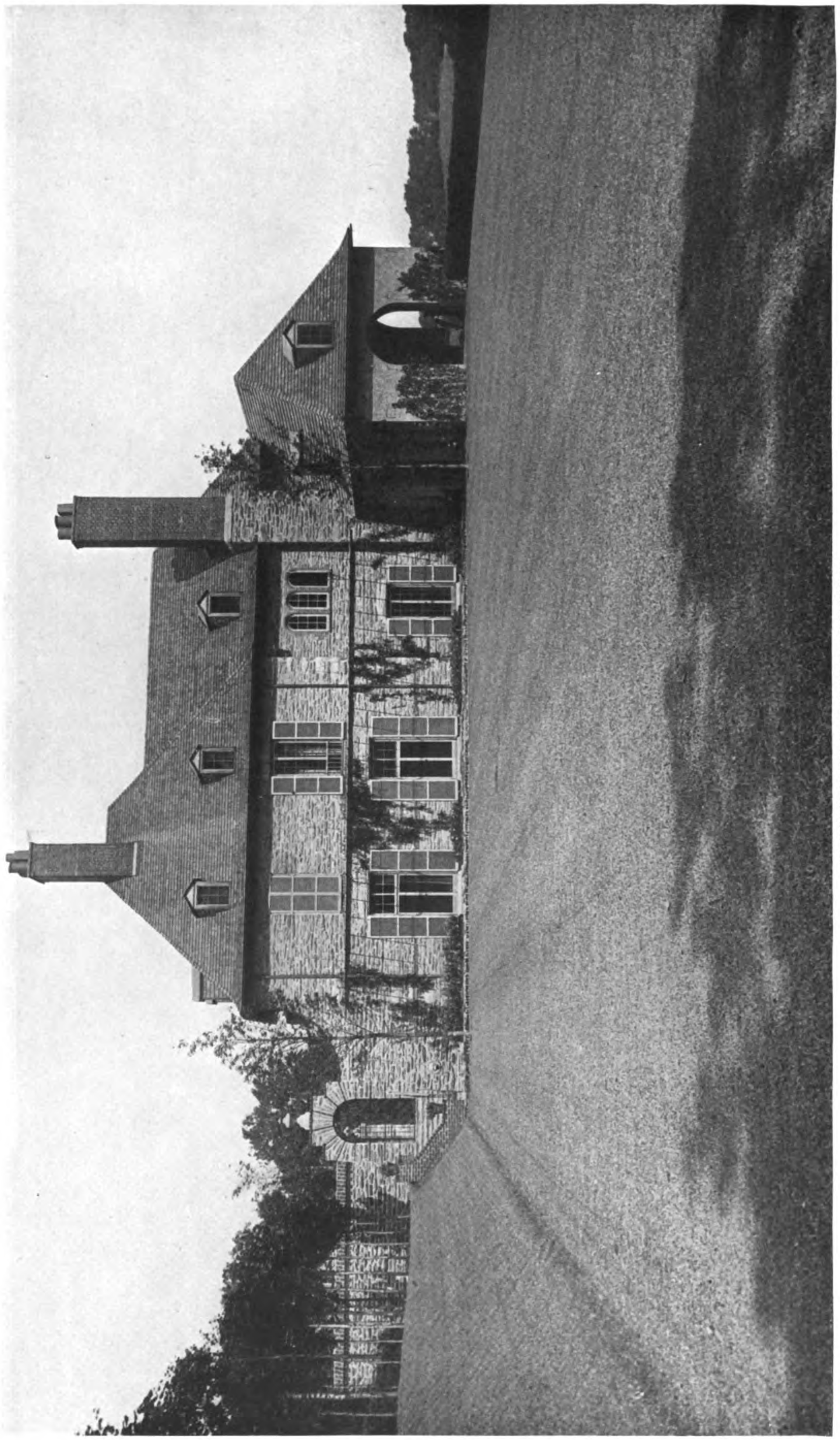
VIEW OF HOUSE FROM THE HIGHWAY

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS



GARDEN GATE AND POOL
HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.
MELLOR, MEIGS & HOWE, ARCHITECTS



SOUTHEAST FACADE FROM PARTERRE

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS

DETAIL OF TERRACE ON SOUTHEAST FRONT

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

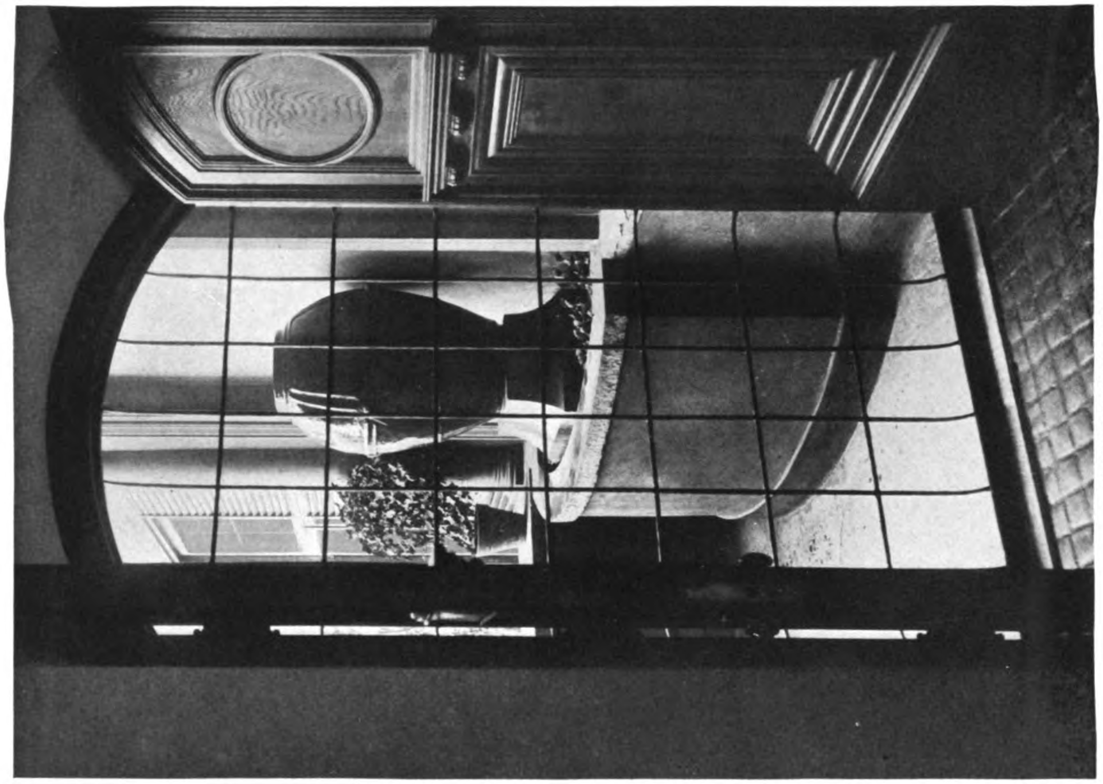
MELLOR, MEIGS & HOWE, ARCHITECTS

ENTRANCE HALL

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS

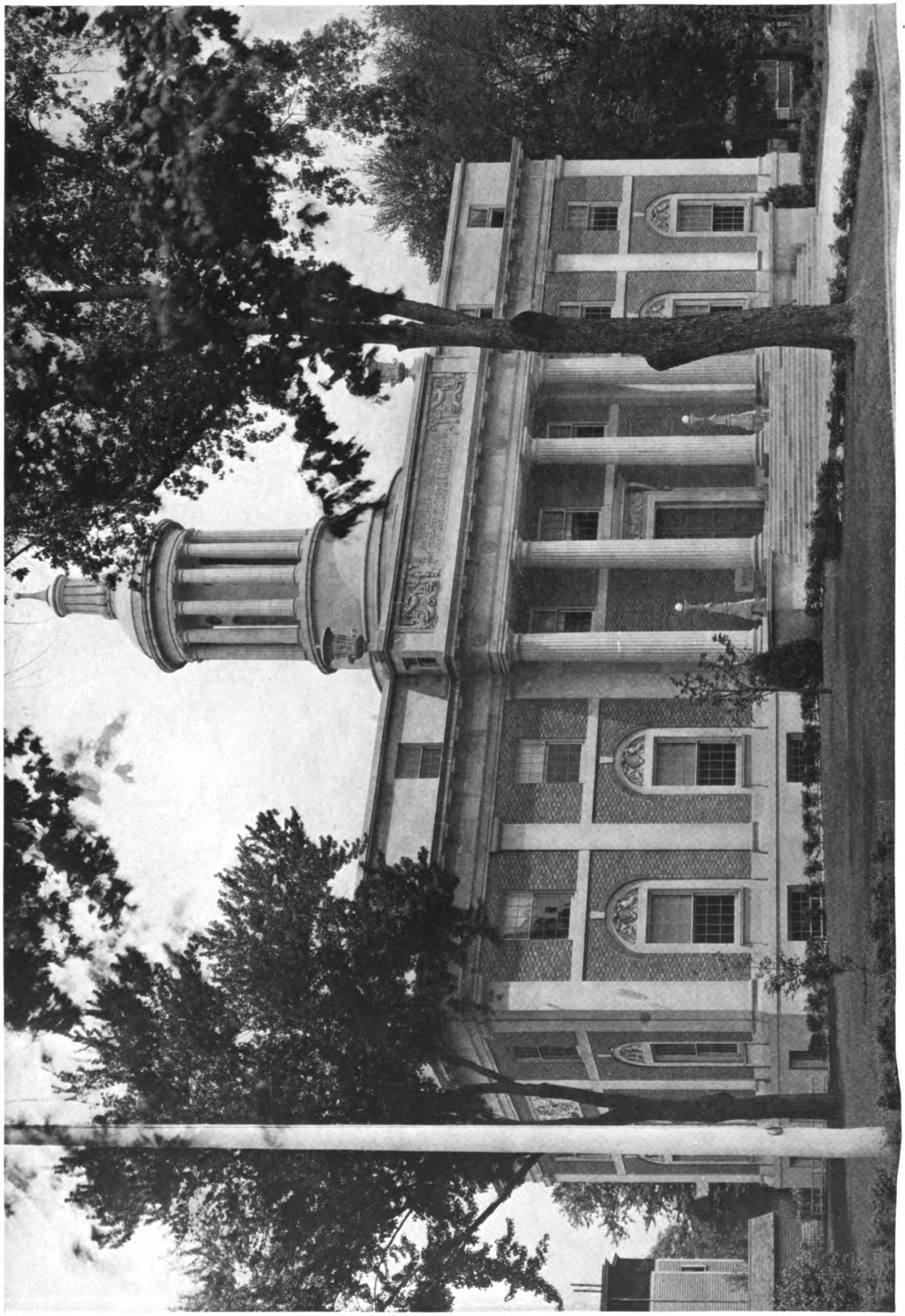
DETAIL OF GARDEN GATE



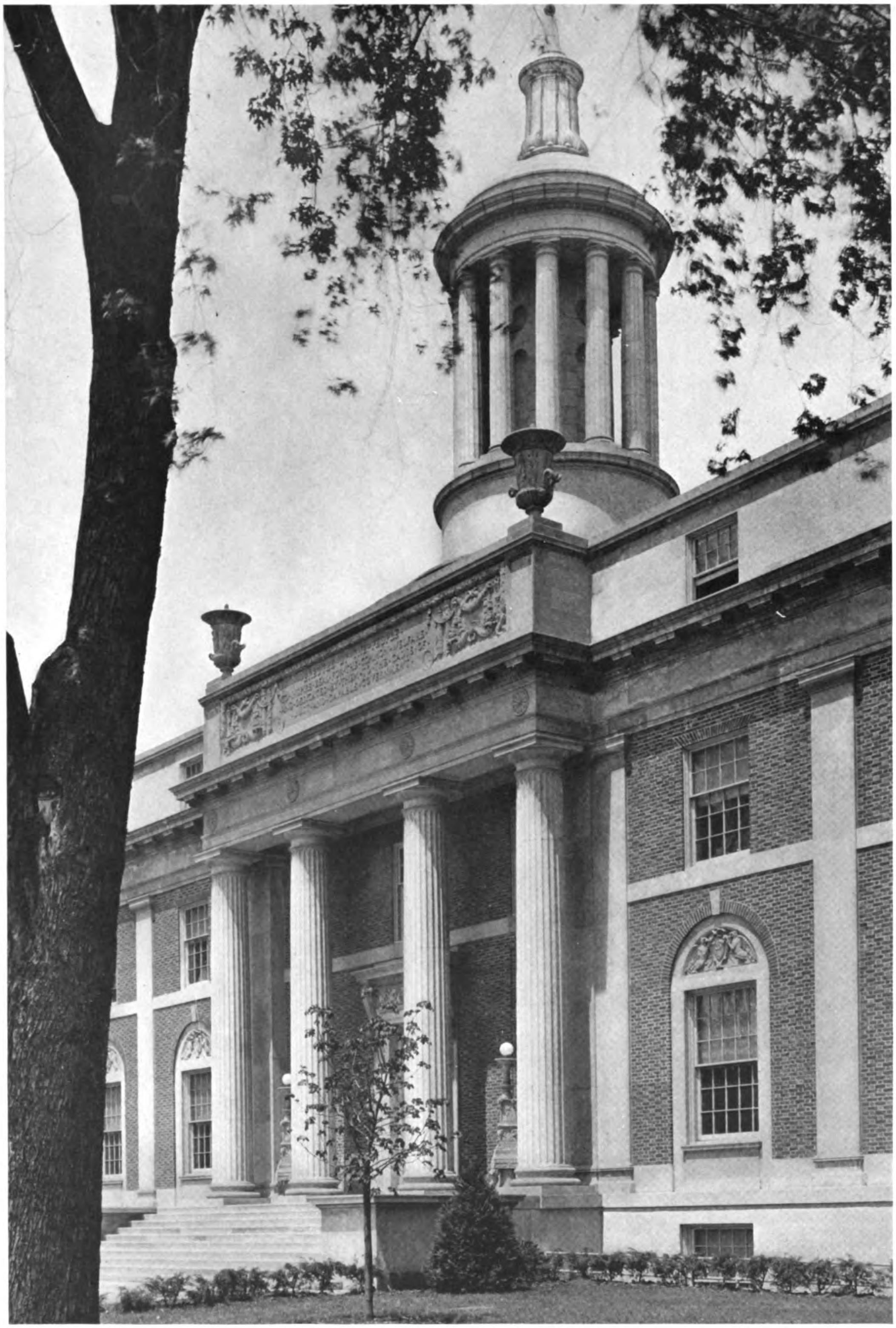
FOUNTAIN IN LOGGIA

HOUSE OF FRANCIS S. McILHENNY, ESQ., CHESTNUT HILL, PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS



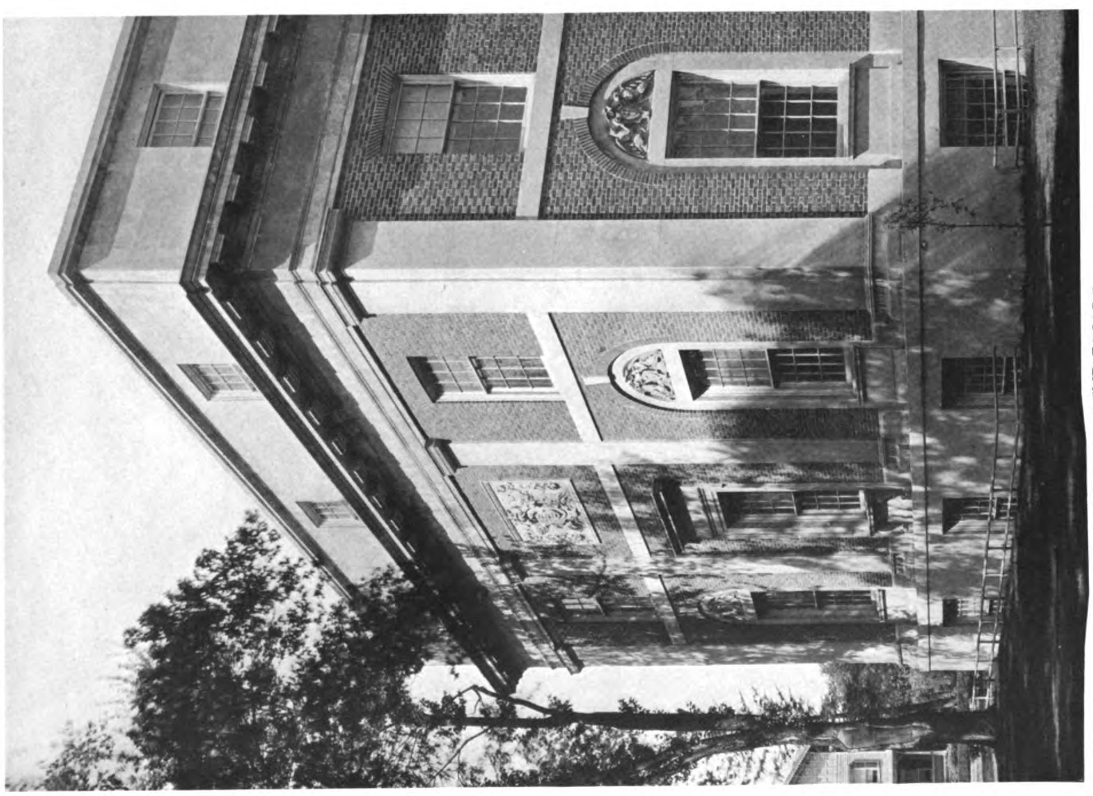
GENERAL VIEW OF EXTERIOR
MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY
LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS



DETAIL OF ENTRANCE PORTICO

MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS

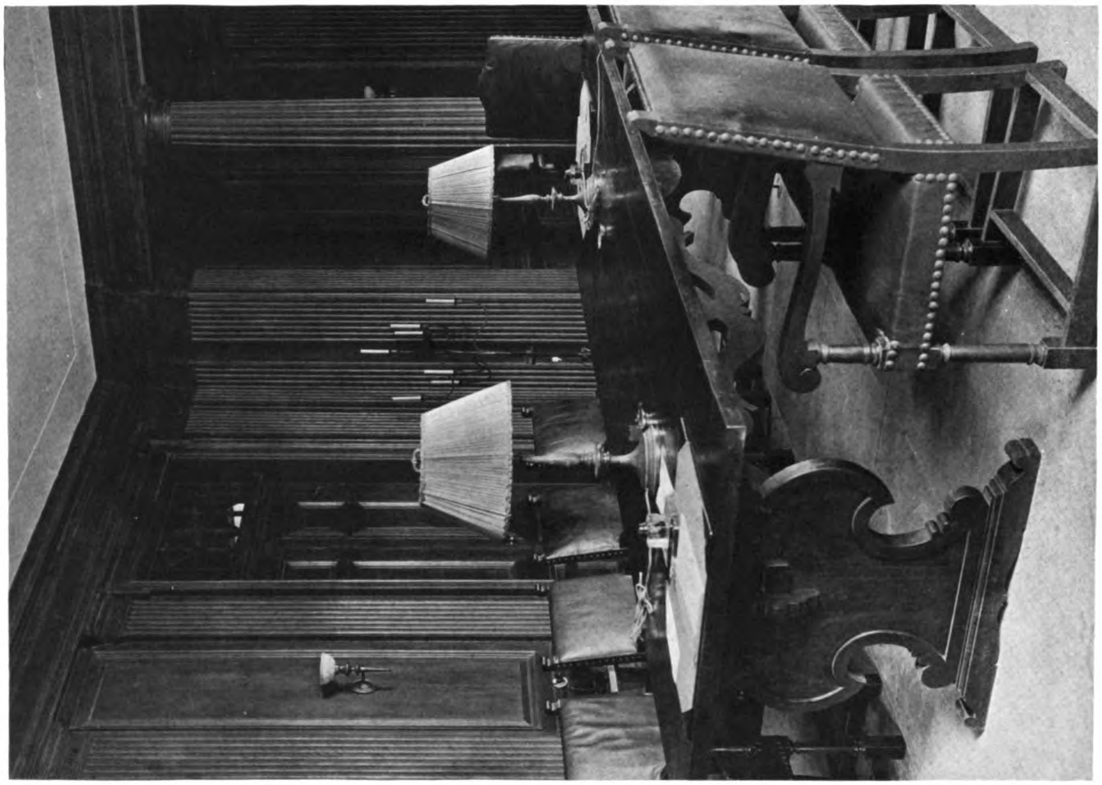


DETAIL OF END FACADE

DETAIL OF ENTRANCE DOORWAY

MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS



DETAIL OF LIBRARY

MAIN HALL AND STAIRS

MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

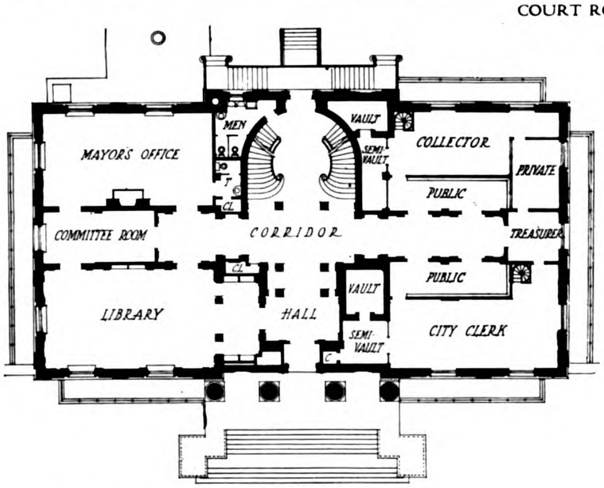
LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS

MANTEL IN MAYOR'S OFFICE

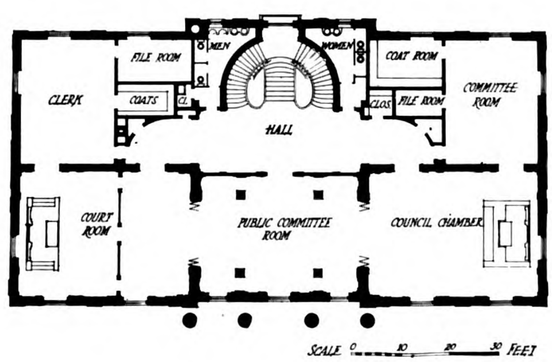
MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS

COURT ROOM



FIRST FLOOR PLAN



SECOND FLOOR PLAN

MUNICIPAL BUILDING, PLAINFIELD, NEW JERSEY

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY
ASSOCIATE ARCHITECTS

The Municipal Building, Plainfield, N. J.

LAURENCE F. PECK, WM. LAWRENCE BOTTOMLEY, ASSOCIATE ARCHITECTS

By C. MATLACK PRICE

ALL who seriously follow the development of architecture in this country must hail with real appreciation the achievement of a small municipal building of good design. Not that such a building should constitute a particularly difficult problem, but because it is unfortunately too often involved with a variety of un-architectural complications. Too often this type of building falls into the hands of a political contractor, and the result is a painfully un-architectural building.

In other instances there has been insistence on "making a show," on erecting a pretentious imitation of a building which, if properly carried out, would far overrun the official appropriation voted to its design and construction.

The town of Plainfield, N. J. is fortunate in having secured, through competition, a building which is not only thoroughly architectural in its plan, but which is also thoroughly appropriate, in size and character, to the community for which it was designed.

In many ways, indeed, it might well be offered as an example to other towns, as an example of the practical application of architecture and good taste to a small public building.

We are by no means infallible in the design of our larger public buildings (as attested by many monstrous state capitols and the like), and in our small public buildings the meritorious example is the exception.

The selection of a stylistic expression for the Plainfield Municipal Building was a happy one—a frankly Americanized version of Italian Renaissance, skilfully modified to conform with the general simplicity and unaffectedness of the whole scheme.

View of Portico and Cupola

The mass is agreeable, with its dignified colonnaded cupola crowning the composition, and set so far forward as to escape the danger of partial eclipse in perspective. This cupola, studied as an integral part of the front elevation, is thus seen as a part of the front elevation, almost exactly as it appeared on the direct elevation drawing.

The columns of the portico are excellently dignified, and the needed interest of detail is added by the pleasantly Italian doorway and its flanking candelabra.

The stone used is the warm textured, rubbed "American travertine," with variegated brickwork in a range of color a little less pronounced than the usual "Harvard" brick.

A consistent but agreeable approach is laid in brick and cement, with a projected plan of simple planting which will be in accord with the simple character of the whole building.

Perhaps the only detrimental incident in the front elevation is seen in the windows of the super-story, a detail militating somewhat against the clean-cut dignity of the whole building.

On the rear elevation a detail of combined straightforwardness and subtlety is seen in the iron stair railings and stair-landing balcony above. This detail of well scaled ironwork is seldom amiss in any building of this sort which is carried out in brick and stone, and in this instance has added exactly the right note to the rear elevation of the building under consideration.

The plan is a counterpart, in consistency and simplicity, of the exterior. The stairway ascends by two flights directly in line with the entrance, and to the left of the central lobby are placed the mayor's office and private rooms and the library (also available as a private meeting room).

The first floor color scheme is especially worthy of note, being both unusual and in excellent taste. No glaring white new walls proclaim to the visitor the inevitable newness of the building, or make him feel otherwise than that he has come into a place of standing associations.

The main hallway is done in subdued terra cotta colored panels, with trim in a color approximating that of dressed limestone. The mayor's office is carried out in soft brown walnut finished birch, with a distinct antique quality in the finish, and complementary to this is the dull blue of the wall color. The library, with its refined pilasters and built-in book shelves, is also in birch, with the same antique walnut finish, and for both these rooms the architects had special furniture made.

Detail of Exterior Lighting Standard

This introduction of special furniture is, unfortunately, seldom the case in similar buildings elsewhere, and the procedure in this instance should serve as a demonstration of the excellent result, as compared with the dismal installations of commonplace office furniture more frequently seen in public buildings.

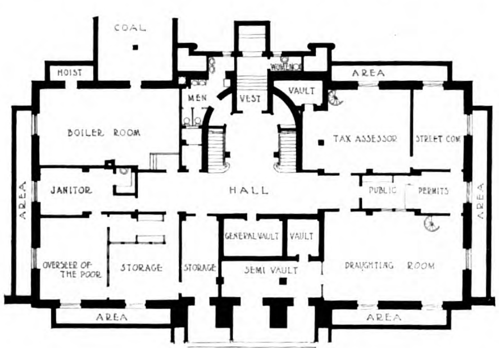
The second floor plan provides for a large "public committee room," at the front and center, located between the court room and the council room. All three rooms may be thrown into one in case of "overflow meetings," by means of folding partitions. As befits rooms intended for use rather than beauty, the color scheme is clean and dignified, all the panels and mouldings being done in three tones of ivory.

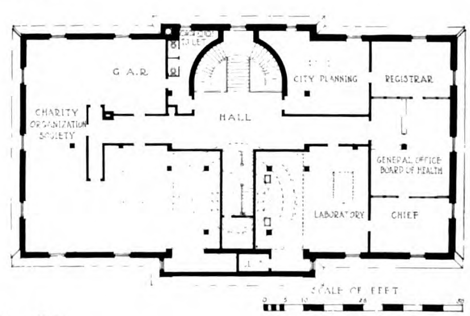
A study of the plans as reproduced will disclose other features of the arrangement, and the illustrations will visualize the general effect of the whole building. It is the purpose of these commentary remarks, rather, to sincerely acclaim the success (for Plainfield likes its new Municipal Building) attending a straightforward architectural handling of an essentially American problem.

The building is as good by reason of the things its architects did not do as it is because of the things they did do. A large part of their achievement lay in not trying to do too much. The result is a good example of a building in which all the material, as well as æsthetic and architectural possibilities, were recognized and fulfilled, and one in which the inevitable limitations did not impair the seeming freedom and sufficiency of the treatment.

It is, furthermore, a very ingenious and sympathetic study in free adaptation, being sufficiently Italian to possess a significant degree of architectural "manner," but not so Italian as to be in any sense un-American.

The whole character is well calculated to contribute largely toward the realization of the intent expressed in the inscription over the portico, which tells us (and will tell posterity) that this Plainfield Municipal Building was "erected by the people to inspire zeal for the common welfare. . . ."





Basement and Third Floor Plans

DEPARTMENT OF ENGINEERING & CONSTRUCTION

CHARLES A. WHITTEMORE, *Associate Editor*

A Comparison of Wood and of Concrete Piling

By A. C. TITCOMB

DURING the last fifteen years a number of engineering and contracting organizations have been built up through the development of the concrete piling industry. In certain localities the use of concrete piling has, to a large extent, lessened the use of wood piling which had been, up to that time, an almost universal method for foundations of buildings, bridges and other structures situated on unreliable soil, and for piers and wharfs. In some places, and for some purposes, wood piling has, and probably always will maintain its usefulness. There are certain merits in wood piling which have stood the test of time, and there are a great many features in concrete piling which are of importance.

There are several materials which are used for wood piling, and there are many kinds of concrete piling in existence. The length of this article will permit of only a brief description of the various kinds.

Most wood piles for building foundations are of spruce. Lengths can ordinarily be obtained up to 45 feet. For piles over that length, pine, chestnut or oak must be used. Spruce makes an excellent material as it is always tough enough to withstand driving, and the piles are uniformly straight. Both short and long leaf pine are also straight, but short leaf pine is liable to break on driving. Oak piles have great toughness, but are not always straight. Chestnut piles also are not straight and are liable to fracture on driving.

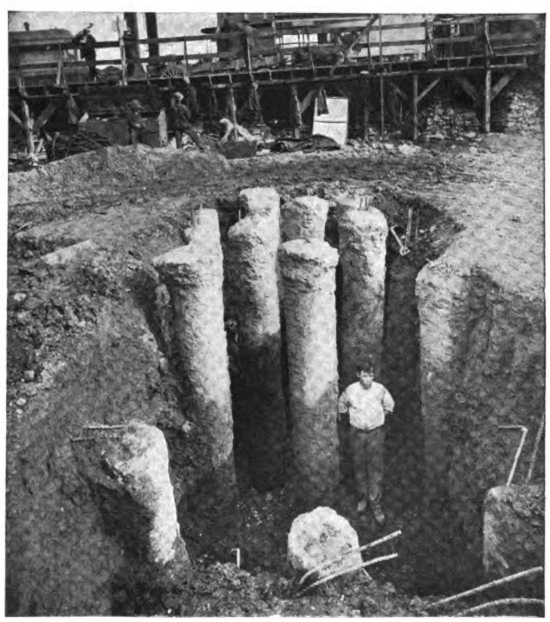


Fig. 1. Concrete Piles Withdrawn for Exposure Test

Concrete piles are of two general types: those which are cast before driving, and those which are made-in-place. Pre-cast piles can be made any shape desired to suit the conditions of soil and of load. They must be reinforced to stand handling and driving, and in longer lengths so much reinforcement must be placed that the cost becomes a large factor. They are cast horizontally on the ground in wooden or metal forms. After setting two or three days they can be moved to a storage pile and must then be allowed to cure for three to five weeks before being driven into the ground. They are driven with a steam or drop hammer, with the addition of a powerful water jet. Fig. 1 shows some concrete piles which after being driven were excavated for an exposure test. Note the size as compared with the customary 8-inch or 10-inch wood pile.

One of the patented systems of concrete piling places a pre-cast concrete pile by the following method:

A cylindrical steel pipe with cast-iron point on the end is driven to the required penetration. A small quantity of soft concrete is placed in this pipe and on this, as a bed, a pre-moulded reinforced pile is lowered through the pipe which is then withdrawn, leaving the moulded pile in position. A quantity of thin grout poured into the form before it is withdrawn is sometimes of material benefit.

Of the made-in-place piles there are three types which have been used extensively for ten or more years. All of these piles are formed by forcing the form or mandrel into the ground and filling the hole thus formed with concrete.

One system uses a pile-forming apparatus consisting of a cylindrical steel casing and a core which fits inside the casing. The whole apparatus is driven to the required depth, after which the core is removed and a small amount of concrete is placed in the casing. The core is put back in the casing and the concrete is rammed, which may, in some soils, form a bulb on the bottom of the pile. The ram is removed and the casing is filled with concrete, after which the casing is withdrawn.

In another type a collapsible tapered mandrel is covered by a shell made of sheet steel. This mandrel is driven into the ground and the mandrel is collapsed and withdrawn and the shell is filled with concrete.

In the third method a conical shaped, cast-iron point is placed at the lower end of a cylindrical steel tube that is driven to proper penetration, after which the form is filled to a sufficient height with the proper quantity of concrete to fill the pile hole to proper level. The form is then pulled out, and the concrete is forced down by its own weight and completely fills the hole to its compacted wall.

For all ordinary conditions of soil there would seem to be no preference for the use of wood or of concrete piling, as wood piles can be obtained up to 80 feet in length without undue delay or expense, and concrete piles can be driven to approximately the same depth.

Concrete piling, of at least two of the best known types, can be driven in soil in which it would be impossible to place a wooden pile. In many localities where piling is required, there are heavy fills composed of sand or gravel which become very firmly compacted after they have been in a few years. These fills, in many cases, overlie silt, peat or mud. In some cases the weight of the fill displaces the soft material under it, but more often borings will show that several feet of this soft, unreliable material still remains between the fill and the hard, underlying soil. This stratum of peat, silt or mud is usually very well compressed, but is not a proper material on which to rely for foundations of buildings of any weight, even though the depth of overlying fill is great, and it is, of course, requisite that foundation piling be carried through this fill and underlying stratum, hard though it may be, into firm soil.

Wood piles have, in many cases, been driven in compact fills of this kind; but it is my opinion that it is a dangerous practice on account of the fact that the driving is usually very hard, and the pile is liable to be split or broomed at the point before it has penetrated very far, and be rendered of absolutely no value. This damaged condition is hard to detect, and great care should be used in inspection where such conditions occur. The use of a strong water jet often helps the driving of wood piles when such soil conditions are encountered.

Another soil condition in which wood piles may give trouble, due to brooming, is one in which hard pan is overlaid by mud. Under a large group of buildings constructed near Boston several years ago a soil condition of this kind existed, and wood piles were driven under the most careful inspection. A large number of them were pulled out after driving, and it was found that the point of the pile had penetrated about one foot into the hard material, and that then had developed so much resistance in the hard material that the point could penetrate no farther. Driving did not stop, however, as proper penetration per blow, as indicated by the movement of that part of the pile above the ground, had not been obtained. Before the point of the pile had stopped moving it began to broom about one foot above the point, and the continued driving resulted in the shattering of the pile for a distance of about two feet or more, beginning at a point one foot above the lower end of the pile.

If, in either of the two cases above mentioned, concrete piles had been used, there would have been no difficulties, as the pile-forming apparatus used in placing concrete piles is usually so rugged and so heavy that proper penetration could have been obtained without damage.

If wood piles are cut off at such a level that they are always wet, they will not decay or otherwise deteriorate. It is very difficult to determine what the permanent water level will be unless the work is so situated that it is on tide water.

In many of our large cities the construction of subways and of trunk sewers and the extensive drilling of deep wells have cut off the flow of water, or have drained the surrounding territory in such a way that the water level is materially lowered, and the tops of the piles are left dry. In conditions of this kind, decay starts immediately, and in a very short time the pile is of no supporting value whatsoever.

In some foundation work which I recently observed, within 300 feet of the retaining wall built along the Boston side of the Charles River Basin, I noticed that the elevation of the water in excavations occasionally stood as low as grade three for several hours at a time, and for several days was no higher than grade four, and at times got as high as grade six, but never stood above this level except for a few hours after a heavy rain. The elevation of the water in the Charles River Basin is grade eight.

Occasionally it becomes necessary in alteration work in existing buildings to change materially the existing foundations due to the fact that by the alteration of the building the loads are to be materially increased, or due to the fact that poor foundations were originally put in and new ones became necessary.

In conditions of this kind, where piling is necessary, it is usually impossible to use wood piling on account of the fact that enough head room cannot be obtained inside the building for the required length of wood piles, and it is necessary either to use concrete piling or to excavate to firm material by the use of caissons. By the use of one of the existing methods of concrete piling, piles over 60 feet long have been put down inside of a building where only 14 feet of head room was available.

An instance of this kind occurred in one of the cities of the Middle West where old foundations

Fig. 2. Steel Tube Forms for Concrete Piles Driven Under Low Head-Room

under the building failed during one of the floods on the Ohio River. New concrete piles were placed under the building by that method of made-in-place piling which consists in driving a steel pipe with a cast-iron point at its base to proper penetration, filling with concrete and withdrawing the pipe. The driving forms used on this work were put down in short sections and coupled together. After filling the entire tube with concrete, the form was withdrawn a few feet at a time and uncoupled as it came out.

In New York City several years ago, when the new subways were being constructed, it was necessary to carry the new line under the Post Office Building. In order to carry the immense weight of the building during construction, concrete piles were placed under all the walls and piers before any work was started, and there was only about 6 feet of head room available in which to put down these concrete piles. Thin steel tubes made in 2-foot lengths (Fig. 2), with a thin steel reinforcing band riveted on the outside at the top, and a thin steel reinforcing band riveted on the inside at the bottom and projecting 2 or 3 inches below the bottom of the pipe, were driven, one on top of the other, into the ground without any point on the lower end. The dirt inside the pile was taken out by the use of a small orange-peel bucket made to operate inside a circle 12 inches in diameter, and after excavation the pile was filled with concrete. Work of this kind is, of course, very expensive, and this method is used only where the head room is so limited that the other method previously described for concrete piling inside buildings cannot be used.

In wharf and pier work wood piles have been, and will probably continue to be, almost universally used, as they are cheaper and more suited for this type of construction than are concrete piles. If concrete piles are used, it is necessary that they be pre-cast piles, which necessarily requires a large amount of steel reinforcement, and, of course, requires a long time to manufacture and to cure properly.

In some parts of the Southern Atlantic coast the waters are infested with wood borers of two kinds,— the teredo and limnoria, — both of which attack wood piling.

In some places, where the water is very clear, wood piling will last only two or three years before it is completely destroyed. The limnoria and teredo only operate in clear water, and for this reason these borers are not a factor in the use of wood piling in the harbors of our large cities.

The creosoting of wood piling, if properly done, is an almost certain preventive against damage to wood piling from either of these insects. To be effectual, the creosoting of the pile must be done, not by applying with a brush, but in tanks under pressure, in order that the fluid may penetrate a great distance into the pile.

An objection to concrete piling for use in wharfs and piers is the action of freezing on concrete. The greatest amount of damage to concrete in sea water occurs between the high water and low water mark, and is caused by alternative freezing and thawing as the tide rises and falls. A dense concrete, made from carefully graded and selected aggregates with the addition of some waterproofing compound such as hydrated lime, in a measure prevents the deterioration of concrete in salt water.

There are certain instances where, owing to the nature of the soil, wood piles cannot be driven, and in these locations it is necessary to use concrete piles for wharf and pier construction.

In Florida there was constructed, about ten years ago, a concrete pile wharf at a location where the soil consisted of a small amount of silt and sand which overlay coral. It would have been impossible to drive wood piles into this coral reef, but concrete piles were driven into it a sufficient distance to provide support for the structure. In a great majority of cases, however, wood piles are the proper material to use for the support of wharfs and piers.

The most important factor in the consideration of these two types of foundation material is that of cost. Of course the relative cost of concrete and wood piling depends to a limited extent on the one hand on the availability of cement, sand and gravel, and on the other on the availability of wood piling. In all piling territory, however, the prices of all of these commodities are fairly constant except in special cases. If exceedingly long piles should be required in a locality some distance from the coast, where there were no wood piles at hand, rail shipments would be necessary and would be very costly. If sand and crushed stone or gravel had to be transported long distances by rail, and then had to be teamed to the site, the cost of concrete piling would be somewhat increased. In the main, however, the permanent water level determines the comparative cost.

If wood piles are cut off at such a level that they are entirely below the permanent water line, they will last indefinitely without the slightest decay; but if their tops are dry, they will decay very rapidly. Upon this fact depends the relative cost of the two methods. In a large majority of cases, where piling of any kind is to be used, the permanent water line is a considerable distance below the elevation of the basement floor, and it is necessary, if wood piling be used, to carry piers and walls down below the basement floor to the tops of the wood piles. This requires a large expenditure of time and money for excavation, shoring, sheet piling and pumping; also it is necessary to construct large concrete footings and carry deep walls and piers from the tops of the piles to basement level. By the use of concrete piling most of this is eliminated as the concrete piles can be brought to the elevation desired without reference to the water level, and require only a comparatively small capping.

The cost of one wood pile is very much less than the cost of one concrete pile of the same length, but due to its greater size the carrying capacity of a concrete pile is greater than that of a wood pile. The usual allowable safe load for the former is 30 tons, and for the latter, 10 tons.

To show a comparison in cost of the two types of piling, I have estimated the cost at current prices prevailing in Boston, of a typical pier carrying a load of 120 tons, using in one case wood and in the other case concrete piling, and have shown graphically the increasing cost of wood piling as the depth of permanent water level below floor elevation increases. I have assumed the length of piles as 30 feet. The rapid increase in cost of wood piling, due to a variation in water level between 6 and 7 feet, is caused by the necessity of using shoring and sheathing from this point on.

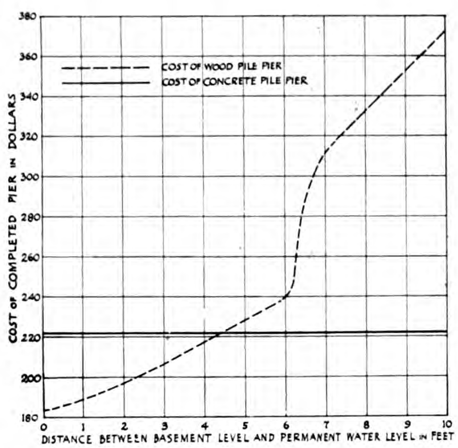


Fig. 3. Comparison of Cost Between Concrete and Wood Piling

In all parts of construction work careful inspection and good workmanship are necessary for the success of the undertaking. This is particularly of importance in piling work, as poor piling is usually not discovered except by the settlement of the building which it is intended to support.

I believe that concrete piling should not be used for the support of any structure, unless the architect requires the use of one of the approved methods that have been extensively tried out over a period of years; and further, that he requires piling to be placed by an organization of whose integrity and workmanship there is no question, and as an additional check on the manner in which the work is to be done he should supplement his care in the selection of the type of piling, and of the contractor, by skilled inspection from his own office. Failures of concrete piling have been very few, but in the few which have occurred the cause of the failure has been either an attempt by an inexperienced organization to place an untried system of piling or poor workmanship and inspection during the progress of the work.

Wood piling, while requiring a usual amount of inspection and workmanship, does not require the extraordinary care which concrete piling requires except in a few unusual cases.

Types of Reinforced Concrete Floor Construction

By BURTIS BROWN, C. E.

WITH the ever-increasing use of reinforced concrete as a building material, there are constantly coming to the architect's mind questions as to the best method of lay-out for the particular work in hand. Should a simple slab between beams be used or would one of the more complicated flat slab systems be specified?

Let us look at some of the advantages of the more prominent methods available to-day.

(*A*) Concrete Slab between Steel Beams

One of the first methods that was used to any extent in large building operations was the simple, reinforced concrete slab supported on structural steel beams. This system had the advantage of being very rapid in construction. The steel beams gave an excellent opportunity to hang the wood centering and it was economical in form lumber, as no shoring or studs were necessary.

It does, however, require much structural steel work at the fabricating shop and on the job, besides in a first-class building all of the steel beam (bottom of flange as well as top) must be fireproofed, so the next step was the elimination of the structural steel and the substitution of reinforced concrete beams for steel.

(*B*) Beam and Girder Design

The spans for the slabs, beams and girders for a reinforced concrete frame are about the same as for steel skeleton construction. This method is shown in Fig. B. The slab is designed just the same as in (A), but there is an advantage in using concrete for the beams and girders. The amount of reinforcement in beams of this kind is less than one-half that required for an I beam that sustains the same load. In a first-class building it is necessary to fireproof the structural steel to protect it from buckling and collapse in case of fire. With the steel frame building the top flange of the steel beam carries all the compression, while the upper part of the concrete is simply protecting material. However, there is usually a sufficient amount of concrete in this fireproofing to sustain all the compression, because in the complete concrete structure the concrete slab acts in compression with the top part of the beam.

Sometimes the plaster is placed directly on the underside of the slab, beams and girders, allowing the larger members to show in the finished room; but in the better buildings a suspended ceiling is built, thus giving a smooth surface throughout. The beam and girder system has many stanch advocates, as the method of calculation is more direct than some of the systems described later. The steel is much easier to place and inspect, and the longer use of the system has enabled contractors to devise economical methods in form work.

(*C*) Concrete Joist and Terra-Cotta Tile

With the desire to obtain a flat ceiling without the expense of the suspended ceiling, and to save the loss of headroom, there was developed the concrete joist and terra-cotta tile system as shown in Fig. C. Usually the tiles are 12 inches wide and they vary in height from 4 inches by 2-inch increments to 12 inches. These tiles are set on the forms with a 4-inch or 5-inch space between rows, and the sides of the tile used to form the sides of the concrete joist. Steel reinforcement of the required amount to carry the desired load is placed in the joist. A few buildings were constructed where the top of the tile formed the top of the floor, but much more commonly a concrete slab from 2 inches to 4 inches thick is poured at the same time as the joist. Also a small amount of steel is placed in the slab. Wire fabric is excellent reinforcement for this work. This slab may be given a terrazzo or granolithic finish or a wood wearing floor laid above it, whichever best serves the use of the building. The hollow space in the tile can be used for pipe or conduit ducts. Besides the advantage mentioned above, this method does not require so many forms. The tile is sufficiently strong to support itself if a small bearing for it is allowed on the form under the joist.

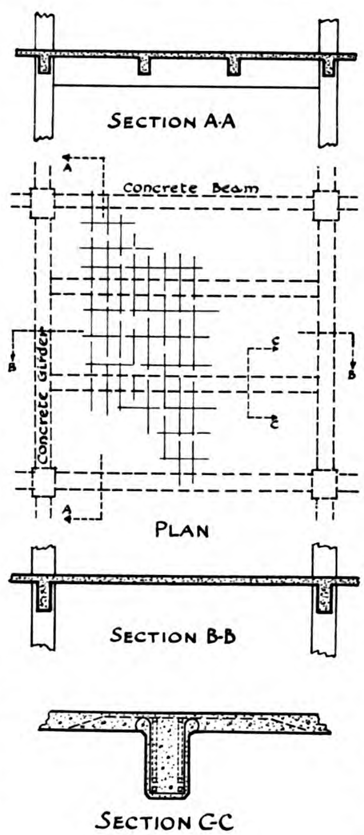


Fig. B

In plastering a ceiling of these combined materials the outlines of the tile and joist are very noticeable, which detracts from the appearance of a fine building. By treating the surface before plastering this can be avoided. There is now a tile on the market which has a flange extending under the joist so the plaster is on the tile throughout, thus eliminating the objection just mentioned.

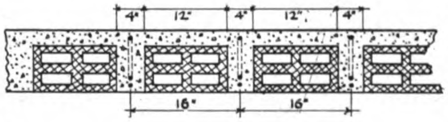
The dead weight of this type is not so great as in the methods previously described and therefor the combination floor is well adapted to public buildings, hospitals, hotels and schools.

(*D*) Concrete Joist and Pans

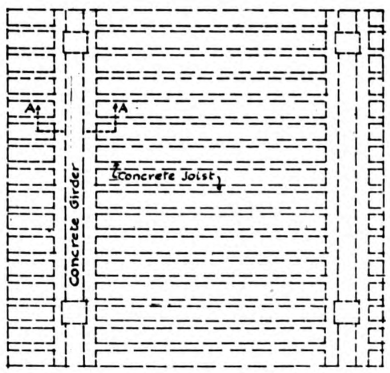
The tile just described does have some dead weight and it is expensive in some parts of the country due to high transportation charges, so the manufacturers of sheet metal specialties devised a pan, so-called, to replace the tile. The spacing of the joist is usually 24 inches, center to center, although 36-inch centers are obtainable and the depth of pan varies from 4 to 12 inches. With the 24-inch spacing of joists as shown in Fig. D the pan width is usually 19 inches at the base and slants in toward the top, making the joist wider in the compression area, — an advantage in strength, — and it allows the form to be removed more easily. The sloping sides also permit the pans to be "nested" for shipment.

In buildings where there is much moisture, such as laundries, the pans should never be left in place, as the drip from moisture condensing on the ceiling is destructive, but there are types of buildings where this objection does not obtain. These ceilings are not usually things of beauty, even when painted.

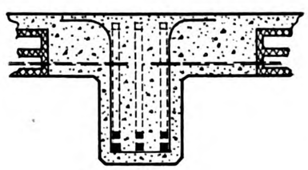
The dead weight of this system is small and the forms economical because of repeated uses. The space between joists permits pipes and conduits to be easily located. With both of the joist systems it is necessary to build large beams or girders to carry the loads from the ends of the joist to the columns or walls. Joists are adapted to spans from 16 to 30 feet.



CONCRETE JOISTS AND TERRA COTTA

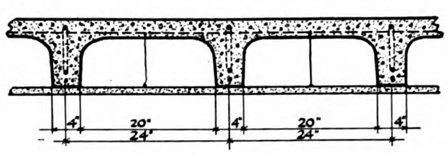


PLAN

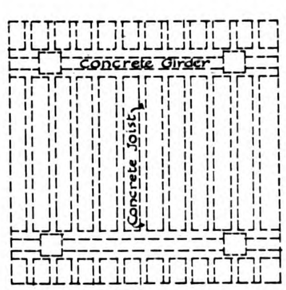


SECTION A-A

Fig. C



SECTION
CONCRETE JOISTS AND PANS



PLAN

Fig. D

(*E*) Unit System

In some locations the "unit system" best serves the use of the owner. It might well be termed "concrete lumber" method because the individual concrete members are moulded separately on the ground and later hoisted into place.

This is an excellent system to use in the winter as the members may be poured in a shed where there is heat. There is a saving in form lumber. It is best adapted to locations where there is much vacant land, on which to store the members while hardening; for this reason it is not satisfactory for city buildings where storage space is limited. The advantage of continuity is lost, and moments for these beams must be calculated 50 per cent higher than in a monolithic system. Besides the beams have to be deeper, as the slab in the monolithic system helps to carry the compressive stresses of the beam.

Sometimes the beams and girders are poured in moulds on the ground, allowed to harden and then hoisted into place. Stirrups are arranged to project. Wood slab forms are placed between the concrete beams and the slab poured in place, as in method "A" and "B." The stirrups are a part of both the beam and the slab, and make a very efficient tie between these two members, as tests at Harvard University laboratory have shown.

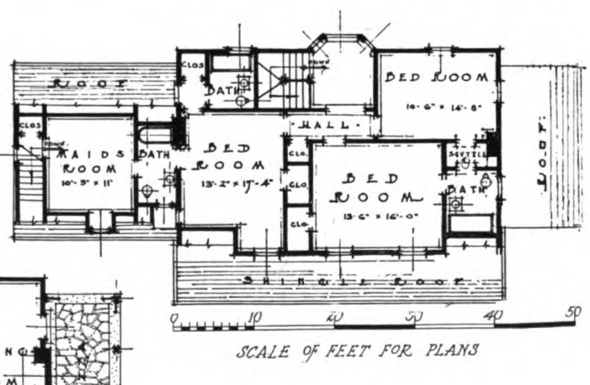
The types of floor construction previously described are simply copies of the methods used in the framing of wood or steel. A distinctly new type was introduced when the flat slab or "mushroom" system was designed. This method possesses advantages both for loading and spacing of columns not found in any other system and will be discussed in a later issue.

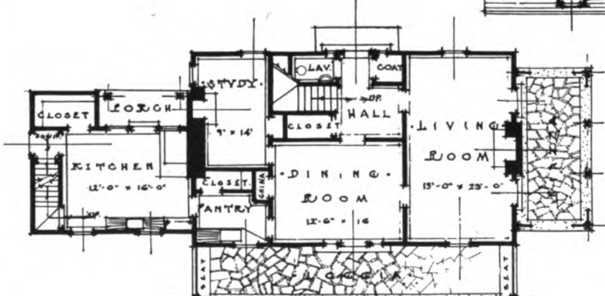
A Small Country House at Rockford, Ill.

THE RESIDENCE OF DONALD FERGUSON, ESQ.

AYMAR EMBURY II, ARCHITECT; LEWIS E. WELSH, ASSOCIATE

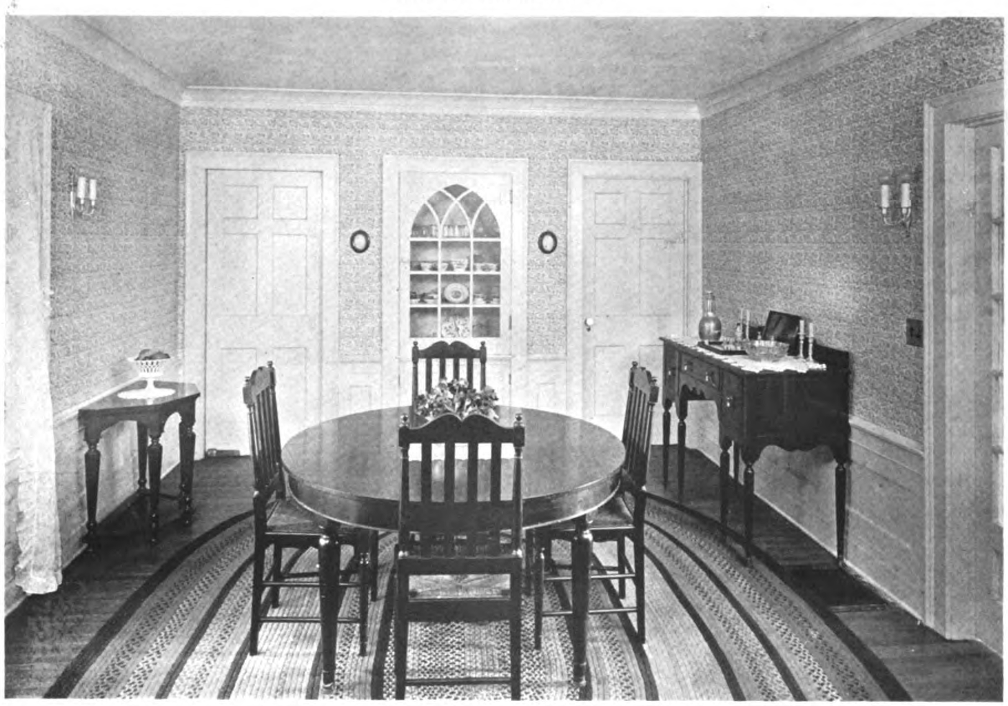
GENERAL VIEW OF ENTRANCE FRONT





FIRST AND SECOND FLOOR PLANS

VIEW OF GARDEN SIDE



VIEW OF DINING ROOM

HOUSE OF DONALD FERGUSON, ESQ., ROCKFORD, ILL.

AYMAR EMBURY II, ARCHITECT; LEWIS E. WELSH, ASSOCIATE

The Colonial Precedent in Minor Domestic Architecture

By GEORGE F. MARLOWE, ARCHITECT

IT is said that it was the attractive physical qualities of the English garden villages which enabled John Burns to secure the passage of the Housing and Town Planning Act of 1909. Much that appeals to us in this and other modern English architecture is due to an insistence on the vernacular, the "regional" type; a quality, excepting in the better class of work and in a few fortunate localities, almost entirely lacking in our own residential communities.

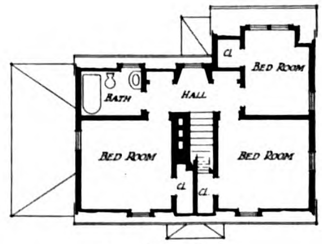
For perfectly obvious reasons, the Colonial or Georgian is now generally accepted as our regional type, at least throughout the East and Middle West. The advantages of the "style" from the practical standpoint seem so apparent as scarcely to need repeating, yet they are frequently overlooked.

A marked characteristic of the Colonial being simplicity of plan and consequently of roof design, it fulfills at the start the fundamental principles of economical construction. Conversely, any attempt to apply to a severely simple plan a style habitually associated with complexity in planning, elevation and detail is hopeless from the beginning.

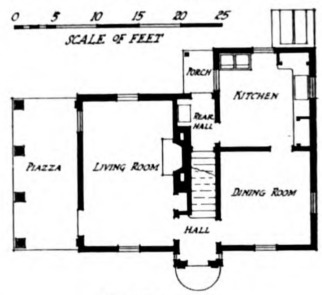
Both materials and methods of construction at the present time are practically identical with those of the middle and late Colonial periods, the sole difference being in modifications in methods of manufacturing and assembling, due to the introduction of new and improved machinery and labor-saving devices. Hence we are working in a style with the materials and methods to which, and to which alone, the very creation of the style and all its characteristics was solely due, and any attempt to design in any style which was the outgrowth of totally different materials and methods is obviously futile.

With the exception of certain details, such as hardware, lighting fixtures, and the added conveniences of heating and plumbing, every part of the modern house is substantially the same now as in the eighteenth century, for with the advent of the planing mill and tools for running mouldings, materials and construction methods came into use differing in no essential from those in use at the present time. Bricks may be made with the aid of machinery instead of wholly by hand, mouldings run in the mill instead of by hand tools, and sash hung with weights instead of with old-fashioned catches; but bricks, mouldings and double-hung sash turned out by machinery are all as good, or better, despite the purists, than those made by the old-fashioned methods, and all are easily obtained and used in the most every-day work. On the other hand, the imitation of hand hewn timber or other archaic materials, which deceives no one, is not only in bad taste but bad construction, and to hew it by hand would be just as absurd as to insist on wearing hand-knit underwear or stockings, cloth made upon a hand loom, or shoes made entirely in the manner of the old bench shoemakers. Doors, windows, gutters and other parts of almost the cheapest form to be bought in the market ready made, are admirably adapted to the details of the type. Even the much despised stock Colonial column may be made to serve very well for the less exacting requirements of cheaper work. While the nicer refinements are unfortunately lacking in the stock mouldings of the finish mills, after all, with the exception of a doorway and such interior finish as mantels, stair details, etc., with a little care and a real knowledge of the essentials, practically all the characteristics of the style, may, if necessary, be obtained without the use of a single specially made detail. This is said without the slightest desire to disparage the use of carefully made details when the cost will permit, as the full refinement of Colonial work can, of course, be obtained in no other way. While one or two firms of the highest class are at present

Own House at Framingham, Mass.
Charles M. Baker, Architect



Second Floor Plan

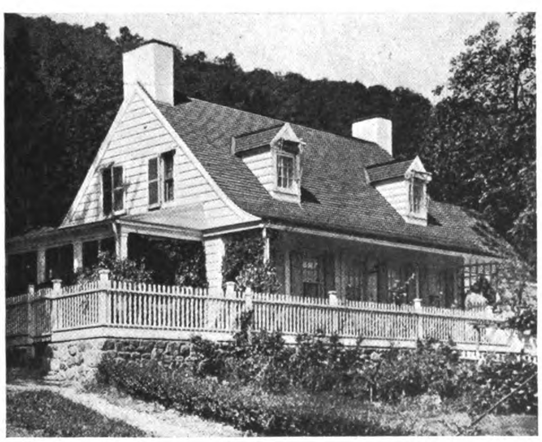


Exterior and Plans of Cottage at Newtonville, Mass.
Derby & Robinson, Architects

First Floor Plan

making "stock" mantels of a high degree of excellence, their cost excludes them from use in the less expensive work which we are now considering.

It is sometimes claimed that the style lacks flexibility and on this account is not easily adapted to the more exacting requirements of modern planning. This is just as unintelligent as the Victorian idea that Gothic consisted merely of pointed openings, mouldings of a particular profile and foliated capitals naturalistic in treatment. As a matter of fact, when the problem is large enough to allow of any multiplicity of parts or complexity of motif, there is every opportunity for elaboration of design or picturesque treatment with the simpler forms. For this we find precedent in the well-known Fairbanks house in Dedham, Mass. Houses entirely of the seventeenth century, however, with



Cottage at Sparkill, N. Y.
Aymar Embury II, Architect

hewn beams and leaded casements, while suggestive of much that is possible for reproduction, are not especially well adapted to modern methods of construction and modern building materials; just as the English half-timbered house is hopelessly impossible and usually in bad taste when reproduced in stucco on wire lath with false timbers of seven-eighths-inch boards.

Fault has sometimes been found with smaller cottages of the Colonial type on account of the lack of space in the second story. Obviously, if we design a one-story house and then attempt to beguile ourselves into the belief that the roof space may be made to contain the equivalent of a full second story, we are looking for a suspension of the rules of logic in expecting something for nothing, which is no more to be found in this case than in any other. Often the better way is frankly to design a two-story house, usually costing but little more, though perhaps at some sacrifice of the picturesque quality. Here again, however, we often follow a false lead, for the charming little Cape Cod house may be hopelessly out of place and inadequate in the midst of the higher buildings of the typical suburban or small town development. The one-story cottage with roof of rather low pitch is, however, an acceptable solution of the often objectionable "bungalow." The gambrel roof is often satisfactory, and with proper planning of the second story sufficient head room may be obtained. This may be increased by the rather overworked long "shed" dormer, at least on the rear, though to build a house with only one side for publication is a practice to be discouraged. The recitation of the "architects of Fate" of our school days and the admonition that "the gods see everywhere" invariably comes to mind when the rear shed dormer is suggested, though with careful treatment it is not always to be discarded.

