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MAKE NO little plans;
they have no magic to
stir men's blood and
probably themselves
will not be realized.

Make big plans; aim high in hope
and work, remembering that a
noble, logical diagram once recorded
will never die, but long after we are
gone will be a living thing, assert-
ing itself with ever-growing insist-
ency. Remember that our sons and
grandsons are going to do things
that would stagger us. Let your
watchword be order and your
beacon beauty.

DANIEL H. BURNHAM

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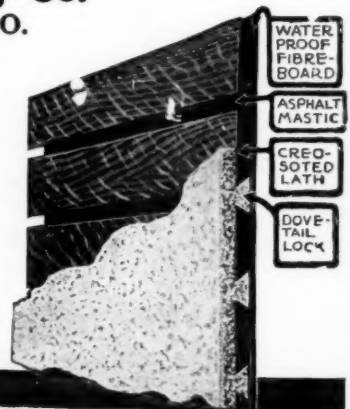
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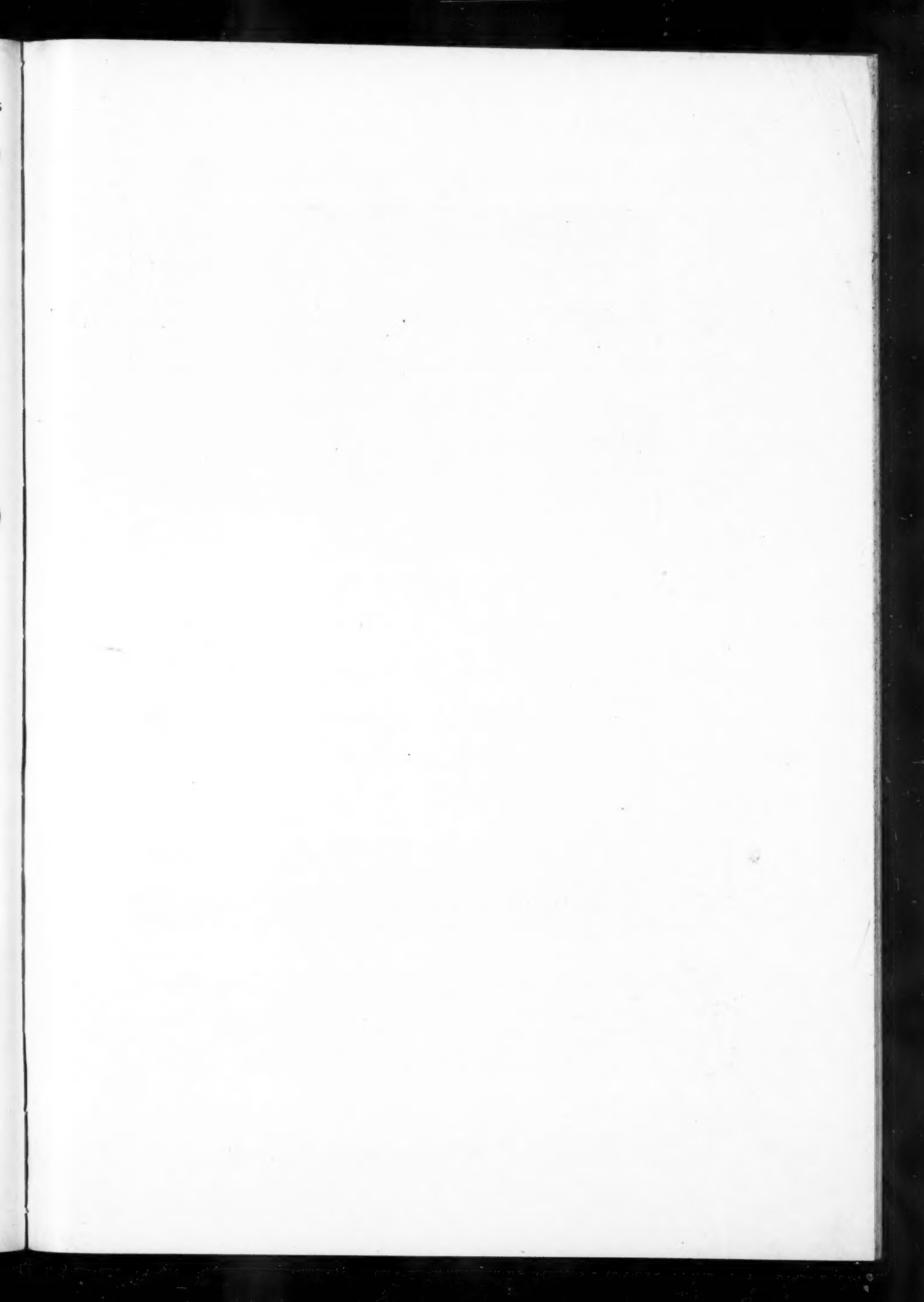
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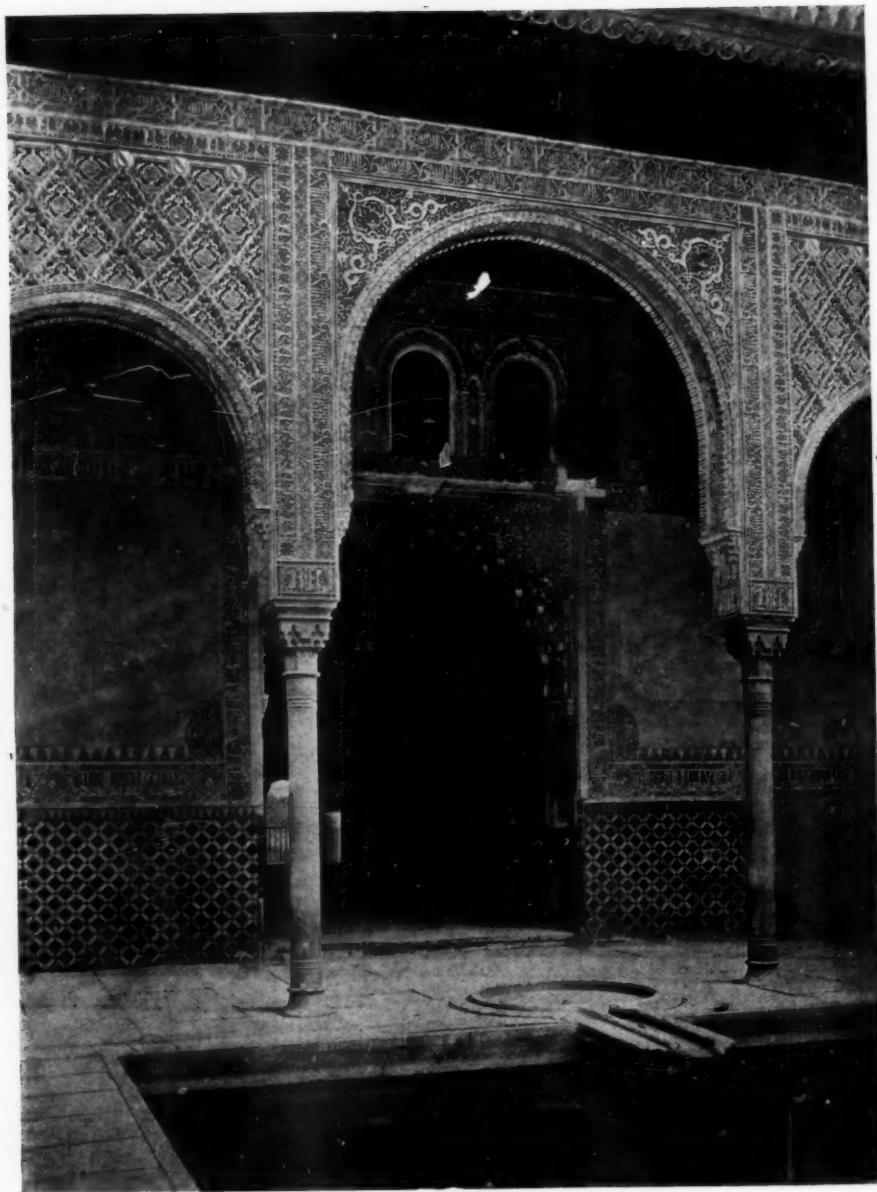


