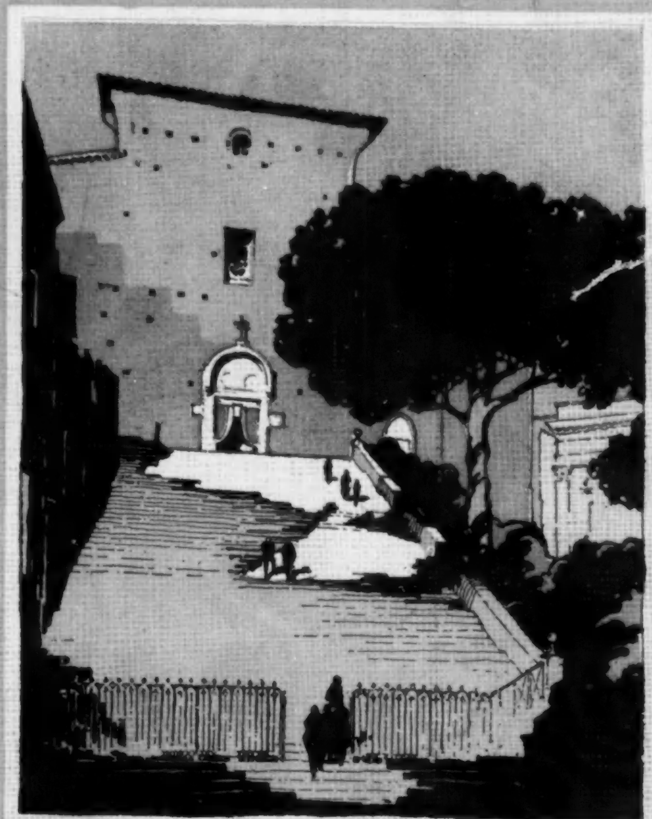
THE ARCHITECTURAL FORUM



SEPTEMBER 1927

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Public Buildings Reference Number, Part II

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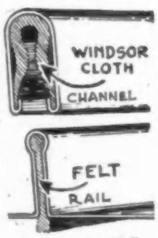

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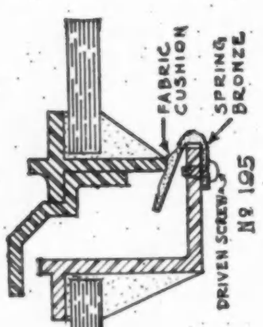

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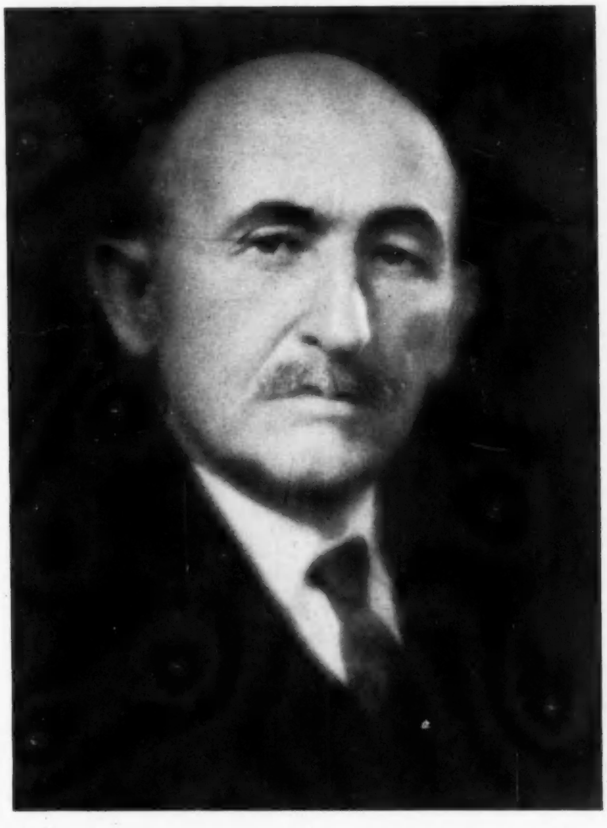
THE EDITOR'S FORUM

Martin Roche: 1855-1927

BORN in Cleveland, of Irish parents, August 15, 1855, Martin Roche came with his family to Chicago a few years later. His early education was obtained in the Chicago public schools, with private tutors, in the courses of study given by visiting men in the old Central Music Hall, and at the Art Institute. Apprenticed at 14 to a cabinet maker, he learned the trade, and through his earnings he advanced his training, entering at 18 the office of W. L. B. Jenney, where he found a group of young draftsmen many of whom were destined to become nationally prominent as architects; among the number he found there was William Holabird.



In 1881 Mr. Roche left Mr. Jenney's office and entered into partnership with Holabird & Simonds, forming the association later to develop into the firm of Holabird & Roche. He was still designing furniture and entering competitions of designing of all sorts when cash prizes were to be awarded. Many of these he won, several in succession. The money went into more courses and into living expenses. Long, lean periods there were in building, and since there were no buildings to design, Mr. Roche busied himself designing furniture. The first building designed by Holabird & Roche of which there is any record is a two-story structure at the southeast corner of Laflin and Van Buren Streets in Chicago,—even today a dignified, simply treated building of brick with shops on the ground floor and apartments above, admirably adapted to its purpose.

Then there came to American cities the necessity of adopting new building methods. To build by the "taller the building the thicker the wall method," the area between walls was becoming too scant for profit. The Tacoma Building, designed by Holabird & Roche, was the first of what was known as "Chicago construction," now spoken of as "skeleton construction." It was the first of a type of building that was to transform American cities, American industry and, to change, in a way, the course of the world, the beginning of what will come to be looked upon as a great achievement in a triumphant age. Out of whose mind came the idea is not known; be it said that neither Holabird nor Roche boasted its conception. But theirs was the courage to design and construct a building that was to crumble to the street,—so said the bystanders. It has been decided in the courts that Martin Roche was the originator of the plan of sub-basementing, now in use and in some ways as revolutionary as skeleton construction. The total amount of money involved in the firm's work at the time of Mr. Roche's death has been conservatively estimated at between $350,000,000 and $400,000,000; its largest single building has been the Stevens Hotel, Chicago, just completed.

Lucian E. Smith, now in independent practice in New York, thus pays tribute to Mr. Roche. "It is my privilege to have known Martin Roche for nearly 30 years. For about two years I was in his office, and since that time I have always counted him a helpful friend and sympathetic adviser. His death leaves his friends bereft and the profession, of which he was such a brilliant figure, the poorer for having lost so great an artist. Throughout his life he was a serious and profound student of architecture and art in all its phases. His love of painting was shown by his consistent acquisition of fine pictures and drawings. His mind at the same time had a definite practical trend which stood the firm in good stead in solving the infinite variety of practical investment problems which for years formed the bulk of its work. He was an indefatigable worker and studied his designs over endlessly, seeking always the best solution. Although he worked in any style, I have always felt that it was Gothic that gave his imaginative nature the most pleasure. The University Club in Chicago is a striking example of his application of this style to modern requirements. He believed in fine things and would go to any lengths to achieve the results that he secured."

Mr. Irwin L. Sperry, manager of the Jefferson Standard Building at Greensboro, N. C.

Gentlemen, meet Mr. Sperry

The Jefferson Standard Building, Greensboro, N. C. . . . its experience with office partition . . . . as told by Mr. Irwin L. Sperry, manager of the building

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Photo of Jefferson Standard Building, Greensboro, N. C., in which Telesco Cabinet-made Partition is used exclusively. At the left, we quote a letter from Mr. Irwin L. Sperry, manager of the building, relating why Telesco was chosen.

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The
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Volume XLVII SEPTEMBER 1927 Number 3

The Designing of Auditoriums

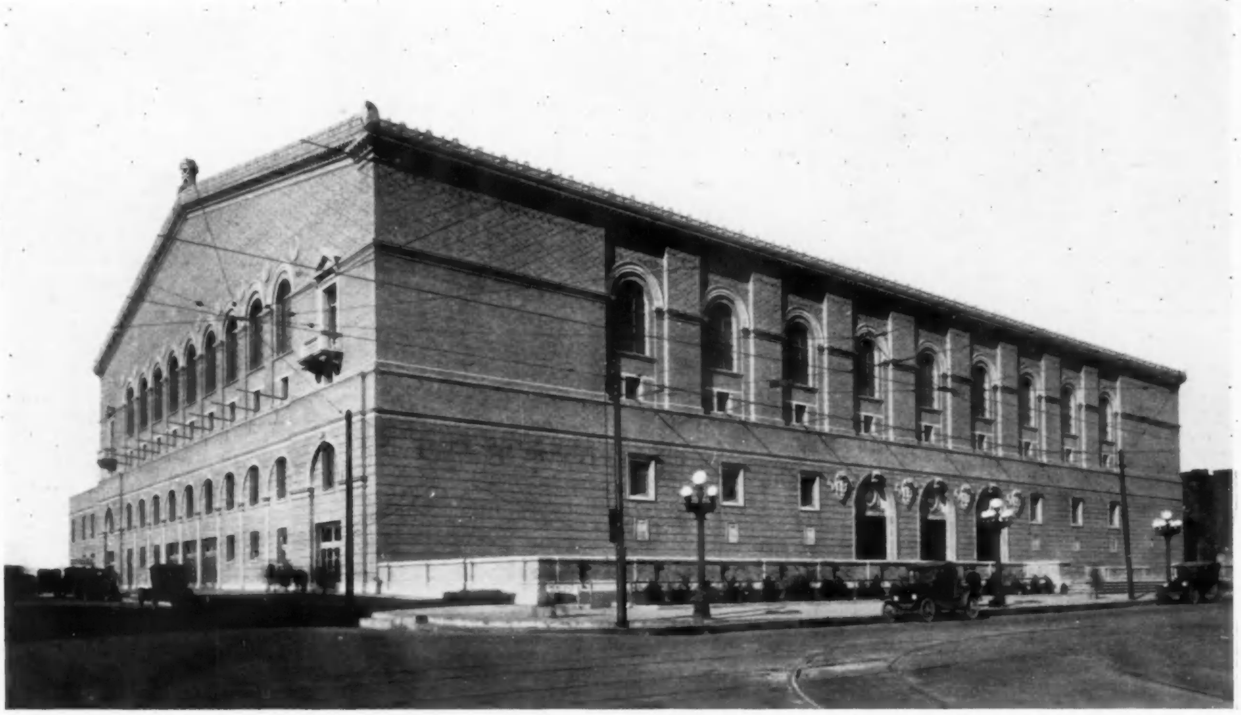
By R. H. HUNT

TODAY more than ever before the municipal or community auditorium is a subject for architectural consideration. Whether this is coincident with the enlarging emphasis being given to community-wide projects, such as are found in the realms of religion and education, or whether it is the outgrowth of an increasing sense of civic pride is not so easy to determine,—and the cause is not as essential as the fact that this condition everywhere exists.

Certain it is that civic pride as expressed through chambers of commerce, boards of trade and a multiplicity of luncheon clubs is now greater than ever, and it is equally certain that more community-wide projects are being proposed and developed than in any period prior to 1917. This existing condition has a bearing on the question of auditoriums, since it is through this type of building more than through any other that this civic pride is finding itself made articulate. This sense of pride is used or capitalized to express appreciation felt for one cause and another. One of the most frequent of current reasons offered for the erection of auditoriums is that of supplying a memorial to the soldiers and sailors and other participants in the World War. It is not within the scope of this article to defend or oppose the erection of buildings of one kind or another for such purposes. Granting that in such a case a city may be making patriotic impulses serve utilitarian ends, it remains true that no public project is more laudable from a community standpoint than that which serves to unite all elements of the community and thereby to afford opportunity for community assemblies. Such assemblies presumably tend to make life more worth while and enjoyable. It will doubtless be accepted as a fact that the municipal auditorium finds its chief justification, its *raison d'etre*, if one pleases, in its potential ability to serve all the community and to serve it fully and in an ever more efficient manner. The auditorium is an important community adjunct.

Selecting the Site. It naturally follows that choosing an auditorium site should be considered a very important first step. It must be accessible to those for whom it is planned, and accessibility with the least inconvenience to the majority makes it desirable that the location be as near the center of population as possible. If business considerations are to enter in very strongly, because of offices to be included in the building, it is preferable that the site be within easy distance of the chief business district of the city. From the point of view of the residents, many of whom in the nature of things will go from their homes to the auditorium rather than from their places of business or the shopping district, it is not requisite that the site be located down town. If the auditorium is to serve as a community center within itself or as one of a group of buildings, the site must be selected with due consideration to the surroundings, approaches, and general conditions. Without doubt the site should be on or very near to important streets and thoroughfares. The close proximity of street car lines and bus lines involving the minimum number of transfers, and of streets for automobiles is vital. The ever-recurring and ever more vexatious problem of providing automobile parking space demands that the structure be placed within a reasonable distance of streets and housing facilities lending themselves to parking. Sites near other buildings in which simultaneous entertainments are likely to be held should be avoided, so that undue congestion will not occur. Generally, theater and hotel zones are to be shunned in selecting an auditorium site. To assist in caring for the parking problem, some of the largest auditoriums are now including parking space within the buildings themselves, this being area convertible for other purposes as well. This space is often on the ground floor, under the main auditorium.

The Multi-Purpose vs. the Limited Purpose Building. If the auditorium is to serve the entire community, it must be far more than one large room designed for very limited purposes. The very size of the building, as compared with other structures in the city, will as a rule make possible the inclusion of arrangements and features giving it a multi-purpose design. A community is composed of many elements differing widely both as to interests and needs. "Community" is a word to conjure with in these days, and many economists are tearing their hair trying to find a suitable definition of what is meant by the term. Regardless of such definitions, we know that a civic enterprise, such as the auditorium under consideration, must be designed to provide for all those things which large groups are

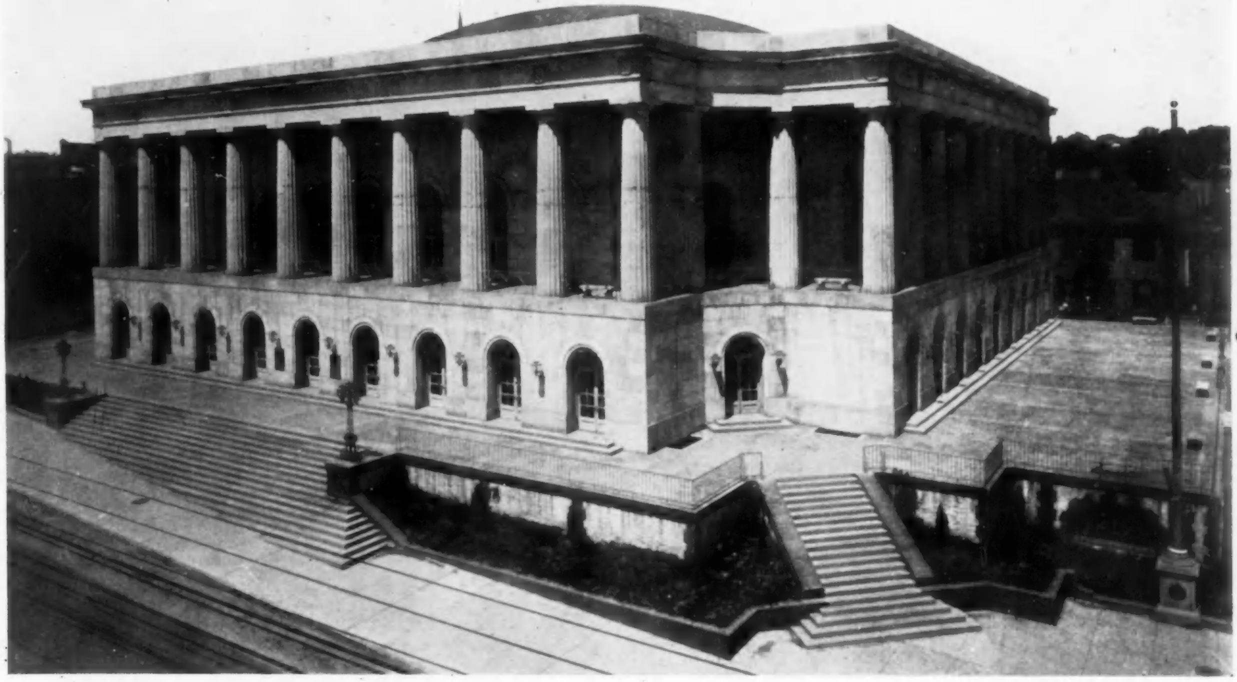


Auditorium, Memphis
Pfeil & Awsumb, Architects

likely to do together. The presence of other buildings in the city makes it imperative that the auditorium shall be large enough to be used for practically any and all purposes for which other buildings have been separately and more particularly designed. There will always be found, for instance, comparatively large church auditoriums, large public school or college auditoriums, and perhaps others. Seldom if ever will any one of these serve more than the immediate constituency for which it was planned. If ever all the congregations of a given denomination or of several denominations should desire to come together, as they frequently do, the city auditorium serves where their own separate buildings could not. If a school gathering embracing more than the student body of a single school is to be held, the city auditorium stands with its wide variety of arrangements as an invitation for such a meeting. In other words, the limited type of municipal auditorium is much more likely to meet with competition and therefore be less frequently used and consequently looked upon as serving a far less definite function than the auditorium serving many purposes. Except in very small localities, the auditorium of the multi-purpose type is being erected today rather than that of the limited or restricted type, which is far less practical.

Some Uses for the Building. To the architect the building designed for many purposes offers a more attractive problem, even though it is much more difficult, than the simpler building. To design a structure adapted to a given purpose, such as public lectures, which will at the same time serve a far different purpose, such as an athletic contest, is far from a one-day study, both as to arrangement and as to appearance. In the first type of program, hearing is a prime requisite, with seeing somewhat secondary; in the second, seeing is all-important, while hearing is somewhat secondary. Or to take another matter as a further illustration of difficulties which will challenge the imagination and intelligence of the architect, if the auditorium is to be utilized for dramatics and grand opera, those in attendance are in a sense on dress parade and they want and expect to find their surroundings beautiful and charming, even as they naturally fancy themselves to be. On the other hand, if it is a political gathering, held perhaps during the hectic days of a blistering summer, the delegates will prefer to be in their shirt sleeves, hot and perspiring, with evidences of disorder on every hand. How else can they make themselves believe that they have truly represented their constituencies with all the fervor of their souls?

As to the actual uses for a multi-purpose building, this list, prepared by the manager of such a structure in a city of 150,000 people, may serve to illustrate some of the things which should be given consideration when designing a building of this kind. This list covers a five-year period, 1922-1927, the time in which the building has been in use: organ concerts; musical comedies; dramatic shows; city-wide celebrations of several kinds; special motion picture shows; amateur dramatic presentations; banquets for from 500 to 3,000; lectures; art exhibits, and conventions and exhibits incident thereto; religious meetings, including city-wide revivals; oratorical contests; notable funerals; sales meetings; dog shows; athletic contests, such as basketball; lodge ceremonials; concerts; club meetings; flower shows; trade shows, including those of automobiles, food, and better homes; dances; school commencements; grand opera;



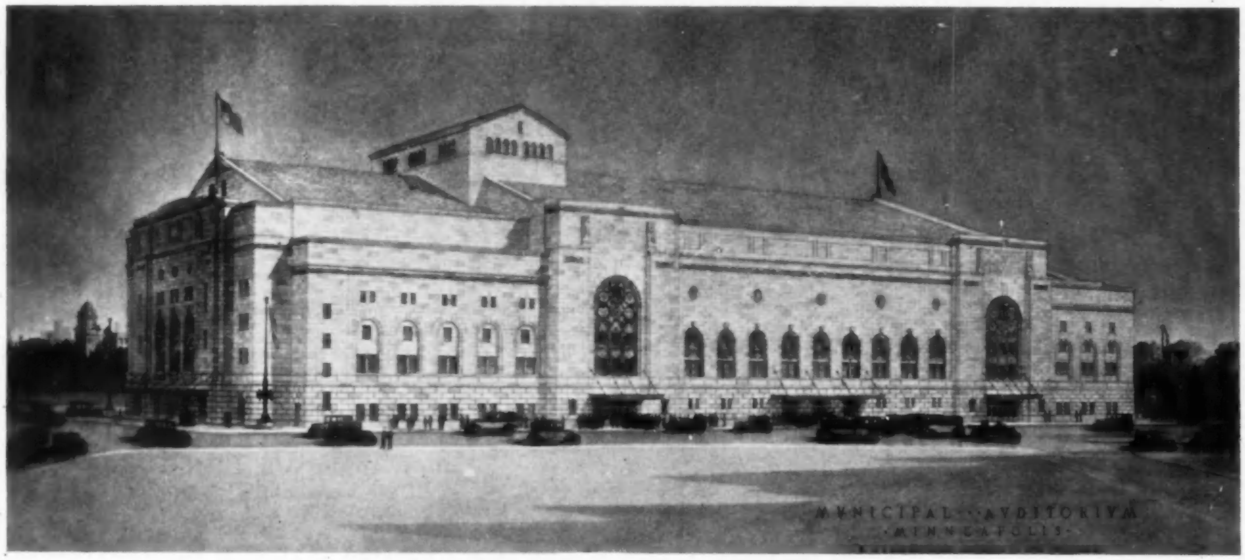
Auditorium, Macon, Ga.
Egerton Swartwout, Architect

cooking school conventions; physical education demonstrations; Easter egg hunts. Allowing for seeming duplications, the list includes 25 rather different purposes, and reports indicate that all of these very varied demands have been very successfully met.

Special Requirements. There must be special consideration given to certain features which tend to fit the building to varying types of uses. It will be conceded that one of the outstanding purposes to be kept in mind in designing the auditorium is that of public lectures. The lecture or address calls for perfect acoustical treatment and arrangements. Entrances should be well away from the speakers' rostrum; floors should be treated so as to make a minimum of noise when the never failing late comer insists on entering, and the seating plan should be ever mindful of the comfort of those who are to sit for an hour or more without opportunity of changing positions. Large gatherings, such as conventions and conferences, demand that speakers other than those on the stage may be heard without the too-frequent reverberations common in such assemblies. With the now very general use of speaking instruments, such as amplifiers, it is not difficult to arrange even the largest auditorium so that everyone may hear. This, however, does not lessen the desirability of making the architectural plans as nearly perfect as possible, so that such extra arrangements do not have to be used except when the capacity of the auditorium is abnormally taxed or when people are standing on the outside. Meetings of almost any nature are given wide publicity today; this calls for seats for correspondents, and for telegraph, telephone, and radio connections, and such buildings would never be complete without ample anterooms, committee rooms, and lobbies if they are to fully meet all demands.

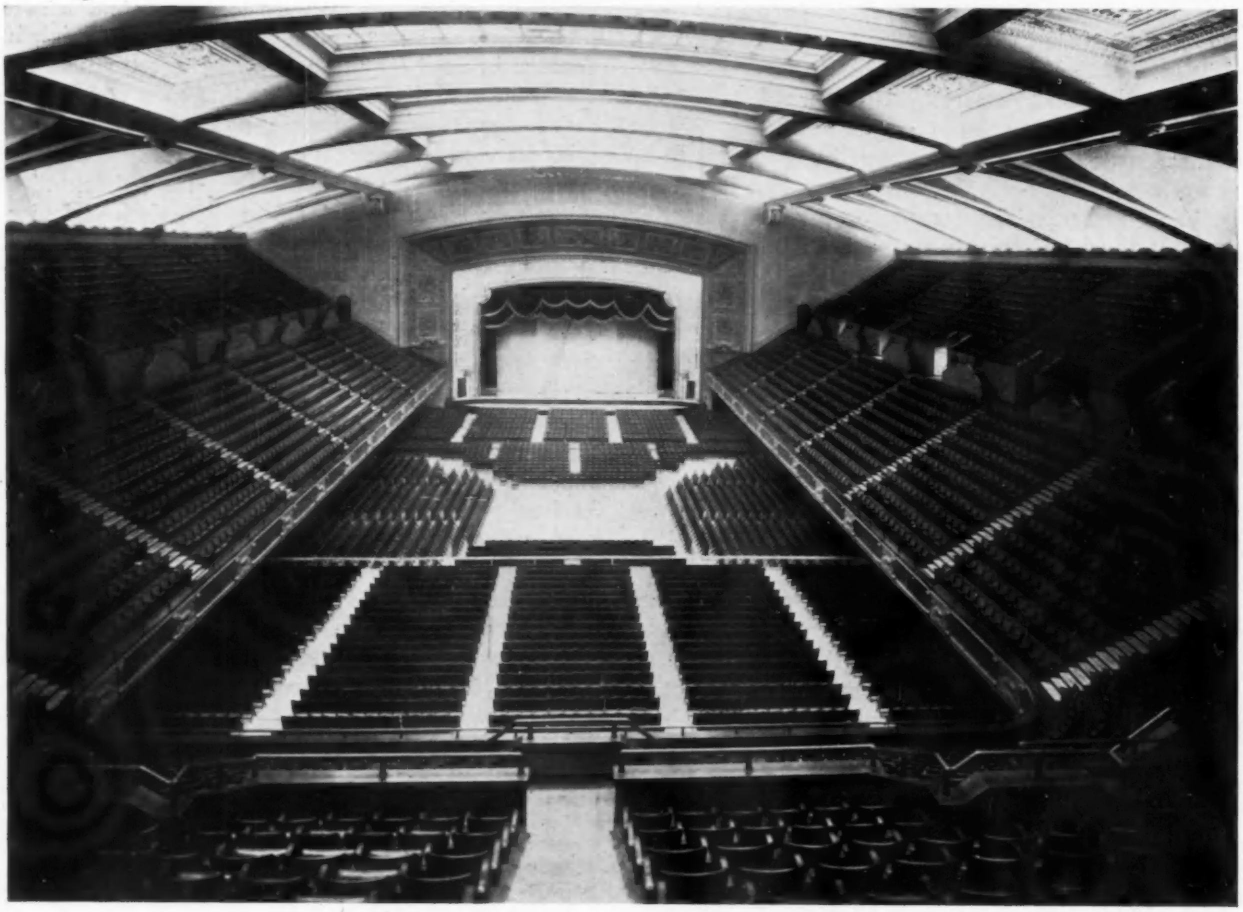
When dramatic and operatic performances of a professional nature are to be given, full stage settings are required; when these are of an amateur nature, much simpler arrangements will suffice. This difference in need may be met by proper treatment of the stage and its accessories, but it is much more satisfactory to have a smaller room properly equipped with its own stage; this secondary auditorium may be termed the "music hall," the "little theater," or given any other special designation desired. Concerts and recitals make it imperative that the stage shall be well developed so as to properly project sound from any and all points at which the performers may be located. Musical comedies, Boy Scout and Girl Scout demonstrations, dramas and operas make necessary special lighting effects. Dances, drill ceremonials, and other gatherings with much movement involved, call for large free space; this is usually provided in the arena. The floor must be level and easily cleared of all seats and other appurtenances. The elevated floor, necessary for the arena space when used for ordinary seating, should be a false floor, lending itself to removal in sections. Athletic contests call for level floors; a basket ball court should be a minimum of 40 feet wide and from 70 to 90 feet long. Conventions, revival meetings, school commencements and similar assemblies involving large audiences demand the fullest seating space and make necessary a careful consideration of sight lines affecting view of the stage or rostrum.

Easy access and egress to and from all seats constitute a feature fully as important as the hearing; it must be possible to enter the auditorium from both sides at several points as well as from the main en-

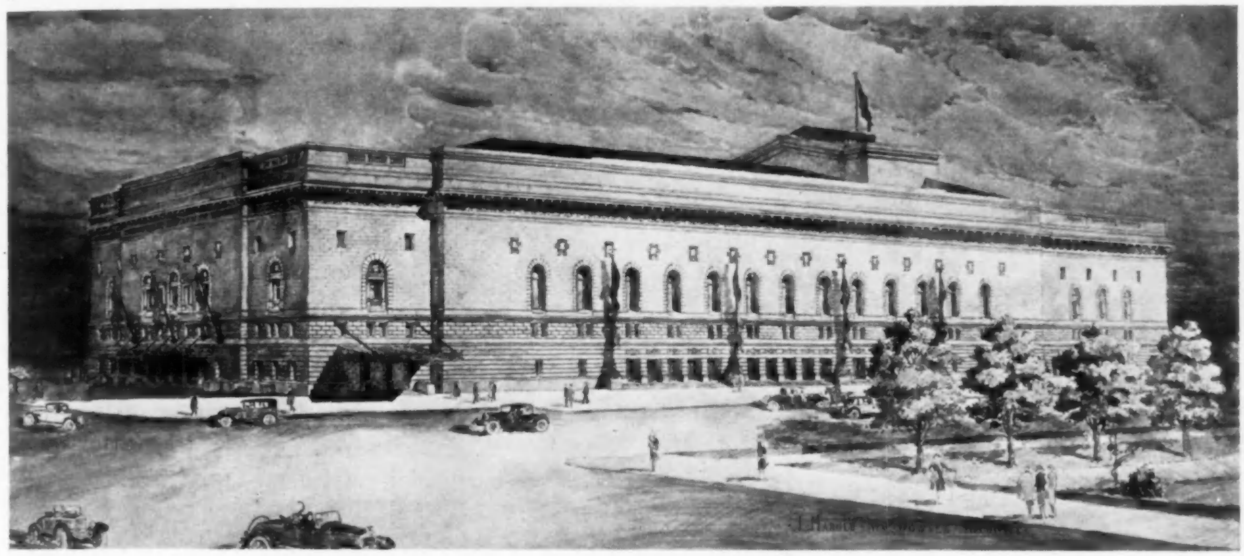


Municipal Auditorium, Minneapolis
Croft & Boerner, Inc., Architects

trances through the lobby. Space devoted to corridors on both sides of an auditorium will serve not only for circulation but will afford additional space for booths and other supplementary purposes in many of the gatherings. When the building houses headquarters of chambers of commerce, the American Legion and perhaps clubs, it is desirable that restaurant facilities be available. If the ground floor serves as a great banquet hall, full kitchen arrangements are needed. If the building is in any sense a memorial structure, special consideration should be given to the organizations identified with the memorial. For instance, if it is a World War memorial in any sense, a room or rooms should be planned for the meetings of the American Legion. While it generally happens that Boy Scout troops



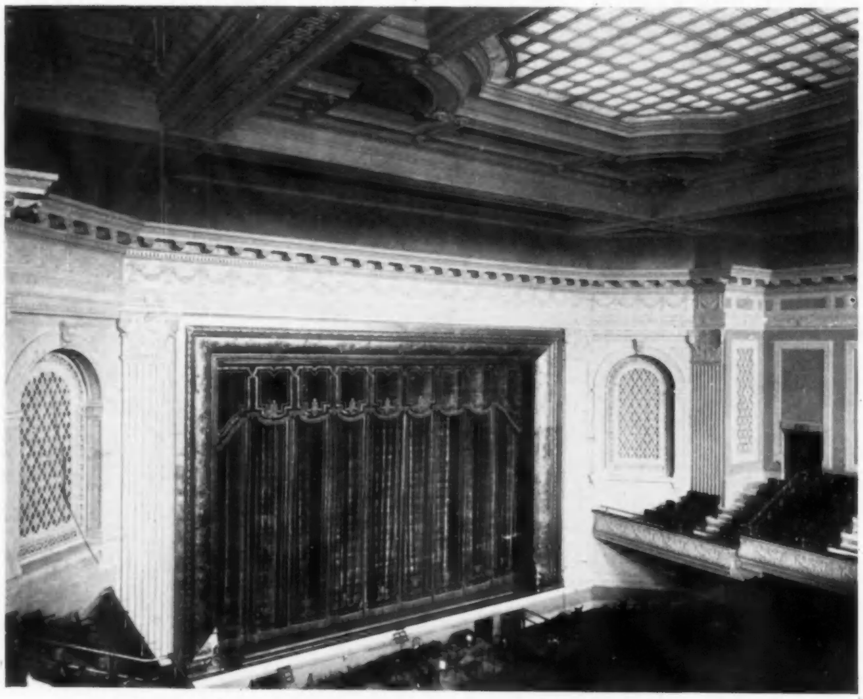
Interior, Municipal Auditorium, Minneapolis
Croft & Boerner, Inc., Architects



Municipal Auditorium, Cleveland
J. Harold MacDowell, Architect

will have their meeting places for their more frequent meetings, they will need occasionally a large hall in which they may gather for city-wide demonstrations and meetings. Their general headquarters room need not be large, but such a room may very well be included in a civic building such as the auditorium. Organ recitals are much in vogue today, and most auditoriums have one or more such instruments. The organ console should be placed within sight of the audience and preferably designed on a platform adapted to raising or lowering as need may require. The orchestra pit likewise should be designed so that it is visible to a very large number of those present. If the stage should need to be enlarged beyond already ample dimensions, the pit may be of the type which is arranged for raising and lowering. This is

Interior, Municipal Auditorium, Cleveland
J. Harold MacDowell, Architect



Theater in the Auditorium, Oakland, Calif.
John J. Donovan, Architect; Henry Hornbostle, Consultant

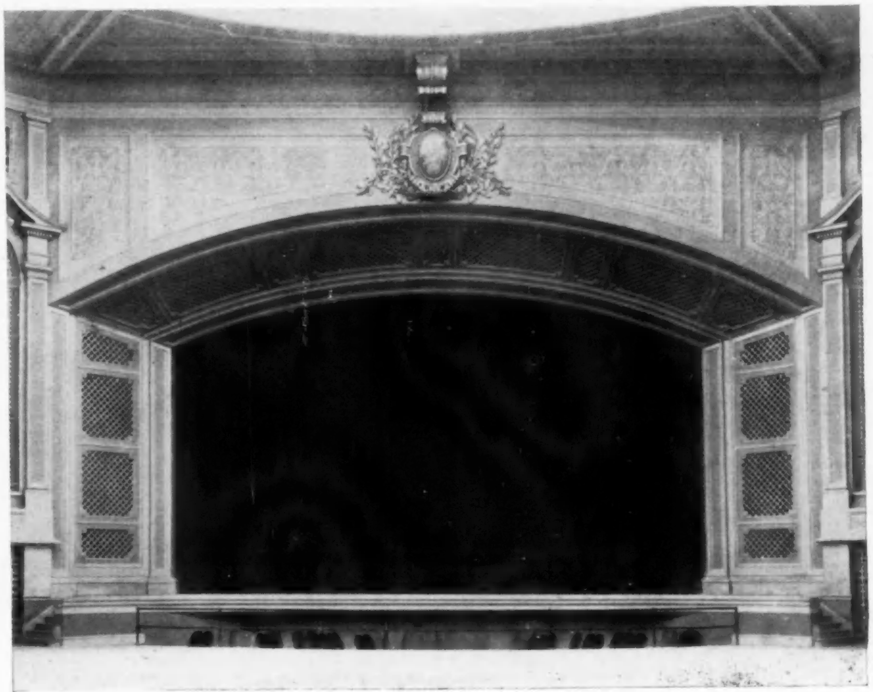
they should be tied together in groups of five to eight, so as not to make possible an easy confusion in time of hurried exits. When these seats are to be stored so that the floor may be cleared for dances and drills or athletic events, it should not be necessary to remove them a great distance. A well developed opening through the arena floor to the ground floor below, easily closed when not in use, has been found most satisfactory for this purpose. This same opening serves as the entrance to a stairway to be used by the public when automobile shows or other large exhibitions require more floor area than any single floor is likely to afford.

The dress circle or tiers of seats surrounding the arena should extend back to the side aisles; this space should be broken by secondary aisles reached by entrances from the corridors, giving the dress circle space sectional arrangement and protecting the circulation from congestion. Each row of seats should be on a platform or floor about 2 feet, 8 inches wide. The steps leading to these seats should have risers of from 6 to 7 inches, with 12- to 16-inch treads. The treatment of the boxes and loges differs radically in appearance and design from that in professional theaters, even though at times they are expected to serve the same purpose, such for instance as grand opera performances. Boxes and loges should be simply treated, no effort being made to make them appear ornate; they must yield to the general surroundings of the auditorium and not primarily correspond to the stage accoutrements. The balcony will usually afford about one-third of the total seating capacity of the main auditorium; balconies should be free-swung or else supported with minimum-sized columns. Extreme height of balcony seats should always be avoided; it being best to have them extend back on a gradual rise. Care should be exercised to prevent balconies from obtruding unduly over dress circle seats, and they should not extend over the arena space at all. Sight lines require adequate study at this as well as other points if the auditorium is to be really serviceable.

Circulation and Control. Consideration of circulation and control begins with the main entrances and lobbies. Conservation of space in the design of a building should never begin at this point. Unlike structures devoted only to theatrical performances, it is not essential that ticket booths be placed outside of the lobby, but they should be very conveniently reached and away from congested areas. There will

not always essential in an auditorium, but it is worthy of consideration, depending largely upon circumstances. It often adds much to a building's flexibility.

Seating Plans. It is when the planning of seating arrangements for the main auditorium as a whole arises that interesting difficulties are likely to be encountered. Of course everyone knows that persons going to public meetings desire and expect to both see and hear. Planning a room seating from 1,000 to 12,000 or more persons is thought-provoking for the architect who is determined to serve his profession while he is also serving those who are to use the building. A room capable of seating 10,000 may be perfect acoustically when completely filled, but it does not follow that it will be likewise perfect when only 2,000, 4,000 or even 6,000 persons are present. Providing special acoustical treatment skillfully used is the only solution for this perplexing problem. The room may be beautiful and it may be pleasing in general, but if a person or any considerable number of persons are so unfortunate as to be those sitting behind other persons or columns, an attitude of dissatisfaction will be created; the unfortunates leave the building with the feeling that the structure is a failure, and it is so far as they are concerned,—for the time being at least. This applies whether the poor seats are in the arena, the dress circle, in a box, or in the balcony. The shape of the auditorium should be not more removed from the rectangular than the proportion of three to four. The seats on the arena floor should have a graduated rise, having the rise begin about one-third of the distance back from the stage and sloping in keeping with the size of the room. There should not be any steps on this floor. While the arena seats will have to be movable,

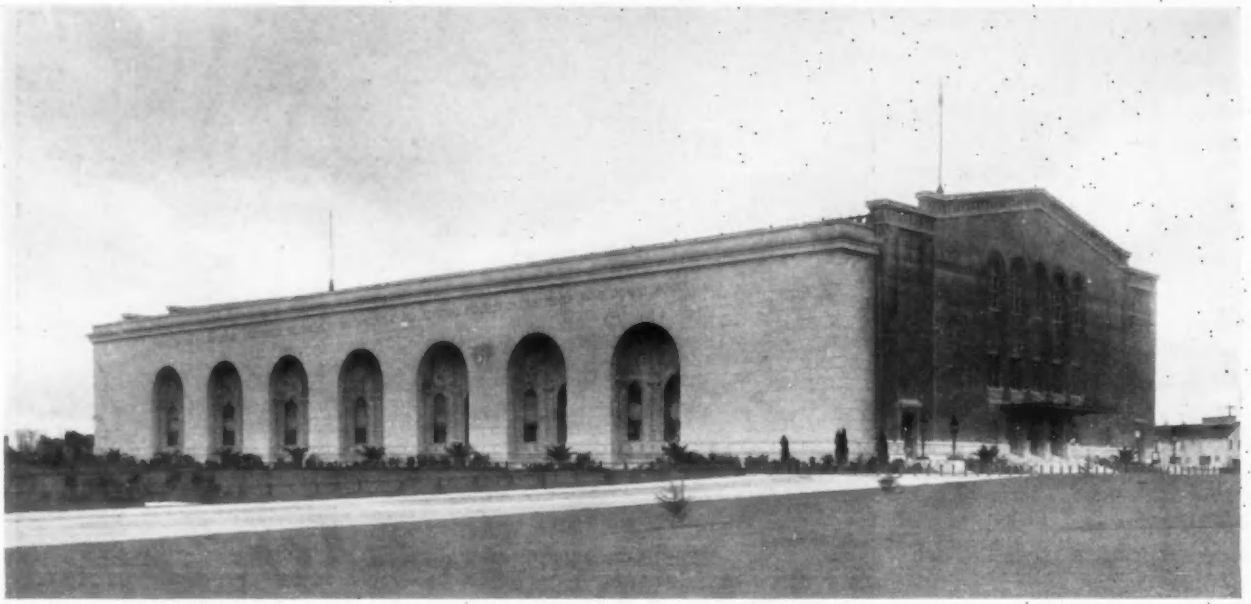


The Proscenium, Stockton Auditorium
Glenn Allen and Wright & Satterlee, Associated, Architects

be more occasions when no tickets are required to enter the auditorium than otherwise. The lobby should be spacious and highly pleasing. The extreme limits of decoration and ornamentation now used in outstanding motion picture places and theaters are not called for in this type of building. However, the architect has unbounded opportunity for treatment of the lobby. It is a frequent and appropriate treatment to make the lobby serve as a special memorial hall. If it is in reality a memorial building, this space affords suitable and ample area for emphasizing this by means of tablets, portraits, sculpture effects, paintings, or other striking features. The lobby gives a definite, even if brief, pause before entering the extended and far-reaching spaces of the auditorium itself. The fact that the lobby will be used as the chief place for entrance and exit demands that every precaution possible be taken to make circulation free and easy. Generous allotment of floor area to the main lobby will be far from wasted. Stairways in or near the lobby make possible a feature which may either make or mar the entire approach. These main stairways should be wide, with 6-inch risers and 12- to 14-inch treads. Doors should always open out, and double doors are always best for main entrances. The main auditorium should be protected from noises in lobbies and corridors by means of double sets of doors. Exits will of course be marked by signs prominently displayed and lighted by independent wiring. It should be possible to completely empty, without undue haste, a building seating 5,000 or more people in less than five minutes; this calls for an exit for approximately every 300 persons. Balconies are to be served by special exits, preferably by outside stairways or independent stairs leading to lower corridors without making it necessary to pass through the main auditorium. Aisles will vary from 3 to 6 feet in width, the former being the minimum width and the latter the approximate maximum. Let it always be remembered that such a building is not unlike a newspaper,—that its life depends on its circulation. Adequate provision will be needed for rest rooms on each floor level. While the building may not be in use every day, it will often be used by large groups, and the peak load will have to be kept in mind in determining sizes of such accessories as drinking fountains, lavatories, toilets, and smoking rooms. Main toilet rooms should be placed on the ground floor, near lobbies used during intermissions.