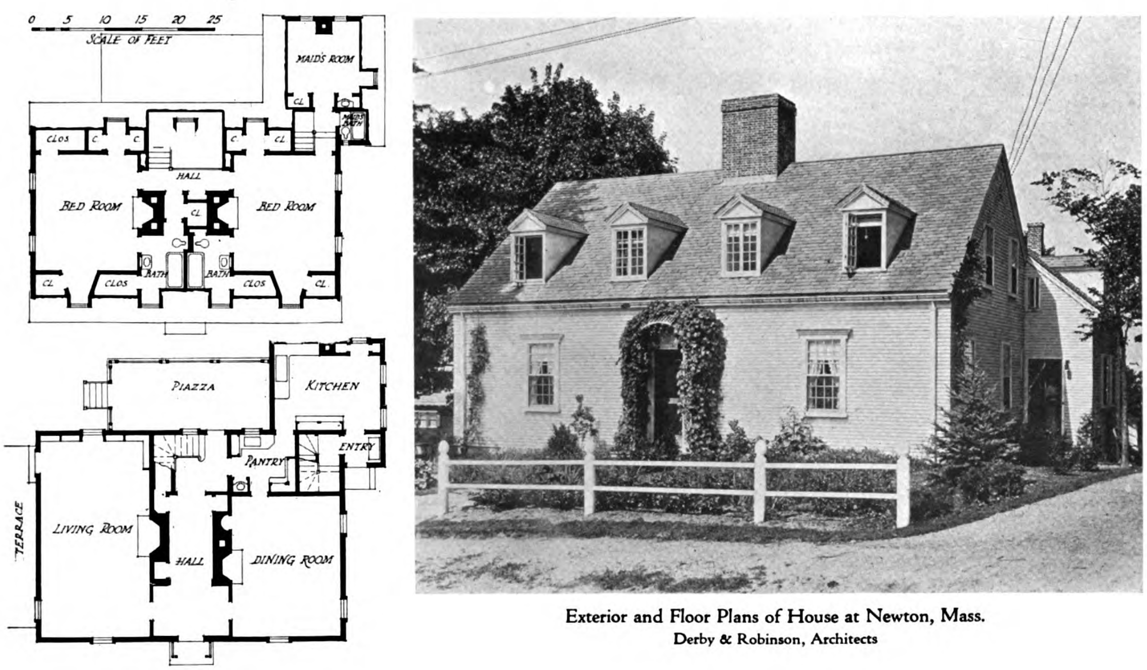
There was, perhaps, nothing more significant of the marvelous courage and spirit of the French in the very midst of their darkest hour and of their confidence in ultimate victory, than their calm and deliberate preparations for rebuilding in the ruined districts. Months ago the Société des Architectes Diplomés held, under the auspices of the French Government, an exhibition of the regional architecture of the invaded territory in connection with a competition for reconstruction. While the greatest importance was naturally attached to the improvement of living conditions, sanitation and the advantages of modern planning and construction in general, scarcely less stress was laid upon the importance of proper architectural treatment, or, for the Frenchman seldom hesitates to call things by their right names, in plain English, — beauty. The American architect in dealing with his clients, especially if they are "business men," usually has to beat about the bush, making excuses for whatever satisfactory architectural treatment he may have been able to attain, more or less surreptitiously, and playing up strongly on economy of construction or advantages of plan, knowing perfectly well, what the clients so often fail to realize, that the importance of these goes without saying.

One cannot do better than to quote from a lecture by M. Reinach, relating to the rebuilding of the destroyed French towns: "On account of speed being a great factor, would it not be opportune to

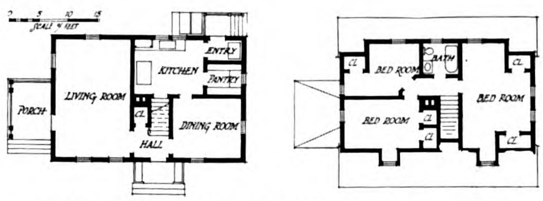
A Renovated Cottage at Framingham, Mass.

adopt the standardized type of house in cement or concrete, thus achieving speed and economy? I feel perfectly safe in foretelling that at the moment of settling, impatience, combined with the pursuit of material interest, will try to induce the sluggish and easily complacent mind to restore our destroyed villages in standardized cement houses, much in the fashion of some working settlements of London and some little towns built over night in the far West.

"To this I shall answer that, in every country, but particularly in ours, we could by no means leave aside the question of beauty. . . . For though ugliness was not always absent from the destroyed villages, yet, generally speaking, the rural house recommended itself by some pleasing trait; and it would be altogether unfair to repay



Exterior and Floor Plans of House at Newton, Mass.
Derby & Robinson, Architects



Exterior and Plans of Chauffeur's Cottage at Belmont, Mass.
Stanley B. Parker, Architect

the stoicism of all the victims of the devastated regions by rebuilding their abodes in the most depressing monotony. . . ." He then goes on to say: "It would be no less a violation of common sense to transplant in Lorraine and in Flanders the architecture proper to Provence than to transplant in the same country the lemon tree and the palm tree. . . . The architecture which fits especially the north or the south, the mist or the sun, varies on the spot at each epoch according to the necessary needs and to the degree of general progress. It is self-evident that a landowner of the twentieth century could not any better put up the mansions of his ancestors of the Middle Ages and the Renaissance than the latter the dwellings of their own predecessors, more rustic and primitive. But it is, as it were, the growth of the same tree with new branches and sprouts."

Of the architect who will endeavor to rebuild the villages, he says: "Then they will inspire themselves with the local tradition, not with a view to copying it servilely, but to continue it in the fashion of life which renovates without repeating itself. Though changes will have to be introduced, yet . . . once more beauty will be derived from utility. Thus we are reminded of the fundamental principles of good architecture. Service was given first place."

Another lecturer, M. Leon, says: "The climatic conditions shaped the forms of the roofs, affected the very planning of the farm;" and a third, M. Revault, calls attention to the "effects of the huge task of reconstruction on the speculators and admonishes his audience not to yield to the appetites of all those who are ready to take advantage of the opportunity."

Much of this applies to conditions in our own country, prevailing for the past three-quarters of a century and particularly acute at the present time. For this is the day of the ready-made plan catalogue, the results of which are ugly beyond expression. Throughout the land, from sea to sea, and from the wilderness on the north to the Gulf of Mexico, suburbs and country-side are being hopelessly and irretrievably spoiled by cheap, poorly built, machine-made structures, often in the worst of taste, which are in marked contrast with the fine and substantial, though usually extremely simple architecture of the past. It is neither to be expected nor desired that we should build to-day exactly as did our ancestors. It is desirable, however, that some sort of standard in taste should be maintained; some decency and fitness. To live in New England in a red roof bungalow with eaves overhanging three feet and cobble-stone porch columns two feet square should be recognized as just as bad taste as to appear in the streets masquerading in the costume of an Italian peasant or Mexican Indian.

What, then, is the standard of taste and how is it to be obtained? First, as M. Reinach has said, that it shall be characteristic of the region, and we are speaking now particularly of the Eastern and Middle States. "They will inspire themselves with the local tradition, not with a view to copying it servilely, but to continue it in the fashion of life which renovates without repeating itself." "The growth of the same tree with new branches and sprouts." The red roofed bungalow with overhanging eaves might be well enough in the southern climate of California or Mexico, as houses of a similar type are suited to the climates of India, Italy or Greece, where protection from the sun is desired. In western countries, however, they are unsuitable and, therefore, in poor taste. The roof of fairly steep pitch, with close eaves and rake is obviously admirably adapted to a climate where snow and rain and short, dark days prevail during a good part of the year. Walls may be of white clapboards or shingles, — stucco or brick if it may be afforded, — with green blinds and double-hung, twelve-light stock sash painted white. Stucco on hollow tile is very satisfactory and concrete treated architecturally in a manner similar to stucco is equally good. All of these are the commonest materials in every-day use, all admirably suited to their purpose and capable of producing a house indigenous to the soil and economical of construction as any that can be built.

The task of the reformer with a hobby is ever a thankless one. But the war has brought its opportunities, compensating in a small measure for its work of destruction. A few of our new industrial villages for war workers even now give promise of realizing many of these very qualities to which we have referred, thanks to the painstaking efforts of some of those who have been entrusted with their creation, and are bound to have a lasting influence in the future. What can be done to foster and increase this influence throughout the country?

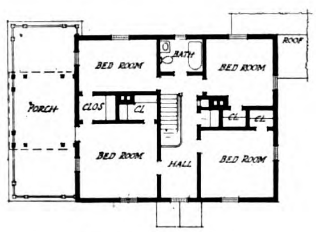
There is, of course, a great demand for ready-made plans. The average man often thinks he cannot afford an architect, even if he appreciates the advantages of having one, which generally is not the case.

A committee of the English Board of Agriculture and Fisheries, appointed to consider the problem of rural housing, has had prepared a series of excellent plans, with specifications, for small houses, cottages, and houses in blocks. The working drawings are sold at one or two shillings for the set, and a penny for the specifications. Something of the kind is also being done in Canada. May not this be a solution of the problem? Plans for good houses should be furnished for a sum so small that the price cannot preclude their use by any one. A large number of carefully studied types should be made available. To say that this sort of thing would interfere with the legitimate practice of the architect is absurd. It would create a more general appreciation of the importance of his work.

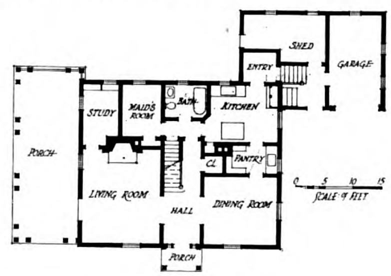
The ideal means of distributing these should be through the state or national government, but as the ideal is, unfortunately, seldom attained in this way, the various planning boards or local boards of trade would seem a suitable means. Something of this sort is already being done by the Massachusetts Agricultural College at Amherst, and by the State of Minnesota.

In the first place, after a certain number of studies had been prepared and, if possible, a number of model houses built which could be photographed, an educational campaign should be undertaken. Drawings, photographs and descriptive literature should be exhibited in schools, colleges, libraries, art museums, boards of trade, granges and elsewhere. Explanatory lectures should be given in the different communities, with lantern slides illustrating the objects to be attained. It has often occurred to the writer that a more general attempt should be made in the schools and colleges to cultivate an appreciation of architecture as well as of literature and music, and that a short course should be given to all students outside of the courses taken by those especially interested in fine arts.

It is a foregone conclusion that the houses should be economically and conveniently planned and capable of construction at such a cost as to compete favorably with the cheap stock plans or speculative builders' houses. This should appeal to social and civic workers, but a strong appeal should also be made to those who would be in-

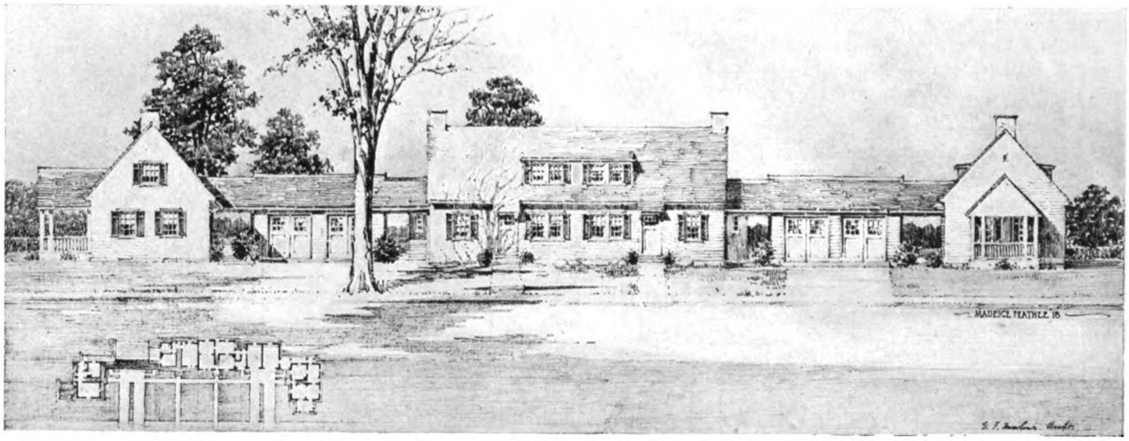


Second Floor Plan



First Floor Plan


House at Cohasset, Mass.
Stanley B. Parker, Architect



Design for Group of Six-Room Cottages
George F. Marlowe, Architect

terested in the preservation of an acceptable architectural type throughout a given region.

Obviously, work of so wide a scope should be under the direction of those well fitted to undertake it. The committee or commission should include an architect or architects who have been successful with domestic work, and a builder of good standing used to construction of this character. The commission or the specialist employed by it should also act in an advisory capacity to assist in the selection of the best type for a given case, in the planning or laying out of a group or community if construction on a larger scale were involved, and in the grading and planting which owners should always be encouraged to undertake even on the smallest suburban plot.

If France, in the midst of her struggle for existence has thought these problems of sufficient importance for serious and careful consideration, should not we find them equally so?

Model of Cottage Group Designed on Lines of Early American Farmhouses
Andrew H. Hepburn, Architect

C. STANLEY TAYLOR, *Associate Editor*

What Constitutes "Cost" in a Cost Plus Contract?

AS outlined in the article on "Protecting the Owner under a Cost Plus Contract" which appeared in this department in the September issue of THE ARCHITECTURAL FORUM, ever increasing interest is being evidenced in the feasibility of the cost plus method of building, not as a temporary relief for unsettled conditions, but as a permanent institution in the building field. Practically all large building projects, and in fact a great percentage of smaller operations, are now being carried out under this form of contract.

Brigadier-General R. C. Marshall, Jr., Chief of Construction Division, U. S. A., has recently stated that "no contractor should be called upon or permitted to undertake the performance of any contract that within the four corners of the paper upon which it appears is or may be written the financial bankruptcy of the contractor. It is unjust; it is unequitable; it is uneconomic. The great lesson of this war on the subject of the relationship between the contractor and the owner is the cost plus contract. This represents the only equitable basis under which a contractor may perform constructive and economic service for the owner. It is the only form of contract which affords protection to both parties."

In considering this subject a question of direct interest to the owner is involved in the term "cost." He understands the basic elements of the cost plus contract, and through analysis may develop various methods of protection under this form of contract. The question of interest, therefore, is what constitutes cost — and of this cost what items should the owner fairly pay?

The Three Classes of Costs

In the handling of any building project, from the financial viewpoint, there are three classes of costs:

1. Those which should be paid directly by the owner.

2. Those which should be paid by the contractor and reimbursed to him by the owner.

3. Those which should be borne by the contractor as expense against his fee.

In order to analyze clearly the various cost elements and allocate them in a manner which shall show clearly the method through which they should be handled, it will be well to outline a complete tabulation of cost elements in a cost-plus building project. These are as follows:

Tabulation of Cost Elements

(All items usually paid by owner are shown in ordinary type; those which represent actual cost to the contractor are shown in italics.)

Materials.
Labor (all directly on contractor's payroll).
Sub-contracts.
Contractor's fee.
Supplies (hardware, paints, etc.).
Equipment (including temporary structures, hand tools, canvas, tarpaulins, etc.).
Transportation (materials, equipment, plant labor).
Bond and insurance premiums.
Rentals on construction plant.
Negligence loss.
Defective work loss.
Material purchase loss.
Excess cost loss.
Salaries in field office.
Expediting material production and transportation.
Traveling expenses of contractor and employees.
Permit fees, royalties and legal costs.
Fire, flood or similar losses by contractor (not compensated by insurance).
Drafting.
Minor expenses (telegrams, express, blueprints, etc.)
Salary of the contractor if an individual, or salary of any member of the contractor if a firm, or salary of any officer of the contractor if a corporation.
Salary of any person employed, during the execution of the work, in the main office or in any regularly established branch office of the contractor.
Contractor's direct overhead or general expenses of any kind.
Interest on capital employed by contractor in plant or in expenditures on the work.

Cost Subject to Direct Payment by the Owner

The experience gained in past years in contractual relationships between owners and builders has resulted in establishing precedents which make it possible to determine fairly in what manner various costs arising during building construction shall be met. The American Institute of Architects is now giving this subject considerable study, and several tentative drafts of an agreement form between contractor and owner have been drawn up, together with explanations of various points. This contract provides properly that the owner shall meet directly the following costs:

1. Materials.
2. Sub-contracts.
3. Contractor's fee.
4. Supplies (hardware, paints, etc.).
5. Equipment (including temporary structures, hand tools, canvas, tarpaulins, etc.).
6. Transportation (materials, equipment, plant labor).

7. Bond and insurance premiums.
8. Rentals on construction plant.

The question of direct payment by the owner of these costs has been discussed by the writer with several experienced builders (and incidentally with several owners now engaged in building), and opinion has been unanimous in favor of the practicability of such arrangement. On some cost plus contracts, however, the builder does not finance the payrolls, as the owner may prefer to keep check on these through his own organization. The practical method carried out in such cases involves a report on Thursday of each week by the builder to the owner giving in statement form the various material, supply and similar bills on which payment is due, together with the payroll for the week and a statement of the contractor's fee on these items. Checks are drawn by the owner for direct payment of the various accounts outlined above, together with cash for the payroll and a check for the builder's commission. This has proven a fair and equitable manner in which to handle a cost plus operation, and it serves to keep the owner in touch with the progress of the work.

Defining Various Costs

A simple definition of the various costs as set forth above will be of interest where the meaning is not self-evident. In presenting its draft of a cost plus contract form the American Institute has also issued an explanatory pamphlet which defines many of the costs in an excellent manner, making it unnecessary, for the purpose of this article, to go beyond such definition in but few cases.

Of the costs outlined above, Numbers 1 to 7 are self-explanatory. Number 8 — rentals on construction plant — has by general practice been made chargeable for direct payment by the owner, whether the plant is rented from the contractor or others in accordance with rental agreements which may be approved by the architect. The cost of rental should be defined under the terms of the rental agreement to include transportation, cost of loading, unloading, installation cost, dismantling, removal and minor repairs and replacements. "Plant" is defined as follows:

> Plant comes from many different sources, and under different conditions, of purchase or rental. No fixed rule can be laid down. Each individual piece of equipment that is bought or rented will be necessarily the subject of a definite agreement.
>
> In some contracts it is provided that when a certain percentage of the value of a piece of equipment has been paid in rental, the title thereto shall vest in the owner. This is felt to be an unwise procedure and involves complications of ownership and subsequent disposition of the equipment without any real benefit to the owner. The contractor, as the adviser of the owner, should notify him when it is better for him to purchase plant outright and when it is better to rent it.
>
> In renting plant it is not easy to cover the matter of repairs. The owner of the plant should furnish and maintain the plant in workable condition, and should make good "internal" defects that may develop — the results of normal use — or "wear and tear." Minor repairs and replacements due to the accidents of use are a proper charge against the work and should be made by the person renting the plant. Provisions to this effect should form part of the rental agreements.
>
> The furnishing of all necessary plant for a fixed sum is undesirable.

In this connection it is usual for rental agreement or contract to include a schedule of machinery and equipment which goes to make up plant necessary for the particular operation. Reference is here made to the United States Government form of cost plus fee contract for cantonments where in a typical schedule the machinery and equipment which should be considered as plant may be found.

It might be well also to note here the opinion of the American Institute of Architects on the question of small tools which are considered under the heading of equipment above. This opinion, which seems to be based on experience and sound reasoning, is as follows:

> Small tools constitute one of the most troublesome items. Some prefer to cover small tools and certain other "plant" items by a lump sum for which the contractor is to furnish all that are needed for the work. This, however, is illogical in that it inserts a small lump sum contract with a cost plus fee contract and is unsatisfactory and troublesome as it creates the necessity of determining constantly whether or not certain items fall under the lump sum or are to be paid for as part of the regular cost. It seems best to have all such small tools as are actually used up during the work paid for as part of the cost, and any that are used, but remain of value at the end of the work, taken over by the contractor at a fair valuation to be agreed on.
>
> In less important forms of work, such as small repairs or alterations, it is often customary for the contractor to furnish small tools without expense to the owner, being covered by the general percentage or fee. Such a case may be covered by inserting in the contract a provision such as the following:
>
> The contractor further agrees to furnish all tools and construction plant necessary for the proper and expeditious performance of the contract without making any charge for their cost, use or repair.

Costs Paid by and Reimbursed to Contractor

As has been explained in foregoing paragraphs, the question as to whether the contractor shall pay the labor payroll and then be reimbursed by the owner, or present his payroll requirements for direct payment by the owner, is naturally dependent upon the original agreement and should be definitely settled at that time. It is evident that the closer contact an owner may have with the work as it proceeds, the more familiar he is with progress and the channels through which his money is being spent. In addition to labor cost other costs which are paid by the contractor and reimbursed on his statements are as follows :

1. Salaries in field office.
2. Expediting material production and transportation.
3. Traveling expenses of contractor and employees.
4. Permit fees, royalties and legal costs.
5. Fire, flood or similar losses by contractor not compensated by insurance.
6. Drafting.
7. Minor expenses (telegrams, express, blueprints, etc.).

These items are largely self-explanatory. Number 1 — salaries in the field — represents a cost which is the basis of considerable argument and misunderstanding. It would seem fair to eliminate this cost on the following basis, as is done on many building operations to the satisfaction of both owner and contractor. That is, that field office employees shall be only those engaged on any work in connection with the particular project being carried out, and that this work shall not include any activity which normally would be done in the contractor's office and which is fairly chargeable against his profit.

Number 2 — expediting material production and transportation — is a cost which is not usual, except on very large operations where it may become necessary to send employees of the contractor to check and expedite production of certain material or to follow up freight shipments.

Number 3 — traveling expenses of contractor and employees — should be considered that proportion of transportation, traveling and hotel expenses of the contractor, his officers or employees, incurred in the discharge of duties connected directly with the work.

Number 4 — permit fees, royalties and legal costs — would include any damages for infringement of patents and costs for defending suits therefor. Also for deposits lost for causes other than the contractor's negligence.

Item Number 5 above is outlined in the tentative contract drawn up by the American Institute of Architects as follows :

Losses and expenses, not compensated by insurance or otherwise, sustained by the contractor in connection with the work, provided they have resulted from causes other than the fault or neglect of the contractor. Such losses shall include settlements made with the written consent and approval of the owner. No such losses and expenses shall be included in the cost of the work for the purpose of determining the contractor's fee ; but if, after a loss from fire, flood or similar cause not due to the fault or neglect of the contractor, he be put in charge of reconstruction, he shall be paid for his services a fee proportionate to that having general application.

Number 6 — drafting — includes only such drafting or modifications in plans and details as may be carried out by the contractor's force.

Costs Which the Contractor Must Bear

A general outline of the costs which the contractor must bear constitutes the charges which he must make on his own books against the fee received from the work in order to determine his net profit. These are as follows, including certain potential charges which may materialize.

1. Salary of the contractor if an individual, or salary of any member of the contractor if a firm, or salary of any officer of the contractor if a corporation.
2. Salary of any person employed, during the execution of the work, in the main office or in any regularly established branch office of the contractor.
3. Contractor's direct overhead or general expenses of any kind.
4. Interest on capital employed by contractor in plant or in expenditures on the work.
5. Negligence loss.
6. Defective work loss.
7. Material purchase loss.
8. Excess cost loss.

In general, these costs as outlined above are also self-explanatory. It has been customary in some cases for *pro rata* charges to be made on salaries of firm members and officers. It is essentially unfair to the owner that such charge should be made and in drawing up a contract this matter should be clearly understood.

As stated by the Institute and substantiated by the opinions of practical builders and of many owners, the theory of a cost plus contract is that the contractor shall be reimbursed every cost, direct or indirect, forming the subject of the contract, and that for his services in conducting the work he shall receive a fee which is absolutely net to him and subject to no deductions except for negligence (and his own office overhead cost).

This question of negligence brings up the potential items Numbers 5, 6, 7 and 8 in the above list. Just what may constitute negligence, defective work, material purchase loss and excess cost loss is at best an indeterminable quantity. It is evident, however, that if mistakes are made in the purchase of material so it is necessary to sell material at a loss ; if defective work is done which must be replaced at a loss ; if through direct negligence accidental occurrences may increase the cost ; or if in buying the prices paid are palpably high, there must be *prima facie* evidence to this effect. In order to avoid misunderstanding which may ultimately result in expensive law proceedings, it is well to agree in advance to place this phase of cost in arbitration where dispute arises.

In the above paragraphs, in so far as space has allowed, it has been the purpose to give a clear conception of what "cost" is, as used in the sense of a cost plus contract, and to show exactly how and by whom the various costs should be borne.

Competitive Bidding on a Cost Plus Fee Basis

IT is easily possible to devise methods by which the element of competition may be introduced in letting a cost plus fee contract.

One ingenious method of accomplishing this end and at the same time enabling the contractor by efficiency in the conduct of the work to increase his own profit while reducing the expense to the owner is now in use. It may be explained by a clause from an actual contract covering the construction of an important viaduct.

"Each bidder shall state his estimated 'cost of the work' which shall be termed contractor's estimated cost, and shall also state a fee which shall be termed contractor's profit fee, which shall be separate from and not a part of the contractor's estimated cost. The contractor's profit fee must not exceed 10 per cent of the contractor's estimated cost.

"The contractor's estimated cost shall be assumed to be based upon the approximate quantities hereinafter stated. Inasmuch as the actual quantities in the finished structure may vary from those approximate quantities, each bidder must also quote unit prices for each of the various construction items as given in the form of proposal and bid herewith. These unit prices shall be applied to the differences between the approximate quantities given and the actual quantities in the completed structure. The sums so obtained shall be added to or subtracted from the contractor's estimated cost accordingly as the actual quantities are respectively greater or less than the corresponding approximate quantities, thus fixing an amount to be termed the revised contractor's estimated cost.

"The contractor shall be paid the actual cost of the work plus a profit fee. If the actual cost of the work is equal to the revised contractor's estimated cost, the contractor shall be paid the contractor's profit fee in full. If the actual cost of the work is less than the revised contractor's estimated cost, the contractor shall be paid the contractor's profit fee, and in addition thereto one-half of the amount which the actual cost of the work is less than the revised contractor's estimated cost. If the actual cost of the work is more than the revised contractor's estimated cost, the contractor will be paid the contractor's profit fee less one-half of the amount which the actual cost of the work is in excess of the revised contractor's estimated cost; but in no event shall the contractor be paid less than the actual cost of the work plus one-third of the contractor's profit fee."

Next is defined the actual cost of the work. "Profit fee" is then defined as follows:

"The profit fee paid to the contractor shall be deemed to cover and include the contractor's profit, the use of his organization, his skill and energy, his overhead expenses, administrative expenses, services of contractor's executives, expenses of contractor's executives giving occasional attention to the work, services of the general superintendent devoting all his time to the work, all contractor's legal expenses, interest on moneys used, taxes, all expenses of any office or offices of the contractor other than the field office on the work, and all other expenses deemed by the engineers not a part of the actual cost of work as herein defined."

In explanation of the operation of this contract the following statement has been made:

"The contractor, by attention to the work and efficiency in administration, may increase his profit, while at the same time he reduces the expense to the owner. On the other hand, although he is in a position where he probably will have small financial loss, he may suffer the loss of his time and attention to the work. The percentage fee to be named is limited to 10 per cent, and the minimum fee above the actual cost to one-third of that amount, or not to exceed 3⅓ per cent of the cost of the work. It is estimated that this 3⅓ per cent will not more than cover the items specified as part of the profit fee. It is essential in such a contract to draw a very distinct line between what is to be the actual cost of the work and what is to be covered by the profit fee and to exclude from the actual cost of the work all indefinite charges or amounts which cannot readily be checked by ordinary auditing."

Other methods have been used by which competitive bidding may be obtained on the cost plus fee basis, as for instance the method employed by the U. S. Housing Corporation, in which the various bidders not only competed in the amount of their fee, but also were called upon to name their estimated total cost, their organization and the personnel available to handle the work in the field, the amount for which they would furnish the plant required for the work, and the estimated time needed for the work. A definite scale of values for the various items determined which was the low bid on the project as a whole.

In order to eliminate any suspicion as to the sincerity of the contractor in holding down costs, a carefully worked out form of contract which has been employed in several cases involves in its simple details the following factors: A careful estimate of cost by the contractor on which his fee of 10 per cent is based. If it is found at the end of the job that the estimated cost has been overrun, an equal percentage of the overrun is deducted from the fee as based upon the estimate, so that the contractor's fee is reduced in proportion to the amount of overrun. In other words, if a building is estimated by the contractor to cost $200,000, the contractor's fee is set as 10 per cent of the amount, or $20,000. If, however, it is found upon completion of the job that the building has cost $250,000, 10 per cent of the overrun, or $5,000, is deducted from the contractor's fee, cutting it down to $15,000. This method is good in that it creates an incentive without disturbing the various valuable elements of the cost plus system, nor is the contractor made financially liable in a manner which will either cause him to be bankrupted by the job or to lose interest and refuse to finish the work.

Insurance Engineering as a Factor in Architectural Service

A SUBJECT which has received very little consideration on the part of the average architect is that of providing safety against fire loss as a factor in design. There can be little doubt that the average person realizes that there is an excessive fire waste in this country and that considerable effort is being put forward by various interests toward encouraging the reduction or elimination of dangerous conditions. In fact, a definite profession known as insurance engineering has developed as a result of the need for studying building design and equipment from the fire hazard and insurance viewpoints.

Insurance engineering, broadly defined, is a service which involves a careful study of fire hazard in any building for the purpose of determining what methods of prevention and protection may be used to reduce the danger of loss by fire to the lowest minimum. Incidentally it is evident that such reduction of fire hazard in a building and the provision of proper protective measures should reduce the cost of insurance. As a matter of fact, this is the case, as the fire insurance underwriters have definite schedules in rating buildings. These rating schedules take into consideration the class of materials used, the design of a building in so far as protection against exterior communicative fires may be concerned, and the provision of fire walls to reduce dangerous areas. The underwriters' laboratories are known in a general manner to all architects, their specific purpose being to test various building materials and protective devices and to classify them according to their qualities of fire resistance and protective value.

To demonstrate the need of studying this subject as far as the architect is concerned we have but to quote the planning of the Equitable Building in New York City. It is fairly well known that the Equitable Building represents the highest achievement of fire safety in any building of its size in the world. When the first plans were drawn for this building a tentative insurance rate was quoted by the underwriters to whom the plans were tendered. The owners, however, wisely engaged the services of an experienced insurance engineer who went over the plans carefully, making recommendations for the use of unburnable materials at many points; introducing protective features such as wire glass; sprinkler system at points of special hazard, such as kitchen, storage rooms and service rooms; automatic fire doors, and carefully protected elevator shafts to prevent entrance and spread of flames. This building is practically divided into four buildings by fire walls, each unit having its own means of egress such as smoke-proof tower and well protected elevator system. As a result of the introduction of these features and the reduction of the fire hazard, the insurance rate was reduced to about one-quarter of that which would normally have been placed upon the building. This resulted not only in a definite saving on insurance premiums, but in providing a very definite incentive for the location in this building of business firms whose valuable records are well safeguarded against loss by fire.

In a brief consideration of fire loss the direct loss is easily understood and is usually compensated by insurance. To such an extent has the idea of insurance compensation for fire loss been instilled in the minds of the American public that comparatively little attention is given to the fire hazard by the average person. There is a subconscious assurance that if a building is burned, the insurance company pays the loss.

As a matter of fact, however, the indirect loss by fire which is not compensated by insurance probably amounts to over five times the direct loss in this country. It may be interesting to consider briefly what constitutes indirect loss. First, we may consider the loss of documents, valuable papers and correspondence which cannot be replaced and in many cases cannot in any way be compensated. Again, there is the checking of business momentum, for instance, when a factory is burned. Insurance may compensate the building loss and even the payroll loss, but the entire course of the business is checked; production is impossible for many months; active markets which should be taken advantage of are lost, and the entire operation of the business through forced suspension is so curtailed and disrupted that the indirect loss to the manufacturer may easily represent considerably more than the direct fire damage.

Normally it would seem that the masonry building is unburnable, and this is true in so far as the masonry portions may be concerned. As a matter of fact, however, the average large fire loss occurs in a masonry building, the unburnable walls of which really constitute flues and furnace walls; while the wood trim, sash, doors and other inflammable material incorporated as a structural part of the building constitute paths along which flame may travel.

The attitude of insurance companies toward this matter of safety building has undergone a considerable change in the last few years. As the insurance business has become more directly under public control, the sources of income and profit have been eliminated more than in the earlier years of great reserve funds.

Recently an extremely interesting development has taken place in this field. During the war period the insurance companies imposed an excess 10 per cent premium charge to meet increased hazards owing to abnormal conditions in the industrial and business fields. Since the close of the war, however, State Insurance Commissioners have refused to permit the further collection of this excess premium. This means a source of curtailment in the revenue of the underwriting corporations and it has been determined that this can best be made up through a substantial reduction in the country's fire waste. Apparently such action is economically sound as it is certain that the annual fire loss is in a large measure preventable. In many fields this fact has been tested — the conservation work carried out by the underwriters among the grain elevators of the West and Northwest during the past year provides simple proof of this fact. Here a rigid system of inspection, insistence upon the erection of fire walls, installation of automatic sprinklers, fire alarms and other protective devices have been so effective that fires in grain elevators have been practically eliminated.

The National Board of Fire Underwriters have now determined to carry out an extensive program of educational and exemplary work throughout the country. The present program contemplates dividing the country into five districts, — New England and the Coast States constituting one ; the Southern States another; the Middle States a third; Northwestern group a fourth, and the Pacific Coast territory a fifth. Each territory will be controlled from a divisional office, the whole to be under the general direction of George W. Booth, chief engineer of the National Board of Fire Underwriters, with headquarters in New York City.

As a very positive means toward the desired end, the adoption of modern building ordinances will be advocated, and where these are already in force their rigid application will be urged.

It is evident that with the excellent work in this field which has been done by the National Fire Protection Association, augmented by this broad activity of the underwriters, there will undoubtedly develop a strong current in favor of reducing fire hazard and insurance premiums. It is therefore evident that the architect must give more serious consideration to this question. Not only as a service to his client is he called upon to provide the most efficient and serviceable type of building which may be maintained at the lowest possible charges, but apparently the strengthening of building codes and ordinances against hazardous conditions may be expected, and in this case designers of buildings will be forced to consider this problem.

There can be no doubt that much of the responsibility for fire waste in this country rests upon the architectural profession. Architects, in so far as the structural integrity of a building may be concerned, bear the direct responsibility of incorporating in their design such features of prevention and protection as may at once discourage conflagrations and destructive fires. The structural fire hazard is divided definitely into two classes, — the exterior and interior hazard. The exterior fire hazard has to do with the danger of communicated fires. To avoid this danger the insurance engineer will carefully consider surrounding buildings, both existing and potential. Where, adjoining, there are to be found small structures of inflammable type, window openings should be protected by the use of shutters or metal window frames with wire glass, and other exterior openings should be likewise protected so that in case of adjoining fire, flames cannot find their way into the building. In other words, the desired result is to obtain exterior walls where obstruction to the passage of flames is prevented at every danger point. In the case of small buildings such as dwellings, a large percentage of fire destruction results from communication of fire to frame exteriors and wood shingle roofs. This hazard is one which at best must be dealt with in a commonsense manner. It is evident that large areas of congested frame construction are potential conflagration points, and houses built in such districts should be protected by the use of unburnable materials. In less congested areas the choice of materials is less limited.

The second structural hazard is found in the interior design of a building. Space at this time does not permit of an exhaustive analysis of interior fire hazard, but it is evident that all vertical shafts in a building should be so protected that flames cannot communicate from one floor to another. This is done by the use of fire doors which are automatic in their operation. Again it is considered that no open area of over 5,000 square feet should be permitted, as it is possible to provide fire walls to subdivide larger areas than this. Protective features, such as automatic sprinklers and fire extinguishing devices, should be provided at points where there is danger of fire origin or quick spread of flames.

It is evident from the points brought out in foregoing paragraphs that here is a subject worthy of careful study by every architect. Membership in the National Fire Protection Association is open at a nominal charge, and through this and various underwriters' organizations literature containing exhaustive studies of this subject may be obtained.

Post-War Committee — More Comprehensive Service

Editors, The Architectural Forum: Be there a need of a more comprehensive service? Most decidedly yes, if the client is to be considered.

Ordinarily he is one who is busily engaged in his own particular field. Building is comparatively incidental to him. His time is valuable to him; he knows little of the technical side of building and does not feel warranted in learning it, for there are plenty of trained men who are desirous of serving him.

Usually he is interested, first of all, in the cost of the contemplated structure, and he looks for help in this direction. Too often this is only obtainable from a contractor.

Having secured the desired information he then wishes to know how to proceed with the work with the least inconvenience to himself. At this point he may be told of the complete service idea which includes the designing, constructing, furnishing and sometimes financing. All he has to do is to sign on the dotted line. Eureka! No time wasted, no bother about details. Just a check and a vote of thanks when the work is done. Appealing? Of course it is! Is it the best way? That depends on how much the client's time is worth per minute. Very few could actually afford it, if they analyzed the problem accurately.

Has it received the intensive study it deserved? Does it express the clients individuality? Has it given one hundred cents worth for each dollar of the check? If put to the acid test of impartial, scientific analysis will it be found to be the best method?

The answer will be illuminative and valuable.

But the complete service idea is attractive and should be studied; its lessons learned; its good points adopted and its defects discarded.

Attention has been called to the results achieved by the United States Government during the war, and it is suggested that this might be the desirable method to pursue. Is it really?

The Government called in architects, engineers and contractors and said we have so much work to be done in a given time and need your help. It was given enthusiastically; what seemed impossible became a fact and the work was turned over on time.

Why not adapt such successful methods to present-day needs? Can it be done? Yes, with certain modifications.

The men who achieved such instructive results were selected from all over the country because of their peculiar fitness for the task. They were engaged in independent practice and had made good. They became an organization and co-operated with one another and got there. They had the knowledge and the experience and applied them unselfishly with patriotic fervor. Patriotism made it possible! That incentive passed with the signing of the armistice. After that each one began to consider himself and his individual practice. Few, indeed, would be willing to lose their identity by becoming a part of an organization. Their reputations are their individual property, to be maintained and increased by their own efforts.

With the organization eliminated and the service desirable what can be substituted?

Co-operation! How? The architect, engineer and contractor to act as a unit or a committee. Any one of the three could act as spokesman, for leadership is a personal quality rather than a divine right of a particular profession.

Acting as one they render the desired service, and because each has his independent practice they never lose sight of their individual responsibilities, consequently they are able to serve more impartially. Designing and construction are two separate and distinct functions and are so recognized by thinking men in and outside of the building industry. One should not be subordinated to the other. It is not only possible but highly desirable that they should form an alliance.

Should those who assist the principals be more than employees? Yes, when they can qualify as junior partners. New blood and enthusiasm coupled with ability are needed to keep up-to-date. The knowledge and experience of the seniors should not be lost when they retire or die. Progress should be continuous and such relationships make it possible.

An architect's services should be complete, no matter what the relationship with his client and his fellow-workers may be. He should be able to advise as to the permanency of the building, be it residence, apartment, institution, mercantile or industrial structure. This involves a study of the growth and development of cities and their sub-divisions.

A building improperly located or a site with an ill-advised building may mean a loss of a large portion of the investment. He should have a thorough knowledge of the laws and restrictions governing buildings. Lacking this, time and money, his and the clients, may be wasted. His plan and specifications should be complete, and this may require the services of structural, mechanical, electrical, sanitary and, perhaps, illuminating engineers. They should be his associates on the work and the fact indicated on the drawings. This is a departure from the usual practice, but credit should be given when due.

Inspection in the shop and in the field may require the services of inspection engineers. Superintendence may require partial or entire time of a clerk of the works. All of these should be included by the architect in his fee whether it be on a percentage basis or other method. To do otherwise is to mislead the client. He has a right to expect that all designing and inspection that may be necessary shall be included in one transaction.

This complete service cannot be rendered for the customary prevailing fee, but the client would feel better about paying it all to one man whom he holds responsible for the work in its entirety. Once establish as a principle the complete service idea and we will find the profession on a sound and respected basis.

St. Louis, July 30, 1919. ERNEST JOHN RUSSELL.

EDITORIAL COMMENT

COORDINATION OF THE BUILDING INDUSTRY

IN connection with the Bridgeport housing development, which is illustrated in other pages of this number, several very interesting investigations were carried on. The United States Housing Corporation was particularly interested in building comfortable houses, suitable to the needs of the employees who were to occupy them, and embodying all possible elements tending toward economy and speedy construction.

As a result of these investigations methods of construction were adopted which are of vital interest to all concerned in the building industry. It may or may not have been an advantage that the Corporation, through its governmental function, could set aside all local regulations and building codes. It is a fact that some of the construction is in violation of existing ordinances; but it is recognized by experts as the equal of or superior to that required by local authorities.

There are many things in the building industry to-day which are carried over from the prehistoric past; there are many requirements still in force which should be rendered obsolete in the light of modern knowledge, and there are many accessories which are superfluous but which are advised by manufacturers and the labor element, all of which militate against conservative and economical building at the present time. It might be interesting to analyze the situation from all of these standpoints, but it will be sufficient to take a leaf from the book of experience of the United States Housing Corporation in their building development along one particular line of investigation.

One outstanding method of distinct saving in the plumbing installation, which for a time was adopted at Bridgeport, but which was later changed to the old form construction, was in the use of anti-syphoning traps.

The representatives of the Housing Corporation had conducted careful tests and investigations and had consulted with experts in sanitary conditions relative to the system of back vent piping. As a result it was decided to omit all back venting of traps and use anti-syphon traps instead. This change appears to be only a small point, but see what follows! The plumbers have less piping to install, the manufacturers have less piping to make, and the owner has less piping to pay for, and there is no doubt but that the plumbing installation under these conditions is equally good from the standpoints of health and sanitation. The time consumed in installation is obviously less and the possibility of "speeding up" the construction is real. This fact tends to the advantage of the employer and employee as well as the owner.

For some unknown reason labor has taken a very antagonistic attitude towards the installing of non-syphon traps, whether it be solely because of the less amount of labor involved or whether it be because anti-syphon traps displace customary portions of the installation, is difficult to say. The fact remains, however, that under the present conditions the unnecessary piping is continually installed. The building laws of many cities permit the use of non-syphoning traps, but usually with a provision which negatives the permission. The plumbers are especially vigorous in their opposition to the omission of this piping. Is it because they believe the non-syphoning trap unscientific and unsanitary? Is it because it gives them more work to do?

Do the manufacturers urge the retention of the back venting system simply because of the increased use of pipe? It seems as if this could not be the case because ordinarily the stock of pipe is far below the demand.

We are, therefore, forced to assume that there is a lack of coordination in the building industry which is not confined to the specific instance noted. Why this should exist when all parties are working toward a common end, is difficult to determine. It may be a reflection of the misunderstandings so prevalent at present between labor and capital; it may be due to lack of energy on the part of those associations that should look after the proper framing or revision of the laws governing construction; it may be due in part to excessive inertia on the part of the architectural profession.

In building construction, the corporation, if such it be, which is financing the operation is interested in economy; the corporation doing the manufacturing is interested in economy plus a volume of business; the corporation installing the work, which in this case we may assume as the labor element, is interested in volume and continuity of work in keeping the men busy the greatest possible number of days.

Why is it not possible, then, to so adjust the points of view of these different elements that all may pull together rather than pull apart? Why cannot the "corporations" be merged into one "co-operation"? Only by the close and friendly coordination of the financiers, manufacturers, labor, architects and owners can a real solution to our building problem be found.

Let us no longer do as our grandfathers did if modern wisdom shows a better way. Let us be on the watch for short cuts to economy so long as they lead us along in the direction of good construction and sound principles.

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PLATE ILLUSTRATIONS

LETTERPRESS

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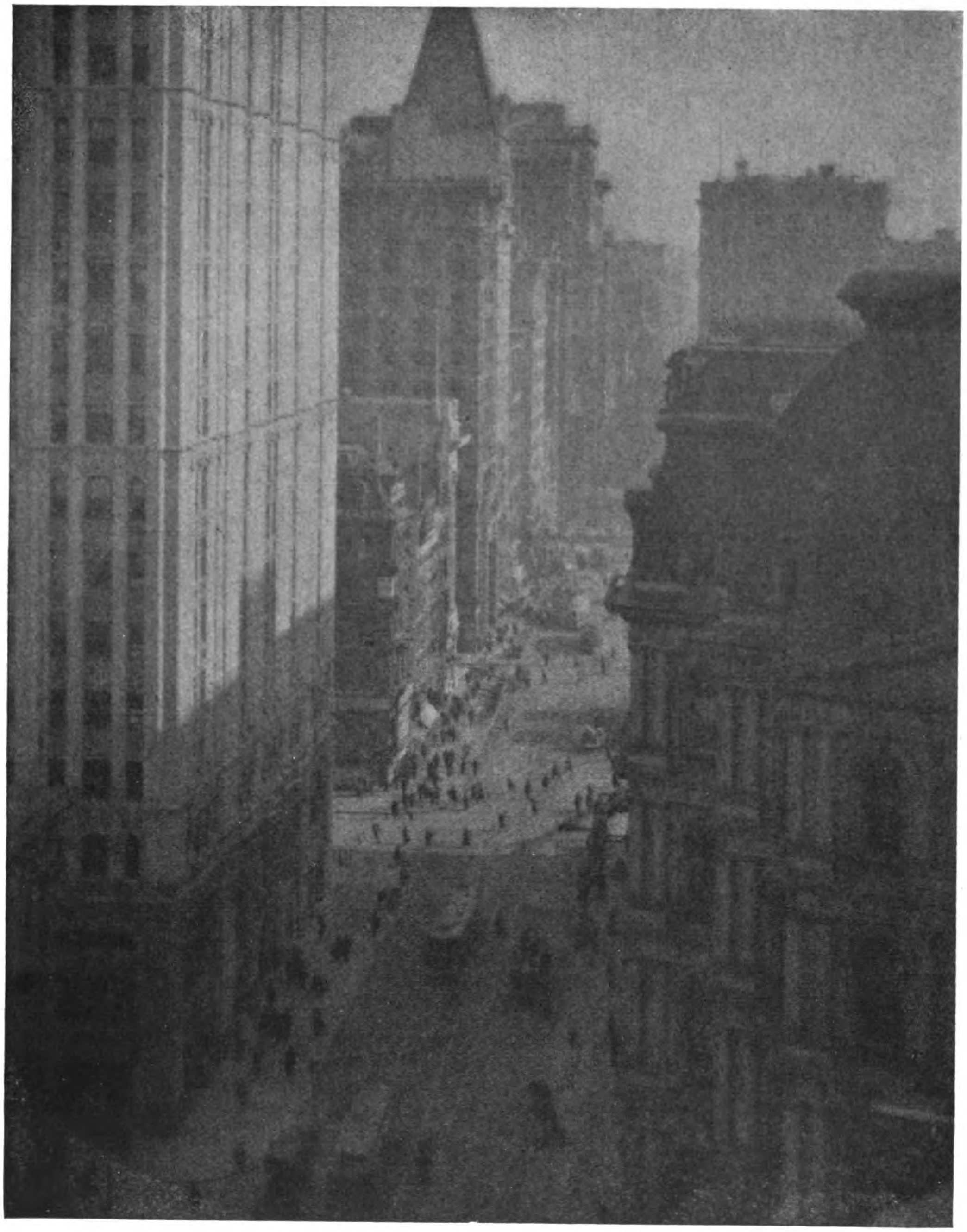


VIEW LOOKING NORTH ON
BROADWAY, NEW YORK CITY
Lower Stories of Woolworth Building
At Left and Old Post Office at Right
Photograph by John Wallace Gillies

THE ARCHITECTURAL FORUM

FOR QUARTER CENTURY THE BRICKBUILDER

VOLUME XXXI NOVEMBER 1919 NUMBER 5

The Apartment Building for Moderate Rentals

By ELISHA HARRIS JANES

IN discussing the conditions of moderate priced apartments it is necessary to consider somewhat the origin and development of the type, and the best place to trace their growth is in New York, where they started, and where at all times the housing problem is the most serious and conditions the most changeable.

Curiously, although the first one built in New York was designed by one of our most eminent architects, the late R. M. Hunt, in 1869, very few of the thousands erected since have been from the plans of a prominent architect.

The first apartment caused much ridicule, directed not at the architect but at the idea of the owner. The building was erected on a wide plot; a few others followed and, as their practicableness began to be demonstrated the ever ready speculator started to imitate, but not on a wide plot or with the assistance of the skilled architect, but on the narrow 25-foot city lot, and probably from his own plans. This resulted in the development of the long string of rooms, all except those at the front and back, dark and musty, and smelling of the lively little germs. Even if several lots were to be improved, the foresight of the speculator could not show him any advantages in changing the type of plan. The corner plot was the one exception.

These conditions existed up to the late '90's, for although this substitute for a dwelling was far from attractive, the narrow and elongated conditions of Manhattan Island encouraged the apartment house development. About this time the real estate operator expanded, introduced the building loan method, worked with larger plots, and encouraged building on units of 50 feet or thereabouts — all with more or less improvement and with the development of several types of plan.

In the meantime the real tenement house was paralleling the development of the apartment, only with such disgraceful results that the agitation for its betterment finally reached a climax, and, notwithstanding the strong oppositions and the many arguments advanced to show that every one interested in apartments or tenements would be ruined, there was passed by the New York Legislature a law which was the greatest blessing to the health of the people, the housing problem in New York, and to real estate in general — the Tenement House Law — a law that has been used as the foundation for most of the laws covering ventilation and housing in many other cities and states.

How did it work out? For about two years no builder was found bold enough to risk sinking his money in what he thought was doomed to failure, and few of this class of buildings were erected; but this was really fortunate for the speculating builder, as the supply had gotten ahead of the demand, and had building continued at the previous rate, it would have spelled ruin to many of them.

The squalid and wretched conditions of the people, doomed by their poverty to live in the old tenements, caused some philanthropic men to study model housing problems, experimenting practically by erecting buildings, and risking an investment to better the living conditions of the poor. These experiments proved such good financial investments that competent architects were invited to make a serious study of the subject, and competitions produced many excellent plans which greatly improved the general housing conditions and proved the new law a success.

With the high priced apartment so much capital is involved that the builder fears to risk it with other than an experienced architect, and many are the splendid plans which have been evolved for these buildings.

Much has been published of these two classes,— the tenement house and the high priced apartment, — but of the moderate priced apartment, built to rent from $7 to $30 per room per month, no one has appeared to champion its humble but necessary cause, and upon it very little serious thought has been bestowed. Nevertheless, in many ways, this problem is much more difficult than either of the others. In the expensive apartment such high rentals can be obtained there is little excuse for not giving the tenant all that he desires or expects. In the tenement not much is expected in the way of luxuries — often they do not get even hot water or heat. But with the moderate priced apartments the tenants look for almost as much as the high priced apartments give, and expect to pay little more than do the occupants of the tenement houses. As an example, many of the tenements rent as high as $8 per room, and the people have only painted walls, sometimes a fresh coat when a new tenant moves in, or perhaps the walls are just washed. Some moderate priced apartments up to this year rented for but little more, yet each new tenant expected new wall paper on every room, decorated halls, telephone in the house, janitor service, and so on with many other items.

It is to be regretted that, with few exceptions, apartment houses are built by speculative builders who employ architects whose low fees are far more attractive than their workmanship, and who can therefore afford to give very little study to the problem, even if they had the ability. For a short time other cities suffered from the same trouble, and in Chicago sets of plans were even advertised at $5 and up. This is the reason that New York, which should now lead in apartment house buildings, does so in *numbers* only but not in *quality*, except in the highest priced apartments. Almost every other city having apartments can show better planned and better paying buildings of the moderate priced class, and designed by the better class of architects. The main faults appear to lie in the method by which they are financed, designed and built in New York.

One asks, then, "Why, if these methods are so bad, the plans so poor and so little studied, are the buildings successful, and why does it pay to continue to build them?" It probably would not pay in any other city. But in New York the growth of population has been so rapid it has been safe to repeat previous plans, and the speculator sees no reason for changing his methods. The supply has continually been behind the demand, with the exception of 1899 just before the Tenement House Law went into effect, when the fever of erecting apartment houses with building loans had been running high for some time and a speculator could erect a building without any capital.

Therefore, when a new type of plan is suggested to the builder it is difficult to persuade him to adopt it. Some improvement in the plans is due to a building being erected by some investor who has engaged a competent architect to study the problem; but too often, while the architect may develop a good plan in many respects, he has not been able to give it the study required to produce the most economical one, which you cannot blame a speculator for wanting. The greatest improvements occur when a progressive builder has an open mind and will listen to and engage one of the very few architects experienced in the work. Unfortunately this is rare and the arguments have to be long and strongly presented. But when the new idea has proved a success, the other speculators' architects are quick to copy.

The method by which most apartment houses are built and financed should be considered briefly. With few exceptions they are built for speculation, and while many of the builders are conscientious and erect well built buildings, many others are actuated with the single idea of negotiating an early sale, and "anything will do" is their motto.

Few of the builders can afford to use much of their money in the purchase of the site, so that most of the property used in apartment building is generally bought in large plots by real estate operators, either at auction sales or from estates. Sometimes it is accumulated from small plots. It is then subdivided and sold to the speculative builder, who purchases the plot with a purchase money mortgage, or a very generous mortgage, and arranges with either the operator or an institution for a building loan, by means of which money is advanced as the building progresses, that may or may not become a permanent loan at the completion of the building. When this method first started a builder was able to undertake an operation without expending any money of his own at all, but from sad lessons building institutions and money lenders are now much more careful. Several of them retain architects (but charge the cost of the service to the builders), who pass upon the plans, specifications and construction methods, and issue certificates before any money is advanced upon the loans. They also have certain standards to which the building must comply. When an investor purchases a building erected by money loaned by one of these institutions, he may be satisfied that structurally he is getting a very good building.

With these few exceptions, beyond deciding the size of the plot to be built upon, few restrictions are made by the operators when the property is sold, resulting often in one building injuring the one adjoining. Here is where the operator could help in an advantageous development. If, instead of selling two or three lots and allowing the builder to erect any kind or shape of building, he would consider his whole plot, have it carefully studied and sold in such parcels that each would benefit the other, he would not only add to the comforts of the tenants, but would be repaid by the greater success of the building, and therefore, quicken sales of the balance of the plot.

It is well known that there is economy in large units, or a combination of many smaller ones operated as one large unit, by the saving in one heating plant, one superintendent, etc. Yet the market for the large plant is limited, so naturally the size that is the most marketable must be considered. Nevertheless, the fact that some small units are to be used, does not mean that the profit of light or ventilation in larger units by combining court space should be lost to the small units, and they would not be if the whole plot is first considered.

Recently there have been several cases where the whole plot was studied in mass and lots sold with restrictions as to the general court area affecting each building. Figure 1 shows a block diagram of how one plot was originally laid out for development, using one of the popular types of apartment—that with the open court in front; and Fig. 2, the change that was made after the owner was persuaded to allow the whole block to be studied. For this plot sketches were submitted, using the different standard types of plan as shown in Fig. 3, the dumbbell plan, the type with *rear* courts only, and the open *front* court and its variations. An inspection of the block plans readily shows which gives the better ventilation and light. They both provide the same number of rooms per lot. Figure 1 uses the minimum size courts and covers almost the maximum amount of ground allowed; while in Fig. 2 the combining of courts has allowed 20 feet between the buildings instead of the minimum of 13 feet, and the two yards amount to 32 feet instead of 26 feet as required, thus giving additional space for garden treatment. The staggering of the units allows the rear apartments to obtain a view to the street and to benefit from the breezes in any direction. Although the buildings cover a smaller percentage of area, they contain as many rooms as in the first arrangement, and therefore cost less per square foot of rental area to produce, as will be shown later in the article.

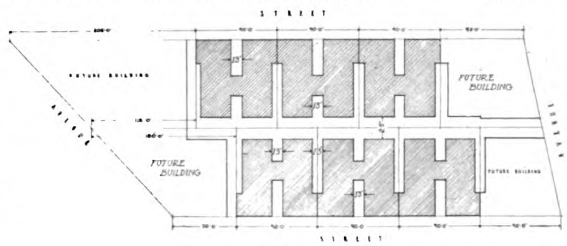


Fig. 1

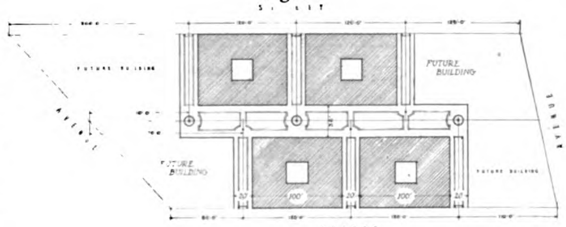


Fig. 2

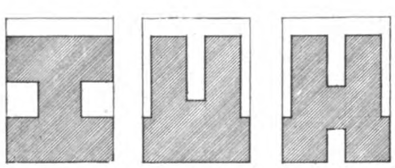


Fig. 3

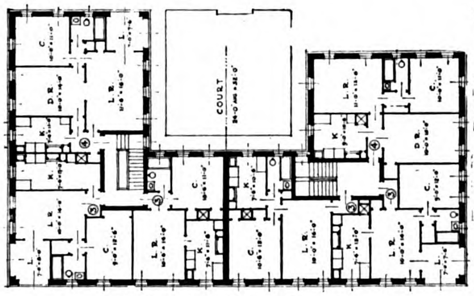
Figures 4 and 5 show two developments in walk up apartments which are great advances over the usual types. Each building profits by the court space of its neighbor and all benefit by good garden space, splendid ventilation and much greater privacy. These also cover a much smaller percentage of the plot than the usual types and are consequently produced at a lower rate per renting foot.

The plot having been decided upon, the next thing to consider is the size of the apartments,—what number of rooms are most suitable to the neighborhood. This depends on many conditions and is really a study to be made in consultation with the real estate professional; only he knows how many inquiries have been made for the different kinds of suites, the amounts that can be paid, and how other buildings have succeeded. This decided, the type of building is discussed.

Is it to be a walk-up or an elevator apartment, and how many stories? The former is the more economical to build and maintain, but when higher than four stories the difficulty arises of renting the upper apartments. Five stories is really the limit except in very cheap buildings. Some builders, in order to overcome the objections of the climb to the fifth floor, endeavor to make that apartment more attractive by small balconies and French windows, which also improve the façade. The low building, especially when spread out like many of the Chicago and Boston apartments, gives much more the impression of a dwelling and is therefore very popular. The elevator apartment costs from $1 to $1.25 per month per room more to operate, but allows many more apartments on the same piece of property. Can the class of tenants pay that additional amount? When entering upon an undeveloped field it has been considered hazardous to pioneer with an elevator apartment; on the other hand, if the walk-ups have been started and the elevator apartments make their appearance, the former are apt to suffer.

Having decided these questions and obtained the costs of the property and building, it is a matter of figures to check back and find the most profitable combination.

In planning the plot the first question the builder of apartments asks is, "How many rooms can you get on this plot?" his theory being that the plan



Typical Floor Plan of "A"

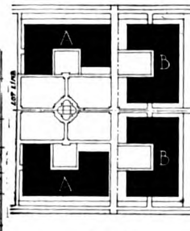
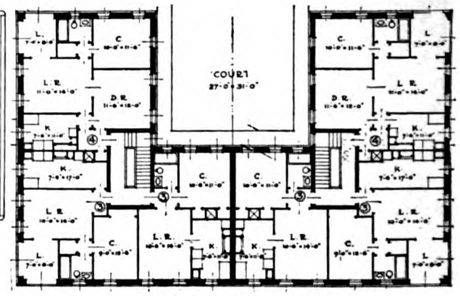


Fig. 4

Andrew J. Thomas, Architect



Typical Floor Plan of "B"

with the greatest number of rooms on a given plot will give the greatest income. What a fallacy! Assuming for argument that the outlook of the rooms and the other conveniences are on a par in each case, unless the property is very high priced the reverse is apt to be the case.

The second fallacy is that the more apartments you serve with one flight of stairs or one elevator, the cheaper will be the operation and hence the better the income. This is wrong in practically all cases. Those points were shown to the owner in the plot plans (Figs. 1 and 2), when figuring out the investment. The best typical plans were taken; the value of outlook and environment were considered equal for the moment, and the buildings were compared on the basis of cost per square foot of rental space. In this the bathrooms, closets, etc., were not figured in the rental space in the buildings, as they were of the same area in each plan and therefore constant, and the halls were omitted as the minimum is preferable, and it is furthermore in this part of the plan where most of the space is wasted.

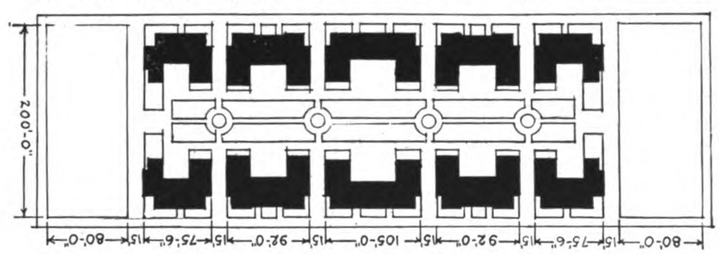


Fig. 5. Andrew J. Thomas, Architect

Assume a price for a square foot of property and a price per square foot for the building. If this is divided by the rental space, there will be obtained a cost per square foot of rental space by which the costs of the operations can be compared.