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ENTRANCE TO THE HALL OF THE AMBASSADORS, THE ALHAMBRA, GRAN-
ADA, SPAIN

THE AMERICAN ARCHITECT

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1919

STANDING at the threshold of 1919 and looking forward, the vista is one that should arouse a considerable degree of pride in every American citizen. After four years of war in Europe, and eighteen months of participation on the part of the United States, the storm has become calmed. We may feel all of that deep satisfaction which results from a duty well performed. It will not be proper boasting to refer to our own part in this war. The true story of what we have accomplished may be left for future historians to record. While the destiny of the world hinges about the calm deliberations of the peace commission, we in this country may fix our eyes wholly on the future, firm in the belief that unless we falter or fail to profit by the lessons of the past, we shall steadily move forward to our rightful position before all the world.

WITH the cessation of hostilities and the demobilization of our large land and sea forces, many complex problems are being presented, on the proper solution of which will chiefly depend the success of the future.

The return to America of more than two million men, suddenly taken away from their usual occupations and as suddenly brought back, will so greatly affect labor conditions in this country as to constitute perhaps the first and most important

question of all. The introduction of women and minors into every phase of industrial labor has served to bridge this country over an important crisis. It will be our duty to show a due appreciation of the non-combatants whose work, if less spectacular, has been quite as patriotic as that of the men who have gone overseas to fight. The problem of retaining this large element in employment and at the same time finding remunerative work for the returning soldier and sailor is most intricate.

AS no nation may succeed which shows ingratitude to its defenders, it becomes vitally necessary that we provide employment for the large number—estimated at a quarter of a million men—who either by mutilation, wounds or other physical conditions incident to service, have become incapacitated from pursuing their pre-war vocations. These the Government will regard with the utmost paternal care. A large appropriation has already been made to provide educational facilities at technical schools and colleges for men in this class. This feature of the Government's work in the rehabilitation of its defenders will, it is quite certain, be carried forward to the highest state of efficiency. While we may deplore the cause that has led to the necessity for a work of this kind, there is no doubt that the result will react to the great benefit of the

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individual and also to the development of a high order of citizenship. A man taken from civil life, with perhaps but a limited earning capacity, returned to this country after months of military training, discipline and contact with the big things of the world, will, when re-educated to meet his new conditions, become a valuable and patriotic citizen.

THE experience gained during this war has developed, and in large numbers, types of men who will put the impress of their fine abilities on every future undertaking. In every professional rank there has been learned the lesson that it is the practical, workable idea that counts, that gets results. There has been no place in the turmoil of preparation and the steady grind of the daily task for the theorist, the dreamer or the poseur. It has been shown that men of the highest ideals can only successfully work with their fellows when they combine with such ideals the hard, practical sense that leads to success.

Particularly has this been shown in the fields of architecture and engineering. Just what history has been written in this country during the past two years in the annals of these two professionals need not be dwelt upon here. They have been discussed and argued to a point where further allusion would only be repetition. It has been clearly demonstrated that in times of stress, or active operation, only one type of man can survive in the daily turmoil of war's activities. That man will be the most practical and most efficient that can be found. Whatever errors of omission or commission may in the future be set against our Government, it will be conceded that it sought out in every field of endeavor the most practical and efficient and aggressive type of men it could find. That large group of men with yearly earning capacities of upwards of a million dollars, who patriotically set aside every selfish consideration to serve their country at a salary of one dollar a year, exemplifies the class that will in the future dominate every field of labor. The lesson is obvious.

THE suspension of building operations for a period of many months, does not afford an opportunity to refer to the progress of our architectural development. Building in this country, with the exception of the Government's operations, has been practically at a standstill. But, in the feverish activity displayed in the vicinity of our

shipyards, cantonments and munition plants, there has been opportunity to note the probable future effects of a very matter-of-fact attitude toward building and the architectural progress that may have accompanied it.

Possibly this war has served to develop features of industrial housing to a greater extent than any other. In design and plan, the homes of our industrial workers have been so vastly improved as to mark an epoch in this phase of construction. Architects may claim and prove their contention that it is to their abilities that this great advance is due. In every instance where large operations have been under architectural control, there has been no word of inefficiency, and the results are so very good that they will exert the most lasting influence on our domestic architecture.

MEANWHILE, the large number of men in the profession of architecture who at great personal sacrifice have closed their offices and gone to the war, are returning educated to all those higher things which their trained powers of observation will have taught them. It is among this class that we may with calmness look for that type of man who will show to all the world just what an architect is and means to his profession. There are problems now that architects must take up and solve. They must realize that while they are artists, trained in the power of artistic expression, they are also business men and must become good executives. With the military training received by the architect, the higher and broader outlook he has acquired, he will regard everything he undertakes with the view of a super-educated, practical man. The future of architecture under the control of men of this type looks brighter now than ever before. It will be this class of men who will dominate the profession. It will be these men who, having learned that much of the study in their college courses was, as referring to their future work, so much lost time, will see to it that the curricula of our architectural educational institutions are revised so as properly to fit the young man for the work before him.

THIS question of education in architecture is one of the first that the profession in its efforts towards reconstruction in its own field will need to consider. Undoubtedly many of the things in architectural practice about which we so loudly

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complain today are due to faulty educational methods. Modern methods will need to be very largely revised. In the leading article in this issue this important topic is very thoroughly discussed by Mr. C. H. Blackall. Without doubt there will be a very general agreement with Mr. Blackall's presentation of this subject and concurrence with the measures he proposes for the improvement of present methods.