Lighting, Heating and Ventilation. The subject of lighting, heating, and ventilation requires much fuller treatment than the limits of this article permit. Let it be said, however, that whether direct, indirect, or a combination plan of lighting be used, it should be possible to easily control the varying degrees of light required for different purposes. This applies not only to the stage but to all parts of the auditorium; from a very dim to a very bright lighting effect with several intermediate degrees should be possible. The heating of a large building of this type, taken together with the ventilation, offers problems for the most skilled engineers. Even with a well developed system of cross ventilation, there will be required supplementary air-cooling plans. The heating plan must give special thought to the upper and lower sections of the auditorium, so that a uniform temperature will prevail throughout. It has not infrequently happened that one section was too cold while the other was too hot, all because due consideration was not had for insulation, proper distribution of heat units, and circulation of the air in the planning.

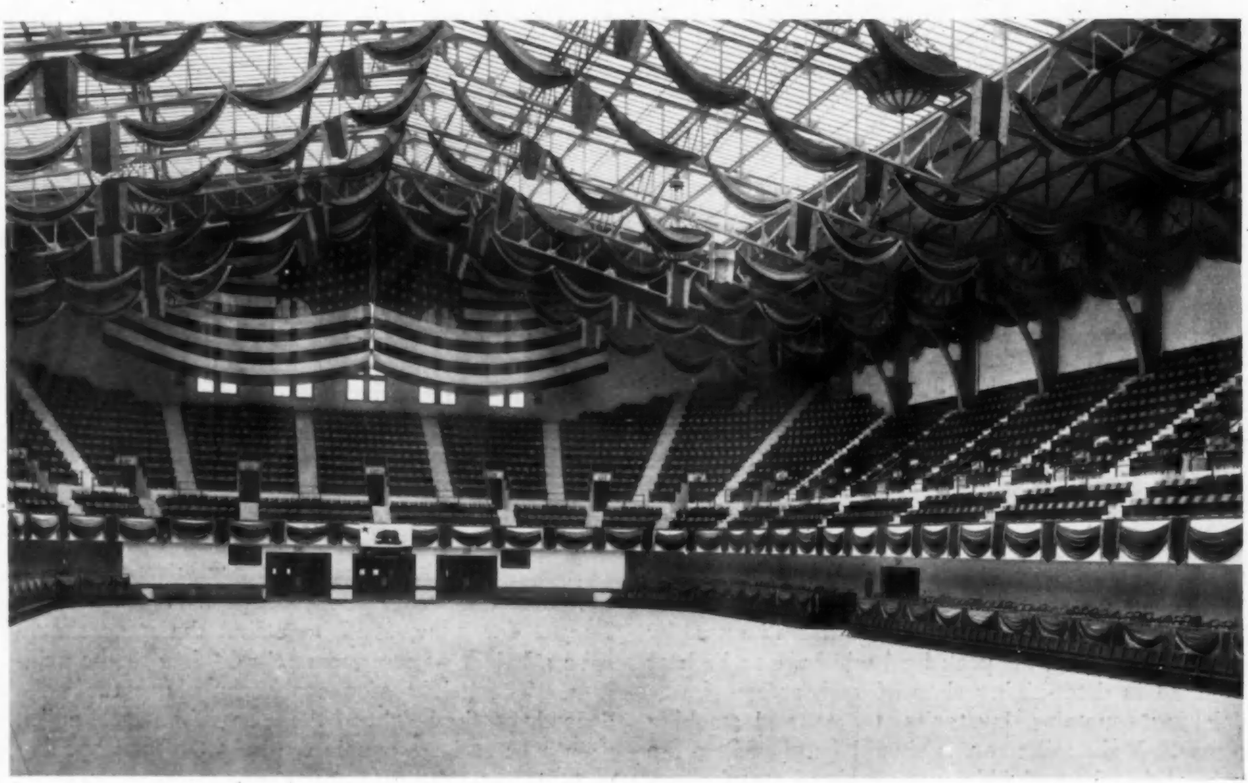
The Stage and Its Accessories. The stage in a structure of this type must be of full size and adaptable to every kind of program likely to be put on. It must have a minimum depth of 30 feet and an ample width, varying with the width of the auditorium itself. Edward H. Kearney in writing about the theater stage of the professional type in THE FORUM for June, 1925, says that the stage should have a height of approximately 60 feet to the gridiron. The height of the gridiron above the stage depends on the height of the proscenium arch, and it should be at least double the height of the opening plus 5 feet. And what he says concerning the stage



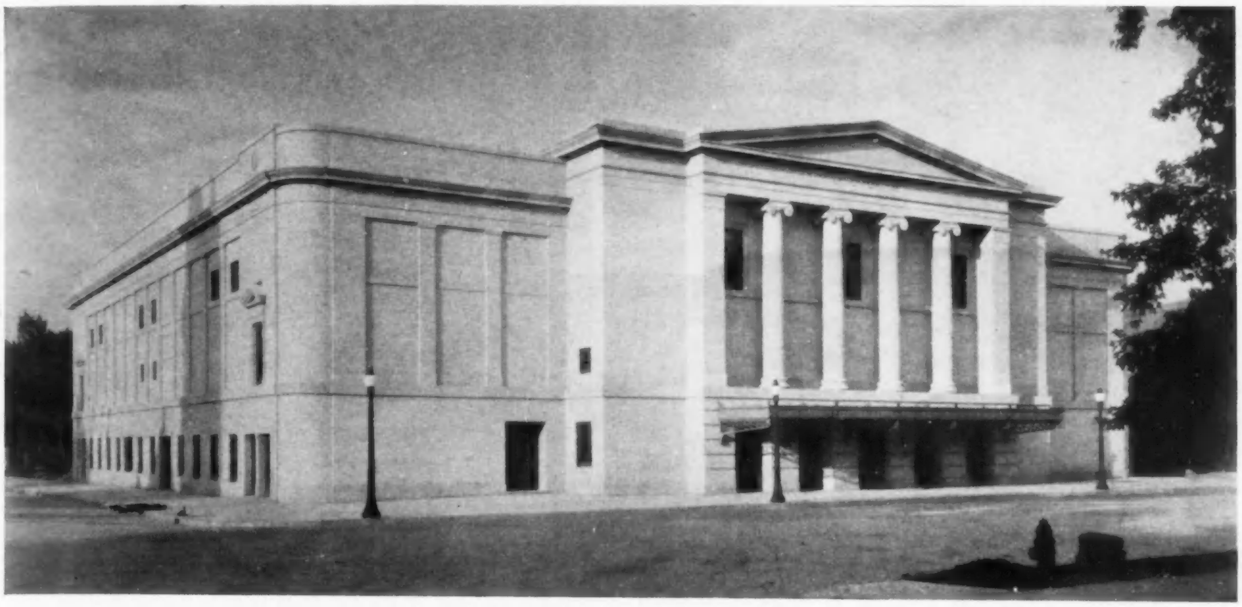
Municipal Auditorium, Oakland, Calif.
John J. Donovan, Architect; Henry Hornbostle, Consultant

requirements applies here very largely also: "The stage requirements are an asbestos curtain and rigging; three 'oleos' or rapidly working curtains; a picture sheet, and about 45 sets of lines for drops. The asbestos curtain must have a rigging of its own, consisting of a 16-inch sheave and 20-inch hair block, hung on wire cables counterbalanced so that the curtain will descend by gravity under its own weight, the counterweight to run on T-bar guides. Head blocks and sheaves should be placed on brackets, either built into the proscenium wall or securely bolted into it. Rigging for the act curtain is of the same type as is used for the asbestos curtain, but it may be only counterbalanced." In addition to the foregoing, the auditorium stage should be provided with a cyclorama, which is not usually required in theaters. Dressing rooms, either to the rear or at the sides of the stage, will be required, these varying from three to six in number. If a secondary hall or "little theater" is provided, additional dressing rooms and stage accessories will be required for its best use.

Style of Architecture. The exterior of a public



Interior, Municipal Auditorium, Oakland, Calif.
John J. Donovan, Architect; Henry Hornbostle, Consultant



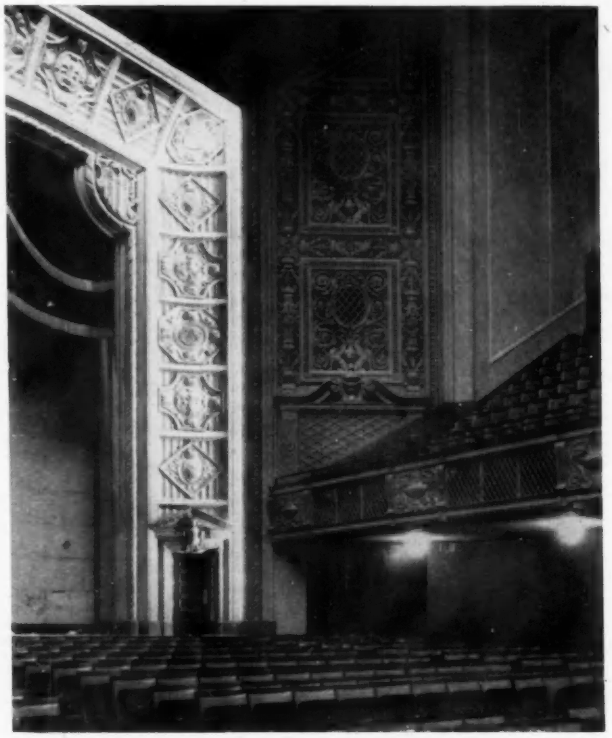
Municipal Auditorium, Colorado Springs
Charles E. Thomas and MacLaren & Hetherington, Associated, Architects

auditorium building affords plenty of room in which the growing genius of American architects may roam and perchance develop. As someone remarked in another connection, the biggest room in the world is the room for improvement. Up to the present time comparatively little that may be termed unique and at the same time successful can be pointed to in the treatment of such exteriors, there apparently having been more roaming than developing. The reason for this doubtless lies in the fact that we have sought to cross symphony halls, theaters, memorials, and churches without clearly realizing that a building embracing arrangements adapted to all of these is capable of being treated in a manner all-embracing without surrendering to a mere conglomeration of them all.

The exterior must be pleasing, but it ought to omit ornateness and the "millinery" adornments so frequently found on facades of theaters, academies of music, and other public buildings, use of none of which can be justified here. Forms which have appeared to yield themselves to most successful treatment include Classic, Renaissance, and particu-

Interior, Municipal Auditorium, Colorado Springs
Charles E. Thomas and MacLaren & Hetherington, Associated, Architects

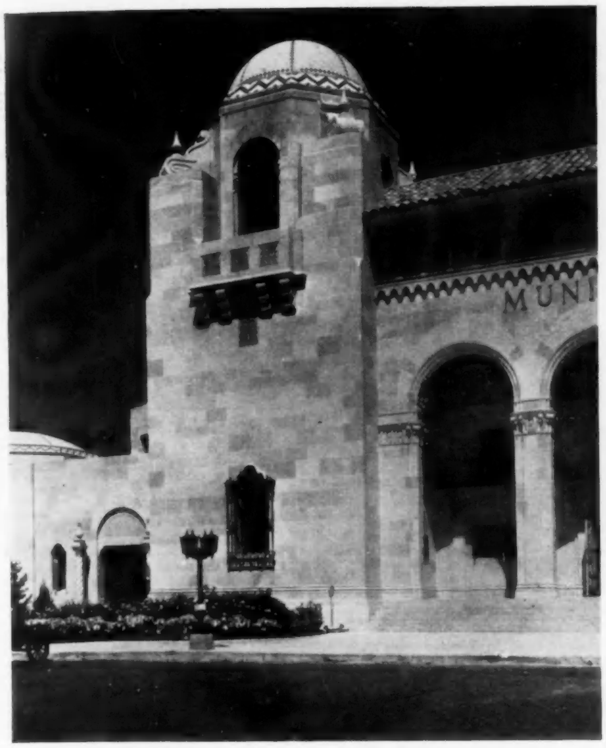
Detail, Auditorium, Minneapolis



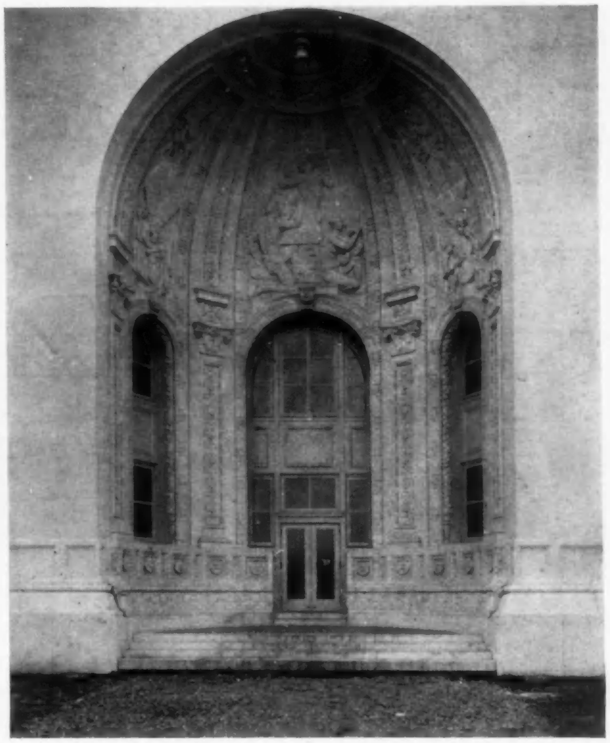
Proscenium, Auditorium, Minneapolis

larly the Italian. The "exposition" type has not given such good results. General characteristics of the exterior should include boldness of detail without cumbersomeness; sharpness of outline without rigidity; expression of interior functions without a potpourri of brilliance; and a beauty of finish without weakness. If the building bears the name of a memorial, there should be definite recognition of this fact in the exterior treatment, and this should not be in any sense of an apologetic nature. The interior design will of course affect the exterior lines, and the exterior should follow the interior plans and give promise of what is to be found when the building is entered. Structural arrangements for large free

Interior, Municipal Auditorium, Minneapolis
Croft & Boerner, Inc., Architects



Detail, Municipal Auditorium, San Antonio
Atlee B. & Robert M. Ayres, George Willis and Emmett T. Jackson, Architects

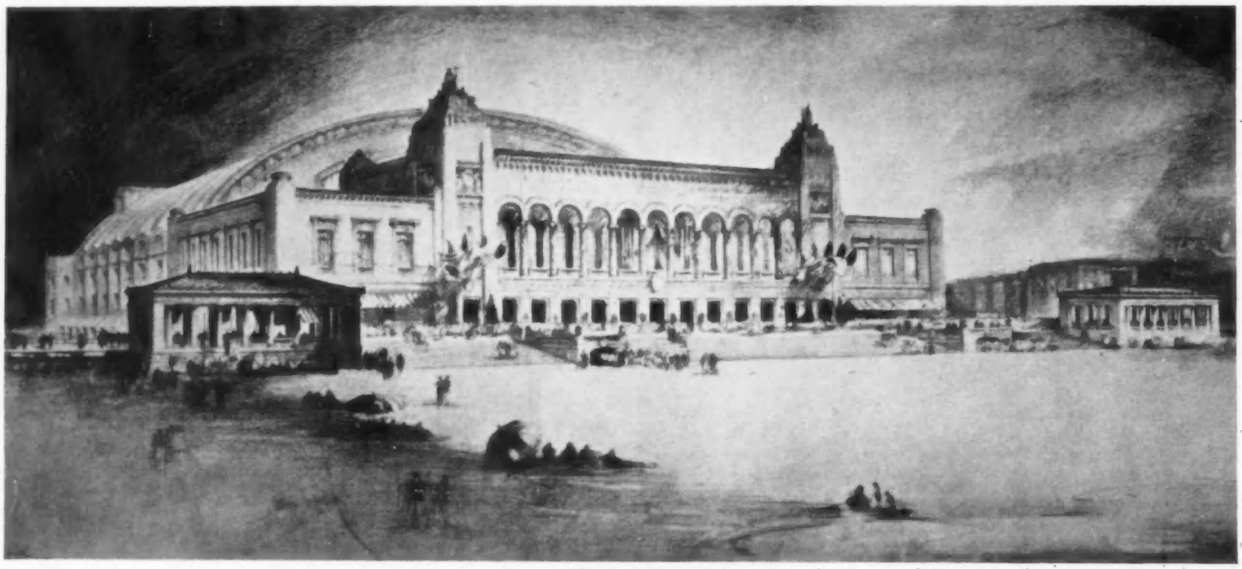


Detail, Auditorium, Oakland, Calif.
John J. Donovan, Architect; Henry Hornbostle, Consultant

areas for seating react on wall and roof treatment.

Seating Capacity, Cubage, and Costs. A general allowance of from 7 to 8 square feet per person must be made in computing the floor area required. This is sufficient to provide for aisles and spaces between seats. The number of seats to be provided must be governed by local needs and conditions, but it is safe to say that the auditorium should seat from two to four times as many persons as any smaller auditorium in the city; this very matter of liberal capacity will prevent the building's coming into any seeming competition with other auditoriums and will tend to make it a community-wide project. The cubage should be reckoned primarily from the over-all

Interior, Municipal Auditorium, Stockton, Calif.
Glenn Allen and Wright & Satterlee, Associated, Architects

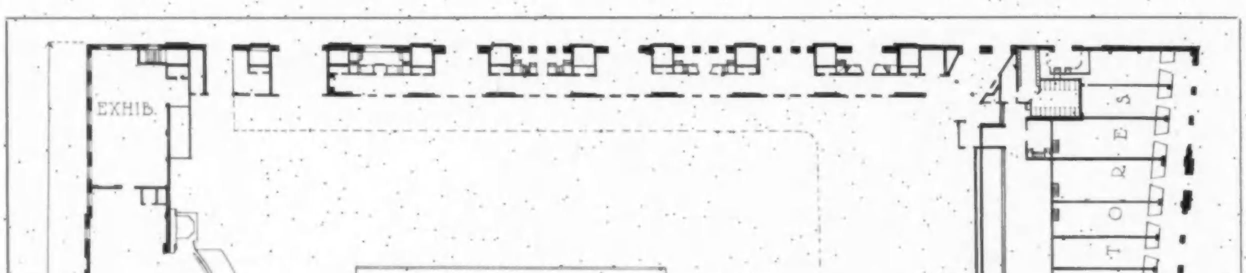


Municipal Auditorium, Atlantic City
Lockwood, Greene & Co., Architects and Engineers

dimensions, but in planning for the structure it is essential that the various features should be shown separately so that it may be clear to all concerned as to the proportionate space devoted to each part.

The cost must be based on the governing factors, such as the type of construction, nearness to markets, local labor conditions, and special arrangements. An auditorium of the kind thought of throughout this article should be as nearly fireproof as it is possible to make it. The cost will vary from 25 cents to 50 cents per cubic foot. The Soldiers' and Sailors' Memorial Auditorium at Chattanooga (Plate 33), erected in 1922, cost about 26 cents per cubic foot.

Finally. From all of the foregoing, it should be apparent that the writer, at least, regards the designing and planning of auditoriums as very important and exceedingly difficult, but nevertheless architecturally interesting and worth the while of anyone who wishes to contribute to the welfare of the community and to the advancement of the cause of architecture. Like entering the married state and other life-long ventures, building an auditorium is not to be entered upon thoughtlessly or in a spirit of levity. Happy is the architect who is able to design and bring to a successful completion a great auditorium; present and future generations shall call him blessed.



Plan, Municipal Auditorium, Atlantic City
Lockwood, Greene & Co., Architects and Engineers

Acoustics in the Design of Auditoriums

By VERN O. KNUDSON
University of California

SECURING satisfactory acoustics in an auditorium is a straightforward engineering problem. If it is worked out in accordance with known facts, the outcome is determinable and can be made to meet the most exacting requirements. There is no warrant for the superstition or belief, still held by many, that the acoustical qualities of an auditorium cannot be known until the building is completed. It is true that difficulties arise during the designing or the construction of an auditorium, but there are devices the use of which adjusts the difficulties and secures entirely satisfactory results. It is the object of this paper to discuss these devices in a simple but thoroughly practical manner, and to present some results of research which have established the soundness of the fundamental principles upon which the securing of good acoustics depends.

In order that an auditorium have good acoustics, certain details should be looked after in the design:

1. The shape and size of the auditorium should be such as to secure adequate loudness of speech or music in all parts of the room.

2. The walls and ceiling should be arranged and treated so as to eliminate every possibility of there being echoes.

3. Disturbing noises, whether of outside or inside origin, should be reduced as much as possible.

4. Reverberation in the auditorium, which is controlled largely by the nature of the materials used for the interior, should approximate closely a predetermined optimal condition.

5. Auxiliary equipment for the amplification of sound should be installed in very large auditoriums.

These are the basic requirements for good hearing in any interior, given in the order in which they should receive attention by the architect or the consultant on acoustics. Upon the principles which determine these requirements rests the science of securing satisfactory acoustics. The designing of every auditorium should be done in close accordance with these requirements. It is therefore necessary either that the architect be thoroughly familiar with the fundamental principles of acoustics or that he engage the services of a competent consultant. In general, if the auditorium be small and simple in shape, the architect can depend upon his own knowledge and follow the general principles and rules set forth in any good treatise on acoustics; if the auditorium be large and complex in its form, it is highly advisable to engage the services of an acoustic consultant. The consultant should be prepared not only to criticize and advise, but also to make tests, either in the laboratory or in the actual auditorium, of new or uncertain acoustic materials, and to investigate the propagation of sound waves in models of auditoriums which have doubtful shapes. When a consultant is necessary, he may be retained by either the architect or the owner, but in either instance he should be associated with the architect from the beginning of the first sketches to the completion of the last details of the furnishing of the auditorium.

Shape and Size. There is no favored ratio of length, width and height for maximal audibility. In plan, the auditorium should be short and wide, so that the audience is brought near the platform or stage. There are splendid auditoriums in which the width exceeds the length by as much as 40 or 50 per cent. The ceiling should be as low as the architectural style or other conditions will allow. Since the loudness of speech or music in an enclosure diminishes as the cubic area of the enclosure increases, high ceilings or other unnecessary extensions of length or width involve a compromise with the best acoustic conditions. All floors, especially toward the rear in large auditoriums, should slope up as steeply as possible. Balconies should not be hung low, nor should they extend far over the main floors. The proscenium opening of a stage should be developed, with respect to position, curvature and surface, so as to promote the penetration of sound to the remote parts of the auditorium. The shape and size of the auditorium are important also with respect to the avoidance of echoes. When direct and reflected sounds reach the ear, coming from the same source but over sound paths which differ in length more than 66 feet, an echo is the result. It is necessary therefore to avoid large differences of paths of direct and reflected sound. If the auditorium be large, all reflecting surfaces which may produce echoes should be well broken up. Deeply beamed or coffered ceilings, open truss and gabled ceilings, pilasters, windows, wall ornament and other architectural features can be utilized to break up undesirable reflecting surfaces. A curved surface may cause troublesome echoes or interference, especially if the center of curvature be near the level of the audience. Such curvatures should be avoided. Where curved ceilings are used, the radius of the curvature should be either large or small compared with height.

Noise. All noise, either of inside or outside origin, should be eliminated as far as possible. Many tests by the writer and others have demonstrated the interfering effect of noise upon the hearing of speech. The practical conclusion from these tests is that even a slight noise, such as may come from a ventilating fan or from walking or talking in an adjacent room, may greatly impair hearing conditions. Inside noises may be reduced by covering the floor with soft materials, and by installing low-speed, quietly-operating ventilating fans and motors. Outside noises are most effectively reduced by building heavy, non-yielding walls and partitions, and by eliminating all cracks

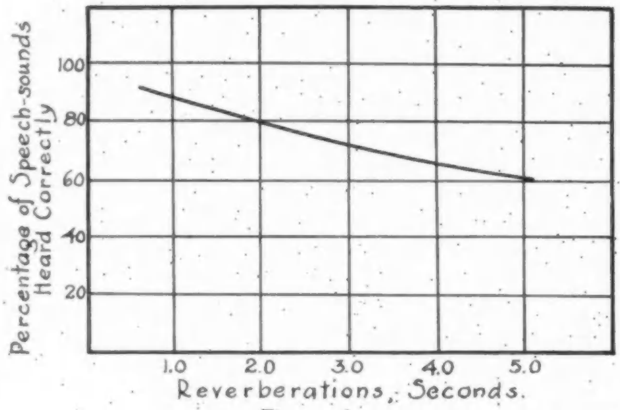


Figure 1

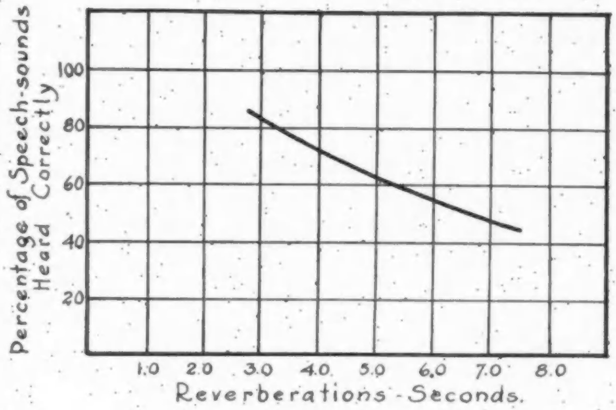


Figure 2

Graphs Showing Relation of Reverberation to Audibility in Actual Speech Tests

around doors and windows. There is a distinction between insulation and absorption which should be understood. Recent tests by Dr. Paul E. Sabine and others indicate that weight, stiffness, and the absence of pores are the effective factors in sound insulation. Reinforced concrete or solid masonry provides satisfactory insulation. Porous, sound-absorptive materials are effective agents in the absorption of noise.

Reverberation. The control of reverberation is, without question, the most important factor in securing good acoustic design. At least 90 per cent of the acoustic defects in auditoriums are attributable to excessive reverberation. In order to determine the effect of reverberation upon the hearing of speech in an auditorium, the writer has conducted some speech tests,—some in a special control room, where the reverberation could be varied by bringing into the room different amounts of hair felt, and some in a series of high school auditoriums which were almost alike as regards shape and size but different as regards reverberation. These tests were similar to the speech articulation tests used by telephone engineers for testing the speech-transmission efficiency of telephone equipment. Meaningless monosyllabic speech sounds are called out, in groups of three, at a rate of one speech sound every .65 seconds, and observers stationed in different parts of the room record what they hear, or think they hear. By comparing their recorded lists with the records of calls, the number and nature of the speech-reception errors can be determined. In this way it is possible to measure the acoustic efficiency of an auditorium for the hearing of speech. The results of these speech tests in the control room and in the group of auditoriums are shown here in Figures 1 and 2. The curves in Figures 1 and 2 show the effect of reducing the reverberation in an auditorium. Thus, in the small control room the percentage of correctly heard speech sounds increased from 61 per cent with a time of reverberation of 5.01[1] seconds, to 92 per cent, with a time reverberation of .60 second. In the group of large auditoriums the hearing conditions, measured in the same way, increased from 43.5 per cent when the reverberation was 7.5 seconds to 84 per cent when the time of the reverberation was only 2.8 seconds.

Reverberation is controlled largely by the nature of the interior materials and furnishings in a room. Thus any large room constructed of hard, impervious materials, as concrete, hard plaster or varnished wood, will be very reverberant, especially when only a few persons are present. Such a room is defective, acoustically, because the separate sounds of speech or music persist so long that they overlap and interfere, resulting in a confusion of the individual sounds. If articulated speech or music is to be heard clearly, each separate syllable or note must be distinct and free from the interfering effect of the preceeding syllables or notes. To meet this requirement there must be a considerable amount of sound-absorbing material in the room, so that each separate sound in speech or music will be absorbed effectively before it interferes with succeeding sounds. Porous plasters, certain wall board materials made of fibrous substances, porous tiles, hair felts, hangings, upholstered seats and heavy carpets are effective agents in reducing reverberation. To secure the best acoustic conditions in a room, the choice of these materials and planning the areas to be treated should be based upon certain acoustic calculations. These calculations are based upon Sabine's reverberation equation and the optimal time of reverberation. Sabine's equation is:

$$t = \frac{kV}{A}$$

t=time of reveration, that is the duration of audibility of a sound whose initial intensity is one million times its barely audible intensity.

V=volume of room in cubic feet.

A=total absorption of room, expressed in square feet of a perfectly absorbing surface, as an open window.

k=a constant, depending upon the shape and dimensions of the room. For a simple rectangular room k=.050. For more complicated shapes k varies between .040 and .050.

To illustrate how this equation is used, consider as an extreme case a rectangular room 90 x 100 x 40,

[1] The time of reverberation in any enclosure is the duration of audibility of a standard tone, that is the time that the tone can be heard after its source has been stopped.

built of solid concrete. Solid concrete absorbs only 1.7 per cent of the sound energy which strikes it, the remaining 98.3 per cent being reflected. The volume of this room is 360,000 cubic feet, and the total interior area of concrete is 33,200 square feet. To obtain A, the total absorbing power of the room, the area, 33,200 square feet, must be multiplied by the coefficient of sound absorption, 1.7 per cent or .017; i.e., A=33,200 x .017=564 units of absorption. Therefore, t=.050 x 360,000÷564=31.9 seconds. This indicates that in such a room a loud sound would remain audible fully one-half minute after the source of sound is stopped. Obviously, the room would be very poor acoustically. If the floor of the same room be covered with a heavy carpet, having a coefficient of sound absorption of .30 and the walls and ceiling be plastered with an acoustic plaster, having a coefficient of sound absorption of .20, then A is the sum of the absorption furnished by the carpet and by the acoustic plaster. Hence,

A=9000 x .30+24200 x .20=2700+4840=7540 units.

Therefore t=.050 x 360,000÷7540=2.39 seconds. With this condition of reverberation, the room would have good acoustics, especially with an audience to further reduce the reverberation to about optimal value.

The most favorable time of reverberation for small rooms used for both speaking and music is approximately one second. Large halls and auditoriums require more reverberation, the optimal value being as high as 2.0 to 2.5 seconds in very large auditoriums. The size of the audience will of course affect the time of reverberation, and should be considered in all calculations. It is good practice to provide the optimal time of reverberation for two-thirds of the maximal audience. The acoustics will then be satisfactory with either small or large audiences. The table included here gives the optimal time of reverberation.

Volume, cubic feet	*Optimal time*
Less than 25,000	1.00 seconds
50,000	1.20 "
100,000	1.30 "
200,000	1.50 "
300,000	1.64 "
500,000	1.75 "
1,000,000	1.90 "
2,000,000	2.10 "

Having outlined the method of calculating the reverberation and given the best values of reverberation for different sized auditoriums, it remains to give the coefficients of absorption of some common building and acoustic materials which are in wide use.

Concrete has a coefficient of	.017
Hard wall plaster	.02 to .035
Lime plaster	.03 to .05
Soft wood	.06
Good acoustic plaster	.15 to .25
Carpets	.15 to .40
Patented sound-absorbing materials	.21 to .25
Hair felt	.30 to .70

Auditorium, Washington
Milburn, Heister & Co., Architects

These coefficients[2] are for a tone of 512 double vibrations a second. The coefficients generally are smaller for lower tones and larger for higher tones. The ideal acoustic material is a substance which has the same absorption for all the important frequencies which occur in speech and music. Specifically, such a material should have the same coefficient between 100 and 5000 double vibrations a second,—that is, throughout the useful range of frequencies which occur in speech or music. Such ideal materials are not available, but the architect should be guided by this principle in selecting acoustic materials.

Amplifying Devices. Loud-speaking equipment is not a cure-all for poor acoustics, but in a properly designed auditorium of large dimensions use of a suitable amplifier is advantageous. A loud-speaker will not correct reverberation; it may actually aggravate it. On the other hand, it may be used to increase loudness, and the horns which project the sound may be so placed as to minimize the effects of echoes or interfering reflections. The observations of the writer indicate that auditoriums having volumes smaller than about 500,000 to 1,000,000 cubic feet do not require loud-speaking equipment, provided there are no interfering noises. Wherever such equipment is needed it should be installed under the supervision of a competent engineer. Furthermore, if such amplifying equipment be installed in an auditorium which is to be used primarily for speaking, the reverberation should be reduced somewhat below the optimal value as given in the table.

Treatment of Auditoriums with Defective Acoustics. The principles set forth for good acoustic design apply in the correction of faulty acoustics. The problem usually consists of reducing the reverberation suitably by treating the ceiling or the walls, or both, with absorptive materials. In addition, it is often necessary to locate and eliminate disturbing noises or echoes. The latter may sometimes involve such structural changes in the ceilings or walls as the introduction of a false or a suspended ceiling or the introduction of heavy hangings over certain portions of the walls. It is probably advisable to engage the services of an acoustic consultant in all cases of correcting defective auditoriums. The work should be done under the general supervision of the architect.

[2]For more complete data on the coefficients of absorption for different materials consult references Nos. 1, 3 (a), 7, and 10 (b) listed in the bibliography at the end of this article.

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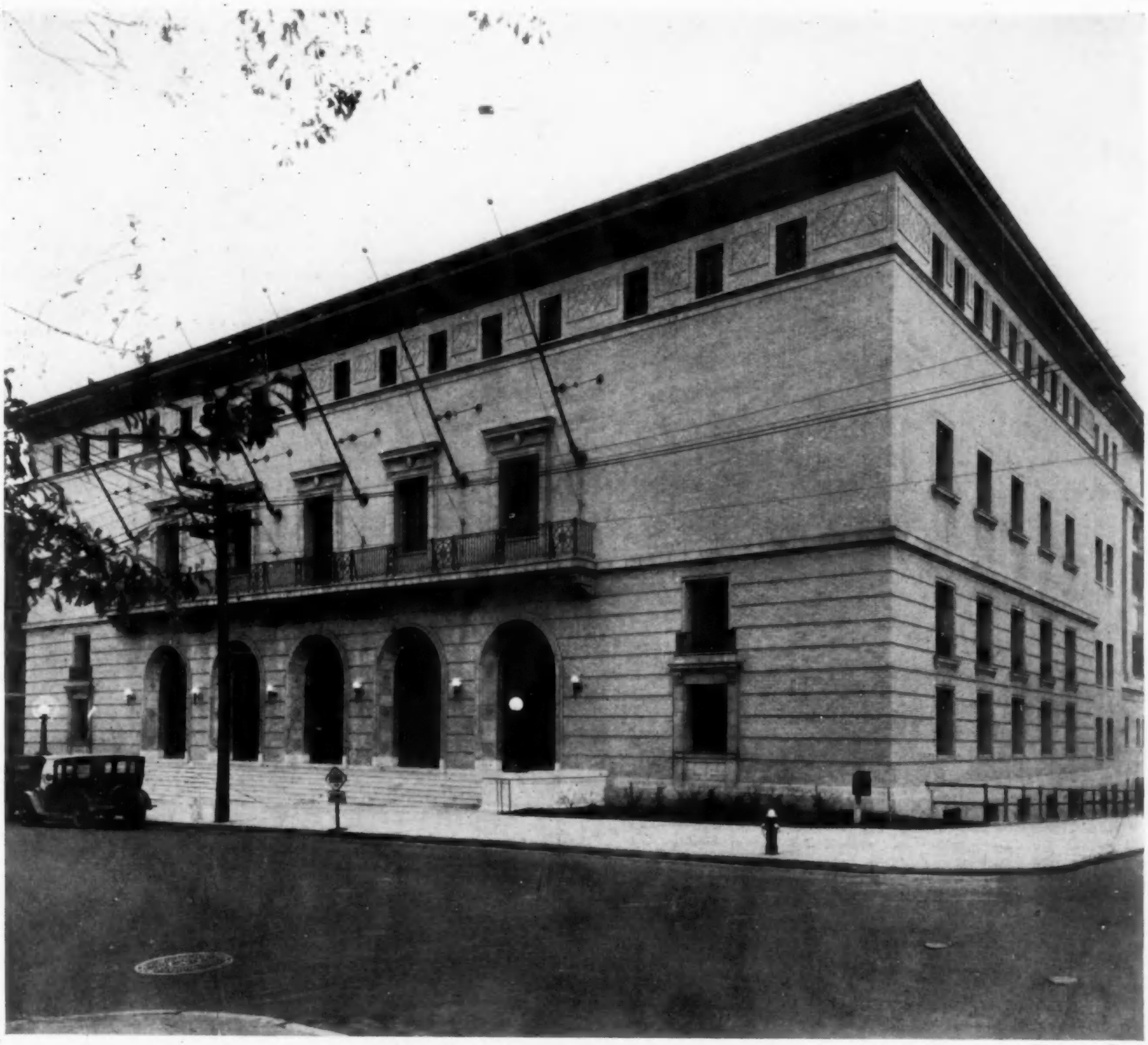
Soldiers' and Sailors' Memorial Auditorium, Chattanooga
R. H. Hunt Company, Architects



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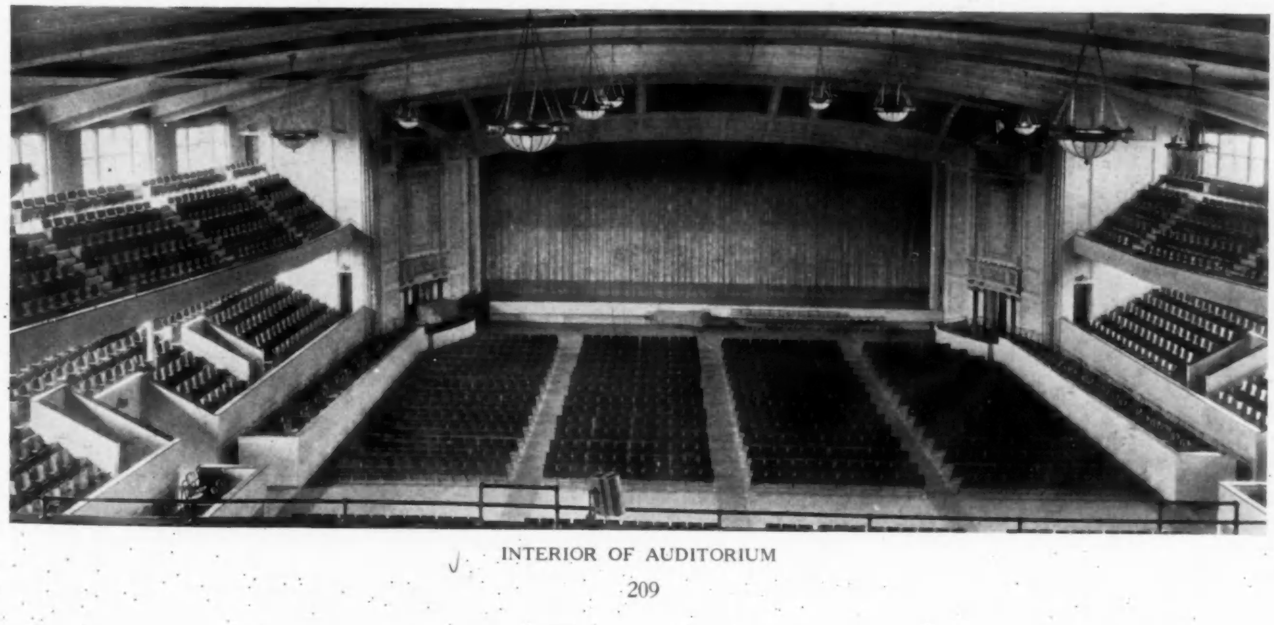
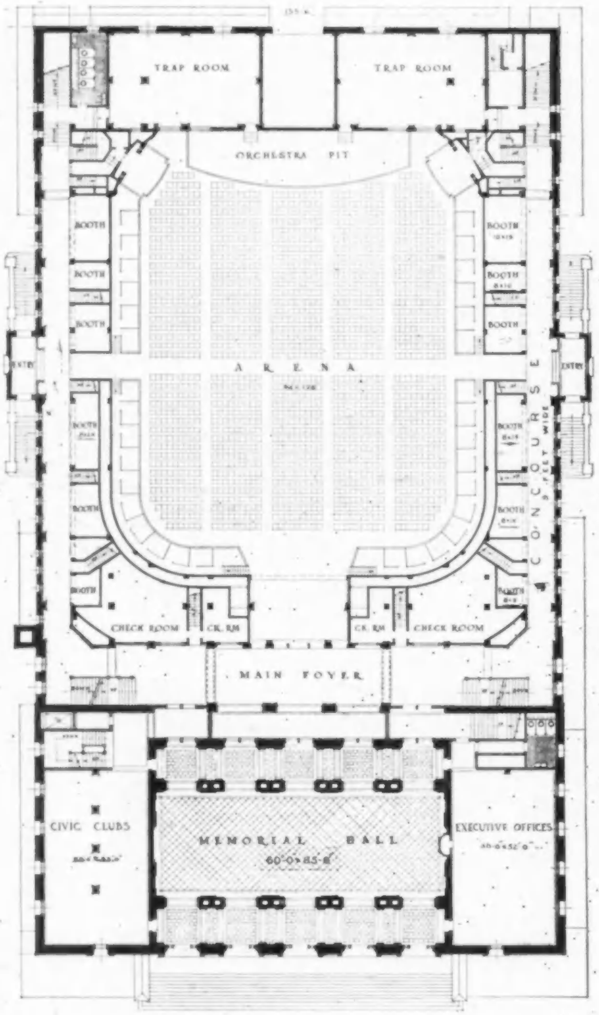
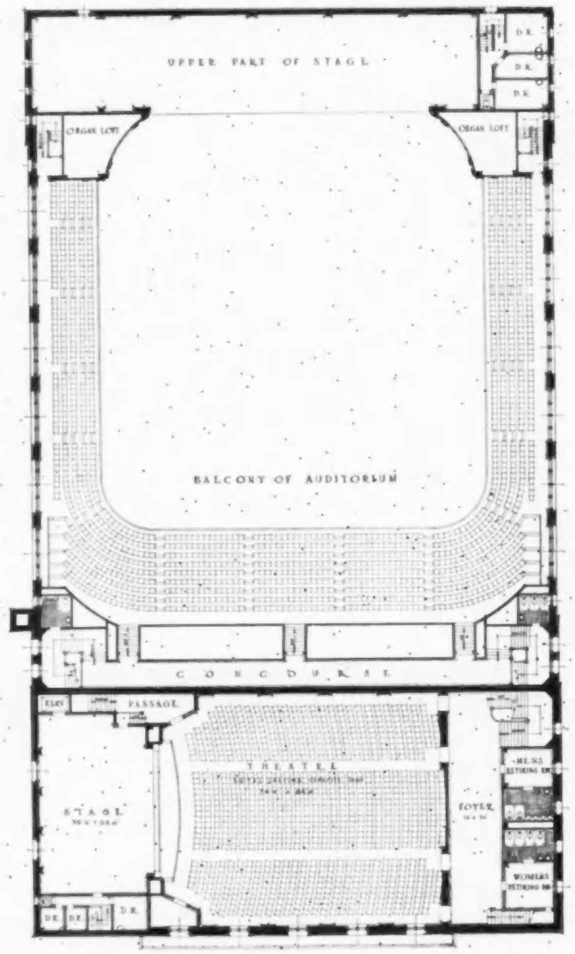
MEMORIAL AUDITORIUM, CHATTANOOGA
R. H. HUNT COMPANY, ARCHITECTS