The property was placed at \$7,500 a lot of 2,500 sq. ft., or \$3 per square foot, and the buildings, six stories high, at \$20 per square foot. Of the different types selected from those generally built covering the maximum of lot allowed and compared, the dumbbell plan (Fig. 6) showed the best results as follows:

Lot,	7,800 sq. ft. @ \$3	\$23,400
Building,	5,560 sq. ft. @ \$20	111,200
Cost		\$134,600

Divided by the area of rooms, 19,800 sq. ft. = \$6.79 as the cost per square foot of renting space.

The percentage of ground covered is 71.3, and only 59.3 per cent of the area of the building is devoted to rooms.

In the plan accepted (Fig. 7) the cost shows as follows:

Lot,	11,670 sq. ft. @ \$3	\$35,010
Building,	7,350 sq. ft. @ \$20	147,000
Cost		\$182,010

Divided by the area of rooms, 29,220 sq. ft. = \$6.23 as the cost per square foot of renting space.

Ground covered is 62 per cent, and 66.2 per cent of the building was used for rooms. This gives a saving of 56 cents per renting foot, or 8.1 per cent on the cost of the building.

Applying the same test to the plans shown in Fig. 4 and Fig. 5,* practically the same results are obtained, showing that the building occupying the smaller percentage of ground may be the better investment, specially when part of a large unit.

Many groups of apartments have been built up by the smaller speculative builders who buy their property from the operator who often owns as large plots as these examples show. Would it not be better for the operator to establish some unit to work to, letting each builder have his individual minor changes if he desires, but plot buildings so that each may derive some benefit from the other?

In other cities, on account of very deep lots, some being 200 and 300 feet deep, the large open court is quite common, as is shown in the plans (Fig. 8 and Fig. 9), and it is to be noted that in neither plan does a stairway lead to more than two apartments on a floor.

We now come to the question of determining the number of stairways or elevators. As soon as

*Detailed plans and description of this group of apartments were published in THE FORUM, June, 1919.

more than two apartments are to be supplied from one common stair, the problem increases in difficulty. In some cases four apartments may be supplied, but more than that requires long halls and generally the passing of every room and the bath before reaching the living room. If two separate stairways with a common hall on the first floor are used, the problem is simplified; that is, as to the planning. But troubles begin when the architect starts to demonstrate the advantage of the scheme to the speculative owner. Immediately the cry of expense and waste space is raised. Yet, in the examples illustrated, the difference in the cubic contents saved by having two elevators instead of one, and the resulting long halls, amounts to much more than the cost of the extra elevator, and the interest upon the money thus saved added to the cost of decorating and repairing the extra halls is enough to pay the expenses of running the second elevator. This is again disregarding the added advantage to the building in having such direct access to the apartments from elevators, or stairways, and the additional attraction of service of an extra elevator.

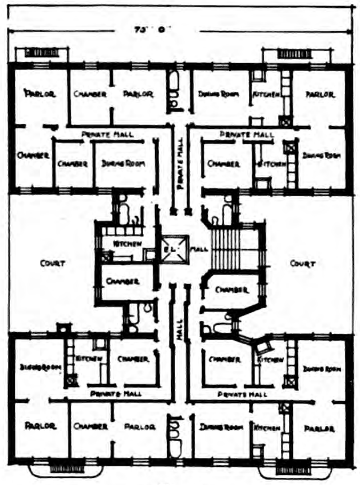


Fig. 6

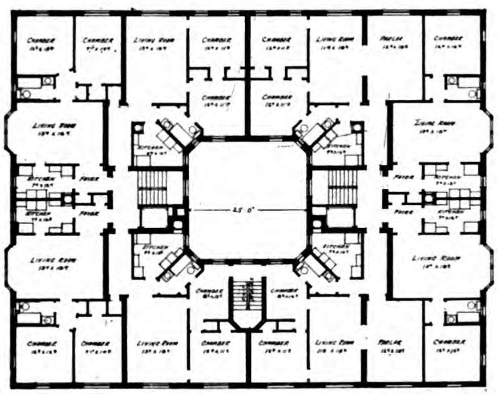


Fig. 7
Elisha H. Janes, Architect

That this is not an isolated case is shown in the two plans of non-elevator apartments, Figs. 10 and 11, the former, built several years ago, and the latter a new plan by A. J. Thomas. Comparing these in the same manner as above, but taking the building at $17 per square foot, Fig. 10 is as follows:

Property, 10,000 sq. ft. @ $3	$30,000
Building, 7,875 sq. ft. @ $17	133,875
Cost	$163,875

Divided by the area of the rooms, 23,675 sq. ft. = $6.91 as the cost per square foot of rental space. The building covers 78¾ per cent of the plot.

Figure 11:

Property, 10,000 sq. ft. @ $3	$30,000
Building, 6,760 sq. ft. @ $17	114,920
Cost	$144,920

Divided by the area of the rooms, 21,820 sq. ft. = $6.64 as cost per square foot of rental area. The building covers 67 per cent of the plot.

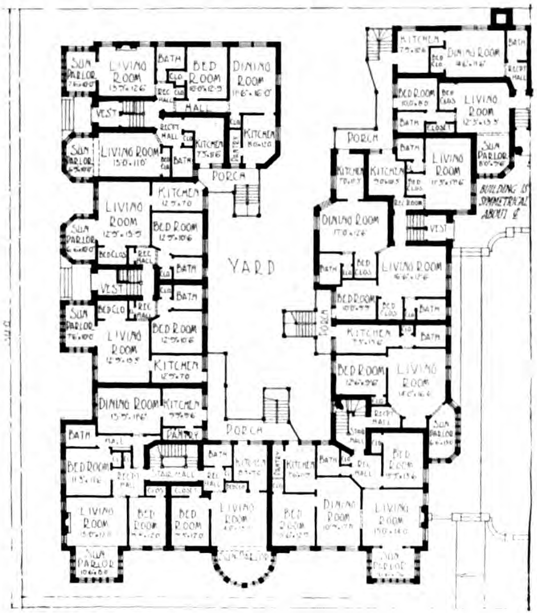
These buildings are on similar corners and have the same number of rooms and baths, yet the latter costs $18,955 less to build; and the rentals, if anything, should be greater, as all the interior rooms look out on larger courts. The same applies to plans in Figs. 4 and 5.

An unfortunate condition is that ultimate investors do not build in the first place, following instead the practice of purchasing from the speculator or the operator. If the opposite were the case, we would have far better buildings both in design and construction. One of the arguments advanced by the speculative builder is that he can build cheaper than the owner and thus save to the owner the profit he pays. The majority of speculators do build cheaper even than a reputable builder can, due to their methods and often lack of conscience; but the ultimate repair bills tell a different story. But aside from that, take into consideration the profits, bonuses, interest charges the speculator has to pay and add them to the cost of the building, and the balance sheet is apt to show up very differently.

There is first the profit the speculator pays to the operator who has sold him the lots, for it is seldom he has been able to purchase the property from the original owners — by that is meant the owners other than those who are professional buyers and sellers of property. He then pays a commission to obtain the building loan — perhaps a bonus with it. He pays the highest rates of interest, cannot profit by buying for cash, has to pay a commission and possibly a bonus for the permanent mortgage, and if not successful in selling within a year will probably pay a second commission and higher bonus for a second mortgage, and finally a commission to a broker for selling the property.

Here are the interest figures and profits paid in the erection and financing of one apartment erected in New York, which is not an exception.

The operator purchased the property at an auction sale of an estate and sold it to the specu-



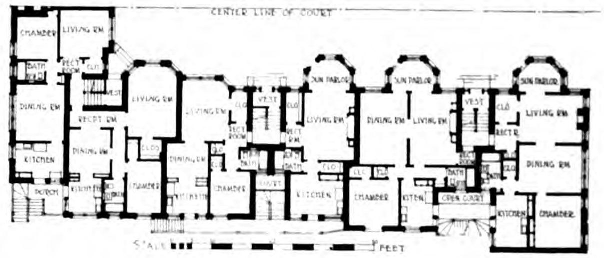


Fig. 9. Half Typical Floor Plan and Diagram of Complete Building Showing Development of Deep Lot. Chicago Apartments.
Edward Benson, Architect

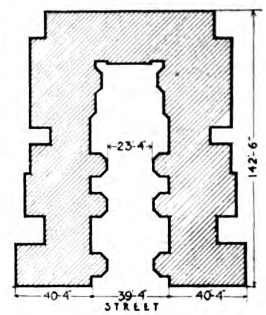


Fig. 8. Half Typical Floor Plan of Chicago Apartments.
Robert L. Kane, Architect

lator within two months for a profit of $105,000.00 taking back a purchase money mortgage for the whole amount. It took one year to complete the building. The figures showed as follows :

Profit to operator	$105,000
Year's interest at 6 per cent on $280,000 purchase money mortgage	16,800
6 months' interest on building loan, $650,000 at 6 per cent	19,500
Taxes 2 per cent	5,600
Commission to obtain permanent mortgage of $730,000	25,000
Building sold at profit of	110,000
Commission to agent for sale of property	10,000
	$291,900

The final owners of the building had sufficient credit to have obtained the necessary funds with the minimum commission and interest, so their expense above the actual building would have been about as follows :

Interest on $280,000 at 5 per cent	$14,000
6 months' interest on $650,000 at 5 per cent	16,250
Taxes	5,600
$730,000 at 2 per cent, commission for mortgage	14,600
	$50,450

or a saving of $241,450, or 23 per cent of the total purchase price, and 38 per cent of the cost of the building — a percentage it is doubtful if the most conscienceless builder could save, and an amount well worth the worry the investor would have had.

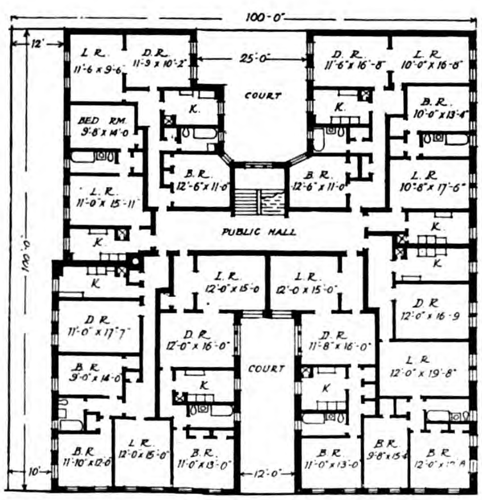


Fig. 10

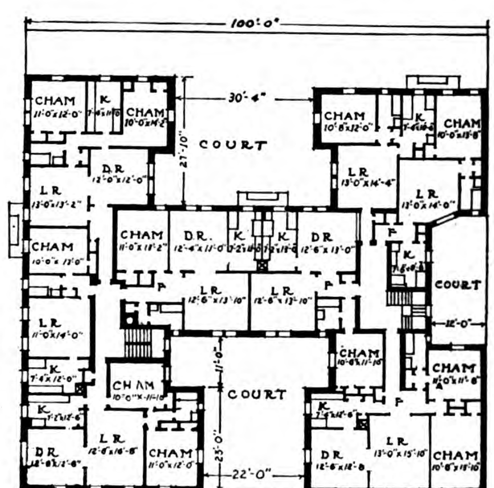


Fig. 11

DEPARTMENT OF ENGINEERING & CONSTRUCTION

CHARLES A. WHITTEMORE, *Associate Editor*

The Design of Industrial Plants

By H. L. GILMAN

THE term "industrial plant" is a very broad one, covering as it does all buildings or structures in which the raw products of mine, forest, agriculture, etc., are prepared for human use or consumption. Facilities for handling, storage and distribution of products, both raw and finished, may well be included in the term.

While many classes of these structures should be strictly the work of the trained industrial engineer, there are other classes which should be handled by the architect, or, at least, by an engineer in co-operation with the architect. Especially is this true at the present time of great industrial development when the manufacturer is paying more attention than ever before to permanent construction and clean, attractive surroundings, to keep his employees contented, and reduce as much as possible the expensive labor turnover. More attractive exteriors, well laid out grounds, restaurants, garages, recreation buildings and grounds, and, most important of all, housing facilities, are some of the new problems in the design of the industrial plant of to-day.

The first step in the design of an industrial plant is selection of the site. This involves consideration of the source of raw materials and the quantities to be used per unit of time. If they are bulky and there is much waste, as in the use of lumber, for instance, the plant would be located near the source of the logs. The lumber mill must also be located near a source of cheap power.

If a plant uses raw materials in considerable quantities from various sources, then proper and adequate shipping facilities are important. Again, an industry which uses comparatively small quantities of raw materials, but adds a great amount of labor to the finishing of its product, should be located near a source for the labor required.

Sometimes, too, the consideration of the market for the finished product is the important factor in locating an industry, but not so often as one would believe. The writer has in mind three large and very successful builders of heavy machinery, practically all of which is used in the Central States and in the western mining sections, and yet they are located in eastern Massachusetts. That their business is growing, may be seen from the fact that they are enlarging their plants or are preparing to enlarge them at the present time.

Other factors in the local selection of the plant are: the class of buildings required, nature of the soil with regard to foundations, shipping facilities, housing facilities, sources of power, water, etc., street and fire protection advantages.

Industries requiring heavy machinery, and one story buildings covering a large area, should have a site of ample area for present construction and future extensions. The land, therefore, must not be too expensive. Again, a factory which may be housed in a multi-story building may to advantage be constructed on expensive land in order to obtain other advantages, as convenience to market, labor, power, etc. The nature of the soil sometimes has an important bearing, where heavy loads are carried, as a cheap site requiring expensive pile foundations may be more expensive than one with good soil that costs much more.

A plant shipping and receiving large quantities of materials by rail or water should be well located with respect to these facilities, so that there may be ample sidetracks on the property.

The problem of the convenient housing of employees is an important one and should receive careful consideration, not only with regard to housing, but to street car or other means of transportation of employees to and from the works.

The first work to be done after selecting the site should be the preparation of a plan of the site, with railroads, wharf (if any) and streets located and grades indicated. This plan should also show all underground water, electric and sewerage lines. While this is being done the flow sheet or routing diagram is made up. This, together with calculations of quantities of raw materials used and product turned out, will be used to determine the size and location of buildings, locations and necessary length of sidetracks, capacities of storage bins, yards or buildings, and warehouses and shipping buildings for the finished product. The location of these with reference to their uses and to the handling of materials to and from them requires careful study. For instance: In a foundry, coke, pig and scrap iron should be unloaded from the cars and stored where they may be transferred to the cupola charging floor with but one handling, either by cars on an industrial track, if on the same level, or by traveling crane with a lifting magnet or a grab bucket, or other economical means which may be devised. Moulding sand must be stored convenient to moulding floors, flasks and patterns must be easy and convenient of access, and finally, finished castings must go to the shipping platform, storage or machine shop. This problem of handling materials applies to a greater or less extent to every industry, though there are probably few having more complicated problems than the large machine works turning out several millions of pounds of finished materials per month, where every ton of finished product means at least three tons of raw material handled.

If the industry is to have its own power plant, the location of this important adjunct should be carefully studied. There should be ample storage space allowed for fuel, and it is advisable to have a special side track so that there may be no interference with the unloading of fuel at any time, particularly in plants of medium and large size, and by all means proper equipment for handling coal with the least possible manual labor.

In designing the boiler house it is well, if an overhead coal bunker is not part of the original equipment, to plan the building so that one may be put in at a later date without necessitating any considerable reconstruction. Also both boiler room and engine room should be arranged, if possible, so that they may be extended in the future, as it has been the writer's experience that heretofore in many plants no provision has been made for such extension, resulting in the housing of this most important machinery in inadequate space and consequently with wasteful crowding.

In one recent instance additional boilers were installed in the space which had been allowed, but no provision had been made for an overhead bunker, — quite necessary when automatic stokers are used. The building was on a pile foundation which would not carry much additional load, so that in order to build the bunker it was necessary to erect an entirely new and heavy steel structure entirely spanning the old boiler house, at an expense greater than the original cost of the building.

The power house may be located at the most convenient point for handling of fuel and ashes, because electric transmission and underground pipe lines will carry power, light and heat to any desired point.

Another important step in the design of industrial plants is the selection of materials of construction. This should be decided by the character of buildings and the conditions of the local market. In some sections of the country, with the present high cost of lumber, reinforced concrete is about as cheap as standard wood mill construction with brick walls. In some types of buildings, as, for example, one-story shops with wide bays, only steel trussed roofs supported by steel columns and brick or concrete walls are suitable. For spans of over 30 feet, reinforced concrete for floors and roofs is not as a rule economical, but this is a matter for comparison on each individual job. Spans for roofs up to 60 feet have been used with fairly good economy. A comparison of the costs of reinforced concrete and steel frame buildings at the present time will probably show very little difference. In 1911, estimates for a large ten-story warehouse gave reinforced concrete an advantage of only 3 per cent over steel frame, and this was offset by the saving of floor space by the use of steel columns. Recently on a six-story building carrying heavy floor loads the elimination of two rows of columns and use of longer spans in the steel frame building showed an advantage in cost of 5 per cent for steel frame over concrete, with a considerable saving in floor space, although the building was slightly higher than would have been necessary in concrete construction.

Roofs of multi-story buildings will naturally be of similar construction to the floors. In one-story shops and mills, however, selection of material for the roof requires some study. If the nature of the contents requires automatic sprinklers for fire protection, then roofs of plank on timber purlins will probably be the most economical; but in machine shops, foundries, etc., where sprinklers are not required, a roof of concrete on steel purlins and trusses will prove least expensive, as saving initial cost and maintenance of sprinklers. Gypsum roofs are used to some extent, both in pre-cast slabs and monolithic construction, thereby lightening the load and reducing the cost of structural steel over that required for a stone concrete roof.

The matter of condensation should not be forgotten in designing a factory building, as considerable damage may be caused by the water dropping from underside of the roof. Concrete is particularly subject to this trouble unless insulated. A layer of cinders containing just sufficient cement to hold it in place on top of the concrete and on this, finished roofing material, makes a good type of construction which should eliminate condensation.

The proper and adequate lighting of industrial plants is of great importance. Large windows with solid steel sashes have almost entirely replaced the old style wooden sashes and window frames, enabling the use of larger windows and providing better ventilation and lighting, which is in many cases had at a less cost than for wood. In case of outside exposure to fire danger the use of wire glass in steel sashes gives a protection equivalent to the expensive and troublesome shutters.

In planning the location of windows, as a rule the sill should be 3 feet or more from the floor, and the head or top of the window as close to the ceiling as possible. In wide shops one or more monitors with pivoted steel sashes in either side give excellent lighting and ventilation as well. These sashes may be arranged to be operated mechanically from the floor at one or more points, either by hand-pull chain or by electric motor.

For covering large areas of ground with one-story shops the sawtooth skylight gives the best solution to the problem of lighting. With interior surfaces painted white and ribbed glass in the sashes, the diffusion of light is as nearly perfect as possible. With the monitor form of lighting the head room may be less than in the ordinary form of wide building, thereby reducing the cost. This, of course, does not apply to shops requiring heavy traveling cranes which require the high bay and monitor windows. With the sawtooth lighting, north light may be obtained, thus doing away with the direct sunlight and the attendant deep shadows.

In our severe northern climate one disadvantage of the sawtooth construction is probable leakage, due to snow and ice filling the gutters, unless great care is taken in the design and construction. Condensation should be overcome by means of gutters under the glass leading to the outside or to conductors. Care should be taken, also, to provide for ample ventilation. The heat, too, due to the low and thin roofs, may be excessive at times. The sawtooth roof is much used and is well adapted to weaving sheds of textile mills, light foundries and machine shops, and other structures requiring good light and no heavy cranes.

Planning the layout of the floors in an industrial building or group requires a knowledge of processes, machinery and character of the materials handled, and here, the flow sheet and routing diagram come in. From these the machine positions are laid out, with a view to obtaining a flow of materials with as little interference as possible and without conflict of materials flowing in opposite directions. The writer recalls a plant where materials going to and coming from a dry house passed on trucks over a single bridge not sufficiently wide to permit two trucks to pass each other. This caused much delay and loss of time through waiting, and at times promoted heated arguments among the workmen using the bridge. A slight change and an additional bridge at little cost made one-way passages and brought the dried material nearer the machines where it was to be worked.

It is well here to discuss the experience or knowledge required for the successful design of industrial plants. The average manufacturer thinks that he or his own organization is the only one who knows enough about his business to design his new plant, because he has many formulæ or processes which no one else knows; whereas these things are of very little importance to the engineer or architect, who knows that all manufacturing is a series of operations or the passing of materials through the various machines or appliances. The real problems are those of properly routing the work and conveying or handling materials through the various processes, and the engineer who has designed plants of all kinds and is familiar with the modern methods of handling materials, with labor and power-saving appliances, and the best systems of construction adapted to the different classes of industries, is far better equipped to design the new factory than the owner and his staff. The designer, however, should always co-operate with the manufacturing expert or the owner, who will as a rule select suitable machinery and work out the sequence of processes.

There are certain classes of manufacturing, such as textile and paper making, in which the designing engineer should have a thorough knowledge of all processes, for to obtain economical production, the buildings must be designed with a view to housing the machinery to the best possible advantage. There are few if any industries outside the textile field requiring such large numbers of duplicate machines, all of which must be so placed that they are accessible, arranged to be driven in groups, and each properly located as to lighting. Paper mills have few machines, but large, and a multiplicity of piping, and they consume a considerable amount of power, which must be properly distributed.

Planning for future extension should always be kept in mind in designing an industrial plant of almost any character. It is well to arrange buildings so that they may be extended in the future with the least expense and least possible interruption to business. In fact, many plants are laid out so as to cover the largest possible future growth, and then only the needed number of units built.

Careful consideration should be given by the architect or engineer to fire prevention and fire protection. Processes in which there is great danger of fire or explosion should be housed in isolated buildings. Large areas containing inflammable materials should be divided by fire walls, and well protected by fire hose, extinguishers and automatic sprinklers. Even fireproof buildings should be equipped with automatic sprinklers when containing inflammable materials. It is well for the designer to consult and co-operate with the engineers of the local insurance boards, as by so doing he is likely to save his clients much money in reduced insurance rates and in safety from fire, particularly in important works.

Buildings exposed to outside fire exposure should have either steel sash and wire glass or fireproof shutters wherever the exposure occurs. Outside fire hydrants and hose houses are important considerations in large plants, particularly when the area covered is of considerable size.

Modern equipment for the handling of materials — raw, finished and in process — has become so efficient and complete as to do away with a large amount of the hand labor of the older processes. Conveyors should be installed wherever they will displace enough hand labor to pay for the investment, and this may be easily determined by the engineer. In a large brass foundry, for instance, a conveyor carries the metal from basement to charging floor; the molten metal is conveyed to the moulds by traveling cranes. A conveyor belt under a grating in the floor returns all used moulding sand to the sand basement, where it is mixed with new sand after screening and brought up by another elevator and conveyor and distributed to the moulding floor. Much of this work was done by wheelbarrows and trucks heretofore.

An important point in the design of industrial buildings is to have all the plans carefully checked to see that there is no interference of air, steam, water, gas and plumbing pipes, electrical conduits, etc., either with each other or with other parts of the work, as it is annoying, at least, to find when the work is well along that a large water pipe has been placed exactly where a trolley system was to be hung on the ceiling. It is also necessary to see that crane runways are kept clear of piping and other work. Electric panel boxes, which are quite bulky, should be located so as to be easily reached and also to clear machinery and passageways.

Foundations for heavy machinery and of chimneys should be kept entirely separate from building foundations, as vibration or unequal settlement is likely to cause cracks which in the stack will reduce the efficiency of the draft.

To describe the many types or kinds of buildings required for industrial plants would require a large treatise in itself. They may be separated into three general types. The one-story, three-bay construction for foundries, forge and machine shops for medium and heavy work, requiring heavy overhead cranes; the one-story sawtooth or monitor lighted building for lighter work, requiring no heavy cranes, which may be of any width and any number of bays, and the multi-story building for all types of manufacturing purposes, as well as storage, except of the heaviest character.

The first usually has a wide center bay served by one or more heavy traveling cranes, and usually from 30 to 60 feet to the roof, and a narrower bay on either side for the lighter machine tools, tool rooms, etc. Foundries are usually similarly arranged, with melting furnaces, core shops and core ovens in one bay, heavy moulding in the center bay, and machine moulding, cleaning, sand blast, etc., in the other side bay. The usual construction of these buildings is of brick with steel trusses, and concrete or wood roof. The windows are as large as possible, and by monitors the room is well ventilated and lighted. Steel sash may be said to be used exclusively in this class of building.

The second class, usually the sawtooth roofed building, may be of any width, and the columns may be spaced to suit the requirements of the work. A good long span with bays up to 60 feet wide, and the roof carried on steel trusses, is about as cheap in first cost as closely spaced bays with beam construction to support the roof, and gives excellent working space. Lengthwise a 20-foot bay will be found economical and very convenient.

The third type, or multi-story building, is the type with which architects are most familiar and is too broad a class to be covered in this article. In this type of building, frequently housing hundreds of employees, great care must be used in allowing safe and sufficient exits and ample elevator equipment for handling materials and carrying passengers to the upper floors. The transmission of power electrically has greatly simplified the distribution of the same to the various floors, so that the old belt tower is now done away with.

The width of the building should be determined by the requirements of the equipment, and the possibility of proper lighting. Shoe factories are, as a rule, rather narrow compared with other factories, usually about 45 feet with 50 feet as the maximum. Textile mills vary from 75 to 125 feet or even more for all departments except weaving, which requires good light and for which the sawtooth weave shed is now usually preferred.

Loft buildings and the so-called industrial terminals which are erected for many tenants occupying single floors or parts of floors are designed for general light manufacturing business. Most architects are familiar with this class of building. They should be well built, properly equipped with elevators, stairways, fire escapes and well lighted. They are usually furnished with ample electric power, gas, water, sprinkler service, etc.

In this article the attempt has been made to give only a brief outline of the principles that govern the design of industrial plants in general, with the hope that it may contain some helpful points to architects and engineers generally.

Types of Reinforced Concrete Construction

PART II. FLAT SLAB CONSTRUCTION

By BURTIS S. BROWN, C.E.

BRIEFLY described, the flat slab, as illustrated in Fig. 1, consists of a reinforced concrete slab, without beams or girders extending below the slab, supported on a column with an enlarged capital. The portion of the slab adjacent to the capital is made thicker than the main construction and is called "the dropped head," or "plinth." Both at the circumference of the capital and at the perimeter of the "dropped head" the concrete must be of sufficient thickness to prevent the slab from punching or shearing through the concrete. Besides, the greatest compression and tension occur adjacent to the column capital, so in addition to the increased thickness of the slab an extra amount of reinforcing steel must be placed over the capital. An analysis of the straining in the slab and plinth at the point over the column head and at the edge of the plinth will show an interesting relation between the positive and negative bending moments.

There are many advantages in the use of flat slabs, such as saving in head room taken by beams; clear spaces for sprinkler, steam and other pipes; better surfaces to reflect artificial light; less obstruction to water from fire-fighting apparatus to save contents of room in case of fire. The limiting dimensions of the flat slab as to clear space and thickness make it an exceptionally desirable method for manufacturing and industrial buildings. Spans up to 30 feet square may be used even for heavy loading. In such cases the saving in head room over the steel frame construction is quite apparent.

It is at once obvious, as will be seen by Fig. 2, that the total space saving in a building of legal limit height will amount to many cubic feet, sometimes a full story. In other words, the building represents the maximum available space and the cost is based on maximum actual usable cubic feet.

In Fig. 2 are shown the sections through a building 120 feet high. Each is drawn for columns spaced 20 feet on centers both ways. The story height is 10 feet under the beams or under the dropped head. Section A shows a beam and girder design, while Section B shows a flat slab type. It is readily seen that without making the exterior walls any higher, an entire floor is gained without any additional cost of walls. In cities where the building laws limit the total height of the structure, the flat slab type has a distinct advantage from an investment point of view.

To sustain a live load of 150 pounds per square foot on a span of 20 feet, a slab 8 inches thick is sufficient.

There has been much litigation over different methods of reinforcing flat slabs, but the basic patents expired in April, 1919, so designers now feel more liberty in choosing this layout. The design of flat slabs is more complicated than simple slabs or beams, but now the Joint Committee of the American Society of Civil Engineers has established rules for their design, also the building laws of the larger cities include requirements for calculation of stress.

Metal forms have very recently been placed on the market, which can be rented. These are adjustable for different spans and story heights. With these forms a larger section can be removed in advance of the form just above the posts than with other types, thus giving the concrete an opportunity to dry out more quickly and permitting these forms to be used over again immediately. The economical use of forms has been one of the greatest problems of the contractors. Now that a satisfactory solution has been found for that perplexing part of

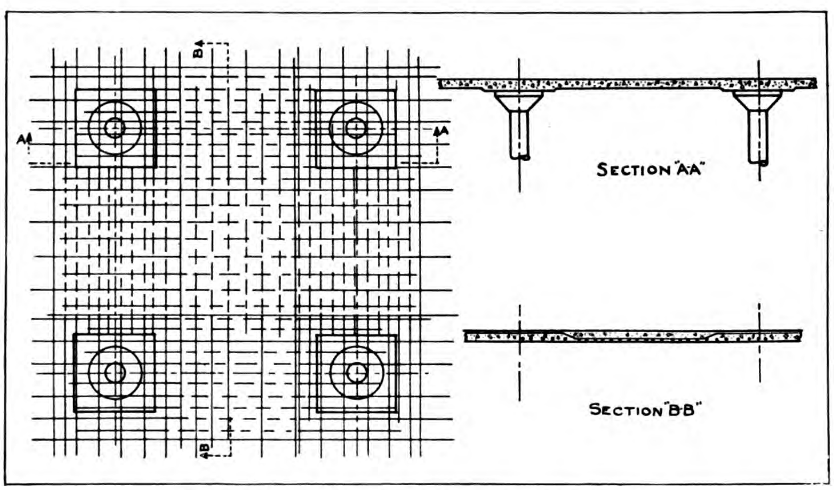


Fig. 1. Diagram Showing Reinforcement and Slab Sections

the work, the builder can estimate with much more certainty on concrete work.

With the introduction of mouldings on the capitals of columns, a decorative effect may be obtained which will eliminate much of the harshness of the plain work. Mouldings are sometimes used on the underside of the flat slab, dividing the continuous flat surface into panels; and there are also many other ways of making a satisfactory, pleasing ceiling.

Flat slabs are best adapted for buildings carrying heavy loads, as warehouses, factories and garages. It is not so well adapted for office buildings, as the column heads interfere with the partitions between rooms, and also the space to conceal pipes, etc., is lacking.

Flat Slabs with Domes

To the designer of flat slabs the large dead weight has always been a drawback. Recently there has been introduced a method of reducing the dead weight of these floors by eliminating the concrete on the underside of the slab between the dropped heads.

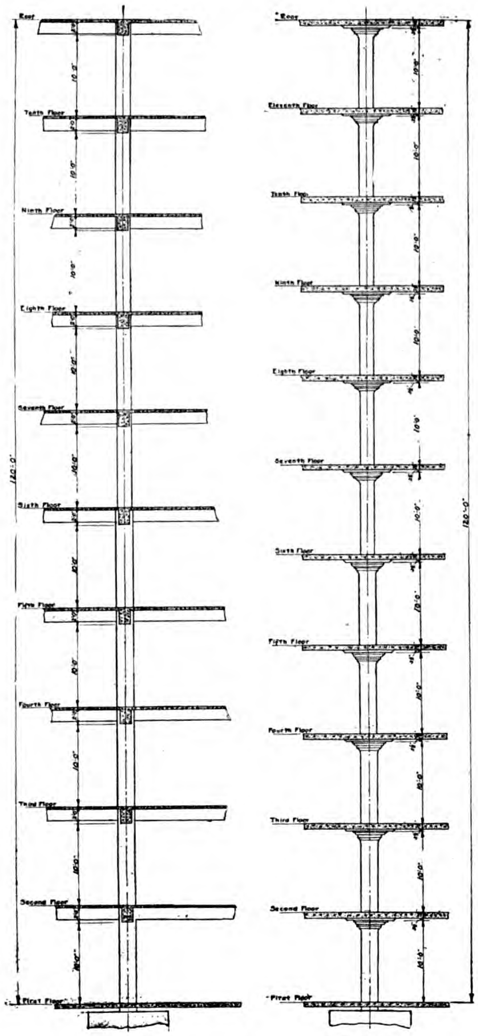


Fig. 2. Comparison of Beam and Girder with Flat Slab Construction in Building 120 Feet High

In order to accomplish this result, sheet metal domes are placed on the forms and a space of 5 inches left between them. The appearance of the finished floor is much like the underside of the joist system, except in this case the joists extend in two directions and are 24 inches on center. The slab is 2 to 3 inches thick over the top of the dome.

The capital and dropped head are constructed the same as for a flat slab. It is quite common to make the bottom of the joist on the same line with the bottom of the drop head. Of course the ceiling is not smooth, but has indentations or coffers 19 inches square separated by 5 inches of concrete. Its appearance is best described as the surface of a large waffle cake.

There is a saving of from 30 to 45 per cent in the dead weight of this floor, which means a saving in concrete and steel. Furthermore it makes a saving in the columns and foundations.

For offices or show rooms the indentations caused by the domes can be decorated to give as pleasing an effect as a deeply coffered architectural ceiling.

The metal domes used in these floors are leased, so the contractor does not have to buy expensive equipment to be used only once or twice and then scrapped. They are used many times and only the rental charge has to be absorbed by each floor.

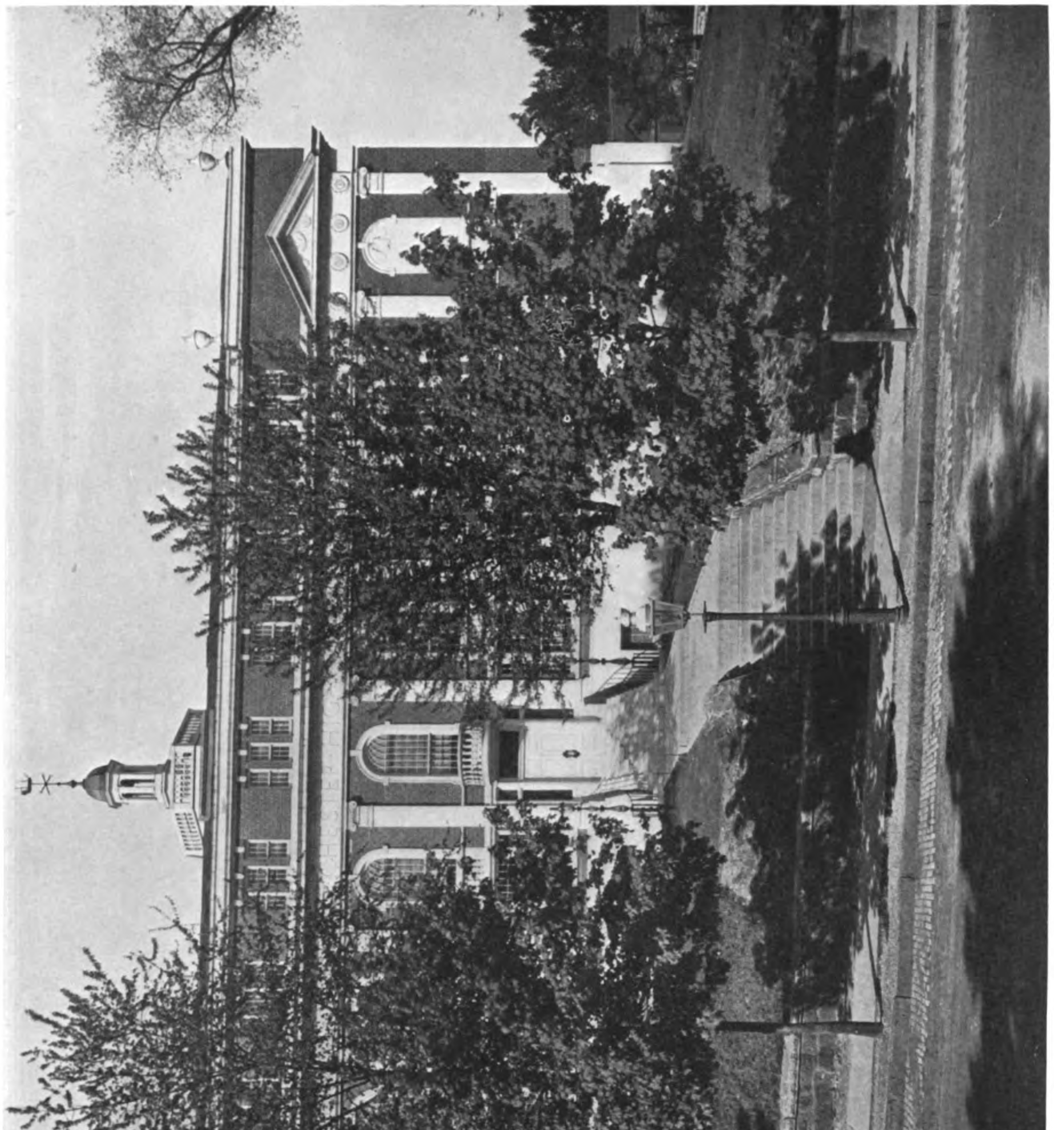
Recently two bays of this type of construction, each with spans of 30 feet in both directions, were tested with a live load of 300 pounds per square foot. The building tested was a public garage, and the floor load used in the design was 150 pounds per square foot, with a 25 per cent reduction, so the actual live load was 2.67 times the designed load. With this large load the maximum deflection was about one-half inch. The allowable deflection at 1/360 of the span would be one inch. In a careful examination of the top of the slab, where the maximum stresses occur, no cracks could be detected. Therefore, from actual tests, this newest type of floor construction proves its worth.

With the increasing cost of materials and labor, new types of construction are sure to appear, and it is quite likely the greatest innovation will be in the use of concrete.

DETAIL OF MAIN ENTRANCE

PORT CHESTER HIGH SCHOOL, PORT CHESTER, N Y.

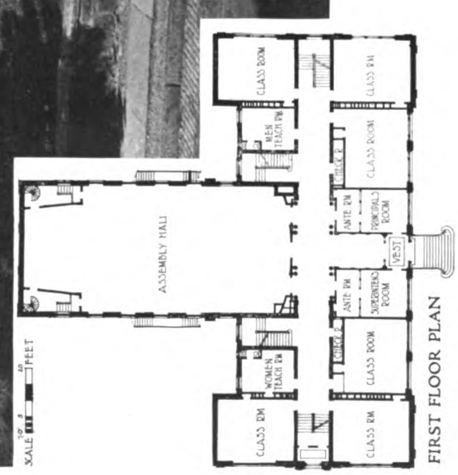
DESIGNED BY WM LAWRENCE BOTTOMLEY, HEWITT & BOTTOMLEY ARCHITECTS



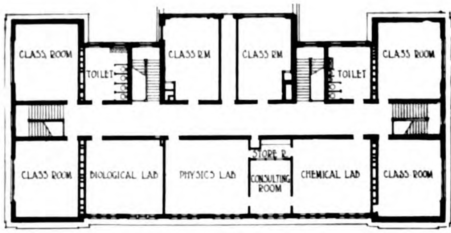
GENERAL VIEW

PORT CHESTER HIGH SCHOOL, PORT CHESTER, N. Y.

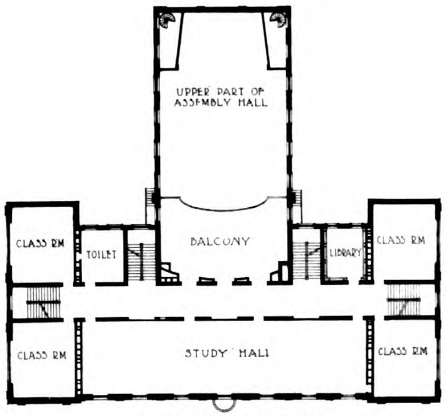
DESIGNED BY WM LAWRENCE BOTTOMLEY, HEWITT & BOTTOMLEY, ARCHITECTS



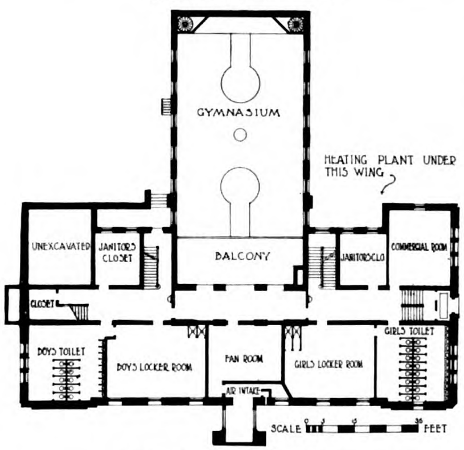
FIRST FLOOR PLAN



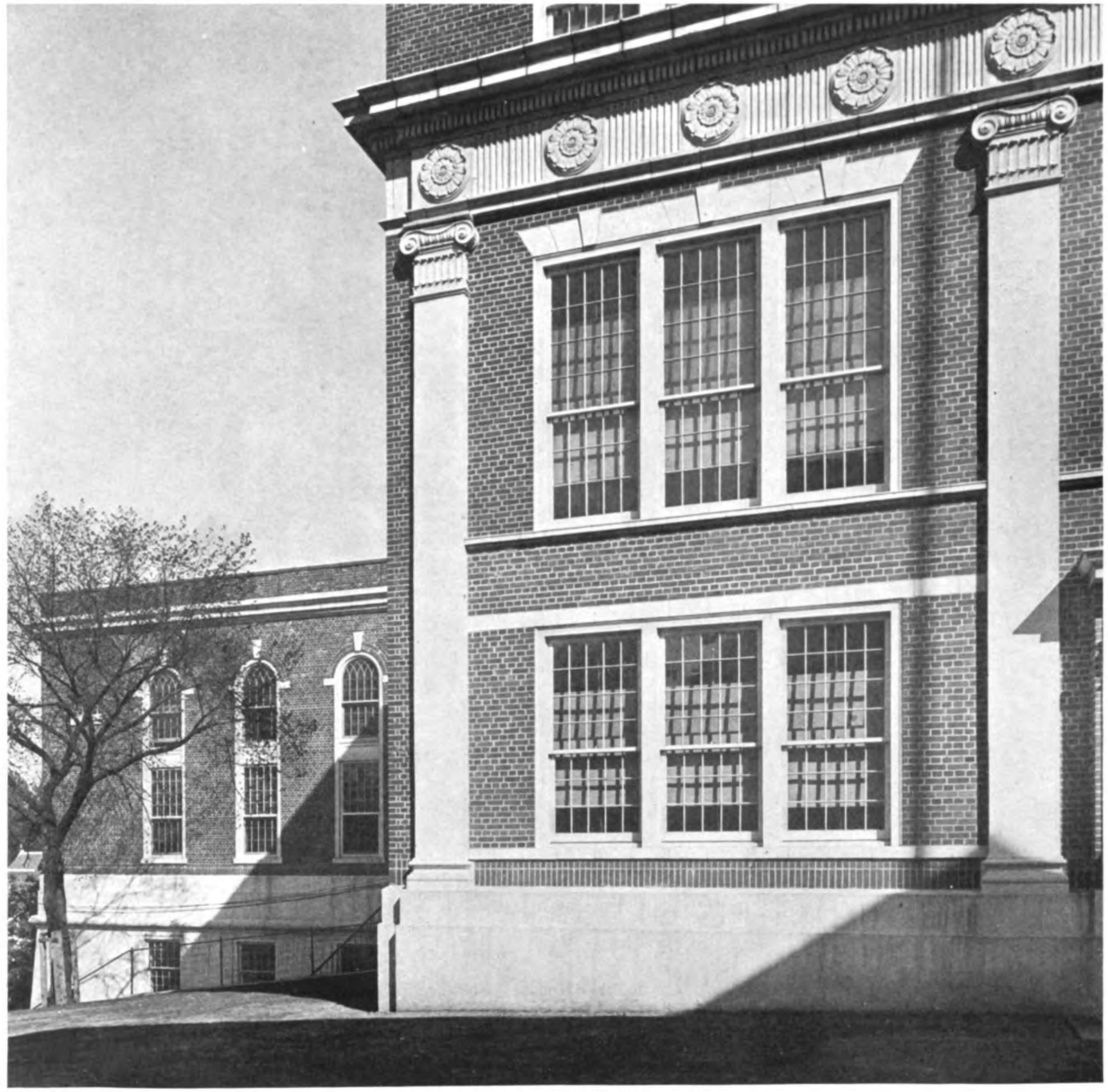
THIRD FLOOR PLAN



SECOND FLOOR PLAN



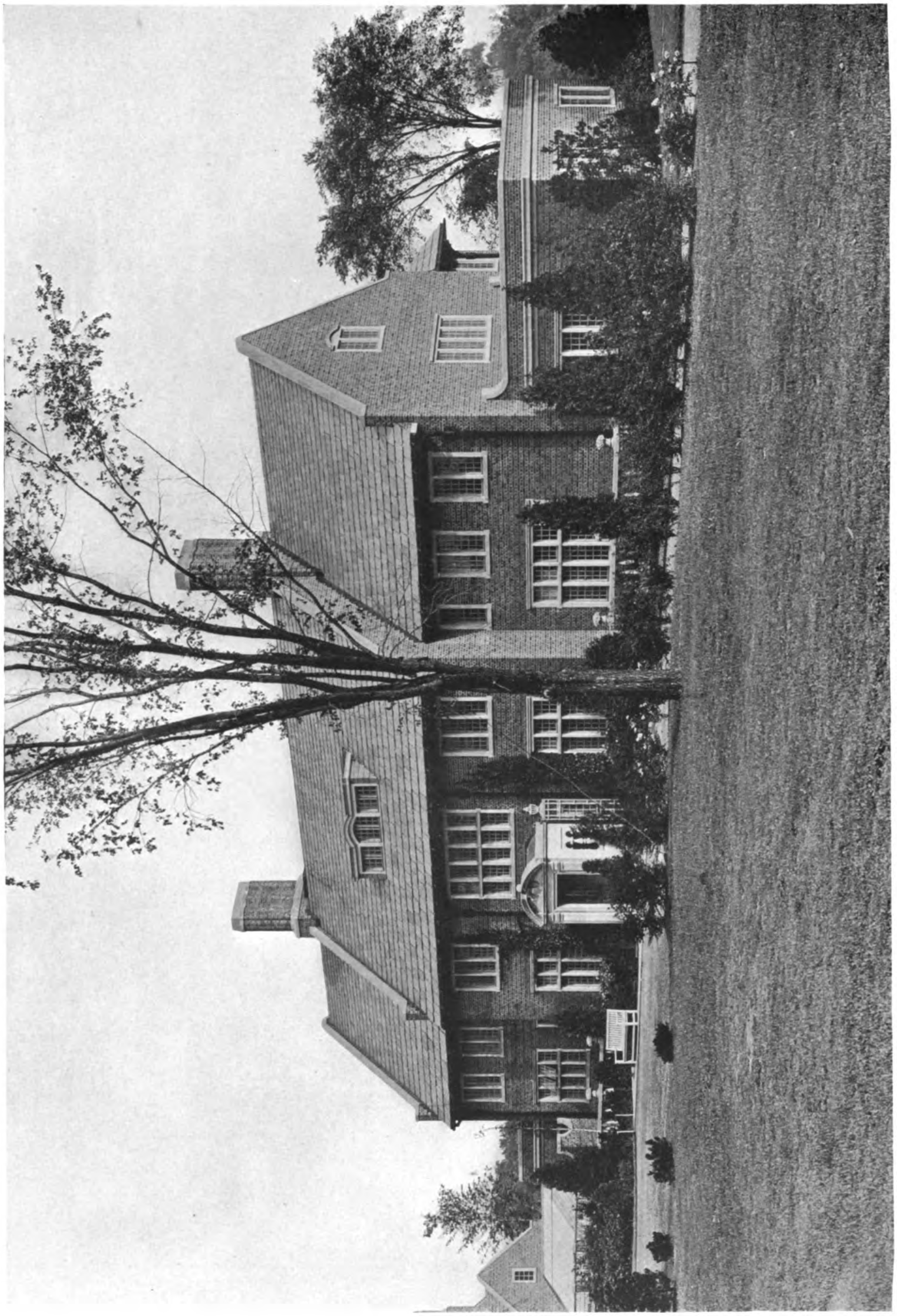
BASEMENT FLOOR PLAN



DETAIL OF END AND REAR WING

PORT CHESTER HIGH SCHOOL, PORT CHESTER, N. Y

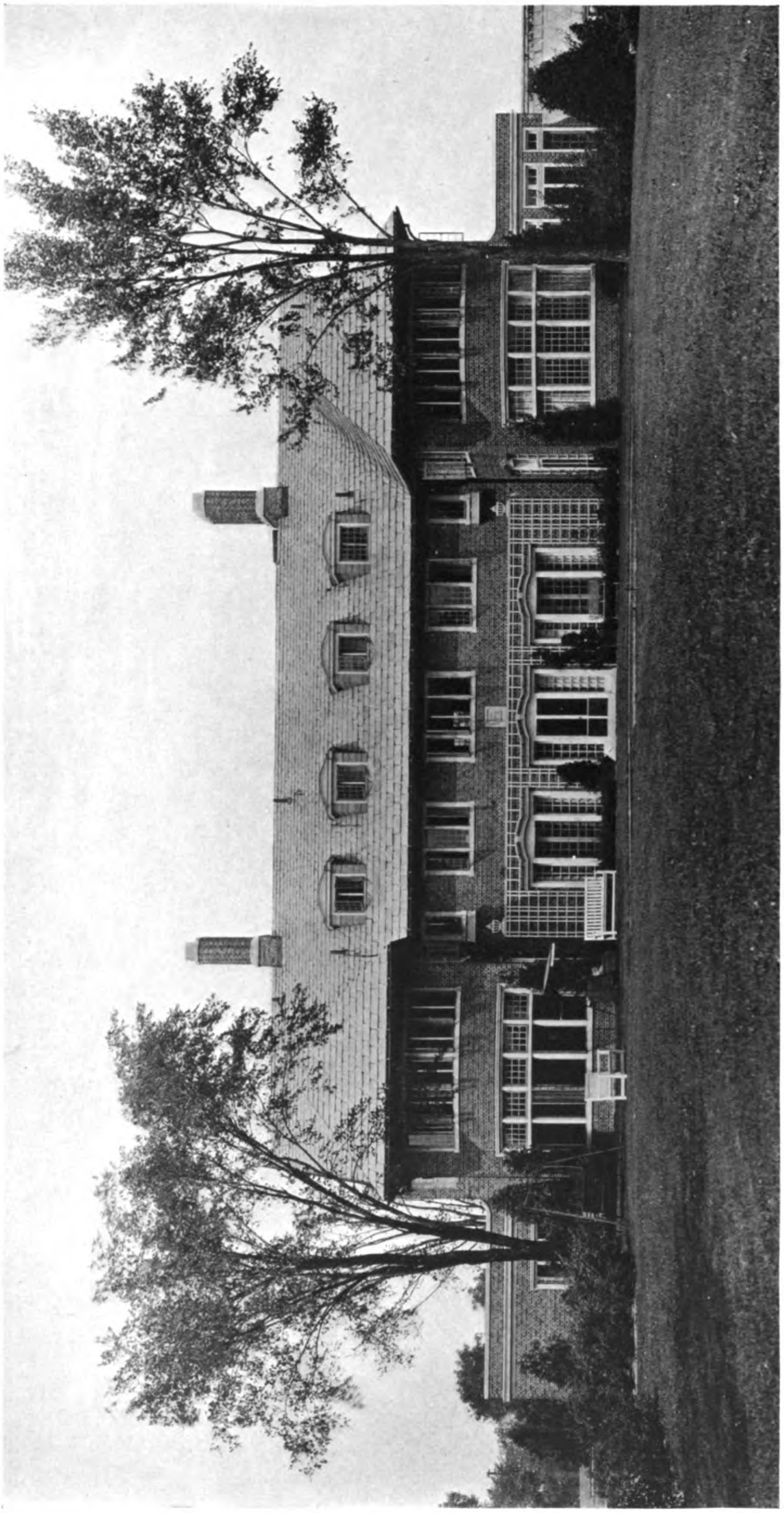
DESIGNED BY WM. LAWRENCE BOTTOMLEY, HEWITT & BOTTOMLEY, ARCHITECTS



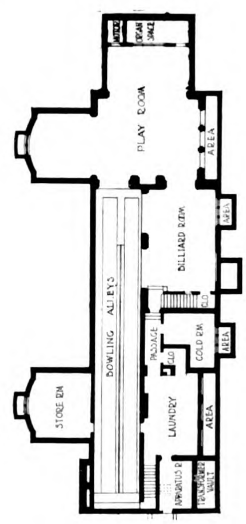
VIEW OF ENTRANCE FRONT

HOUSE OF C. S. MOTT, ESQ., FLINT, MICH.

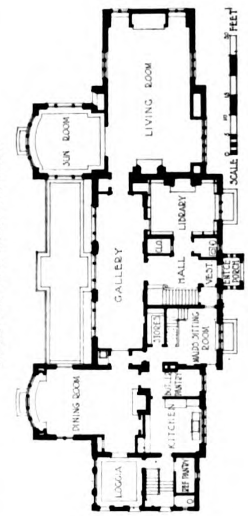
DAVIS, McGRATH & KIESSLING, ARCHITECTS



VIEW OF GARDEN FRONT



BASEMENT PLAN

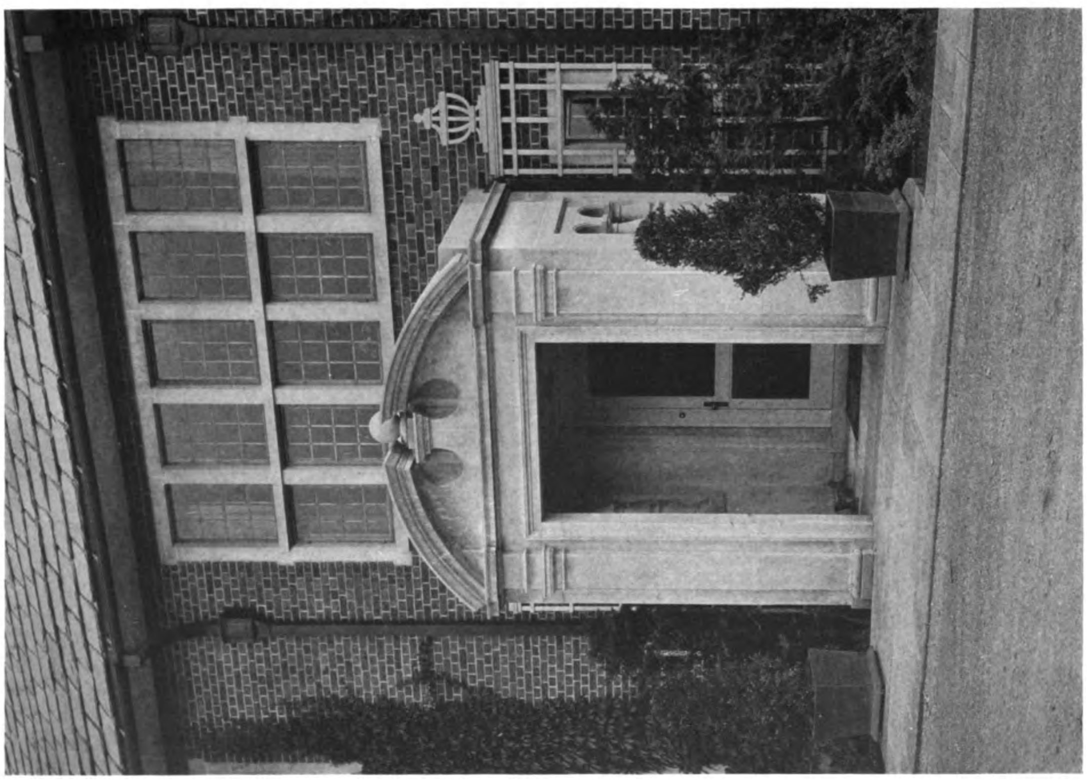


FIRST FLOOR PLAN

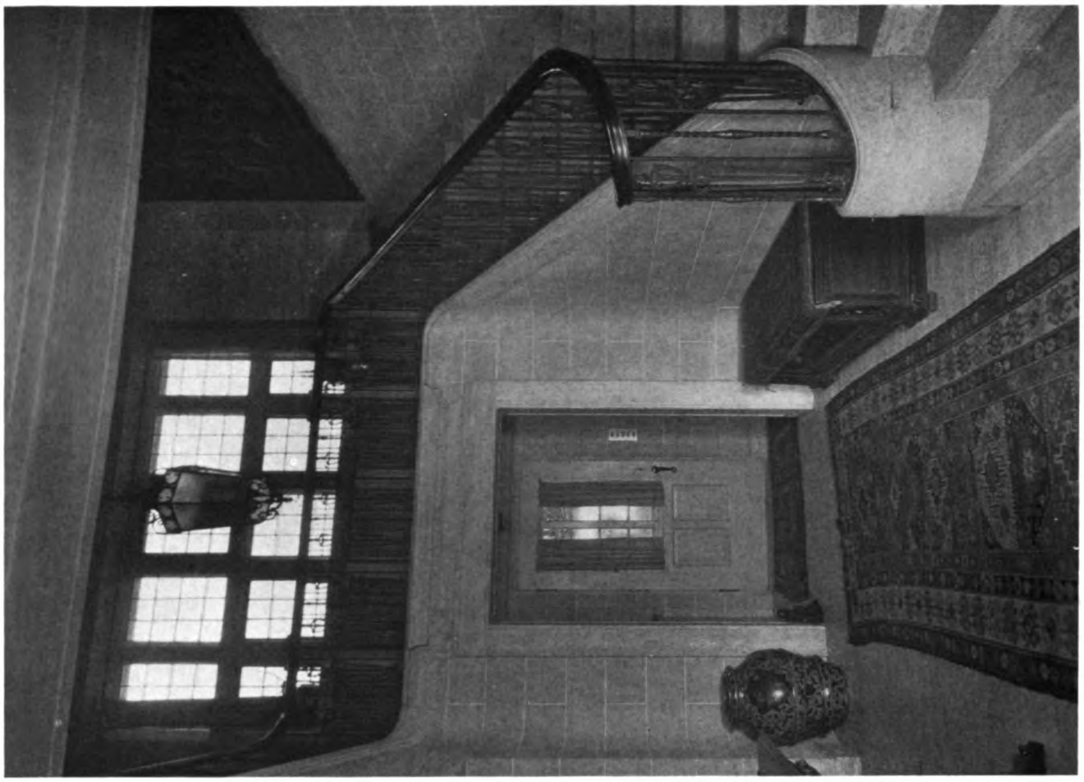
SECOND FLOOR PLAN

HOUSE OF C. S. MOTT, ESQ., FLINT, MICH.

DAVIS, McGRATH & KIESSLING, ARCHITECTS



DETAIL OF ENTRANCE



DETAIL OF STAIR HALL

HOUSE OF C. S. MOTT, ESQ., FLINT, MICH.
DAVIS, McGRATH & KIESSLING, ARCHITECTS

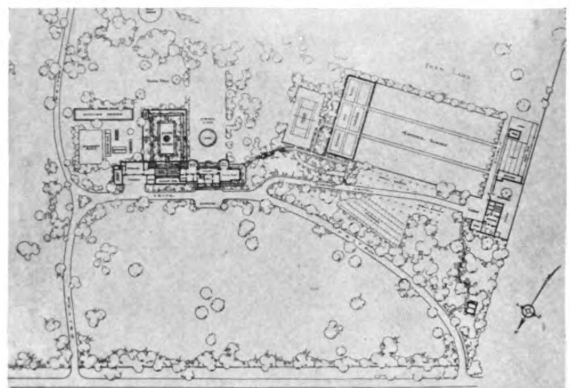
GALLERY LOOKING TOWARD DINING ROOM

VIEW OF LIVING ROOM

HOUSE OF C. S. MOTT, ESQ., FLINT, MICH.

DAVIS, McGRATH & KIESSLING, ARCHITECTS

VIEW FROM SOUTHEAST

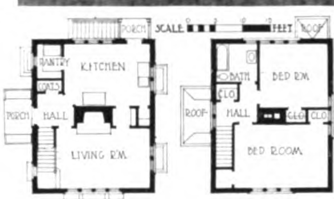


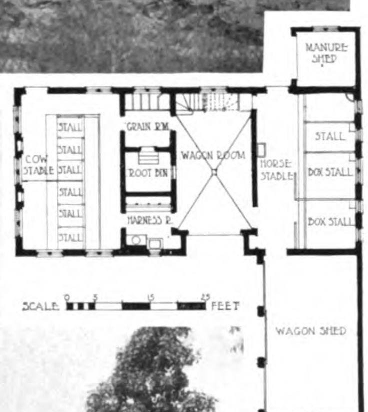
VIEW OF GARDEN FROM DINING ROOM WING

HOUSE OF C. S. MOTT, ESQ., FLINT, MICH.

DAVIS, McGRATH & KIESSLING, ARCHITECTS
WILLIAM PITKIN, JR., LANDSCAPE ARCHITECT

VIEW OF STABLE AND LODGE





ENTRANCE SIDE OF LODGE

HOUSE OF C. S. MOTT, ESQ., FLINT, MICH.