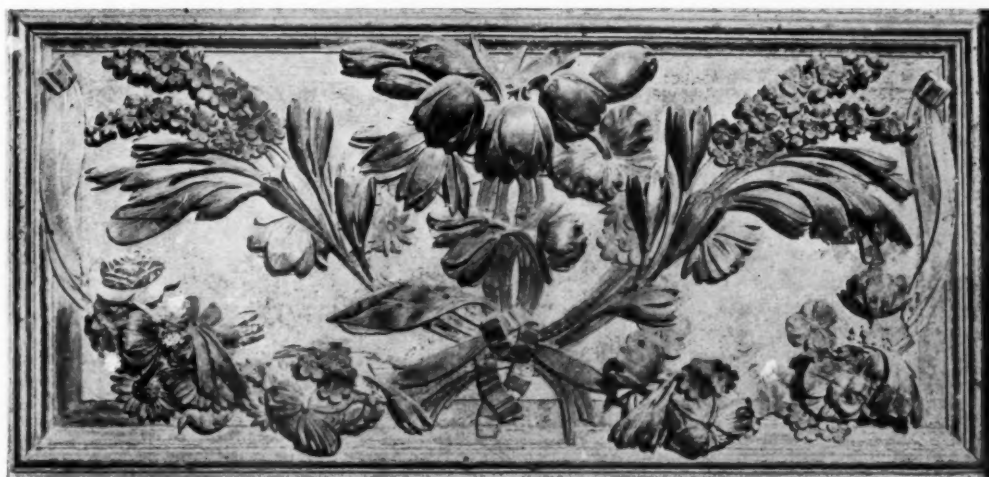
Tom P. Barnett, in a communication printed on another page, makes the admirable suggestion that our rich men could find a very useful opportunity for a great and valuable work in the founding of schools of craftsmanship in Europe for American men and women. The immense amount of good that would be derived, especially during the next five years, from the establishment of such schools, is too apparent to need further urging. Along certain well-developed lines, the American Academy in Rome has been for years carrying forward a work of this nature. If this valuable institution were more liberally endowed and placed on the most practical basis, it could at once take control of these trade schools and make them, in the field of craftsmanship, as valuable to the American student as it now is in the higher field of the Beaux-Arts.

The successful future of architecture will depend more largely on the successful development of craftsmanship than is at once apparent. If some group of liberal donors will generously provide for these trade schools in Europe, they will do more to advance the progress of architecture, and that is

art, in this country, than by the hoarding of collections or the endowment of classic memorial museums and libraries.

A PERFECTED and smoothly working organization always produces results if energetically administered. But any body representative of certain fields of endeavor can reach its goal only when it receives co-operation from those it endeavors to serve. Organized architecture in this country has seen many vicissitudes and in spite of its handicaps has accomplished a certain measure of good results. But it has been almost entirely in the hands of certain men who, day and night, have labored to serve, and who have in many cases become disheartened by lack of support, unwarranted criticism and cold indifference. We shall have to make the profession more democratic, and we shall have to make its organization more truly representative.

There is as pressing a need for two organizations, state federated societies and the Institute, as there is for two parties in our national Government. Until this has been brought to consummation, we can hope for little, if any, practical result. With correct educational methods, methods that will be based on the counsel of practicing architects, with two well organized parties, each striving to outdo the other in effort for the common good, we shall have an organized profession that the Government in future crises will not ignore, for the very good reason that it will be impossible to do so.



Looking Forward to Architectural-Engineering Practice

THE construction of buildings in 1918 was restricted to those having an occupancy devoted to war purposes. This limitation naturally confined the new work to certain industrial plants, army and navy base warehouses, ordnance depots, shipbuilding plants and industrial housing prospects. These undertakings are of a permanent character. New cantonments and additions to those constructed in 1917, loading plants and hospitals were very largely of temporary construction.

In all of this work there was nothing developed which is of especial interest from the purely architectural or engineering viewpoint. The buildings were strictly utilitarian in character and the designs made to use available materials. The main feature of this work was the matter of constructing the buildings in as short a time as possible. This required the use of executive ability which resulted in the competent organization of all the elements employed. The outcome of these undertakings has, as a whole, been adequate to the needs.

One great benefit will accrue to the building industry from the bringing together, in intimate contact, the architect, engineer and contracting forces from all parts of the United States. Each came to the job with his local methods and ideas and the most meritorious generally got proper consideration. Local prejudices have been largely wiped out and architects and engineers are approaching a unity of thought, method and purpose that could not have been effected in any other way or in so short a period of time. To illustrate: A well-known western engineer was assigned to oversee the planning of a large pier to accommodate ocean-going vessels and railroad connections. This engineer's experience had never included a contact with such a problem. He found that the concrete floor slabs were designed, as customary in that port, as simple beams supported at both ends. To secure economy in materials he suggested that they be designed as continuous beams. Opposition to this proposal was based on the theory that the simple beam would best meet the condition resulting from a settlement of the supporting pile foundations and precedent. An investigation showed that no pier in that large port had any such settlement and that the expensive and wasteful design was made to care for a condition that never happened. The pier has been built on the continuous beam design

and the future will disclose the correctness of the new idea. Numberless other instances could be cited to show the great advantage of this commingling of professional men, all working against time to achieve a common end.

Construction methods will profit by this experience and those from every locality will have gained some valuable knowledge to apply in the work of normal times. The fixed procedure, guided by precedents, will be diluted with the short-cut and direct methods of the newer communities where problems are solved, as they arise, by using the best judgment available in lieu of a definite experience. Some practices of the older sections will be carried away to strengthen the usages of the younger communities.

It would appear then that a gain has been made in the ability to adjust building construction to the available materials and in the equalization of methods of design and building, obliterating some localisms and making some of these general in their application.

There is no doubt but that the revival of the building industry will be hastened by the knowledge gained during the abnormal period just terminated. This knowledge and experience will be applied to a better use of the materials that enter into the structural parts of the building, such better use being accomplished by giving the materials more work to do through the increase of fiber stresses, an added refinement in structural design and other means. As a nation, Americans have been wasteful in the use of many materials, due to their comparative cheapness. No material is cheap to-day and it is probable that their cost will never reach the pre-war levels. This increase in cost will, in many instances, be overcome by a more intelligent use. Construction equipment will be improved to reduce human labor, and labor will undoubtedly become more valuable as the relations between the employer and the craftsman become more reasonable and satisfactory. The common interest of both will become more apparent during what appears to be a short, necessary and somewhat troublous period of readjustment.

The relations between architects, engineers and contractors can be modified in some ways, resulting in economies. Under present procedure there is a wasteful duplication of work. This obtains in the necessity of contractors maintaining drafting or-

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ganizations to supplement the work of the architect and engineer; this is not general, but its cost assembled into one sum is an element of considerable moment. This can be eliminated by the better and more complete preparation of the drawings in the first instance as one organization always can give complete service more cheaply than two separate organizations.

The duplication of estimates made by general and all sub-contractors is a very large item of building cost which, like fire insurance, is a tax on every building that is constructed. This tax can be eliminated by the introduction and universal use of a system of quantity surveys similar to those in use in England and other countries. The estimator always adds a safety margin for incomplete plans and specifications, unfortunately all too common. Before a guaranteed quantity survey can be made, the obscure points, omissions and overlapping of specifications must be eliminated before the survey can be completed. This safety margin is an appreciable percentage of the total building costs and is a tax due to incompetent plans and specifications. This condition is general enough to deserve close study and energetic efforts to correct it. There are several other related wastes that will be eliminated by the use of this method.

By the adoption of safety methods the waste due to injuries to workmen can be very materially reduced by the consequential lowering of liability insurance costs. Attention to fire prevention during construction will result in savings in fire insurance.

One of the greatest wastes in building construction is that due to building codes. The progress in code making has in no way kept pace with the progress in engineering knowledge. There are engrafted on all codes requirements for the sole purpose of consuming materials without any return whatever in real value to the owner and the public. These demands, favorable to special interests, should be eliminated at once and the code made in the interest of the public. Such changes would

decrease temporarily the amount of some materials used, with a consequent lowering of the cost of building construction, but the vastly increased amount of building will ultimately result in a greater consumption of all materials.