INTERIOR OF AUDITORIUM



MAIN FLOOR



SECOND FLOOR

MEMORIAL AUDITORIUM, CHATTANOOGA

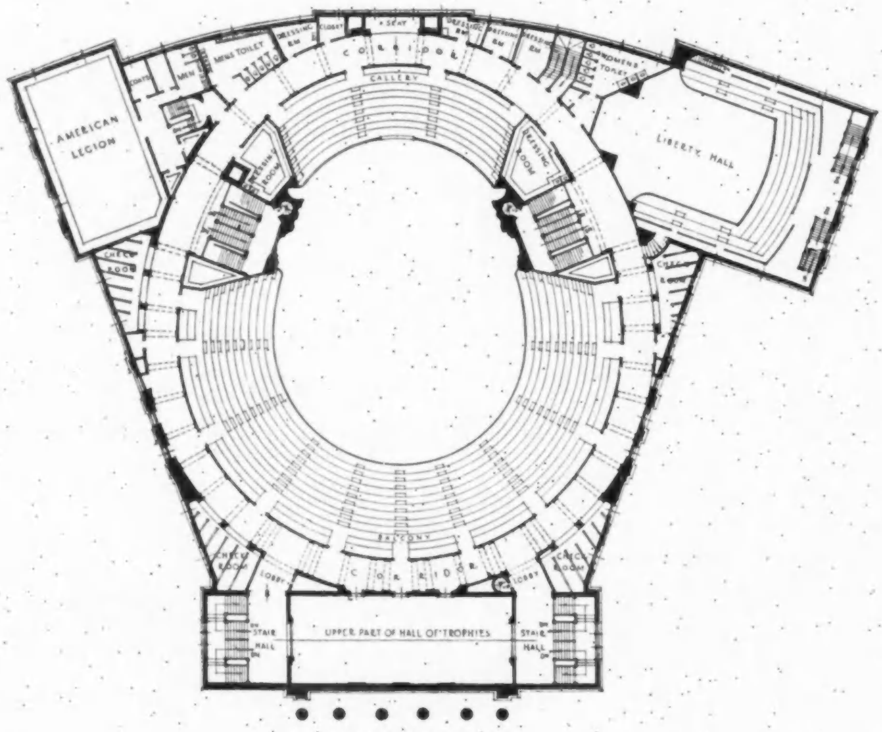
R. H. HUNT COMPANY, ARCHITECTS

Photos. Paul J. Weber

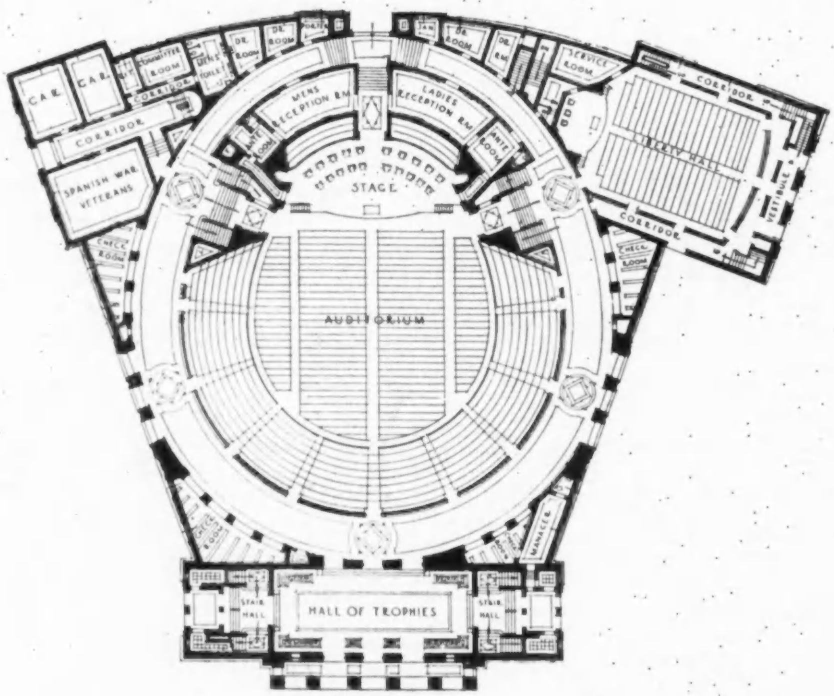
MEMORIAL AUDITORIUM, LOWELL, MASS.
BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS

Plans on Back

INTERIOR OF AUDITORIUM



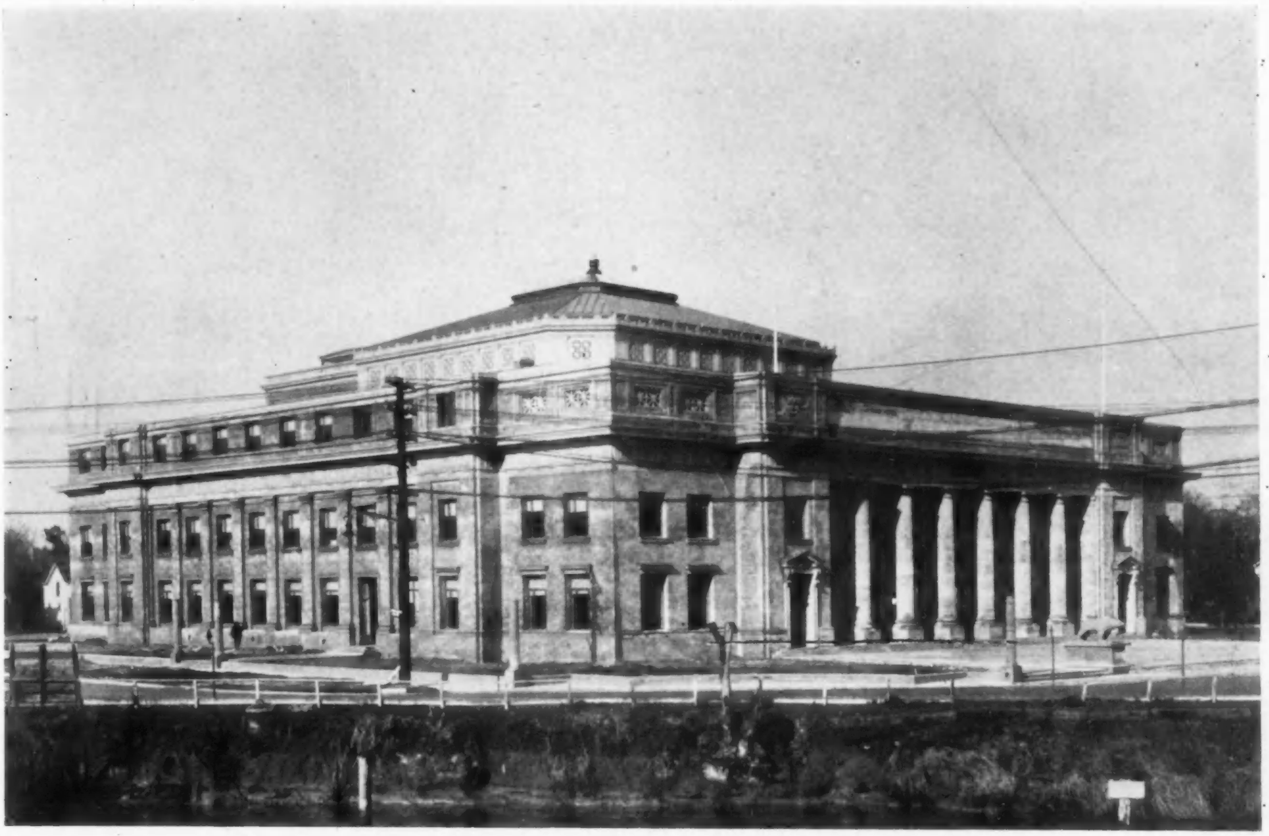
BALCONY FLOOR



MAIN FLOOR

PLANS, MEMORIAL AUDITORIUM, LOWELL, MASS.

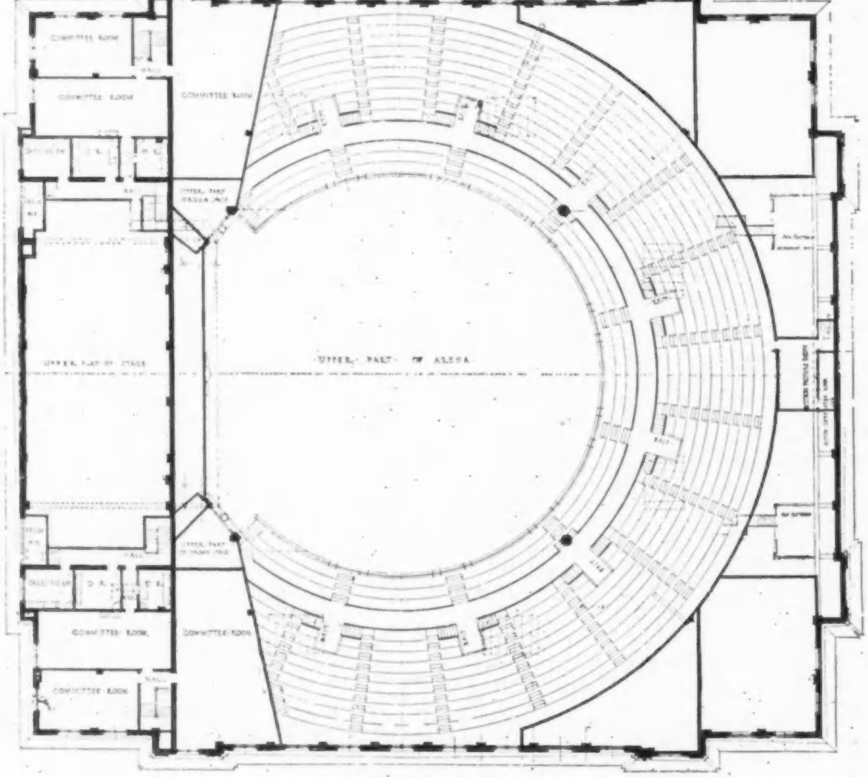
BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS



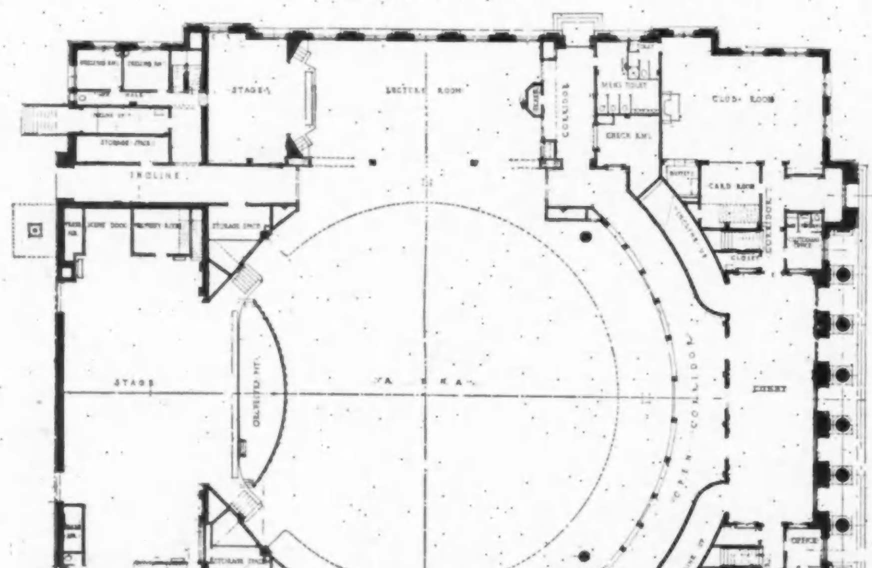
Plans on Back

MEMORIAL AUDITORIUM, STOCKTON, CALIF.
GLENN ALLEN AND WRIGHT & SATTERLEE, ASSOCIATED, ARCHITECTS

INTERIOR OF AUDITORIUM



BALCONY FLOOR



MAIN FLOOR

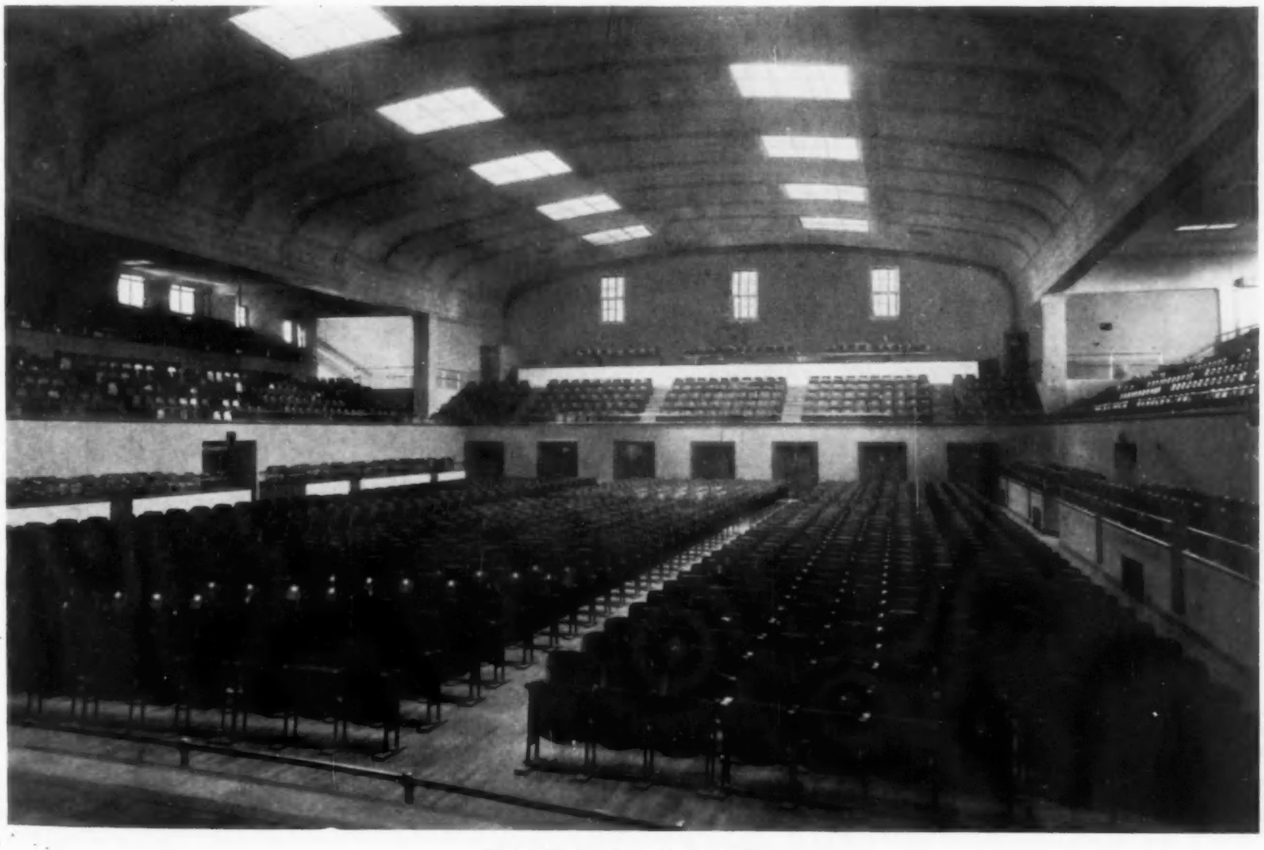
PLANS, MEMORIAL AUDITORIUM, STOCKTON, CALIF.
GLENN ALLEN AND WRIGHT & SATTERLEE, ASSOCIATED, ARCHITECTS

Photos. Theo. M. Fisher

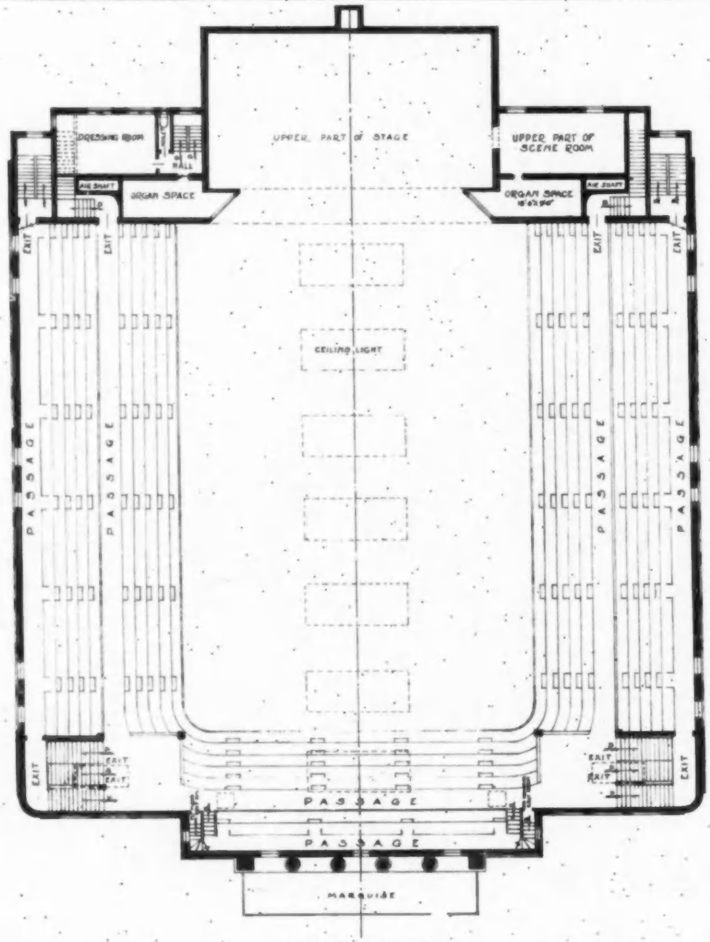
Plans on Back

MUNICIPAL AUDITORIUM, COLORADO SPRINGS

CHARLES E. THOMAS AND MAC LAREN & HETHERINGTON, ASSOCIATED, ARCHITECTS



INTERIOR OF AUDITORIUM



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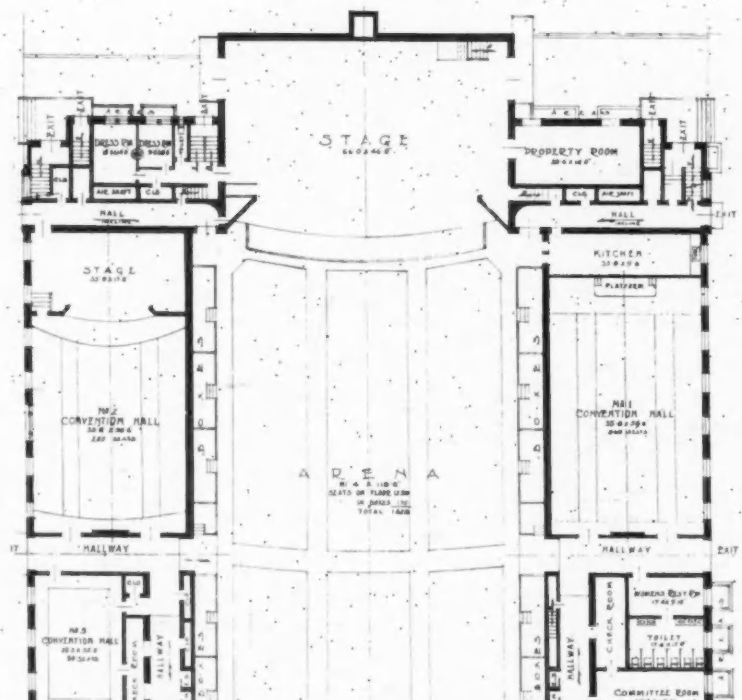


MAIN FLOOR

PLANS; MUNICIPAL AUDITORIUM, COLORADO SPRINGS

CHARLES E. THOMAS AND MAC LAREN & HETHERINGTON, ASSOCIATED, ARCHITECTS

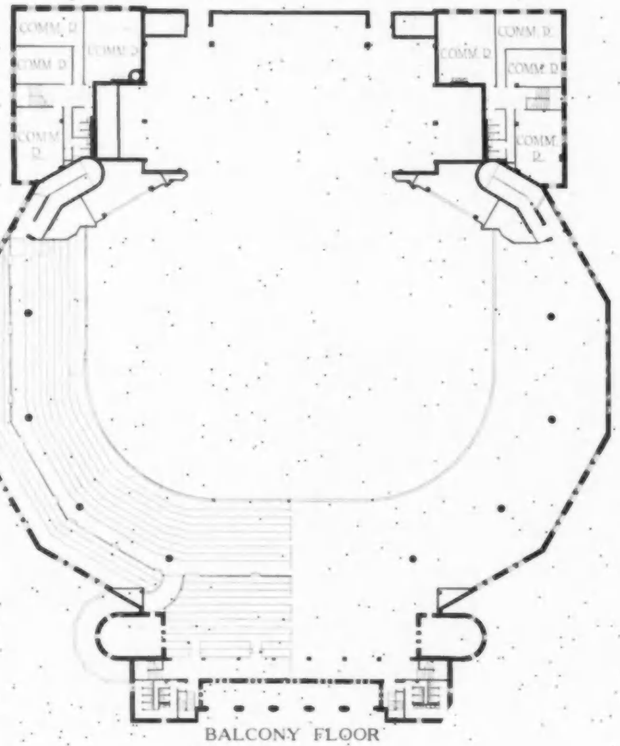
Photos. Harvey Patteson

Plans on Back

MUNICIPAL AUDITORIUM, SAN ANTONIO

ATLEE B. & ROBERT M. AYRES, GEORGE WILLIS, AND EMMETT T. JACKSON, ARCHITECTS

INTERIOR OF AUDITORIUM



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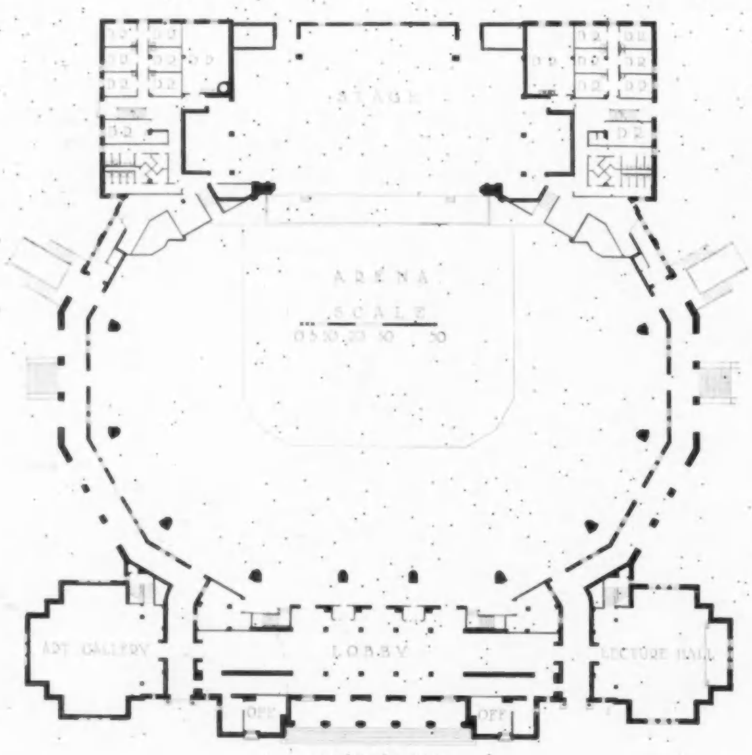


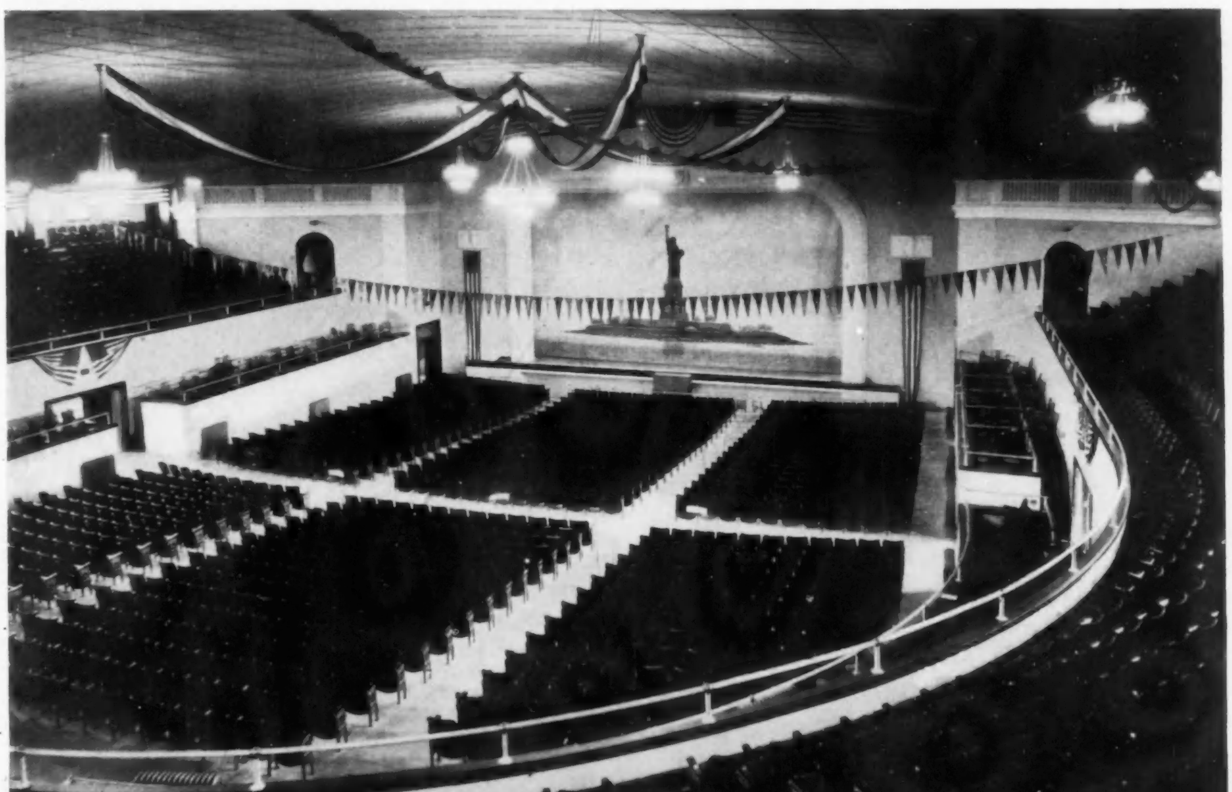
MAIN FLOOR

PLANS, MUNICIPAL AUDITORIUM, SAN ANTONIO

ATLEE B. & ROBERT M. AYRES, GEORGE WILLIS, AND EMMETT T. JACKSON, ARCHITECTS

Plans on Back

AUDITORIUM, AMARILLO, TEX.
SMITH & TOWNES, ARCHITECTS; LANG & WITCHELL, ASSOCIATED



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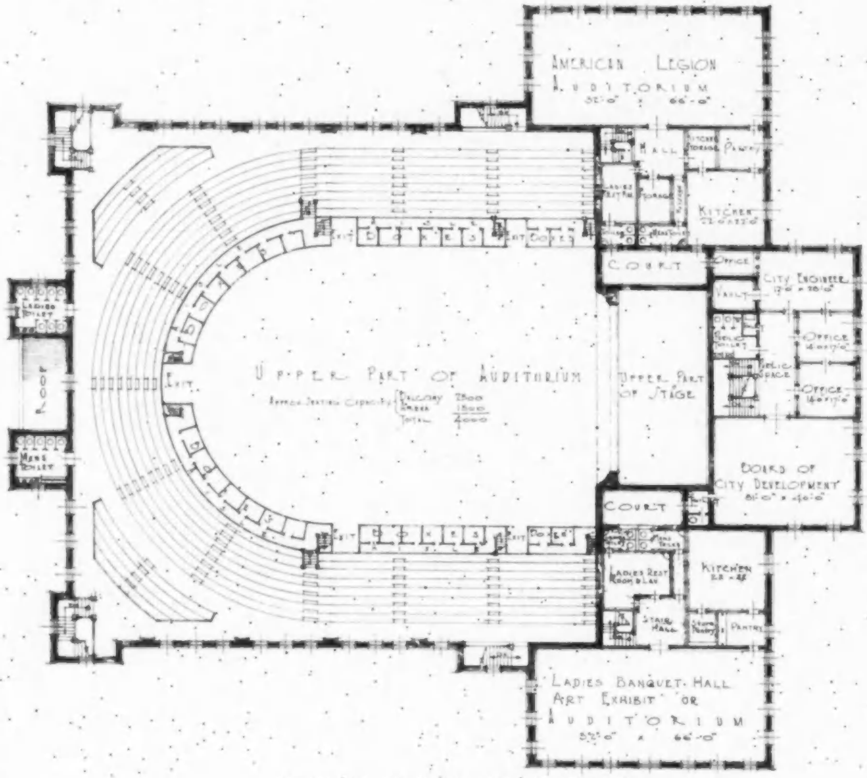
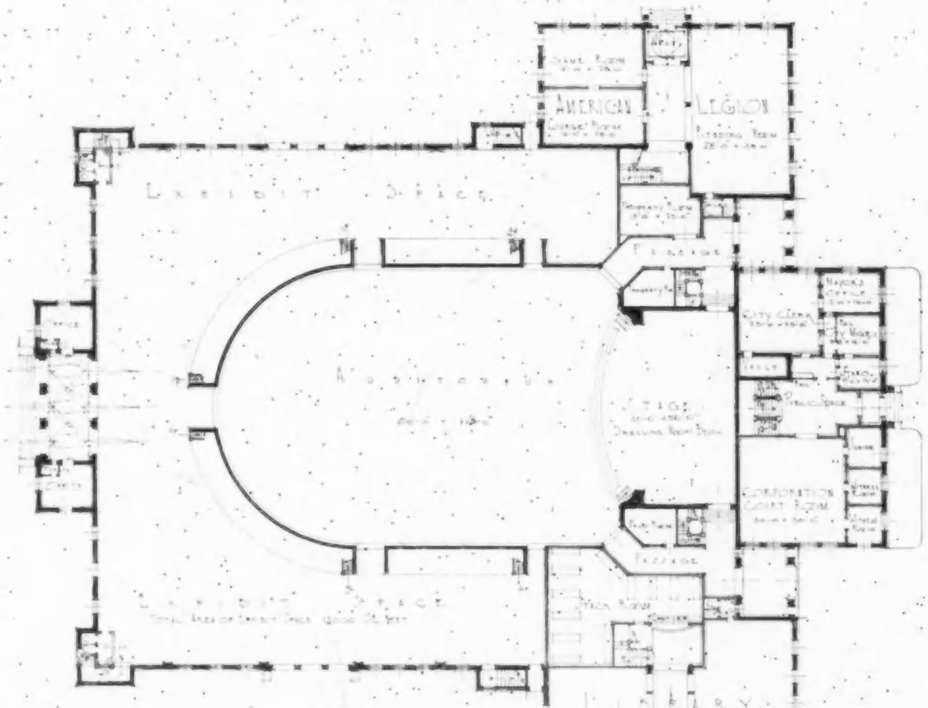


BALCONY AND SECOND FLOOR



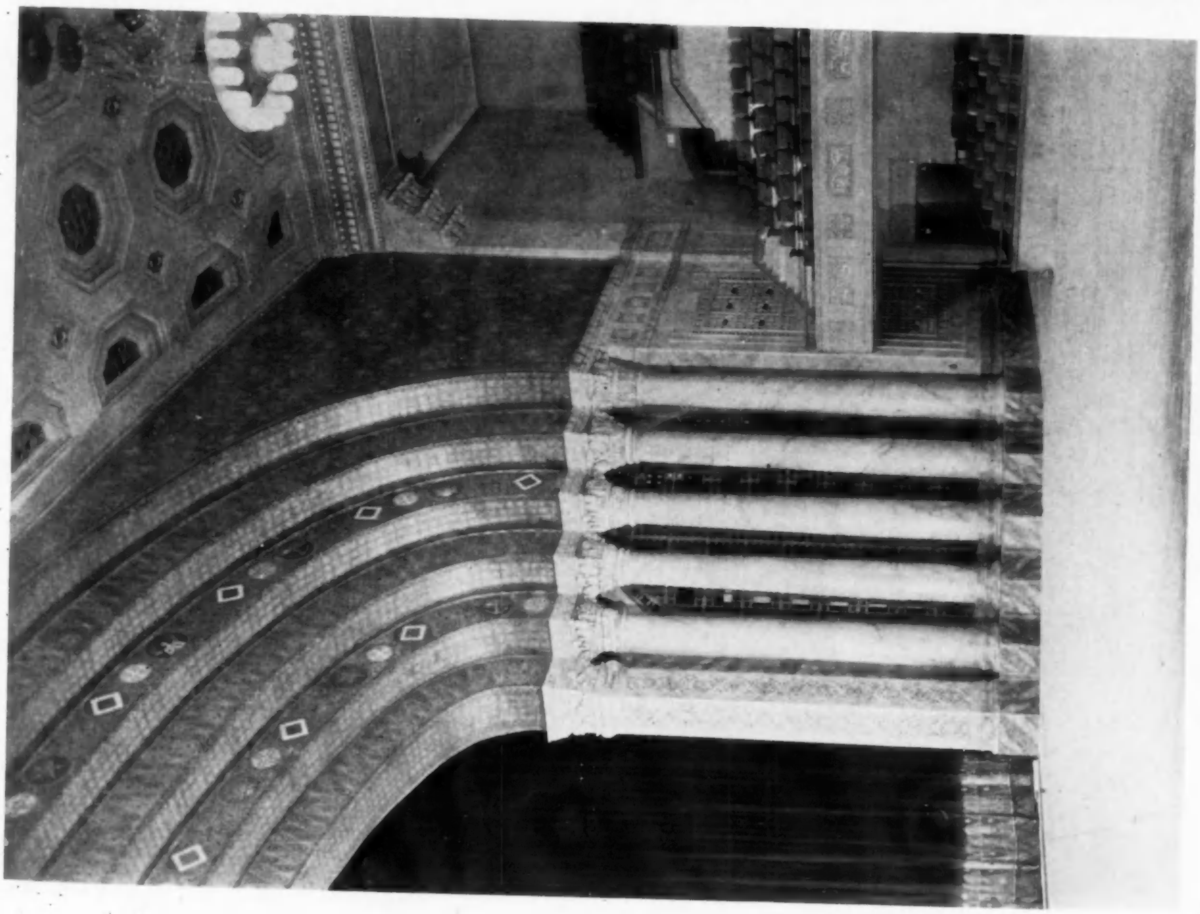
MAIN FLOOR

PLANS, AUDITORIUM, AMARILLO, TEX.