DAVIS. McGRATH & KIESSLING, ARCHITECTS

VIEW OF ENTRANCE SIDE

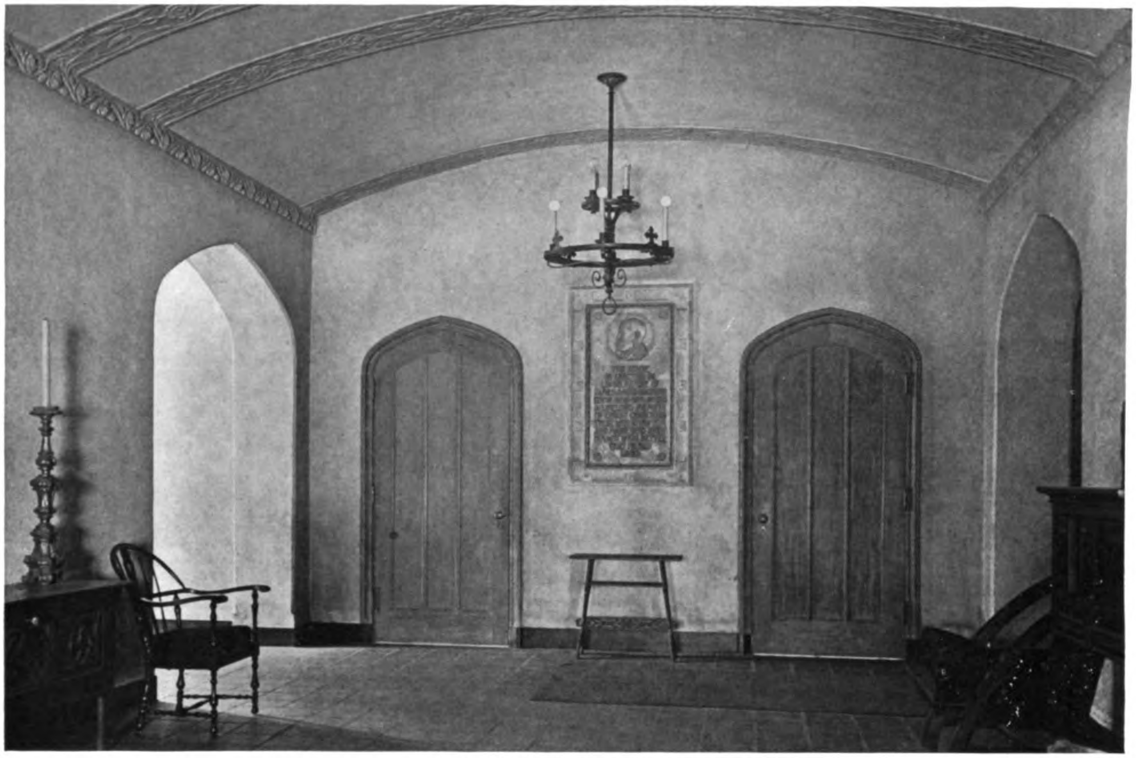
HOUSE AT FOREST HILLS GARDENS, LONG ISLAND, N. Y.

AYMAR EMBURY II, ARCHITECT
LEWIS E. WELSH, ASSOCIATE

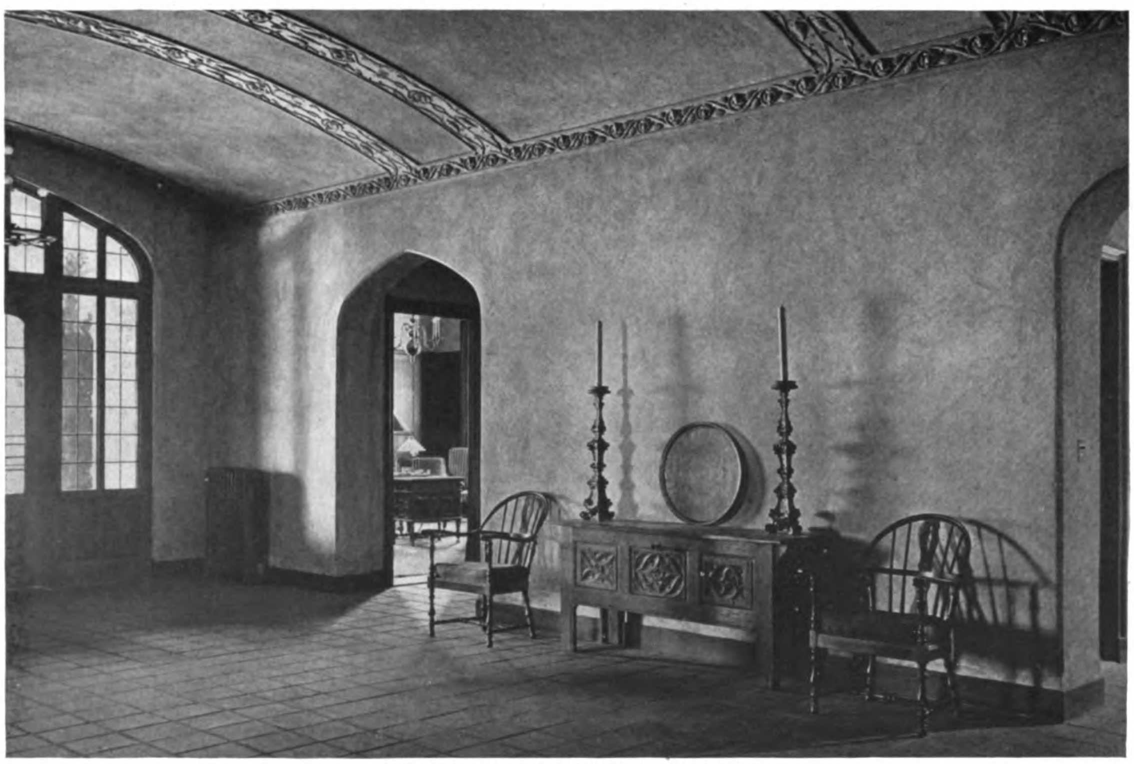
VIEW OF STREET FACADES

CHRIST CHURCH PARISH HOUSE, HARTFORD, CONN.

DELANO & ALDRICH, ARCHITECTS



REAR END OF ENTRANCE HALL

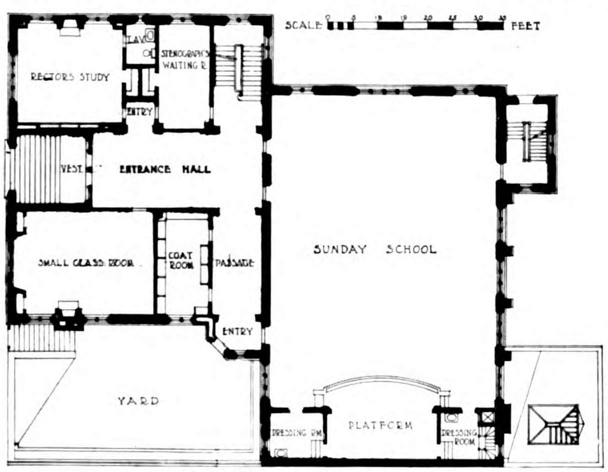


HALL LOOKING TOWARD RECTOR'S STUDY

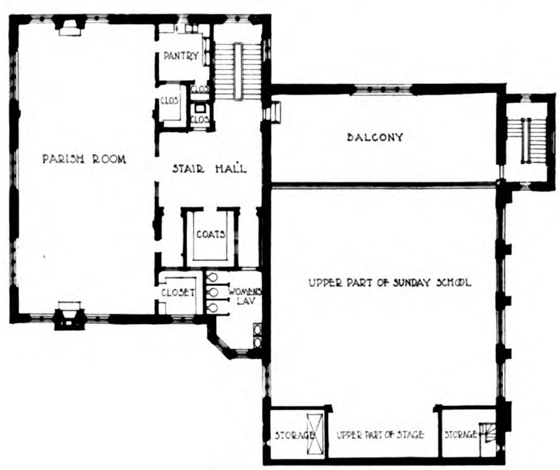
CHRIST CHURCH PARISH HOUSE, HARTFORD, CONN.

DELANO & ALDRICH, ARCHITECTS

SUNDAY SCHOOL ROOM



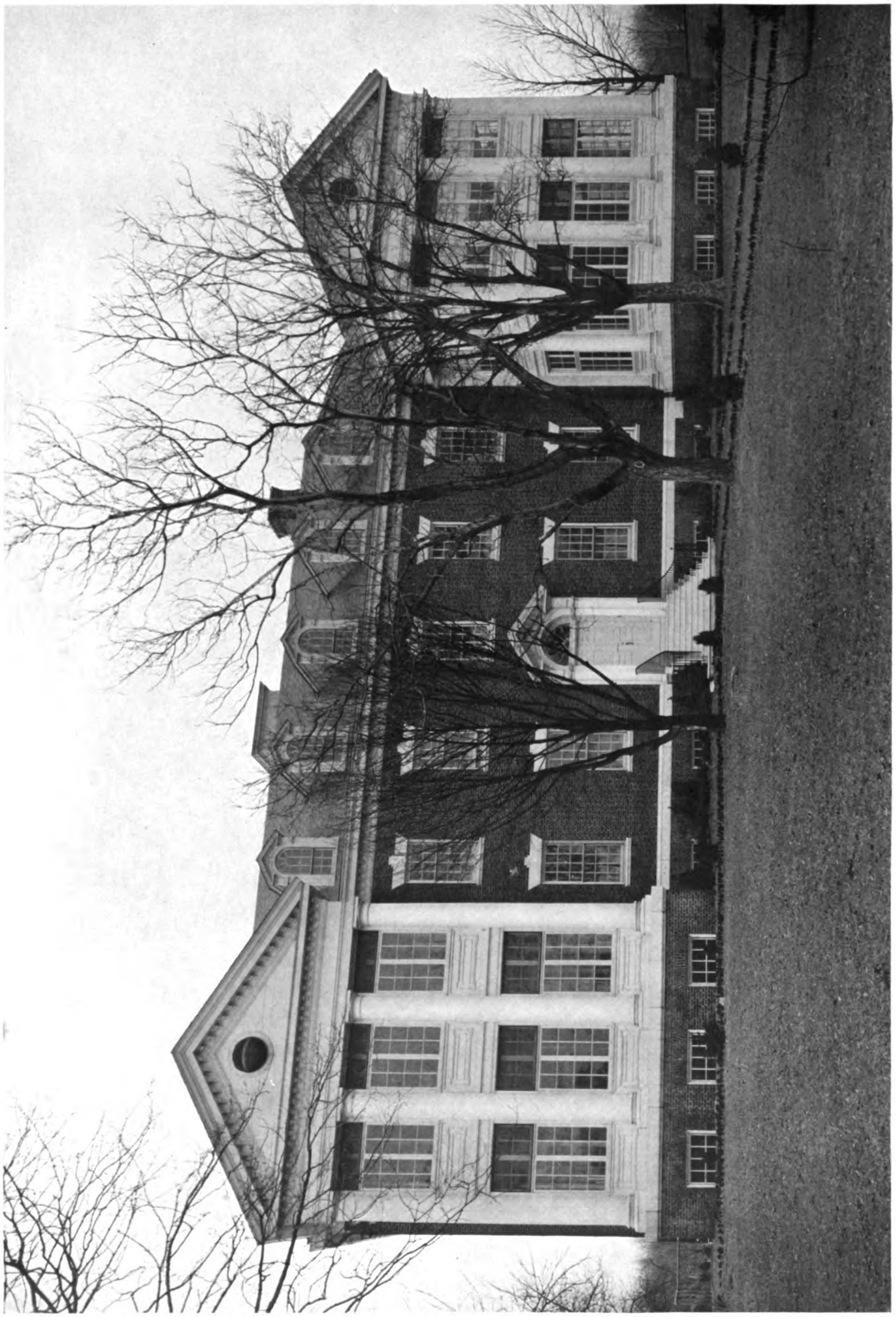
FIRST FLOOR PLAN



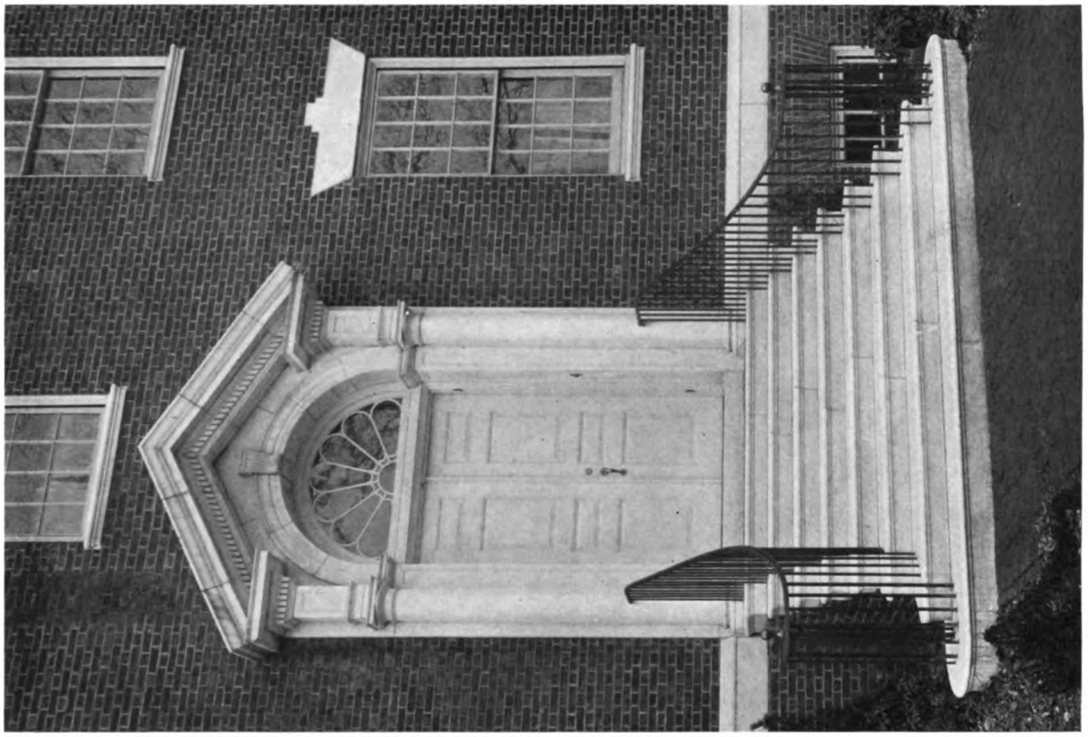
SECOND FLOOR PLAN

CHRIST CHURCH PARISH HOUSE, HARTFORD, CONN.

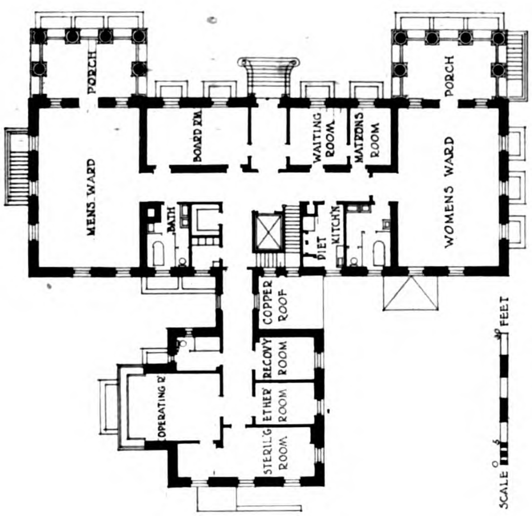
DELANO & ALDRICH, ARCHITECTS



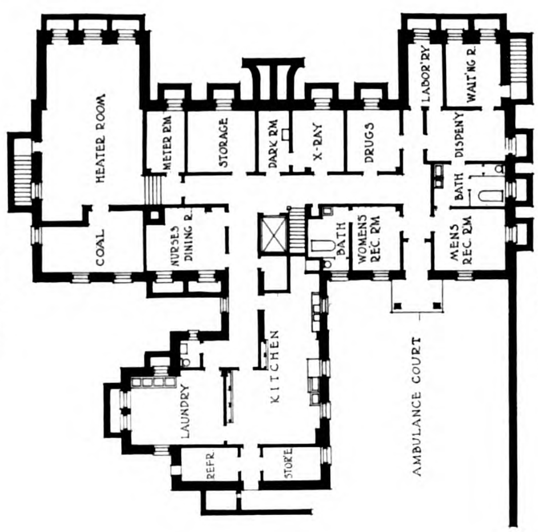
VIEW OF MAIN FACADE
ABINGTON GENERAL HOSPITAL, ABINGTON, PA.
BISSELL & SINKLER, ARCHITECTS



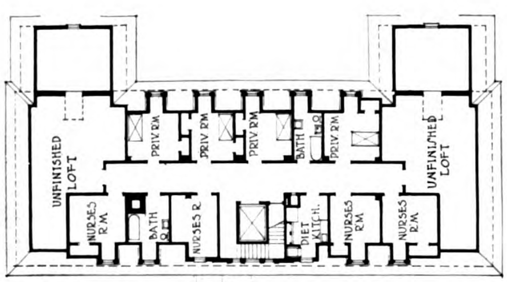
DETAIL OF ENTRANCE DOORWAY



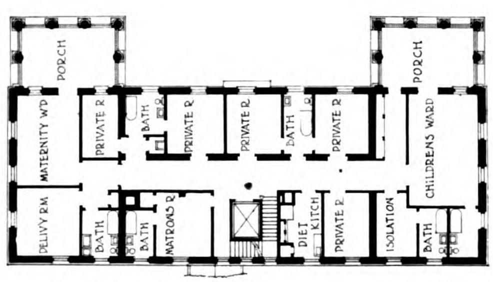
FIRST FLOOR PLAN



BASEMENT FLOOR PLAN



THIRD FLOOR PLAN

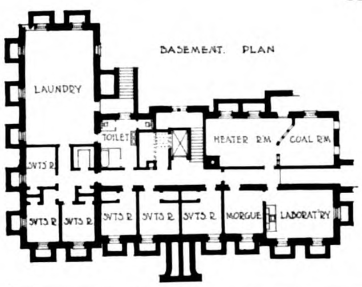


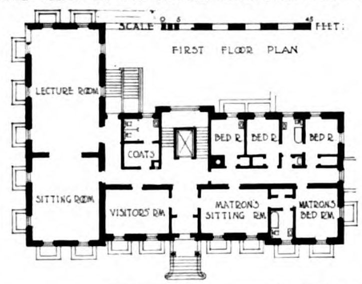
SECOND FLOOR PLAN

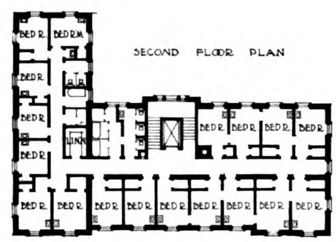
ABINGTON GENERAL HOSPITAL, ABINGTON, PA

BISSELL & SINKLER, ARCHITECTS

GENERAL VIEW OF HOSPITAL AND NURSES' HOME







MAIN FACADE OF NURSES' HOME

ABINGTON GENERAL HOSPITAL, ABINGTON, PA.

BISSELL & SINKLER, ARCHITECTS

The Abington Memorial Hospital and Nurses' Home

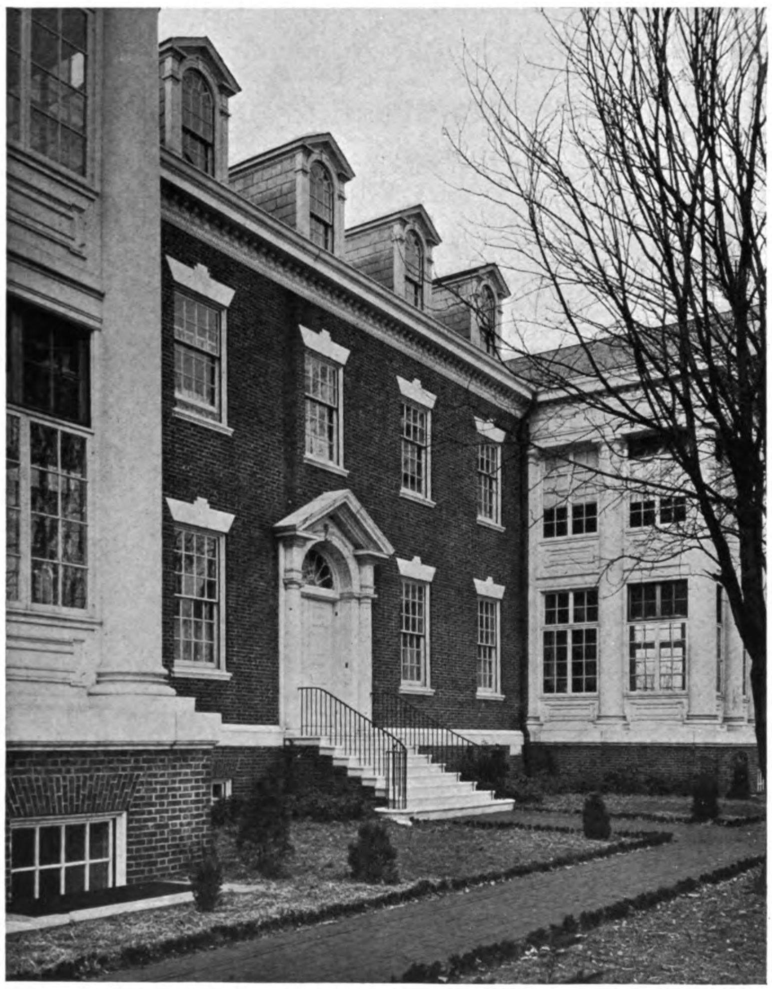
BISSELL & SINKLER, ARCHITECTS

OF all the beautiful suburbs that surround Philadelphia, none excels the section traversed by the ancient highway still known as the "Old York Road." It is a country of many hills and vales, abounding in streams and patches of woodland; while here and there old houses of stone or brick, having all the charm and dignity that go with well-bred old age, recall the Colonial and Revolutionary days, when Colonial architecture was in its glory. With the advent of the automobile and the extension of the suburban trolley systems, the movement from town to suburb began, and this section had its full share of the increase in population. Small hamlets and settlements changed almost over night into towns of respectable size, and the movement is still going on undiminished in volume.

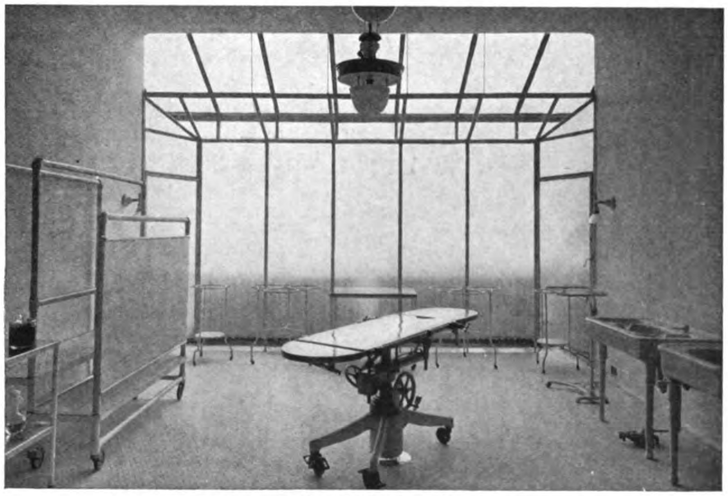
Soon, with the increase in population, and along with the other amenities of a modern community, came the need of a well equipped hospital, and it was a recognition of this need that, five years ago, prompted a public spirited citizen to build and endow a hospital which was to be of moderate size as befitted its rural setting, but was to include everything that goes to make up the modern hospital. An admirable location was chosen for its site on the northern outskirts of the little town of Abington, on a rise of ground that marks the summit of the northern boundary of the Huntingdon Valley. Open to the sun and swept by the prevailing breezes of summer, it is nevertheless protected by a high ridge of hills beyond, which serves as a barrier against the cold winds of winter.

Bearing in mind that its locale is a district strongly reminiscent of Colonial days, the choice of the Georgian style appeared logical. The building, which is fireproof throughout, has exterior walls of dark red brick with white marble trimmings; the porches are of wood; the roof of slate.

The main points that largely determined the plan were these: the hospital was to be small, and its rate of growth was entirely problematical, therefore all the wards must needs be small, and no division between medical and surgical cases was to be made; there was to be a children's ward and a maternity ward, the latter. reduced to its lowest terms; then there was to be an operating room and an out-patient department, and as many private rooms as could be secured after providing for the nurses. Future growth was to be met by additions to the present building and later on by other buildings, the first of which would be a nurses' home; but the operating room and out-



Detail between Porch Wings on Hospital Front



Operating Room Showing Glass Bay

the hospital the erection of a nurses' home was begun. At the same time drawings were made for a power plant which would also contain a laundry and garage; but notwithstanding the serious need for a central power plant, its erection was postponed, and only the garage was built at that time.

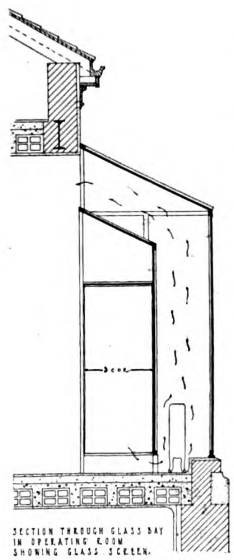
The design and materials of the nurses' home and garage naturally follow the main building, and like the latter they are thoroughly fireproof.

The open air porches are conveniently arranged with respect to the various wards and they command an attractive outlook. The ambulance court is located on the side of the building opposite to them and its approach is not in their view.

The growth of the hospital has been quite remarkable. The number of patients has risen from 450 in 1914-15 to 1156 in 1918-19; last year 1972 patients received treatment in the dispensary. The time is not far distant when additional buildings will be required, and it seems likely that what was originally designed to be a small hospital serving a rural community is destined to become an institution comparable in size to those to be found in the larger cities.

patient department were to be made adequate for some years to come. As one means of future extension to the present building, the walls of the rear wing, which contain the operating room, were designed to carry two additional floors, which would bring the wing up to the height of the main building, and with this in mind, light for the operating room was arranged for by a bay of glass instead of the usual skylights. (See illustration of section.)

That a need had existed for a hospital was proved as soon as the new building was opened and almost at once came a demand for more private rooms. To meet this situation the nurses were taken out of the building and housed temporarily in an old building adjacent to the hospital, thus releasing their rooms for the use of private patients, and two years after the opening of

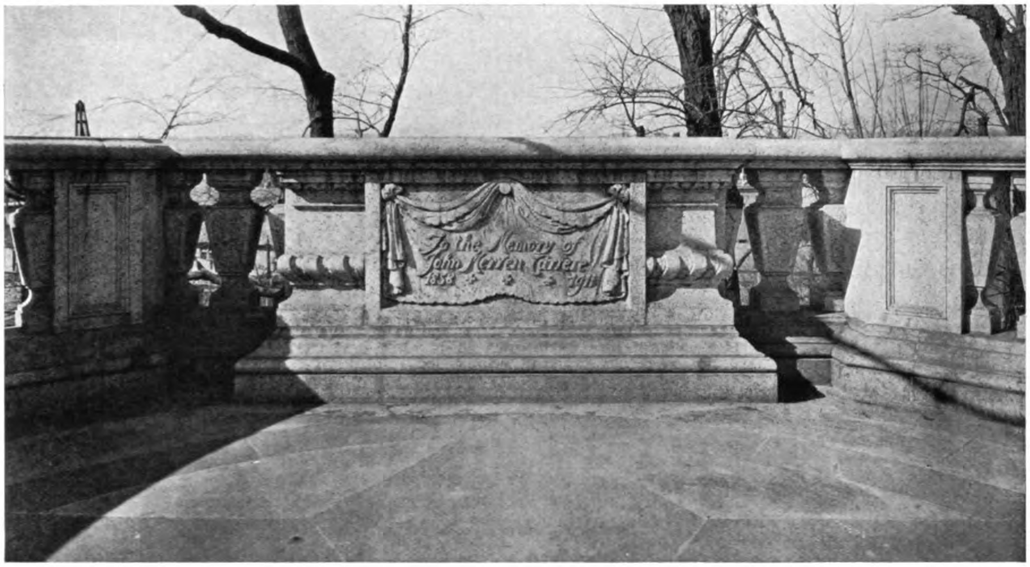


Detail of Glass Bay in Operating Room

Hospital and Nurses' Home from the Rear

John Merven Carrère Memorial

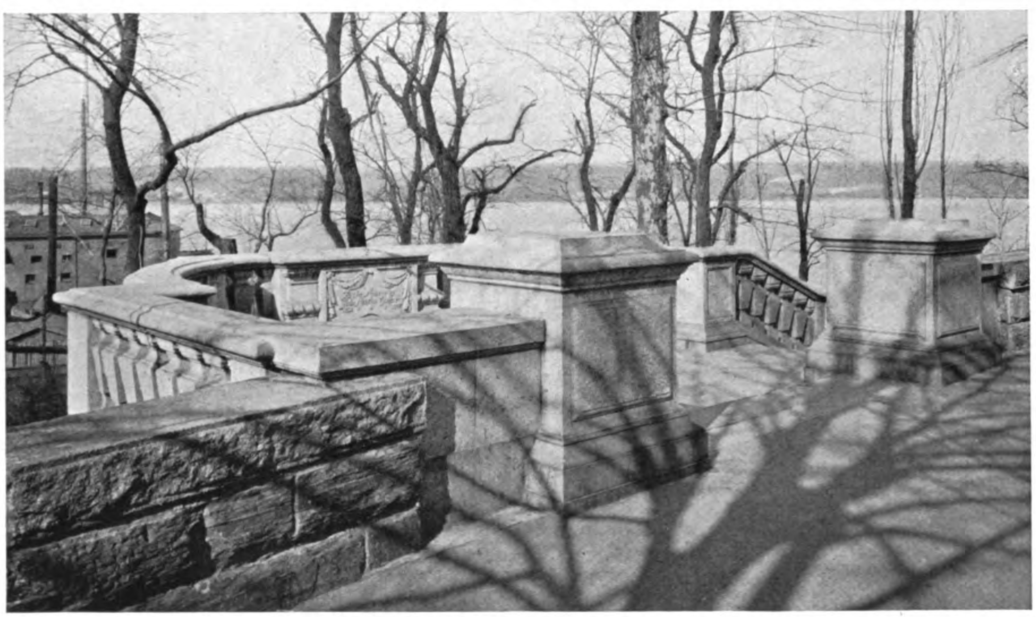
RIVERSIDE DRIVE, NEW YORK CITY



THIS exedra and staircase of pink granite was erected to the memory of John Merven Carrère by friends and professional associates of the late architect. It was unveiled and formally presented to the City of New York on Oct. 16, 1919, in the presence oi members of the various architectural and art societies of which Mr. Carrère was a member, and as Mr. Joseph H. Freedlander, Chairman of the Memorial Committee, called the name of each society, its president placed a wreath on the memorial tablet.

With the exception of the memorial to Richard M. Hunt at Seventieth Street and Fifth Avenue, New York, this is the only memorial to an architect ever erected in this country. It was designed by Mr. Thomas Hastings, partner of the late Mr. Carrère.

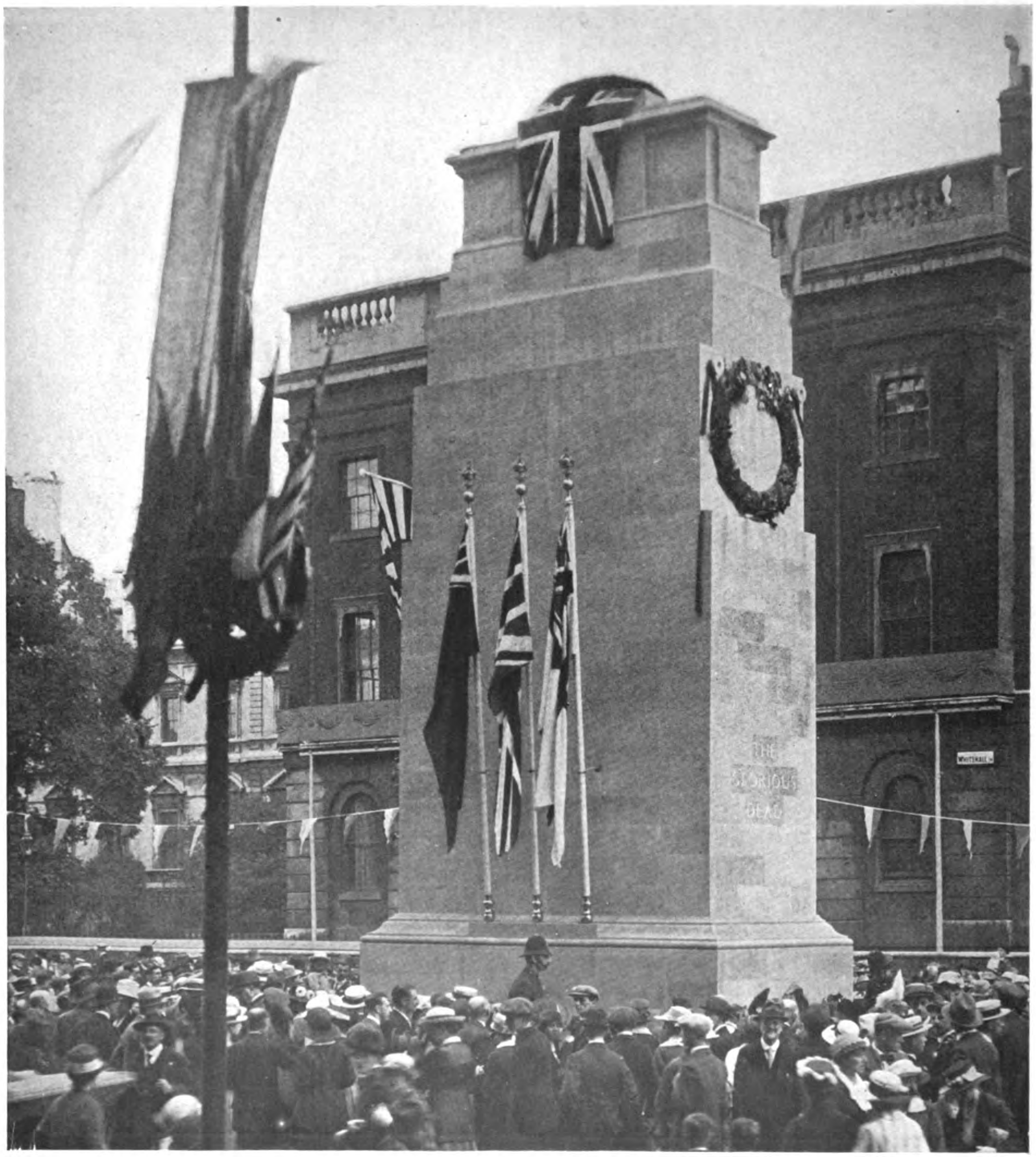
It is situated on Riverside Drive overlooking the Hudson, where it will be an enduring expression of the affection and esteem in which Mr. Carrère was held by his confrères, and will always mark the efforts and creative spirit of a noble man.



The Whitehall Cenotaph, London, England

SIR EDWIN LUTYENS, ARCHITECT

IT IS not always that a monument of architectural distinction wins immediate public approval, and there is, therefore, great interest to all artists in the circumstances surrounding the temporary cenotaph designed by Sir Edwin Lutyens and erected in Whitehall for the London Peace Day celebration. It was, in the nature of all temporary civic decorations, rapidly conceived and promptly executed for what was thought but a brief space of time; but its excellence as a monument and tribute to "The Glorious Dead" at once impressed the public mind, with the result that an immediate desire was expressed to have it executed in permanent materials. When it became evident that the public appeal must be granted, the city officials suggested the desirability of other sites in consideration of possible traffic difficulties; but this aroused such opposition that there was no doubting the interest of the public in seeing the monument executed on the same site for which it was created. It is a great satisfaction that a pylon of such simple dignity should command the widest approval. An English contemporary says, "For once we have the right thing in the right place."



Notes from England

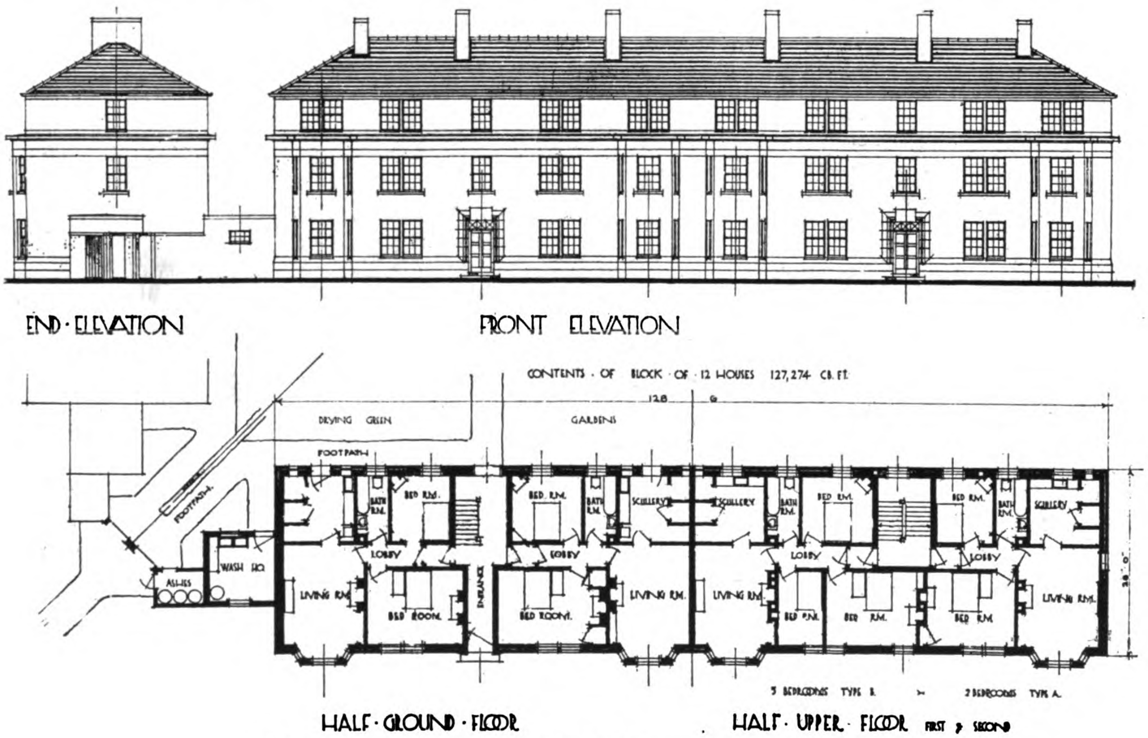
WITH SPECIAL REFERENCES TO POST-WAR HOUSING DEVELOPMENTS

By H. J. BIRNSTINGL, A.R.I.B.A.

IN order that an historian may view events with that dispassionate vision which is so essential if they are to be recorded in their true proportion and with due regard to the success or failure of the results which they achieve, it is necessary that he allow a lapse of time to intervene between himself and the period under review. Nevertheless to whatsoever conclusions the future chronicler of the architectural profession may ultimately arrive, when in due course he deals with the present period, it may with comparative safety be predicted that he will find it possessing many unique qualities, foremost amongst which will be noted the manner in which the present post-war work groups itself under two opposed headings. At the one extreme is the housing problem calling for the speedy erection of hundreds of thousands of adequate yet cheap workingmen's cottages; and at the other extreme, the building of vast commercial premises, for the most part large stores, whose cost may in some cases approximate to a million pounds. The medium sized domestic dwellings — that very type of architecture which has slowly developed upon a soil rich in tradition through centuries of scholarship and refinement, until English domestic architecture has indeed become justly famous throughout the world for its production — finds no place in the present scheme of things, owing chiefly to the enormously increased cost of all commodities.

The Government department which now has the matter of working-class housing in hand is the newly formed Ministry of Health, which since July 1 has superseded the Local Government Board of England, although Scotland still retains its own Local Government Board.

The country has for the purpose of housing been divided into eleven regions, each controlled by a commissioner assisted by a staff of architects, surveyors and inspectors, whose duty it is to inspect the sites, consider the layout plans, the house plans, the financial aspect in connection with the Government loan, and generally advise upon, and finally approve, the scheme. The chief architects under the Ministry of Health are Mr. Raymond Unwin and Mr. S. B. Russell. The



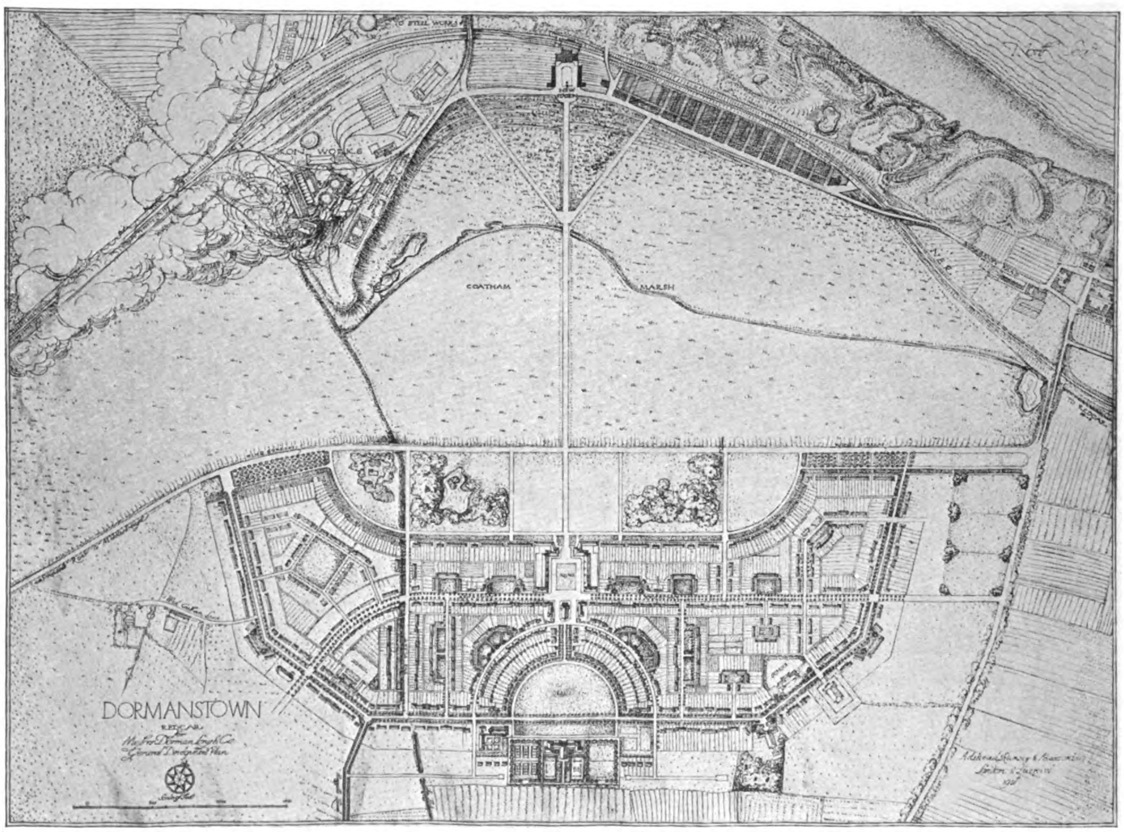
Type of Tenement House Designed for Local Government Board in Scotland
John A. W. Grant, Architect

Group of Cottages Bordering Village Green, Dormanstown

latest figures state that houses covering 41,000 acres have been approved by the Ministry.

A marked advance in the science of town-planning is noticeable in most of these schemes, and to a large extent the International Town Planning Conference held in London in 1910, which gave such an enormous impetus to this subject and afforded architects opportunities hitherto denied them of studying the methods of other countries, notably America and Germany, who were so far in advance of England in the matter of comprehensive and coordinated city layouts, is, together with the pioneer work of Mr. Raymond Unwin, responsible for this great improvement.

The Ministry of Health published a manual on State Aided Housing Schemes some months ago, and this has recently been followed by an equally interesting publication issued by the Local Government Board of Scotland, which includes designs for two and three storied tenement buildings,



Plan of Dormanstown and Vicinity
Adshead, Ramsey & Abercrombie, Architects

which are happily designed to avoid the appearance of depression which so often accompanies buildings of this description—indeed, a pleasant compromise seems to have been struck between the too exclusively rural or urban treatment, pleasing effects having been achieved by the use of such diverse features as the Mansard roof and the horizontal Georgian simplicity.

Row of Cottages, Dormanstown

It is interesting to note how the prevalence of the Georgian influence, which recently received a real impetus by the publication of "Small Houses of the Late Georgian Period," by Mr. Stanley C. Ramsey, A.R.I.B.A., still persists, displaying itself indeed on many a cottage design fresh from the drawing-board. This influence has almost entirely replaced that of Neo-grec which preceded it, and signs are not wanting that in its turn it may yield to an early Victorian revival in the course of a few years.

Amongst the more important housing schemes which are in a fairly advanced condition, may be mentioned that of Messrs. Adshead and Ramsey at Dormanstown. Both Mr. Adshead and Mr. Patrick Abercrombie, who is associated with the firm of Adshead and Ramsey in the execution of the Dormanstown scheme, are professors of town planning at Liverpool University. The following extracts from a description of the village, written by the architects, appeared in *The Architects' Journal:*

Semi-Detached Cottages, Dormanstown

"The first three hundred houses of this village were built during the war by Messrs. Dorman, Long & Co. of Middlesbrough, to house the employees at their new works. The village stands on a site open in all directions, permanently separated from the works by a wide strip of common land.

"As will be seen from the plan, the principal feature of the layout is a wide, central avenue leading from the market-place in the north to a large semicircular village green in the center, on either side of which is the more or less symmetrically composed village, with subsidiary tree lined avenues, forming an enclosing ring, the resultant effect being one of completeness and unity.

"The elevations are almost severely plain, depending, as they do, for interest, on their grouping, the careful disposition and proportion of the windows, and the studied details of the doors.

"These cottages, with their neatly sashed windows and delicately moulded doors, have been designed in sympathy with the prevailing architectural note to be found in the older buildings of the neighborhood.

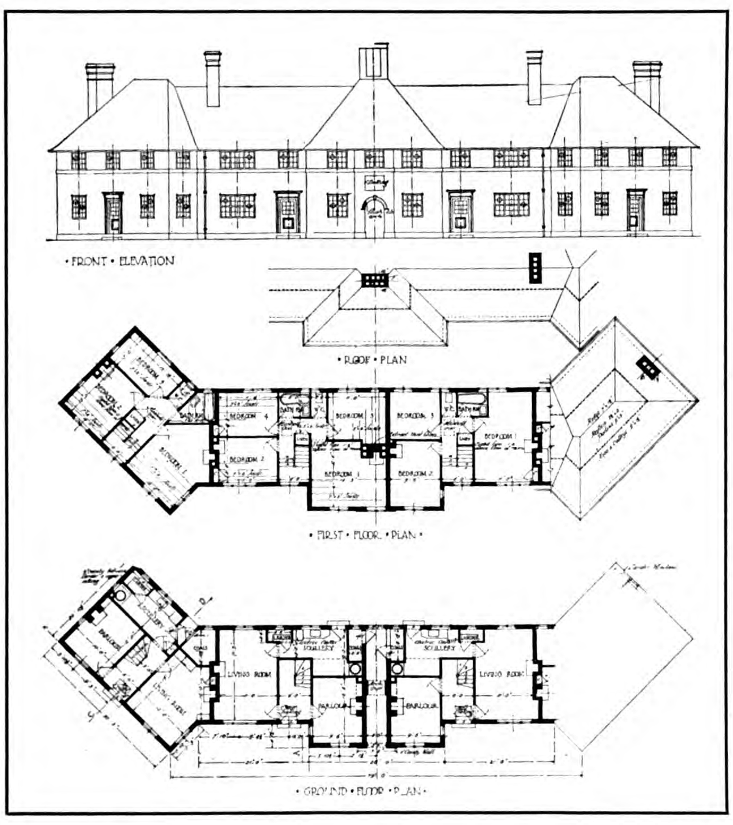
"The elements of these modest and charming Georgian buildings, so characteristic of many of the Yorkshire villages, lend themselves admirably to a system of standardization inseparable from any modern housing scheme which is to be both effective and economical. One of the most interesting points in the design of the houses at Dormanstown is the consistent variation in size between the ground floor and the first floor windows, resulting in long horizontal lines, with their suggestiveness of stability and restfulness. The appearance of the village, which was built on an open plain devoid of a single shrub or tree, is at the present moment, as may be gathered from the illustrations, rather bleak; but the landscape gardeners are busy at work, so that it is quite safe to prophesy that in a few years Dormanstown will be one of the most beautiful industrial villages in the north of England.

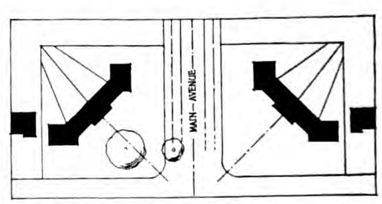
"The houses already built are pretty equally divided between the non-parlor and parlor type, with three bedrooms and hot and cold water services to the baths and sinks."

One of the most successful schemes recently approved by the Ministry of Health is one executed by Messrs. Thompson, Hennell & James for a layout of 370 acres at Swanpool, near Lincoln. This scheme was originated by the Swanpool Co-operative Housing Society, Ltd.

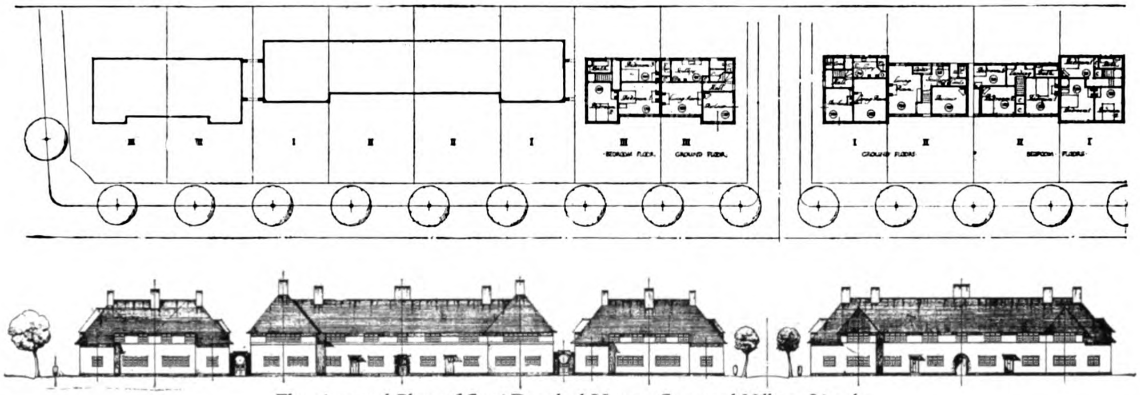
As shown by the layout plan, the estate is situated on a nearly level site and contains a large lake, known as the Swan Pool, from which the name of the estate is derived. This lake will be available in due course for boating and bathing, and a large portion of the land has been reserved around it as an open space and pleasure ground, being already well covered with trees. On the west side will be the recreation and cricket ground, with pavilion, etc. To the south is shown the technical institute standing in an open square; while extending southwards is the main avenue, ending in the main Central Square, where in due course will be situated the church, free church, institute and other public buildings. Many open spaces are reserved for tennis courts, bowling greens, playgrounds, orchards, allotments, etc. Three shopping centers are shown. Sites for schools, swimming baths, laundries, public bake-houses, power station, etc., are reserved. It will be seen that when completed the estate will combine all the essential elements of a self-contained community. Provision is made for the erection of some twenty-five hundred to three thousand houses, to meet the requirements of residents with either large or small families. One of the most attractive features of the scheme is the proposed installation of central heating and constant hot-water supply, generated in one operation with the supply of electricity for house and street lighting and for cooking. Under the proposed system the waste heat produced in generating the electric current will not be dissipated, but will be turned to a practical use in providing the heating and constant hot-water supply to all the houses and other buildings on the estate.

The external design of the cottages illustrated has been dictated to a large extent by the fact that good facing bricks were not available in sufficiently large quantities or at a reasonable price. Fletton bricks and roughcast have had to be used, which almost compelled a more or less informal treatment. As soon as facing bricks of good surface and color





Block of Four Houses and Diagram of Location at Corners, Swanpool Village, Lincoln
Thompson, Hennell & James, Architects

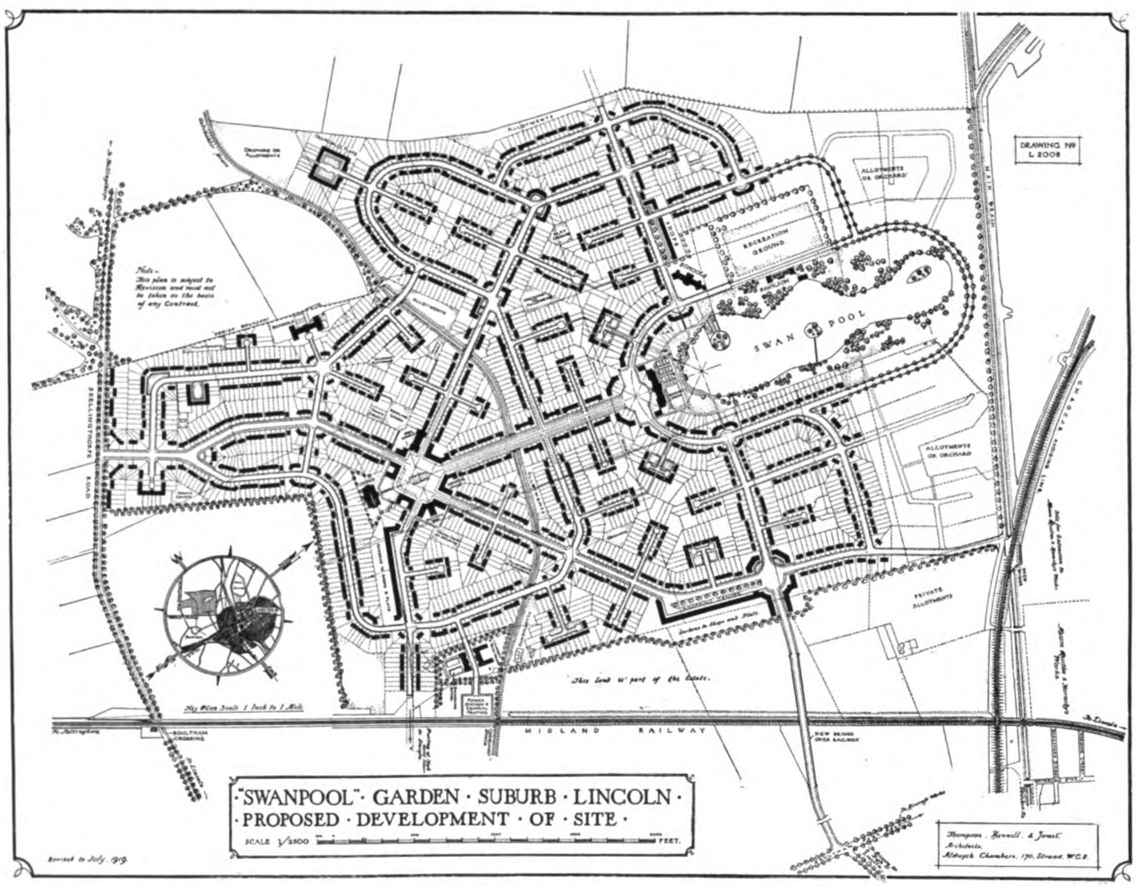


Elevations and Plans of Semi-Detached Houses, Swanpool Village, Lincoln

can be obtained, it is hoped to adopt a more formal Georgian treatment in some of the houses.

The Ministry of Health is anxious to encourage and preserve, as far as possible, the use of local traditions and materials, and a group of eight cottages at Newport in Wales, designed by Mr. Walter Rosser, M.S.A., shows a successful achievement in this direction. The cottages, which contain the usual accommodation of parlor, living room, scullery and bathroom on the ground floor and three bedrooms on the first floor, are built of stone of mottled colors obtained locally and roofed with stone tiles; part of the walls are plastered externally, thus preserving a local tradition.

There are many indications that this, the first peace year, will be an extremely active one for the Royal Institute of British Architects, which is being infused with fresh vitality by its new and energetic president, Mr. John W. Simpson. The



Thompson, Hennell & James, Architects

opening of the new presidential year was marked by a very vigorous address at the first Council meeting of the session, in which the president boldly outlined a policy which embraced many delayed and vital reforms.

Among the more successful innovations of the Institute must be mentioned the formation of two consultative boards. One composed of architects, surveyors, contractors and members of the National Federation of Building Trade Operatives was formed for the purpose of establishing congenial relations, and a better understanding amongst persons whose interests are, appearances notwithstanding, far from inimical. The second board, known as the Central Consultative Board, exists for the purpose of placing local authorities and others who may be desirous of undertaking housing enterprises in touch with architects having the necessary qualifications. The beneficial effects of this scheme are twofold: The local authority is supplied with the necessarily qualified person, and the young architect, having perhaps upon enlistment lost an incipient practice and being at a difficulty to recover it, is materially assisted. In cases where the scheme is a particularly large one, comprising some thousands of houses, an arrangement has been introduced whereby one or two architects of established reputation are appointed in a consultant capacity, dealing with a layout plan as a whole, and advising upon the site and its distribution; while the actual design of the houses is divided amongst a panel of younger executant architects, each of whom is responsible for some two hundred dwellings. Thus work is distributed and the possibility of monotony arising from the too frequent repetition of designs, all emanating from one mind, is removed. A special scale of charges devised for work of this kind has been sanctioned and tabulated as follows:

	Layout per acre	Houses		Roads and Sewers assuming £900 per acre	
		Architect on gross value	Quantities on gross value	Design per acre	Quantities per acre
	£ s. d.	Per cent	Per cent		£ s. d.
12 Houses		5	2	On a uniform rate of £45 per acre	
50 Houses		3.17	1.24		
100 Houses		2.52	1.05		
10 Acres	2 2 0				20 10 0
120 Houses		2.35	1		
200 Houses		2	.9		
20 Acres	2 2 0				19 5 0
240 Houses		1.92	.87		
30 Acres	1 18 6				18 16 8
360 Houses		1.78	.83		
40 Acres	1 14 1				18 12 6
480 Houses		1.71	.81		
80 Acres	1 9 11				18 6 3
960 Houses		1.6	.78		
1,500 Houses		1.57	.77		
2,000 Houses		1.55			
3,000 Houses		1.53			
4,000 Houses		1.52	.76		
	and down to one guinea per acre minimum	and down to a 1·5 per cent minimum	and down to a ·75 per cent minimum		and down to an £18 per acre minimum

The success with which the problems of the future will be faced, must depend in no little degree upon the education received by the student to-day, and in order that he may be the more adequately equipped, many drastic reforms are being considered, the general tendency of which is to broaden the outlook of the future architect. Hitherto he has maintained a position of glorious isolation from most other contemporary manifestations, which has led to the present disastrous position, which finds so many architects completely out of touch with the thoughts and aspirations both of their fellow-artists and of the people generally. The Architectural Association School, under the headmastership of Mr. Robert Atkinson, is making particular efforts to counteract this evil and is arranging students' courses in the subsidiary arts and crafts.

Cottages Near Newport, Wales, for the Ministry of Health
Walter Rosser, Architect

Meeting the Demand for Hotels in the Smaller Cities

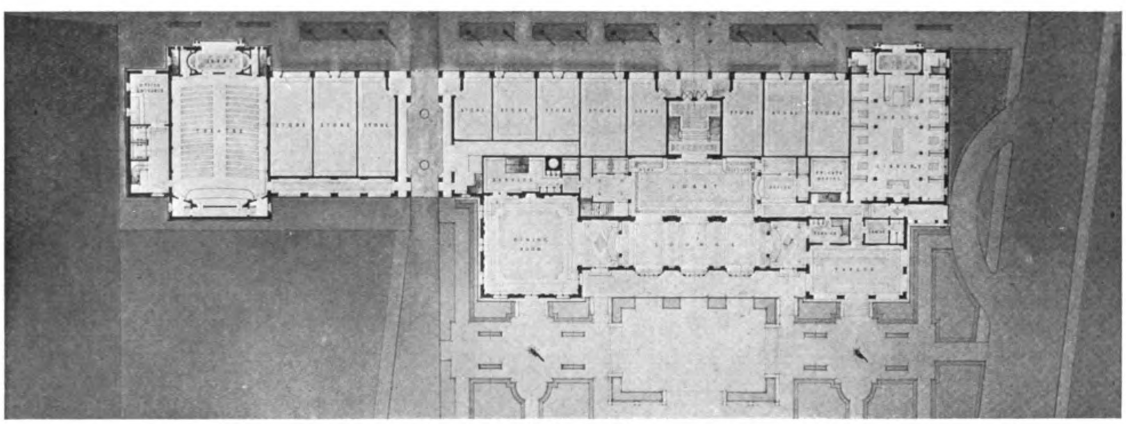
IN visiting the various smaller cities of the United States and Canada, particularly those which have been affected by an increase of industrial activity, there are three definite impressions which are usually made upon the mind of the average business man. These are : first, the need for additional and improved hotel accommodations ; second, the shortage of houses of every type ; and third, the need for additional commercial space for renting purposes. The first impression by contact is naturally that of a lack of hotel accommodations. In fact, it is safe to say that to-day there are not sufficient good hotel accommodations in any of our smaller cities which have undergone the pressure of rapid industrial growth.