Building commissioners have excused some of these unreasonable conditions by the palpably incorrect reason that such laws must be made to combat the worst conditions of designing, inspection and contracting service. On the contrary, such codes should be made for the best conditions and strictly and honestly enforced. By so doing the incompetent or dishonest designer and contractor will disappear as a matter of natural elimination.

The status of the contractor will be improved for the reasons before mentioned and such activities will be recognized as a business inseparable from a profession. The contractors are fast becoming men of technical training, business and social standing equal to that of the architect and engineer, and they, as such, will compel the consideration to which they are entitled. Their rights in the matter of awarding contracts and fair dealing must be recognized.

The architect or engineer who has the welfare of the building industry at heart and also his personal business interest must face the problems of 1919 with the determination to be a vital element in that work. To do this he must first clean his own house in order that he can render the complete service that will be demanded of him; so design that construction waste is eliminated; adopt a quantity survey system to overcome the tax of individual estimates; reduce the liability and fire insurance tax by supervision for safety, and take immediate and energetic steps to secure a radical and common-sense revision of building codes.

Prosperity will come in any event, but it is the duty of those engaged in architectural and engineering practice, with the co-operation of the contractor, to make themselves a vital and potent factor in its rehabilitation.



"We Are Going To Build"

By WILLIS POLK

NOW that the frosts of war that drove the building industries into hibernation have been dispelled by the grateful warmth of the armistice, the dormant bear of investment finance stirs in its slumbers, rub its eyes and prepares to seek whom it may devour! But, dazed from its long inactivity, emaciated from its enforced fast, is cautious. It is like the architects, and the architects are like the twenty cats, camped around one tiny knot-hole from which one timid little mouse exposes one bristly little whisker. So queries Mr. Investment Finance: Can we build now? What about capital issues? What about priorities? What about the next Liberty Loan? What about the high cost of labor? What about the high price of materials? Still the spring thaw that releases the stored up snows of winter, with its resultant freshets, will wash away all obstacles.

Shall we wisely impound and direct this flood or shall we permit its uncontrolled flow to wreak destruction equal to, or greater than, the devastation of war? Therefore, Mr. Capital Investment, Mr. Labor and Mr. Materialman, hearken unto my voice! Sit ye at my feet and learn wisdom! Labor will never be cheaper. My father after the Civil War was glad to cut, haul and pile good oak cord wood for one dollar a cord. I guess we are glad to pay \$20 to-day.

Still we can buy a better elevator for less money to-day than we could ten years ago. We can buy a better automobile for less money to-day than we could five years ago.

We can build a better building for less money to-day than we could twenty years ago.

Twenty years ago more steel was put into the foundation of the Claus Spreckels Building in the form of grillage than was recently put into the entire Hobart Building from base to roof. We didn't know better then; we know better now. We can do better things now for less money than we could then. James Phelan, it is said, traded a band of mules for the lot upon which the Phelan Building stands to-day. What are we going to trade for the opportunities of this moment?

We are going to build and build and build, wages and prices to the contrary notwithstanding. The sleeping giant stirs; the sleeping giant awakens; look out when he sheds the superfluous hair from his shaggy fur! Stand aside, oh timid ones, lest thou be devoured!

The late D. H. Burnham used quizzically to relate that H. H. Richardson held that an architect's first duty was to get a job. Then he would solemnly observe, "But Henry was wrong! An architect's first duty," he maintained, "was to DO the job."

"But do it well," he would always add.

Architects and Engineers

The relationship between Architects and Engineers is like the relationship between bricks and mortar.

The present tendency on the part of the investing public to rely more on the Engineer than the Architect can only result in a happy rivalry that will tend to cement the functions of both Architects and Engineers into an inseparable union, with resultant benefit to the investing public.

WILLIS POLK

Architecture After the War

1. Architectural Education

By C. H. BLACKALL, *F.A.I.A.*

UNDER the above title the writer ventured to make some predictions regarding the probable conditions of architecture after the war. We are now safely out of the war and so far without any prospect of an economic crash or any profound social disturbances. We are just beginning to feel the returning waves of prosperity in our profession and all the indications are that by next Spring the architects will have all the work they can reasonably take care of and that many will be snowed under with the increasing tide of large and important commissions. We cannot, therefore, postpone decisions as to what we shall do with ourselves and our profession. The decision must be made now and it must be made as far as possible so as to endure for the new era which we believe is coming in. We may continue to theorize as to what it may be, but we are now in the midst of an actual condition and we must trim our sails and plan our course accordingly.

The very first question to be answered by the profession is what to do with the young men who are not yet in it but to whom we must look to carry on the work in the future. Architectural education in the United States thirty or forty years ago was a comparatively simple problem. There were few who wanted it, fewer still who could profit by it, and the profession itself was interested only in an academic fashion. But we no longer have an apprentice system; boys do not enter architects' offices now to learn the business, but go to a school of architecture. Moreover, the requirements for a successful architect are so vastly enlarged, there is so much more that should be acquired by the young practitioner, that what might have answered in the 'seventies is hopelessly out of date to-day.

Nor have our schools altogether kept up with the procession. It is right and fitting that the professional element should have predominated in the past, and it is also quite proper that schools of architecture should have leaned to the conservative rather than to the radical and should have accepted and taught the tested methods, and have had in view the ripened, accepted aims of the past rather than the newer eclecticism of to-day; but without desecrating in the slightest the work the schools have done, the net result in the last twenty-five years has been to force architectural education into more academic lines, to restrict independent thought and, above all, to foster academic methods in place of the severely

practical requirements of everyday business. Our architectural schools never have been business schools in any sense. They must be that now. They have given a prominence to art which was once quite proper, but the relative importance of pure art in architecture has decreased and the business and practical sides of the profession have enormously enlarged, so if our schools are to turn out the men that the profession wants, there must be some very radical changes instituted at once.

These changes will not come of the free initiative of the schools. That is to be expected. They must come from the profession itself and architects of to-day have a manifest duty in this respect. There has been altogether too much separation between the profession and the school; too much treating the teaching of architecture as if it were an end in itself rather than the preparation for a life work and as if the academic successes were tangible achievements rather than mere groundings. The profession has greatly drawn away from the schools as a natural consequence of such teaching and it has been each year increasingly harder to interest the actual practitioner in the work of the young men. We do not even see our putative successors, or know they are in existence except at rare intervals, but if we are properly to meet the after-war opportunities our first task right to-day is to get busy with our architectural schools.

It would be more than presumptuous to claim that any one point of view is necessarily the best one, or that any one expression could be absolutely depended upon as showing the way in which the schools can change. But it is worth while to mention at least some of the views which have found expression regarding architectural education, and then it is up to the profession and the schools themselves to determine the real consensus of need, to find out just what the architects want as a practical necessity, and then to cast out absolutely from the college curriculum and the college training everything which would detract from turning out architects at Commencement Day capable of carrying forward the work which we soon will have to leave. This is not an impossible program at all. It is simply applying to architectural education the common sense deductions of any efficient business, cutting out the non-essentials, omitting mere mental activities and getting down to real hard facts of necessity. Four years ought to be ample to train any young

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man for architecture if he has the right stuff in him, and while it is the task of the schools to formulate and apply the necessary training, it will be impossible to accomplish real good unless the profession as a whole takes hold and helps out, and not only helps in the starting but follows it up and takes a real interest in architectural education and in those who are striving to acquire it, at the same time insisting upon giving the young men the training the architects want, as distinguished from what educators, so called, might feel was the theoretical equipment. The profession knows better what it wants than any academic board. We have a right to demand consideration from the schools. They are training the young men not for themselves but for us, and if the profession shows a consistent and coherent desire for certain architectural training, the schools themselves will be only too glad to give the profession what it wants.