SMITH & TOWNES, ARCHITECTS; LANG & WITCHELL, ASSOCIATED

Plans on Back

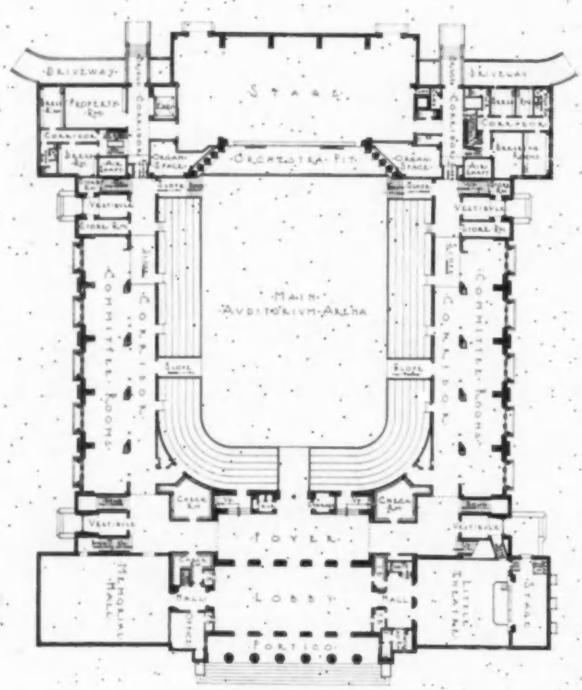
MAIN ENTRANCE



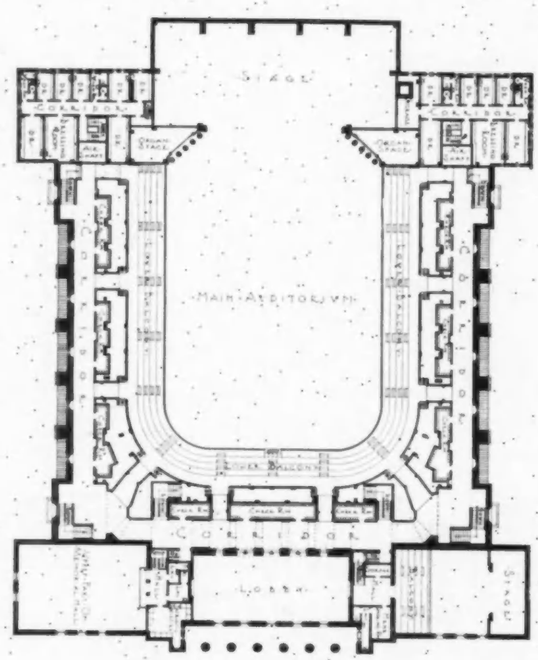
PROSCENIUM

MEMORIAL AUDITORIUM, SACRAMENTO

DEAN & DEAN, ARCHITECTS; G. ALBERT LANSBURG, COLLABORATING ARCHITECT; ARTHUR BROWN, JR., CONSULTING ARCHITECT



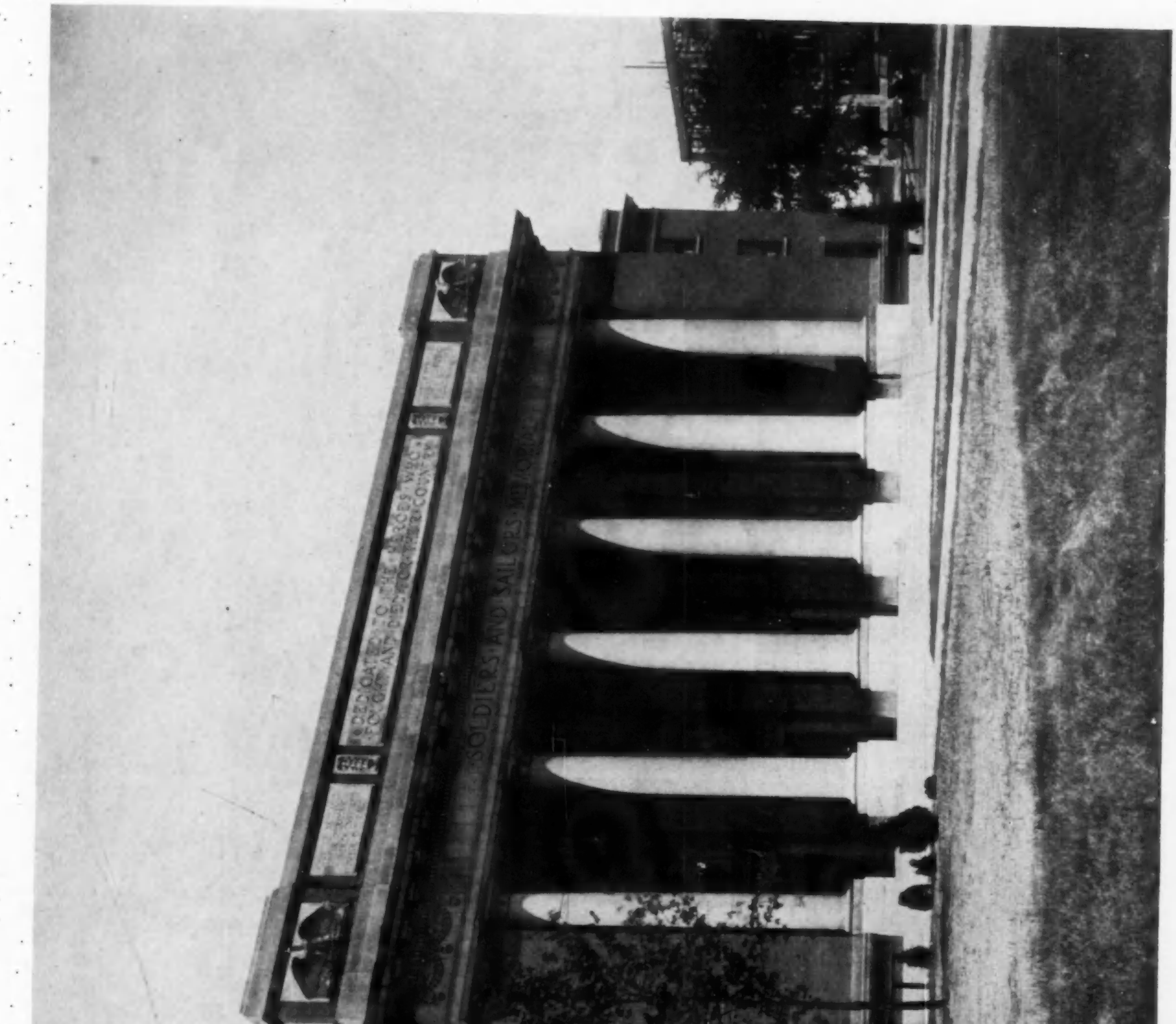
MAIN FLOOR



MEZZANINE

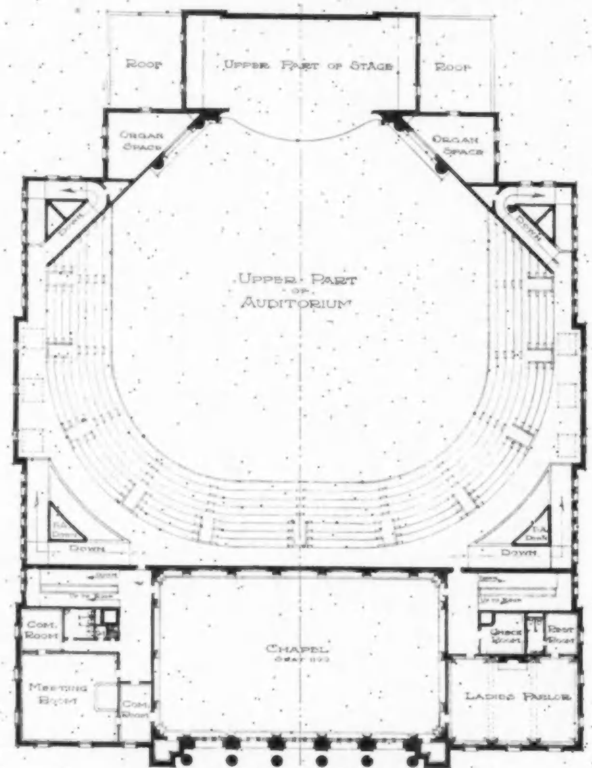
PLANS, MEMORIAL AUDITORIUM, SACRAMENTO

DEAN & DEAN, ARCHITECTS; G. ALBERT LANSBURG, COLLABORATING ARCHITECT;
ARTHUR BROWN, JR., CONSULTING ARCHITECT

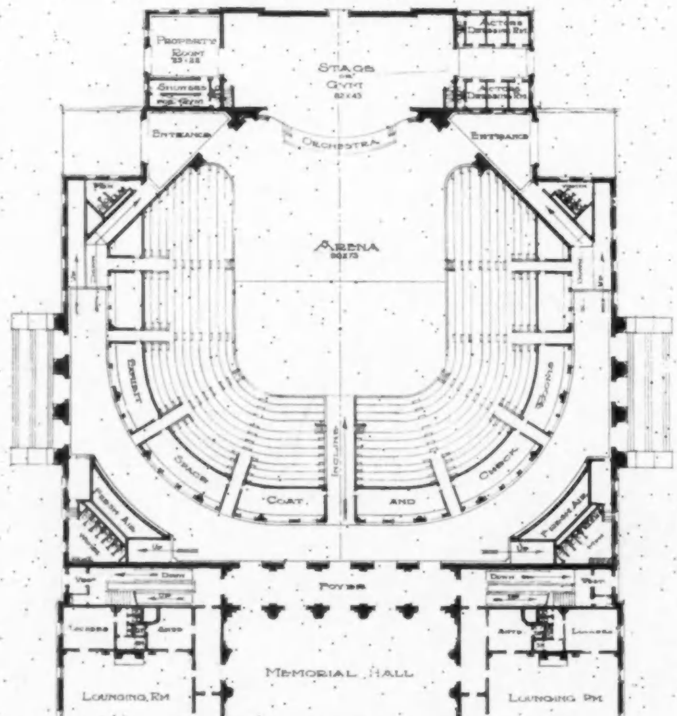


Plans on Back

MEMORIAL AUDITORIUM, KANSAS CITY, KAS.
ROSE & PETERSON, ARCHITECTS



GALLERY AND SECOND FLOOR



MAIN FLOOR

PLANS, MEMORIAL AUDITORIUM, KANSAS CITY, KAS.

ROSE & PETERSON, ARCHITECTS

The Building Program of the Government

By OSCAR WENDEROTH

THE Public Building Act is in many respects a very remarkable piece of federal legislation. It inaugurates in an impressive manner a public building program that will undoubtedly require years for its execution. It also establishes an entirely new legislative policy in connection with the distribution, authorization, designing and construction of the classes of federal buildings customarily placed under the control of the Treasury Department. Among its other important provisions, the new act paves the way for participation by the private architect in the execution of that part of the whole federal building program that Congress entrusts to the office of the Secretary of the Treasury.

It may be interesting to note what are included in "the classes of federal buildings customarily placed under the control of the Treasury Department." These are court houses, post offices, immigration stations, custom houses, marine hospitals, quarantine stations, and other public buildings of the classes under the control of the Treasury Department. The "control" which the Treasury Department exercises over these projects includes the acquisition of sites, the designing and the preparation of specifications, the supervision of construction, the making of contracts and payments, and the furnishing, equipping, maintenance, operation and repair of the structures.

Certain joint reports submitted to Congress by the Secretary of the Treasury and the Postmaster General indicate that an expenditure of several hundred million dollars will be necessary to place the accommodations provided by buildings under the control of the Treasury Department on a par with the needs. The new Public Building Act carries authorizations totaling about one hundred and thirty-two million dollars for expenditures outside of the District of Columbia. It sets in motion a construction program for the completion of which very considerable additional expenditures must be authorized in subsequent acts.

At the close of the last session of Congress there was pending a bill which would have appropriated the funds necessary for the commencement of the construction work outside of the District of Columbia that is newly authorized in the Public Building Act. This bill also authorized an increase of one hundred million dollars in the aggregate expenditure on this part of the program. The bill failed of passage, but not because of any opposition to its provisions. It

Photo, Drix Duryea

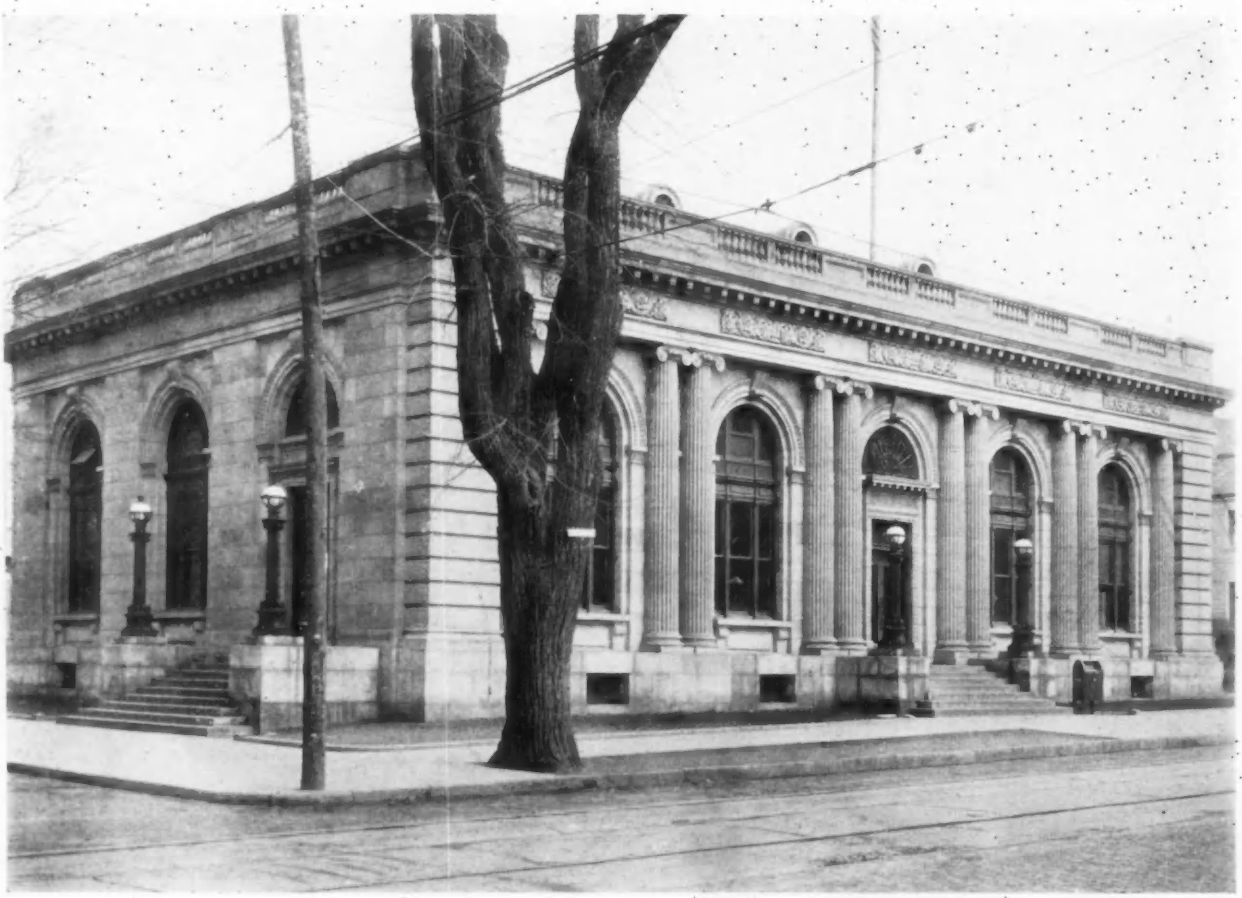
Post Office, New York
McKim, Mead & White, Architects

was caught in the legislative jam which resulted from a "filibuster" in the Senate. In company with other legislation that failed of enactment for the same reason, it must await reconsideration during the session of Congress which begins in December of this year. Favorable action on this bill, when it is reintroduced, seems to be assured. Prior to the time of the filibuster in the Senate, Congress made appropriations which permitted the Treasury Department to proceed with the construction of the previously authorized but "deferred" projects. There were 79 such projects.

The agency through which the Secretary of the Treasury administers the portion of the federal building program that is under the control of the Treasury Department is the office of the Supervising Architect. This office has been a part of the Treasury Department for fully three-quarters of a century. The public building legislation, enacted and contemplated, makes of the work of the office of the Supervising Architect one of the major activities of the federal government. But notwithstanding the long period during which the office of the Supervising Architect has been identified with public building work, neither its function nor its relation to the Treasury Department seems to be generally understood or appreciated. The Post Office Department contracts for the lease of buildings which are erected in accordance with its requirements and under its supervision by private initiative. The Treasury Department has nothing to do with the designing and construction of these buildings but all buildings erected with the public funds and used wholly or in part for the conduct of the postal business are constructed from designs prepared by or under the direction of the Supervising Architect of the Treasury Department.

The new act requires that the plans for all of the construction work shall be prepared in the office of the Supervising Architect of the Treasury Department. The act, however, gives the Secretary of the Treasury authority to employ architects and other experts in a consulting capacity to assist in the study of what is often an exceedingly complex problem. In accordance with this authority, the Secretary has called in an advisory board of architects to coöperate with the Supervising Architect in the consideration of the arrangement and disposition of the department buildings it is proposed to erect in Washington.

Before work may be commenced on any project provided for in the new Public Building Act, the Secretary of the Treasury is required to submit to Congress an estimate of the cost of the individual project. The approval of this estimated expenditure by Congress, and its citation in an appropriating act which provides funds for the commencement of work, establish the limit of cost for the project. The Deficiency Appropriation Act, approved July 3, 1926, contains several such items for the District of Columbia. They indicate the magnitude of the



Post Office, Ithaca, N. Y.

building projects in the capital for which the office of the Supervising Architect is engaged in preparing the plans. The items are: (1) The Administration Building of the Department of Agriculture. Messrs. Rankin & Kellog have been employed by the Secretary of the Treasury to prepare, in coöperation with the office of the Supervising Architects, sketches and designs for the completion of the building. The limit of cost has been fixed at two million dollars. (2) Agricultural Department; at a limit of cost of five million, seven hundred and fifty thousand dollars. (3) The National Archives Building; at a limit of cost of six million, nine hundred thousand dollars. (4) The Department of Commerce Building; at a limit of cost of ten million dollars. In accordance with specific authority contained in the new Public Building Act, the Secretary of the Treasury has employed Messrs. York & Sawyer to prepare studies and sketches for this great building, in coöperation with the office of the Supervising Architect. (5) The Treasury Department. A building for the accommodation of the Bureau of Internal Revenue, at a limit of cost of seven million, nine hundred and fifty thousand dollars. (6) The Treasury Department. Additions to the so-called "Liberty Loan" building adjacent to the building of the Bureau of Engraving and Printing; two additional stories, at a limit of cost of three hundred and seventy-five thousand dollars.

One of the activities of the office of the Supervising Architect of which very little is generally known is concerned with completed buildings. For these buildings the Supervising Architect supplies the furniture, rugs, carpets, and lighting fixtures, and the post office working room equipment, as well as all vaults, safes, and post office lock boxes. The Supervising Architect operates, maintains, and repairs these structures. This includes the employment and direction of the boiler and engine room, janitor, and char forces that are required in the care of the buildings and their grounds, and in the furnishing of heat, light and power. This force now numbers about 6000 persons, distributed among approximately 1600 buildings in all parts of the United States. The office of the Supervising Architect deals extensively in real estate, doing both a conveyancing and a rental business. The office renders a great many other services to the federal government for which there is no counterpart in the service which the private architect gives the private client. It will be seen from this that if the office of the Supervising Architect is required to expend twenty-five million dollars a year on the acquisition of sites and on building construction, its total annual expenditures must be much more.

At the present time (August, 1927) the technical staff in the office of the Supervising Architect in Washington numbers 188 employes; the administrative and clerical staff numbers 165, a total of 353 employes. The present field staff, charged with the

Post Office, Kokomo, Ind.

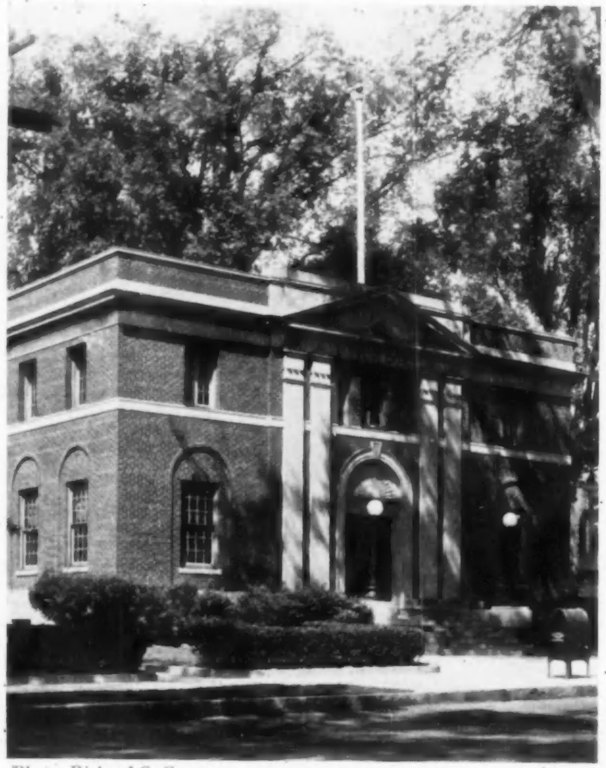


Photo. Richard S. Grant

Post Office, Greenfield, Mass.

supervision of construction and of the upkeep of plants and structures, numbers 60 employes. The technical staff includes architectural designers and draftsmen, architectural engineers (estimators and specification writers), structural engineers and mechanical engineers. The administrative and clerical staff in the office of the Supervising Architect seems very large in proportion to the technical staff. This is not because there is a large number of administrative employes. It results from numerous activities of the office that are apart from its purely architectural functions. The acquisition of sites, the care of purchased property, the preparation of a nationwide survey of the needs of the public service, the many estimates and reports for which the office is called upon, the work of furnishing, equipping, operating and maintaining completed buildings, the conducting of a very large correspondence, and the administration from Washington of a diversified activity that spreads out over a territory of more than three million square miles, all help to account for what seems to be a disproportionately large clerical staff. The relation between the technical staff on one side and the administrative and clerical on the other illustrates strikingly the difference between the character of the service rendered by the office of the Supervising Architect to the government and that rendered to the private client by the private architect.

The office of the Supervising Architect is not yet acquiring sites and constructing buildings at the rate of twenty-five million dollars a year, exclusive of its other activities. The increase in the technical staff which may become necessary in order to comply with the requirements of Congress respecting the execution of the public building program may present quite a problem. The office of the Supervising Architect may become an active competitor with the private architect for the services of designers, draftsmen, engineers, specification writers, superintendents, and other technically qualified employes needed in his office.

It seems right that the various activities of the federal government should be housed in public buildings that are properly designed and constructed. This must be accomplished through the agencies that Congress has provided for the purpose. The public building legislation offers the private architect an opportunity of coöperating in the carrying out of the great public building program. The extent of this coöperation, and the manner in which the service may best be rendered, may become more apparent when the new building program is actually in process of execution. In the meantime, there are undoubtedly ways in which the architectural profession can coöperate with the Treasury Department in its task of placing the office of the Supervising Architect on a footing to meet satisfactorily the heavy demands which Congress will probably make upon it during future years.

What has been said up to this point may seem to have very little to do with the designing and construction of the post office buildings which are shown in these illustrations, but it all has a bearing on the subject. All the factors affecting the administration of public building work must be taken into consideration. If this is not done it is difficult to understand the differences between the methods in vogue in the direction of public work and the procedure customary in private practice. The private architect may control, at least to some extent, the conditions under which he can do his best work. In any event, he is free to decline a commission if the conditions attached to it do not meet his approval. Not so the Supervising Architect. His work, and the conditions under which it is to be executed, are determined for him by legislation and by departmental procedure.

Of all of the classes of public buildings erected throughout the United States by and under the control of the Treasury Department, those that are required for the accommodation of the postal business are in the great majority. The plans for these post office buildings are prepared by or under the immediate direction of the office of the Supervising Architect, which also superintends their construction. As this office has been identified for so many years with the designing and construction of post office buildings, both large and small, one might very naturally assume that by this time the process had been reduced to a system, and that the requirements underlying the planning of all the different types of post office buildings could be expressed as a sort of formula. While this is one of the achievements that, within reason, is made possible by the new Public Building Act, it is not as yet an actual accomplishment,—at least not to any considerable extent. It required the coöperation of Congress in the form of amended legislation to enable the office of the Supervising Architect to apply to the planning of post office buildings in a systematic manner the experience of many years in this particular class of work. The Public Building Act, approved May 25, 1926, fully clears the way for the application of these methods.

Prior to 1902 public buildings were authorized by Congress, singly or perhaps in small groups of not more than a half-dozen. The determination of the localities in which new buildings should be erected was a jealously guarded prerogative of Congress. Authorizations were not based upon any general survey of the needs of the public service throughout the country. The Treasury Department might submit estimates and reports to Congress respecting contemplated public buildings or the needs of the public service, but the choice of the favored communities in which new buildings were to be provided and the sums to be expended upon the buildings, continued to be wholly functions of Congress. In those days the Treasury Department operated somewhat independently of the Post Office Department in carrying out public building authorizations. The Treasury Department collected the data respecting the needs of the postal service in a community in which the construction of a building was authorized. This information was obtained from the local postmaster. It represented his personal opinion, which would not necessarily have been the recommendation of the Post Office Department. But on the basis of the data thus collected the office of the Supervising Architect prepared the plans for the building. Each authorization was looked upon as an independent proposition, and the office of the Supervising Architect approached the designing from that point of view.

With the passage of the first of the so-called "omnibus" public building bills, Congress inaugurated the custom of grouping a considerable number of building projects together in a single authorizing measure. At this time Congress also began the practice of authorizing the construction of public buildings in smaller communities. The new elements introduced into the public building situation by the "omnibus" public building bills brought about changes in methods in vogue in the office of the Supervising Architect. The necessity for a more systematic procedure impelled the Treasury Department to take the initiative in securing closer coöperation with the Post Office Department in the determination of post office requirements. Out of this there developed the designation of a joint Treasury Department—Post Office Department committee on post office planning. The Treasury Department then commenced to erect buildings for the Post Office Department instead of for postmasters. The Post Office Department collected data respecting the needs of the postal service in the various communities in which the construction of post office buildings was authorized. The Post Office Department's representative on the committee submitted in each instance the Department's recommendations

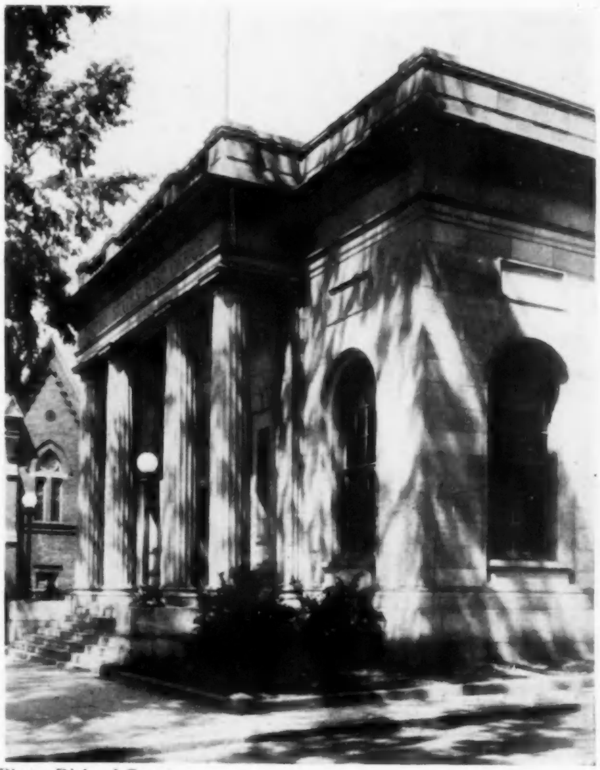


Photo. Richard Grant

Post Office, Johnstown, N. Y.

regarding the desired accommodations for the service.

The joint committee analyzed the data it collected respecting the needs of the branches of the public service entitled to accommodations in buildings erected by the Treasury Department. It made every effort possible to assist the office of the Supervising Architect in formulating systematic methods of planning for the needs of the postal service. Many improvements in planning and arrangement grew out of the work of the committee. It brought about much closer coöperation between the two departments. However, the efforts of the committee toward a more systematic procedure and the standardization of methods were hampered by the Congressional procedure still in vogue for the determination of the localities in which buildings should be erected and the fixing of the limits of cost; Congress continued to exercise these prerogatives. An "omnibus" public building bill would provide a construction program for the Treasury Department that would require several years for its execution. Such an act was purely an authorizing measure. It designated the places in which buildings should be erected and fixed the limits of expenditure, but it appropriated no actual funds for carrying on the work. Such appropriations were made in the annual appropriation measures passed at each succeeding session of Congress. A rule required the office of the Supervising Architect to place public buildings under contract in the order in which the government acquired sites.

This course seemed to be the only way out of an embarrassing situation, but it was not a very satis-

Main Corridor, Post Office, Denver

factory solution. Buildings were placed under contract without regard to the relative urgency of the need for them. The Post Office Department would have preferred that the order in which such buildings were constructed should be determined by a study of the needs of the postal service. Under these conditions, the joint departmental committee could make but a limited application of its accumulated data respecting the facilities for the conducting of the postal business throughout the country. When one of the authorized projects was reached in turn, the committee met to consider the data which had been collected relative to the particular undertaking, and the recommendation of the Post Office Department. The allotment of space was discussed, and a general arrangement was agreed upon. The decision was based not only on the existing needs, but took into consideration a reasonable growth in the public business during the ensuing decade. The Treasury Department contributed its recommendation respecting any accommodations which should be provided for any branches of the public service other than the postal service entitled to quarters in the new building. The task of the office of the Supervising Architect was then to determine whether an adequate building appropriate to the locality could be built for not to exceed a limit of cost that may have been fixed several years previously by a Congressional committee which based its action upon purely tentative information. In

Photos, Charles S. Price

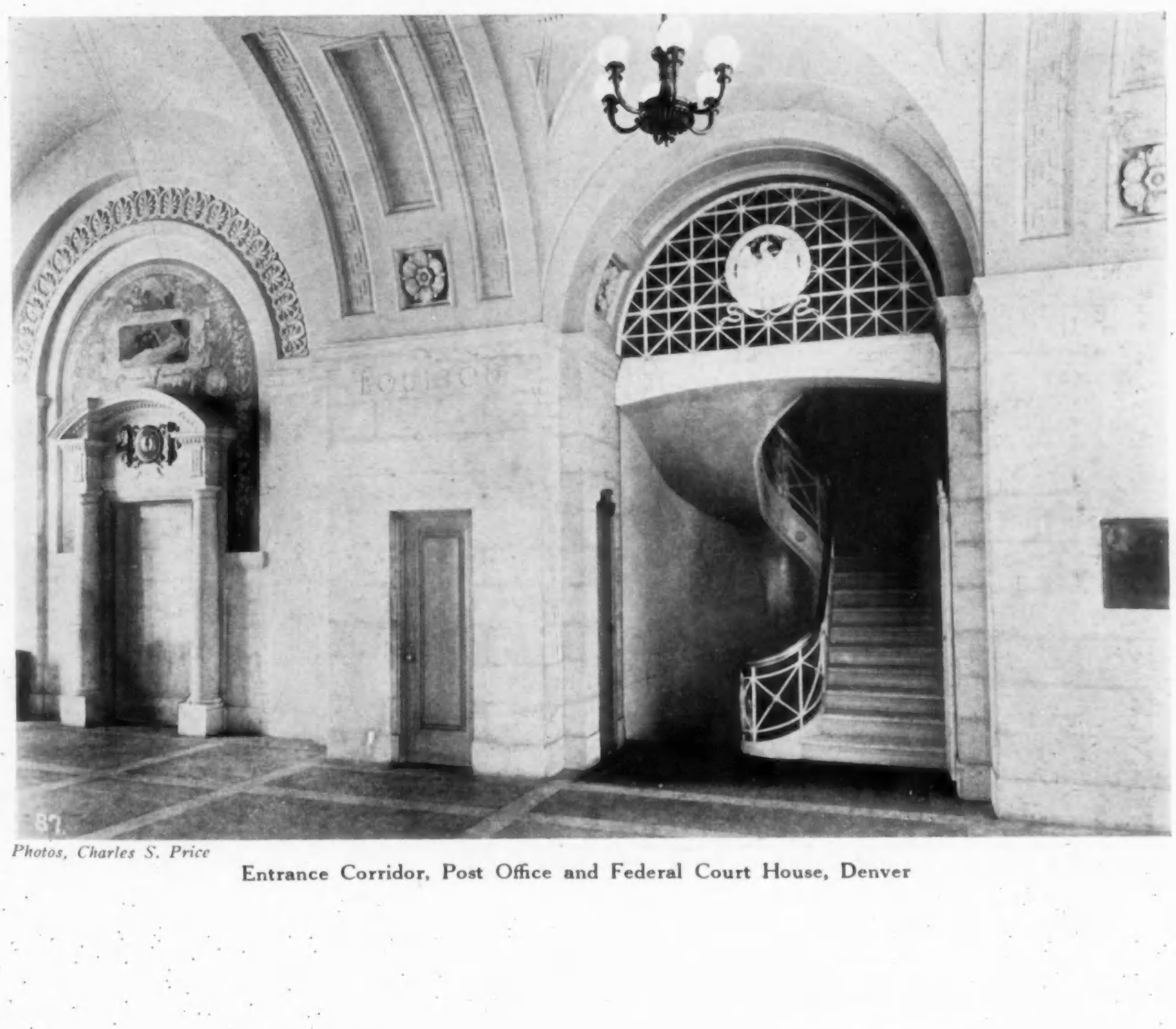
Corridor, Post Office, Denver

many instances the office of the Supervising Architect found it impossible to reconcile the various factors.

When a private client is advised by his architect that the program he has laid down cannot be executed within the expenditure he has in mind, he has the choice of revising his program or of increasing his expenditure. Neither of these courses was open to the Supervising Architect. Requesting Congress to increase a limit of cost for a building was an expedient which was adopted only in the most acute situations. It not only involved delay but, more than that, it opened the door to fresh embarrassment for the Secretary of the Treasury. In the designing and construction of the building, advantage could be taken of every expedient that would tend to hold down the cost. If, however, the authorized limit of cost would require the construction of a building that would be outgrown even before it was completed, there was no choice but to lay the project aside, report the facts to Congress, and await the time when, through Congressional action, the limit of cost was extended sufficiently to permit the work to go ahead.

It is not true, of course, that all of the authorizations contained in an "omnibus" public building act were inadequate. The tendency of the system, however, was to bring about the construction of buildings which fell measurably below the standards of planning, arrangement, design and construction which should always be maintained for public buildings.

Lobby, Federal Circuit Court, Denver



Photos, Charles S. Price

Entrance Corridor, Post Office and Federal Court House, Denver

The policy of Congress seems to be to authorize lump-sum limits of cost for various section of that portion of the entire federal building program that is placed under the control of the Treasury Department. Thus the present act sets aside fifty million dollars for expenditures in the District of Columbia; one hundred million dollars outside the District; fifteen million dollars for a group of deferred projects; and a general authority for the purchase of new sites in certain localities from the proceeds of the sale of existing buildings and the land. The Secretary of the Treasury is required to submit to Congress his recommendations respecting the manner in which each lump-sum authorization should be allocated. The limit of cost of a project ceases to be fixed arbitrarily years in advance of the time when work on it may be commenced; it is now determined by the latest data available to the office of the Supervising Architect.

The office of the Supervising Architect, especially during the last 25 or 30 years, has produced, either from its own designs or in coöperation with private architects, many well planned and architecturally admirable public buildings. It would be quite possible to select from among these structures a number which would illustrate the successful application of recognized principles of planning and designing in the solution of the problems presented by public building work. Among these buildings, however, there are many that are frankly compromises. They are the best that could be had under the circumstances, but the Treasury Department would be unwilling to have them accepted as representative of the standards of design and construction which the office of the Supervising Architect strives to maintain.

Under the liberal provisions of the new Public Building Act the office of the Supervising Architect will be given the opportunity, in coöperation with the Post Office Department, of applying systematic methods to the designing of post office buildings and of giving this work the full benefit of the special study which both departments have devoted to the subject. This does not mean, however, that from now on post office buildings are to be produced after the manner of stereotypes. The post office buildings that are designed in the office of the Supervising Architect are distributed over a territory of more than three million square miles. In this vast area the office encounters a great variety of local conditions, all of which affect the work of the designer. Stereotyped plans and designs could not be applied to the varying conditions encountered in the numerous localities in which public buildings must be erected. The office of the Supervising Architect has developed a number of typical plan schemes for post office buildings which, within limits, may be adapted to changing conditions. This applies generally to the smaller buildings. The larger projects involve conditions which make each building a special problem.

Photo, Paul J. Weber

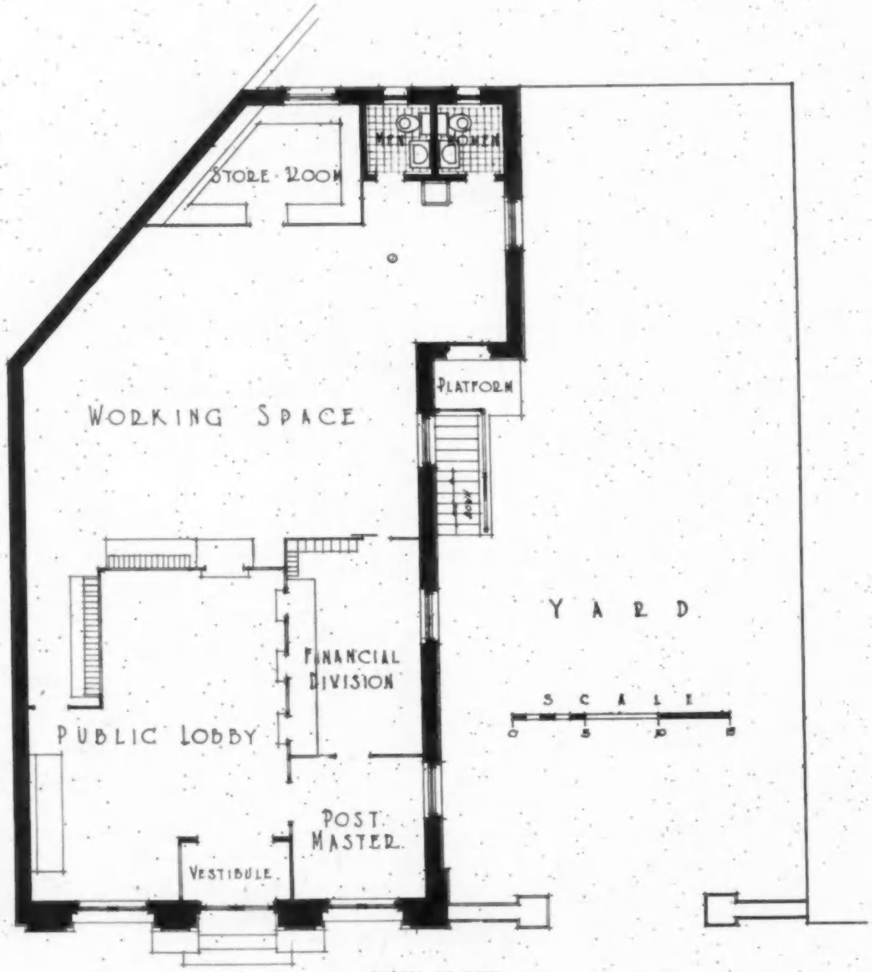
Post Office, Cambridge, Mass.

Photo. George H. Van Anda

Plan on Back

POST OFFICE, LARCHMONT, N. Y.

FRANK A. MOORE, ARCHITECT



MAIN FLOOR

PLAN, POST OFFICE, LARCHMONT, N. Y.

FRANK A. MOORE, ARCHITECT

Photo. George H. Van Anda

POST OFFICE, BRONXVILLE, N. Y.
PENROSE V. STOUT, ARCHITECT

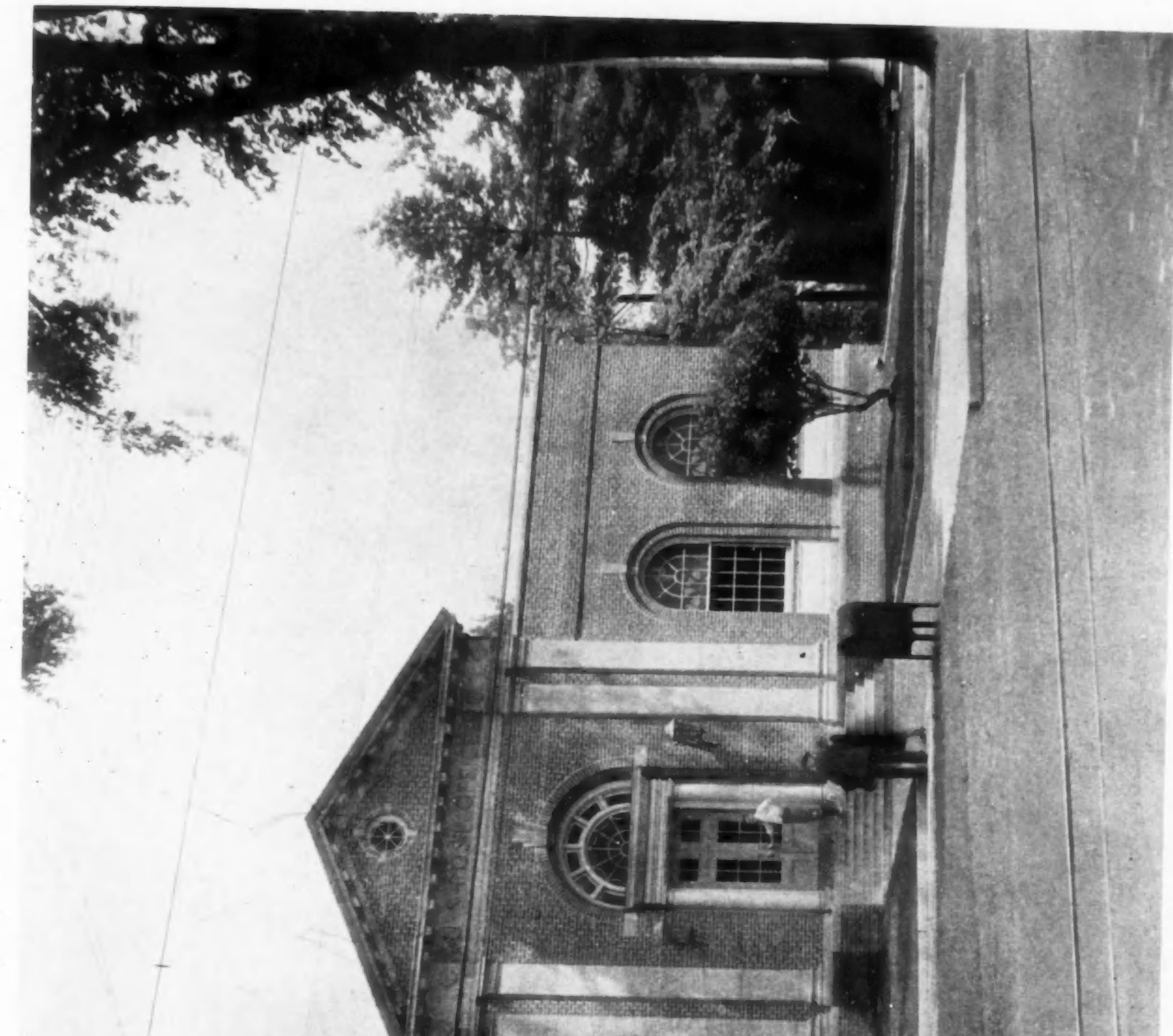
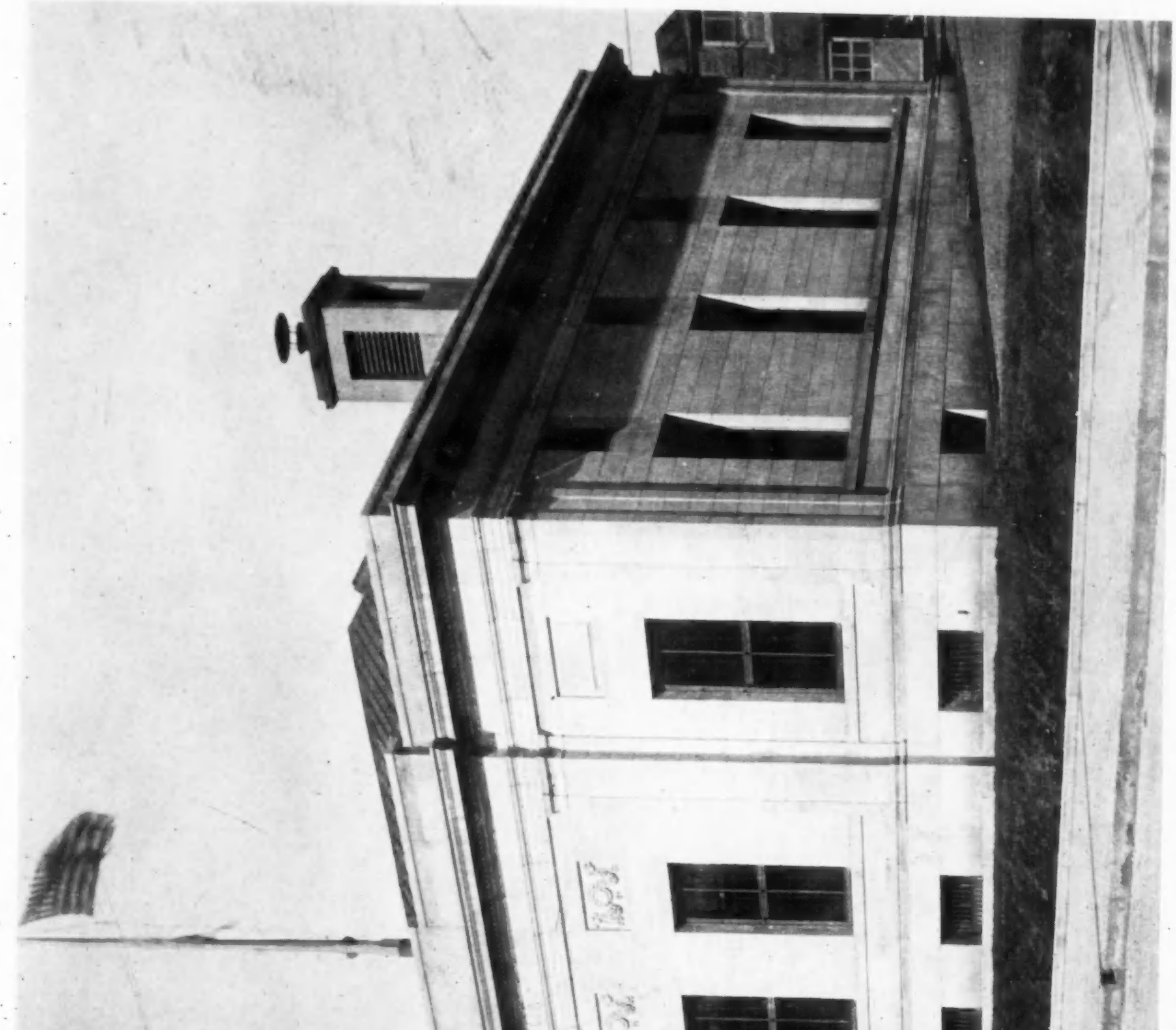


Photo. Paul J. Weber

POST OFFICE, AMHERST, MASS.