In visiting city after city, particularly in the Middle West, one is impressed by the similar character of the old hotels which seem to be of practically the same vintage, all approximately equal in poor design and lack of efficiency, and usually having undergone foreclosure proceedings and forced reductions of capital investment which have reduced the actual investment to a point where hotels can be operated on at least a reasonable profit. Of course under present conditions practically any hotel is profitable. The better hotels in almost every city have invariably a waiting list, and travelers are forced to take accommodations in less attractive buildings. The popular hotels are accordingly paying high dividends.

The Trail of the Hotel Promoter

The trail of the hotel promoter of ten or fifteen years ago can be followed through a number of cities where ornate structures have been built by local capital raised through the efforts of the professional promoter. Investors of this type almost invariably suffer severe financial losses. This condition has been due to the fact that the average hotel of this type has been designed in an impractical manner with too much waste space, too great distances between production and service points, rooms which are too large, and other points of general inefficiency which, however, are of the utmost importance in their effect against the successful operation of the hotel. In such hotels too much money has been invested in ratio to the amount of paying space and, as a result, a large proportion of such investment has been lost through foreclosure proceedings and forced concessions on the part of the investors.

It is evident, therefore, that there is a direct relative factor between the amount of investment and the amount of paying space. If too much money is invested, this will be reduced through various agencies until a point has been reached when the investment will pay. Until that time the hotel does not operate on a successful basis. There are, of course, periods of fluctuation and increased business resulting from some unusual demand, but these do not constitute criterions of the financial success of the hotel, nor of its earning capacity.



An Interesting Plan of a Hotel Showing Elimination of Waste Space

Mann & MacNeille, Architects

In the above plan for a large tourist and commercial hotel the architects have cut to a minimum all non-paying space without sacrificing attractiveness of design. At the same time the utilization of this space for stores, theater and public library station creates an interesting center. Incidentally the City Club is located on the top floor of this hotel.

The only manner by which the value of a hotel investment may be successfully gauged is through the average earnings, discounting unusual conditions.

The General Hotel Shortage

To-day there exists a general hotel shortage such as has never been known before in the hotel business. This shortage is due to the following agencies:

1. Construction of new hotels not equal to city's growth.

2. Increased volume of travel, particularly by business men.

3. Industrial expansion involving general increasing of business in many cities.

The enforcement of national prohibition has, of course, been a decided blow to the business of existing hotels; but at the same time the passing of cafés and various other places of entertainment is bound to increase the popularity of hotel restaurants and other facilities for public amusement. The loss due to the cessation of liquor trade in hotels is being made up by slight increases of tariff on rooms and food, and by the establishment of lunch rooms and soft drink dispensaries.

There is a pressing demand for modern hotel accommodations in hundreds of our cities. The meeting of this demand by the design and construction of new hotels may be expected to bring about within the next few years the greatest investment in hotel projects that the country has ever known, and as more consideration is being given to the business aspect of such investment it may reasonably be expected that hotels may be more efficiently designed and constructed than ever before. Consequently, this field should prove of particular interest to the progressive architect.

Hotel Promotion as a Civic Activity

To such a point has the need of hotel accommodations been developed in the average industrial town and city that the provision of new hotels is being given serious consideration by those interested in civic betterment, particularly chambers of commerce, boards of trade and occasionally manufacturers' associations.

The value of a good local hotel is being constantly more clearly understood by the business interests of the city. There is no doubt that the existence of a good hotel brings considerable trade to local storekeepers, and in general creates a much better impression of the entire city in the minds of the public. The hotel reflects the spirit of the city in matters of progressiveness, and many factors of industrial expansion have been traced to the existence of a good hotel which has induced recommendation of the city by traveling men, financiers, manufacturers and other business men who have spent some time in the city because of the fact that they could find good hotel accommodations there.

It is therefore evident that when the need for hotel accommodations becomes pressing this condition is quickly realized by the chamber of commerce or a similar centralized body of business men. The next step of the chamber of commerce is usually to investigate hotels as to their business aspects, methods of financing and other factors of interest in connection with such a project.

Methods of Financing

There are three ordinary methods of promoting a hotel of this type as follows:

(*a*) Through the activities of a professional promoter;

(*b*) Through the activities of a committee of the chamber of commerce or a similar organization;

(*c*) Through the activities of interested individuals.

The efforts of the professional promoter must not be underestimated, for it is a fact that while in many cases hotels promoted in this manner have proven failures, there are many cases where cities have benefited considerably by the activities of these men.

The *modus operandi* of the average professional promoter after learning of the need for a hotel in any city is to visit the chamber of commerce and various influential citizens for the purpose of interesting them in the project. The promoter, as his first step, acquires an option on land forming a desirable location for the hotel, and has sketch plans prepared showing the type of building and its general layout. His next step is the organization of a holding company. In many cases he is well connected financially to the extent of being able to furnish first mortgage money to approximately 60 per cent of the valuation of the property, and it is the equity which he seeks to raise in the form of stock subscriptions. Often, too, he has already made arrangements with some firm of individuals who are ready to enter into contract to operate the hotel.

Having organized his holding corporation for a sufficient amount of stock to provide the necessary financing above the first mortgage, he attempts to sell his stock locally, usually selecting one or two influential citizens who if induced to buy may influence other investors. Unfortunately in many cases an attempt is made to do this through a gift of stock, but this practice is rapidly dying out. The promoter's services in many cases include not only the sale of stock locally but the furnishing of designs and supervising the actual construction of the building, for all of which he gets a percentage of the entire cost of the operation, usually varying from 10 to 15 per cent.

The average hotel plans as worked out by the promoter are not good. He has not been able to retain the services of designers who really understand the operation of a hotel, owing to the fact that he is not in a position to pay for such services. His interest does not lie in the successful operation of the building, but is particularly directed to raising the money and seeing the construction carried out, at which point his activities cease.

The promotion of a hotel project through the activity of the chamber of commerce or similar organization is increasingly finding favor in our American cities. The method of the chamber of commerce involves: first, obtaining an option on a suitable site; second, obtaining agreements (usually through local financial institutions) to make a building and first mortgage loan up to approximately 60 per cent of the value of land and building, and finally to organize a holding company with sufficient capital stock to provide the necessary equity.

The chamber of commerce or a local committee in selling this stock usually works among those who may expect to gain indirectly from the existence of a good hotel. These naturally include owners of better stores — industrial corporations having local factories and others directly interested in civic betterment and municipal expansion. Usually it is found not difficult to raise the required funds, provided the plans for the hotel have been worked out along careful and logical lines, but it is at this point that many meet failure.

Where the raising of a large amount of money is found impossible through direct contact among those interested, chambers of commerce have been successful in putting on a sales campaign among the citizens to dispose of stock in smaller blocks. The slogan of such a campaign is invariably that of city betterment rather than extensive profits. There is no doubt that this is a less satisfactory manner of raising money as it is always found difficult to carry on the business of a local stock corporation where the stock is widely distributed, and it becomes necessary to give consideration to the viewpoints of many. Invariably the smaller a stock holding the more interest is taken by the stockholders, as it is usually found that the small stockholders are the principal obstructionists in any incorporated business, particularly if the holdings are in one community where neighborly interchange of opinion results in constant hectoring of the directors and complaints when stock is not producing dividends after a very short period.

While the financing of hotels through popular subscription has been carried out in a number of instances it is interesting to realize that such hotels have for the most part resulted in failure, and the conclusion to be drawn is that this method of financing is but a last resort.

The first step after securing option on the land should be to have a good architect draw sketch plans of a hotel which will contain practical money-making features. Some details as to the business aspects will be considered in later paragraphs, but the point is that if the hotel is logically designed, it will be less difficult to obtain a lessee; and if the lessee can be provisionally obtained, the raising of necessary funds is made much easier.

The third method of promotion is the fostering of a hotel project by some individual who is to be directly interested. In some cases it is an architect who crystallizes public interest by working out a sketch plan on a logical location and stirring the chamber of commerce or other civic bodies into active efforts to materialize the plan. In other cases it is a builder or real estate broker, landowner, and sometimes an individual who has at heart the general interest of the city.

In all cases the methods of financing hotels of this character are similar and do not involve intricate detail. To demonstrate the lines along which financing such a project is generally carried out, the following paragraphs will describe in some detail how the necessary money was recently raised to build a hotel in a city of approximately 100,000 population. This city is located in the Middle West and is the center of a number of industries.

The hotel project was first taken up by a professional promoter who met with little success, owing to the fact that he had not much background of experience nor were the people of this city of a type easily impressed with his promotion methods. The work he did in the city, however, had the value of still further stressing to the public mind the need for a hotel; and after the promoter had given up the project it was revived by the chamber of commerce, which started out along logical lines to make the proposed hotel a reality.

Their first action was the formation of a hotel committee consisting of fifty representative business men, including bankers, real estate men, department store heads, industrial executives and men of similar type. This committee in turn elected an executive committee of three men, who were to report on various details. The executive committee obtained options on several tracts of land and at the first committee meeting final decision was made as to which tract of land was best for the purpose. This was done through the medium of open discussion followed by an elimination ballot.

The next step was the formation of a holding company, and arrangements were made with local banks for financing up to 60 per cent. The tract of land selected cost $80,000, $40,000 of which the owner agreed to take as a second mortgage on the finished hotel, the remaining $40,000 to be cash.

An architect who had had some experience in hotel design was selected to draw up sketch plans, and these plans were submitted to several hotel managers in other cities for criticism as to their service features. The sketch plans as drawn called for a million-dollar structure containing three hundred rooms, but the holding company wisely planned to build at first only one unit of this design containing one hundred rooms. The first unit of the hotel was built at a cost of approximately ~~$320,000, the~~ construction being heavy enough to add several floors above, and there was contemplated also an additional wing.

The total cost of the operation, therefore, including land and building, came to $400,000. On this amount a first mortgage of $240,000 was taken by the local financial institutions. The owner of the land as per agreement took a second mortgage of $40,000, and the necessary balance of $120,000 was raised by the formation of a holding company capitalized at $125,000 in shares of $100 each of non-assessable common stock.

Arrangements had been made with a hotel manager in another city to take a long term lease on this building on the basis of 6 per cent of the value of the land and 8 per cent of the cost of the building, 2 per cent of this latter amount being placed in a sinking fund to insure reproduction value. In addition to this, all repairs, taxes and similar charges were to be at the expense of the lessee, with the exception of interest on the mortgages.

It is customary for the lessee of a hotel to provide the furnishings at his own cost, and a first lien on these furnishings is usually made a guaranty of the lease, providing that such furnishings shall accrue to the owners of the building in case of any default on the lease. The actual method of obtaining such protection is the issuance of a first mortgage against the furnishings in favor of the owner of the building, recorded and placed in escrow pending any default by the lessee.

The following tabulation will show approximately how the financing of this particular project was carried out and what the returns will be to the holding company. It must be realized that large direct returns cannot always be expected where a hotel is financed by those who expect indirect returns in the way of increased local business. It is on a basis of this nature that a hotel may be successfully promoted through civic enterprise.

Financial Tabulation of a Recent Hotel Project

Cost of land		$80,000	
Cash	$40,000		
Owner agrees to take second mortgage	40,000		
Cost of building		320,000	
COST OF ENTIRE OPERATION		$400,000	
Building and first mortgage loan from local institutions at 5% for 5 years			$240,000
Second mortgage accepted by owner in part payment for land at 6% for 5 years			40,000
Cash required from stock sales			120,000
			$400,000
Holding company formed with capital stock (all common) 1,250 shares at $100 par value providing cash			$125,000
Cash required for equity in building cost		$120,000	
Cost of obtaining first mortgage loan (charges 1½% to cover)		3,600	
Cash left in treasury		1,400	

The terms of the lease involved an annual income to holding company as follows:

6% on $80,000 — cost of land	$4,800
8% on 320,000 — cost of building	25,600
GROSS ANNUAL INCOME	$30,400

The holding company should have practically no overhead expense. Therefore payments which must be made out of income are as follows:

Interest on first mortgage, $240,000 at 5%	$12,000
Interest on second mortgage, $40,000 at 6%	2,400
Payment into sinking fund, 2% on Cost of building $320,000	6,400
Annual legal and overhead expense (estimated necessary)	500
Net income payable as dividends	9,100

The net income as shown above represents approximately 7 per cent of the total stock issue of $125,000. It must be realized that this percentage can be obtained only by careful handling of the business of the company in keeping down its overhead expense. A holding company of this nature does not require a business organization, as practically all its business can be transacted through an attorney who will make necessary collections and payments. In addition to the amount shown as net income the holding company had set aside at the end of each year an amount of $6,400 in the form of a sinking fund to offset the building depreciation or reproduction shrinkage. This amount is to be kept on hand (in an interest-bearing account) and is not to be divided among stockholders, but is to be used at the period of mortgage termination for the purpose of mortgage reduction. Naturally if at the end of the mortgage period, which in this case is five years on both first and second mortgages, the mortgagees are willing to make a further extension of a period of years without reduction of principal, the sinking fund can be divided as an extra dividend.

At the end of a five-year period of the tabulation given above there will be on hand in the sinking fund approximately $32,000 and interest. Of this amount it is planned to use $10,000 to reduce the second mortgage principal and $20,000 to reduce the first mortgage principal. The earnings of the stock during the next five years would then be :

Gross annual income	$30,400
Interest on first mortgage $220,000 at 5%	11,000
Interest on second mortgage $30,000 at 6%	1,800
Payment into sinking fund 2% on cost of building $320,000	6,400
Annual legal and overhead expense (estimated necessary)	500
NET INCOME	10,700

The above net income during the second period of five years represents a return of 8½ per cent on stock issued to the amount of $125,000.

From this point on mortgages will probably be no longer reduced and sinking fund can be periodically divided among stockholders.

From the first tabulation of this hotel project it will be seen that the following constitutes the percentage to stockholders :

Net income as shown in first tabulation	$9,100
Payment into sinking fund	6,400
Total annual net profit or 12.4% on the investment of $125,000.	$15,500

NOTE. To this amount may be added accrued interest on deposit of sinking fund money.

The figures given in the above operation are those of an actual lease consummated in a town where there existed considerable demand for a hotel. The percentages paid on land and building are liberal, and higher than in larger cities where they usually run 5 per cent on land and 6 per cent on buildings. Under normally good conditions, however, the rental as shown above for a hotel of that type is not excessive and the operating company can expect to make a large percentage.

Another method of financing hotels which requires less money to be raised originally is the amortization type of hotel mortgage which has been worked out by two or three loaning institutions which operate nationally.

In general, this method of financing involves the obtaining of a building and mortgage loan approximating about 80 per cent of the value of the land and building, making it necessary to raise only 20 per cent of the cost of the operation locally. This mortgage is reduced periodically by payments against the principal as well as the interest, and in some instances a regular monthly payment is worked out in the form of an amortization table which over a period of approximately ten years will reduce the mortgage until it comes within a banking percentage, at the same time paying interest. Quite often the rental paid by the lessee is applied directly to this amortization payment.

Another obvious method of financing is to pay the landowner a good price for his land and to arrange with him to take this payment in the form of stock in the holding company. It is then possible to obtain a construction and permanent loan almost sufficient to pay the cost of construction, and the necessary balance is raised by stock subscription.

In leasing a hotel the most popular method at present is that of payment of the lessee of a percentage on land and the building investment, together with all taxes and improvements. In very large city hotels, such as the Pennsylvania and Commodore in New York City, the lessee pays 5 per cent on land and 6 per cent on the building. In the small hotels, particularly those where the holding company counts on a fair percentage on the investment, the lessee pays as outlined above, 6 per cent on land and 8 per cent on the building. Of the 8 per cent on building, 2 per cent is placed aside in a sinking fund to bring about a gradual reduction of the building investment so that in case the cost of material and labor may fall in coming years, the investment on the building has been reduced at the rate of 2 per cent a year to a point where the investment will not suffer by depreciation or reproduction values. This is a factor which should be given serious consideration at this time of high production cost.

Selecting a Site for the Hotel

The selection of a site for a hotel in any of our smaller cities has many important business aspects, both from the viewpoint of civic benefit and from the individual viewpoint of hotel owner and lessee. It is no longer thought necessary to have a hotel located at a railroad station. In fact, it is more attractive for tenants of the building to be in a quieter section. It is usually conceded by authorities that in smaller cities hotels should be within comparatively easy walking distance of the railroad station wherever possible.

In locating a hotel from a civic viewpoint it must be realized that a building of this nature may be so located that it will tend to encourage the extension of the business center and perhaps to set the pace for high class business development in a section of the city which heretofore has been backward. This condition may be plainly seen in the placing of various recently constructed hotels.

It is found that the location of a hotel usually causes a rapid increase in realty values in surrounding land. Of this point, advantage is often taken in promoting hotel projects by agreeing to the location of a hotel in accordance with stock subscriptions of owners of land which will be benefited.

The site of a new hotel should be fairly central in its relation to stores, theaters and other community facilities, and if possible should be given the benefit of open parking space.

Why Many Hotels Have Failed

In the course of an interesting discussion with a hotel man who has had wide experience in the management, sale and leasing of hotels of all types throughout the United States and Canada, it was interesting to learn that the average hotel failure has not been ascribed to lack of business or dulness of local conditions. In many instances such conditions are blamed for hotel failure by shortsighted managers, when, as a matter of fact, if a hotel has been properly designed and managed, it would have proven a paying venture on the gross annual income which had been realized.

It is true that hotels which have failed might have paid if they had been filled at all times, and that they were not filled is due to local business conditions not warranting such occupancy; but the experienced hotel man usually ascribes failure to other causes.

Probably the most important cause of failures among hotels is that of impracticable design involving too much waste space. One has but to recall the average old hotel to realize the great spaces which were given over to lounges and similar public space; unused dining rooms, over-wide corridors, and similar waste space which, however, represented a considerable percentage of the necessary investment. As a result such hotels were forced to pay the overhead and interest on this wasted investment, and this has resulted in failure in business, when the same volume of business in a hotel of practical design, with a much lower ratio of non-paying space, would have paid well on the smaller investment required. (In a future article in this department by one of America's leading hotel experts this question of waste space in hotel design will be given consideration from the business viewpoint.)

There are, of course, many sources of income which may be instituted in the average hotel, but for the most part these are included in the lease and are operated by the lessee. In the design of the average hotel, however, it is quite possible to include a number of stores in the building which may be retained by the holding company for rental purposes. Depending on the location, these stores may at times prove sources of considerable additional income, and with show windows opening in the lobby of the hotel they often constitute a valuable and attractive feature of service to guests.

Making the First Period Easier for the Lessee

It is of course understood that the first two or three years in the development of business in a new hotel are usually the hardest years from the financial viewpoint of the lessee, and as this fact is generally recognized some provision is usually made in leases to graduate rental cost in fair ratio to the expected income of the business.

There are several methods through which this plan is carried out, and it might be well to cite the method used in the lease of the Pennsylvania Hotel to the New York Hotel Statler Company. This lease was made to run for twenty-one years after the completion of the building and calls for payment of ground rent of 5 per cent a year plus taxes and other charges. In addition the lessee pays an annual rental of 6 per cent of the cost of construction of the building less a deduction of definite and decreasing amounts each year for three years. During the balance of the term of the lease, or a period of eighteen years, the lessee is to pay the total rent as determined by percentages on ground and building costs and in addition is to pay annually one-eighteenth of the sum deducted in the first three years.

Applying this policy to the hotel project tabulated in previous paragraphs, we find the lessee paying annually 8 per cent on a building cost of $320,000, or a sum of $25,600. In making this lease this payment was reduced by $7,600 the first year; $5,600 the second year, and $3,600 the third year. In other words, the actual rental to be paid over a period of twenty-one years is $18,000 for the first year; $20,000 for the second year; $22,000 for the third year, and after that at the rental of $25,600 a year plus one-eighteenth of the total of the previous deductions ($16,800), making an additional payment of approximately $930 per year, or an annual payment over the eighteen year period of $26,530.

Another means which has been used successfully to give definite civic encouragement to a hotel project is the policy of tax exemption. It is apparent that the direct benefit which the small city may expect from a hotel should make such encouragement logical and the usual period for which tax exemption is granted is for ten years. As much of the success of a hotel depends upon the business ability and enthusiasm of the lessee who operates the business, it is evident that if he is relieved of the additional burden of taxes, his profits will be consequently greater and his interest equally stimulated.

In many hotels in smaller cities it has been found convenient to locate a city club in the hotel. Experience has shown that this action is mutually beneficial, as it provides a definite annual rental income for the lessee, as well as any restaurant and general business which may emanate from the club. In this matter the hotel is made somewhat of a business center — a condition which is thoroughly impressive in its effect on visitors.

Competition for a Small Face Brick House

REPORT OF THE JURY OF AWARD

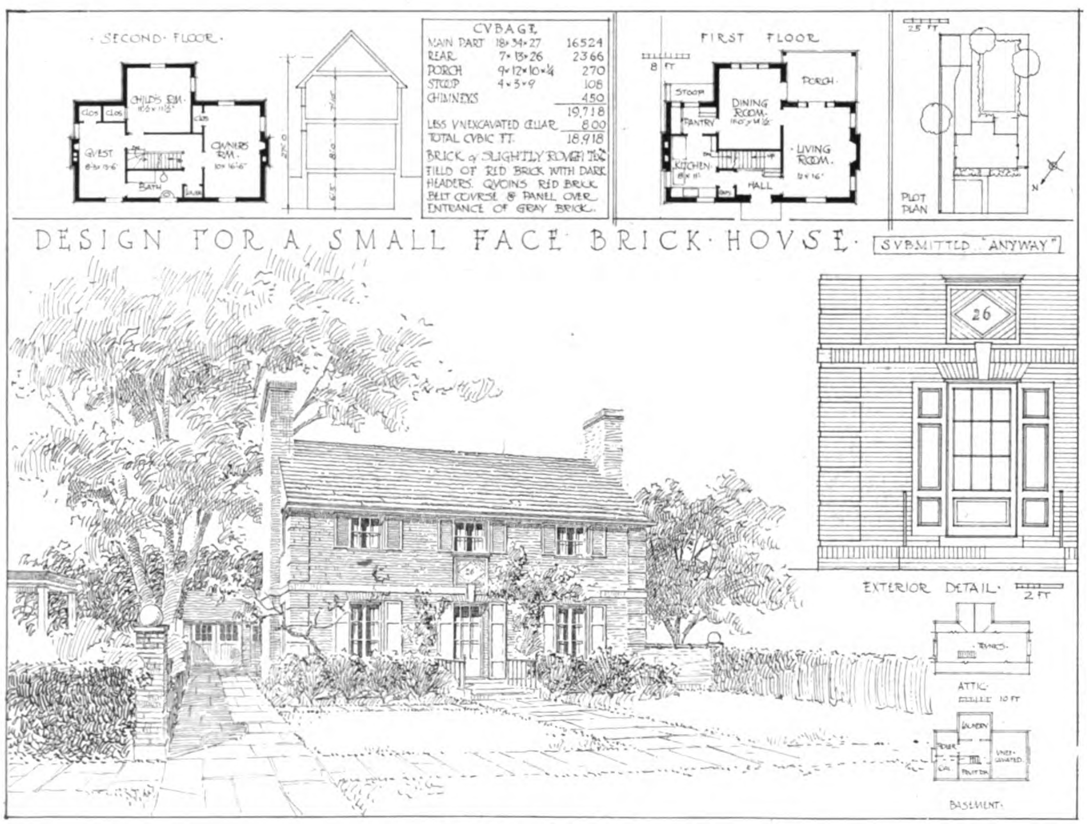
THERE were submitted in this competition 366 designs, an unusually large number, and indicative of the fact that architects and draftsmen are out of uniform and back on their jobs. While there were no designs submitted of such conspicuous and outstanding merit in either design or rendering as we have seen in previous competitions, the drawings were as a whole remarkable for two things: First, for the uniformly high standard of them all, which made it extremely difficult to select ten designs to be premiated; and second, because there were absolutely no drawings submitted which showed so little knowledge of architecture as to be ludicrous.

It was also a pleasure to find that the competitors had on the whole considered the spirit as well as the letter of the program, and had designed houses (as they have to be designed for clients) with one eye on the cost as well as one on the design of a picturesque building. We all know that since this program was written prices have so advanced that it is no longer possible to build a brick house, or indeed a house of any kind, for 35 cents a cubic foot in most parts of the country; but the obvious intent was that it should be economically designed within 20,000 cubic feet.

The standard of pen rendering in the United States has enormously advanced since the first *Brickbuilder* competition some ten years ago. The jurors were desired to select forty houses, in addition to the premiated designs, for publication in book form, and while in this competition one could have selected a hundred and fifty which were well rendered and of meritorious design, in the earlier competitions it would have been difficult to have found twenty. However, in many of the designs submitted, the rendering was overworked so as to confuse the drawings, and in endeavoring to produce drawings with a "punch" too much black was used without proper regard for spotting it to produce a pictorial effect.

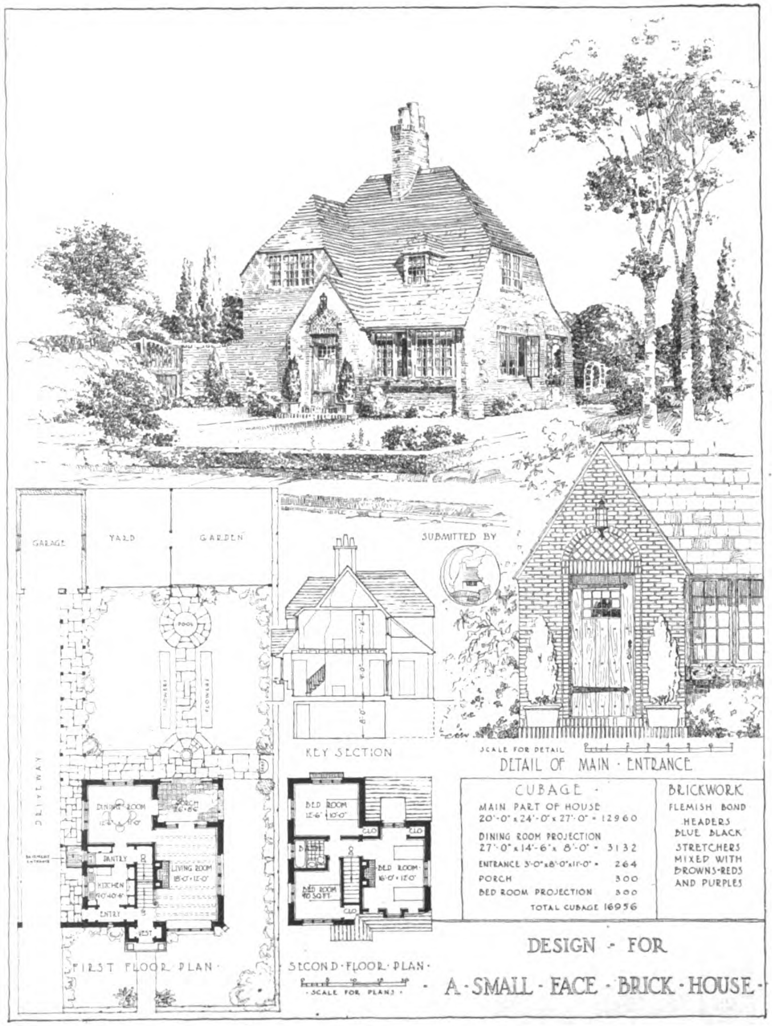
The jury found a great number of designs on an "L" shaped plan with the ridges at the same height. This unavoidably results in a confusion as to what is the principal mass and what the appendage, and this type of house is too small for a group of masses, but must be treated as a single mass with appendages. Also there was a tendency to vary unduly the roof pitches in a way to lead to unpleasant results, as well as to make difficult construction.

The program called obviously for a house which



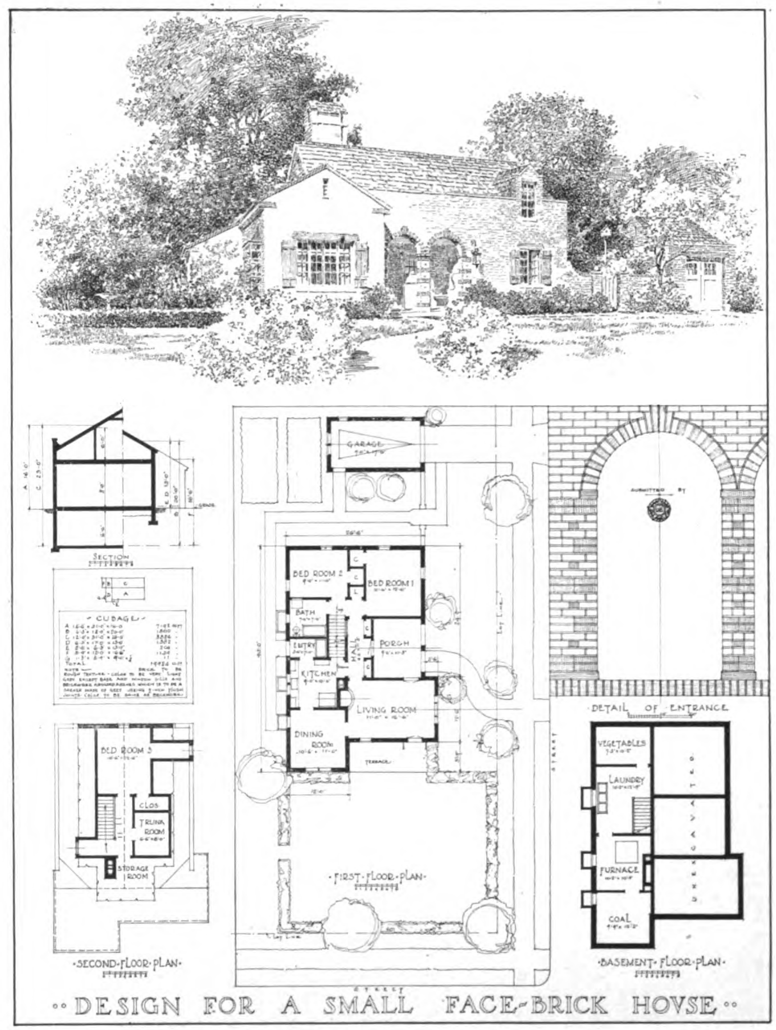
FIRST PRIZE DESIGN

SUBMITTED BY OLAF WILLIAM SHELGREN, BUFFALO, N. Y.



SECOND PRIZE DESIGN

SUBMITTED BY J. FLOYD YEWELL, NEW YORK, N. Y.

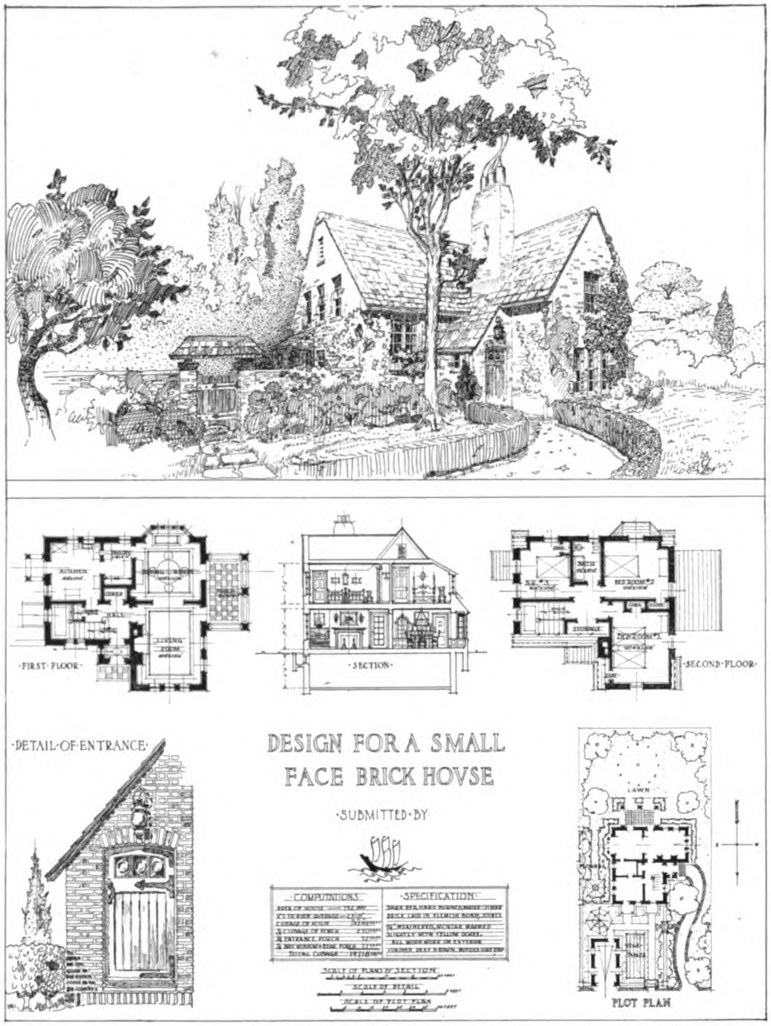


THIRD PRIZE DESIGN

SUBMITTED BY E. J. MAIER, T. E. KING AND G. H. ERARD, TOLEDO, O.

could be run without servants, and great economy of space was therefore requisite. The kitchen should be made compact and convenient — as purely a working space. The main staircase then should be accessible from the kitchen as well as from the living room, and while the foot of the staircase might be near the entrance doorway, there is no reason why it should not ascend from a part of the house remote from the entrance. The dominant rooms should be the living room on the first story and the owner's bedroom on the second, and no space should be wasted in an attempt to make an impressive hall.

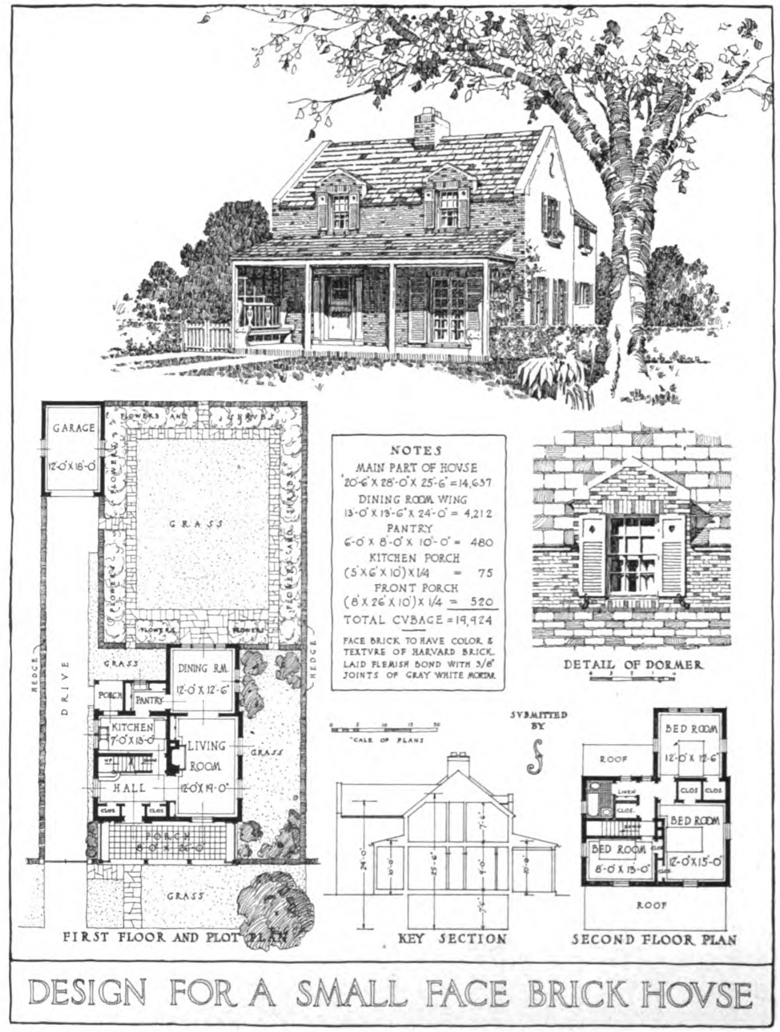
Further, while an interior lot was not definitely prescribed, as there are ten interior lots to every corner lot on which houses of this size are built, the jury gave preference to the competitors (the vast majority) who took the more difficult problem of the interior lot. On the whole, also, the jury preferred those designs which placed the living rooms of the house to the rear facing a garden, believing that the average American suburban community places too much stress in facing the street; but the disposition of main rooms would normally follow the sun, air and outlook — conditions not predicated in the program, but which would be assumed by the competitors, so that designs with the principal rooms or piazza facing the street were not regarded with disfavor.



FOURTH PRIZE DESIGN
SUBMITTED BY HALSEY B. HORNER, BOSTON, MASS.

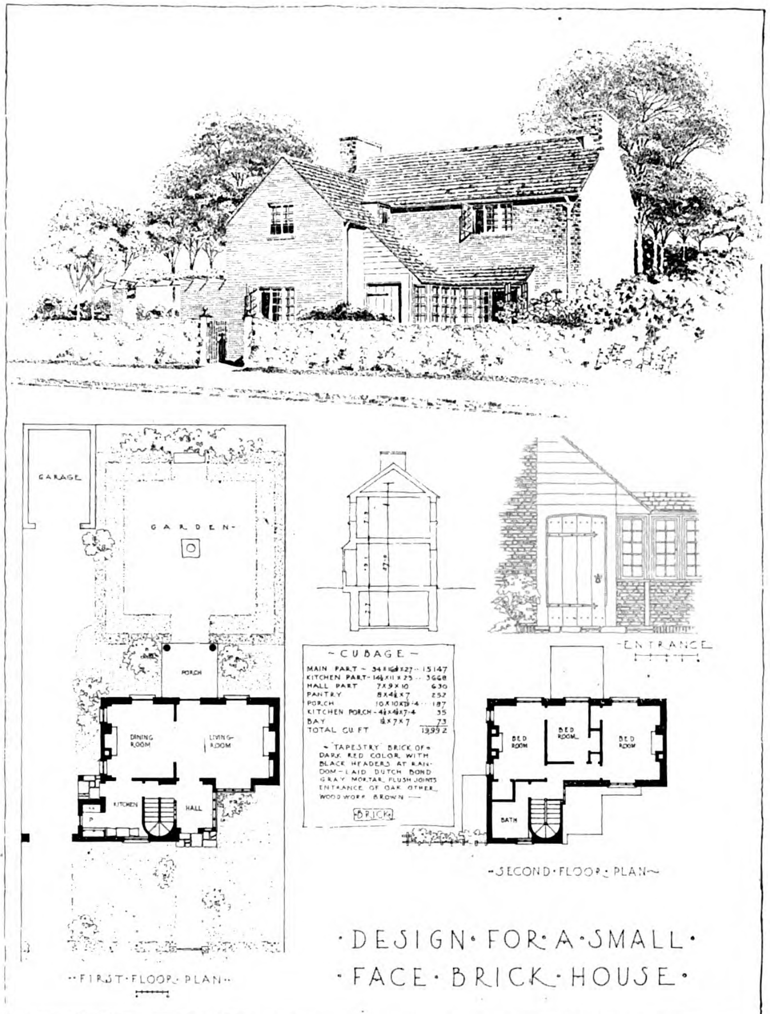
FIRST PRIZE DESIGN. This design combines practically all the features that the jury felt to be necessary to a correct solution of the problem. The architecture is of an extreme simplicity, but very great charm, and admirably adapted to secure a maximum decorative effect with a minimum of expense. The design depends only upon the fenestration, the excellence of the mass, and the good quality of the detail. The placing of the house upon the property is good, and the treatment of the back garden simple, but entirely satisfactory. While the plan presents no extraordinary feature, there is no waste space and the rooms are of good size, properly proportioned each to the other and well located. The porch connects the living and dining rooms, so that it may be used either as a living porch or an outside dining room. The kitchen is compact and is connected to the dining room by a pantry, which while small is entirely adequate, since in a house of this size the pantry would be used only as a china closet without an extra sink, but its inclusion as an intermediate feature between the kitchen and the dining room is necessary to cut off odors from the kitchen. The bedrooms are all square and free from projecting closets or unpleasant angles. The scheme as a whole is a practical and artistic solution of a just conception of the problem.

SECOND PRIZE DESIGN. Much the same considerations which determined the choice of the first prize influenced the jury in selecting this house for the second prize, although Mr. Shelgren's design indicated a formal little house, while this design tends toward the picturesque. It is quite the best of the picturesque houses submitted, growing up as it does in each direction from the ground, and depending for its picturesque quality upon the admirable placing of the entrance, the gables and the windows, and upon the simple and natural treatment of the brickwork. There is no addition of unnecessary features, or contortion



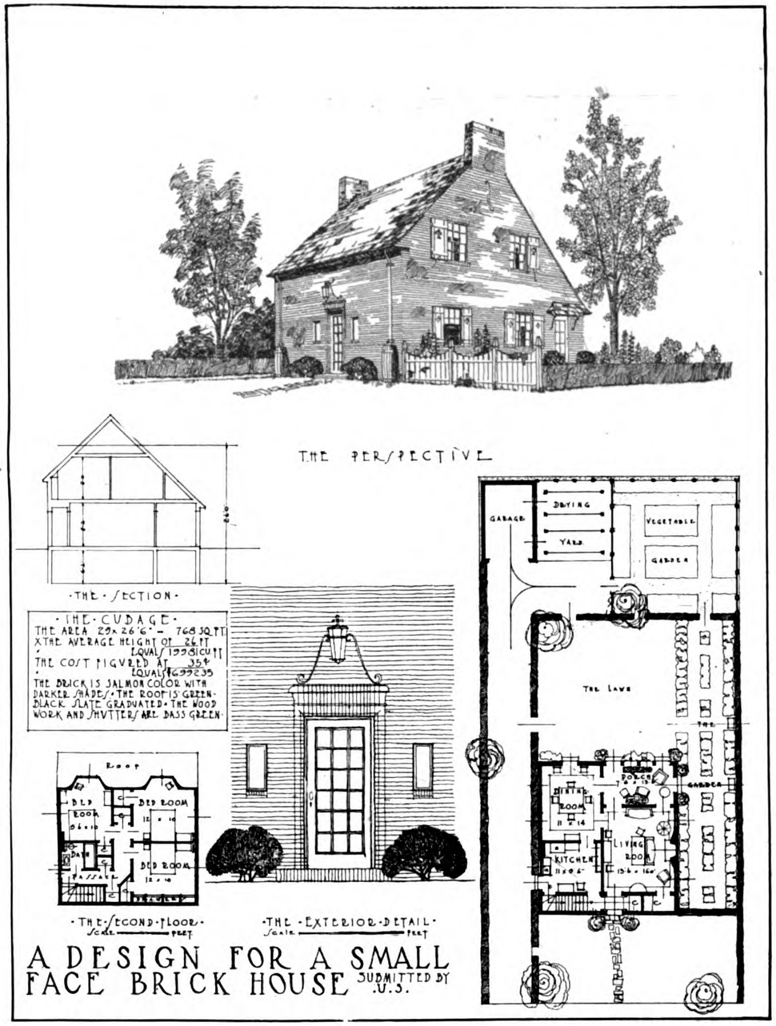
MENTION DESIGN

SUBMITTED BY J. IVAN DISE, DETROIT, MICH.



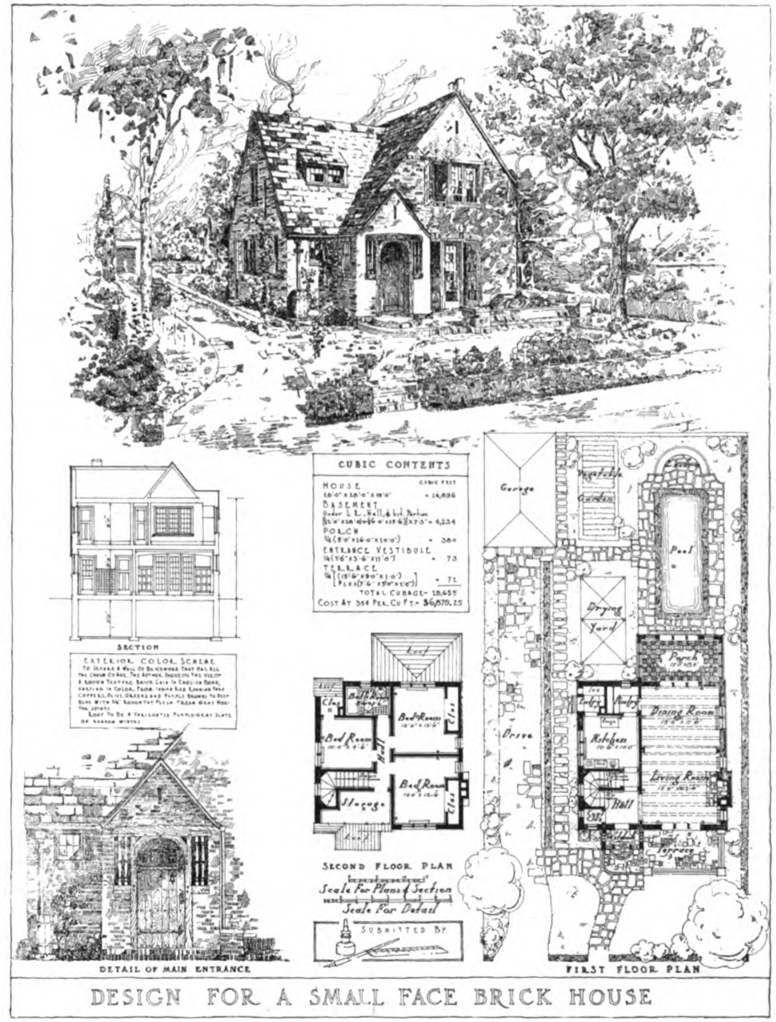
MENTION DESIGN

SUBMITTED BY A. S. CRAPSEY, NEW YORK, N. Y.



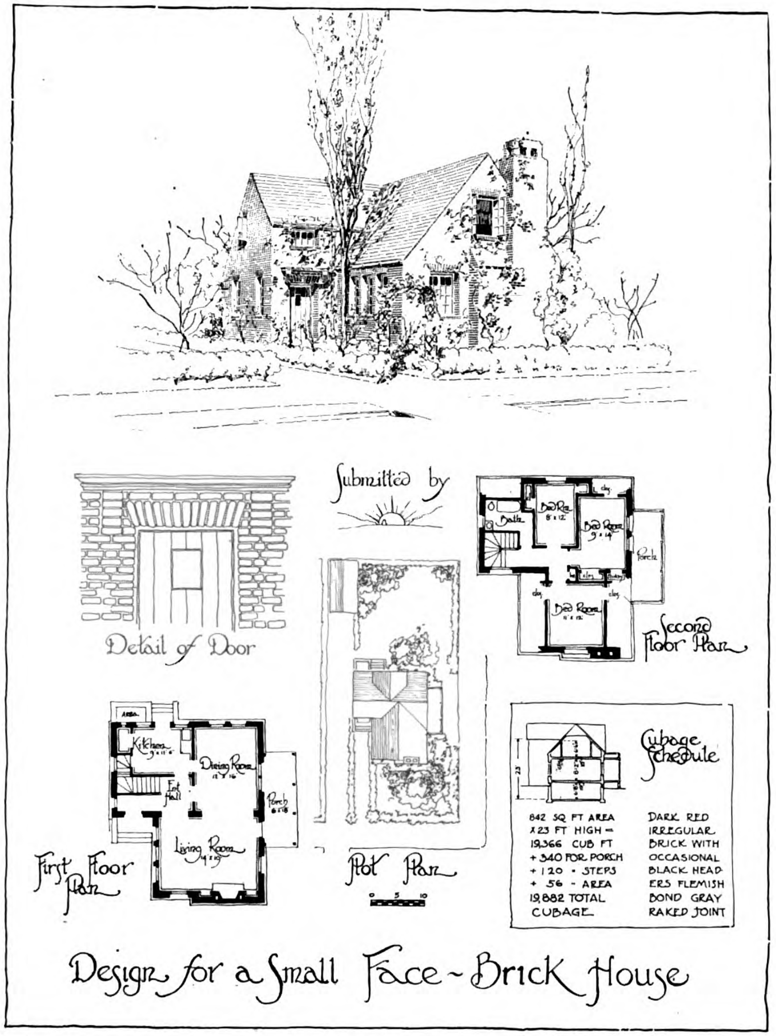
MENTION DESIGN

SUBMITTED BY GEORGE H. VAN ANDA, NEW YORK, N. Y.



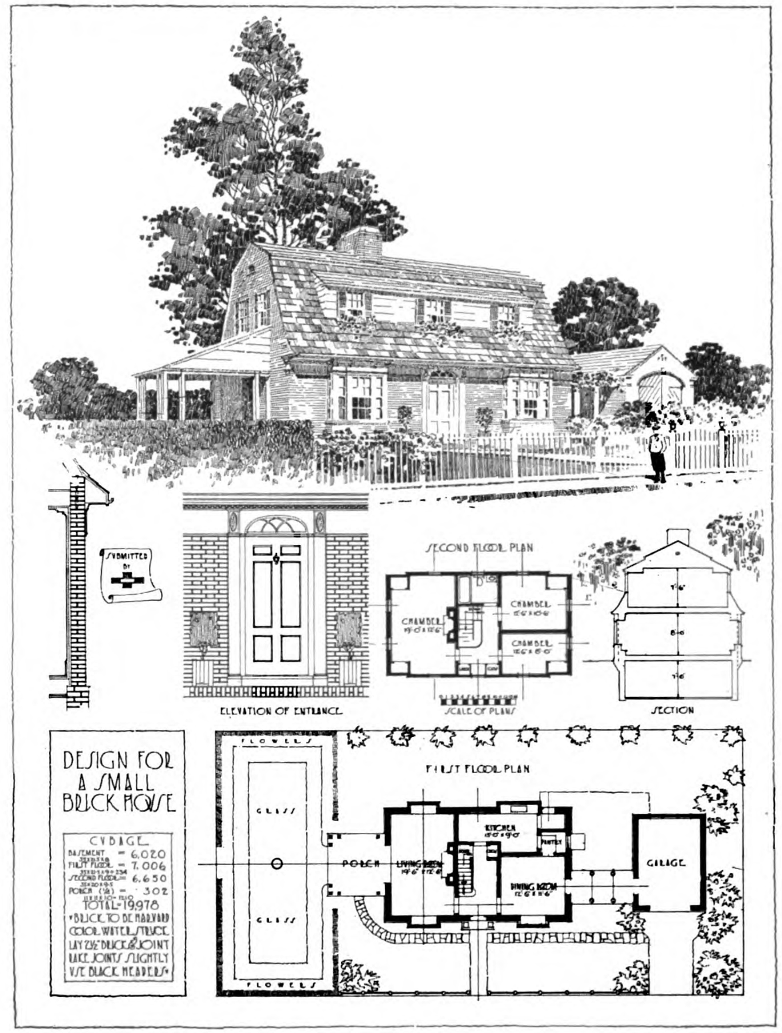
MENTION DESIGN

SUBMITTED BY ALBERT M. AND CHARLES F. PYKE, INDIANAPOLIS, IND.



MENTION DESIGN

SUBMITTED BY ERNEST E. WEIHE, SAN FRANCISCO, CALIF.



MENTION DESIGN

SUBMITTED BY JOHN BARNARD, BOSTON, MASS.

of motives to secure the picturesque at the expense of practicality of plan, or simplicity of construction, and each of the motives, which commend themselves as attractive on the exterior, is a signified expression of some feature equally attractive upon the interior. The jurors felt that the staircase was rather thrust upon the person entering the house, although the vestibule mitigates to some extent the objection. The service entry and the pantry were thought to be commendable features. While the main bedroom has the ends cut off by the slope of the roof, the dormers are placed on center of the principal axes and the waste spaces taken up by closets, so that the room will be both practical and attractive. The bathroom is well placed over the pantry and the plan is perhaps the most compact of all those submitted.

THIRD PRIZE DESIGN. This design might very well have been placed higher than third, except for two things: First, the designers have chosen a corner lot, reducing the difficulty of their problem; and second, because the designers seemed to be uncertain in their own minds as to whether they were or were not designing a bungalow, and finally compromised by placing one bedroom in the second story, badly lighted and far from the bathroom — a decided inconvenience. The first story is excellently planned except for the tour of the grounds, which is necessary from the street to the service entrance, for which some much better solution might be obtained. The arrangement of the living room, dining room and kitchen is good, and the bedrooms form a group completely separated from the living part of the house, —and no space has been lost in halls leading to them. The exterior was, perhaps, the most interesting of the entire competition, but the above mentioned defects forced the jury to rank the design no higher.

FOURTH PRIZE DESIGN. This was quite the best of the very great number of "L" shaped plans submitted. The placing of the chimney assists to relieve the unpleasant appearance of ridge lines at approximately the same height. The exterior is very picturesque and the plan of the first floor is extremely practical and compact. The second story suffers somewhat from the loss of space inherent in the adoption of low eave lines and steep pitch roofs, but this on the whole has been well taken care of. A better disposition of the closet space in the second story might easily have been made. The drawing suffers in appearance from overrendering of both the plan and perspective. Compare this, for example, with the simplicity of rendering of the first and third prize designs.

MENTION DESIGNS.

The design submitted by George H. Van Anda was given mention chiefly on the exterior, which the jury felt to be unusually satisfactory as a simple and interesting mass. However, the plan was considerably forced to secure the unbroken façade of the street front, and while the first and second floor plans were by no means bad, a considerable amount of study would be necessary to clear up the cluttered hall on the second story and to improve the unpleasant stairs.

The design by Albert M. and Charles F. Pyke is well planned, the jury liking the idea of making the living room and dining room practically as one, and finding the arrangement of stairs between hall and kitchen especially good. The bedrooms on the second floor are also well arranged. The jury did not like the method of roofing the "L" shaped plan, believing that though not bad from the point of view chosen, it would result in an unpleasing exterior from many points of view; but the details of the entrance porch were so good the jury was inclined to believe that the final result would be somewhat redeemed by skill in handling other parts of the building, although they were unable to commend the exterior as a whole.

In the design submitted by A. S. Crapsey the arrangement of the house upon the property was thought to be most excellent in the placing of the living room and dining room across the rear. The living room is planned well and practical. The combination of drive and service entrance is also excellent, and the placing of the stairs especially to be commended. The second floor plan is good and the exterior entirely charming.

The jury was especially pleased with the exterior of the design submitted by J. Ivan Dise. It was one of the few with the porch across the front and, although the architecture is reduced to the simplest possible measure, still the design is sufficiently picturesque. The plan of both the first and second story is attractive, although more space is wasted in the hall than was absolutely requisite, and if the rear of the lot was intended for a garden, it would seem rather a pity not to have the living room receive the advantage of facing this feature.

In the design by Ernest E. Weihe the contestant in common with many of the other competitors failed to make up his mind as to which was the principal roof and which the wing. The plan of the first floor is attractive in its simplicity and the plan of the second story is fair. Lack of effort of the rendering of both plans and perspective was commended by the jury.

In the design submitted by John Barnard the lot was assumed to be a corner one, and thereby the contestant gave himself an advantage over most of the other competitors, which he failed to utilize to the highest degree. The design was the best of a considerable number of gambrel roofed houses submitted, although in order to secure sufficient height in the second story bedrooms the designer thought it necessary to introduce long shed dormers in both the front and back of the roof, thereby injuring to some extent the simplicity of roof, which is the charm of the Dutch Colonial house, and resulting in unusable spaces in the corners of all second story rooms. The plan otherwise is good and the exterior shows good taste in matters of detail.

H. Louis Duhring, Jr., Philadelphia,
Aymar Embury II, New York,
C. Herrick Hammond, Chicago,
Walter H. Kilham, Boston,
Louis La Beaume, St. Louis,
Jury of Award.

EDITORIAL COMMENT

THE PUBLIC APPRECIATION OF ARCHITECTURE

AT the last convention of the American Institute of Architects in April of this year the remark was made by a speaker that no larger or more important task awaited the efforts of the Institute than the matter of public education in the appreciation of the fine arts, and architecture in particular. The resolution that occasioned the remark recommended close co-operation of the Institute's Committee on Education with the Association of American Colleges, and a very interesting discussion centered about it. It was pointed out that our universities had one serious shortcoming from a cultural aspect in that they did not at any point recognize the fine arts, or that the existence and appreciation of the fine arts connotes the highest state of civilization. As a natural consequence, in later years when their graduates take an influential part in affairs of public interest, they are able to bring to their duties no real conception or appreciation of the artist's work.

We are daily reminded of the existence of this barrier to the progress of architecture. There is instinctively an appeal to almost every human in an imposing and handsome building — he may stop to admire it, but very few have any appreciation of the fact that it required some artist to design it. The man is a hundred times more likely to visualize the work of the contractor who erected it, and mentally give him credit for a piece of work well done, than to think of the greater work of the designer. Why is this so? Because we can only appreciate those things about which we have some knowledge. The man in the street has seen the foundations put in place, he has watched the steel framework riveted together, he has observed the building take definite shape through the work of the stone mason. These things he knows; and knowing them, not from a technical standpoint but only in a general sense, he appreciates them. On the other hand, he may not even number among his acquaintances an architect, to say nothing of having any familiarity with an architect's office where he might observe the talent and industry expended in the preparation of drawings for the buildings he sees all around him. Furthermore, he never will know the function of the architect or be able to appreciate the art of architecture until architects realize that they owe an important duty to their profession, and a bigger one to civilization, in taking definite steps to bring to the public some knowledge of their art.

In the exercises attending the dedication of the memorial to John Merven Carrère, which is illustrated on another page of this issue, Mr. Joseph H. Freedlander stated that with the exception of the monument to Richard M. Hunt in New York, this is the only memorial to an architect ever erected in this country. Could more convincing evidence be asked of the lack of public appreciation of architecture and of the men who have brought it to the present high state of development in this country? No other profession has made greater progress in the last half century, nor is the work of any other more intimately under observation, yet appreciation of architecture is practically limited to its own followers.

But what a group of illustrious names does the architectural profession revere! — Richardson, Burnham, Hunt, McKim, Carrère, Day and many others. What does the greatness of our cities not owe these men? Yet their names are known to but few outside the profession. Is not the work they have done in providing us with the inspiration to achieve better civic development, and more wholesome and beautiful surroundings for all citizens, of sufficient value to rank with the work of leaders in the fields of medicine, law and the church? It is an indication of the lack of breadth in our cultural training that the work these men accomplished remains as a sealed book, and the memory of their names confined to their confrères, when the world would be eager to share in giving them honor if their worth were known.

The whole effect of the true architect's work is influencing the public unconsciously to require better buildings and surroundings for their daily lives. The practice of architecture is one of the most constructive callings in the world, and there is in it elements that would strike a responsive chord in the public mind. The art of architecture, the high ideals that govern its practice, its essentialness to the full cultural development of a nation, must be made known to the public. It is, as the speaker at the convention remarked, the biggest task before the Institute. The people are entitled to share in the knowledge of architecture with the profession, and it is the unescapable duty of architects through the Institute, their representative body, to co-operate with all educational agencies to the end that a spirit of appreciation for the fine arts may be fostered, thereby assuring to future generations a greater opportunity to enjoy the things of the spirit, and to the leaders in the greatest of all arts a larger measure of public recognition than is represented by two monuments commemorating so important a public work in this country as the architectural activities of over half a century.

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PLATE ILLUSTRATIONS

LETTERPRESS

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VIEW THROUGH COLONNADE OF
MUNICIPAL BUILDING, NEW YORK CITY
McKIM, MEAD & WHITE, ARCHITECTS
Photograph by John Wallace Gillies

THE ARCHITECTURAL FORUM
FOR QUARTER CENTURY THE BRICKBUILDER

VOLUME XXXI DECEMBER 1919 NUMBER 6

The Apartment Building for Moderate Rentals

By ELISHA HARRIS JANES

PART II

A NEW era in modes of living, brought about by many new conditions, is influencing many to seek apartments who have never given it a thought before, one of the important conditions being the servant problem, causing many people to give up private houses which require two or more servants, and others to change from large apartments requiring one or more servants to smaller and more compact ones, where they are not a necessity. A second cause is the very serious problem of the raising of rents, resulting in the demand for still fewer rooms to keep within the rent budget. For this reason some owners have altered their buildings by cutting one apartment into two and with the same number of rooms almost doubling the total rental. But with all these difficulties the public are becoming more and more particular and discriminating. The new generation has been brought up in the older apartments and is learning what to look for and what can be done.

Conditions are improving because the operators are making a greater study of the problem through the realization that to make an operation a success the tenant must be pleased and his demands met. They can no longer go on the principle that, as one type was a success in one neighborhood a few years ago, it can therefore be repeated in another location and be just as successful.

Some of the apartment builders deserve great credit for the careful manner in which they study the wants of the tenants, whether it be for economy or to please the tenant; some keep careful notes tabulated of all the requests for changes, complaints or criticisms of the apartments, closets, kitchens, etc. By the intelligent use of such data in the building of another apartment they are able to accomplish many savings; as an example, in one apartment house there were many requests for the removal of certain doors; in the next one erected they were omitted, amounting to something like sixty doors — quite an item. In another case it was found shower baths could be omitted from over the tubs. These may seem small details, but a few of them soon amount to a large sum, and they are some of the points that make it difficult for the inexperienced architect and the one who is designing his first apartment.

The planning of an apartment house is entirely different from any other architectural problem: there are no prototypes; the standards are always changing of necessity, due to different manners of living, and only close study with the renting agents of the wants of the tenants will produce a successful building from every standpoint. The average tenant is as particular in taste in the selecting of her apartment as in her dress, and in the course of a few years changes her ideas entirely — perhaps in location, the number of rooms desired, etc.