Individual views, as was stated before, are of value only as far as they help to draw out expression from others, and what is said here is put forward merely as a starter, reserving to the writer always the privilege of changing his mind and acknowledging that one man's view is by no means final.

Fundamentally the architectural training should be that of a business man. Architecture is no longer merely a profession. We may dodge it all we please, but the real fact remains that we are running a business. We try to be professional and we shall continue to be so, but let the young men be taught from the beginning that they are entering a most exacting business in which the business element stands first, that all the rest fails to be of value to the community or to the individual unless it is businesslike and successfully so, that the business of the future is not to be the business of the individual but of groups, that the day of the dilettante in architecture has gone but that at the same time we must keep the ideals and associations which have made architecture a fine art, that we must not let go the good things of the past but build on them, basing everything upon the fact that the mission of architecture is primarily to serve and not to adorn and that the aim of architectural education, to put it in one way, is to make a business man out of a poet. That is the first point to insist on.

Architecture, next to being a business, is construction. That is only less important because it is a means to an end, and construction should be taught in the schools not as a science but as a practical, applied art. A man should look at building construction as the mechanic looks at a machine. It is not an occasion for calculus or the higher mathematics. In fact all the mathematics that an architect needs ought to be imparted to him before he

enters the school, but the application of the fundamental facts of geometry, a few theorems in trigonometry and a raft of practical experience is what enables a young man to be sure of himself in constructing a building. Cut out mathematics as such absolutely. There are fortunately plenty of men in this world whose minds run to such things, but they are not the successful architects. We can profit by their work and spare our boys many hours of mental anguish, but insist upon the instruction being real and not theoretical, upon its applying to actual cases rather than to ideal ones, and limit absolutely and rigorously the time expended on theoretical construction to the barest necessity; emphasize, enlarge and multiply the practical applications. This is the second point.

Architecture is a case of co-operation. No longer does one man do it all. The same principle should be applied in the teaching of architectural design. It is not fundamentally a case of intelligent planning and secondarily a case of appropriating adornment, but let our young men be thoroughly grounded in planning and in that vague quality which we call common sense, which is so hard to define but so easy to understand. Once that logical, rational, orderly system is imbued in the minds of the young men, the mere adornment will come very easily. But our schools ought to abolish the idea at once that length of time in a school is any measure of a man's ability. Personally I believe the atelier system is a far better one than we have followed here. It has already, to be sure, been adopted to a certain extent in Harvard and some of the other schools, but we ought to stop at once any idea of separating the young men by years. Put them all together where the weak will rub shoulders with the strong, where the advanced students can really be part of the teaching force and where the example of those around them will count for far more than the precept of the teacher, and above all rigorously exclude from the teaching force any instructor who has ideas of his own which he wishes to impose on the students, for what we need more than anything else is to develop the student's own ideas, to stimulate his imagination, to foster the right kind of emulation and competition with those who are stronger than himself, to set before them ideals which are a little beyond his reach so he will grow to them, but especially to develop the man from within. I am talking now of planning and design. This condition would never arrive when a man is ranked with his equals. He should be measured with those who are stronger than himself, and that is one of the strong arguments in favor of the atelier system. I believe it should be adopted and carried out in every architectural school which aims to turn out real architects, and that no student should be allowed

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to work up his designs all by himself free from the frank and often rough-shod criticism of those who are in the same class with himself. This is the third point.

Architecture on its artistic side is a retrospective art. Therefore the history of architecture should be studied, but not as a thing by itself, which has been only too often the case in the past. It should properly be looked at as a formulation of historic precedent leading to the work of to-day, representing the point of view toward real architecture and directly or indirectly correlated to the actual work which the young architects will be called upon to perform. It should never be academic in its teaching, never be abstract, never be merely ideal, but it should be in every case a practical application of past experience. This is the fourth point.

There are lots of other points, but they are minor ones in the writer's judgment. Frank discussions and mutual conferences between the architectural teachers and the architectural practitioners will show many paths which may be followed to advantage, but fundamentally in preparation for the architecture of the future our young men must be grounded in the idea that architecture has its predominant business side, that construction is not a mere theory to be elucidated by abstruse mathematics, that design is not one person's whim and fancy but should be the combined effort of the

community and the times, and that the history of architecture means simply knowing what the other man has done and then trying to do it a little better. To teach this to our young men calls for the highest ability which the profession can produce. We cannot expect our young men to rank high unless they are under the direction of the ablest teachers and helpers that can possibly be obtained. Our schools must make up their minds to get this kind of service and pay for it. I say this without any failure to recognize the splendid work which has been done in the past by the leaders of our architectural schools, but the tendency has been a little too pronounced to look on the position of architectural teacher as a sort of stop-gap between the return from the *École des Beaux Arts* and the time when one's friends can get enough jobs together to warrant starting in business. If we want the best we must use the best means and then we must pay the price, whatever it is, but the best is none too good. The harvest is coming. Already the first effects of after the war are beginning to be felt in the architects' offices, and we believe we are on the very threshold of one of the largest developments of architecture the world has ever seen. The war has brushed away many of our ideas, has wiped out some of the traditions, and in order to meet the new era let us first of all set our architectural schools in order.

Educating for Architectural Practice

By FREDERIC W. GARBER

NOT being pedagogically inclined, I can approach the discussion of architectural education with serenity and a one hundred per cent sure cure. It has always seemed to me that the fault with builders and architects has been that they are not working as harmoniously as they should to accomplish the same ideals. This friction is due to lack of similar training. I would not have architects become contractors, or contractors, architects. I am convinced that some architects would make good contractors, but no contractor could, without training, become an architect. A course in architecture would assist any contractor. The architect, with a general knowledge of contracting, would make a super-architect.

If architectural education could be divided into two large groups—first, building, and second, architecture—the two camps would become united. Under building, a certain amount of architectural training should be taught, but greater stress should

be laid on making the pupil a thoroughly competent builder. The science of drawing, specifications, strength of materials, structures, the business of building, etc., should be included in the curriculum: in fact such studies as would fit a student, after serving an apprenticeship with a construction company, to become a good contractor.

The faculty for such a course should be composed, in part, of good contractors and architects. The standard to be attained should be fixed by federal law. No contractor should be permitted to do business without the equivalent of such a standard course. The privilege to practice should carry with it government responsibilities of such a nature as would prohibit cheap, hazardous construction. This would eliminate underwriters and simplify building codes. From such a course could be drawn contractors, material supply men and manufacturers of building materials, etc.

The second group (architecture) should be ap-

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proached only after the course in building, or its equivalent, has been mastered, and should consist of advanced architectural study. This training should be such as is mapped out by our best colleges. There should be no hampering federal restrictions to this course. The faculty should be composed, in part, of the best practicing architects, and some contractors. Such a course would not be too practical, and contact could, through the faculties, be maintained with the best practice of the day. The net result would in time bring about ideals that would be understood by all those participating in building. The first course would have a tendency to remove those not qualified as builders,

and by the same means, would disqualify incompetent men whose ultimate aim was to practice architecture.