Photo, Charles Gilbert Shaw

POST OFFICE, BLOOMINGTON, IND.

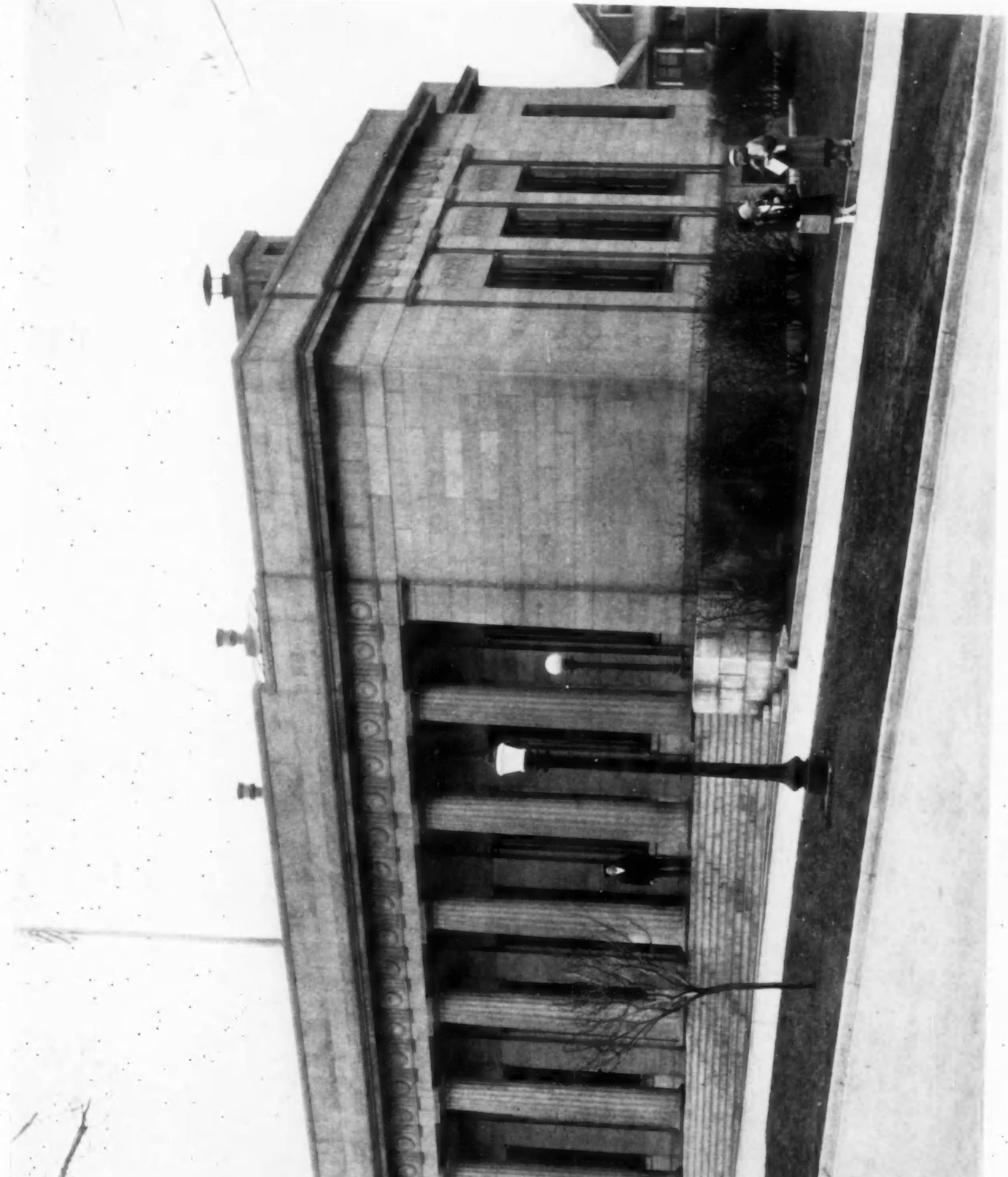


Photo. Clark Studio

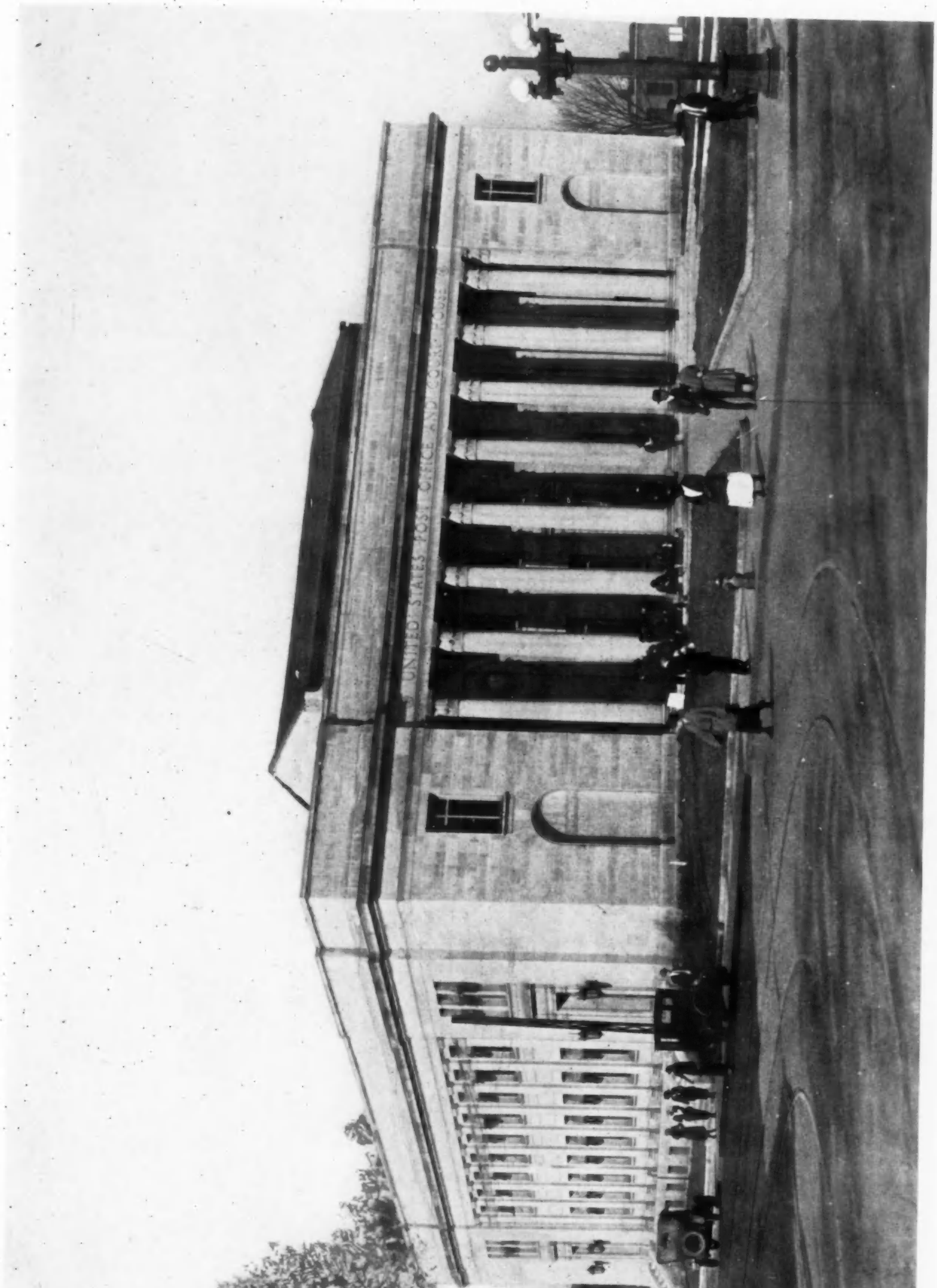
POST OFFICE, CADILLAC, MICH.

Photo. Tebbs & Knell, Inc.

POST OFFICE, MOBILE

Photo. Theo. M. Fisher

POST OFFICE AND COURT HOUSE, DENVER



POST OFFICE AND COURT HOUSE, CHARLOTTE, N. C.

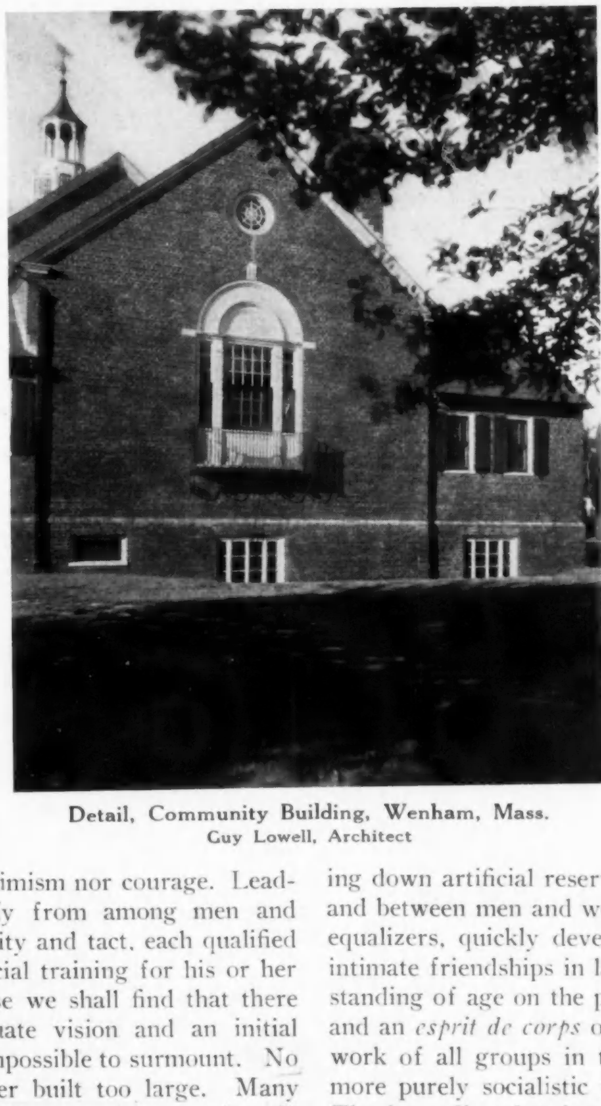
Planning Community Buildings

By RALPH C. HENRY

AS an eminently successful instrumentality for focusing the social life of our smaller cities, our suburban towns, our rural communities and, for that matter, wherever people sense the value of getting together for the comparison of ideas, with its consequent stimulation to collective effort, the "community house" has already found its place in the scheme of things. The idea is not new. It does not have to be "sold." It is the shelter of by far the most democratic of social organizations, and its conclusions, by consequence, form the most accurate index of average neighborhood opinion. Its influence and power for good are directly proportionate to its adaptability to varied enterprises, to its external environment, and to the adequacy of its housing arrangements.

Elasticity of plan arrangement, therefore, becomes at once an obvious desideratum if the largest numbers, both young and old, are to be attracted to participate in the varied activities that come well within the scope of such a structure. Promoters of such enterprises should be chosen from among the most aggressive and successful of local business and professional men, devoid of neither optimism nor courage. Leaders should be chosen only from among men and women of executive capacity and tact, each qualified by natural ability and special training for his or her particular task. Otherwise we shall find that there is the danger of inadequate vision and an initial handicap, difficult if not impossible to surmount. No community house was ever built too large. Many have been built too small. The normal community will grow to whatever of seeming excess has been provided, and in this stimulation to physical, mental and spiritual growth lies the inner secret of the whole matter. The influence of the community building is great.

To architects, as a professional group, the chief interest is likely, perhaps, to lie in the building itself,—in its external expression, in its arrangement, in its minutiæ of equipment, and in the soundness of its structural scheme. This should not be the entire interest, however, even to the architect, important and indispensable though it be. The erection of a successful community building is not an arduous task to any architect of good taste who has a sufficiently developed natural aptitude for design and the requisite engineering and business experience to accomplish its realization in many and varied aspects.



Detail, Community Building, Wenham, Mass.
Guy Lowell, Architect

Therefore, before analyzing those requirements, which may be considered more specifically the architectural requirements, I should like to dwell, briefly, upon one or two of the fundamentals which have a more direct bearing upon the location of the building and upon its environment as a whole.

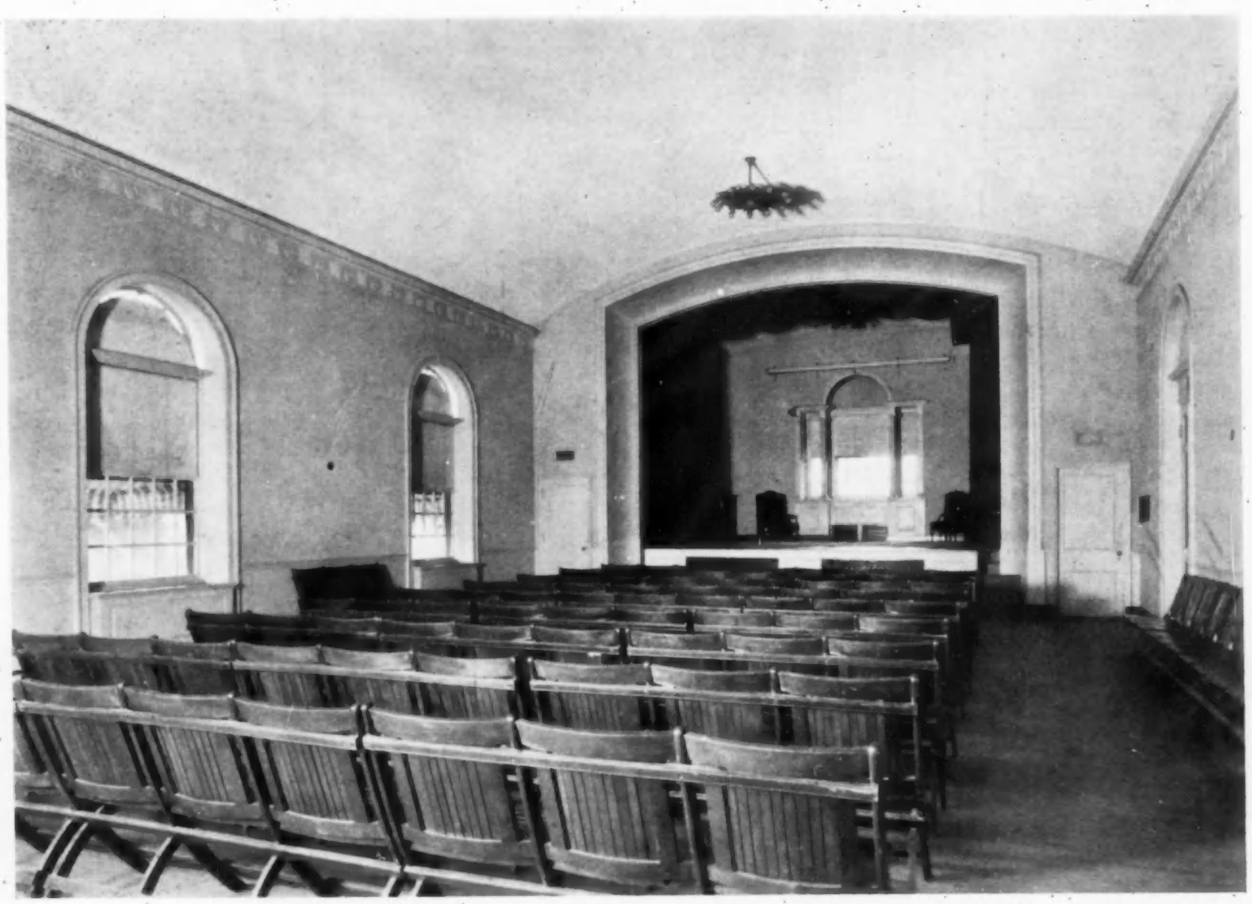
First: Let us not lose sight of the fact, freely admitted among all who are identified with the promotion of facilities for community recreation, that organized play for young and old in the interests of friendly rivalry and pure fun is a very important element entering into the program of the community house problem. Competitive athletic games of all sorts, properly adapted to the requirements of people of the ages participating and properly supervised, are the best media for breaking down artificial reserve as between boys and girls and between men and women. They are remarkable equalizers, quickly developing clean companionship, intimate friendships in large numbers, a riper understanding of age on the part of youth, and vice versa, and an *esprit de corps* of marked benefit to the team work of all groups in their later application to the more purely socialistic problems of the community. The immediate bearing of this consideration of organized play upon the problem of the community building is, obviously, that there be considered only such sites as give ample outdoor environment and space for athletic recreation in the open, space accessible to the building and conveniently arranged with reference to it. Proximity to a good golf course would be ideal, but in default of this there should be at least sufficient space for tennis courts, for hand and volley ball, for wading pools, swings and jingle gyms, and for the other usual forms of competitive play in the open. The building should occupy not more than 10 per cent of the site,—better by far if it occupy only 5 per cent of the entire allotted area.

Second: The site should be readily accessible to the center of local population. If, in such a locality, sufficient space does not seem to be readily available, make room for it. Few communities will be harmed by the taking of numerous relics of the nineteenth century for this better purpose; many will be benefited.

Third: The site must be made beautiful as well as be ample and accessible. Real estate values and the interests of owners of nearby property alike demand this. The judicious planting of protective shrubbery along borders and the creation of expansive green play lawns serve a triple purpose. They conserve and more frequently enhance real estate values and create beauty. They also aid in administration by giving gateways of restricted access with attendant simplification of the problem of supervision and the maintenance of order. Some fencing of the play area is quite essential and preferably by natural vegetation rather than by wire or wrought iron.

Of the truth of all these contentions I have personally seen the demonstration. In my home city of Newton, Mass., there has been for generations more than lavish provision for the requirements of church life, civic life, country club life, and all that makes for national preëminence in the field of education. We are not without evidences of complacency toward innovation, and several residential sections were inclined to view with alarm the threatened creation of just such community centers as I have outlined. We already had enough of all "advantages." The noise about the new centers would be intolerable. Rough elements were bound to creep in and force us to keep our children at home. The little folks would be placed at the mercy of a more selfish adolescence. Real estate values would be irreparably injured. We should have to sell out to the first comers and move away. Such was the prologue. What is the epilogue? A neighborhood club in the best sense about each such center. Men and women of 50 and over playing tennis, getting acquainted,—courts always full. Spring and fall tournaments, enlisting every boy and girl able to lift a racquet. Similar spring and fall tournaments among men and women who heretofore had imagined that their playing days were over, at any rate for any game other than golf; annual field days; folk dancing; prizes for handiwork and ship models; baseball games; final singles between the local Catholic priest and the Episcopalian vestryman. Such are some of its results.

What kind of a community house for such a crowd? Let us examine it. You may add to it or make eliminations as your immediate problem demands:



Assembly Hall, Community Building, Wenham, Mass.
Guy Lowell, Architect

1. Auditorium:
   a. Audience Hall;
   b. Stage;
   c. Anterooms;
   d. Dressing rooms;
   e. Property and costume room;
   f. Organ chambers;
   g. Toilets;
   h. Foyer;
   i. Vestibule;
   j. Public toilets;
   k. Projection booth.
2. Club Rooms.
3. Banquet Hall:
   a. Kitchen and serving room;
   b. Storage and preparation;
   c. Linen.
4. Swimming Pool:
   a. Attendants;
   b. Dressing rooms;
   c. Shower preparation;
   d. Pool;
   e. Solarium;
   f. Toilets;
   g. Lockers.
5. Pool and Billiards.
6. Bowling.
7. Gymnasium.
8. Card and Game Rooms.
9. Reception and Committee Rooms.
10. Steward's Suite; Office of Caretaker.
11. Service Dormitory.
12. Storage for Athletic Equipment and Supplies.
13. Library
14. Reading Rooms.
15. Writing Room.
16. Coat Rooms.
17. Ticket Office.
18. Domestic Engineering Equipment.
19. Children's Playrooms.
20. Toilets.
21. Heater and Fuel.

The design and function of many of these rooms are obvious enough. A few require some analysis.

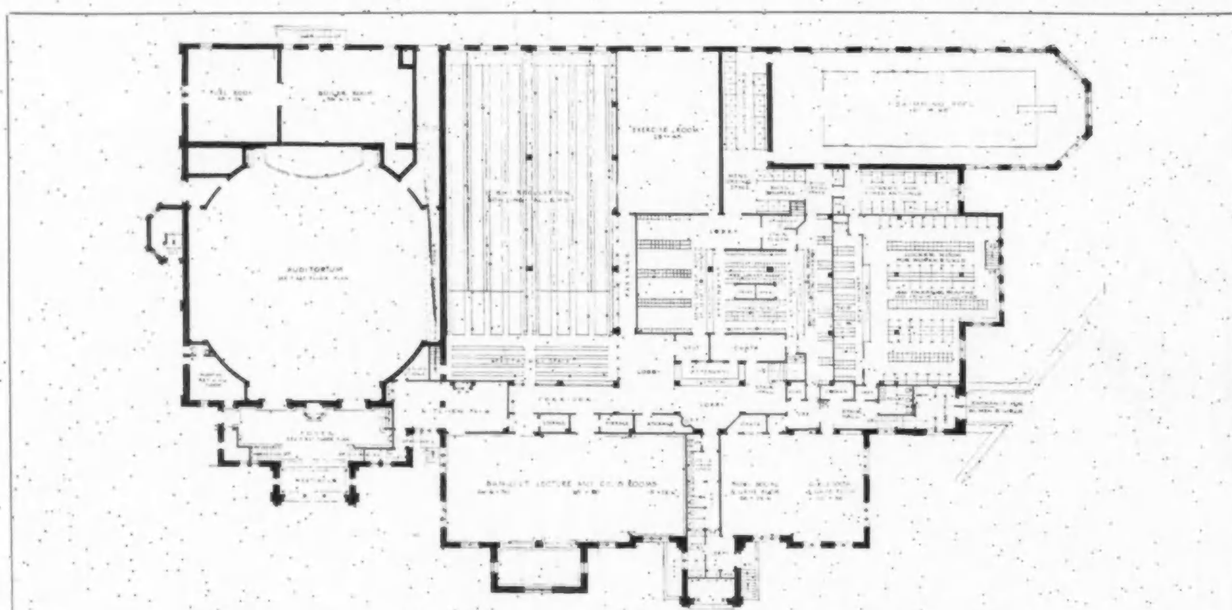
The Auditorium. Where resources permit and where other provision may be made for banquets, dancing and similar activities demanding a level floor, the auditorium should have a permanently sloping floor, developed, preferably, to the involute curve determined by securing uniform clearance of the sight lines to the stage. This clearance to a central focus point 5 feet, 6 inches above a 3-foot stage elevation should be not less than 5 inches for each successive row. The aisles should be sloped to the curve of gradually increasing grade from front to rear, but the fixed seats should be upon level, stepped platforms projecting above it. The sloped surface often adopted under seats is economical but uncomfortable and should be avoided. These stepped platforms, the lowest about 1 inch rise and increasing gradually to about 5½ inches rise, may be of wood over the concrete slab of the structural floor in locations where first class, fire-resistant construction is not demanded by local ordinance. In the latter case, the steps should, of course, also be of concrete. Aisles may be of mastic with countersunk linoleum strips, or they may be of granolithic with or without carpet

Little Theater, Municipal Auditorium, Colorado Springs
Charles E. Thomas and MacLaren & Hetherington, Architects

Whiting Memorial Community House, Whiting, Ind.
Shattuck & Layer, Architects

or linoleum strips. Seats, back to back, should not be less than 2 feet, 6 inches; laterally, arm to arm, not less than 19 inches; 21 inches is better and much more comfortable; 22 inches is generous. A central and two side aisles is the best arrangement of aisles, and the square is preferable to the long rectangle as a general shape for the room. Not more than 15 seats should be placed between aisles. Windows should be above a high wainscot and draped to permit ready darkening for the projection machine. Deeply recessed windows give a rich effect, are valuable acoustically to decrease reverberation, and provide space for direct radiation, for control of ventilation, or for a combination of both when desired.

Vaulted or coved ceilings of auditoriums should not be made of hard, smoothly troweled plaster, but should be broken into ornamental stucco caissons in the design or made of some one of the various effectual porous materials promoting sound absorption. Apply the Sabine formula for sound "decay" before you build your auditorium to make sure it will be successful acoustically. There is no longer any excuse for failure in this respect. Two seconds or less for sound "decay" indicates a satisfactory design. The gallery, better at the end than at the side, should also be stepped for sight lines, applying the same



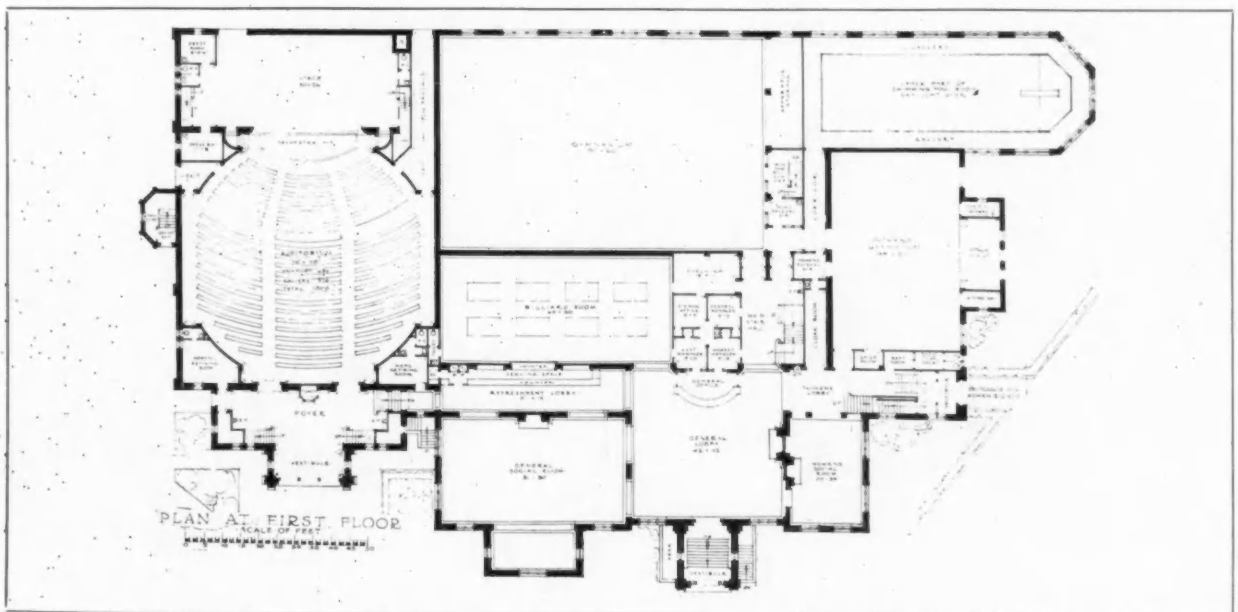
Basement Plan, Whiting Memorial Community House, Whiting, Ind.
Shattuck & Layer, Architects

Auditorium, Whiting Memorial Community House, Whiting, Ind.
Shattuck & Layer, Architects

reasoning as in planning the floor. The involute curve will naturally produce steeper stepping as the platforms recede farther and farther from the stage.

If your audience hall, on the other hand, must also serve as a ballroom, with level floor and portable seats, sight lines may be much improved by making the stage level 4 feet above the floor. It should surely be at least this if the floor accommodates more than 300 seats. For artificial lighting chandeliers are better than cove lighting, and they should be so spaced as not to hang within the lines of vision from the gallery. Two or three such chandeliers on the lines of quarter width are usually in all respects satisfactory.

The Stage. The community building does not demand as elaborate a stage as the city theater, but it should be not less than 18 feet deep from back of the proscenium line, and the proscenium should be from 24 to 30 feet wide, with height in proportion. A too prevalent defect in stage design is inadequacy of wing space. There should be at least 5 or 6 feet of free space beyond the proscenium jambs for electrical equipment and for freedom of stage setting and management. Pivoted footlight boards and two lines of border lights on three switches each and connected with rheostat dimmers are sufficient lighting equipment, and a grille height equivalent to twice



First Floor Plan, Whiting Memorial Community House, Whiting, Ind.
Shattuck & Layer, Architects

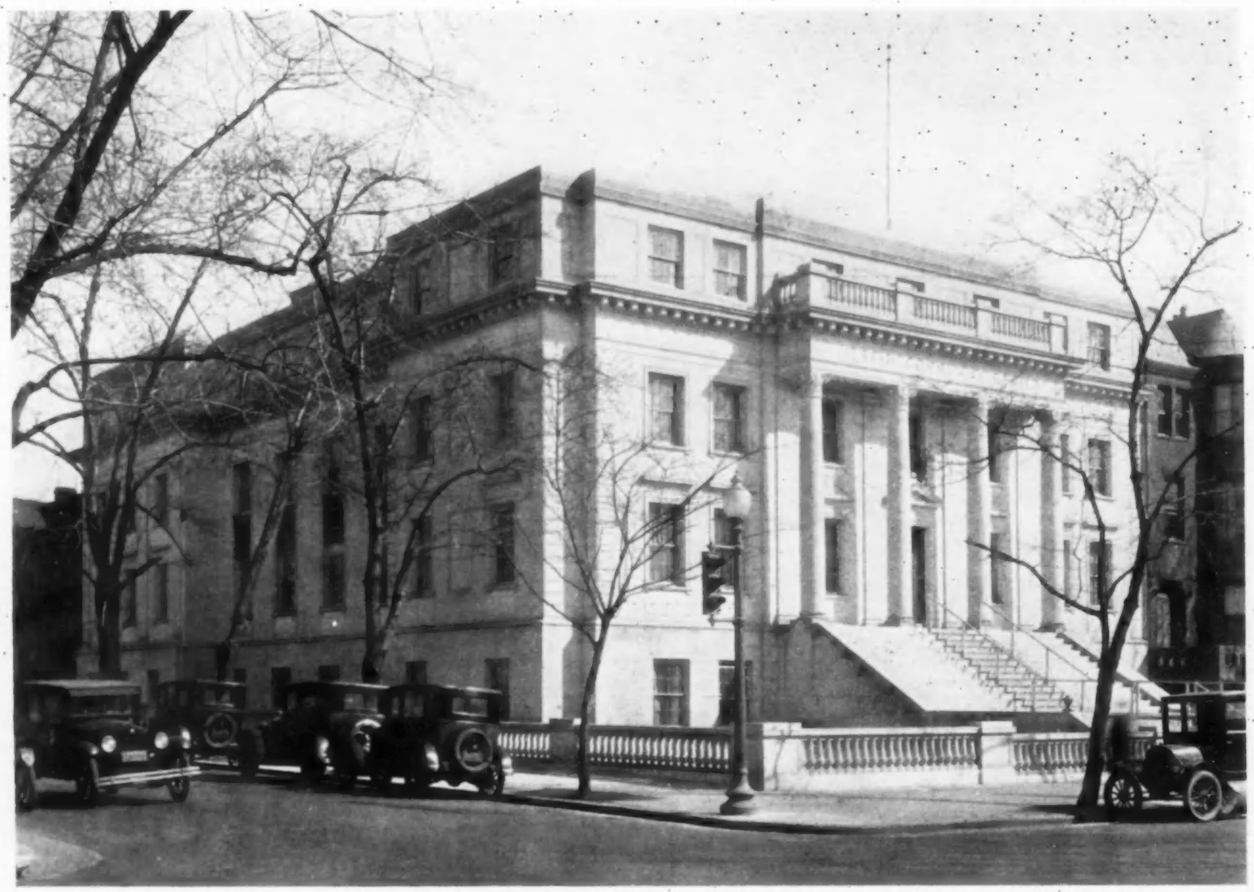
the proscenium opening is very desirable for quick scenery changes. A paneled wooden back drop, counterbalanced for lifting out of the way, is an ingenious device for giving the stage a permanent look as background for lectures and concerts. The floor should rise about 6 feet for a depth of 18 to 20 feet.

Stage Subsidiaries. Among the essential adjuncts to a modern small stage are the dressing rooms, of which there should be two on each side, with small toilets. These need be only 8 feet high, as the spaces over them are ideal for the installation of an organ. There should also be a large closet for storage.

The organ chambers should rise to the roof, if possible, with an open grille to the stage on each side, extending from 5 feet above the organ chamber floor to the highest point of the chamber and of about 12 feet in width. The grilles should not be stopped below the organ chamber ceiling, since an undesirable sound pocket is thereby created. Similar grilles should open from the chambers into the auditorium, above the proscenium exits, but these should be backed by a closeable shutter operated from the portable organ console. One side usually receives the great and choir organs, the other the swell organ. Each chamber should have a floor area of about 14 feet in width and 16 feet in depth. The height should be at least 20 feet. Proscenium dress curtains should roll on trackers with noiseless tracks. The lifting of a draped curtain requires motor operation.

The Banquet Hall. For community "spreads" the plan should provide between 48 and 50 square feet per table of four, or approximately 12 square feet per person, and a space not less than two-thirds of this ultimate area for the preparation and serving of food. Such a kitchen and serving room space should be a single room, well lighted, with side light and top monitor if possible. In appointments it may vary from a room of very simple scheme, demanding attendance of the caterer with his pre-cooked viands, to a modern serving room with basement food preparation and first floor serving facilities. In the latter and more complete variety, the basement preparation room would receive all stores, and here all pastry and all meats would be prepared. Here also would be the principal refrigeration units. The first floor serving room would contain the ranges, counters for salad preparation, china, silver, and linen stores, dish-washing room, and all appointments for waitresses. No two stewards would agree on all the particulars of such a room, but the kernel of the matter lies in securing such an arrangement of equipment as permits rotary circulation of the waitresses, eliminating crossings and retraced steps. By this means orders may be filled expeditiously, and therein lies the whole secret of delivering and serving food hot.

Swimming Pool. The design and construction of



Jewish Community Center, Washington
B. Stanley Simmons, Architect

swimming pools have become, in comparatively recent years, an engineering specialty. The prudent architect will consult a specialist at the inception of such a project, and that specialist will not be the over-zealous salesman of tile facings nor of water conditioning machinery if the architect is to produce a modern swimming pool of permanent beauty and usefulness. There are weightier matters. When pools are placed in basements, as they normally are in community buildings, care must be exercised in calculating ground water pressures or in making sure that they do not exist. The concrete mat in pressure conditions and the walls of the pool must be of sufficient reinforcement and dead weight to give complete stability to the pool itself when it is empty.

The regulation indoor pool is 25 feet wide and 75 feet long, with shallow end of 3 feet, 6 inches of water and deep end 8 feet, 9 inches to 9 feet. Adjoining the deep end there should be a chamber, also waterproof and pressure-proof, about 10 feet wide and 9 feet deep with its length corresponding to the width of the pool. This chamber receives the water heaters, water conditioners and filters, and all the pumps and terminals of the piping and drainage system. Over this apparatus is the diving platform of the pool, which should not be of less width than 10 feet. The side aisles, 9 feet above water level, should be 4 feet to 4 feet, 6 inches wide, and the platform at the shallow end should be from 4 feet to 6 feet wide. The bottom and sides of the pool, joined at all angles by radius quadrants of not less than 6 inches, should be tiled with small, vitreous tesseræ tile, and the surrounding platforms and room walls may have a varied treatment in encaustic tiles. Concealed wall light fixtures at about 9-foot height give diffused lighting of the ceiling, particularly effective if the ceiling is vaulted. The swimming pool room should be so arranged that access to it cannot be obtained by people in street clothing. The ideal pool is reached only by first passing from dressing rooms through both shower and foot baths, as bacteria multiply rapidly in warm water, and all precautions assuring sanitary conditions must be taken.

Where it is convenient, an adjoining solarium should be provided from which spectators in street clothing may view the swimming meets. This room should be from about 10 to 12 feet wide by the length of the pool room, and separated from it by tightly fitting interior sash and glass of ample size to afford an unobstructed view. This facilitates an entirely different temperature and humidity control of these two adjacent rooms, making the pool room comfortable for the swimmers and the solarium less warm and less humid for the comfort of the spectators.

Close to the deep end of the pool, on each of the long sides, there should be inserted a recessed tile

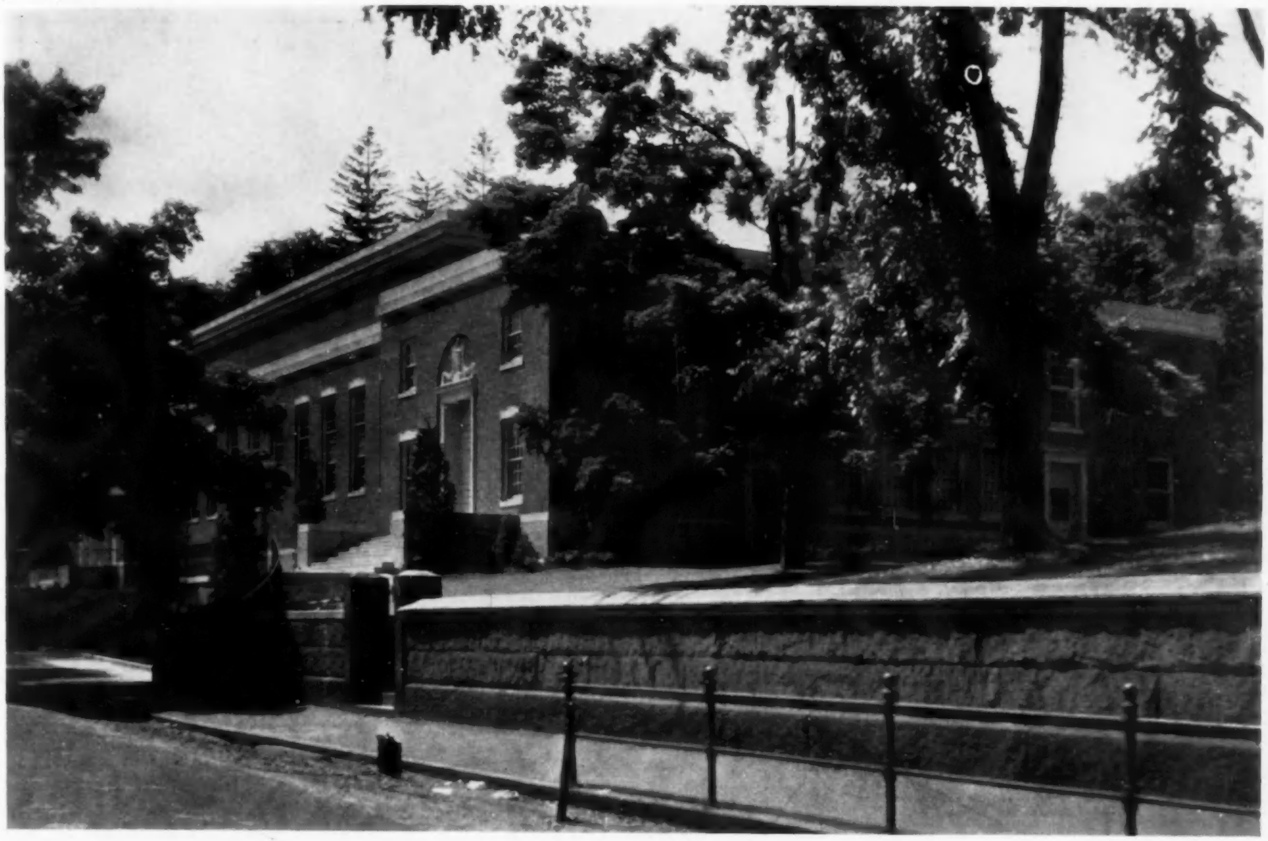
Community Building, Chisholm, Minn.
E. C. Giliuson, Architect

ladder of five tile rungs, opposite the top of which is a 2½-inch brass standard placed in the tile walls to be used as a "pull out." The tile for the bottom and sides of the pool should be white ceramic, ¾ inches square except for the racing lines inset in the bottom of the pool and running longitudinally 5 feet on centers, giving five divisions in the width of the pool. The gutter face is usually in colored tile with each 1-foot subdivision of length marked by contrasting tile and each 5-foot subdivision by inset tile numerals. A satisfactory wainscot would be of 7 by 6-inch bright glazed sanitary base and 2 by 6-inch cap, with dado of 1 by 2-inch sand gray tile laid in basket pattern not less than 4 feet, 6 inches high but preferably 7 feet or more, according to the design of the walls. The "high" diving board should be used only in rooms that are at least 16 feet high above water level, but the usual "low" board may safely be used in a room as low as 12 feet. The board should be 1 foot, 8 inches wide and 12 feet long, supported on a pipe frame with rubber-covered, movable fulcrum. The distance between fixed end of board and pool edge should be 7 feet, 6 inches, and the thickness of the board tapered from 3 inches at the fixed end to 1½ inches at the spring end, the latter 2 feet, 6 inches above the water level. The foot tubs in passages from shower room to pool should be 6 inches deep, with standing wastes holding water to 4-inch depth, and the size of the foot tub should be 3 feet in width and 5 feet in length to prevent hurdling.