There is, perhaps, more detailed work to be considered in apartment house building than in any other type of structure. This statement at first will not be believed and will be contradicted. At first thought it does seem, for example, that a residence would receive much more detailed consideration; but a moment's reflection recalls that in a residence the architect has only to build for and please the one owner. In the apartment he has to build for and please as many tenants as are going to occupy the apartments for years to come,— that is, if he puts his conscientious efforts in it, — as well as the owner, who is looking for a profitable investment.

It must be admitted that the first consideration is to make the operation of the building a financial success and, secondarily, an architectural success. Fortunately they both generally run together. But each detail, each feature, has to be weighed and considered as to how it will affect the first. In the previous paper the direct financial sides were considered in detail, the part affecting the owner; in this paper we want to consider the other side, the intimate and personal side which caters to the tenant, attracts him and helps keep the building fully tenanted, thus insuring the success as figured in the financial side.

Having established the location and the type of building, there now follows the discussion, inasmuch as the exterior is first to attract the eye, as to how expensive a type of façade should be chosen. Considering the economic side, it is very difficult to decide when and where expense is warranted.

In certain locations the simplest and plainest type will be a success. In other places it is absolutely necessary to make a more or less elaborate design. As an example, in 1903 one of the first twelve-story apartments was built in New York, The Dorilton, and as it was pioneering to a certain extent, it was decided after long conferences to make the building figuratively "shout" — to make it talked about. At this time the earlier students were returning from the Ecole des Beaux Arts and introducing the bold French architecture. This style was therefore used and a considerable amount was spent on the façade, with the result as anticipated. The building was a success from the time it was opened and has remained so. It is probably known by more people than any other one in the city. This, of course, is an extreme case.

The Dorilton Apartments, New York
An Early Type Illustrating the Influence of L'Ecole des Beaux Arts
Elisha Harris Janes, Architect

On the other hand, an apartment of the usual type, built in a district where there is a great demand for apartments, will be a success, no matter what the design of the façade; and a simple design in simple materials, which has sufficient refinement to attract the better class of tenants, is the most advisable. There is one good characteristic about the speculative builder, — he copies fairly well a building that has proven a success. This, coupled with the fact that the former types with heavy metal cornices, fancy terra cotta, etc., were not only more expensive, but the upkeep was much greater than the quiet, refined and simple design now popular, has caused great changes in the general character of façades for apartments.

Undoubtedly the most appropriate is one that gives the appearance of a residence. These have been carried out exceptionally well in some of the Chicago and Boston apartments.

Several exteriors are published which show what splendid compositions may be designed when treated in large units, some giving a suburban appearance as the "Gables," and another resembling the Manor architecture of England. The use of a large front court from 40 to 50 feet wide, and the several entrances arranged from its three sides, give a feeling of privacy and quiet.

The apartment illustrated on Post avenue, New York, has some half timber work and gables cleverly introduced without reducing the full head-

Sterling Apartments, Chicago, Ill.
Robert L. Kane, Architect

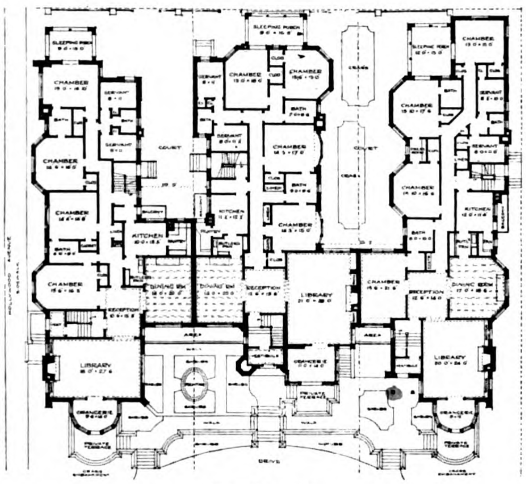
room of the top story, and the corners are made into blind chimneys. It is unfortunately spoiled by the exterior fire-escapes.

The design by Mr. A. J. Thomas, illustrated on page 186, which received the gold medal of the New York Chapter of the Institute, has been copied extensively, more or less successfully. Combining, as it does, taste and refinement with economy, it appeals to the speculator.

Next to the façade comes the entrance and vestibule—an important influence with women. Where many apartment builders neglect the façade they have realized the importance of the entrance and strive for something pretentious, sometimes resulting happily, but more often very much overdone from a decorative standpoint. A plain, simple and dignified one is undoubtedly the best.

Whether there should be a reception room depends upon the character and manner in which the building is to be operated. If visitors are to be announced, one is necessary. Otherwise an attractive hall will suffice. Careful consideration should be given to the location of the telephone switchboard, stairs and entrance to the elevators, as these produce the first and last impression upon a prospective tenant.

The question whether the ground floor shall be used for stores or not is generally decided by the location. Where the apartment house is on a thoroughfare or business street, it is practically obligatory. At times though, when an apartment is erected in advance of the business, the stores are omitted; but in such cases it is advisable to have the entrances on the unimportant street, so that



First Floor Plan

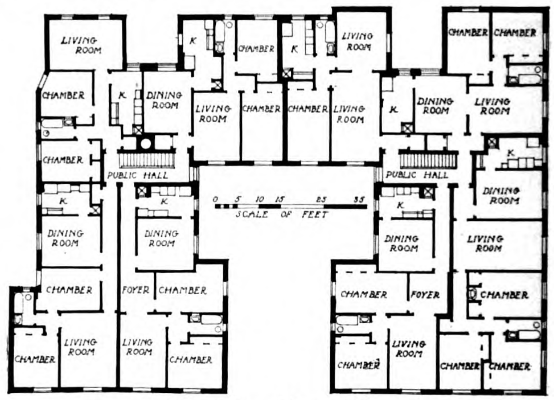
The Gables Apartments, Chicago, Ill.
J. E. O. Pridmore, Architect

the portion on the main street may be changed to stores without much alteration, if desired, at a later date. There is no doubt that it is objectionable to have stores, and it not only affects the rents, but also the class of tenants ; but this is generally overcome by the higher rents obtained from the business premises. Again it is a matter of figures.

The moving in of furniture presents a serious problem in apartments, specially the non-elevator ones. The movers have little respect for the walls, trim, etc., and much damage is caused by them. It is therefore necessary to arrange the access so as to eliminate as much as possible the chances of damage. It is an item to which too little importance is given when considering the question of a rear entrance or service elevator. The halls should be wide and with few turns, and the decoration such that cannot be easily damaged ; yet if damaged, easily repaired. It is a fortunate thing, however, that dwellers of apartments usually have little furniture.

In the early apartment it was thought necessary to have long halls in order to reach each room. This is eliminated in the better designed houses as described before. In larger apartments the long

Apartment House, 204th Street, Bronx, New York

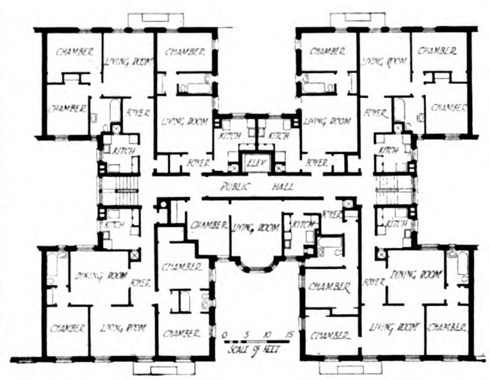


Typical Floor Plan of Above
Andrew J. Thomas, Architect

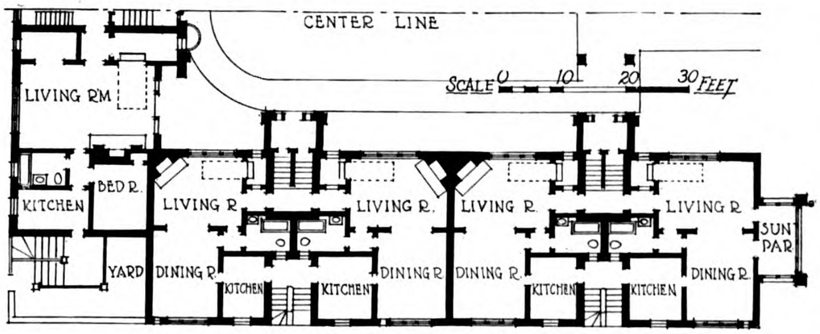
Apartment Houses, Post Avenue and 204th Street, Bronx, New York
Fred F. French Company, Architects

DETAIL OF AN END ENTRANCE COURT

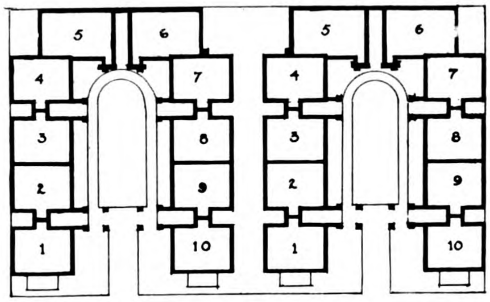
THIS group of apartments is composed of three units similar to that shown in plan. The plan illustrated is the typical floor of the center unit and is similar in all respects to the end units, with the exception of the bay window in the entrance court. The first floor provides for two doctors' suites in each unit arranged on either side of the entrance with individual entrances as shown in the illustration above. The apartments vary in size from two to five rooms, with bath and conveniently arranged kitchen. Service to each apartment is provided from the basement by dumb waiter.



APARTMENT HOUSES, 115-135 WEST 16TH STREET, NEW YORK, N. Y.
G. A. & H. BOEHM, ARCHITECTS



Detailed First Floor Plan of One Wing, Kellshore Apartments



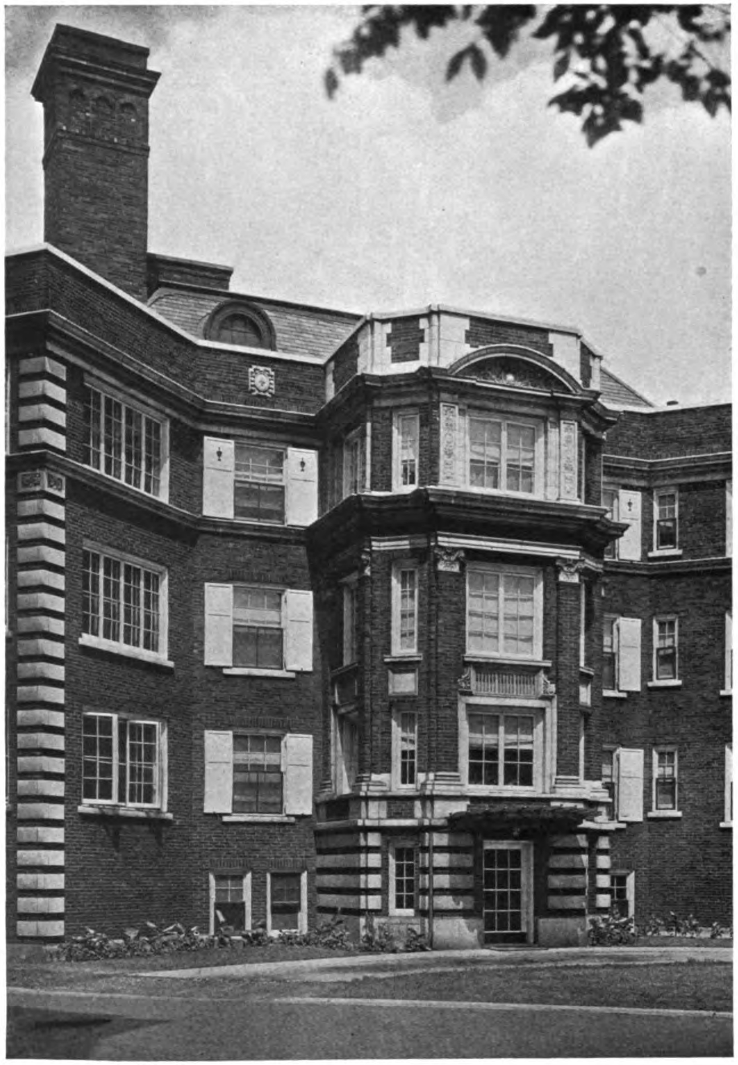
Block Plan, Kellshore Apartments, Chicago, Ill.
E. Norman Brydges, Architect

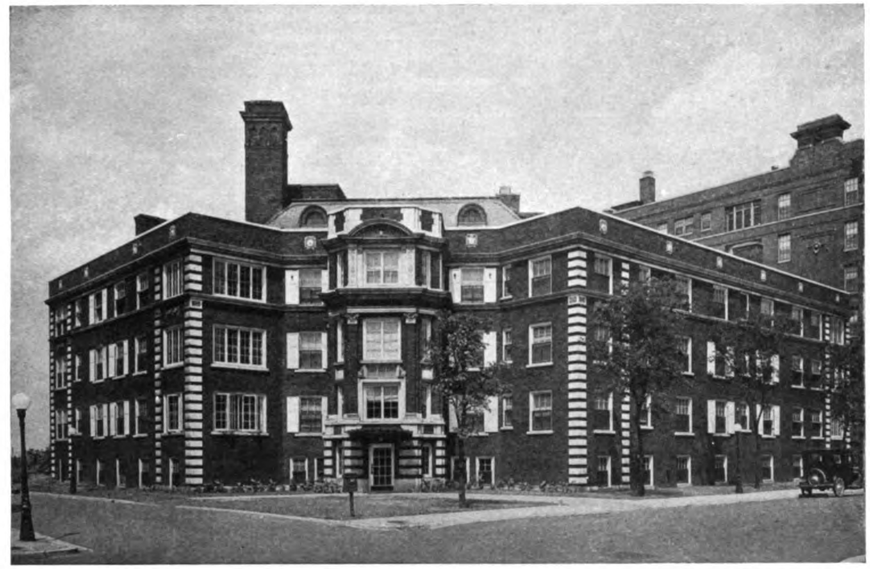
hall is sometimes necessary, but in those cases it is well to modify it by a foyer. This without wasting room gives a generous, hospitable entrance, allowing a place to put one's coat and hat.

The most inexcusable mistake in many apartments is the location of the bathroom. No one would ever think of placing the bathroom in a private house on the first floor by the front door. Yet that is precisely what is done in many apartments. It should be placed next to the chambers and as far from the entrance and living room as possible, even though it cost an extra stack of plumbing. It will be repaid. It is attractive to have the bath open off the main chamber or between two chambers. But in that case it should also have an entrance from the hall, and the New York tenement laws require it unless there is a second bath. It is too often squeezed into any place, generally with the idea of saving an extra stack of plumbing. Little thought is given to its detail, yet it is one of the strong renting points. If possible the tub should be built in. It pays in the end by minimizing the danger from leaks by the splashing of water, especially if there is a shower, and the greater ease with which the room may be kept clean. A medicine closet is essential, and if a towel or bathrobe closet can be worked in, it should be done. With the plumbing it is economy to arrange a pipe shaft where repairs can easily be made without damage to the building or decorations.

The location of the kitchen is one of the most difficult problems. The Chicago and Boston apartments often answer it successfully by having rear entrances from alleys. This is the ideal solution in walk-ups, but it is not always practicable. The scheme of a service elevator that supplies several apartments of course is most convenient, but lacking that service must be by dumbwaiter. These

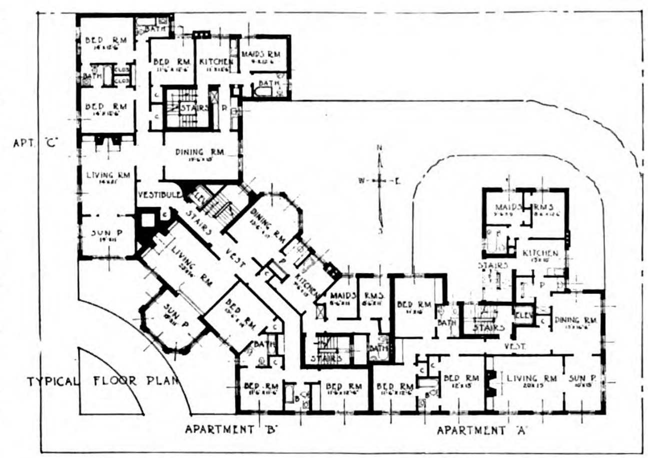
General View and Typical Floor Plan of Kingsbury Apartments, St. Louis, Mo.
La Beaume & Klein, Architects





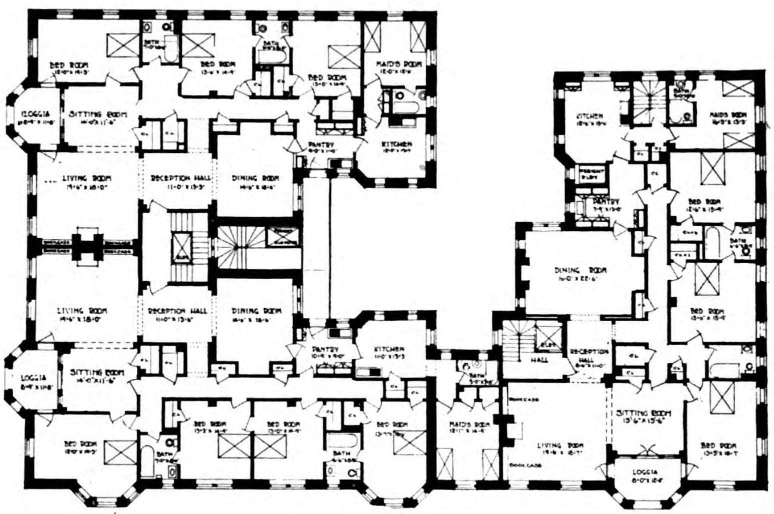
GENERAL VIEW OF EXTERIOR

THIS plan gives the openness of a private house in its arrangement of principal rooms in a comparatively small space. The main rooms of all apartments have street frontage. There are three apartments of practically the same size to each floor. Sun parlors are an important feature and have been incorporated without depriving any of the rooms of direct daylight.



APARTMENT HOUSE, 205 DELAWARE PLACE, CHICAGO, ILL.
CHATTEN & HAMMOND, ARCHITECTS

General Exterior View



Typical Floor Plan

Oxford Apartments, St. Louis, Mo.
La Beaume & Klein, Architects

should only open to one kitchen on a floor, otherwise the danger of robbery increases. The delivery of food, ice, etc., and the taking away of garbage by the dumbwaiter, are most annoying; but the difficulty can be modified greatly by the manner in which the house is run and cared for by the janitor. Some of the older buildings had one common dumbwaiter in the hall for the use of all the tenants, but that now only occurs in the tenements.

The kitchen naturally should be convenient to the dining room, but otherwise shut off as much as possible from the balance of the apartment to keep out the noise of dishes and odors of cooking.

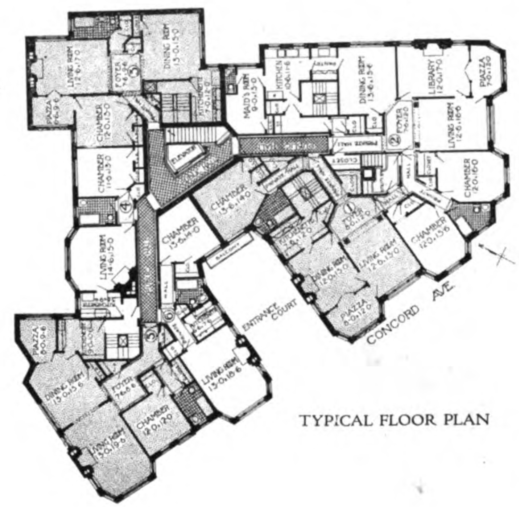
Ventilation, unfortunately, is little considered in most of the kitchens, which often results in every one knowing what their neighbors are going to have for dinner. Two flues, 12 by 12 or 12 by 16, connecting to alternate kitchens, are a great help in overcoming this nuisance, especially if a hood is over the range. In this room there is a great chance to please the housekeeping wife by compactness and the convenient location of the range, sink, tubs, dresser, refrigerator, etc. Also details that may be introduced in the manner of combining the sinks, tubs and drainboard, a small broom closet in connection with the dresser, a drop table, sliding bread board and arrangement of the drawers and dressers, an overhead clothes dryer that lets down by pulleys, the concealed and ventilated garbage holder under the window, the garbage chutes connecting directly with the incinerator, shelves and utensil hooks—all tend to make a house a success. It is surprising how often an apparently minor detail, as any of those just mentioned, will attract the woman looking for an apartment and overbalance a major defect.

Whether the living room or chamber should have better exposure has raised many discussions. The argument for the living room is to have a cheerful room with good outlook in which to spend the day. The argument for the chamber is that the room to be slept in should have the sun if possible and the best ventilation, as during the day much of the time is spent in them, while the living room is used most during the evening. Apartments have been designed both ways with success. But probably the majority of the public give preference to the living room having the good exposure. The chamber should never be next the elevator for obvious reasons. It should have at least one ample closet. It is worth while to provide an additional closet in the apartment and to make use of space under window seats for closets.

Unfortunately few apartments make good use of the roofs. In that a splendid opportunity for a roof garden is lost. The objection of the builders to having it is the cost and a fear of their tenants

CONCORD HALL APARTMENTS, CAMBRIDGE, MASS.
NEWHALL & BLEVINS, ARCHITECTS

THIS building is provided with fireproof halls and stairs, each apartment having two fireproof means of exit. Apartments vary from two to six rooms, all of them containing a large living room with an open fire. The kitchens are conveniently arranged and are provided with service stairs direct to basement, where laundry space and maids' rooms are located.

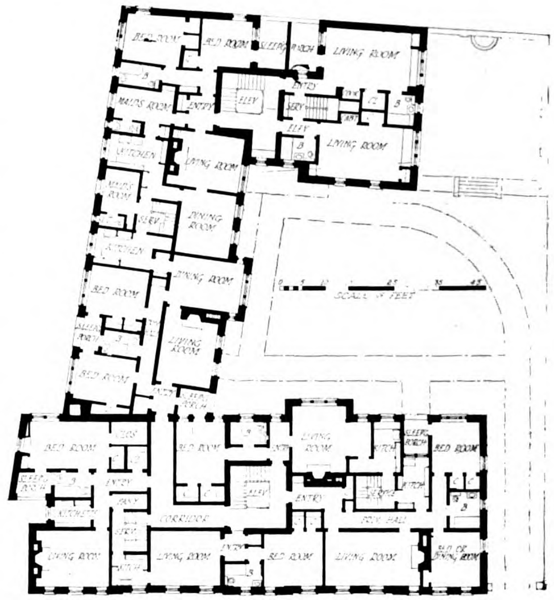


TYPICAL FLOOR PLAN

becoming too friendly, gossiping and conniving and discussing the defects or apparent annoyances in the building, which, of course, appear magnified, and then following with concerted complaints to the owners. This may seem exaggerated, but there are instances of sun parlors being designed and built for apartments and then abandoned just because that happened. With most houses the only use made of the roof is for the drying of clothes. It is unfortunate, as with the crowded streets it would make an excellent place for children to play.

The laundry problem has never been settled. Probably the most practical method is the old custom of hanging from the clothes pole in the rear, but long discarded on account of appearances. The other methods — drying on the roof, using clothes dryers and a common laundry in the cellar — each have their advocates, and one is as successful as the other.

The basement differs greatly in different apartments, due a great deal to management. The controlling features are the boiler, the coal space and the access to the dumbwaiters. As many trades people have to have access to the last, they are semi-public, therefore they should be easily reached and the passage shut off from all other parts so there is no excuse or temptation for people to stray from the corridor.



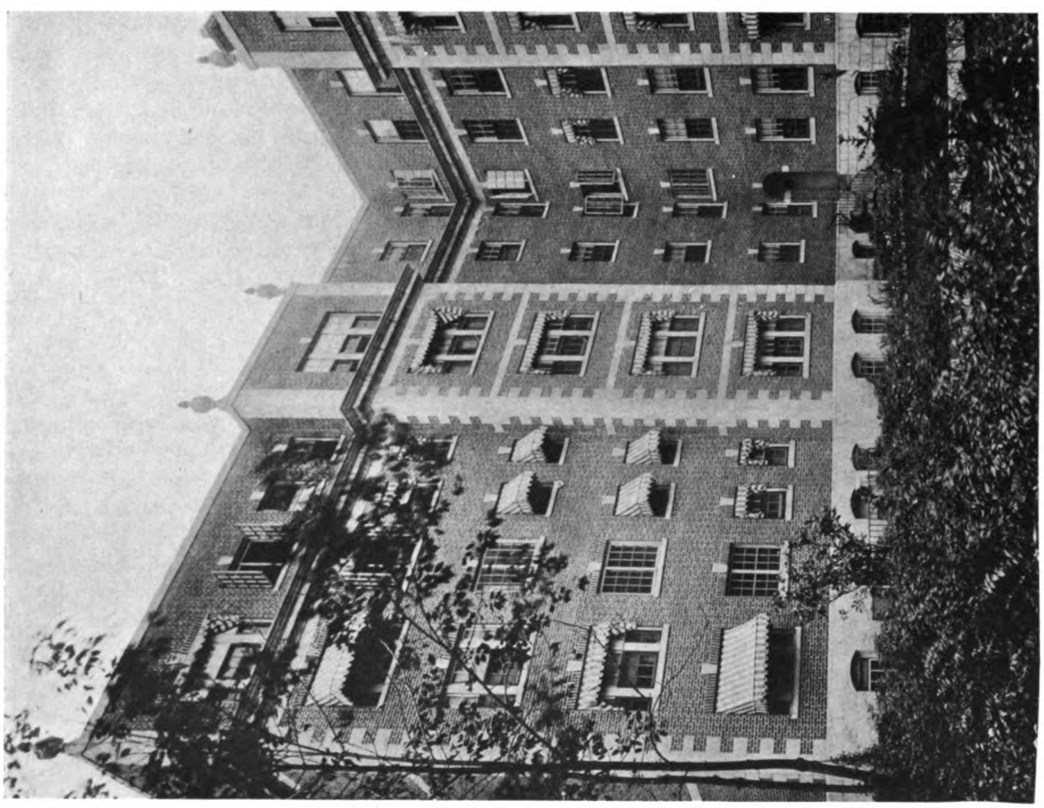
Typical Floor Plan, Georgian Court, Cambridge, Mass.
Goodell & Root, Architects

Too little care is given to the heating and water supply of buildings. Nothing causes more complaints and dissatisfaction than poor water supply, specially hot water, and lack of heat or noisy and leaky radiators. The generous use of cut-off valves will save much damage from leakage, and fire lines will save their cost many times in insurance premiums. Some thought to the convenience of the handling of the coal and firing the boiler will also show economies.

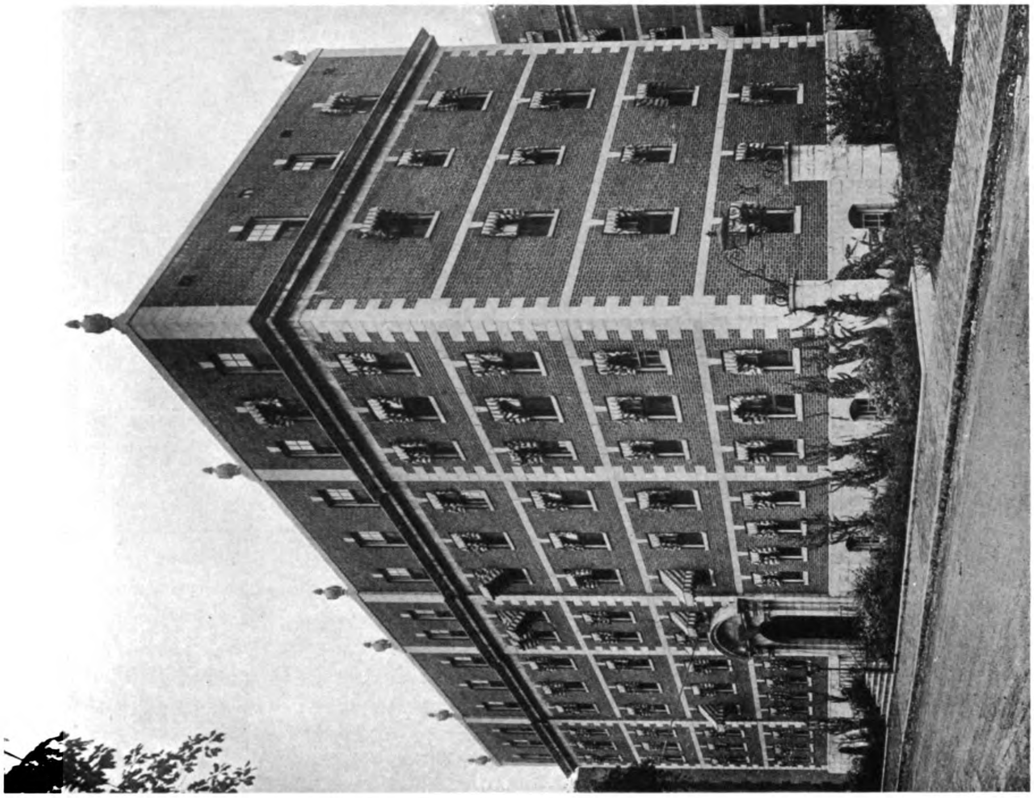
Detail of Entrance from Court, Georgian Court, Cambridge, Mass.

A few years ago the accommodations for the janitor were very meager, and very small salaries were paid, because the privilege was sought by many. But it has been found that it is a good investment to give the janitor good quarters and pay him enough to get good service, for he is the owner's representative, and his action reflects on the owner and can easily change the character of the house.

One of our difficult problems is the fire escape, — a decided necessity. No reputable architect would think for a moment of wishing to eliminate the second means of exit, yet all would welcome the elimination of the



VIEW OF INTERIOR COURT

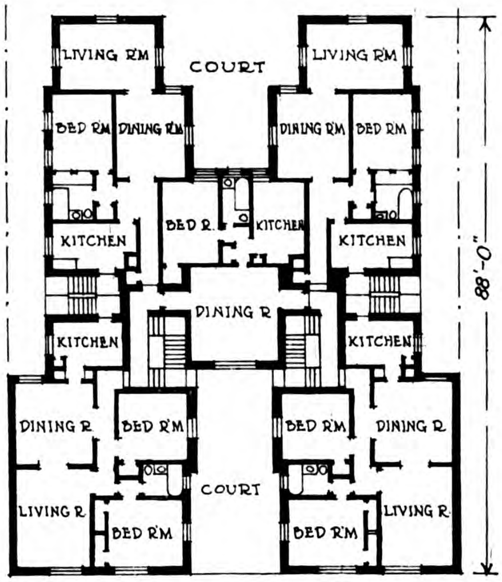


GENERAL VIEW OF STREET FACADE

GEORGIAN COURT APARTMENTS, CAMBRIDGE, MASS.

GOODELL & ROOT, ARCHITECTS

fire escape — they are dangerous — and the means of many accidents and robberies. In many of the cheaper houses they are used so much for litter of different kinds that the fire department has to make constant inspections to see that the regulations are not violated. With care in planning they can be omitted.



Apartment House Plan Showing Open Stairs between Fire Walls as Fire Escapes
Andrew J. Thomas, Architect

The plan illustrated opposite shows a second means of exit from each apartment — an exit that is far safer than a fire escape and that also provides for rear delivery service. The brick wall between the two staircases adequately cuts them off from each other. The cost of these two stairs is slightly more than the three fire escapes required ; but consider the enhanced value of the building without the fire escapes on the façade, and this extra cost is more than balanced, especially on the front of a building where it is so objectionable that to many it immediately stamps an otherwise high class apartment as a second class apartment.

One point of the New York law demands that if an apartment faces on the front and not the rear, it must have the fire escapes on the front if no other second exit is provided.

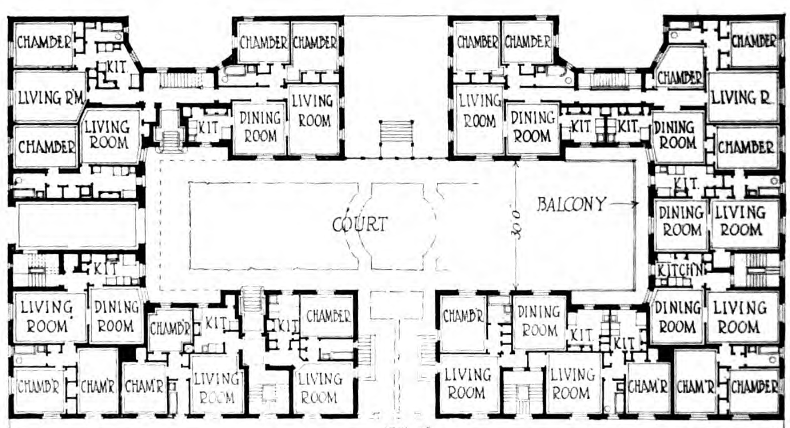
It cannot even be on a side court opening to the street. Many variations have been tried, such as forming a recess for the fire escapes and even masking them with arches or fenestration of some sort, but they still form a scar to the façade.

The plan opposite by Mr. Thomas shows another innovation of combining the fire escapes into balconies. When this plan was first published it was criticized as wasting property, but when put to the test, as illustrated in the previous issue, it showed a cost per rental foot of $6.50 and covered 66.2 per cent of the property — a saving of 41 cents per rental foot over a building covering 78 per cent of the property, or a saving of 6⅓ per cent over the total cost of the operation.

Several plans are published of buildings in Middle West cities. In these, special attention should be called to the extensive use of the sun parlor, sometimes taking the whole end of a room, or being added to the front and covering portions of the living room and dining room. They may also be used as open air chambers. Loggias placed on the corners of the buildings are also quite common in Washington.

The use of the combination kitchen and dining room is to be noted, sometimes called the "dining kitchen." It consists of a long narrow room, the inside being used for a kitchen and the outer part for the dining room. The division is formed by china closets 4 to 6 feet high. Another exceptional feature is the use of the folding wall bed, that swings into a ventilated closet, sometimes large enough to be used also as a dressing room.

The opportunities for new types of apartment buildings to meet the demands not only of investors, but to furnish the public with better living conditions, are innumerable, but require an endless amount of study. The details are so numerous that an article of this kind can only touch upon them. Yet it is to be hoped some assistance may be gained from these comments.



Plan of Apartments, 183rd Street and Concourse, Bronx, New York, Showing Fire Escapes Arranged as Balconies on the Court Walls
Andrew J. Thomas, Architect

C. STANLEY TAYLOR, *Associate Editor*

The Financing of Apartment House Projects

IT may be said generally that apartment building has during the past years been divided into two distinct classes: first, the purely speculative building activity; and second, the building of rental properties for permanent investment.

Naturally the first class of building has been poorly planned and cheaply constructed. The average speculative builder has had very little reason, in his own estimation, to call for the services of an architect. On the other hand, his problem was that of financing the building as extensively as possible without the use of his own money, and to build so cheaply and at such low overhead cost that a building could be made to show an attractive gross rental income when first tenanted in order that he could sell or exchange the building quickly with a good margin of profit to himself.

With the exception of isolated cases here and there where the speculative builder was in a position to carry out other than "shoestring" financing, and where he has been foresighted enough to realize that by building right an investing clientele would follow his operations and take the building off his hands at reasonable profit, we find that the trail of the speculative apartment house builder has almost invariably been one of inefficiently designed buildings in which material and equipment have been of inferior value and poor lasting quality.

On the other hand, practically all of the better apartment house buildings which can be found throughout the country are the result of investment building rather than speculative.

Such buildings have been little affected by fluctuations of the real estate market, and have maintained their values remarkably well even in periods when a comparatively small amount of property was being transferred.

In following the impress of mortgage foreclosures through apartment house sections of our various cities, it is evident that the owners of cheaper speculative buildings have invariably been the first to suffer financial reverses. In such buildings the turnover of tenants with consequent increased cost of repairs and general maintenance has always been much higher. Of course, at the present time, all apartment buildings are affording unusual incomes to their owners, and in the larger cities the speculative real estate activity has been almost confined to this class of buildings.

To-day, however, both speculative and investment builders are adopting a much better standard, owing to the fact that economy can be realized only through careful, practised design, and that buildings constructed at present-day costs must be built well if they are to maintain their values. What is more natural than that the great volume of expenditure which is now commencing in the field of apartment building shall be largely directed by the architectural profession? Here only can the planning experience so greatly desired by present-day builders be found, together with the ability to develop plans which will result in economies of building and maintenance.

Evidently, then, the architect is to be brought into consultation from the very inception of many such building projects. His advice will be asked in connection with the location of the building, and in many instances he will be called upon to interest himself in the financing of the project, which is probably the most difficult factor in connection with present-day apartment house building.

Preparing to Finance the Project

Never in the history of building finance has such careful study been given to the subject as the analytical consideration now applied by various loaning institutions to each logical mortgage loan application which is presented to them at the present time. These institutions are striving to do all that lies within their power to assist in remedying the housing shortage and to encourage building which will afford means of relief. Earnest endeavor is being made to encourage general public investment in mortgage securities, but at the same time it is necessary to afford such investors definite security. For this reason careful attention is paid to the planning and construction of the building to make certain that it is designed with efficiency of purpose and constructed sufficiently well to create an investment and collateral unit which will not suffer when building costs may be lower.

At this point the services of a capable architect may add materially to the success of the project in preparing carefully for its presentation to the loaning institution or other source of mortgage money. In order to obtain from the loaning source a definite idea of what proportion of the financing may be obtained under a building and first mortgage loan, the first application should be accompanied by carefully presented sketch plans showing the floor plans and elevations of the building; outline specifications showing the proposed construction of the building, and a general rental and maintenance cost schedule to demonstrate the earning power of the building. These figures should be based on actual conditions applying to the building in question. The estimated cost of the building accompanying the plans should be more than tentative and based if possible on relative costs of similar construction in the same locality at a recent period and tempered by any change in the building material and labor market. In other words, the plans should be worked out efficiently to meet a known demand in the locality, and all cost and income figures should be made with sufficient accuracy to make certain that they will be borne out by careful investigation.

Many architects have at present well established reputations with loaning institutions in the building field, and for others who have not done so much work in this field there is offered an opportunity now to establish good will and a name for careful, intelligent work which will prove of considerable business value in the years to come.

Various Methods of Financing

There are, of course, in common with most types of investment and speculative business activities, many methods of financing apartment house projects. In general, however, these may be broadly classified along the following lines.

The financing methods more commonly and successfully used for apartment building projects are:

1. Building without mortgage.
2. Building and permanent first mortgage and equity.
3. First and second mortgage and equity.
4. Participation mortgage and equity.
5. First, second and third mortgage and equity.
6. Amortization first mortgage and equity.
7. Co-operative financing.

The above methods of financing are considered in brief paragraphs following, and numbered to correspond with the tabulation:

1. The building of apartment houses without mortgage needs little comment, as such an activity is unusual and only possible where considerable funds are at the disposal of the builder. There are, of course, few apartment houses which are constructed and kept without mortgage, as the earning capacity of money which is borrowed at 4½ to 5 per cent is usually sufficiently great to show a profit above that figure.

On the other hand, the building of apartment houses without building loan, for the purpose of placing the mortgage after the house is completed, is a method which is quite often followed. In this manner some saving may be enjoyed through elimination of the cost of financing, and in many instances it is possible to obtain a more favorable mortgage loan after the building is completed.

In some cases building loans are made for the carrying out of apartment house projects. These may be straight building loans or building and permanent loans. In the case of the straight building loan an amount of money equal approximately to a normal first mortgage is loaned in three or four payments as the building progresses, and payment is provided for within one year after the completion of the building. In this manner a large proportion of the building cost is financed, and during the year after completion sufficient time is provided in which to arrange for a first mortgage loan.

Some builders and building companies which are particularly well financed build apartment houses on a speculative basis and sell at somewhat more than the average market price by taking back a first mortgage, which is more liberal than that usually allowed by the average loan institution. In this manner it is found possible to add somewhat to the selling price of the building and in turn to discount the first mortgage, which in itself constitutes a method of financing not unusual in localities where mortgage money is somewhat difficult to obtain.

2. A usual method of financing an apartment house project is through the medium of what is known as a building and permanent mortgage. In this manner, after working drawings are completed, a definite mortgage contract is entered into with a loaning institution, the provisions of which form a definite agreement as to the amount of first mortgage to be placed on the property after the building is finished. In the interim, to finance the construction, a building loan is made in three or four payments, the first payment usually after excavation and foundation is completed; the second payment when exterior walls are up and roofing on; a third in some cases when the rough plaster coat is finished; and the final instalment at the completion of the building. This final instalment is made when completing the last payments on contracts or building cost, in whatever form it may take, and shortly thereafter the agreed amount of first mortgage loan is adjusted and recorded.

The usual cost of a building loan is about 10 per cent for one year and 6 per cent for a period which the owner may extend over that time. It is evident, however, that in obtaining a building loan the bonus system must operate in direct ratio with the difficulty of financing and the amount of money available for such projects in a given locality. In times when there is little money in the building loan market, bonuses varying by agreement between the principals are paid for obtaining a building loan, and the amount of bonuses which the owner can afford to pay depends largely on the demand for the building and the consequent rental or sales profits which may be anticipated.

Permanent first mortgages are usually placed on a basis of 4½ to 6 per cent interest for a period of from three to five years. In placing a mortgage loan there are certain costs which must be met, including at times a bonus, although an extensive bonus is not usual in this case. Where the loan is placed through an attorney or mortgage broker there is a fee varying from ½ to 2 per cent of the principal amount, and in addition to that the mortgagor is expected to pay the cost of recording, legal services, title insurance policy or abstract, and other fees incidental to a real estate transaction of this nature.

In general it may be assumed that the cost of obtaining a first mortgage will be from 2 to 3½ per cent of the principal amount. The actual rates of interest on first mortgages are controlled in many instances by state law, but usually mortgage interest is as shown in preceding figures.

At the time a mortgage becomes due it is customary to seek an extension of the mortgage, at which time from ½ to 1 per cent of the principal amount is paid as a cost. In many states also there is a mortgage tax, the amount of which is easily determinable on inquiry and which is paid on all new mortgages as issued. This amount must also usually be borne by the borrower, but in case of renewals or replacement of mortgage it is customary to transfer the mortgage in a manner which will make it unnecessary to pay a mortgage tax on that particular property again.

After the completion of the building on this plan of financing further procedure depends on the purpose of the building. If it is a speculative venture, the building is immediately placed on the market subject to first mortgage and whatever terms are agreeable to the owner. If an investment project, the operation is now complete and a first mortgage loan, usually approximating from 50 to 60 per cent of the value of land and building, has been arranged.

In this manner the equity represents the investment of the owner, and on this amount the percentage of his rental profits is figured.

3. It can be readily understood that an apartment building operation, financed on a first mortgage only, requires a considerable cash investment by the builder, which represents usually from 40 to 50 per cent of the entire cost of land and building. The average speculative builder is not usually in a position to invest so heavily in a single operation and for that reason it is quite customary to borrow on notes during the progress of the building operation an amount of money approximating 10 to 20 per cent of the cost of the operation, with the understanding that when the building is completed and first mortgage placed, a second mortgage is to be issued to take up these notes.

In general, second mortgage money is expensive in that a discount which in some cases is as high as 15 per cent is asked by professional lenders in this market. Often, however, where the builder finds it necessary to finance in this manner, this discount or bonus is paid and added to the cost of the building on which to base its selling price.

Another method by which the building operation may be financed through the medium of a second mortgage is to arrange for the owner of the land to take a substantial price for his property, but in lieu of cash to take this entire amount as a second mortgage on the building when completed on this land. This action is commonly known as going behind the first mortgage and constitutes a method which is rather commonly employed by speculative builders. The land owner receives a good price for his property and is at all times protected by his mortgage claim. He in turn often discounts this mortgage if he wishes to cash in on his property.

Second mortgages are placed on buildings quite usually in the form of purchase money mortgages. This operation entails the construction of a building subject to a first mortgage, and at the time the owner sells the property he takes from 15 to 25 per cent of the sales price in cash and allows the balance of the equity to be paid for in the form of a second mortgage placed on the building and owned by him. This mortgage may be kept as an investment or discounted, and in many cases represents the actual profit on a building operation, while the cash payment is a return to the building owner of his original investment.

4. A form of mortgage which has been used somewhat extensively in the East and some parts of the West and South is known as a participation mortgage and involves the placing of a more than ordinarily liberal first mortgage in the following manner:

From any loaning institution a normal first mortgage representing from 50 to 60 per cent of the value of the property is obtained, and from individual investors an additional amount of approximately 10 per cent, or sometimes as high as 15 per cent, is also obtained under the same mortgage. In this proceeding a participation mortgage is issued, having a face value or principal of 70 to 75 per cent of the value of land and building. The first loaning institution has a primary interest in 60 per cent of this mortgage, and the lender of the participation money has the balance of interest. In this manner one interest rate applies to the entire mortgage and the actual interest payments are divided *pro rata* according to ownership of the mortgage.

The reason for placing such a mortgage is often to avoid the legal complications and sometimes the excessive cost of a second mortgage, or in some cases to make it possible to obtain a more liberal first mortgage through the services of any institution legally restricted to a loan not exceeding a certain percentage of the building, but through whose services investors may be reached who are willing to take the additional risk.

A participation mortgage in one sense is better than the first and second mortgage in that all necessary legal action in filing and other necessary procedure may be carried on under direct co-operation. From the lender's point of view the second claim in a participation mortgage is somewhat better than a direct second mortgage, as some relief is thereby given against action which might be taken by the first mortgagee where foreclosure proceedings are instituted.

5. In apartment building operations of a highly speculative nature in which the principal purpose is to carry out as great a volume of building as possible on a slender capital, the operation is in many cases financed through the media of first, second and third mortgages. Naturally in obtaining third mortgage money, while the rate of interest is usually 6 per cent, as in the case of the second mortgage, the actual cost of financing this proportion of the operation is excessive, as money thus invested entails considerable risk on the part of the lender. The third mortgagee must assume all responsibility of the owner in respect to the first and second mortgages, and must make any payments on which the owner may default.

All mortgages on this class of property, as in fact practically all real estate mortgages, contain provisions by which foreclosure proceedings may be undertaken in case the owner defaults on normal payments, such as taxes, assessments and interest. Under foreclosure proceedings action may be brought by the first mortgagee and the property sold at auction to pay for the principal amount on this mortgage. In case of foreclosure sale, the second and following mortgagees must be ready to pay off the first mortgage, replace it, and to buy in the property or bid it up to an amount sufficient to protect the principal of the mortgage.

In foreclosure proceedings where the property is actually bid in at foreclosure sale by an outside party, the first mortgagee has the prior claim after taxes are paid, and second and third mortgages are paid off after the first has been satisfied.

6. To meet the unusual conditions of present-day building in which high building costs must be met, it is evident that many of the more conservative sources of building loans are not willing to loan even as high as 60 per cent of the cost of the operation. This condition is the result of present-day high costs, and the refusal to make liberal loans is due to fear that some time in the future replacement values may decrease to the direct injury of the value of collateral on which the loan is based. To meet this condition, however, a number of loaning institutions, particularly those financed by investors in real estate mortgage bond companies, are specializing in the amortization form of loan. The amortization mortgage generally takes two forms, the first being a loan of a longer term than usual with a liberal principal amount, sometimes up to 70 to 75 per cent of the cost of land and building. The amortization plan calls for a periodical reduction of the mortgage principal by annual payments. For instance, a loan may be made of 70 per cent of the cost of land and building, and the loan period may be ten or fifteen years. Annual payments include not only interest but part of the principal, which will repay the entire amount over the term of years.

Another form of amortization loan calls for a liberal mortgage principal and for comparatively small annual payments on principal over a term of five years, during which this principal is reduced to a normal first mortgage loan. The cost of a loan of this type depends largely on the loaning institution from which the money is obtained; but as a rule the borrower pays the general costs of the transaction together with 1 per cent of the principal amount as a fee or profit to the loaning institution.

7. Another interesting and somewhat novel method of financing apartment house operations is involved in the so-called co-operative method. Basically this method involves the bearing of the financial burden by a number of persons, each of whom participates in the profits which may accrue. There are a number of co-operative methods which have been evolved. One of these which has been successful entails the actual ownership of an individual apartment unit in the building. In other words, the apartment instead of being rented is purchased outright, and the rental actually paid is known as the owner's rental, and is a *pro rata* division of the running cost of the building. In such an operation the building may be constructed without mortgage and on funds advanced by the individual apartment purchaser, or the purchase may represent a share in the equity of the building.

This co-operative method involves considerable detail and has in effect developed a new science of building protection.

Co-operative apartment buildings which have been successful have, as a rule, not been entirely sold to individual apartment buyers. Usually about 40 per cent of the rentable space in the building has been placed at the disposal of shareholders; while the balance of 60 per cent of rentable space has been leased in the usual manner, the profit on such occupancy being applied to the reduction of rental of occupying stockholders in the venture. This type of operation has, in one or two successful instances in New York City, resulted in investments paying an average return of 15 per cent.

Another interesting co-operative method of financing an apartment building project has been that of interesting various sub-contractors. Several buildings have been constructed on this basis in the East, involving ownership by carpenter, plumber, mason, electrician and other sub-contracting units, in ratio to the amount of service and labor furnished, while actual material purchase has been carried out through building loan and first mortgage financing.

It is evident that under the general classification of co-operative financing almost any equitable arrangement may be made in the course of which various activities called in for the erection of the building may take an actual interest in the completed structure, rather than cash for work performed or services rendered. In some cases the architect or contractor takes payment in the form of a second mortgage or a stock interest in the holding company.

Sources of Building Loans and First Mortgage Money

Practically all building loan and first mortgage money is obtained from the following sources:

1. Savings banks.
2. Title and trust companies.
3. Insurance companies.
4. Mortgage corporations.
5. Estates and private investors.

The method of obtaining mortgages is either the direct method of applying to a logical institution or individual for the loan, or through the services of a mortgage broker or attorney.

1. Savings banks are restricted by law to make real estate loans not exceeding 60 per cent of the appraised value of the land and building, or 40 per cent on vacant property. The savings bank, while conservative in making loans on apartment house property, is an excellent institution with which to do business, as a savings bank loan is not usually called at its period of expiration, but as a rule such institutions are particularly liberal in making extensions. In this manner the cost of replacing a mortgage after a comparatively few years is avoided.

As a rule the savings bank mortgage has direct value in establishing the soundness of the property as an investment, and it is noticeable that apartment houses subject to mortgages from savings banks or other reliable institutions are more readily salable than those on which the first mortgage loan is placed with comparatively unknown individuals or organizations.

Savings banks as a rule adopt very definite policies as to the type of property on which they will loan and the locality in which they are willing to invest money. It is not difficult to learn which savings banks are interested and willing to loan on apartment house property, and by making direct application the owner is often successful in obtaining the required mortgage.

2. Title and trust companies loan extensively on apartment house property and may be directly approached by the owner. The procedure here is practically similar to that of obtaining a savings bank loan, but in some cases it is possible to obtain a more liberal interpretation of values and consequently a larger loan.

Generally title and trust companies maintain an Investors' Department through which bonds having as collateral real estate mortgages are sold and the principal and interest guaranteed. In this manner the money of many small investors is centralized, and to these investors 4½ and 5 per cent is paid on money which is in turn loaned to building owners at 5, 5½ and 6 per cent, the difference in percentages accruing to the company, which guarantees the individual investor's money and interest.

3. Insurance companies, particularly the larger fire and life companies, have extensive reserve funds, a large proportion of which is directed into the channel of building and permanent mortgages. Here again the approach may be direct and the amount of loan will be determined by excellence of plans and feasibility of the project.

4. For the purpose of directing extensive funds which represent many small investors in the real estate mortgage field, there have gradually developed a number of mortgage corporations which have this activity as their sole object. These mortgage companies sell guaranteed bonds having mortgages on real estate as collateral, and depend for their profit on charges made in connection with loaning of such money.

As reserve funds of such organizations are built up, it is apparent that at the discretion of corporation officials liberal loans may be made, and it is through such activities that the amortization and similar forms of mortgage are usually issued. These mortgage companies are sufficiently sound in their business methods, and in connection with the housing shortage are contributing in a valuable manner to direct the accumulation of small investors toward the financing of new housing and the consequent relief of housing shortage.

The example of the Liberty Loans and Government thrift activities has induced an increased saving tendency on the part of the American people, and this increased interest in sound investment is now being reflected by a constantly growing aggregate amount of capital available from small investors for loans on building projects, particularly those involving general housing and increased capacity of mercantile buildings.

In the larger cities, and particularly on the part of owners inexperienced in the placing of mortgages, it is quite customary to retain the services of an attorney or a mortgage broker to assist in the financing of apartment house projects. Many real estate brokers are also mortgage brokers, and some individuals and companies specialize in the mortgage business alone. Their business is to keep constantly in touch with sources of mortgage money and to know what class of property and what type of loan various institutions and individuals are willing to entertain.

With mortgage brokers commission ranges from ½ to 2 per cent of the principal, commission depending on locality, difficulty of obtaining the money and general practice.

In applying through a mortgage broker for an apartment house loan it is not wise to retain the services of more than one broker at one time. When an apartment house project is contemplated and loan desired, the news quickly travels and several brokers may appear upon the scene anxious to do business for the owner. If the owner treats with all, the result is a flood of applications sent to various loaning institutions and accompanied by such statements as the individual broker may desire to make. As a result the property in question is often discredited, and obstacles are placed in the way of obtaining a loan in the proper manner. It is always safer to deal with an established mortgage broker who knows his business thoroughly, and when he asks for an exclusive authorization to obtain a loan, this should be given without question, as he will then feel free to expend his best efforts in consummating the transaction.

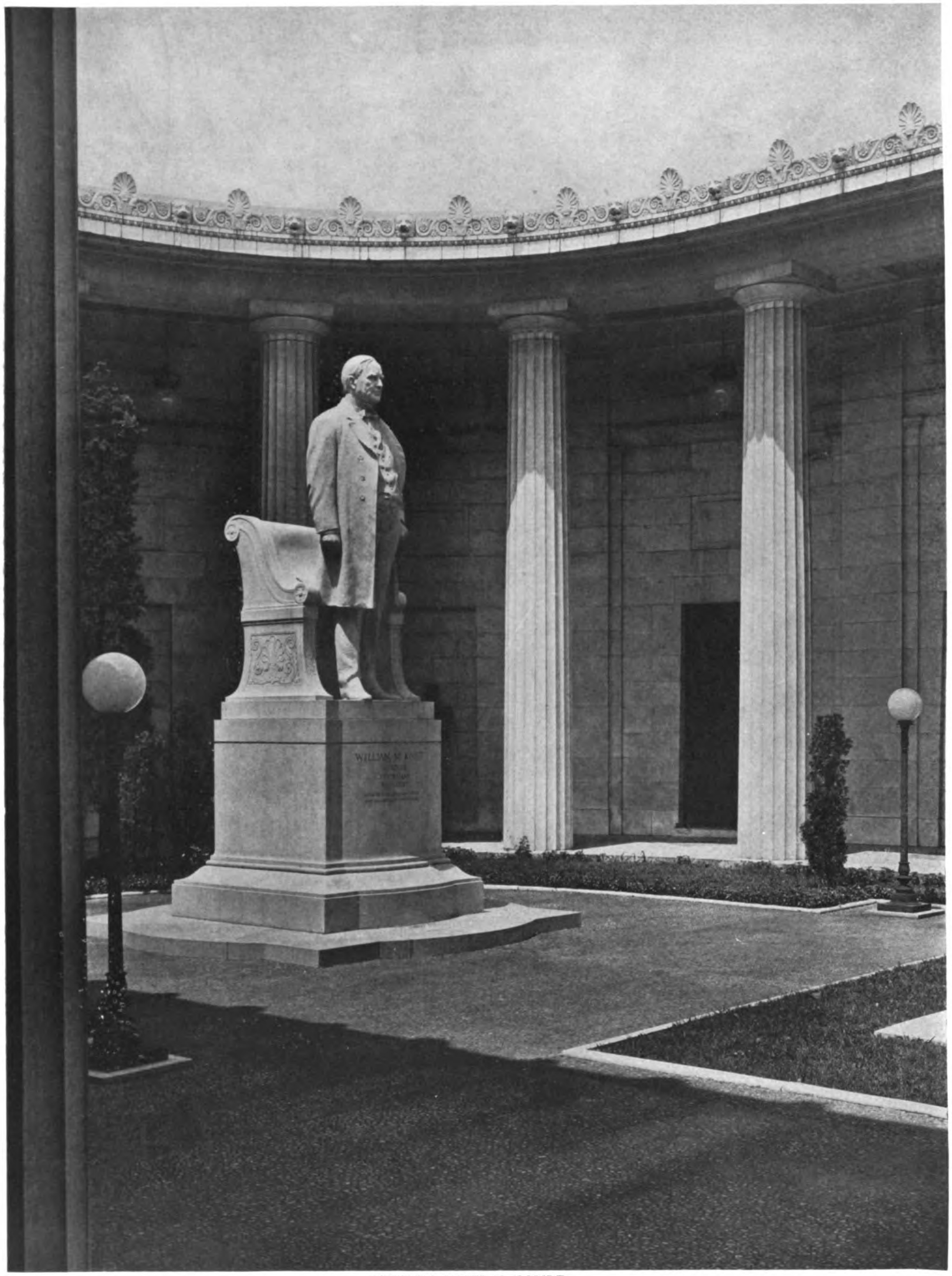
In the case of obtaining loans through attorneys, the procedure is simple. Many attorneys have at their disposal funds of estates or clients which are available for building investment in the form of building and permanent loans. Good apartment house loans are desirable for this class of investor, and it will often be found that the owner's attorney will be in a position to arrange his mortgage.

In obtaining additional financing such as second mortgage money, this also is often done through an attorney or mortgage broker. In fact, unless one has personal connections to obtain such money the attorney or broker is probably the best method through which to solve the problem.

There are, of course, all sorts and conditions of second mortgage lenders, among them being the popularly known "second mortgage shark." It must be realized that while a second mortgage is usually placed for the same period as the first mortgage, it is not always easy to obtain an extension of this mortgage or to replace it. Usually payment is called for promptly on the expiration date, and one phase of the business of the so-called second mortgage shark is to place a second mortgage loan and ultimately force an owner into foreclosure proceedings or other financial difficulties where he has operated on too slender a margin of capital.

The safest manner in which an apartment house project can be financed is through the medium of the building loan and permanent first mortgage, whether this be of the amortization type or of the usual type. The second mortgage in a sound procedure should make its appearance only as purchase money when the owner sells to the ultimate buyer, and financing on the so-called "shoestring" method which involves first, second and third mortgage loans and very little actual cash investment is at best questionable and somewhat dangerous to all concerned.

In estimating during the first consideration of an apartment house project, after carefully figuring the cost of the proposed building and the land, it is safe to assume that about 70 per cent of the entire operation can be financed through mortgage channels, while the balance of 30 per cent must represent investment by the owner. This actual investment amount, together with necessary funds for carrying on the business, usually represents individual investment or the investment of a corporation formed for the purpose of speculative and investment building. Where a company is formed for the purpose of building one or more apartment houses it is usually capitalized for about one-half of the total cost of the proposed building activity and at least 30 per cent of the stock sold, and cash placed in the treasury before operations are commenced. The balance of stock may then be retained as treasury stock or sold when additional financing is required.