In the educational preparation for practice as above outlined, the Government, in some manner through a licensing department, should require all men to be prepared in that branch of military science wherein they would best qualify to serve their country. The requirements of the Government should be such as would maintain efficiency through a continuation course for those in practice. Then, in case of hostilities, the Government would have a large, efficient reserve body, which it could draw upon with ease and economy.



CARVED REREDOS—TUDOR PERIOD

Beauty and Economics

By HARVEY WILEY CORBETT, A. I. A.

A period of reflection is good for the soul. The architects have had such a period, they have reflected, they have put their reflections into print, but has it been good for the architectural soul? Are we justified in supposing that the ideas put forth indicate a general discontent with things as they were, or is it nothing but the outpourings of ordinarily busy minds trying to occupy themselves during a dull period? Perhaps the architects, like the rest of humanity, stirred by the great war to depths never before dreamt of, are unwilling to return to the *status quo ante*. The President tells us it would be a disservice to restore the railroads to pre-war conditions. Labor certainly does not want to return to pre-war wages or pre-war hours. And even the soldiers, many of them, would like to change their pre-war jobs. The architects, therefore, are not alone in their demand for a new deal. Shall it be from the same old pack of cards, or may we start with an entirely fresh deck?

The first step in any change or reform movement is to want something, and the second step is to crystallize thought on what is wanted. Let us suppose for the sake of argument that all the various criticisms and suggestions we have been flooded with, both in the architectural press and the daily papers, are made seriously and with the best interests of the profession at heart, and that what has been put forth is representative of the wishes of the profession at large. Then can we assume the first step in reform is under way, viz., something wanted; can we crystallize thought on what this something is?

A glance over the field of criticism both constructive and destructive is not very encouraging. The range of fire extends all the way from art instruction in elementary education to a complete shift in standards of professional ethics. It would seem that we do not catch the youthful mind in our architectural net early enough, and those we do catch are fed up, stuffed, you might say, on the wrong brain food. We do not catch the public mind often enough and frequently when we do, it slips through the meshes of our net and swims away with less appreciation for our architectural efforts than it had before it was snared. It would seem from some of the criticism that our code of ethics only served to bind the truly artistic soul in its imaginative flights and did not prevent the purely commercial soul from committing architectural murder in the name of art. And, finally, the question of the architect's responsibility comes up only to find

him accused of being a very "artful dodger," hiding behind the screen (very thin, by the way) of artistic license whenever he makes practical mistakes, and ducking behind the shield of practical necessity whenever he commits architectural atrocities.

Can we possibly discover in this wide range of fire any single purpose or central idea which may become the guiding thought of our proposed shift to the new status? Are we aiming at a common target, and if so what is it?

Personally I believe all criticism, all suggestion, all denunciation, all sarcasm, would be stilled if, as a professional group, we could gain more sympathetic appreciation of our architectural efforts on the part of the general public. If, during the war, work for which we considered ourselves peculiarly fitted was given over to lawyers, engineers and builders, it was not because of an unappreciative government, but entirely because of an unappreciative public opinion. Government is only public opinion personified, and public opinion is the final arbiter in all matters of art as well as in business or democracy.

Architects deal in a commodity which the public wants. Buildings are more universally needed than any other one thing we can imagine. Every form of human activity goes on in connection with some form of building, supposedly arranged and planned for its particular purpose. The function of the architect has never been better defined than as one who builds beautifully, one who harmonizes beauty and utility, one who seeks through a comprehensive sense of arrangement to give satisfying expression to the practical needs, desires and aspirations of national life. Why, then, is not the architect the one man who should be the guiding spirit in all this tremendous work? Why is he not the most important citizen in the community, whose opinion is sought above all others, the one to whom all turn for decision and direction? Some one has said, "Let me feed the world and I will reform it." He might better have said "let me house the world and I will ennoble it." For the work of the architect could and should extend to every type and kind of building, whatever its nature or purpose may be.

It is, of course, ridiculous to assume that the architect occupies any such exalted position in any community at the present time. But why not? If, as we have said, his function is to harmonize utility and beauty, one of two things must be true—either the public does not want "beauty" or the architect

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fails to harmonize the sort of beauty he provides with the very essential utility. Which is it? I am entirely satisfied it is not the first one. I believe the public wants beauty and appreciates to the full, every effort that is made, however inadequate or temporary, in this direction. I believe every architectural effort towards beauty is approved and applauded far beyond its merit by an admiring public. It only needs the quality of real beauty to bring forth unrestrained admiration, so deep rooted in the human soul is the love and longing for the beautiful in all its varied forms. We do not, as a professional group, need to break out into advertising to bring the public "up" to an appreciation of our efforts in this direction. They are already there. We simply need to "deliver the goods," the demand is nationwide.

How about the second item, the "utility" which is to go along with the beauty? I think we have here the source of all our difficulties, the origin of all our disagreements, the point of departure which seems to drive us away from sympathy and true understanding with the public and leads us into a group apart, exclusively superior, out of touch with every day human demands and out of harmony with practical common sense requirements. This is the stumbling block where architect and public fall out and wherein originates that very unfortunate and in most cases very unfair impression that architectural beauty is an expensive luxury to be enjoyed only by the rich, and that architects are a dangerous group to deal with if one's purse-strings are limited and one's business necessities vital.

The fault, if there be fault, is surely not with the public. It must be with the architects. In the new era let us correct it, in the new day which we all feel is about to dawn let us make sure that we take our proper place.

How shall we go about it? Certainly not by teaching art in the primary schools in the hope of bringing up a public so imbued with love of the beautiful that they will bankrupt their business to achieve it. Certainly not by changing our architectural schools into business colleges so that whatever other crimes he may commit in the name of art, the student will never make an error in figures. Nor should we attempt to give the student a so-called "practical" equipment which pretends to acquaint him with all the working details of plan arrangement throughout the entire gamut of our ever-changing building requirements. This is manifestly impossible. But we CAN give him a very deep and serious conception of the far reaching importance of his mission in life. We can give him an open and elastic mind, well trained in rational analysis, a common sense groundwork in construc-

tion and a clear understanding of the really limited number of plan elements which are permissible in good building. And finally we can give him the fullest and most complete knowledge of architectural forms in the round, that he can possibly absorb, with an abundance of motives and styles, and the technical facility for expressing them, so that when he goes forth to build he will not be cramped in the solving of the practical, economical and utilitarian elements of his problem by a limited supply of architectural ideas with which to round out and finish off his work.

Now as to the practitioner himself: he, too, could consider with advantage the seriousness of his mission. He, too, could with perfect propriety come off his little pedestal, get down to earth, and associate with his fellow men, the general public, until he thoroughly understands and comprehends their point of view. Let him get it well grounded in his mind that his function in life is one of service—that he is here to help solve humanity's problems as far as his intimate technical knowledge of building affects those problems, that he must never lose sight of the coldly economic side of the case, but must get results within the means available and without sacrifice of those vital elements of plan arrangement or structural simplicity which mean so much in sound financial return to his client. Let him assume full financial responsibility for the accuracy of his estimates and the reliability of his drawings—that is not a new idea, every conscientious practitioner does that now; but he need not assume responsibility in the sense in which a contractor does, for the simple reason that he is not obliged to take a gambler's chance nor permitted to share in the gambler's profits.