The foregoing paragraphs cover the essential details of such rooms of the community house as are within the scope of specialists and represent conservative current practice in the particulars mentioned. The other rooms of our program can obviously be determined only by careful study of plan arrangement and will vary in number, in dimensions and in treatment with the demands of logical design for the program adopted. Their detailed practical requirements are simple and seem to require no explanation.

In design the community house should embody and perpetuate the best local architectural traditions, where any exist. In materials it should anticipate vigorous use and recognize the virtue in ease of maintenance. Experience demonstrates that such buildings, generously conceived, are immensely popular among people of all ages at all hours of the day. They are remarkable if, indeed, they are not almost unique, as instrumentalities for the re-animation of public spirit and local pride. When clothed in an architectural garb of good taste in all elements of their environment and furnishing, they are an early and potent stimulant to the love of beauty and good sportsmanship inherent in all normal youth and are the natural birthright of all forward-looking communities. They help powerfully to make good citizens.

Recreation Building, Miller Beach, Gary, Ind.
George W. Maher, Architect



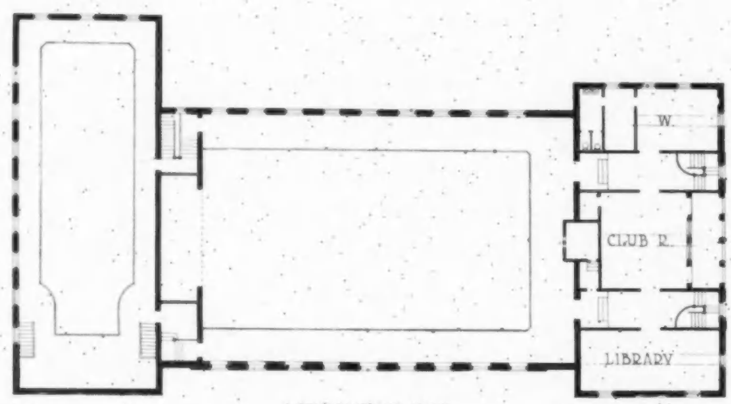
GENERAL VIEW

Photos. Paul J. Weber

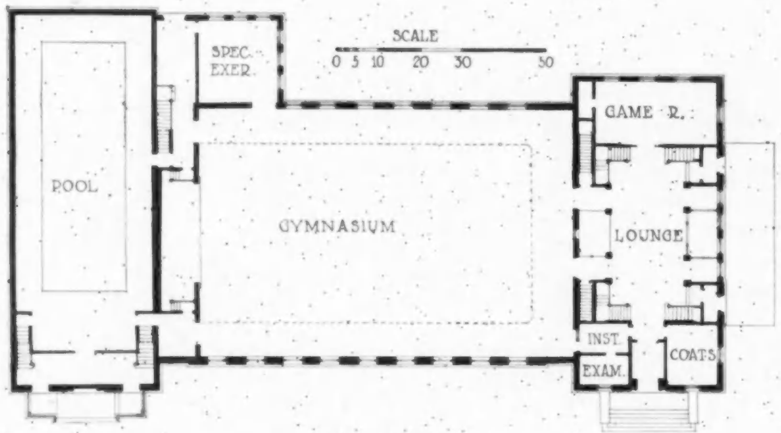
Plans on Back

MAIN ENTRANCE, RECREATION BUILDING, WHITINSVILLE, MASS.

JOSEPH D. LELAND & COMPANY, ARCHITECTS



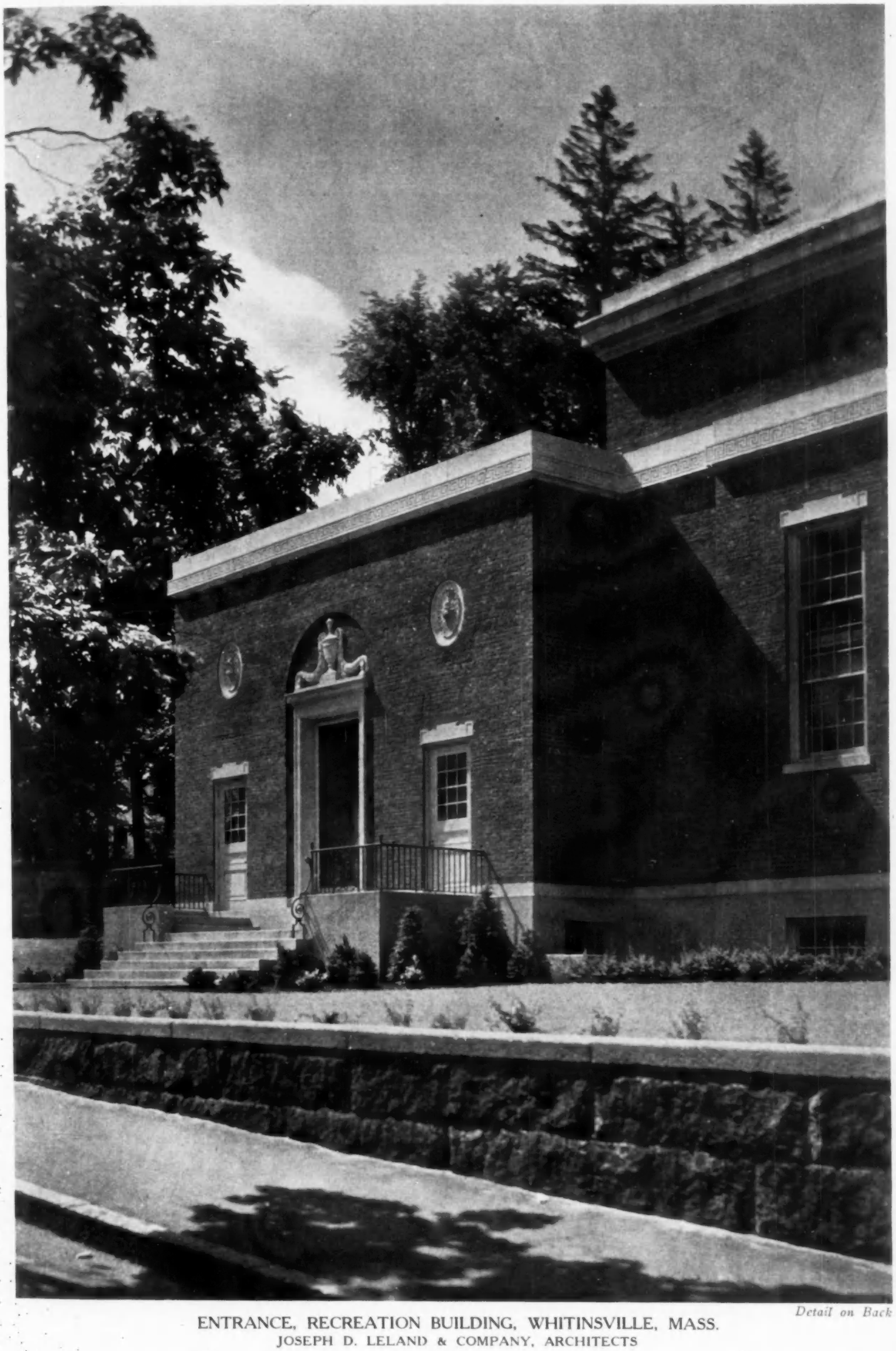
SECOND FLOOR



MAIN FLOOR

PLANS, RECREATION BUILDING, WHITINSVILLE, MASS.

JOSEPH D. LELAND & COMPANY, ARCHITECTS



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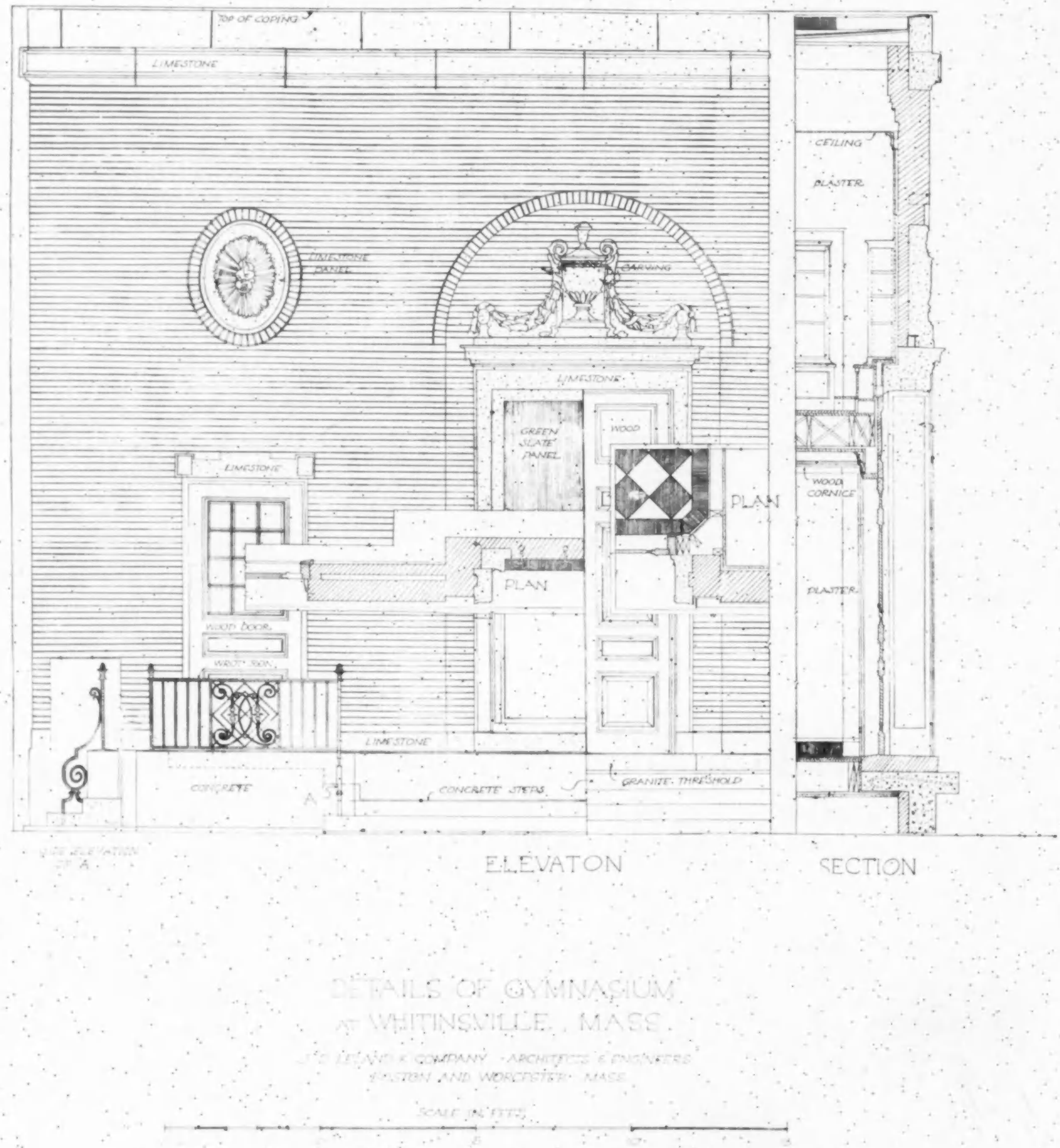
ENTRANCE, RECREATION BUILDING, WHITINSVILLE, MASS.
JOSEPH D. LELAND & COMPANY, ARCHITECTS



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RECREATION BUILDING, WHITINSVILLE, MASS.

JOSEPH D. LELAND & COMPANY, ARCHITECTS

No. 37

The ARCHITECTURAL FORUM DETAILS

Photo. Paul J. Weber

Plans on Back

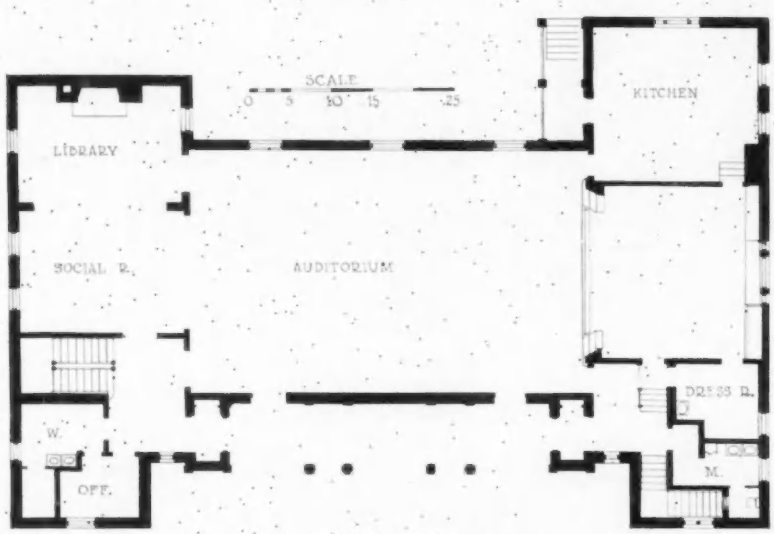
GENERAL VIEW

COMMUNITY HOUSE, WENHAM, MASS.

GUY LOWELL, ARCHITECT

Photo. Arthur Cushman Haskell

LIBRARY



MAIN FLOOR

PLAN, COMMUNITY HOUSE, WENHAM, MASS.

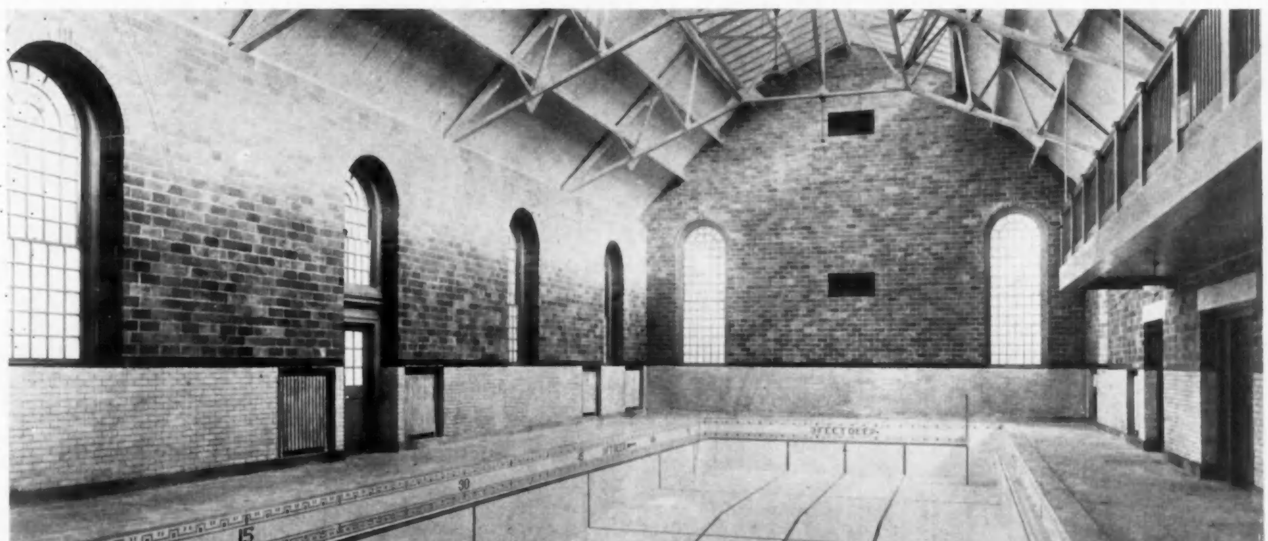
GUY LOWELL, ARCHITECT

Photos. Paul J. Weber *Plans on Back*

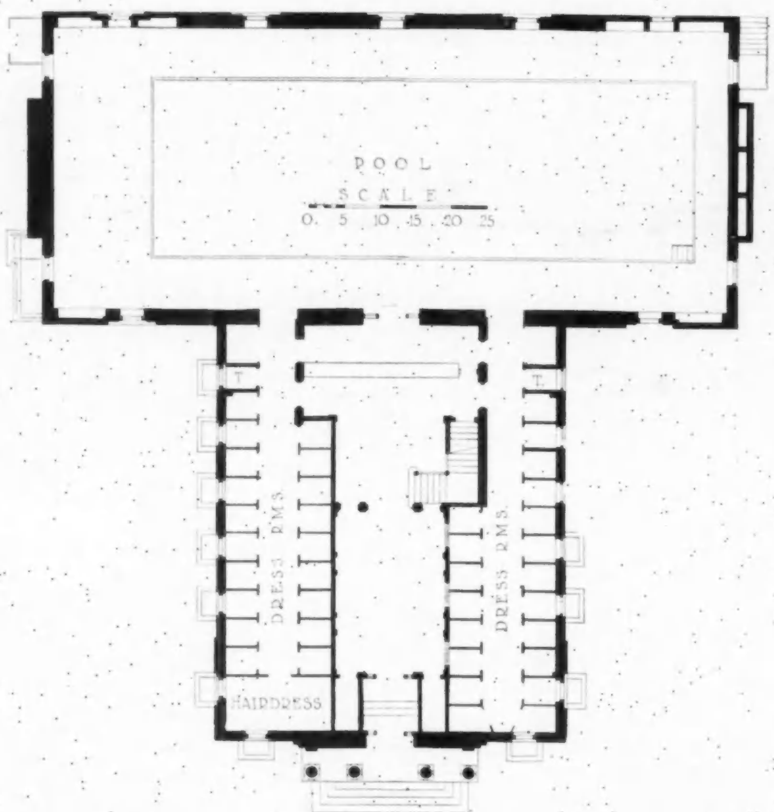
GENERAL VIEW

CIVIC LEAGUE BUILDING, FRAMINGHAM, MASS.

CHARLES M. BAKER AND STANLEY B. PARKER, ARCHITECTS



SWIMMING POOL



FIRST FLOOR

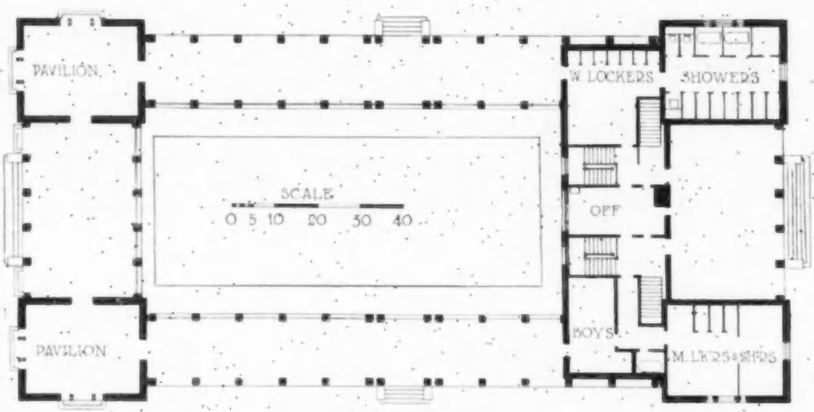
PLAN, CIVIC LEAGUE BUILDING, FRAMINGHAM, MASS.

CHARLES M. BAKER AND STANLEY B. PARKER, ARCHITECTS

Plan on Back

PUBLIC BATH IN THE GROVE, KANSAS CITY
WIGHT & WIGHT, ARCHITECTS

SWIMMING POOL



MAIN FLOOR

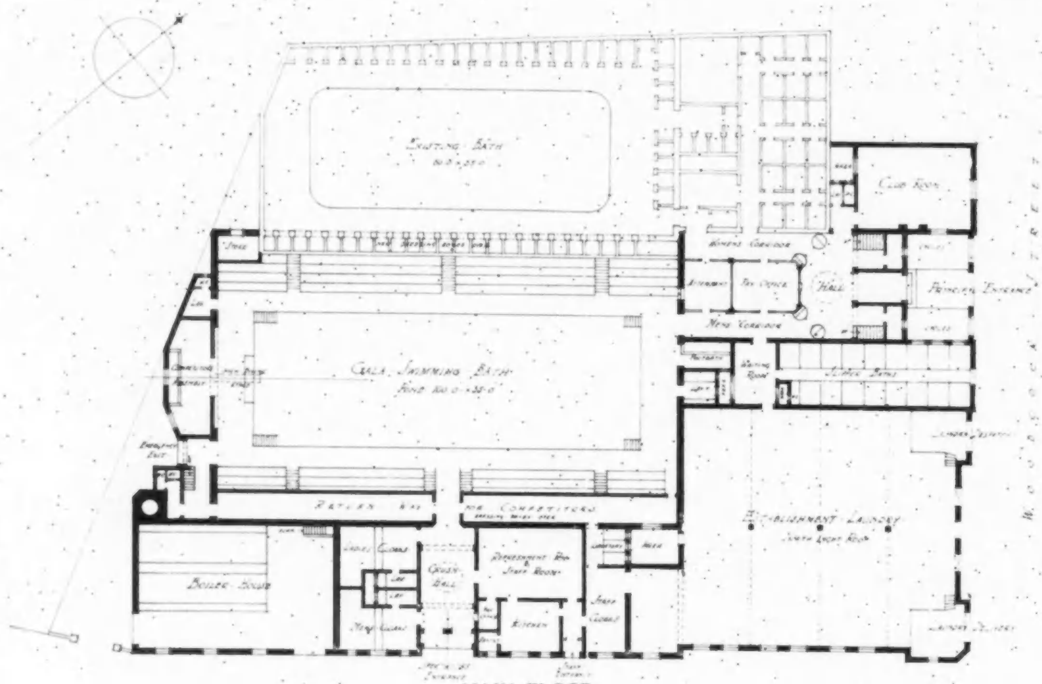
PLAN, PUBLIC BATH IN THE GROVE, KANSAS CITY

WIGHT & WIGHT, ARCHITECTS

Plan on Back

WOODCOCK STREET BATHS, BIRMINGHAM, ENGLAND
ARTHUR MC KEWAN, ARCHITECT

SWIMMING POOL



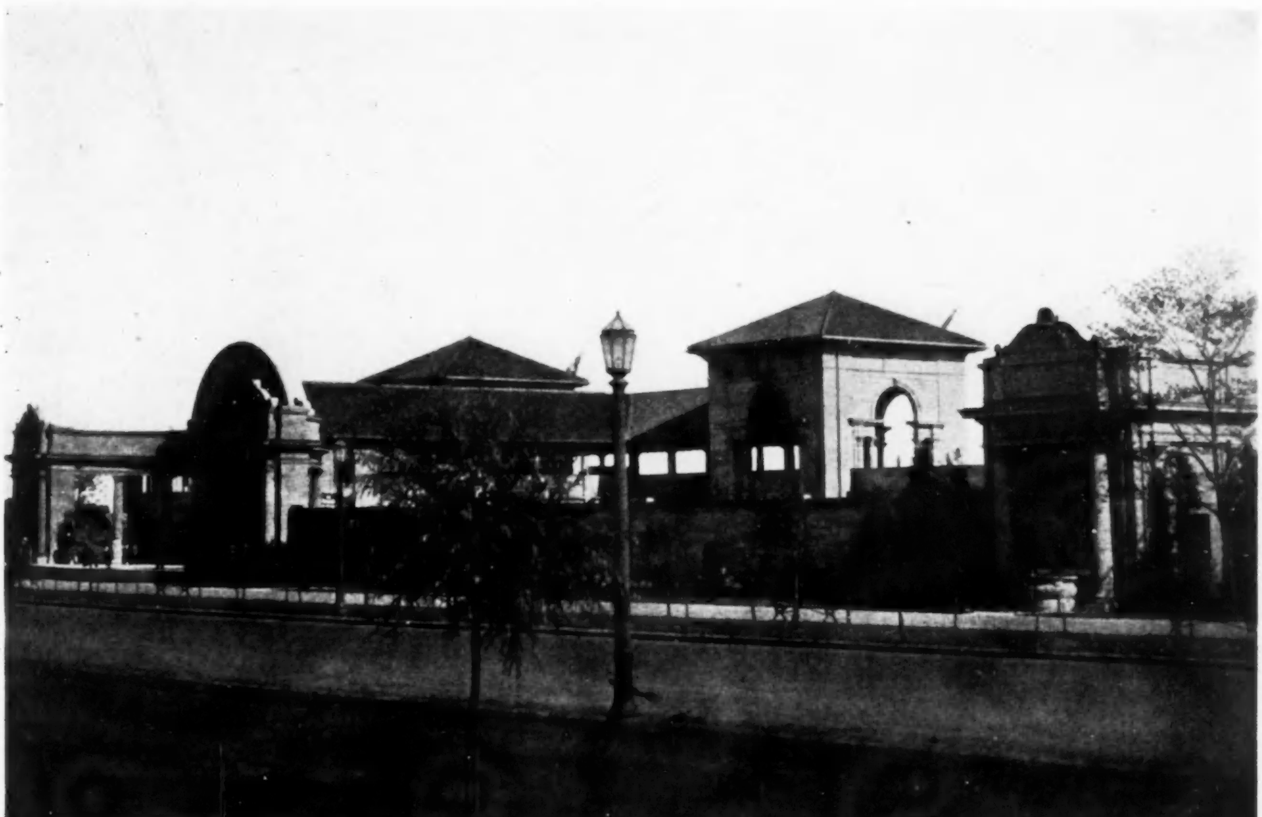
MAIN FLOOR

PLAN, WOODCOCK STREET BATHS, BIRMINGHAM, ENGLAND

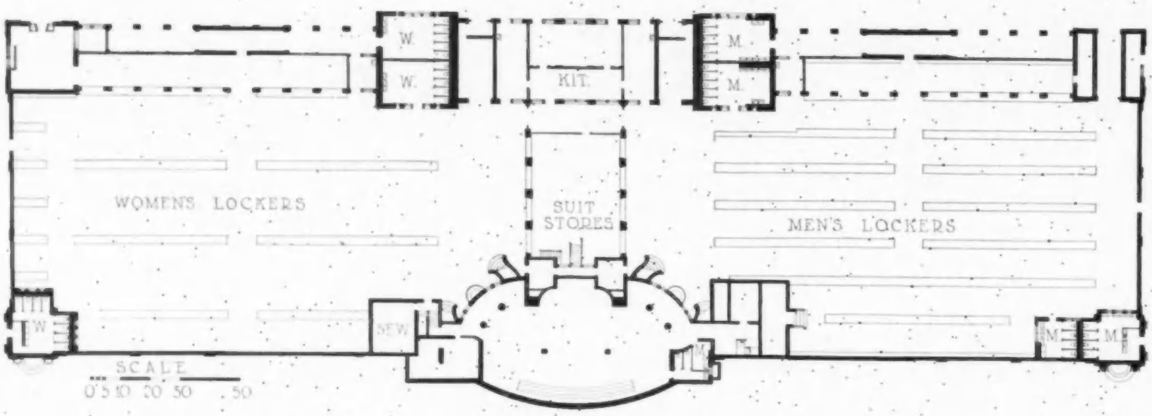
ARTHUR MC KEWAN, ARCHITECT

Plan on Back

SUNNYSIDE BATHING PAVILION, TORONTO
CHAPMAN, OXLEY & BISHOP, ARCHITECTS



VIEW FROM THE BOULEVARD



MAIN FLOOR

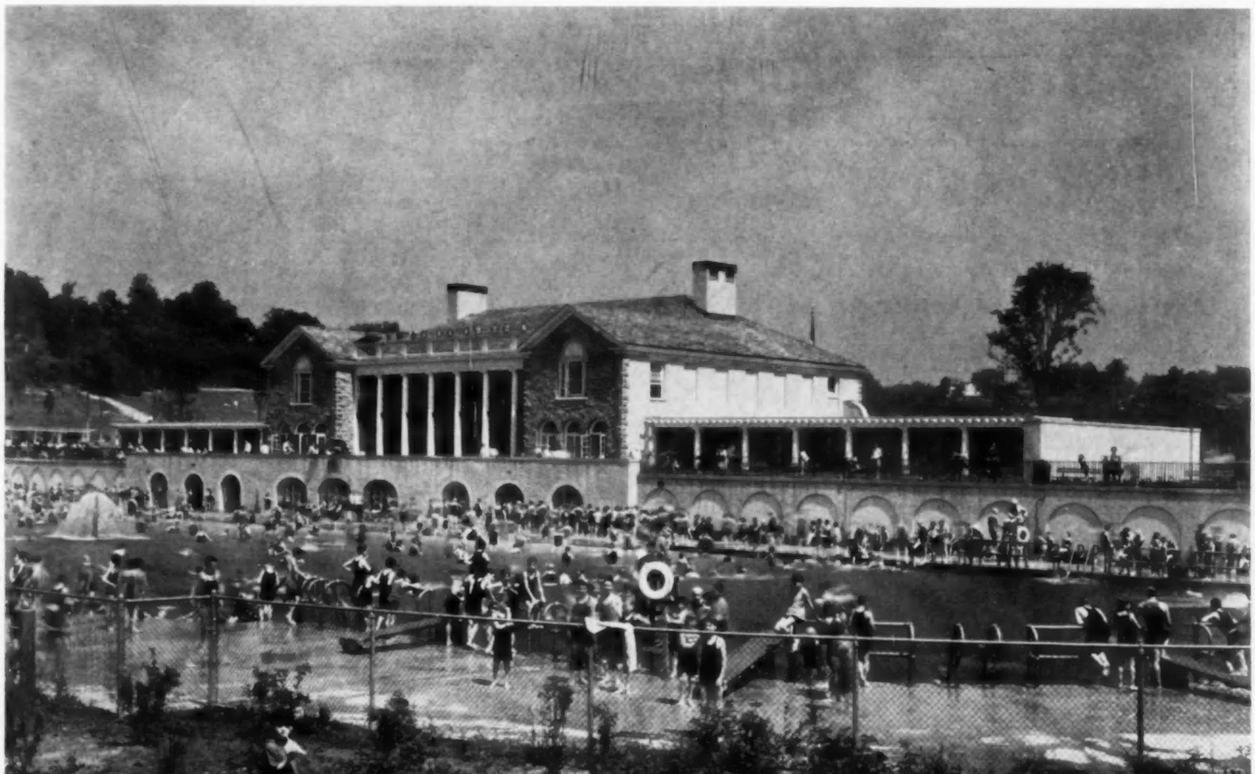
PLAN, SUNNYSIDE BATHING PAVILION, TORONTO

CHAPMAN, OXLEY & BISHOP, ARCHITECTS

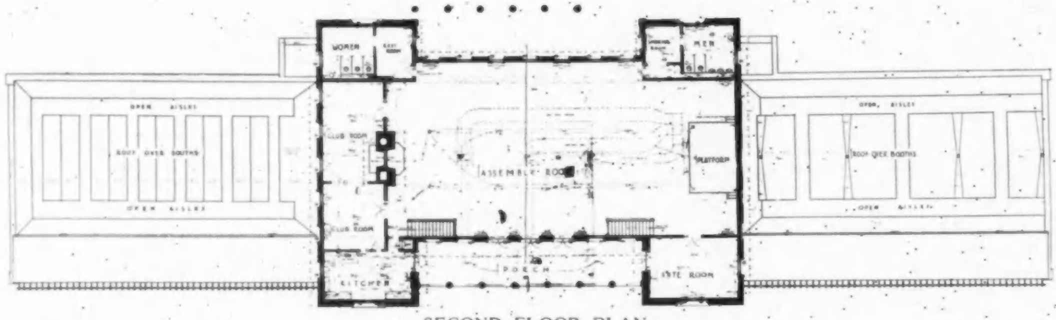
Photos. Tebbs & Knell, Inc. Plans on Back

SWIMMING POOL BUILDING, TIBBETT'S BROOK PARK, NEW YORK

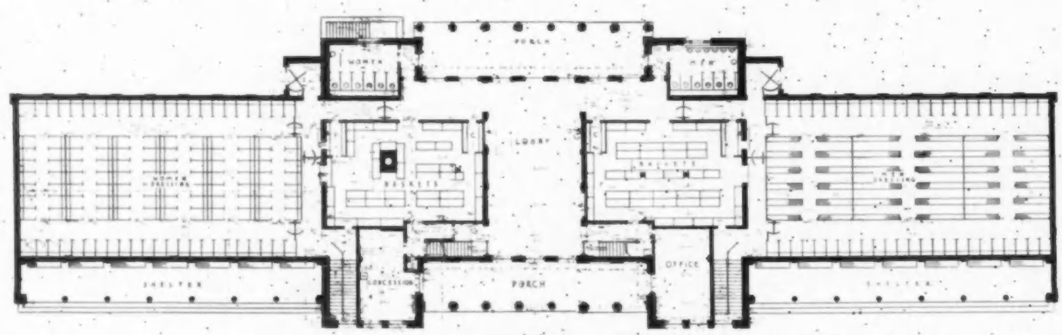
O. J. GETTE, ARCHITECT; GILMORE D. CLARK, LANDSCAPE ARCHITECT



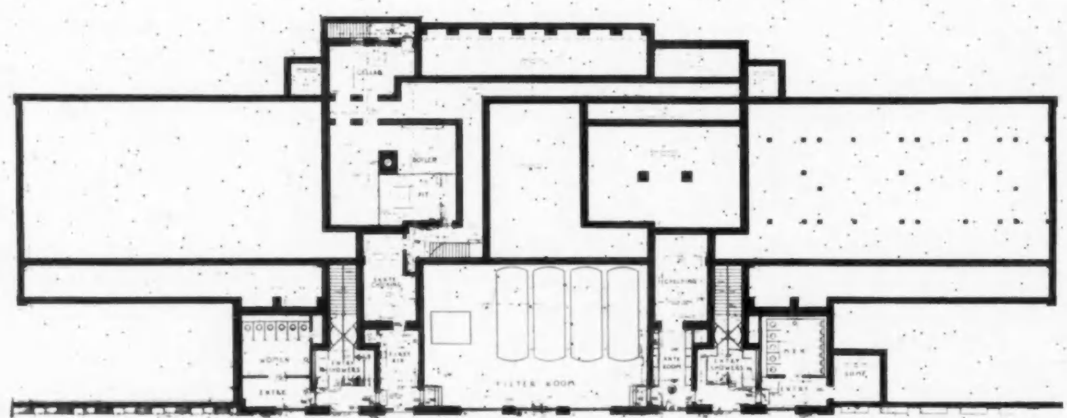
SOUTH ELEVATION AND POOL



SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT PLAN

PLANS, SWIMMING POOL BUILDING, TIBBETT'S BROOK PARK, NEW YORK

O. J. GETTE, ARCHITECT

The Designing of Public Baths

By O. J. GETTE

THE contamination of the beaches near large cities and the wide interest throughout the country in swimming and bathing generally have promoted the building of both indoor and outdoor swimming pools. With the modern provisions for keeping pools sanitary, the danger of contracting a communicable disease has been reduced to a minimum. The amount of benefit derived by the public from a pool is not at all comparable with the cost of it.

When an outdoor pool is located so as to be within easy walking distance of main arteries of traffic or car lines, it is a splendid idea to combine it with an indoor pool. By combining the two pools the filtration plant or system can be made to serve both pools, and year round bathing can be enjoyed. In estimating the size of an outdoor public or commercial pool, about 20 square feet of wading surface should be allowed for each bather and 50 square feet of deep water or diving area. This pre-supposes that four-fifths of the bathers use only the shallow part of the pool. It will be noticed at all pools and in illustrations of them that less than 25 per cent of the bathers use the diving or deep parts of the pools. The major part of the pool should have no water over 4½ feet in depth, while the remaining portion should have a depth of 9½ feet. The large amount of shallow water space is demanded by reason of the great number of children and non-swimmers who are patrons. The general practice had been to slope the pool from its edges gradually to the center, but the bettre plan is to have the deep part at one end. Of course this deep part will need a protecting railing, but there is a decided advantage in having the shallow part of the pool available in its entirety, from the point of view of safety as well as for the convenience of bathers.

Pools of rectangular shape are the easier to build, but an outdoor pool having an irregular outline well studied will add interest to the entire architectural plan and is more pleasant to use. Expansion joints must be provided to prevent cracking in the floor slabs. The site for the pool should be so selected that the natural drainage is good besides being conveniently located so as to attract the greatest number of people. When a pool is to be located in a large public park, the question of water supply and proper disposal of waste must be carefully considered. There is quite a waste of water in a pool, owing to the water splashing and running into the overflow gutter as

Photo. Amemiya

Public Bath No. 4, Yonkers, N. Y.

O. J. Gette, Architect

Photo. Tebbs & Knell, Inc.
Porch Overlooking Pool, Tibbett's Brook Park, New York
O. J. Gette, Architect

concrete pavement abutting the pool for a width of not less than 18 inches should have some non-slip ingredient mixed in the top surfacing. The pavement can be laid out in a series of panels, using different colors to create an architectural effect. Smooth pebbles not over ¾-inch in size are sometimes incorporated in the top coating of the larger panels, although great care must be taken to make sure that the pebbles do not project too far beyond the surface. It must be remembered that the bare feet of the bathers are sensitive, and every precaution must be taken to minimize the danger of bruising. The beach walk adjacent to the pool should slope *away* from the pool so that it will be cleaner. Careful attention to the sanitary features in connection with any pool is an absolute necessity. In all public and commercial pools bacterial tests of the water are required and should be made at frequent intervals. The purification of swimming pool water has been covered in several articles in THE FORUM, and in general there are three systems used in combination with filters,—sterilization by chlorination, ultra-violet rays, and ozonation. All these systems are good.

well as by daily evaporation, so a continuous and entirely adequate water supply must always be available.

One of the problems of the builder of an outdoor pool is how to keep the beach walk surrounding the pool for the exclusive use of the bathers. This can best be accomplished by having the administration and dressing room spaces at an upper level and requiring the bathers to go to the pool by means of ramps or stairs. This has the additional advantage of lessening the number of attendants required by having entrances and exits to the pool where only the bathers can use them. It is understood that the pool should have a stout enclosing fence. Permanent, fixed seats should be provided for the bathers around the enclosing wall or fence. The space surrounding the pool should always be paved with concrete, as a sand beach is not practical, although commercial pool promoters are partial to them. The sand beach requires continuous raking and combing, besides needing sterilization every day. In addition, the bathers carry and track the sand into the pool and the bath house, all adding to the general upkeep and expense. At some commercial pools the promoters have arranged for a sand beach at one end of a pool. This is a compromise treatment. The surface of the

The prime factor in the successful operation of any pool is the ability to get the bather in the pool as soon as may be, and out of the bath house as quickly as possible when he has finished bathing. As it always happens, a large number of bathers get in and out of the pool about the same time. This is the cause of much congestion. Too many wanting to dress at once causes delays at the room where the clothing is stored, and the situation is at times very difficult to handle. It has been found in most public bath houses that a system of wire or sheet metal baskets for checking the bathers' clothing is the most economical of space. These baskets are handed to the bathers after they have passed the cashier and entering turnstile. After securing desired towels, the bather then proceeds to a dressing stall or general dressing compartment and puts his clothing in his basket. On his way to the pool a window or counter must be passed where the basket is left, and the bather is given a metal check which he carries with him. These baskets are of varying sizes; the average dimensions for a public pool are about 11 inches wide at the top, 9½ inches wide at the bottom, 23 inches long, and 9½ inches deep. For commercial pools they are usually made as large as 15 inches wide at the top, 13 inches at the bottom, 32 inches long, and only 7 inches deep.

The objection to a basket system is that the clothes become badly wrinkled by compressing them in limited spaces. If the baskets are made too large, they become unwieldy to handle. The plan of having bathers leave their baskets at a window or opening as they go to the pool or returing them to the office when they leave has a tendency to limit the speedy emptying of the bath house as waiting lines are formed. Another plan is to have the basket room along the length of the dressing room area, with a counter the full length of the basket space. This allows a larger number of bathers to check in or out at one time, but it may require more attendants. In large pools operated by private enterprise there has been some objection to the use of the basket system, and individual lockers are provided. These lockers are arranged in groups of four in each dressing room, lettered A, B, C, and D, with the numbers from one to whatever number of dressing rooms there are. On entering the bath house the first bather is given a key to a locker numbered 1-A, the next bather 2-A, and so on until all the A lockers are in use. Then the B lockers are put in use, and after that the C and D. With this system the chance of the holder of the A check wishing to use the dressing room at the same time as the holder of a B or C check has been lessened, making for convenience.