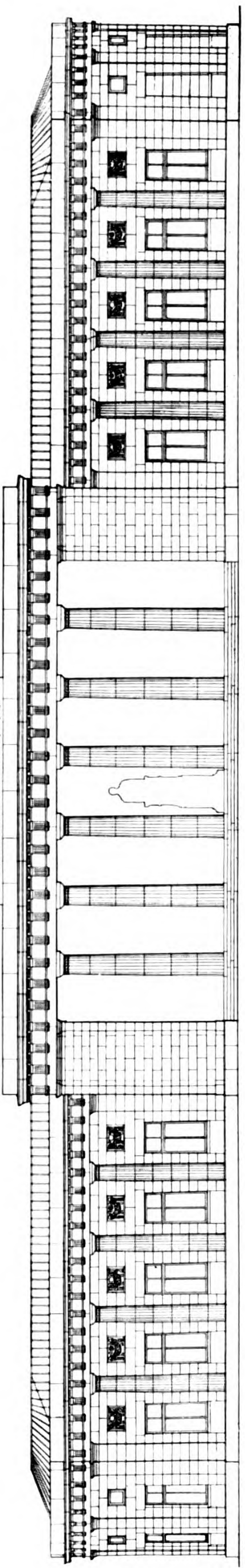
VIEW IN CENTRAL COURT

WILLIAM McKINLEY MEMORIAL, NILES, OHIO

McKIM, MEAD & WHITE, ARCHITECTS

MASSY RHIND, SCULPTOR

GENERAL VIEW FROM STREET



SCALE 0 5 10 20 30 40 50 FEET

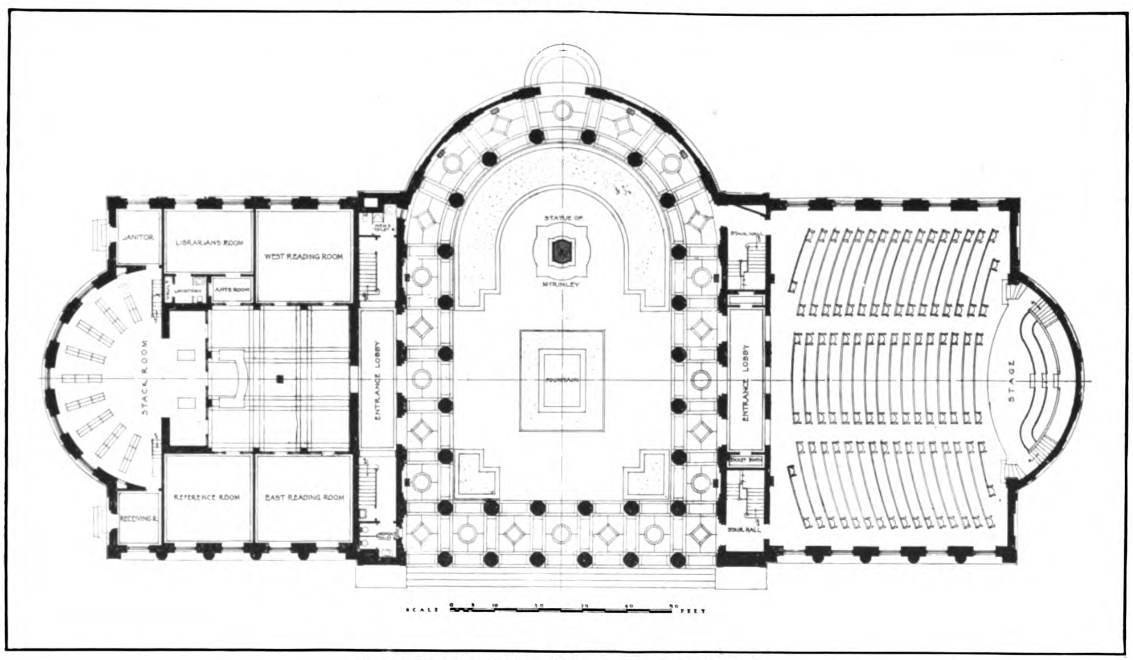
ELEVATION OF MAIN FACADE

WILLIAM McKINLEY MEMORIAL, NILES, OHIO

McKIM, MEAD & WHITE, ARCHITECTS

MASSY RHIND, SCULPTOR

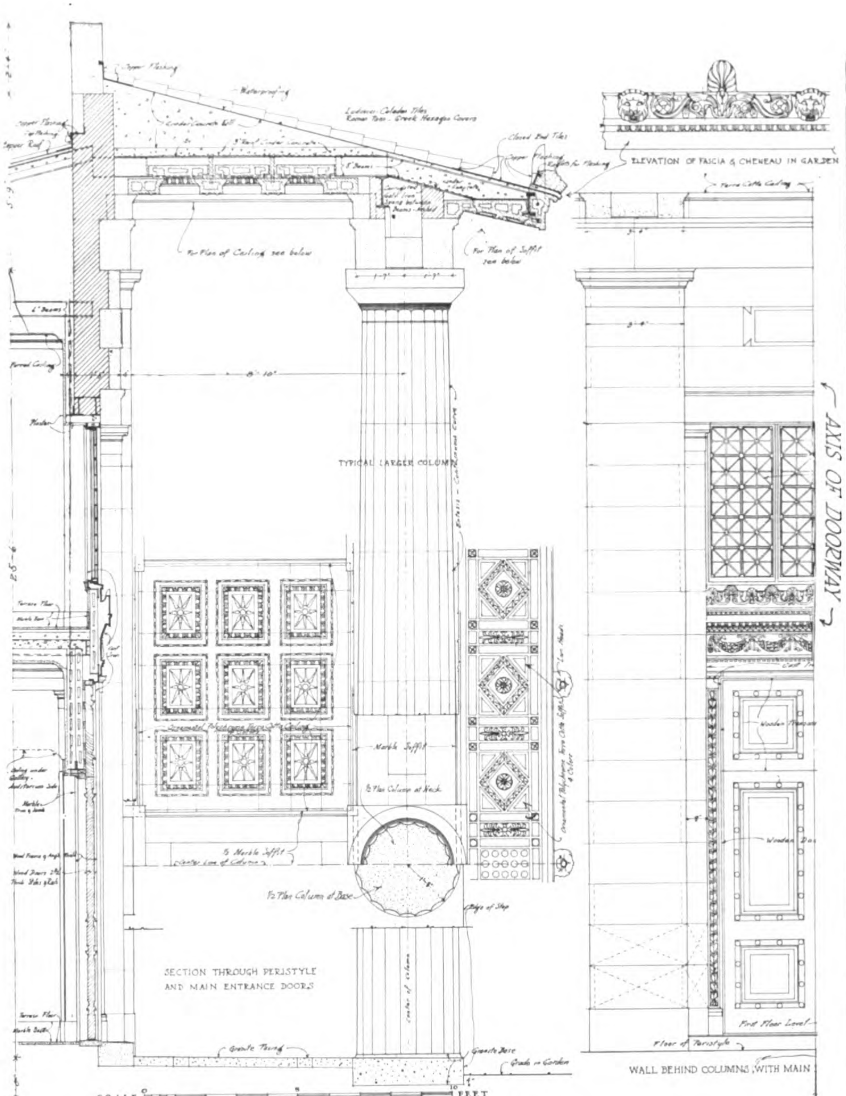
DETAIL OF COLONNADE



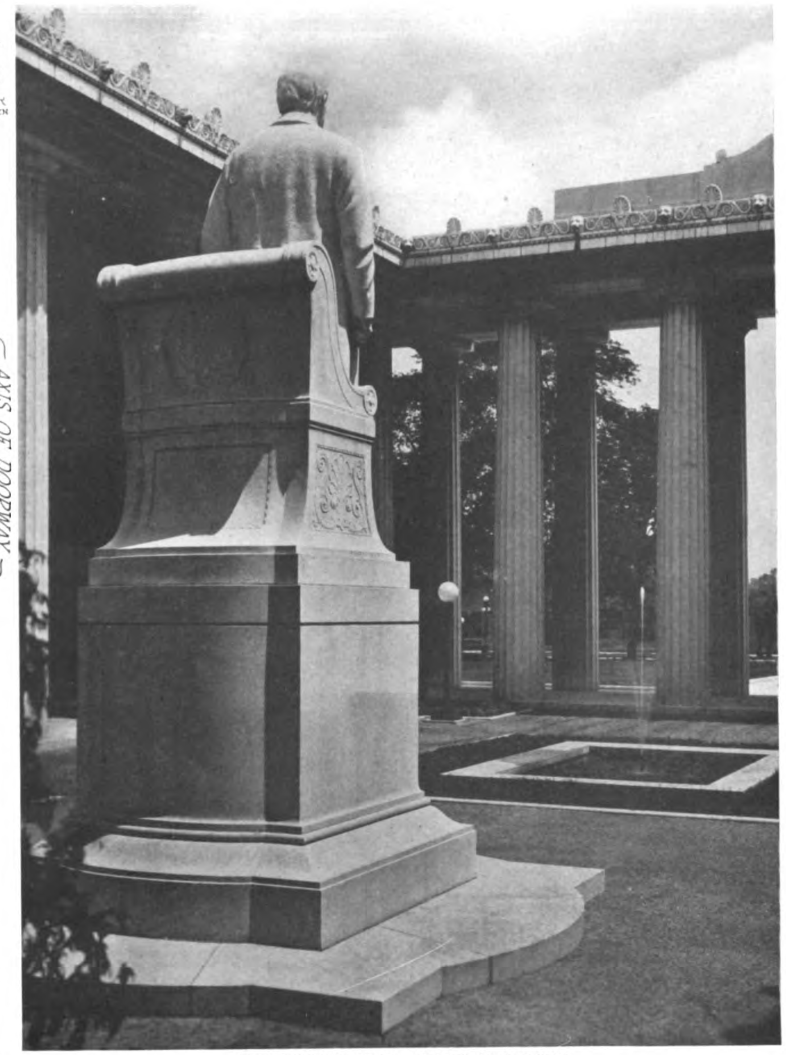
PLAN OF LIBRARY, COURT AND AUDITORIUM

WILLIAM McKINLEY MEMORIAL, NILES, OHIO

McKIM, MEAD & WHITE, ARCHITECTS
MASSY RHIND, SCULPTOR



DETAIL OF PERISTYLE IN COURT

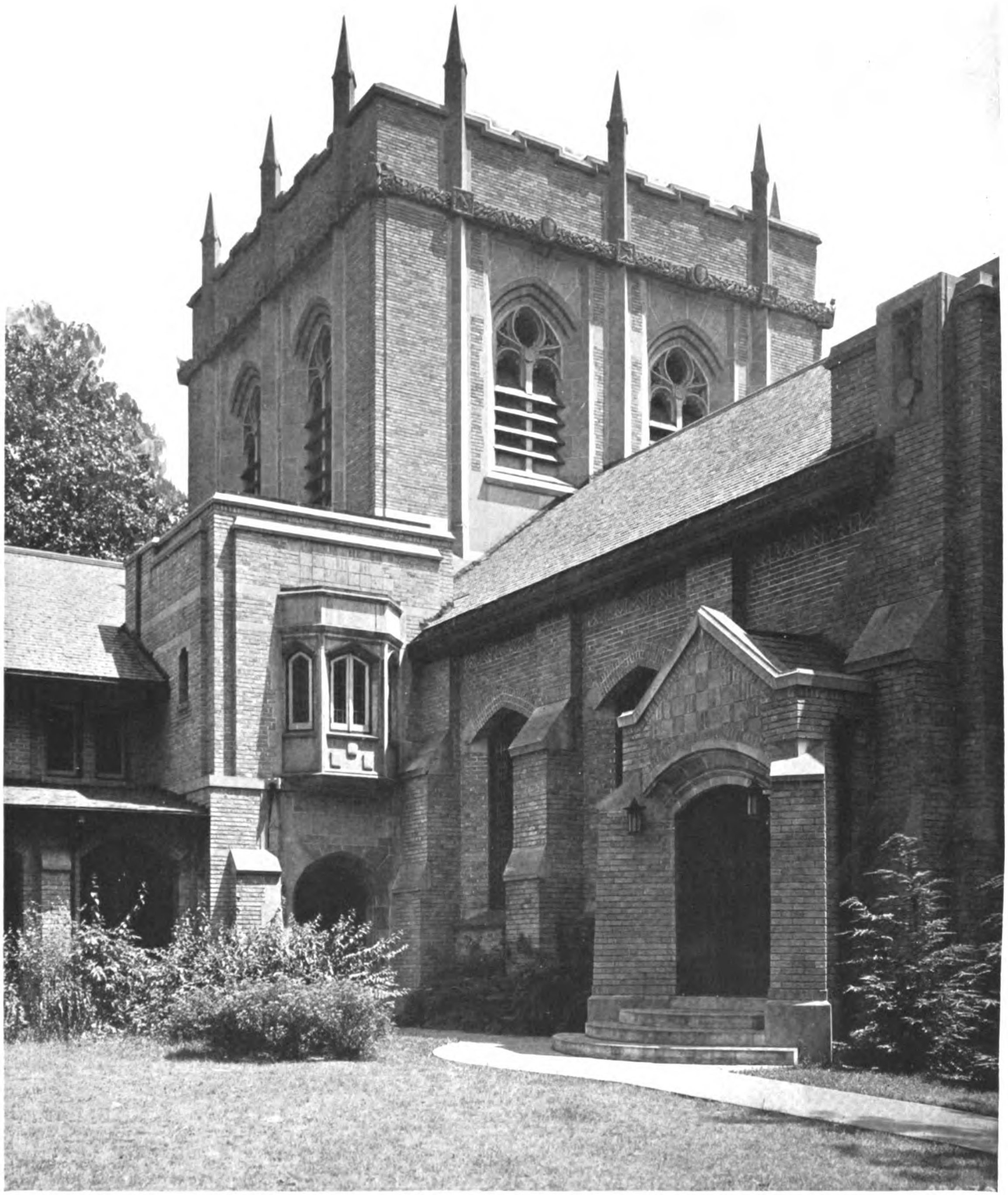


COLONNADE FROM CENTRAL COURT

WILLIAM McKINLEY MEMORIAL, NILES, OHIO

McKIM, MEAD & WHITE, ARCHITECTS

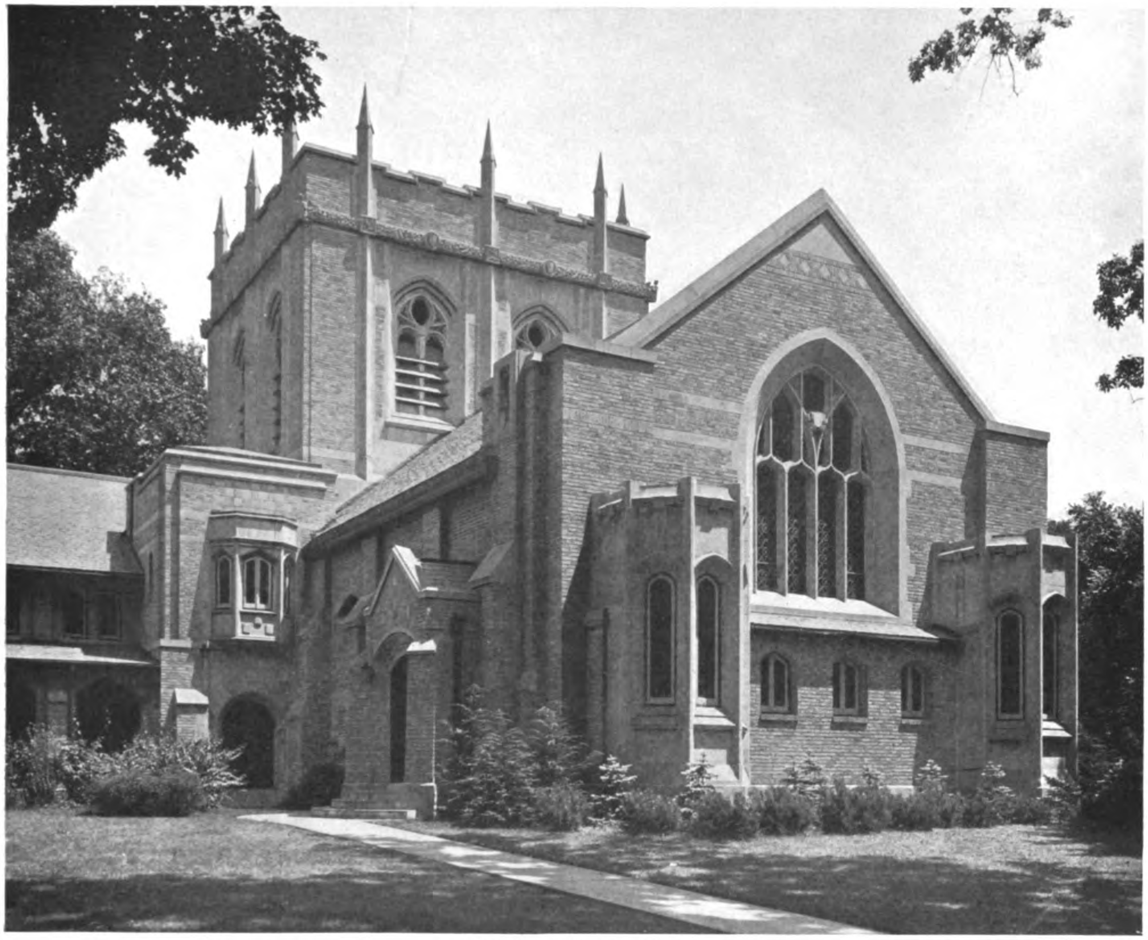
MASSY RHIND, SCULPTOR



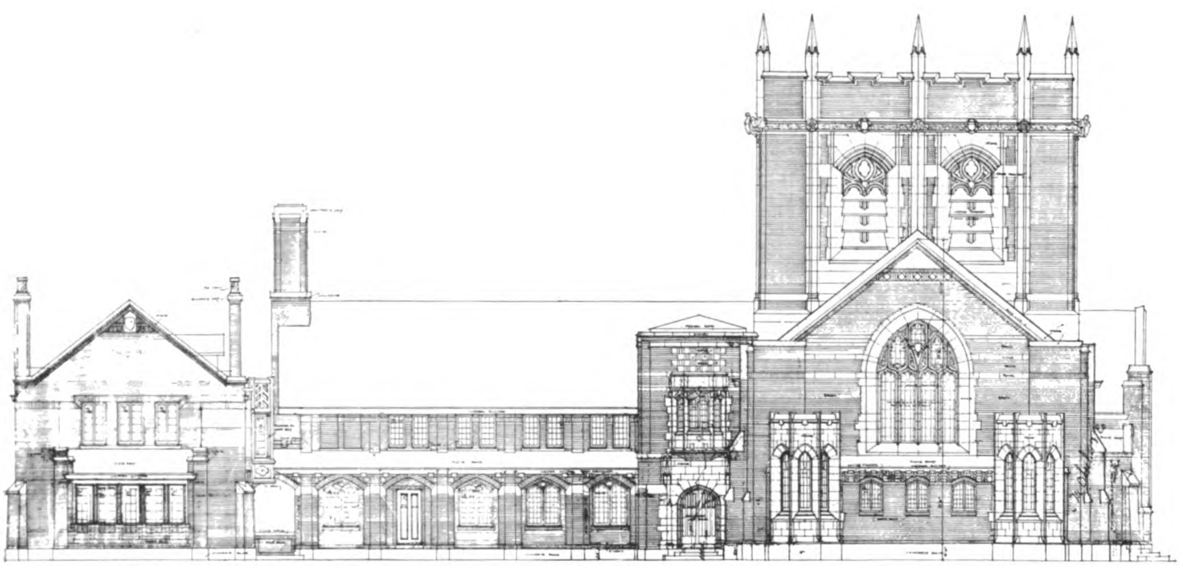
DETAIL OF TOWER

CHAPIN MEMORIAL PRESBYTERIAN CHURCH, NILES, MICH.

TALLMADGE & WATSON, ARCHITECTS



VIEW FROM STREET

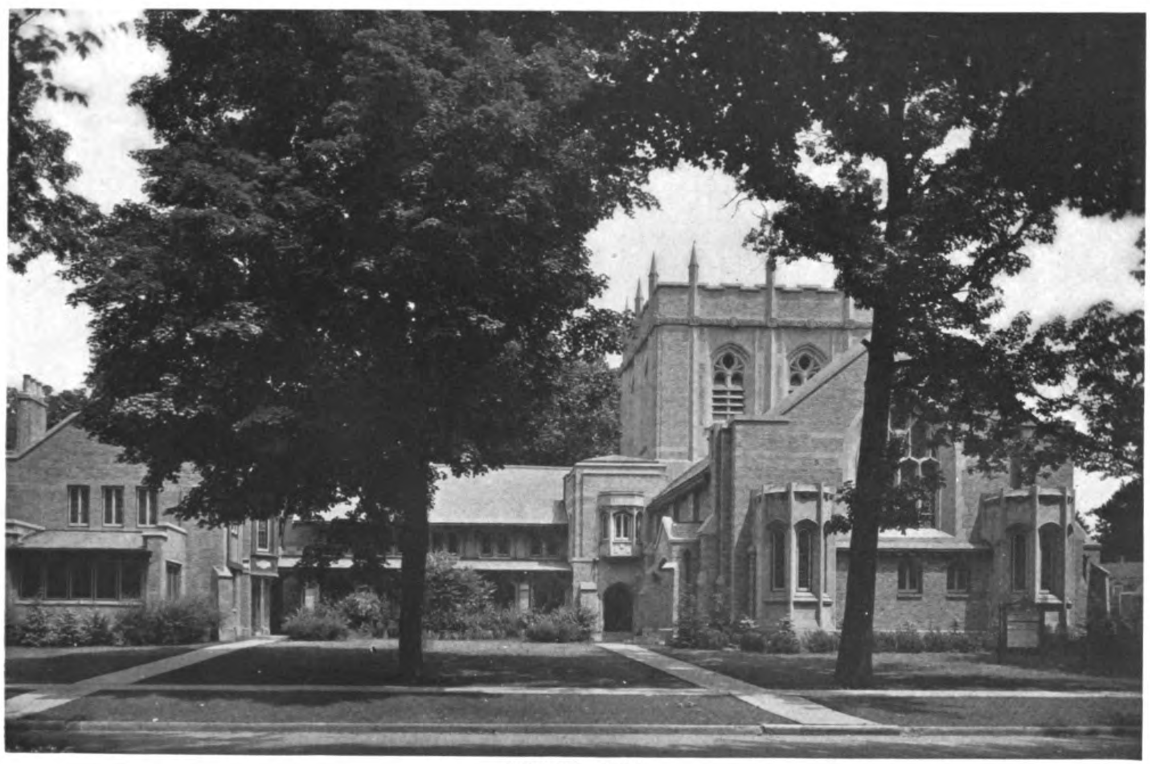


WEST ELEVATION

CHAPIN MEMORIAL PRESBYTERIAN CHURCH, NILES, MICH

TALLMADGE & WATSON, ARCHITECTS

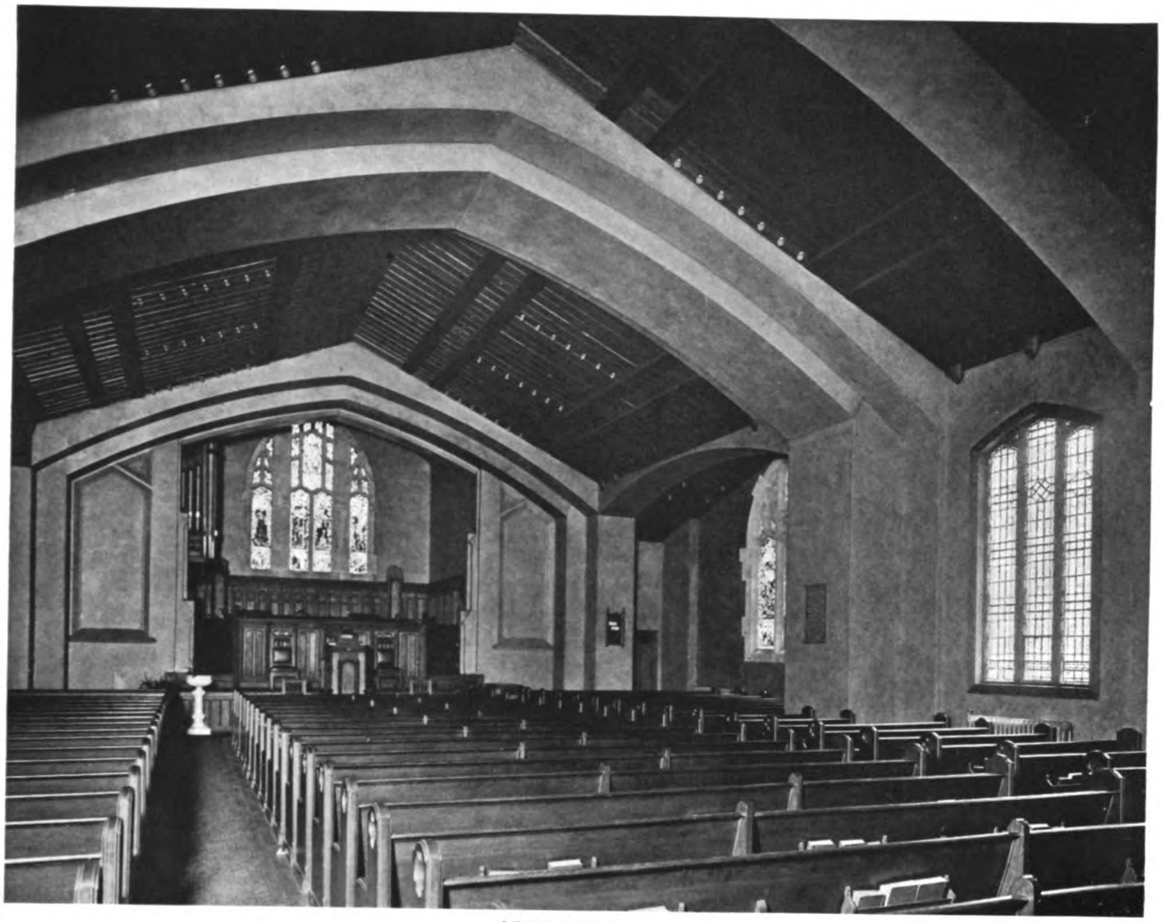
RECTORY FROM STREET



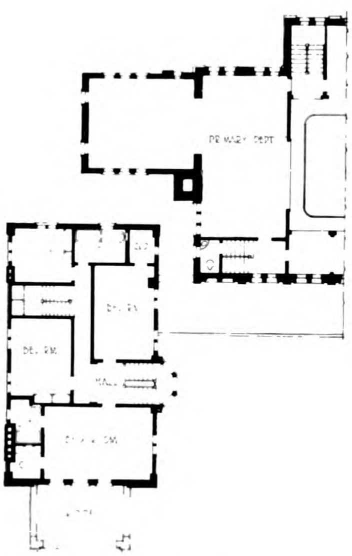
GENERAL VIEW

CHAPIN MEMORIAL PRESBYTERIAN CHURCH, NILES, MICH

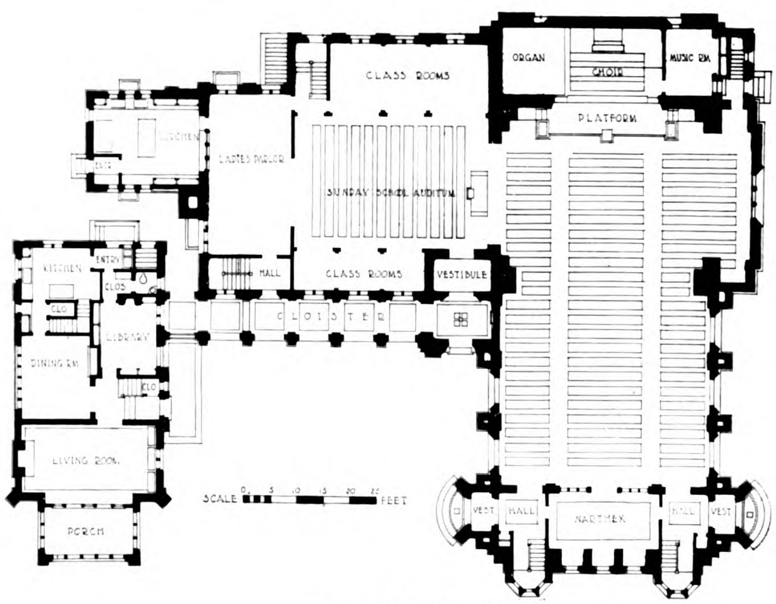
TALLMADGE & WATSON, ARCHITECTS



VIEW OF NAVE



PART SECOND FLOOR PLAN

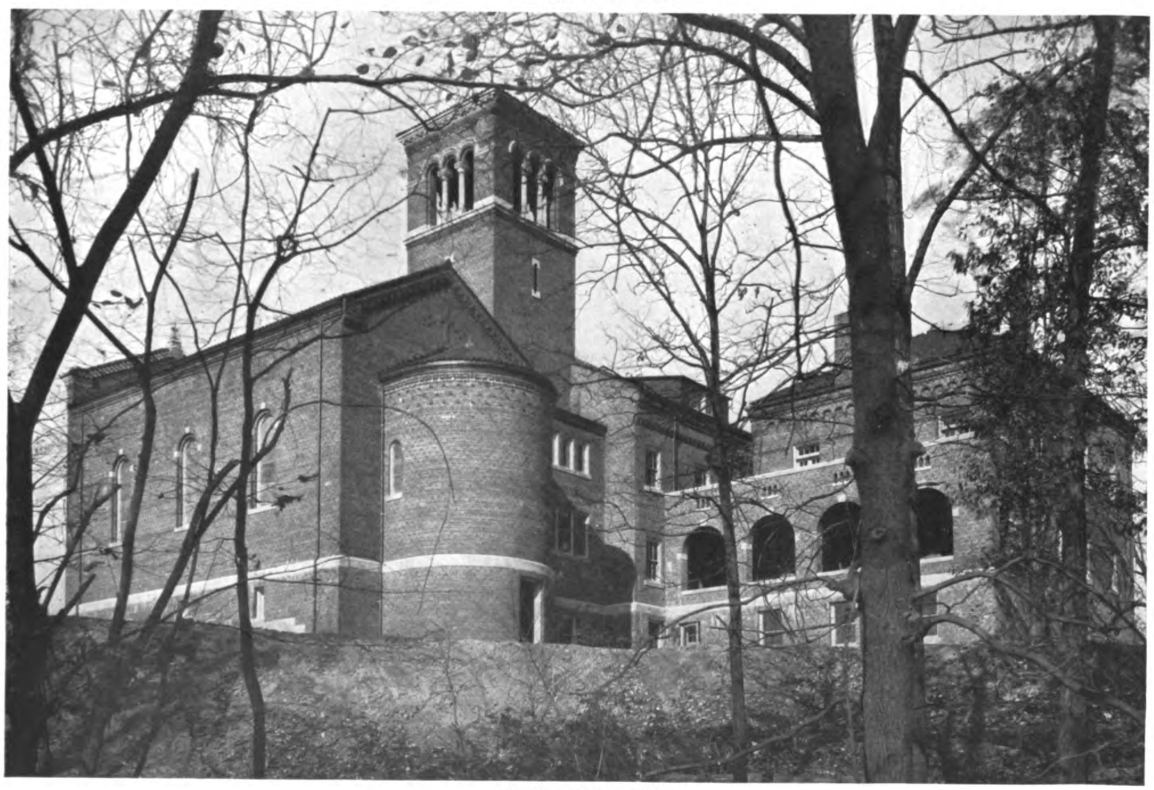


FIRST FLOOR PLAN

CHAPIN MEMORIAL PRESBYTERIAN CHURCH, NILES, MICH

TALLMADGE & WATSON, ARCHITECTS

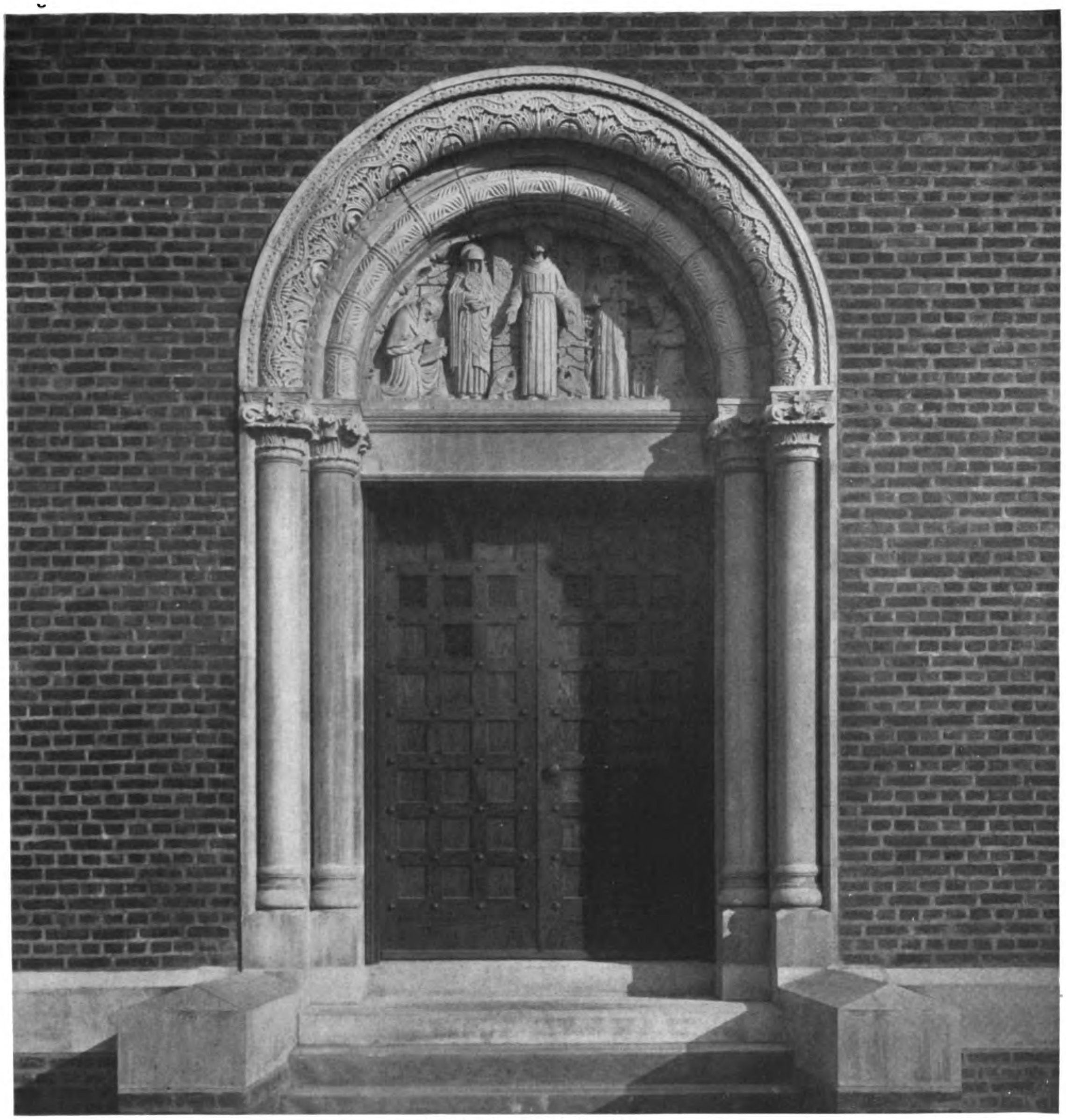
ENTRANCE FRONT



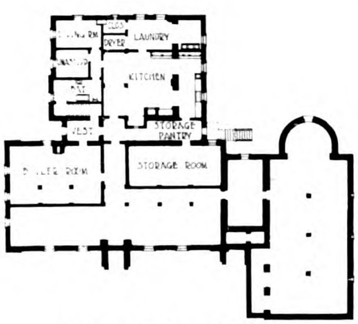
VIEW FROM REAR

CAPUCHIN COLLEGE, WASHINGTON, D. C

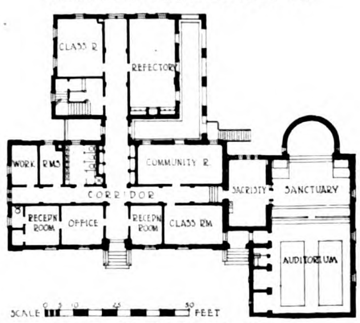
JOHN E. KAUZOR & BROTHER, ARCHITECTS



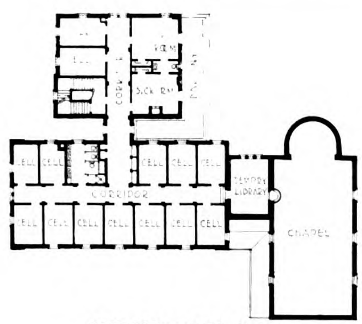
DETAIL OF MAIN ENTRANCE



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

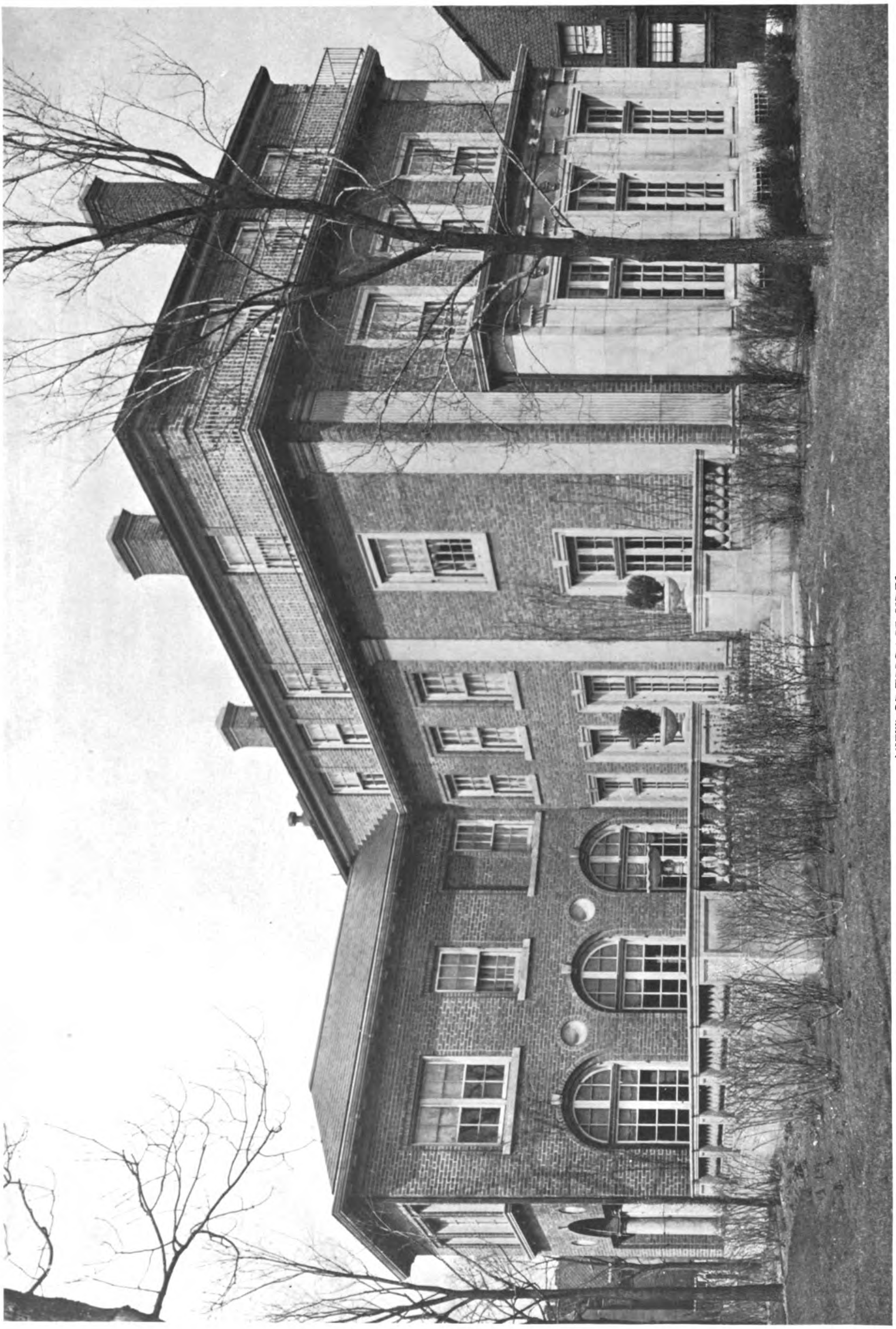


SECOND FLOOR PLAN

CAPUCHIN COLLEGE, WASHINGTON, D C

JOHN E KAUZOR & BROTHER, ARCHITECTS

FRANCIS ARETZ, SCULPTOR

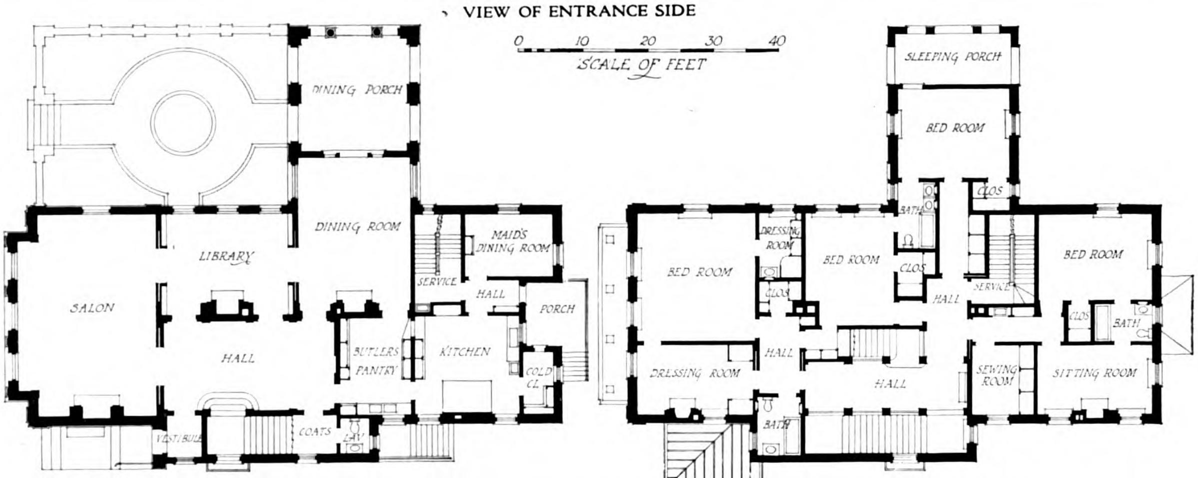


VIEW OF TERRACE SIDES

HOUSE OF MORRIS ROSENWALD, ESQ., CHICAGO, ILL

HOWARD SHAW, ARCHITECT

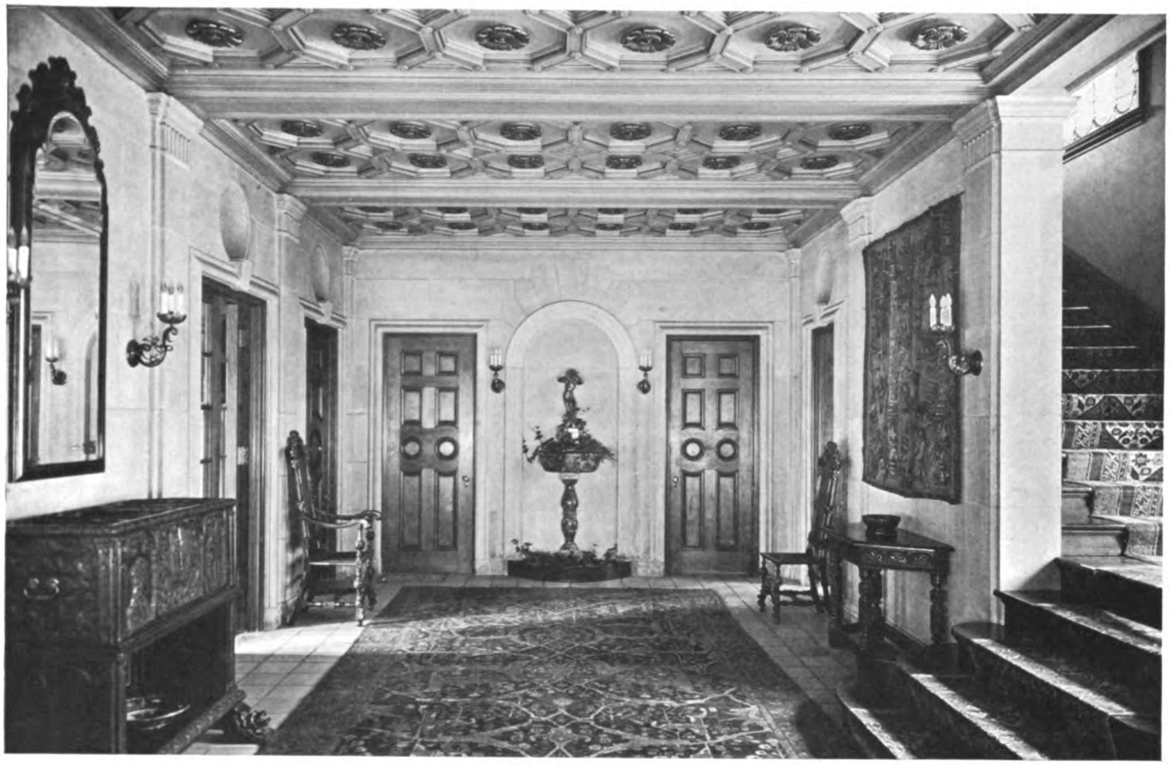
VIEW OF ENTRANCE SIDE



FIRST FLOOR PLAN SECOND FLOOR PLAN

HOUSE OF MORRIS ROSENWALD, ESQ., CHICAGO, ILL.

HOWARD SHAW, ARCHITECT

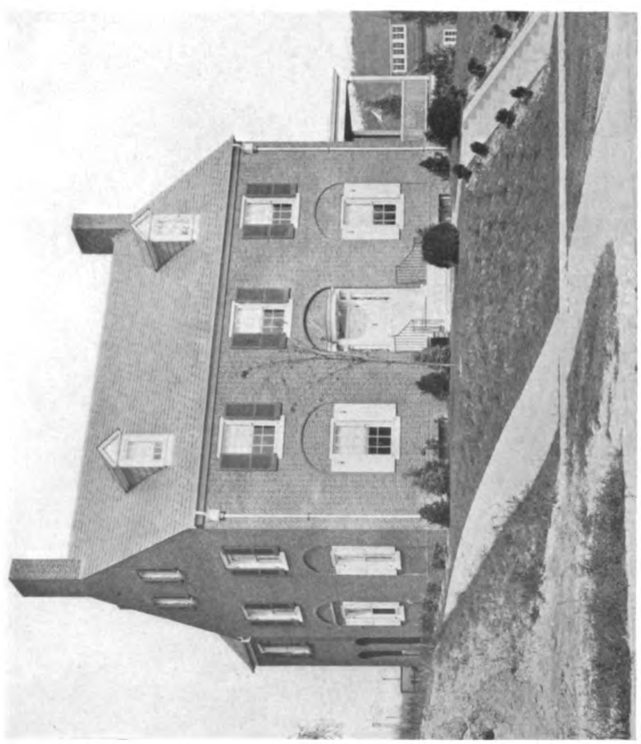


ENTRANCE HALL

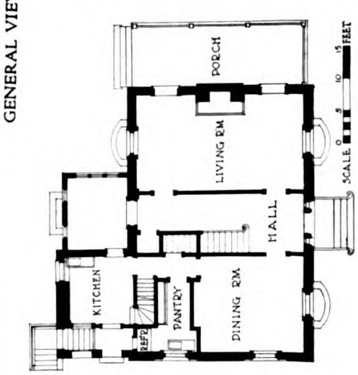
SECOND FLOOR HALL

HOUSE OF MORRIS ROSENWALD, ESQ., CHICAGO, ILL.

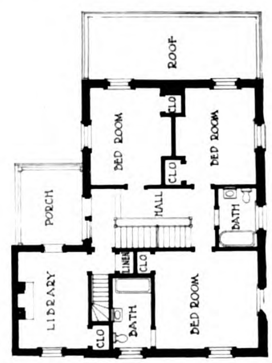
HOWARD SHAW, ARCHITECT



GENERAL VIEW OF HOUSE



FIRST FLOOR PLAN

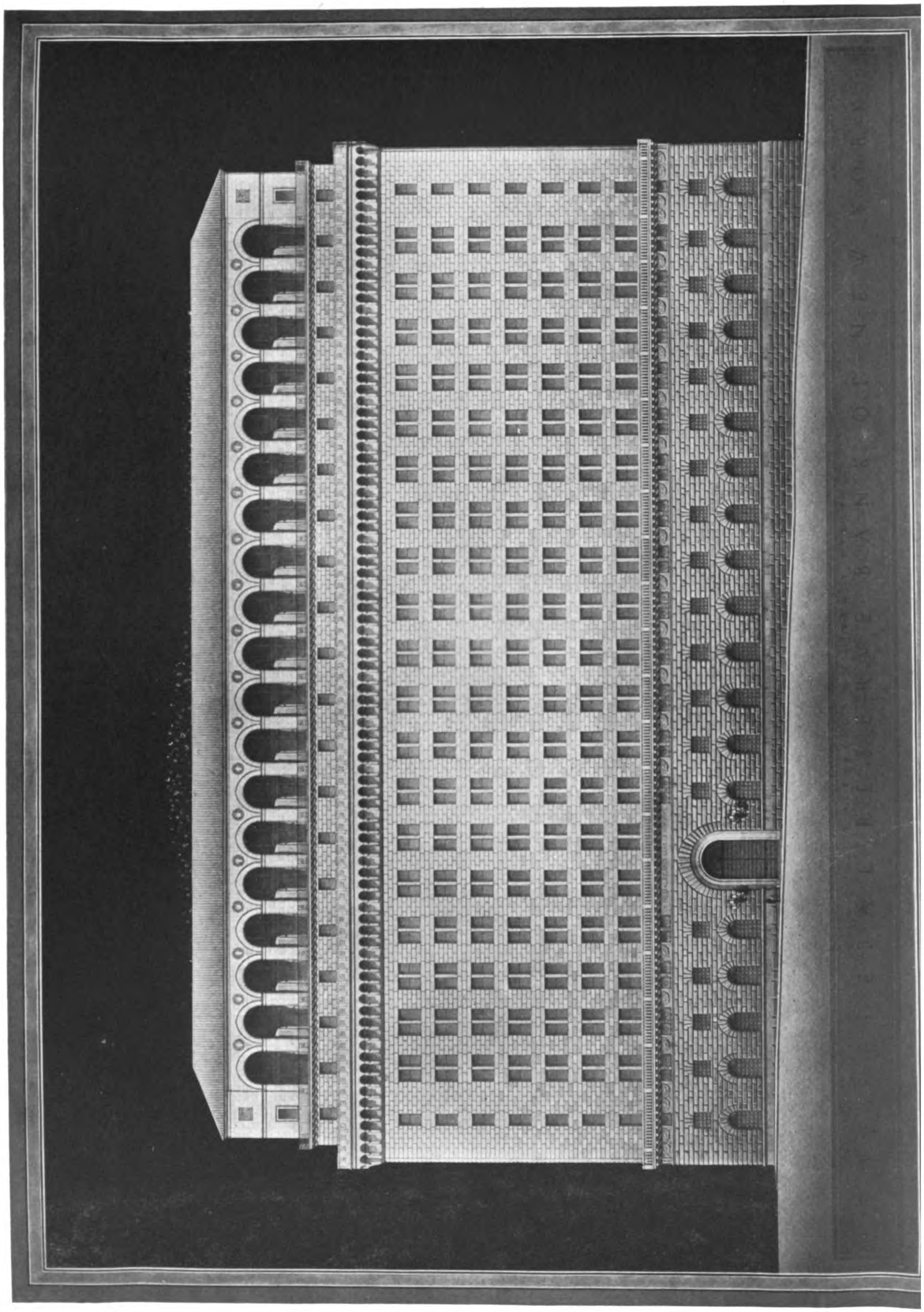


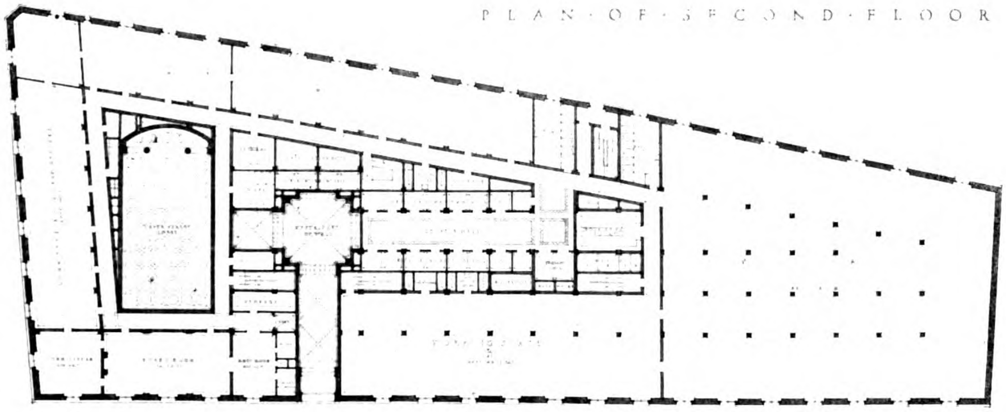
SECOND FLOOR PLAN

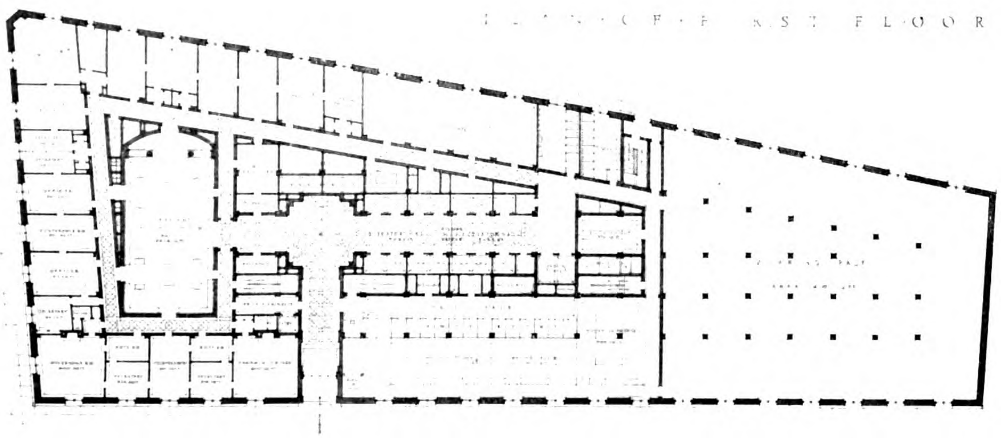
DETAIL OF DOORWAY

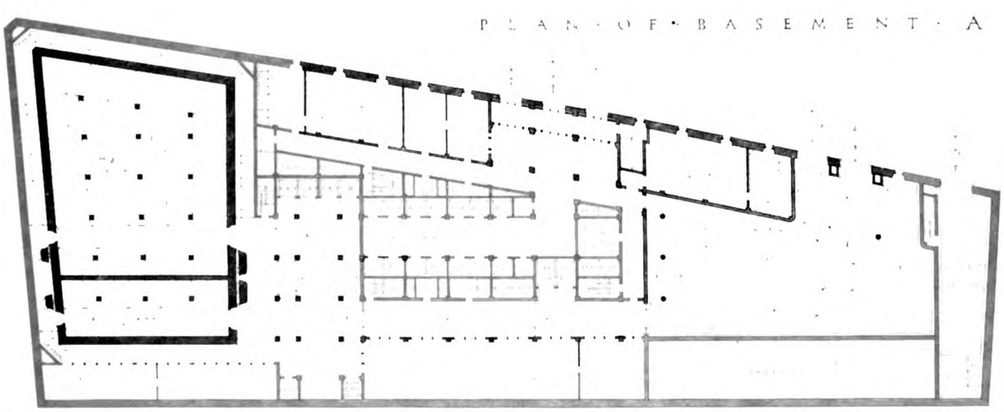
HOUSE OF THEODORE A. STEINMULLER, ESQ., BALTIMORE, MD.

SILL, BUCKLER & FENHAGEN, ARCHITECTS









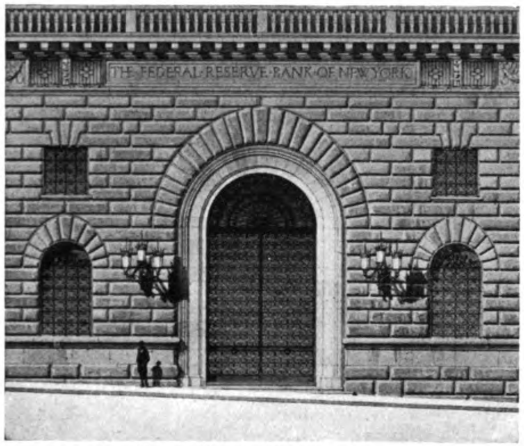
ACCEPTED DESIGN, COMPETITION FOR FEDERAL RESERVE BANK OF NEW YORK, N Y

YORK & SAWYER, ARCHITECTS

The Federal Reserve Bank of New York

ACCEPTED DESIGN IN RECENT COMPETITION

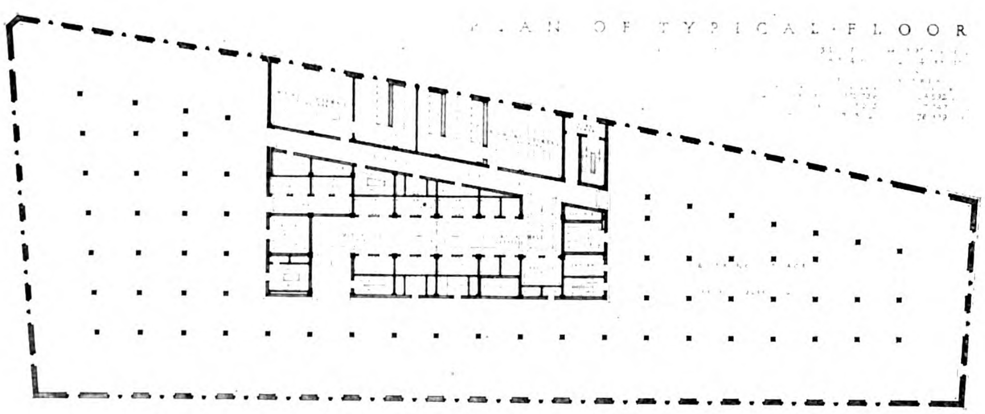
YORK & SAWYER, ARCHITECTS



Detail of Liberty Street Entrance

A MOST interesting architectural problem was involved in the recent competition for the Federal Reserve Bank of New York. This huge institution will require the largest bank building in the country to house its activities, and this fact, coupled with the prestige that will center about the structure because of the great financial matters to be considered within it, offered exceptional opportunity for the creation of a notable piece of architecture.

The program of the competition contained a special plea for an exterior treatment of extreme simplicity, relying upon the ability of the competitors to produce an architecture which would depend upon good proportion and a refined simplicity rather than ornamentation or anything which might be considered ostentatious. The Federal Reserve Board in Washington is anxious to have the architecture of the Reserve Banks appropriate to their use. A Reserve Bank is not in any sense a competitor of other banks in its neighborhood, and does not require costly architecture for the sake of advertising. Its relation to this question is precisely like that of a well designed and well built Government building, where the effort is to create an architecture which will be of educational value, with elimination of everything which tends to commercializing or capitalizing the architecture for business purposes. The program for the New York bank was written with this thought in mind, and it is believed that the design of Messrs. York & Sawyer interprets this requirement to a nice degree. It is not too much to say that the architecture they have chosen and the manner in which they have used it is not unlike a fine piece of literary workmanship in which nothing can be omitted or added without injury to the quality of the work. From an economic viewpoint, the façade is as inexpensive a type of architecture as would be possible to use in a first-class modern building, and is free from the columns and pilasters and the many mouldings that are a customary part of Classic or Renaissance architecture. This design represents a certain phase of early Italian Renaissance, in which a slight trace of the Gothic influence is still apparent. The fact that the architects were able to produce an imposing structure without resorting to the usual orders of architecture is specially



Typical Floor Plan

commendable and helpful as a progressive sign.

The architecture of medieval Florence, which is the direct inspiration for the character of this design, suggests an appropriateness which possibly arises from the fact that it was the endeavor of the Florentines to make their palaces impregnable and secure against the attacks of rival cities. The heavy rustication in the lower stories is a special feature of that style and lends to a building a fortress-like appearance which, in a sense, is what a bank should exemplify. In other words, the architecture suggests security even though the requirements of the organization demand large window openings.

The competition called for plans of two basements, the first floor, the second, a typical floor, and one of the two stories on the roof. The typical floor is an important element in the problem. The bank to-day has 2,800 employees distributed over a large number of departments. It is constantly changing, not only in size but in methods of doing business, and it is unsafe to say that an arrangement in floor plan showing the distribution of equipment in any one department which is satisfactory to-day would necessarily be equally satisfactory one year from now. In consequence, the competition was conducted with a view to securing the most elastic type of plan, thus permitting the bank officers to study at their leisure the placing of departments on these typical floors. It will be observed that the architectural treatment on the exterior admirably expresses this idea, since the typical floors are generally indicated by a very simple type of fenestration.

The site for the building is just above the center of the financial district in lower New York City. It has an area of 46,025 square feet and comprises a full block, with the exception of a small piece of land at the William street end. It is bounded on the opposite end by Nassau street and on the long sides by Liberty street and Maiden lane, with the main entrance from Liberty street. There is a difference in grade between the ends of the Liberty street frontage of 17 feet 5 inches. Due to the special nature of the business carried on by the bank and the large number of employees (estimated to be eventually 4,000), the control of entrances and provision for elevator service are important features in the plan. One entrance from Liberty street provides access for the officers of the bank, visitors and customers. An entrance on Maiden lane is for all employees below the grade of department heads who will enter the building at intervals between 8.15 and 9 o'clock on definite schedules to accord with the elevator facilities. The elevators for public and employees and the corridors serving them are disposed so that there are no means of communication between public and private sections of the building.

Large shipments of bullion, coins, securities, etc., will be frequent, and provision for this feature is made by the entrance for motor trucks into the basement from Maiden lane. Here is a shipping platform directly below the money shipment room and in convenient relation to the vaults at the western end of the building, to and from which money will be transferred by small electric trucks.

The loggia at the top of the building carries around on the four sides and produces a promenade to be used chiefly at lunch time. Behind the loggia are two floors devoted to welfare work and cafeteria service,—one assigned to women employees and the other to men. The cafeterias contain space which is large enough to serve 4,000 employees if they are seated in three different shifts.

The volume of the building is somewhat more than 11,000,000 cubic feet, and with building costs continually mounting the bank is faced with the necessity of expending for this building a good deal more than would have been required a year ago. The present program of the bank does not contemplate immediate construction. The architects have been authorized, however, to continue their studies and in due time will be authorized to make working drawings and prosecute that part of the work without delay. Alexander B. Trowbridge, consulting architect for the Federal Reserve Board, served as professional adviser in the competition.

In conclusion it may be stated with confidence that the accepted design is a distinct addition to modern architecture. The fact that it is inspired from Italian sources is, after all, a minor detail. There is no building in Italy which remotely resembles this design, and yet the architects have borrowed freely from the good taste and the monumental quality of some of the fine examples of Italian art. Many an observer of the drawings will be tempted to question the placing of the main entrance to one side of the middle of the principal elevation. This is a point which would be important if this elevation were situated where it could be seen in its entirety. It is, however, placed on a narrow street, and the 365 feet of length is such as to make it quite impossible for an observer to see from any one point the entire composition. The placing of the main entrance was regarded as a practical question rather than one relating to architectural composition, and the designers have been courageous enough to carry this out with great frankness and with a proper disregard of the academic tradition which would influence other types of designers.