As to the code of ethics, no man whose instincts are those of a gentleman need ever be worried by the code. He does not have to read up on table manners before attending a dinner, nor does he have to run over the code of ethics to determine his conduct in practice. All that is written in our code would be followed without it by every right minded man.

And, finally, let us clear our minds on one thing. Public appreciation comes from rendering public service. Let the architects show by their rational common sense grasp of the fundamental economic conditions underlying every problem that they know and sympathize with the public; let them show that they possess a mental equipment sufficiently broad and elastic to solve those requirements, and then prove in solving them that their technical skill as architects is resourceful enough to harmonize those essential requirements with appropriate and imposing beauty.

Architectural Office Organization for Post War Conditions

By DANIEL PAUL HIGGINS

A HEALTHY professional practice, like a healthy person, may take ill and "die" practically over night. Continual vigilance is necessary to keep abreast of the times, and this vigilance is the price of successful professional growth.

We have known of startling examples of architects suddenly acquiring reputations and who have undeniably possessed more than ordinary artistic talent, but who have not been able to understand the importance of a "foursquare" reputation.

Special reference can be made to an article on the "Business of Architecture" in the October, 1916, number of the *Architectural Review* in which the writer gives a definite story briefly, of architects who have had splendid opportunities for success, but who have "died". The death rate is high and is startling enough to render of first importance the questions (1) What is behind this high death rate? and (2) What is to be done to lower it?

If you can call to mind the pictures you have seen illustrating many early types of architects, and their organizations, or I should say, lack of organizations, you will appreciate the reason which is largely responsible for this high death rate.

It is impossible to avoid some passing reference to the desire of some of these prototypes to be known for their artistic qualifications only, seeking to create impression by adopting a pose and manner, fashioned after painters and musicians, often adopting distinct peculiarities of dress, speech and action. This false pose has had many followers, and even to this day it is still effected by some architects with old fashioned notions, who are still prone to support the mistaken theory that in order to be a successful architect it is only necessary to be regarded as a man of artistic temperament and that business and organization will interfere with their art.

It is only fair to admit that among the older types of architects there were many men of great ability, who, if assisted properly by a smooth and complete organization would have been more successful, but being fettered by old methods and old organizations were free to progress only as far as they could draw the old system along with them.

Although Americans and their institutions are known for their rapid-fire progress in modern thought and teachings, this reputation cannot be credited to our schools of architecture in the sense

of teaching the importance of modern and scientific business methods and organization to keep step with the present day commercial demands made on the profession. Students are taught to do wonderfully large and monumental work; lectures and criticism are freely given by eminent practicing architects on design; but seldom, if ever, are the students made to realize what awaits them in the way of intricate structural and difficult business problems. After a delightful atelier training and experience, they are graduated to meet the ever-exacting business man. They then begin to feel the first pangs of disappointment, for they are at loss to understand his language. The big dreams they have dreamed begin to fade away when they are actually confronted with intricate building and business problems with nothing but a haphazard, hit or miss organization to assist them. Possessing very little business or structural knowledge themselves, their attempts at method in the eyes of the modern client, who has made his money through business systems, appear very amateurish and in a short time breed not only discontent, but very often distrust.

It is this same weakness in the school system of England that fosters the Quantity Survey methods where, as here, the business men are interested first in proper financial consideration with art following as of lesser importance. While this particular system is not strong in America, there is a dangerous equivalent in the modern building organizations which in the past few years have made serious inroads in the architectural profession, receiving not only business but government recognition.

In addition to the many present strong organizations of this character, the writer is aware of similar or even larger organizations in contemplation whose aim, like that of the existing organizations, is to capitalize the weak business and structural organization of the average architect when offering their services to the business client in order to control the entire building project. They propose to take over much of the business of the architect's office, preparing careful lists of materials and quantities and holding themselves responsible for securing the correct estimation of all necessary materials; receiving bids, supervising deliveries, requirements, all of which under a proper system of specialization of functions in an architect's organization could be more efficiently handled.

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In order to cope with the increasing competition of the modern building organization, the first essential is the introduction of an interesting course in modern business methods and organization in the schools of architecture by means of lectures, readings, etc., by men in the profession, who, by experience are recognized as business authorities, thereby giving the student an appreciation of actual organization requirements, a broader and more comprehensive knowledge of architecture in all its phases, instilling in him greater confidence to approach his business client in a forceful and intelligent manner and in such a way as to inspire confidence and respect.

The Bible should have contained this commandment for the benefit of architects: "Put not your entire faith in your art, but be ye chiefly concerned regarding business principles and proper attention to the vital monetary interest of your client, for in their acceptance there are good returns."

A client who has come to regard business dealings as a matter of confidence and whose experience with many types of business men has brought him by various stages to a position where he can observe that real efficiency is quantitative and not descriptive, is concerned with the measure and assurance of quantity as well as quality.

To gain the respect and confidence of this type of client, an architect should thoroughly appreciate that the elements of economy in building construction are:

- Simplicity of design.

- Low cost of construction.

- High quality of construction.

- Speed of construction.

All four points should be considered of equal importance and unless a client is assured by his keen sense of observation that his architect is working for the attainment of these elements he will feel that he has made a mistake in his selection. For clearer amplification of the necessity of strict observance of the elements as set forth above, let us consider the fourth point. Speed is vital in a modern building project because it conserves and contributes to the income on the investment. Perhaps long before the consummation of the architect's plans, the owner has by careful calculations, figured on a completion date for the purpose of establishing an earning basis and any careless delay by the architect beyond that date creates an unusual inconvenience. The client cannot be expected to excuse this or to continue his confidence when the architect has so upset his financial plans.

A common abuse of this same confidence is the lack of consideration on the part of the architect for the financial limitation established by the owner on the cost of the structure. It has been the writer's experience on many occasions to listen to architects

tell of how certain commissions cost from twenty-five to fifty per cent more than the original allotment. This practice of proceeding with designs fully realizing that they cannot be executed for any amount near that determined upon is largely responsible for the hesitancy with which the average prospective client approaches an architect who is known for his artistic qualifications, having heard through friends of experiences with the over-ambitious architects who gave them a building of meritorious design, but which did not, in the final analysis, meet their financial anticipations.

On the surface, this may be considered good business for the architect, but in these days of business efficiency what is not good business for the owner certainly in the end will not be good business for the architect. This weakness is capitalized by modern building organizations in their clever presentation of their architectural services to a business client who regards architecture in this respect as the only business wherein such laxity is permitted.

An instance in point is where a broker client refused payment for services on the grounds that he instructed his architect not to exceed a certain amount, and when estimates were received the cost exceeded that amount by twenty per cent. His defence was sustained by the court, the architect receiving nothing for his services and in addition losing the important commission. The architect's plea for another chance was refused because of the prodigious waste of time already caused his client, who in turn asked the architect what he would think if he commissioned his broker to buy certain stock, specified as to description and amount, if the broker were to spend half as much again, or even a point more than ordered.

The modern building tendency is toward comfort and convenience, and so contemporary architecture puts utility first and art following as a matter of course. In these days utility is the paramount issue and though not the only consideration, it is consistently the first. Manifold economic conditions compel it, notably the ever increasing population, the growth of cities, the facilities of travel, the expansion of commerce, capital increase, new industries and the disposition of communities to work, to live and to obtain their pleasure and amusement within the radius of a few municipal miles.