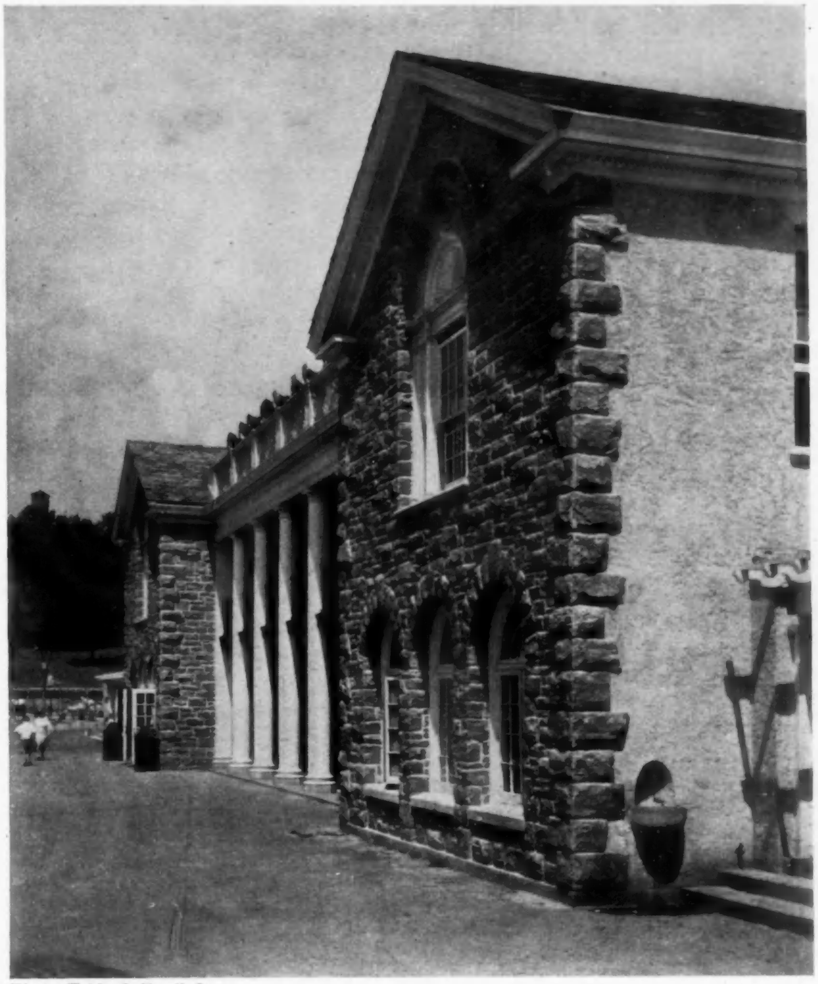


Photo. Tebbs & Knell, Inc.

South Elevation, Public Bath House, Tibbett's Brook Park, New York
O. J. Gette, Architect

For an outdoor pool the dressing room should be exposed to the open air as much as practical and the aisles should not be roofed over. The women should have individual dressing rooms. A number of dressing rooms should be provided in the men's side also. The general dressing room for men and that for boys are provided with long benches. When the basket system is used and the baskets are stored on racks in a room, a ventilating system of ducts with intakes at regular intervals and suction fans should be provided. This will be found very necessary to keep the basket room in a wholesome condition. Of course this ventilating system will not be required where the basket room has one or more entire sides open to the outer air. Whether the basket or the locker system is used, every part of the bath house must be well ventilated and exposed to the sunlight as much as can be arranged. A room is required for checking the bathers' valuables, or during a slack period this is often done by the cashier. For this purpose in many bath houses, small, numbered compartments are provided in racks, the average size being 3 inches wide by 7½ inches high by 10 inches deep.

As a rule the floors of the dressing room spaces are of concrete sloped to outlet drains so that the entire space can be flushed out by means of a hose. In the construction of the dressing rooms and compartments for the outdoor pools it has been found that the combination of asbestos panels with wood rails and stiles supported on brass or galvanized pipe standards is very economical. The roofs would be of corrugated asbestos sheets ½-inch thick. This construction reduces the fire hazard, and in using the asbestos lumber the upkeep costs are reduced. The average size of the individual dressing room should be 3 feet by 4 feet, 2 inches. The seats in the large dressing compartments are best made of oak slats about 2¾ inches wide by 1⅜ inches thick, secured with brass screws to oak pieces expansion bolted to concrete pedestals. The seats should be secured to the floor to prevent shifting and consequent lessening of efficient operation in the hard use they receive.

Before the bather enters the pool he should be compelled to take a shower. In public pools a compulsory shower is often installed in such a way that to get to the pool one must go through a shower pas-

Photo. Lewis & Randall, Ltd.

Entrance, Woodcock Street Baths, Birmingham, England

Arthur McKewan, Architect

sage with an overhead pipe line from which at regular intervals shower heads project. The sprays are so arranged that a good shower is given each bather whether he will or not. Foot sprays should also be provided, and in addition a shallow pool about 6 inches deep through which each bather must wade is often part of the shower aisle. In commercial pools or pools promoted by private enterprise, a battery of showers is generally provided, conveniently located near the entrances to the pool for the use of bathers.

Indoor pools being smaller, the problem of handling crowds is not as difficult, particularly as the attendance lessens as the cold weather approaches. The dressing rooms in public baths where there are no pools, or where the object is merely to secure cleanliness, are generally provided with individual shower compartments. These combined shower and dressing compartments should be constructed of either slate or marble. The standard size is 3 feet, 6 inches on centers for the width and 7 feet, 6 inches deep, half of which is dressing space, separated from the shower compartment. Every dressing compartment should be covered over the top with 1½-inch mesh on galvanized wire, set in 1-inch channel frames and securely fastened to the partitions. The seats of either slate or marble are generally quarter-round in shape, set in corners. Besides these compartments, general dressing rooms should be provided with benches and metal lockers to take care of any large crowd or swimming meet. In public bath houses located in the congested parts of cities, individual baths, showers and tubs, are in great demand, and are used by many in preference to the pools. A general rule is one tub to 20 showers. In bath houses where there are pools the dressing rooms are often planned in groups of three or more, and a shower is installed for each group. The doors to the dressing compartments should be fitted with hinges that keep the doors open when the rooms are not in use. A very important feature for pools, particularly where they are promoted and operated under community recreational commission programs, is to have ample space for spectators. The interest in competitive swimming meets has had its share in popularizing the pool.

The matter of the proper locations and the sizes of toilet rooms requires careful attention. For outdoor pools there should be toilet rooms in connection with the dressing room space, and if they are not convenient to the pool it will be necessary to locate additional toilet rooms accessible from the pool. It is well to have toilet facilities directly accessible from the pool, and placing these close to the toilet of the dressing rooms makes for economy and efficiency in plumbing. For indoor pools the toilet rooms are planned in connection with the shower and tub rooms, with urinals easily available from the pool. Toilet rooms should also be provided for the general and non-bathing public. A good rule to follow for indoor pool and shower bath houses is to allow not less than one water closet and one urinal for every 15 showers for the men and one water closet for 15 showers or tubs for the women. For outdoor pools, assuming that 1000 men bathers and 800 women bathers can be accommodated at one time, 15 individual showers should be provided for the men and 10 for the women. The toilet rooms for men should provide 10 water closets and 15 urinals, and there should be at least 12 water closets for the women. The water closets should be of a heavy type, fastened to the wall, and with a utility corridor back of them. Drinking fountains should be provided for both the dressing room space and at the pools. These should be of the non-freezing type for outdoor pools. A first aid room is always needed

View of Bathers' Entrance, Sunnyside Bathing Pavilion, Toronto
Chapman, Oxley & Bishop, Architects

for an outdoor pool and should be incorporated in the bath house. This room should be located so as to be easily accessible from the pool. The office and rooms for life guards, instructors and attendants can generally be grouped with this.

For public outdoor pools, as distinguished from commercial pools, the towel service and laundry are not so important. As a rule, the patron of the public pool brings or is required to bring his or her own bathing suit and towel. Provision, however, is made for the renting of a towel at a small charge, with the addition of a deposit covering the cost of the towel. If this deposit were not required, there would be very few towels returned. Renting of bathing suits at public pools is seldom done. However it is wise to provide for the sale of bathing caps, water wings, or other floating devices by the office management or the concessionaire. At commercial pools the custom of renting bathing suits is more prevalent, although it has been disappearing very rapidly of late. The towel service is still an important item, and together with the washing of the bathing suits it requires a regularly equipped laundry, for which provision must be made. The towels are sometimes supplied by a towel supply company. In city bath houses the admittance charge, always nominal, includes the use of a towel. These bath houses are usually located in sections where the people have not adequate bathrooms or bathing facilities in their own quarters.

The water in outdoor pools, except in the most exceptional cases, is not heated, the shallow water in the major part of the pool getting all the benefit from the sun and summer winds. Indoor pools naturally require the water to be heated. This is usually done by an instantaneous heater installed as part of the house heating system, with a pump having an electric motor. As a rule for a pool of say 30 by 75 feet, this heater should be able to heat 150 gallons of water per minute from a temperature of 35° to 80°. The pump should also deliver an equal quantity of water per minute. The radiators for indoor bathing houses should in the shower and pool rooms be recessed and covered with grilles. Particular care must be given to securing proper ventilation, and exhaust fans should be installed in the shower rooms as the condensation in both this and the pool rooms is always annoying otherwise. In the pool room this condensation can be lessened to a considerable degree by keeping the temperature of the water the same as the temperature of the pool room, and by placing heating coils near the skylight. The lighting of outdoor pools by means of either flood lights, arc lights or reflected lights adds to their value from a commercial standpoint, and it naturally lengthens the time that the pools can be used. This is particularly so in commercial pools which are used at night, where the time of use is an important factor. The lights should be well distributed and at a sufficient height to be properly diffused in order that the pool be well lighted.

The use of an outdoor pool is not limited to the summer months, as it can be used for a skating rink in winter, providing it is properly constructed. The Westchester County Park Commission has recognized this in building its pools, provisions being made to check the articles of apparel for either bathers or skaters. In addition, the upper part of the bath house provides a large area for a dance or assembly room. At many outdoor pools, concession space (if provided) is an added source of income. At many pools regular restaurant service is maintained, and the revenue obtained from the leasing privilege helps to pay some of the maintenance charges. There is no reason why a public pool should not meet all current expenses, even though there is only a nominal charge for the bathing privilege and though on two mornings of each week there is no charge made for its use.

For outdoor pools a clock large enough to be easily visible from any part of the pool and beach walk is a desirable feature and should be incorporated in a prominent part of the building. One or more spraying fountains erected in an outdoor pool, although of no sanitary value, give the average bather a certain sense of satisfaction in that one sees fresh water continuously discharging into the pool. If these fountains are electrically illuminated for night bathing it will add a great deal to their attractiveness. Provisions must be made for diving boards at the deep water part of the pool. These are generally constructed in accordance with the rules of the athletic association having jurisdiction over swimming. Diving or spring boards are generally covered with rubber or other similar non-slip material. Other features such as chutes, slides and high diving platforms are often provided and add to the general popularity of a pool, frequently attracting new patrons.

For the interior finish of the bath house in connection with the outdoor pool the simplest material should be used. The walls of all lobbies, halls and basket rooms should be preferably of semi-glaze or impervious brick, tile or other sanitary finish. The walls of all indoor pool rooms, shower rooms, toilets, etc., should also be of similar materials. Woodwork should be eliminated as much as possible. Provision must be made at pools for life buoys and other safety devices. At large pools elevated seats are often built for the use of life guards, since constant supervision is essential. It is of the utmost importance that accidents be prevented, as far as it is humanly possible, by strict regulations governing the use of the pool, and by constant and strict supervision by the guards.

Photo. Tebbs & Knell, Inc.

Bath House, Tibbett's Brook Park, New York

O. J. Gette, Architect

The Architecture of Public Water Works

By KENNETH KINGSLEY STOWELL

IN years past the trolley car marked "Water Works" in most American cities came to a stop in the most bedraggled outskirts of town, and ugly brick buildings stood up stark and forbidding. One thought of the "water works district" and the "gas house district" in the same mental breath. Though this condition still exists to some extent, there is a marked tendency to make the city water supply districts attractive as parks and the buildings themselves a source of civic pride. The public spirited civic bodies have realized that a water supply system can be made an ornament as well as a necessity, and that an æsthetic improvement has an economic value as well. Even the old dam has been shorn of its weeds, and the new dam, even if it be of naked concrete, has been studied for symmetry and form as well as for strength. This progress is bound to continue. There is an opportunity for architects to further this development, either in the remodeling of obsolete buildings or in exerting their influence to secure the erection of new structures of good architectural design, though perhaps low in their cost.

Detail, Pavilion, Kensico Dam
York & Sawyer, Consulting Architects

The architect's problem in the designing of water works buildings deals almost entirely with the exterior. The interior is of necessity simple and open for the installation of pumps, valves and various kinds of machinery. The filter building's interior does allow of some more architectural treatment, as the instruments to be housed are small, and there are no large operating machines, as will be seen in one of these illustrations. The exterior design of the pumping station has in many instances been treated more or less successfully in various styles. It would seem that one style that would be particularly suitable for adaptation has been woefully neglected,—the Italian Romanesque. In this the material would be the simplest and cheapest,—brick, properly laid, with a small amount of stone; and yet how much character and beauty there are in round arches, corbeled cornices and tile roofs! There is in the Italian Romanesque a vast amount of design material on which the architect can draw for inspiration and motifs. Here we can have brickwork at its best at very little greater cost than the atrocious work so often seen. However, this is not the only style available; a design in the very modern manner can be equally effective. The new manner of dealing with solids and voids in a large way, rectangularism or cubism, if carefully studied, can be carried out successfully. I refer to the strong, simple handling found in the Bush Terminal in New York or the Ford plant in Detroit, and elsewhere.

When the City of New York undertook the great expansion of its water supply system, it had the wisdom to have architects coöperate with the engineers. It established an architectural office under the direction of Lincoln Rogers, and appointed York & Sawyer consulting architects. Its wisdom is evidenced by the excellence of the results in all the work, from the small gate-valve house to the great Kensico Dam itself. For the most part the buildings are of stone and are designed in the strong and massive Italian Renaissance style. The dam is in perfect accord with the work of this period, though of original conception, and it is of consistently vigorous execution.

It seemed to the architects that previous dams were unsatisfactory for several reasons. First, because an enormous wall was usually built of fairly uniform-sized stones, and however great the sizes of the individual blocks, the wall itself had at a distance no definite scale. Second, that its great curved surface, against which the earth was back-filled at either flank of its buttressing hills, usually disappeared irregularly into the ground, leaving the dam without a base and with unsymmetrical ends. Third, that its crowning motif, usually some type of a building cornice, was inadequate. Fourth, that the face of the dam was not one continuous curve, a true hyperbola, but was the result of starting at the top with a short radius which was increased three or four times as the surface approached more nearly a 45° slope; the angles between these different curves, as seen from the end of the dam, were usually apparent. Fifth, that while above the dam a great body of water added a charming feature to the landscape, below the dam there was likely to be a foreground irregular and unkempt and usually arid and bare, perhaps because of the reflected heat from the great face of masonry, though this is mere conjecture.

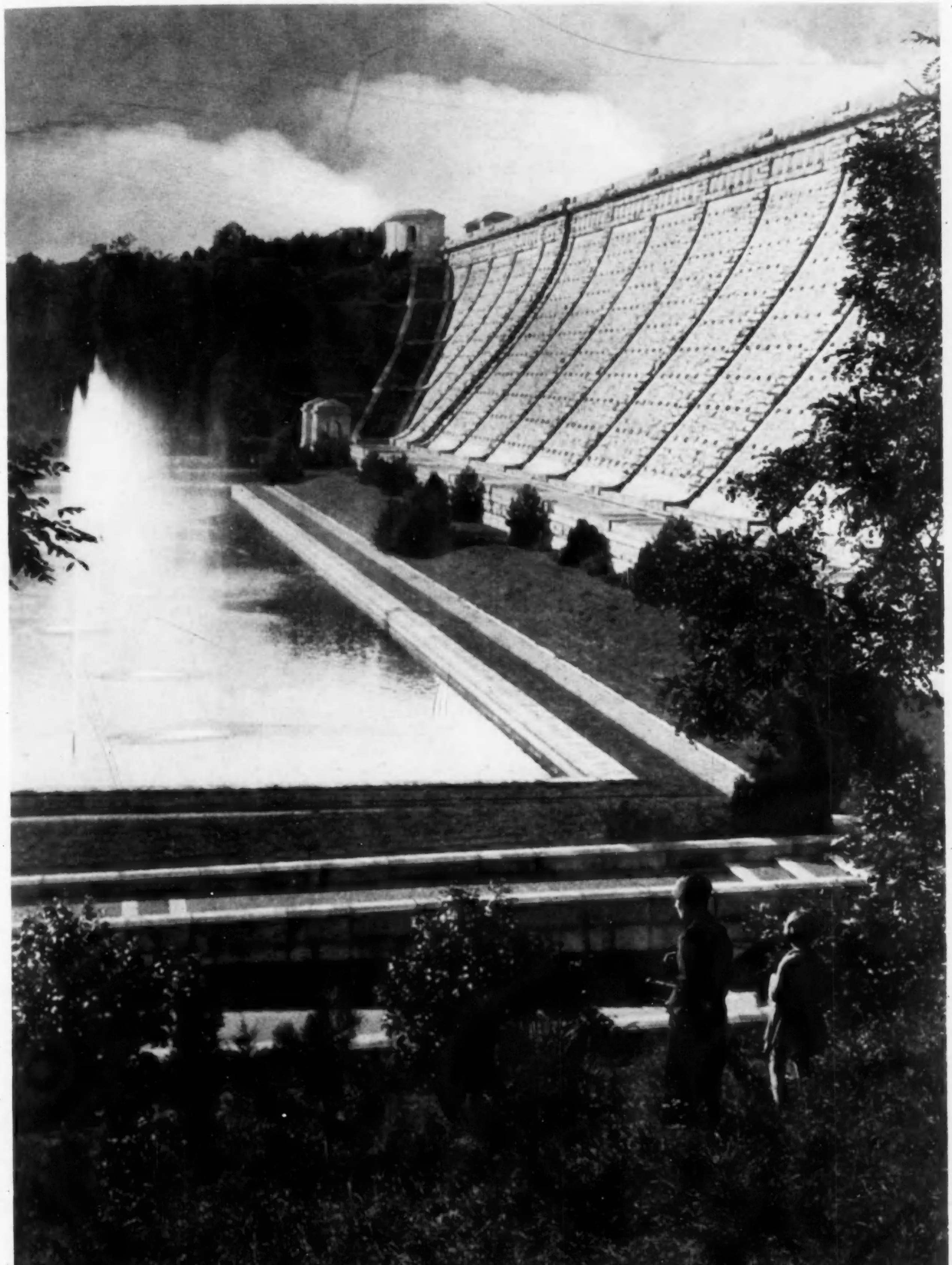
The Kensico Dam has, moreover, a new characteristic. It is divided through its entire structure by vertical expansion joints about 80 feet apart, and it was necessary that these joints should appear on the surface of the dam. It was determined, therefore, that there should be a definite terraced base in the design, an adequate crowning motif to head the wall, a single regular curve of its surface, and that this surface should be divided into panels expressing the construction of each block of the structure in separate units; that there should be a variation in the character of the surface in order to give it variety, scale and texture; that the wall should be flanked at its top and bottom with buildings having balustrades, thus referring the whole mass to human scale; that the ends should be symmetrical, the terrace being carried in some form up the slope of the buttressing hills; and that there should be, parallel with the terrace at the foot of the dam, a pool of great length, provided with water jets which can be played whenever the supply affords waste water; and, last, that the foreground of the dam should be so laid out as to give not only a good view of the structure from a distance but also to provide interesting points of view from as many other nearer positions as was possible.

Long Pool at Base, Kensico Dam, New York
York & Sawyer, Consulting Architects

A quarry near the east end of the Kensico Dam furnished an unlimited quantity of granite of extraordinary variety, color and texture, and it was possible to get out blocks as large as could be conveniently handled. Some of these weighed 30 tons, and a few stones in the rusticated "straps," which extend vertically at each expansion joint the whole height of the face and which divide the wall into panels, are 15 feet long and have projections beyond the wall of over 4 feet and an equally deep bed. The crowning motif of the wall is a half-round moulding 5 feet high, and below it there is a frieze of alternating shields and garlands some 7 feet in height. As it would have been unjustifiably costly to carve these, and as they were intended to "read" at distances of from a hundred yards to a mile, they were so designed as to be cut with an ordinary ¾-inch rock drill and a surfacing machine, and while incredibly crude at close range, they have proved to be in keeping with the ruggedness of the surface treatment and the enormous scale of the structure. Each panel between the terrace and the frieze, flanked by two of the vertical "straps," is about 65 feet wide and 130 feet high. It is surrounded by a plain 5-foot band, referred to by the workmen as the "sidewalk," and inside this the surface is a random ashlar, irregularly rock faced. It seemed desirable to give this surface still further interest, and one of the architects, going abroad at the time, saw in a dam in the south of France, the "Devil's Bridge" in the Alps, and in the Pont du Gard, the great value of projecting "headers" to add interest to such a surface. This idea was adopted, and use was made of projecting stones, those at the bottom of a panel being square and having a projection of about 14 inches, the projection diminishing to 10 inches in the upper course. These, alternately spaced, form a diaper pattern over the whole field of each panel. The whole thing had to be determined as a result of the study of a single experimental panel, about 30 feet square, which was built north of the dam site and is now submerged in the lake. This showed a section of "strap" with the plain band and a very small area of the corner of a panel, with its border and field texture. To base upon this alone the scale and texture of a wall 130 feet high and over 1800 feet long, was of course taking a very long chance. In the panel the variations looked impossibly wild, and it speaks well for the courage of the engineers and the confidence of the Board that they were willing to adopt such a design from so small a sample.

A 30-foot, brick-paved road runs along the top of the dam, and it is illuminated at night by lights placed in flush boxes on the inside of the parapet wall, since it was considered undesirable to have any projections above the parapet, such as a file of lamp posts, which would have broken its line when seen from below.

This entire project, originally designed and estimated in three months, was built for less than the approved cost of $165,000,000 and in less time than was predetermined. All honor to the chief engineer, Waldo Smith, to the consulting engineer, and to the Board who put it through and who, beyond all justifiable expectation, found that in so vast an undertaking some small contribution might be made by architects. We may well take heart when we note the success of this project, thus briefly described, and it is hoped that it will serve as an excellent example for other municipalities considering water works.



Photos. Sigurd Fischer

KENSICO DAM, NEW YORK
YORK & SAWYER, CONSULTING ARCHITECTS

PAVILION AT BASE, KENSICO DAM, NEW YORK
YORK & SAWYER, CONSULTING ARCHITECTS

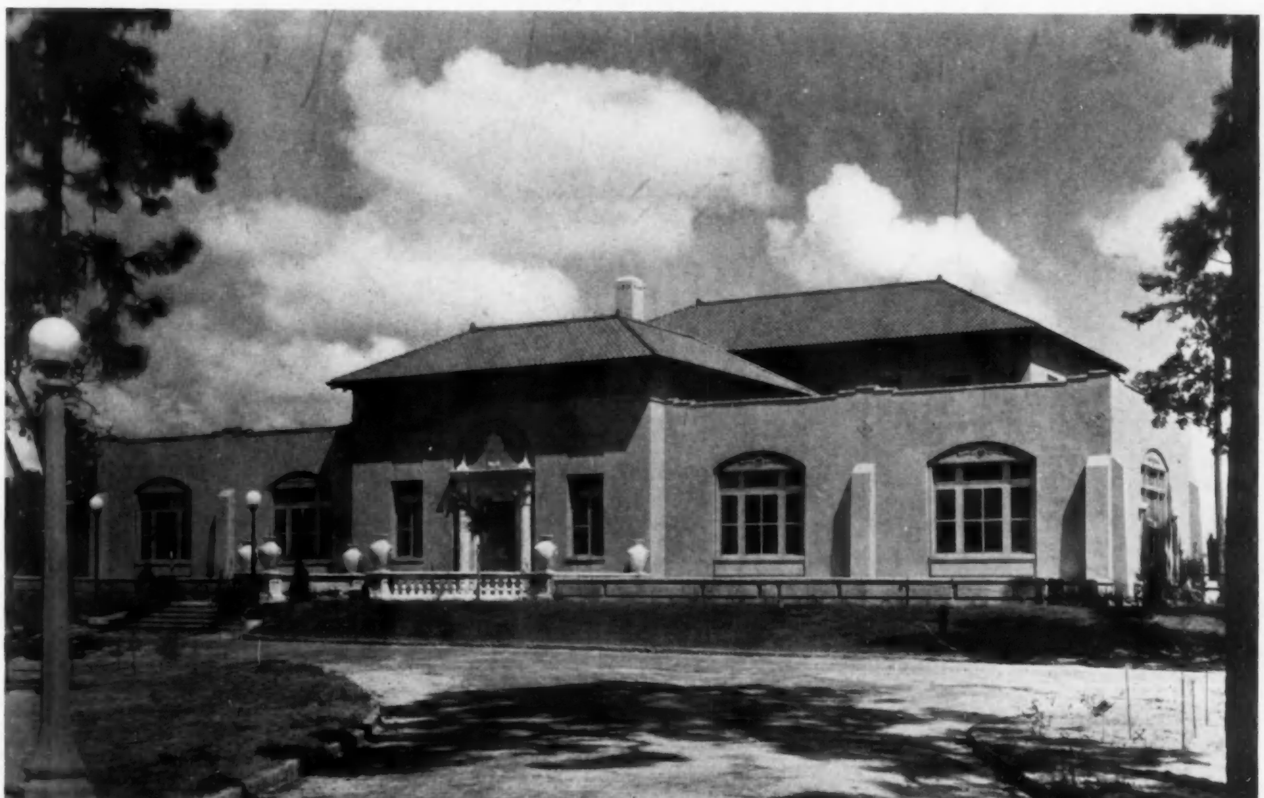
ROADWAY OVER KENSICO DAM, NEW YORK
YORK & SAWYER, CONSULTING ARCHITECTS

Photos. Burgert Bros.

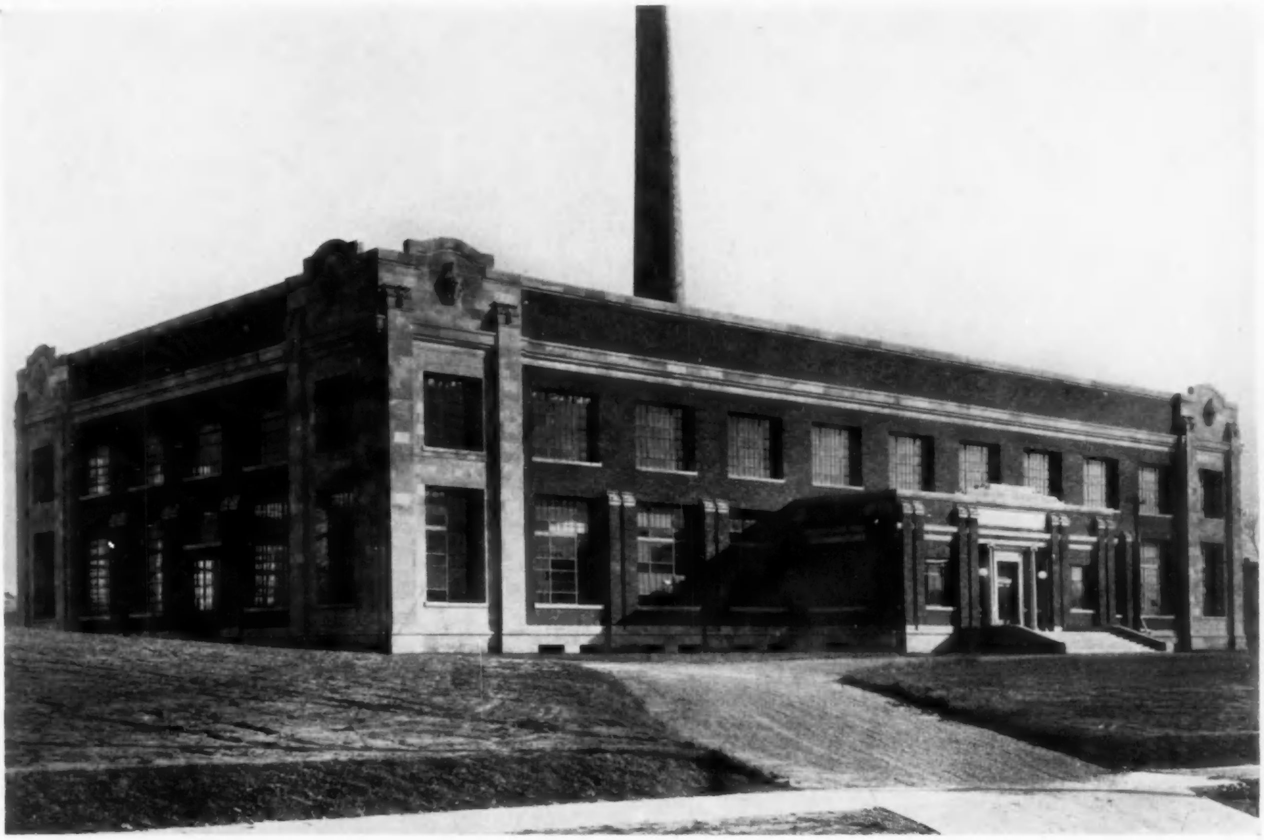
INTERIOR, MAIN FLOOR

CITY WATER WORKS, TAMPA

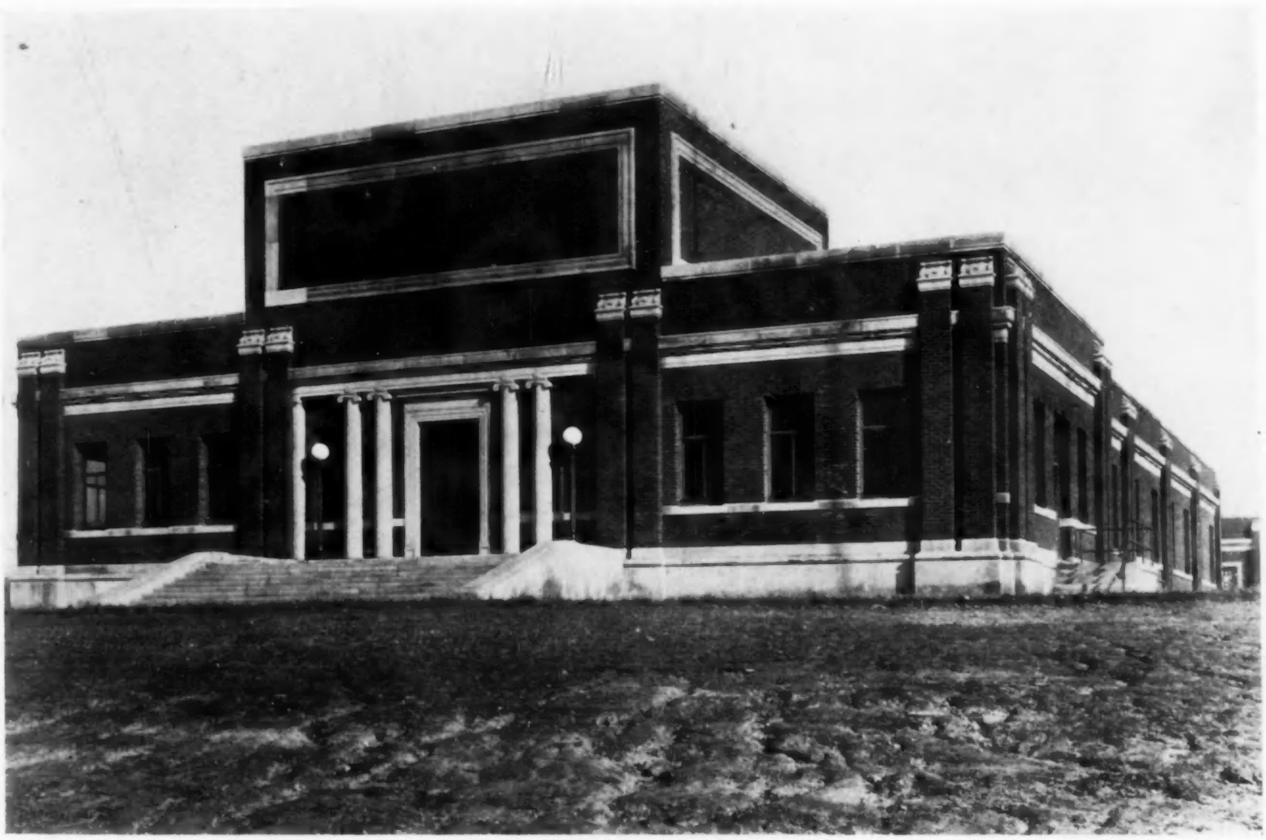
LUDLOW & PEABODY, ARCHITECTS



GENERAL VIEW



PUMPING STATION



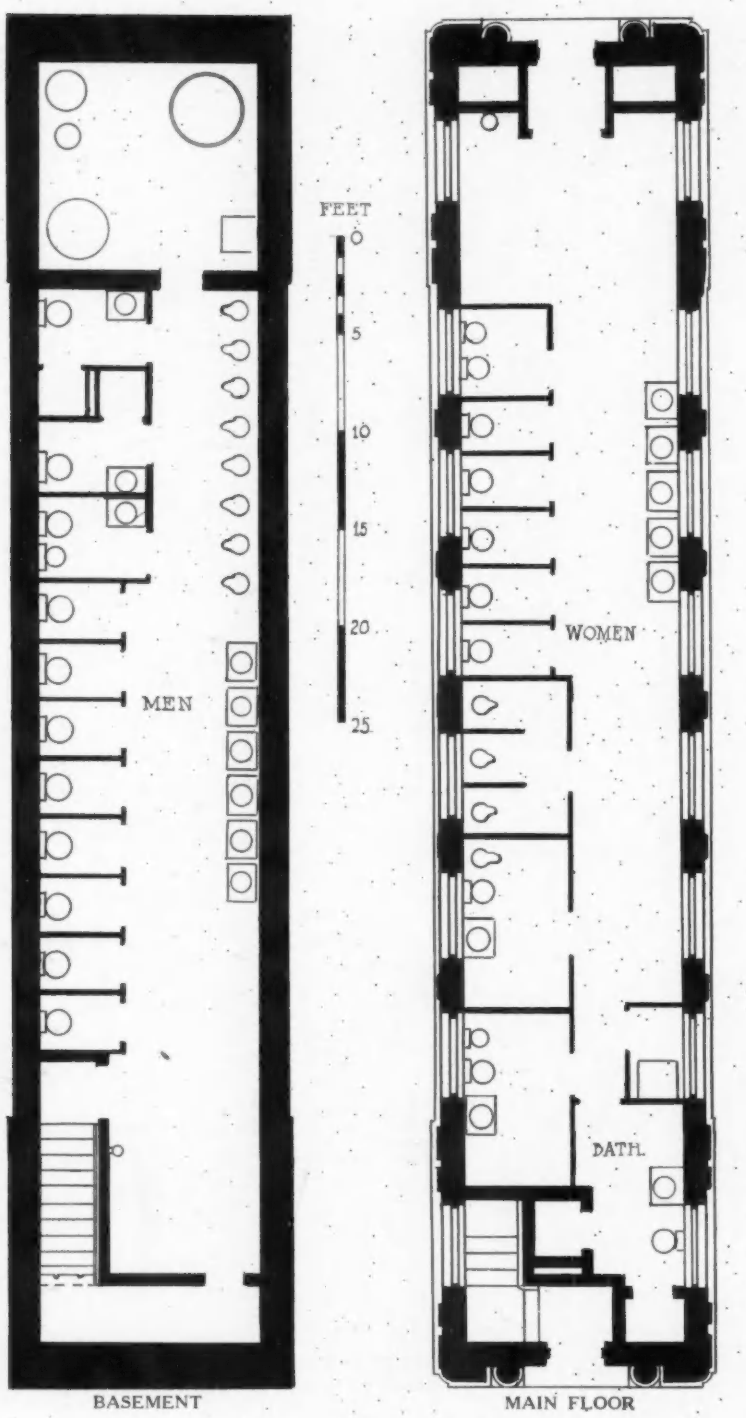
FILTER BUILDING

PARKWAY PUMPING STATION, MEMPHIS

JONES & FURBRINGER, ARCHITECTS

Plans on Back

COMFORT STATION, TRENTON, N. J.
HILL & GOLLNER, ARCHITECTS



PLANS, COMFORT STATION FOR CITY OF TRENTON, N. J.