The Chapin Memorial Presbyterian Church, Niles, Mich.

TALLMADGE & WATSON, ARCHITECTS

THIS church occupies the site of an ancient and honorable fane of the period of the Classic Revival. This church, built in 1850, had become inadequate in all respects and entirely without modern improvements or even necessities. With many regrets in the hearts of the architects, at least, and after an ineffectual attempt to move it, this fine old relic of the past was necessarily laid low.

The new church, which by the way embodies the architects' original sketch almost without change, in plan incorporates auditorium, Sunday school and manse, the three features being linked by a cloister or arcade. The auditorium seating 600 opens through its transepts into the Sunday school; this is equipped with class rooms after the Akron arrangement, with a ladies' parlor and an especially light and ample kitchen. The church is not an institutional one, and so beyond arrangements for moving pictures and a boys' club in the basement, there are no features apart from the usual orthodox establishment.

In style the building is a modernized form of Gothic with personal and local elements in the ascendant. The material is a rough, warm gray texture brick laid with raked joints, and the trim is buff Bedford stone with a rubbed surface. The brick is enlivened with various patterns and the stone with carved ornamentation. Around the tower is a sculptured band with angels supporting shields at the corners. The medallions are carved with the fauna of early Michigan, including a Pottawatomi Indian, and the band itself with oak leaves and acorns. The tracery is of stone and all of the windows are of leaded stained glass.

The nave east window represents the old dispensation with those who had foretold the coming of Christ. Figures of Elijah, Isaiah and Moses fill the panels, with Christ above in a mandorla. The transept window represents the new dispensation with figures of Paul, Peter, John the Baptist and John the Evangelist. Particularly beautiful is the east window with the celestial choir singing "Alleluia for the Lord Omnipotent reigneth."

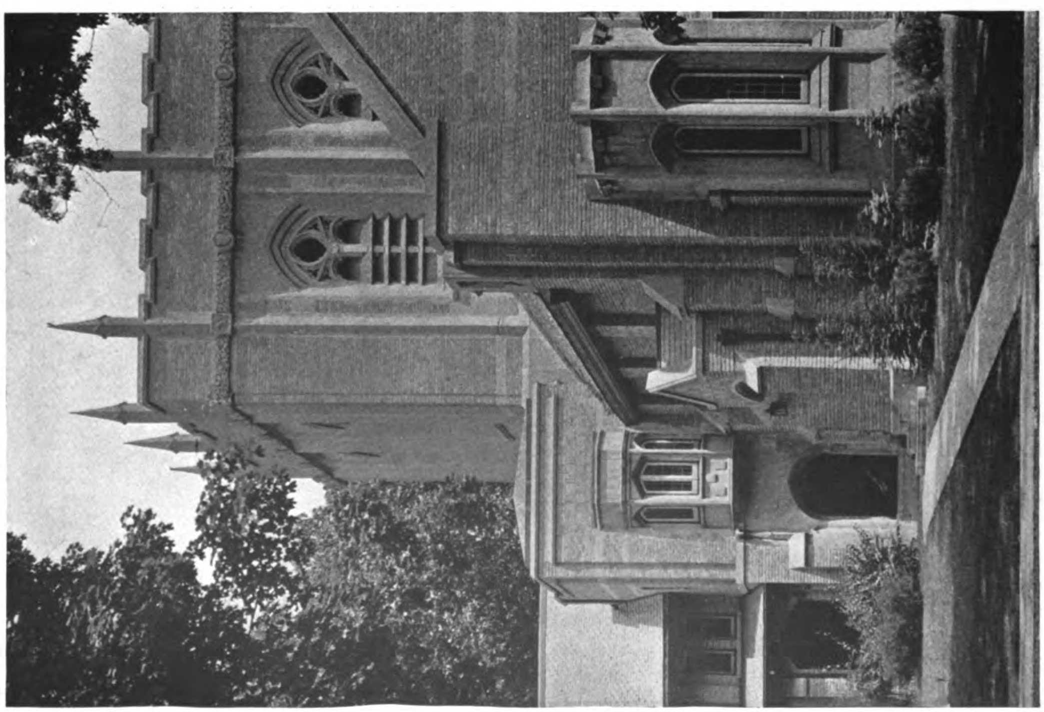
The windows are all in full color and represent a high water mark in the art of glass making.

The side windows in the nave take the place of old memorial windows in the original church and repeat the old inscriptions. They are grayish green, original in design and without high color.

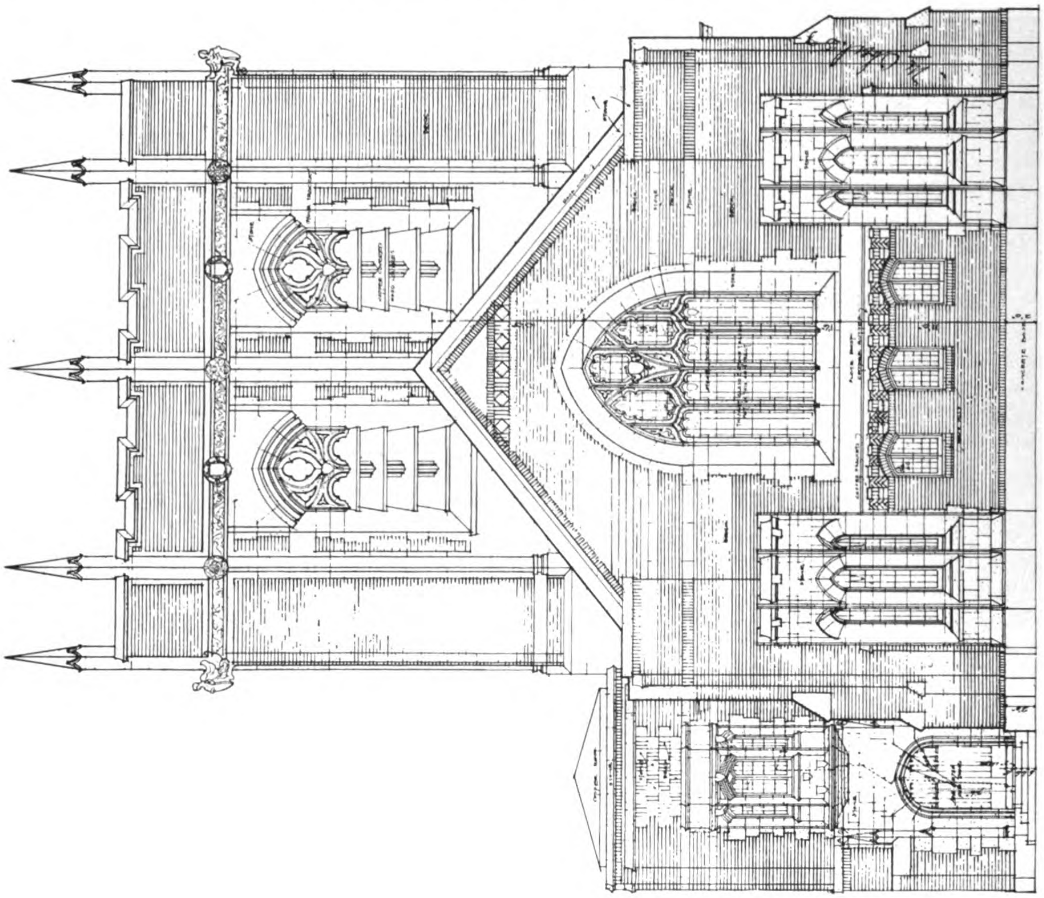
The interior is rough plaster tinted a faded golden hue, and the trim, including the ceiling, is of dark red oak.

The entire group, including all of the furnishings down to the last tin cup and hymnal, was the gift of the widow and children of Charles A. Chapin, a descendant of a pioneer family of Michigan, and of the old Puritan, Deacon Chapin, immortalized by the art of Daniel Chester French. The church was built in 1915 and cost $75,000.

Chapin Memorial Presbyterian Church, Niles, Mich.

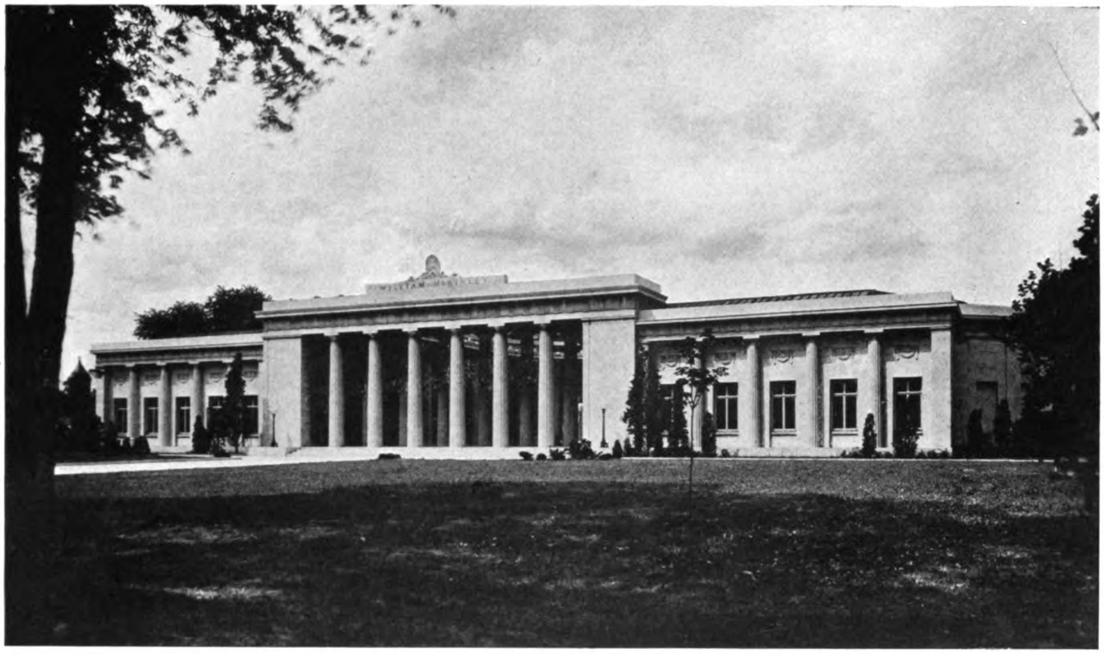


DETAIL OF TOWER AND CLOISTER ENTRANCE



DETAIL OF MAIN ELEVATION

CHAPIN MEMORIAL PRESBYTERIAN CHURCH, NILES, MICH.
TALLMADGE & WATSON, ARCHITECTS



William McKinley Memorial, Niles, Ohio

McKIM, MEAD & WHITE, ARCHITECTS

THE National McKinley Birthplace Memorial Association — a society chartered by Congress in 1911 — proposed in 1914 to erect a memorial to William McKinley in his native city, and held an architectural competition.

The following quotation from the program of the competition gives the character of the problem :

"The projected memorial will take the form of a monument and a building so grouped as to form an ensemble. The monument will consist of a full-figure statue of President McKinley, with suitable pedestal and architectural setting. The building, while destined for practical service to the community, should nevertheless be designed in the spirit of a memorial."

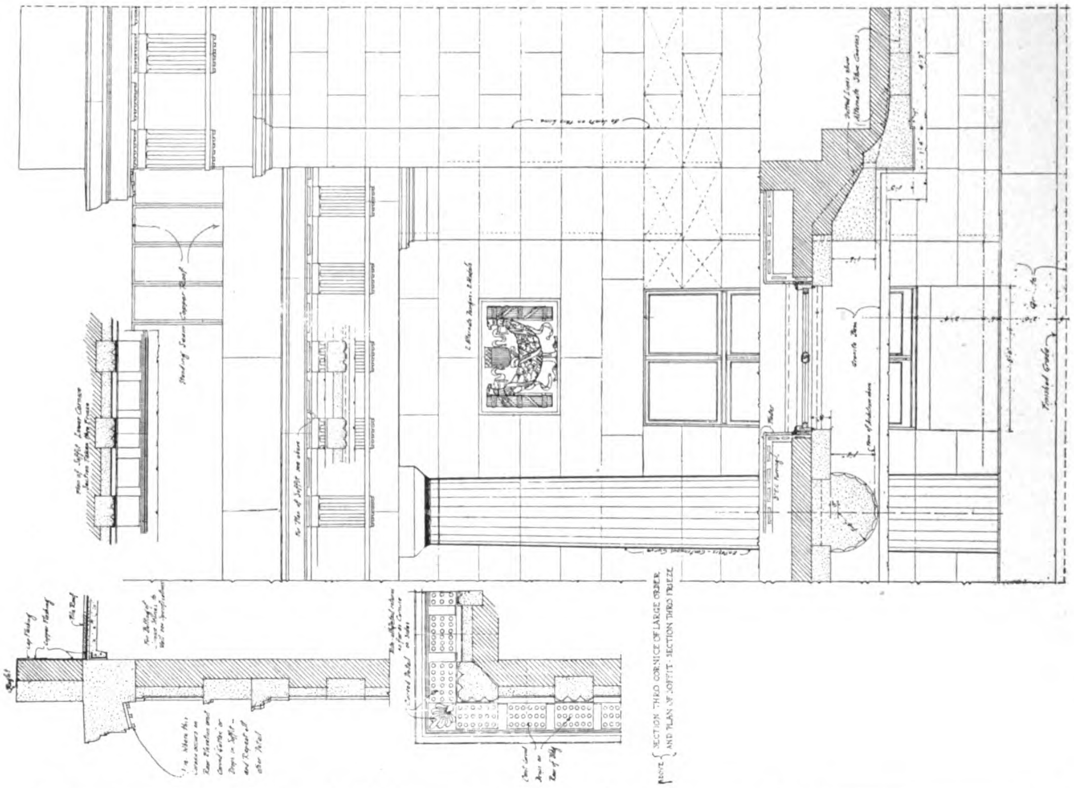
The requirements of the building were an auditorium, a public library, a museum room for McKinley memorials and the meeting of local posts of war veterans, offices for trustees and service rooms. Settings were to be provided for tablets to donors and busts of local historical personages and associates of the late president.

McKim, Mead & White were selected as architects in the competition, and Massey Rhind was appointed sculptor by the building committee.

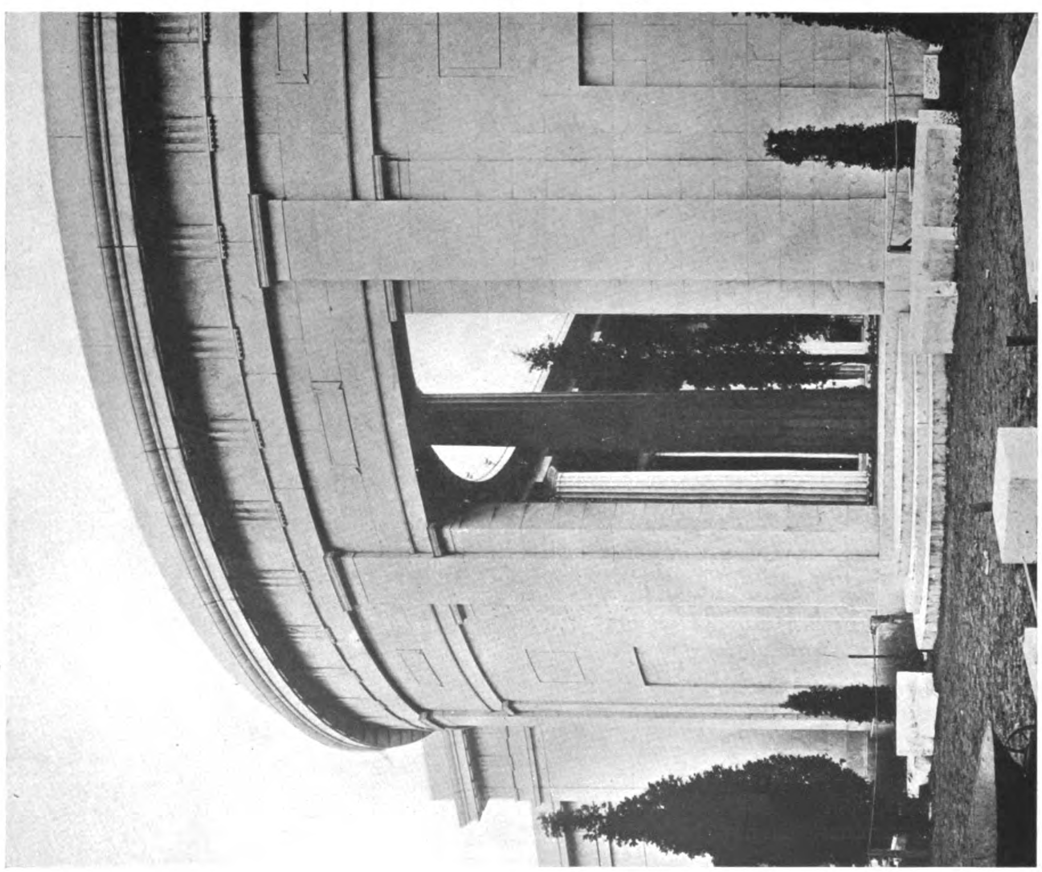
The building was carried out by the architects without a single important deviation from the competition drawings, and an inspection of the accompanying illustrations will show how appropriate to the problem their solution has proven to be. The memorial statue is placed in an open atrium surrounded by a colonnade of great delicacy of proportion in the Doric style. The auditorium and library are both street level rooms, and the isolation of the auditorium permits of an economical operation of the heating plant, as well as insuring a quiet library.

The exterior of the building is faced with white Georgia marble, and the statue and pedestal are of the same material. The ceiling of the open colonnade shows a very interesting use of architectural terra cotta. A classic coffered ceiling was designed and this was executed in polychrome terra cotta of a cream white ground, upon which the ornament is picked out in the primary colors of the ancient Greek palette, — blue, yellow, red and green.

The color scheme was worked out after a careful study of the available records of Greek polychrome decoration and executed with the hearty co-operation of the terra-cotta manufacturers, who extended themselves to produce the clear and brilliant colors in the small quantities and confined spaces which the style demanded. The effect produced is of great beauty and decision, due to the use of limited quantities of strong color, rather than broader masses of "pastel shades," which are often employed by modern designers in their all too rare excursions into this field of designing in color.



EXTERIOR DETAIL OF WINGS



DETAIL OF REAR ELEVATION

WILLIAM McKINLEY MEMORIAL, NILES, OHIO
McKIM, MEAD & WHITE, ARCHITECTS

A Modern Quest for the Archaic

THE SCULPTURAL WORK OF EDWARD FIELD SANFORD, JR.

By J. ARTHUR BARTRAM

IN attempting to show the beauty and importance of the archaic influence in sculpture to-day it is scarcely necessary to dwell upon that particular epoch of Greek art which, starting with the early Dædalid school whence the art of Peloponnesus was derived, through the period of Peisistratus, to which Athens was indebted for its chief artistic inspiration, finally reached the most glorious era of all—the age of Pericles, of whom it was said: "He found Athens of brick and left it of marble!"

It is generally conceived that the products of various arts as practised by a people constitute an important record of a nation. One of our modern critics, Taine, regards the fine arts as the necessary result of the general conditions under which they are at any time produced — conditions of race, climate, religion, civilization and manners. It is extremely difficult to make this opinion conform to the artistic school of 1919, since, in our eastern cities particularly, owing to the many racial elements which go to make up the contents of our national melting pot, such conditions are almost impossible to define.

It is small wonder, then, that the searcher for beauty in modern sculpture would naturally seek a modern artist who embodied to the full the glorious traditions of the past, rather than to seek artistic gratification in the results evolved from the undigested mass of races and traditions so characteristic of our country to-day. The search will be successful. We may indeed find a sculptor whose work is a most interesting combination of purely Greek inspiration and Anglo-Saxon clarity of execution. This unusual modern successor of the Periclean "golden age" is Edward Field Sanford, Jr.

In regard to the archaic Greeks, however, Mr. Taine's view was decidedly *a propos*, as their sculpture was the result of a wonderful national life, unmarred by commercial strife, the product of a period of great united energy. They found their ideals in varieties of the human form as presented by the most harmoniously developed specimens of the race, under conditions of the greatest activity, health and grace. To the perfect physical condition demanded of candidates for the Olympic games, we owe the resulting types of rhythmical composition and design which, through art, has made the life of the nation immortal.

In speaking of Greek classic art it is almost impossible to separate architecture from sculpture. The two were indissolubly bound together. In those days, as in the later Renaissance period, the architect was a master of sculpture, and the sculptor of architecture. The most perfect buildings were designed as temples for the gods, and the most beautiful statues the concrete representations of the dwellers upon Olympus. In those days architecture necessitated the possession by the builder of imagination as well as technical skill, and as an art was so employed as to arrange the plans, masses and enrichments of a structure so as to impart to it interest, beauty, grandeur, utility and power. Vitruvius, the only ancient writer on the art of architecture whose works have survived, lays down three qualities as indispensable in sculpture and in a fine building: *firmitas, utilitas, venustas*, stability, utility and beauty. Through the later period of classical revival which culminated in the Renaissance, Vitruvius is the chief authority, and in every point his precepts were accepted as final. Bramante, Michael Angelo, Palladio, Vignola and earlier architects were careful students of Vitruvius, who through them has largely influenced the architecture of almost all European countries.

Hercules — Garden Figure
Edward Field Sanford, Jr., Sculptor

Since the period, however, of Greek classic art, the world has experienced no revolution in art, but there has been a series of evolutions from the days of the Romans down to our own era. Thus it is not difficult to see whence the Renaissance sprang and to what we owe the various forms of Renaissance art. Achievements of such masters as Donatello and Michael Angelo were based on a new and impassioned study of nature and the ancients together, and in the hands of these artists a fortunate blending of the two ideas yielded results of a poignant and unique charm, thus making us the heirs both of antiquity and the Middle Ages—an inheritance which even the most flagrant misuse has not yet exhausted.

Archaic Greek Head

Yet this medieval awakening to the beauty of classic art can no more be described as a copy of the ancients than can our own modern artists be accused of a mere revival of thought, or even of Renaissance feeling. On the contrary, to those old forms of human soul and skill, such finished artists as Mr. Sanford have added whatever of artistic value the intricacy, complexity and experience of modern life can give.

Antique Fighting Hercules

Of all the classic arts, sculpture was the one most appropriate to ages of lucid and self-possessed ideas, and to the modern artist as well as to the archaic Greek that work should be most instinct with spiritual life which conforms most clearly with the perfect facts of physical life. And yet perfection of form alone is not enough. No true artist can be content with the mere copying of the most ideally beautiful body. Such work has often been done, with a result that makes one deplore the frequent successes of mediocrity. Thus it is most refreshing to find that Mr. Sanford's sculptures treat not only of the permanent and essential truth of life as portrayed in physical perfection, but also endow the art with that higher intellectual appeal which marks the distinctive works of the really successful sculptor.

It is impossible for a work of art to conform to the æsthetic demands of its age. On the contrary, it is for the artist to create that demand, even though it entails years of unappreciated toil. And to attain permanent delight, there must be about such works the impress of a distinct individuality, comprehensible only by virtue of a certain newness and wonder in its conception and execution, through channels whose very strangeness makes them most welcome. The artist who is to endure must bring ideas to the constant regeneration of art; must have at the base of his artistic creations a desire for a deeper spiritual value to be given to all, as well as a more decorative value. There must always be that desire for a nobler form of life, for a freer method and opportunity of expression. As Whistler points out, the power of the artist is to be found in his power of vision, not in his cleverness of hand. The soul of the artist must express itself in the form most proper to it, and one of the chief functions of the imagination is to make up for the shortcomings of reality.

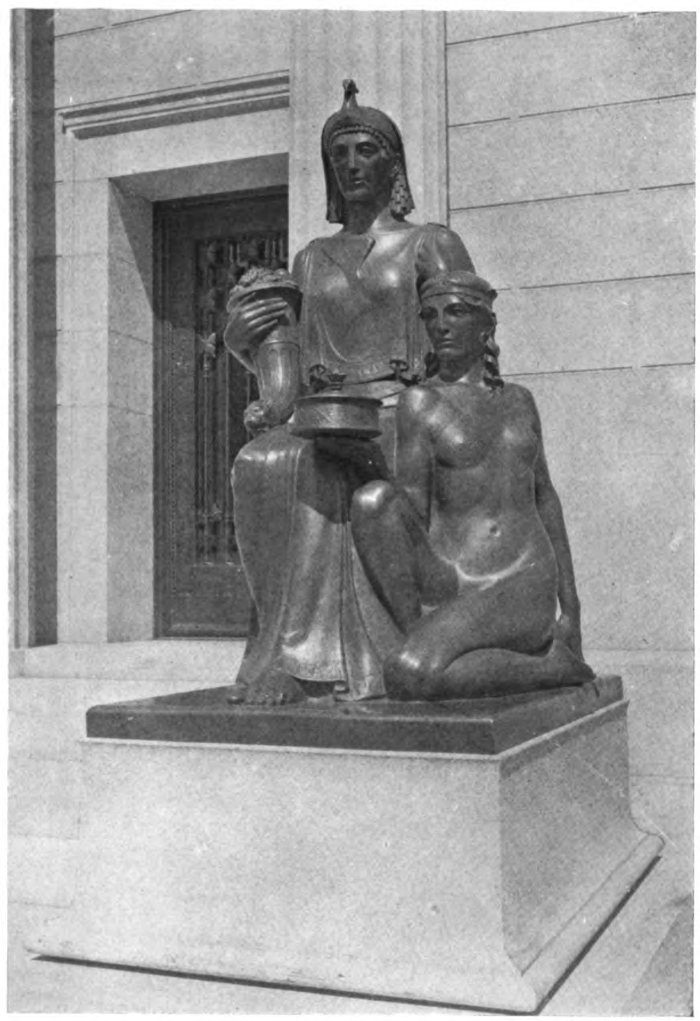
One experiences considerable difficulty in selecting a single artist as representative of this school of modern archaic sculpture. But in order to show those works most characteristic of the early Greek period it is necessary to choose that man whose sculptures consist not only of exquisite modeling, but also taste in choice of appropriate architectural skill as well. Just as the delicate lines and delightful proportions of Greek forms were so exquisitely echoed in their temples and public buildings, so have the most successful of our modern artists employed skill in professions analogous to, but not essentially a part of, their own branch of art. In the golden days of Florentine art the greatest men were generally painters, sculptors, architects and goldsmiths all at once. In using the word "goldsmith" one does not mean to imply that they actually produced metal tableware or jewelry alone, but that they employed that exquisite detail of design and execution which has always been preëminently characteristic of the art of Benvenuto Cellini.

In our modern school we have the combinations of sculptor and goldsmith, several sculptors and architects, but, so far as one is able to judge, only one prominent example where the three are combined. As the most interesting exponent of this new and virile school of sculpture, for the happy combination of sculpture, architecture and design, one may safely select the works of Edward Field Sanford, Jr.

One cannot dwell too much upon the importance of study to the serious artist, both as a means of inspiration and of perfecting style. The results of sincere study and research are so apparent in Mr. Sanford's sculpture that it is most interesting to show in connection with the views of his works selected for this article, photographs of archaic sculptures which might, consciously or otherwise, have been a direct influence. Just as Michael Angelo used the antique torse of the Hercules, now in the Vatican, for the lodestar of his artistic career, so has Mr. Sanford availed himself of the marvelous archaic sculptures which are now fortunately accessible to every artist.

In the western group of figures for the mausoleum, of which Mr. H. Van Buren Magonigle is the architect, a building of early Doric design, Mr. Sanford has achieved a work for which in intellectual sympathy and capacity of understanding could scarcely be surpassed by the sculptors of the school of Praxiteles. Setting aside the mere beauty of form, the grace and loveliness of design and delicacy of technical treatment of this group of two figures, it is impossible not to be fascinated by the exquisite employment of detail and by the treatment which is so simple in its means, so subtile in its effect. In the pictured reproduction of an archaic head, the influence of its eccentric head-dress is to be plainly seen upon that of Mr. Sanford's seated figure. To the cultured critic, perhaps, the most interesting detail is the way in which the lines of drapery reflect the delicate fluted columns of the building which forms the background. The kneeling figure is faultlessly modeled and admirably demonstrates that the artist has that more perfect knowledge of how to make a space decorative without decorating it. The feminine luxuriance of form is subdued by a constant inexplicable reserve and modesty. Both figures have that calm and perfect repose which should be the effect of all fine, imaginative work. In the whole blended harmony of lines there is a faultless devotion to beauty and a more intense seeking for perfection, showing that the artist is a master of exquisite design as well as of all spiritual vision.

The figure of Hercules, shown in a garden niche, while not so interesting from the viewpoint of composition and detail, is a marvelous exposition of perfect modeling and calm dignity. While not challenging the immediate attention of the critic, it is a work which should always endure through mere perfection of form if for no other qualities. It has a style flawless and fearless, a sustaining consciousness of the relative value of each form to the entire. One is impressed anew with the indisputable fact that forms which flow most naturally and easily from the hand of an artist are always those most pleasing to the eye. In conjunction with this modern conception is shown the antique fighting



Group of Figures for Mausoleum
H. Van Buren Magonigle, Architect; Edward Field Sanford, Jr., Sculptor

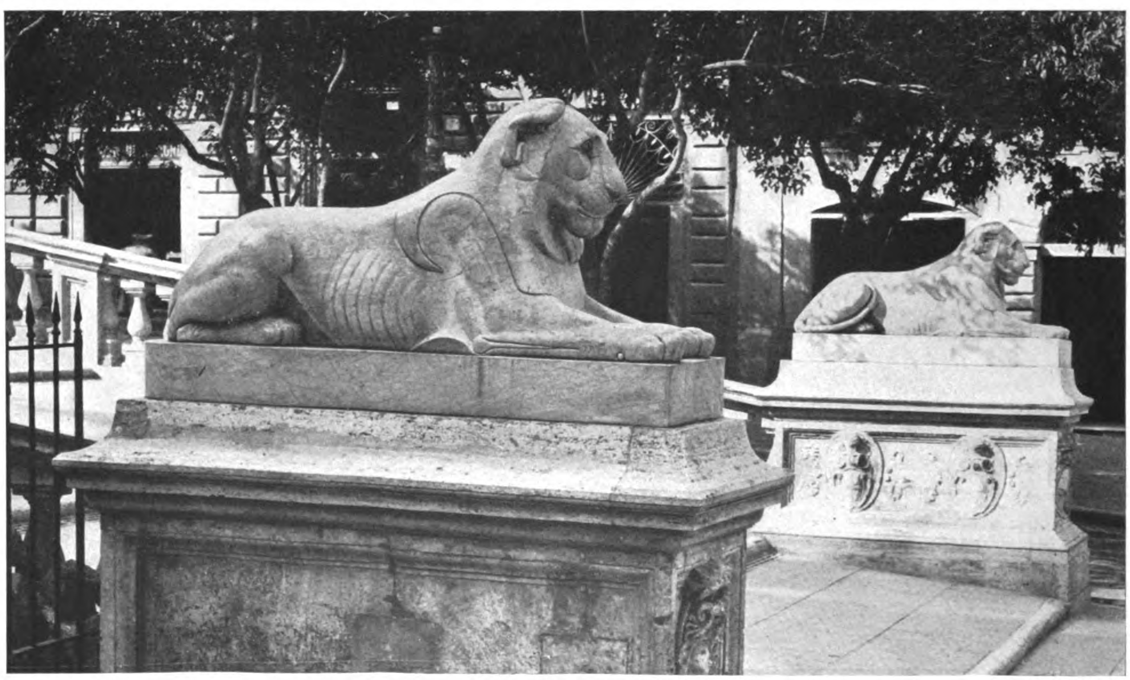
Marble Great Dane
Edward Field Sanford, Jr., Sculptor

that intensified vitality of action which is so essentially characteristic of the Great Dane. It would be impossible for increased value to be laid on elaborate design, or on curious anatomical construction. One realizes anew that all great art is delicate art, roughness having very little to do with strength, and harshness very little to do with power. In this marble dog there is all that restraining influence of design which

Hercules — a perfectly sculptured body which through the vicissitudes of hundreds of years still stands preëminent as one of the finest examples of the perfection of conventional anatomical forms.

In the photograph of the archaic lions placed centuries ago by Michael Angelo at the foot of the Capitoline Hill, where they still crouch indomitable and majestic in their calm repose, we have perhaps the best example of the work of archaic animal sculptors. In Mr. Sanford's Great Dane there is a similar quality of intensified, immobile life — a dog so true to nature, yet so essentially conventional. Upon viewing this marble one feels that creative greatness consists not only in feeling much, but in controlling much. Here is the perfectly realized opportunity for the portrayal of is the glory of the Parthenon. This figure is not one of ideas merely, but also of execution; not one of conception, but of creation. It might be a far more intricate wonder of design, but how much more worthy of the noble animal portrayed and of the dignity and genius of the sculptor is this almost living exponent of that power which controls the imagination of the artist in dealing with his subject.

For the artist no form should be obsolete, no subject out of date; for our modern artists whatever of life and passion the world has known lies before them, virile with beautiful life. They may choose or reject with the calm, artistic control of those in possession of the secret of beauty. As Plato has expressed it, "The beautiful is nothing else than the visible form of the good!"



Archaic Lions at Foot of Capitoline Hill, Rome

DEPARTMENT OF ENGINEERING & CONSTRUCTION

CHARLES A. WHITTEMORE, *Associate Editor*

Drainage Problems in Large Buildings

By F. R. C. BOYD, B.A.

WHILE the problems of drainage in large buildings, unlike the considerations of architectural style, finish and decoration, obviously lack the direct appeal to the artistic sense of architect and owner, they are nevertheless deserving of careful consideration from the utilitarian, sanitary and revenue-producing points of view. The fact that in the majority of large modern buildings the sub-basements are located below the grades of existing street sewers, renders it necessary to provide means in such cases for the collection and disposal not only of such sewage and seepage as may normally originate in sub-basements and other areas below sewer level, but also for handling in emergencies much larger quantities of water which may result from the breakage of pipes within the building, flooding from excessive storms, from fire extinguishing apparatus within or without, from temporary overloading of street storm sewers, from failures of foundation wall waterproofing, and from a variety of other causes of varying probabilities of actual occurrence.

Earlier buildings were provided with steam pumps of more or less ineffectual design or arrangement and generally so disposed as to require starting and stopping by the manual control of an attendant. The expense of operation of such steam pumps, combined with their unreliability when handling sewage, their requirements for frequent shutdowns for cleaning and repairs, and their general unsuitability to the problem, led to the development of the two methods now most commonly and universally used, — the pneumatic method and the electric method.

The Pneumatic Type

The pneumatic method was first developed in Great Britain as long ago as the year 1880, at which time the first installation of any appreciable magnitude was carried out on designs of Isaac Shone in a sewage pumping problem at Eastbourne, England. The general principles of this system, and in fact most of the details as well, have remained practically unchanged from that time until the present. The success of the initial installation at Eastbourne, which was for an ultimate capacity of 2,592,000 gallons of sewage per 24 hours, indicated the entire feasibility of sewage ejection from the basements and lower areas of large buildings. One of the earliest of such instances was afforded by the problem presented in the British Imperial Houses of Parliament at Westminster. The problem in this case was typical of that presented by the large modern building in every way in that the sewage and drainage were collected at a point below the level of the outside sewer. It was essential to eliminate the possibility of odors finding their way into the building; the apparatus should be automatic in action, "fool proof" in construction, and operating with a minimum of moving parts; the operating cost should be appreciably lower than that of a system involving a constant attendant; the space occupied should be inappreciable, and, above all, the reliability factor should be 100 per cent, even although the demands varied in this instance from a normal sewage flow of only about 50 gallons per minute to a maximum required ejection of 1,200 gallons per minute during heavy rains.

In discussing this type of an ejector it should be borne in mind that during recent years various developments and modifications over the original type have taken place and many different kinds of pneumatic ejectors have been installed. Some are connected with compression tanks where the air is compressed by steam pumps for other purposes in connection with the building. Some have their own electric compressors and some are operated by directly connected steam. The principles involved, however, are the same in each case except for the mechanical differences, and the architect in determining which type of a pneumatic ejector is best suited, before the type is chosen, should investigate the other mechanical equipment of the building. For instance, if compressed air is used in large quantities in connection with a manufacturing or mechanical establishment, it might obviously be superfluous to install the electrically driven pump for air compression. On the other hand, if live steam is created in considerable quantity, a steam pump might solve the problem for air compression better than an electric motor.

Method of Operation

To those unfamiliar with this type of ejector a brief explanation of the details may be of interest. The ejectors are either single units or duplex units, and this difference lies only in the tanks.

The storage receptacle into which the sewage from the building flows by gravity is usually a cast-iron receptacle, although in some installations concrete has been used. During the process of "filling," the tank is vented to the atmosphere by a pipe connected directly with the chimney or carried up independently through the building. When the tank becomes nearly filled a float mechanism inside the tank trips an air valve, which in turn allows the compressed air to enter the tank at the top above the sewage. The vent open to the atmosphere is automatically closed by a check valve, and the "fill" pipe also is automatically closed due to the pressure of the compressed air on the top of the sewage. Simultaneously the check valve in the discharge pipe is opened. This completes the mechanical operation. The air pressure is now exerted entirely on the material in the tank and completely empties the tank in a few seconds. The fall in the level of the sewage in the tank causes the float mechanism to restore the air valve to its original position, thus shutting off the air pressure from the compression system and, by opening the air valve in the vent, exhausts the residual pressure to the atmosphere.

At the same time the discharge check valve closes and the inlet check valve opens, allowing the tank again to be filled by the flow of sewage through the inlet pipe, and thus the operation is ready to begin over again.

One of the most important details of this mechanism is the float which operates the air valve. Various types of pneumatic ejectors on the market to-day each have a slight difference in this particular feature, but the principle of them all is the same. All of the other details of this pneumatic type are absolutely simple.

The duplex feature of the arrangement of two tanks will commend itself at once to architect, engineer and building owner. It affords not only a spare unit to be used during the occasional periods of repair of one unit, but also a doubled capacity for periods of emergency. From the construction and operation of this type involving the use of no moving pistons or parts for impelling the sewage, but only the direct action of compressed air on the whole upper surface of the sewage in the pot, it will be apparent that any and all sewage of whatever description which can find ingress to the pots through the sewage piping of the building is certain to be completely ejected at each "dump," without the necessity of providing any means of screening, with the attendant expense for cleaning.

The air pressure for operating a pneumatic ejector, as has been previously noted, may be taken from the air pressure system with which many large buildings are provided; but whatever the source, the pressure required is merely that necessary to overcome the head against which the sewage is to be ejected and raise it to the level of the street sewers. The calculation of this head would not be exact nor sufficiently accurate if all consideration of friction loss in the pipes were omitted. In many instances the pipes are so arranged that a direct line may not be obtained. In such installations each angle or bend in the pipe produces an extra friction which must be taken into account in estimating the pressure.

The Electric Type

The electric method is an American development first worked out along the lines of its present standardized form in Chicago in the year 1903, and the leading reasons for its development are threefold:

First, is the admitted fact that the tendency for electrification of all possible operations and processes has been more rapid here than abroad.

Second, and almost conversely, is the fact that pneumatic methods of handling operations, even including power transmission, had in the years preceding the comparatively recent electric era been worked out very extensively in Great Britain and the continent, which condition did not obtain here, nor does it now, and it is improbable that it ever will. London, for example, has for years maintained large central stations for compressing air which is piped for considerable distances and sold for varied power purposes, and a company in Paris has successfully transmitted compressed air power for miles. The logical appeal, consequently, of the pneumatic ejector to such conditions where the relatively simple iron tank can be installed cheaply, and operated merely at the actual cost of compressed air from street mains, purchased as required, is very great. The absence of such a source of compressed air power in America renders it necessary in our buildings, not equipped with air compressing plants for other purposes, to install for operating pneumatic ejectors a complete air compressing plant and, in order to be reliable and free from shutdowns, this plant must consist of duplicate apparatus throughout.

The third reason for the development of the electric ejector is merely the obvious corollary of the above two reasons: American conditions have demonstrated the need and the demand for an ejector working directly from the most common source of power—electricity; an ejector is desired which is self contained without auxiliary apparatus, low in initial cost and in cost of operation, limited in floor space and excavation requirements, and possessing the 100 per cent reliability features of the straight pneumatic type.

Method of Operation

Unlike the pneumatic duplex type which requires two pots, this type requires only one sewage collecting receptacle, for since it is never subjected to other than atmospheric pressure, both of the ejecting pumps can draw either separately or simultaneously from the same receptacle and at the same time sewage can be flowing into the receptacle. The two ejecting pumps are of a special design of centrifugal pump with large passages and having impellers designed to handle the exacting requirements of practically unscreened sewage. They are located at the bottom of the open ejector pit drawing the sewage from the lowest portion of the receptacle, and are driven by vertical motors mounted on the extended cover plate at the basement or operating floor level. When the inflowing sewage reaches a predetermined level in the receptacle, a simple float mechanism actuates the automatic motor starters, the adjustment of the tappets on the float rod being such that ordinarily only one motor and pump will start when the sewage receptacle becomes filled to the predetermined level. In case of failure of the first unit, a further inflow of sewage will cause the second motor and pump to start, which action would similarly occur in case the first unit, although operative and starting properly, were unable to handle the total amount of sewage as fast as it flowed into the receptacle. This method of operation constitutes the same desirable feature of duplex protection as earlier described for the pneumatic type with the increased advantage that not only can both units operate for emergency conditions, but they can operate continuously.

The central sewage receptacle is provided near its lower end and somewhat above the pump suctions with a grating which acts as a screen to prevent large objects, such as sticks, getting into the pump, and if necessary any accumulation can be readily removed through the hand hole without interfering with the ejector operation. In practice such accumulation is either entirely absent or practically negligible, as the special design of the ejecting pumps permits their successfully ejecting any material which can find its way through the building sewage piping to the receptacle. By means of valves it is possible at any time to isolate either pump from the sewage receptacle so it can be inspected or repaired, or completely removed if desired while the other pump continues in operation. A further desirable feature of this type of ejector is the fact that it can pump out its own pit in which it is installed in case through leakage or other cause water should start to accumulate therein; each ejecting pump is fitted with an auxiliary valve for this purpose, whereas the pneumatic type requires an independent means of keeping the ejector pit pumped out.

The Submerged Type

Where the problems of drainage do not involve the handling of sewage, but merely the water coming from seepage, imperfect waterproofing, underground sources, the drainage of storm water from low areas, or the protection of a basement as insurance against possible periods of flooding, a less expensive form of apparatus may be used, consisting merely of a sump tank in which is located a vertical submerged centrifugal pump driven by a vertical motor above the floor level. Such arrangements, generally referred to as bilge pumps to distinguish them from sewage ejectors, may be of either the single or duplex type. Units of this type are obviously unsuited to handling sewage on account of the absence of the features described above embodied in the duplex ejector, and particularly the difficulty of cleaning and making repairs on the submerged pumps without interrupting the operation of the unit.

Another phase of the drainage problem which at times may be overlooked is that of handling small leakages or seepage through surface water penetrating walls. The submerged type has been used where this condition exists in considerable quantity, but for small installations where only an occasional demand may be made upon them another type of ejector is frequently used. This type is sometimes known as the sump pump, water ejector, etc. It consists of a receptacle with a grating at the top through which the water may flow. In this receptacle there is a float which when it reaches a predetermined point, due to the rise of water in the receptacle, automatically opens a water jet. This jet throws a stream of water into the exhaust line and by creating partial vacuum "sucks out" all the water in the sump. In some installations a steam jet is used and is known as an aspirator. Installations of this character are frequently installed in boiler rooms where the demand is only from the excess water used in washing down the coal or in washing the floor.

General

In determining the capacity of an ejector in "gallons per minute" as they are generally rated, it should be kept in mind that the average daily flow of sewage divided by 24 hours, and again by 60 minutes, is an entirely wrong criterion, since the flows vary greatly at different hours of the day and even different minutes of the hour. A study should be made of what might constitute the maximum flow condition, that is, when every fixture and drain is in service — a condition which might obtain, for example, at the noon hour or office closing hour of a large building. An ejector should then be chosen of sufficient capacity to handle this rate of flow with at least 100 per cent margin of safety on one of the duplex units only. That is, either of the duplex units should be able to handle the maximum probable flow when operating one-half of the time. The adoption of this scheme provides for long periods of rest for the pumps and driving motors during most of the day, for double the normal capacity in emergencies even if one of the duplex units is out of commission, and for quadruple the normal capacity when the complete duplex unit is in the operative condition in which it normally should be. These factors are none too conservative when apparatus or merchandise of value is located in areas served by the ejector.

The determination of the head against which the ejector must discharge is relatively simple, this head being merely the static lift from the elevation of the bottom of the ejector pit to the invert of the street sewer plus the friction loss through the discharge piping. This loss should be calculated on the assumption that both units are discharging simultaneously, and it is advisable to use relatively large discharge piping to guard against excessive friction when partially clogged. If in the preliminary layout of a building it becomes apparent that an ejector will be required for at least a slight lift, it is generally unnecessary to devote much study to keeping this lift to as low a figure as possible — the fact that an ejector is required at all settles at once that the necessary space must be provided and the consequent initial investment must be faced; whereas the increased operating cost for a few feet additional lift is practically negligible and should not be allowed to influence the considerations of best possible location and arrangement of the ejector and its pit.

On the question of space requirements, it may be stated that except for buildings of almost mammoth size, a duplex electric ejector can be installed either in a circular pit 8 feet in diameter or a rectangular pit 8 feet by 6 feet; the depth of pit must be 4 feet lower than the invert of the sewage inlet. A duplex pneumatic ejector of comparable size can be installed in a circular pit 11 feet in diameter; the depth of the pit must be 6 feet below the invert of the sewage inlet. If air compressors with motors and starters in duplicate are required, additional floor space about 6 feet square is required.

With reference to the first cost of the ejectors alone, exclusive of pits, foundations, piping and erection, the purchase price is about the same for both types. Where compressed air is not available, and it is necessary to purchase air compressors to operate the pneumatic type, the total cost of this type may exceed that of the electric type. The extra cost of installation, including excavation and concrete work for the pneumatic type, will be apparent from the comparative pit dimensions given in the preceding paragraph.

In the consideration of operating cost it is obvious that the electric method in which the mechanical power of the electric motor is applied directly to ejecting the sewage, is cheaper than the pneumatic method in which the mechanical power of the motor must first be applied to the compression of air, after which the air ejects the sewage.

A discussion of this subject would not be complete without reference at least to the condition which exists in many large buildings where valuable property is located far below the street level. It is at once obvious that a break in a water pipe, sprinkler pipe or hose system of large complications in the vicinity might be the means of permitting large quantities of water to enter such a building with attendant damage to whatever property might be below the street level. In such instances it is frequently advisable to install a pump of some sort. Whether it be an ejecting type or simple hose pump, may readily be determined by the conditions which will care for the maximum amount of water that may enter the premises. In one of our large cities there is a basement in which some valuable printing machinery is located, and as an item of insurance alone the owners of the building installed a pump having a discharge capacity of 1,000 gallons per minute. The cost of this installation, of course, was large, but the cost was not to be compared with the damage which might be caused by one flood in the basement.

The architect in performing his full duty to his client cannot afford to overlook any possible contingency which may later develop into serious trouble, and where the case is properly presented to the owner the average man is more ready to pay for an installation which is an insurance against possible difficulty than to adopt the "take a chance" attitude.

It is not the function of this article to attempt to decide for the architect the type of installation to adopt, as there are such a multiplicity of factors entering into the consideration and such a great variety of conditions existing locally in certain types of buildings that each case must be considered individually. Both types of ejectors have proven through years of service their entire reliability, which, after all, is the main factor of practical interest, and it is assumed that the principal consideration of the different features herein mentioned, as well as the many other features which will readily suggest themselves to any one interested, will lead to a proper selection.

Concrete Oil Tanks — I. Their Construction

By JOHN H. HESSION
Assoc. Mem. American Society of Civil Engineers

RAPIDLY we are approaching the widespread use of oil as a fuel in place of coal. At the present time this is particularly true in industrial plants. Here large heating units are employed which, when converted to oil burning, effect substantial economies over coal. Conversions are being extended gradually to smaller installations, such as for theaters, apartment houses and residences, so that while the problem of oil burning equipment heretofore has been principally for the consideration of the industrial engineer, the architect must now acquaint himself with its details.

Oil as a fuel found its first use more than a generation ago in the form of a by-product at the refineries of the oil companies. Gradually the high efficiency of fuel oil over coal was realized in the industries, so that just before the war its use was not uncommon. With the advent of the war, due to transportation difficulties and other reasons, the coal supply was entirely insufficient. This acute situation gave sudden impetus to the turn from coal to oil, and since then the use of oil as fuel has grown to tremendous proportions.

In the beginning steel tanks were used for the storage of oil, and continued to be the most common form of tank until the war. They were usually erected above ground, as there was danger of corrosion under ground, as well as difficulty in detecting small leaks. Repairs, too, were expensive. Concrete containers were used to a limited extent up to this time with varying success. When the war was upon us, it became extremely difficult to obtain steel, yet the demand for oil tanks increased greatly. The result was concrete tanks came rapidly into use, until at the present time more fuel oil tanks are being constructed of concrete than of steel. Among the reasons for this are: first, some doubt existed as to whether concrete could be made oil-tight, but this doubt is now dispelled, especially in the case of the heavier oils; second, steel tanks as above stated are not satisfactory when buried, whereas if built above ground there is a substantial loss from evaporation through the joints of the plates, particularly in the summer. The fire hazard in this case is great, as the recent $5,000,000 oil fire at Long Island City attests; third, inasmuch as concrete tanks can be made tight they can safely be buried under the frost line where the temperature changes are slight, thus eliminating large temperature stresses in the structure and reducing evaporation to a negligible quantity. Furthermore, the contents of the tank under ground is removed from the danger of fire either from lightning or nearby buildings. This burial of tanks is often insisted upon by insurance companies.

SIZE. This depends upon the quantity of oil used daily and the number of days' supply desired. Ordinarily a sixty to ninety days' supply suffices, though a single month's requirements may be sufficient in small installation where ready deliveries are made by truck. Some of the large cities specifically limit the quantity that may be stored. It is well to keep the tank as small as possible, in order to eliminate joints in the concrete. If joints are necessary, their number should be reduced to a minimum, since they offer serious planes of weakness to seepage.

Several small tanks are preferable to a single large one, as a fire in one of a group will consume only a portion of the whole supply, while a fire in a single tank might mean a total loss.

SHAPE. Where practicable, it is advisable to use circular tanks to eliminate as far as possible complex stresses in the walls and to reduce the quantity of concrete. Where the tanks are to hold small quantities of oil, it is often necessary to place them where the circular shape would be impracticable and it becomes necessary to use a rectangular shape. Frequently on large installations the tanks must be crowded into a given space, thereby requiring them to be of rectangular or many-sided shape. In such cases extra attention should be given to caring for the bending stresses in the walls at the junction of the floor and roof as well as midway between. A circular wall is better able to adjust itself without appreciable cracking to temperature changes than is a rectangular wall.

CONCRETE. The concrete must be much more carefully attended to than in ordinary building construction so as to insure as perfect work as possible. Where feasible, tests should be made to obtain from the ingredients the densest possible mix. The broken stone or gravel should vary from 1 inch in diameter to ¼ inch, and must be hard and clean. Aggregate larger than 1 inch may give trouble when poured by failure to permit the flow of concrete around the reinforcement. Sand should pass a ¼-inch screen and be graded down to 100 mesh, not more than 5 per cent passing the latter. It must contain no organic matter and its clay or loam contents must not exceed 3 per cent. The cement should be a standard brand of Portland cement, subjected to the usual laboratory tests.

MIX. Satisfactory results have been secured with 1:2:4 concrete, but to insure more density 1:1½:3 is recommended with an addition of 8 pounds of hydrated lime to each bag of cement. The lime gives plasticity to the mass — invaluable in thoroughly filling the forms. A 1:1:2 mix is likely to be difficult to handle in placing, due to its viscosity. The amount of water must be very carefully watched, since too much water is as detrimental as too little. By doubling the correct quantity of water the strength of the concrete has been known to be reduced to less than one-third. The water contents is right when the mix is plastic and yet, on depositing, little or no free water appears on top, that is, the consistency should be "quaky." Having once secured the correct quantity of water, it should thereafter be carefully measured for each batch.

While one-minute mixing has been the rule on most other concrete work, this is not sufficient for tanks. Additional mixing appreciably increases the density and therefore the strength of concrete. Furthermore, the amount of concrete in these tanks is comparatively small, so that extra time for mixing is not a serious delay. Two minutes yield excellent results on mixing, this time being measured from the moment all the ingredients are introduced into the mixer.

FORMS. Forms must be thoroughly substantial and unyielding, as any distortion after initial set in the concrete takes place seriously affects the tightness of the tank and the strength of the concrete. Surfaced lumber, tongued and grooved, should be used.

The wall forms are more difficult to construct properly then the balance of the forming, and yet they are the most important. Every care should be taken to secure tightness, since even a small crack will allow the fine ingredients of the concrete to flow away. The resultant concrete will then be "honey-combed," thereby offering ready passage for oil leakage. A mistake sometimes made is to use heavy rods to keep the inside forms and the outside forms for the walls properly spaced. For ordinary building work these rods will serve admirably, but where water or oil has to be resisted, they form a serious obstacle. Oil and water have a tendency to find their way along the surface of the metal, and a leak of this kind is difficult to tighten properly. The best way to stop such leakage is to cut the rod off about an inch inside the face of the concrete — a difficult matter in itself, and then to fill in the cutting thus made with an oil-tight plaster. The use of twisted wires for the same reason should be avoided if possible; but if necessary to use them, they should be cut off similarly to the heavy rods.

PLACING CONCRETE. This feature is one of great importance. When concrete is carried even a short distance from the mixer, the coarse aggregates separate from the fine. When the mass is dumped, it therefore needs careful puddling to redistribute the ingredients and to squeeze out entrapped air. Insistence on good spading is most necessary. Small batches frequently dumped are preferable to occasional large ones, owing to the advantage of readier puddling.

JOINTS. The ideal tank would have no joints, but practical difficulties usually do not permit such construction. On small tanks it is possible to have but one joint between the roof and walls by suspending the inside wall forms. The larger tanks require in addition to this joint another between the floor and wall, though it is possible to eliminate the latter joint by using sliding wall forms. Such forms are expensive and most contractors do not possess them. The floor must be cast monolithically, as likewise the roof. Walls should be poured continuously from floor to roof, to avoid a horizontal or a vertical joint. This can be done by building up the walls in one or two foot layers, the top layer being deposited before initial set has taken place in the lower layer. Should the lower layer set too hard, its surface must be thoroughly cleaned and roughened, and a 1 : 2 mortar applied just before the pouring of concrete is resumed. This procedure should be followed at the floor and roof joints of the wall, where the concrete has had opportunity to harden before renewal of pouring.

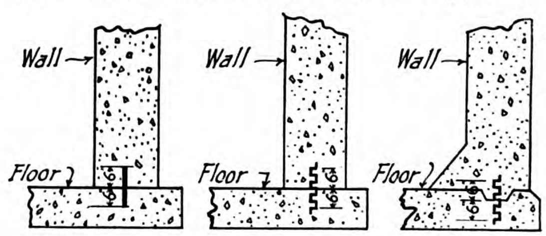


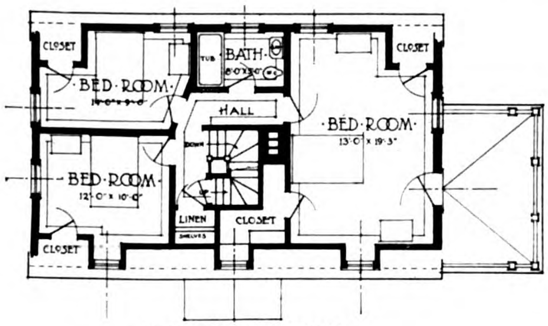
FIG. 1. FIG. 2. FIG. 3.

As a special precaution for obtaining a tight joint at the junction of the floor and walls it is well to use a metal strip about 12 inches wide, embedded 6 inches in the floor and 6 inches in the wall, as shown in Fig. 1. The laps of these strips should preferably be riveted. A further modification in lieu of plain metal is the use of a much bent strip as indicated in Fig. 2. Such an arrangement requires the oil to travel a longer distance than is required with flat metal. In addition to the metal dam the width of joint should be increased by bringing out the base on an angle (Fig. 3) and by slotting the wall into the floor.

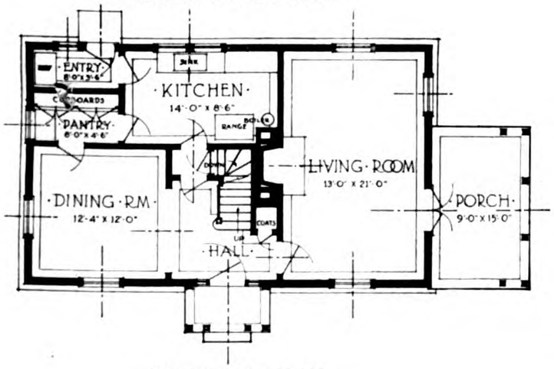
A Small Country House at Belmont, Mass.

THE RESIDENCE OF WALTER H. FOSTER, ESQ.

STANLEY B. PARKER, ARCHITECT



SECOND FLOOR PLAN



FIRST FLOOR PLAN

ENTRANCE PORCH

EDITORIAL COMMENT

ARCHITECTS AND BIG BRIDGES

As a part of post-war expansion the construction of three bridges has been authorized in Pittsburgh in which Allegheny County and the city have associated interests. The city of Pittsburgh has an active and competent Art Commission that is keenly appreciative of the value of well designed bridges, but owing to its limited power it has no jurisdiction over county structures. The bridges, however, are an intimate part of the city, and the Commission after diligent effort was fortunate in interesting the county authorities in its aims, with the result that some assurance was given that the bridges to be erected would have architectural consideration, and evidence of this is now had in the appointment of architects to design the structures.

Our contemporary, *The Engineering News-Record*, expresses surprise at these appointments and calls into question the advisability of the procedure as a matter of public policy. *The News-Record* would be quite content to let the matter pass if the architects were "merely consultants on æsthetic features," but to entrust matters of construction to them appears a menace to the public safety.

It is not our intention to advocate the placing of architects in sole charge of bridge design — in fact, it is our opinion that the most satisfactory results can be obtained by the joint efforts of architect and engineer working with equal responsibility, and our understanding of the situation in Pittsburgh is that this condition exists there. The responsibility for the engineering features of these bridges is invested in the county engineer in charge of bridge construction, and if no independent engineer has been named it may be assumed that the county engineer will perform his functions to a satisfactory degree, and that the appointment of architects will not interfere with the exercise of his usual jurisdiction and authority.

Bridges are not the only structures in which public safety is a factor, nor is it only in them that construction must be given paramount consideration. If architects can only be permitted to consult on æsthetic matters in bridge design, surely terrific responsibilities rest somewhere for permitting them to be in sole charge of the design and construction of thousands of buildings erected annually. Is not the public safety a matter of some concern to the architect who is responsible for the modern thirty-story office building or the auditorium seating 5,000 people?

We do not feel that this reflection of the attitude of the engineering profession toward the responsibility of architects is a true one. The respective professions have made rapid strides in recent years in reaching a common understanding of their particular functions and the results have been measurably greater. A serious consideration of this question must establish the fact that architects are fully as responsible to the public in matters of safety as engineers. The big consideration is that the real and most important function of the architect is mistakenly or not at all understood by engineers and the great body of the public. An architectural problem to them means largely a matter of surface decoration — it is not realized that the fundamentals of any building problem are best solved from the architect's point of view. Before the structural features can be considered it is necessary that a scheme be evolved which will meet the conditions imposed. It is here that the architect renders the greatest service.

In the case of bridges over important waterways, there are many conditions governing design that are fixed by governmental and other regulations. The height of span above mean water level, the percentage of the river's width the supporting piers may occupy, the width of roadway and other factors are predetermined and must be accepted by whomever is entrusted with the problem. The architect is peculiarly qualified to co-relate these conditions with the equally vital matters of approach, relation to existing buildings and the importance and beauty a bridge should possess as a civic feature, and evolve a solution that will meet the larger aspect of the problem. Engineering features are prescribed within definite limits and are properly dependent upon the bigger item, the conception of the scheme, for it is that that will determine the usefulness of the bridge as a traffic artery and its value as a civic feature.

It is only recently that the Municipal Art Committee of the Chicago Chapter of the American Institute of Architects has been of invaluable service to its city in this same connection. Plans had been decided upon for a bridge over the Chicago River that would have been entirely out of keeping with the enlightened stand the city has taken with reference to civic extensions. This design contemplated a pair of huge steel towers and was approved on the theory that other types would not be available because of legal and other complications. The Chapter's Committee gave the matter extensive study and was able to propose and have adopted a type of bascule bridge which not only serves the needs of the river from the standpoint of navigation in a better manner, but also enables the straightening of the river which is contemplated at some future time, to be done without the necessity of a new bridge. This public spirited work has been instrumental in preventing the erection of a very unfortunate structure and assures a bridge that will be worthy of the city when its extensive plans have been brought to maturity.