HILL & GOLLNER, ARCHITECTS

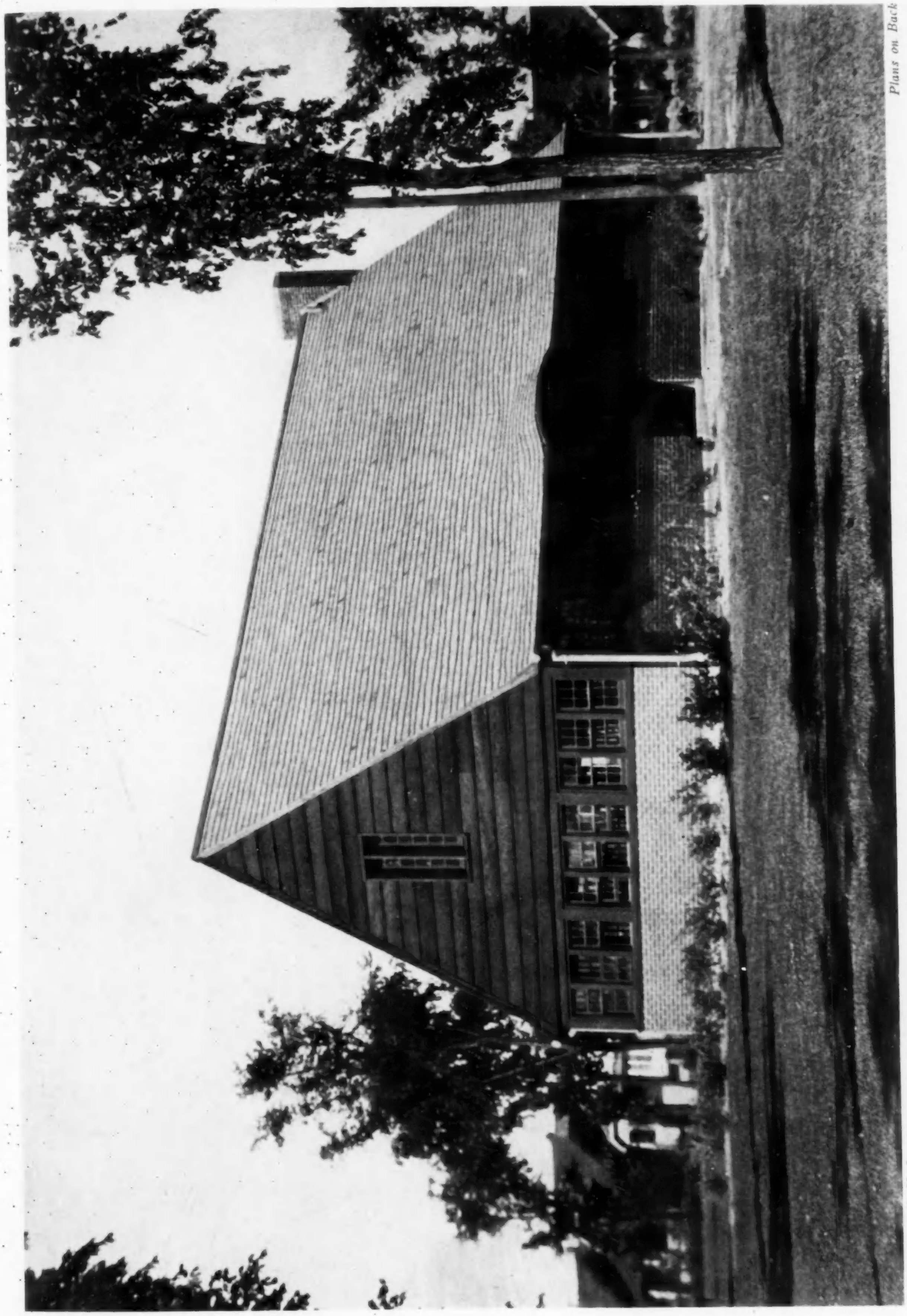
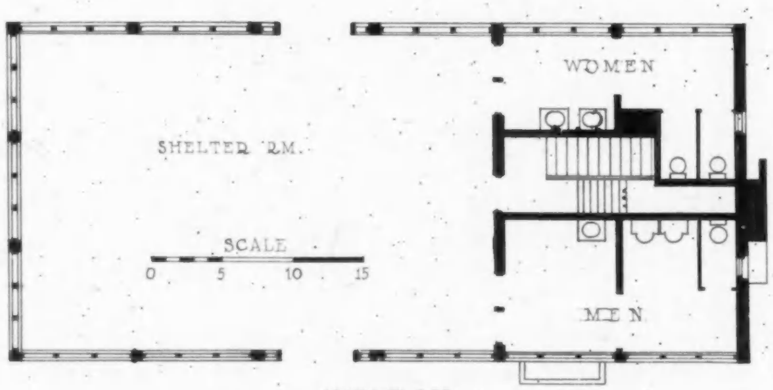


Photo. William C. Verburgt

Plans on Back

COMFORT STATION FOR CITY OF MILWAUKEE

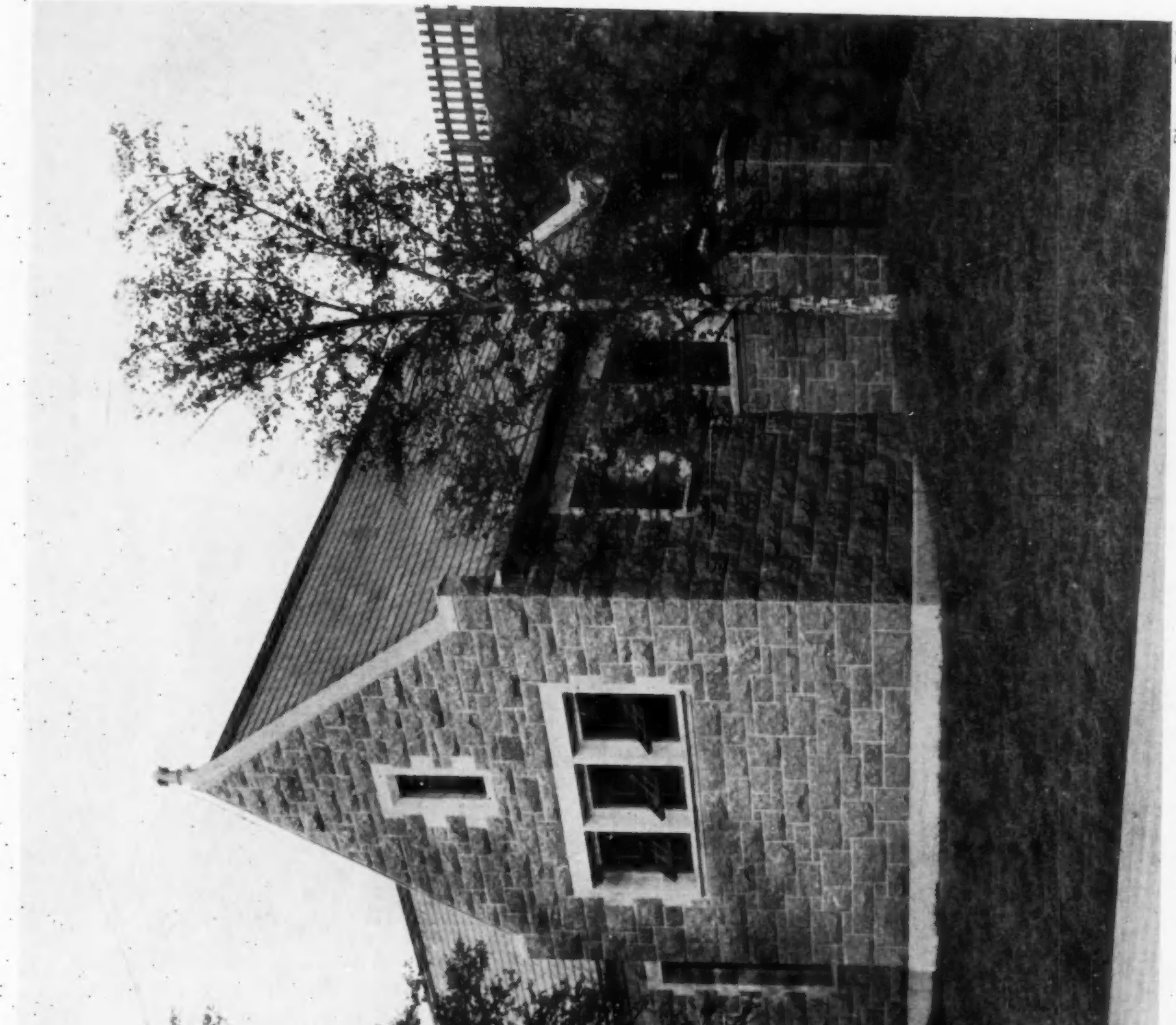
CLAS, SHEPHERD & CLAS, ARCHITECTS



MAIN FLOOR

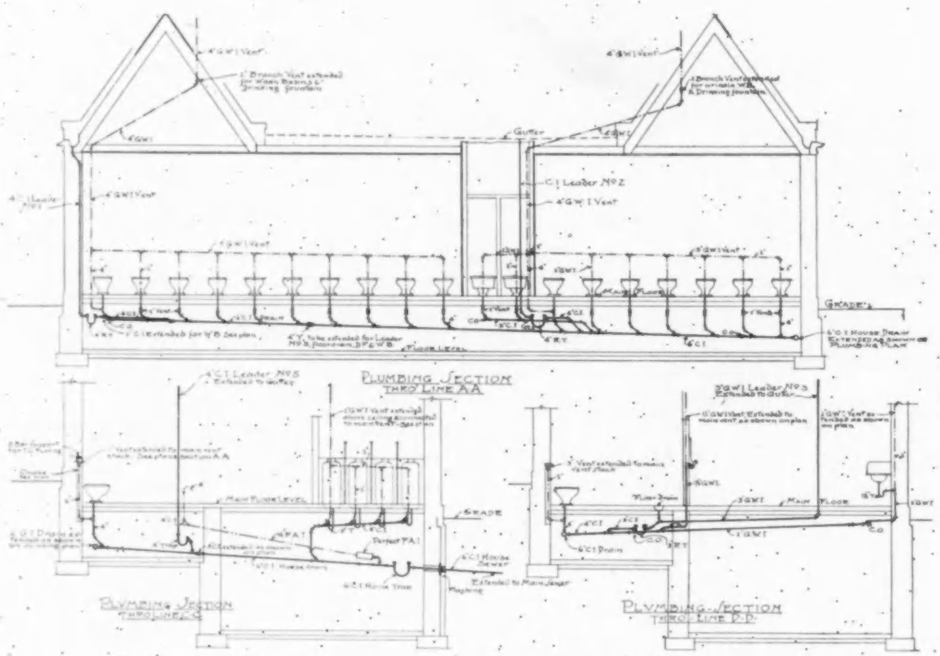
SECTION AND PLAN, COMFORT STATION FOR CITY OF MILWAUKEE

CLAS, SHEPHERD & CLAS, ARCHITECTS

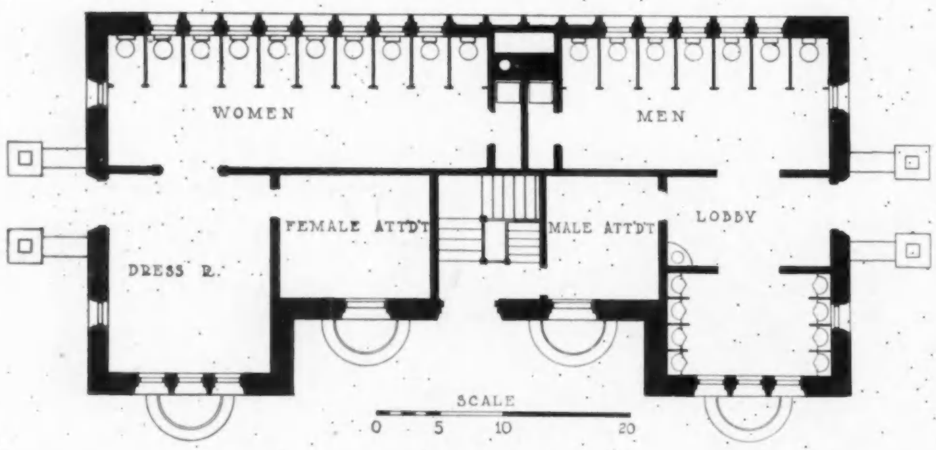


Plans on Back

COMFORT STATION, CENTRAL PARK, NEW YORK
THEODORE E. VIDETE, ARCHITECT



PLUMBING PLAN AND SECTION.



MAIN FLOOR

PLANS, COMFORT STATION, CENTRAL PARK, NEW YORK

THEODORE E. VIDETE, ARCHITECT

The Public Comfort Station

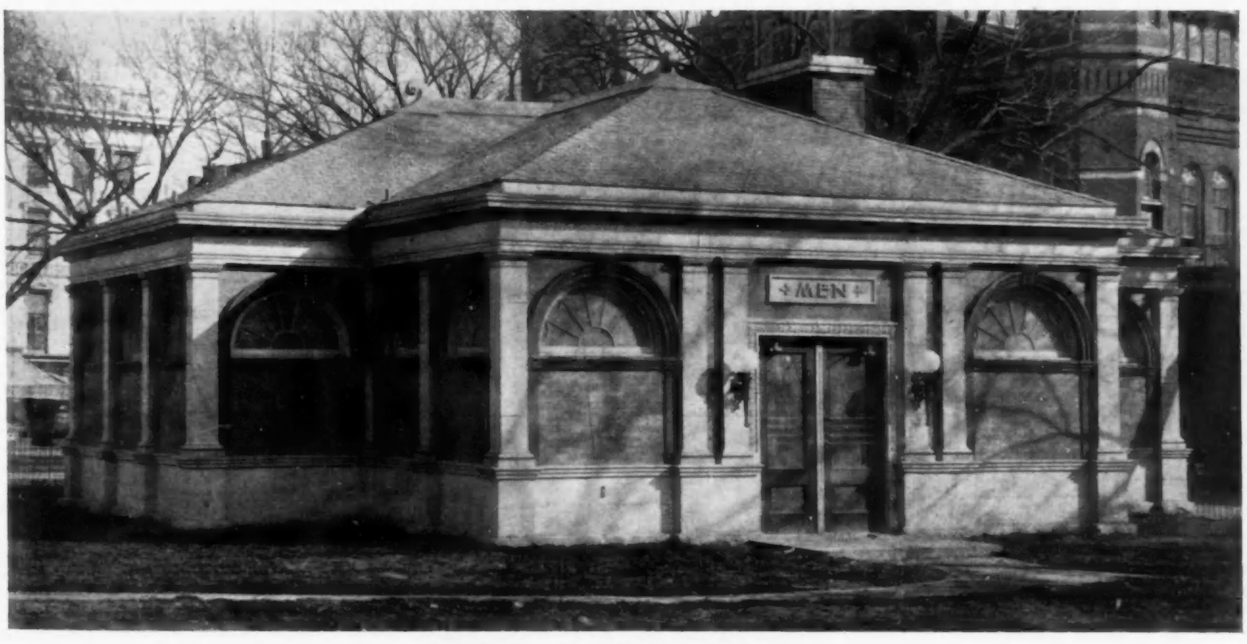
By A. R. McGONEGAL

Member, American Society of Sanitary Engineers

ALTHOUGH the public comfort station, even in its simplest form, had its beginning only in the latter half of the nineteenth century, its need has been apparent from the time men began to gather in colonies greater than the merest villages and the distance and time from work to home and back again became of moment. In Biblical times, though the command to the soldier was "to go without the camp," it was realized that loss of time, danger from enemies' harries and other considerations dictated a better plan, and it became then, and still is, the first duty of a well disciplined army to construct sheltered latrines immediately on pitching camp. For the civilian population such consideration was centuries in coming. The rural dweller has his conveniences at hand, such as they may be, or he has the wide fields and the woods where nature provides both privacy and disposal. Even in small villages he is frequently near enough to home, or, knowing well his neighbors, is welcome there, but as villages become cities and cities increase in size, the matter of answering nature's calls becomes more complex, and more convenience stations must be built.

Factories provide for their workers, railroads for their passengers, office buildings for their tenants, and stores for their customers; but what of the citizen away from his home, the laborer at work, the newsboy, the policeman, the transient or holiday seeker? Time was, before there came a great change in our basic law, when the ever-present saloon especially catered to such needs of the public. It was a well recognized fact that free and comfortable toilet service drew trade, and many establishments fitted up most elaborate facilities. But the cold hand of the law drove the peripatetic citizen and the stranger alike to hotels, office buildings and depots. The maintainers of these services resent the intrusion of others than their own, and the tenant's key, the coin lock and the "Guests Only" sign are much in evidence. It is of course unfair to force a hotel man to provide for more than his guests in order to insure accommodations not already preëmpted by outsiders. It not only costs unnecessary money to install extra fixtures, but every extra fixture figures in annual repair bills, in water and supply bills, and takes up valuable space, which alone is an item of no mean importance. The answer to this pubic need is the public comfort station, built and maintained by the community, and such buildings have long been recognized as a most necessary item of city equipment. There isn't a sizeable city in the United States that is sufficiently supplied with stations of any of the various types, and many, many cities totally lack them. Even where their desirability is recognized, they are not being built fast enough to keep up with increase in traffic, and the great growth of automobile touring during late years is aggravating the situation.

The history of the public comfort station as a building is short, both in years and in achievements. No one knows when a semi-circular niche was first cut in a wall to provide a modicum of privacy, but along about 1830, the first iron scroll, open at top and bottom and with a shallow trough in the pavement leading to the gutter, made its appearance.

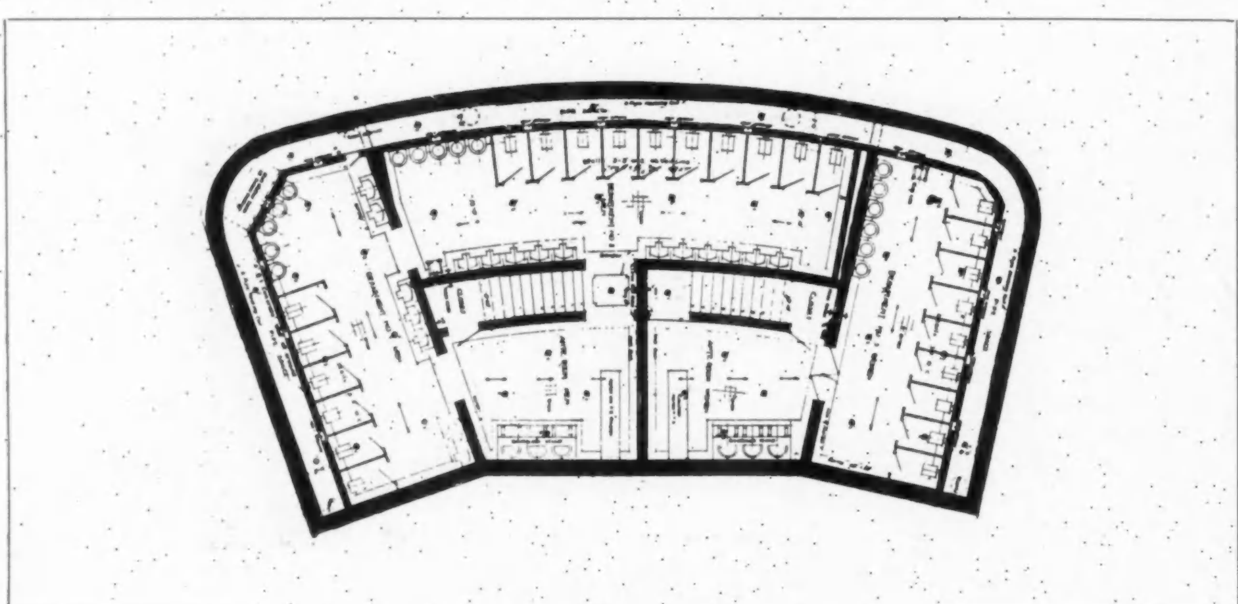


Public Comfort Station, Washington

Shelter Over Entrance to Underground Comfort Station, Seattle
J. Everett, Architect

These simple urinals were used very generally in England, France and Germany, and later in this country. Some years later London constructed many quite pretentious underground stations having general toilet and lavatory service for both sexes. These indicated a need so apparent and so well satisfied that other cities in Britain and on the Continent took it up. Fine examples of these earlier stations are found in Glasgow, Edinburgh, Birmingham, Manchester and Dublin, and in London each ward or parish built its own. These were, and are still, operated generally on a small fee system and either wholly or partly pay their way. There are also exceptionally fine examples to be found in Paris, Copenhagen, Berlin, Dresden, Munich, and some other continental cities. Italy boasts a few, and there are also many wartime American-constructed stations still in use. In these European stations, however, there is not the attention paid to cleanliness and ventilation that there is in the average American station more recently built.

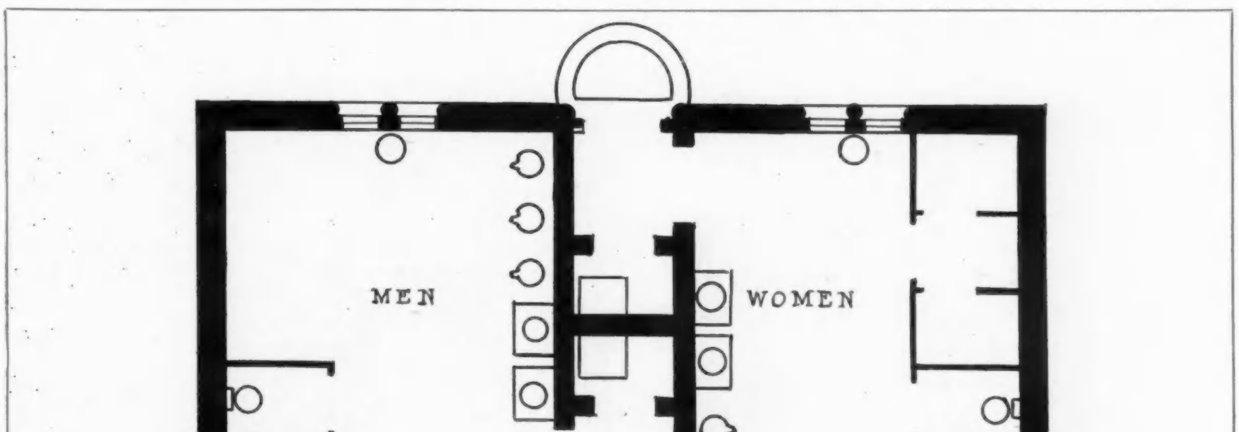
In the United States, the first public comfort station giving general toilet service for both sexes appears to have been opened in Astor Place, New York, in 1869. This was followed some years later by the



Plan, Underground Comfort Station, Seattle
J. Everett, Architect

Public Comfort Station, Trenton, N. J.
Hill & Gollner, Architects

special rooms at the Brooklyn Bridge terminals, and still later by those in stations on the Boston Common and at Worcester, Mass., all of which were well designed. The next permanent station in New York was at the City Hall; the completion of this station seemed to give impetus to many dormant projects, and substantial structures were soon under way in Brooklyn, Washington, Baltimore, Cleveland, Cincinnati, Detroit, and very generally in the larger New England cities. Still later Chicago, St. Louis and the Pacific Coast followed suit. New York, Brooklyn and Chicago are fairly well equipped, as their regular stations are augmented by the many subway and elevated railway station toilets, which are open to the non-riding public, but no other American city has made any serious impression on actual public comfort station requirements. Washington, the sightseeing and convention city, has four with one being built and another projected, instead of the 20 needed, and Baltimore has three instead of the 30 needed, and so on through the list. The foregoing references are to the major type of public comfort station,—the "business center station,"—and while this business center station is the type most neces-

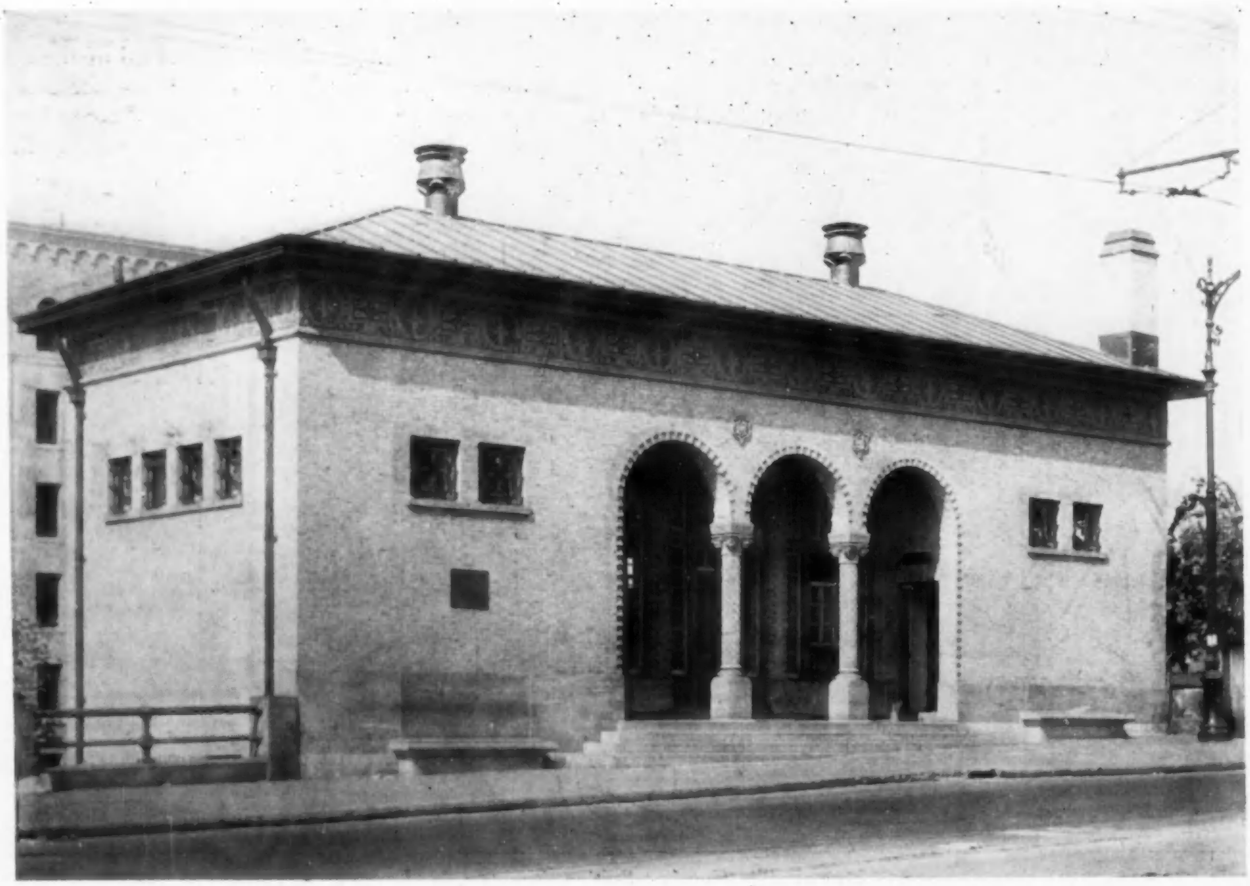


Plan, Public Comfort Station, Trenton, N. J.
Hill & Gollner, Architects

sary and what is generally meant when the subject is under discussion, there are several other types also necessary in a well ordered city to meet various needs.

There is the "main artery station," not built in the business district but on the outskirts of the city on its main automobile travel route, to act as a "first and last chance" for the motoring public. Such buildings should be provided with caretakers, and be in all general arrangements and appointments the same as a major station at a business center except in point of size and number of accommodations. In lieu of salary, male attendants could operate small cigar stores rent free, with the toilets in the rear, and women small notion stores, care being taken that the stores do not dwarf the primary purpose, either by making this architecturally apparent or by the use of the International Public Comfort Station sign. Where zoning regulations are in force, a city may free itself of this obligation by requiring that sufficient and proper accommodations be provided by gasolene filling stations suitably located, retaining some supervision over the operation and care of them. Another type is the "market station," usually a special building provided for the market employes and the country people having stands, but with sufficient capacity to care for the general public in the neighborhood. The public toilets in city halls or other government buildings come under this class, the accommodation of the general public being a secondary consideration, the primary purpose being to care for the needs of those who have specific business at the markets or other buildings. Such toilets are cared for by the caretakers of the utilities of which they are adjuncts, and are not usually under the supervision of the officers in charge of comfort stations, though they should be. Playground toilets in individual buildings are fairly common in most large cities, but they are rarely used by the adult public. Toilet buildings in public parks are more plentiful than any other type of comfort station building. There are few cities of any size having public parks which are not equipped in this respect. They are generally roughly supervised by the park employes, who may enter them for this purpose two or three times daily, though they should be, in the interest of the public, constantly attended. With park stations, the service they render, the proportion between the sexes, the freedom of space for building purposes and other considerations all vary from the rather set conditions under which a major station is likely to be located and maintained.

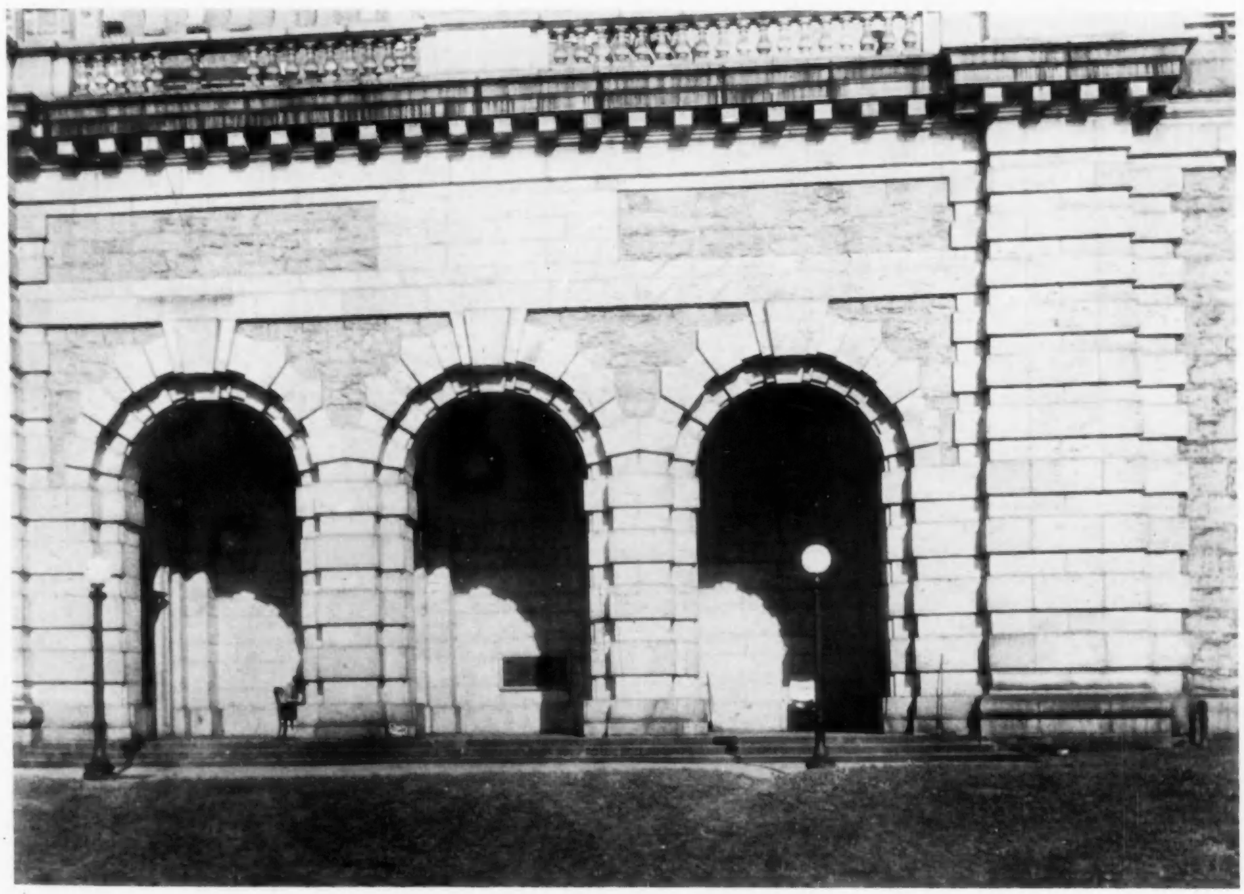
When the construction of a business center public comfort station is undertaken, the most important consideration is its location so that it shall be of maximum service to the people. Such a location will always be found at a street intersection, and it will be the busiest corner in the section under consideration. The corners will be occupied by stores



Public Comfort Station, Washington Bridge, New York commanding high rentals, space behind the building line will be at a premium, and the only suitable place will be found underground, as it cannot be built in the street itself to obstruct traffic. Its value as a public utility will be doubtful if placed down a side street or in space rented in an adjacent building. It should be a structure to itself, right at the busy place, and its purpose should be patent to the stranger as well as to the citizen. By providing a thoroughly waterproof envelope around the building,—top, bottom and sides,—an underground building can be kept dry, and with adequate fan chambers and apparatus, fresh air can be drawn in at one end and exhausted at the other. The best existing stations have air circulation systems changing the air in the main rooms 20 or more times each hour. With this rapid circulation, the exhaust air carries no perceptible odor, as the ratio of street air dilution is great enough to prevent odors from ever being a cause for complaint.

A logical construction would be to build the station as a concrete monolith from curb to curb under the roadway, with entrances for men on one sidewalk and for women on the other. Where existing construction interferes with a complete underground street crossing, the building could be built partly under one sidewalk and partly under the roadway, with entrances at opposite ends of the structure. These entrances could be of ornamental iron similar to a subway kiosk with vent registers in the side away from the stairway or in the top. Plain ventilators, vault lights with their condensation nuisance, or any other variation from the plan of a watertight and, so far as possible, air-tight box served with an adequate fan system, should be avoided. A slight pressure should be maintained, and the fans should be operated every minute the station is in use. A suitable heating plant for wholly indirect heating and capable of keeping pace with the ventilation system must be provided, excepting in the far South.

The size of the building will of course depend on the number of accommodations provided, but it should be as compact as may be possible. The nearer the design approaches a square in plan, the less will be the cost of construction per unit of space. As to the number of fixtures and the proportions of the station, there is a wide difference of treatment in existing stations. It is self-evident that the capacity should be sufficient to accommodate the average peak load during the morning and evening rush hours, but it must be remembered that the "re-use" capacity of fixtures is very great, and that every unnecessary fixture not only adds to the size and cost of the building but affects the upkeep cost through repairs, supplies, and heating and ventilating the excess space. Except perhaps in the largest cities at their busiest intersections, a "ten-unit" station will usually answer all needs. A "unit" is one free water closet stall on the men's side, and all other fixture propor-



Public Comfort Station, Riverside Drive, New York
F. Stewart Williams, Architect

Women's Room, Public Comfort Station, Trenton, N. J.
Hill & Gollner, Architects

tions are based on that. A study made some years ago from actual observations in several cities is the basis for these deductions and averages: a urinal stall is used 12 times while a closet on the men's side is used once, and only five men in every hundred use a closet; so it follows that, in a ten-unit station, there would be ten free closets and 16 urinals for men. In one station 15 per cent of the users were women, and as they use closets only, the proper number for the female side is six free closets. There seems to be a tendency to provide too large a number of wash basins. Two on each side would generally be found ample, and in no case during the study were more than three found in use at the same time. Economy of space and future repair costs should indicate use of the minimum number.

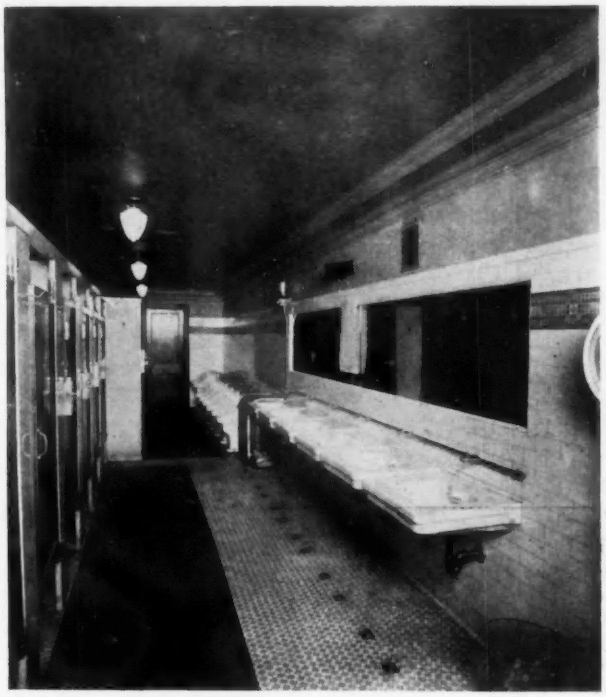
The matter of adding pay compartments must be worked out in each case, consideration being given to the neighborhood and class of prospective users, their home habits, scale of wages commanded, and freedom with which they spend their money, and the fee to be charged. The usual fee in vogue is five cents, although many charge ten. In general, it will be found that private toilets will pay a considerable portion of maintenance costs if the compartments are large enough to contain a closet and basin with comfort and are kept clean and inviting. Some method of accounting must be adopted for assurance that the money from fees reaches the proper office, and hand collection with a street care fare register has been found good, although coin locks are probably more satisfactory. There are several makes, and one or two have been found reliable. One compartment on the women's side should have a "mother and child" arrangement with an added infants' closet with a bowl 9 inches high; or special detachable infants' seats can be hung up in the compartment.

Public Comfort Station, Trenton, N. J.
Hill & Gollner, Architects

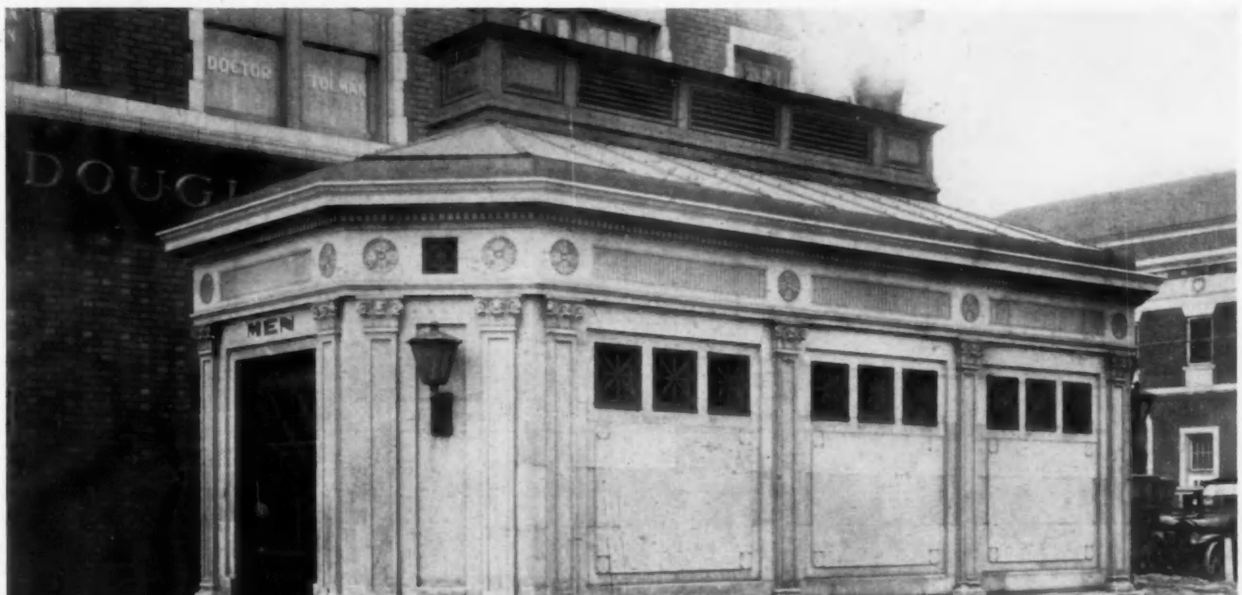
Provision of a rest compartment for the temporary use of any person taken ill on the street can be made if desirable. Half the number of free closets seems a desirable ratio for the pay compartments, although the tendency in the most recently built stations is to increase this proportion. One station has an innovation in a shower compartment and dressing room on the men's side for a 25-cent fee, and reports have it that travelers make much use of it in the summer.

The selection of the plumbing fixtures for a comfort station is very important and has a most distinct bearing on the future cost of upkeep. Pick out the very best and most substantial. Siphon jet floor outlet closets with extended lips should be used, and a special pattern having the siphon limb arranged to pass a 2½- or 2⅝-inch wooden ball will eliminate constant taking up to clear stoppages. People have a most reprehensible habit of dropping things in closet bowls, so the bowls should be so designed that any article passing through the trap entrances will pass entirely through. Old clothes, soiled underwear, tobacco cans, pipes, pencils and like articles easily obstruct an ordinary closet bowl of the commercial pattern. It costs several dollars every time a closet bowl is taken up for a clearing, and three or four dollars added to the original cost of each bowl will assure future immunity from much repair expense. The best is the cheapest in the long run.

Seats should be acid- and wear-proof, preferably some of the black or dark colored composition seats made with open fronts, and the flush should be accomplished under pressure, either with a seat action pressure tank, or by a flush valve of the diaphragm type. In any event, the valve must be arranged for operation either by the closet seat or by a foot- or elbow-operating device, to prevent transmission of disease by means of hand contact. Urinal flushing can



Men's Room, Public Comfort Station, Trenton, N. J.
Hill & Gollner, Architects



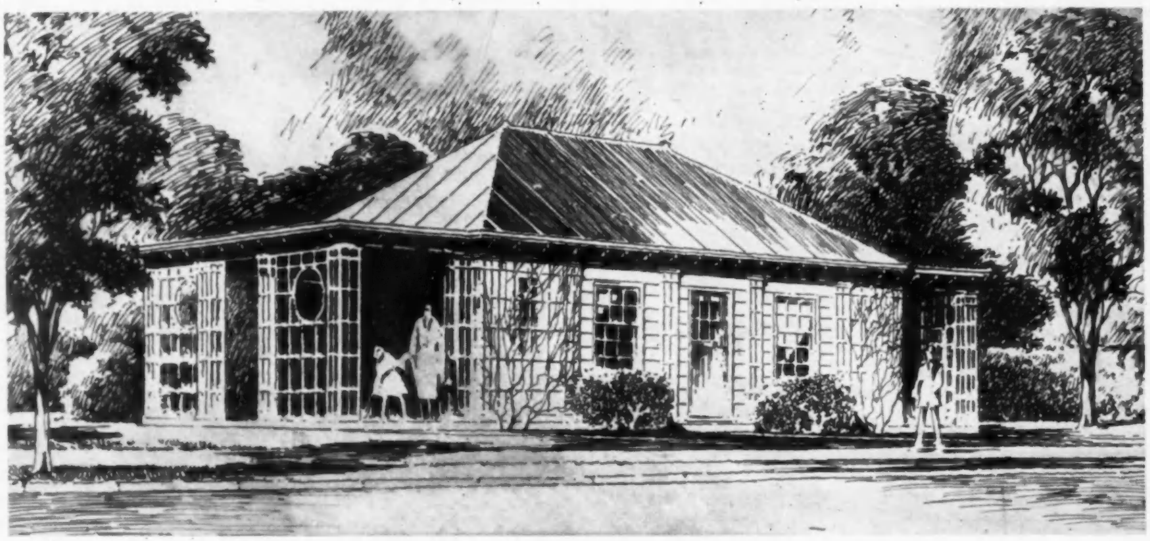
Public Comfort Station, Detroit
Harry S. Angell, Architect

be accomplished by using slate stalls with overflow constant flush urinals, or if porcelain stalls are used with flush valves they should have foot or elbow operation. All urinals are hard to keep clean, but the best types seem to be slate constant-flushing stalls or the free-standing pedestal china urinals with floor outlets, as they fully protect the floor from soiling.

Wash basins should have rubber plugs, and it would be well to avoid using the mechanism incident to pop-up or standing wastes; basin cocks should be self-closing, and together with all other metalwork in the station, should be the same metal all through, such as polished red brass, white brass, nickel or special corrosion and wear-resisting finishes now available. Nickel plating, even the best, wears off in a few months with the constant use to which fixtures in a comfort station are put. Having care that the sewer system is so laid out that there will be ample wash, the sizes must be large enough to pass any article that might get through the closet or other openings. Water supply pipes must be amply large to provide volume for all the fixtures in operation at the same time. A public toilet with poor water supply cannot be kept clean. For the same reason that the fixtures have foot or elbow operation, the toilet-paper holders should have no operating knobs; the paper only should be handled, and the folded type of package paper will be found most satisfactory. The wall and floor finish must be durable rather than ornamental, so colored rough-finished cement floors and glazed brick or terrazzo walls will be found most suitable. The best closet enclosure material seems to be the steel unit enclosure work made for the purpose. Wood doors or enclosure work have no place in such a structure. It might be economy in the long run to have the makers of the steel enclosure units furnish them in heavy sheet copper and have the main doors and trim copper-covered to obviate the possibility of rust.

It goes without saying that a public comfort station must be kept scrupulously clean, and it is only through the agency of plenty of hot water, soap, powder and hard work that this can be done. Don't make the mistake of putting a drain in the floor so the attendant can wash out with a hose. It takes a heavy mop and "elbow grease" to get the scum off the floor and walls. Deodorizing apparatus should never be used to kill one odor with another. Closet seats must have frequent washings with a suitable insecticide, and the insides and under rims of closet bowls must be kept white by liberal use of powders made for that purpose. Uniformed attendants should be on duty at all hours, and in addition to keeping the station in a high state of cleanliness they might have directories, sell paper towels and cheap combs, and the women attendants should have needles and thread or pins for the asking and should sell sanitary napkins. Each station might have pay telephones, and the attendants might be allowed to check parcels. If there is room, a concession should be given a bootblack, or else automatic shoe-brushing machines should be installed. Arranging for advertising panels inside the station brings some revenue, but notices of quack doctors and patent medicines should be barred. It is best to omit all advertising.

The proper designing of a public comfort station is a matter of specialty engineering, and architects should make the most careful study of the entire problem from the standpoint of utility and service. The first stations built developed errors in proportions and in sizes, and in many other ways they were found unsuitable for satisfactory operation. Later examples improved on the original designs until today those designed by specialists are sure in every detail of giving long and satisfactory service at least cost to the public. It is time the average American city realizes that public comfort stations are a necessity, and that their provision and maintenance have a distinct moral and economic bearing on the life of the city as well as on public health and public comfort.



Rest Room and Comfort Station, Milwaukee
Clas, Shepherd & Clas, Architects