These conditions, particularly intensive population, create high land values, and high land values demand large and necessarily complicated structures in order to obtain an adequate return on the money invested in land. This creates the necessity of modern organization to supersede the older systems where dependence was placed on the contractors' assuming much of the architect's business, assisting, or practically making all mechanical or electrical lay-

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outs, full size details, etc., and where other loose methods, too numerous to mention in this article, were characteristic of the older organization, such as the costly method of making architect's details on brown paper of ungainly size, and which necessitated tracing whenever a copy was required; desultory and ineffectual supervision with a lack of practical knowledge as to proper building methods, cost of materials and inability to adhere to completion dates. Eventually, of course, buildings were finished but many times at a practically ruinous cost. Delays have eaten into the rental returns on buildings, thereby defeating the contemplated ratio of income to investment. In many cases the architect's drawings and specification were loosely checked and in consequence of their omissions the contractor demanded exorbitant "extras." Furthermore, due to the incomplete condition of plans and specifications, changes were ordered which in addition to extra cost, tended to invalidate the original completion date, for extras invariably carry with them an extension of time. In addition to these defects in the old methods of architectural organization, the interests of the employees were in a continual state of conflict. Complete harmony was impossible, duplication of work frequent, each employee being inclined to exaggerate the importance of his respective duties. Few had a genuine interest in the business as a whole, not realizing how costly is the absence of lack of specialization and co-operation of function. Specialization of functions was unthought of and much waste of valuable time and loss of considerable profit resulted by return movements and double handling of matters. The seat of the whole trouble was the absence of organized control.

Just now the attention of the thoughtful and progressive architect centers on questions of practical concern, questions of efficiency in organization for the most satisfactory and economical execution of work with profitable returns to himself, questions brought to focus by the modern conditions already mentioned.

It is significant that, despite the modern tendency to centralize great industries, not until recent years has any effectual attempt been made to establish in the practice of architecture some semblance of scientific organization, and to date there are only a few architects' firms who are not clinging tenaciously to old methods permitting the modern building organization to advertise itself as a machine which has perfected all its component parts as the inherent problems of building construction will permit it, appealing thereby to the client of modern commercial ideas much to the embarrassment of architecture, within its own organization with assurances of the best consideration to the client's monetary and structural interest. The apparent progress made by the so-

called modern building organizations in this direction makes paramount the question not only as to the continued prestige and the integrity of the profession, but to save our architecture from the irretrievable damage it must suffer from insidious and unappreciative commercial control.

It is realized by the architect who thinks along modern lines that there must be something done in the way of reconstruction of the schedule of things, and it is also realized that reconstruction must be carried out with a view to the security of the business and structural reputation of the architect under such conditions as prevail with the modern client rather than with a view to the impeccable preservation of the idolized scheme of "art for art's sake only."

While many attempts have been made by architects in late years to improve their organizations to meet demands made by the development of architecture and building to its existing and ever increasing condition of manifold complexity, and while great improvement has been made over the older systems, the value of a scientific organization based on the specialization of functions has not yet been fully appreciated by them in general. This development is bound to come in the same sense as it came to commercial business, but for the present the large majority of architects are prone to accept the notion of placing an individual in complete charge of all functions with the title of "business manager," whose training and general education is invariably along practical lines only, with little or no real business technique. In many cases he is expected to attend to clients' requirements, to supervise business details and routine, oversee the making of drawings, write specifications, supervise construction, etc.

The fallacies of this type of management where all functions are autocratically controlled by an individual of technical training and experience, are injurious to the solution of the fundamental problem of providing for continuity in the life of the organization, for in many offices where this system exists, architectural merit, business and other important factors are made subordinate to the manager's particular interest and sympathies.

Where full control of all functions in an organization is vested in this type of manager, who in most cases has been trained as a building superintendent, there is little or no appreciation for consistent design or business policy, his appointments of designers are injudiciously made and his supervision, interest and direction in matters of design and business are superficial and haphazard. Designers are free to experiment and develop many different styles and his far-reaching authority permits him to interfere with the essential quality of design to effect some change in the construction of the building.

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Changes in design made by him often re-act upon its merit since design is entirely secondary to his own particular sympathies and interest.

Here is an example in point, where the arbitrary change in method of construction sanctioned by the so-called "business manager" interfered seriously with the intention of design, especially since in this case, in the execution of important half timber work, good construction meant good design, where any change either as regard dimensions or material used would lead to a different interpretation of the work when completed. This manager, whose control was absolute, being appealed to by the contractor for permission to make certain changes owing to a shortage of material on hand, granted it without consulting the designer. The design called for certain lengths and dimensions of timber, but the material which was allowed to be substituted in no sense corresponded to the dimensions called for, with the result that when completed, the work was found to be pieced together out of a great number of short lengths which in the use of ceiling beams and such construction reduced this particular effort of the designer to the appearance of a mere amateurish attempt.

In the case of the organization where specialization of functions is featured, this matter would be decided by the head of design who would never permit such an alteration from the drawings to be made, as he could readily have so adjusted his design as to utilize intelligently the material on hand.

At this stage it is proper to state that an article so brief as this is a very inadequate vehicle for the citation of many other defects of this type of management, but it would not be well to stop here without calling attention to a few more dangerous elements. The architect in an effort to shift the responsibilities of the details of his practice in giving such absolute control to an individual is making himself solely dependent on this man and must accept his policy as the policy of the architect's practice, reflecting either credit or discredit on the reputation of the architect, in accordance with the efficiency or inefficiency of the manager's method and control of functions. In most cases this manager is apt to feel that organization and "system" are non-essential for his purpose. He prides himself frequently on his "close attention to all details" and believes—perhaps rightly—due to his shortsightedness in the development of capable subordinates—that, without his personal supervision, everything would go wrong. Now, the first step in systematic management is classification; and that is just where most managers of the old type fail. They do not know how to classify; hence their

work is done in a helter-skelter fashion. No one in the office knows what they may be doing in an hour's time. Routine matters are not attended to, correspondence piles up, business is neglected; such things presage trouble, and if not ultimate failure, the growth of the practice is stunted.

Considerable loss of profit is inevitable under this system, on account of: (1) Lack of interest on the part of the subordinates; (2) waste by the assignment of men to work for which they are not fitted or especially trained; (3) lack of proper scientific accounting and report system devised for the particular needs of the architect's practice; (4) confusion and loss of time in duplicate of accounts and reports; (5) making of accounting records by stenographers or office boys, upon which the architect must depend for data in making decisions of policy, etc., and (6) the general dissipation of energy in the attempt by one person to perform too many and too varying functions when each requires special knowledge and training. To a manager of the old type, a business department headed by an individual especially educated and trained as such, would be considered as much of a luxury as the carved figures which decorate the bowsprits of a sailing vessel, or perhaps the tin traffic policeman or other freakish figure, on the radiator of an automobile. He fails to realize that the ability properly to conduct the business requires an exacting and a difficult training, the power accurately to analyze new situations, to conduct independent research, and to judge intelligently of the relative value of data. The word business is generally misunderstood by most architects, and the old type of business manager as meaning routine and red tape which in their minds can be capably taken care of by any clerk regardless of his or her training.

It is commonly the case where there are any important changes in conditions, managers of this character do not outgrow their habits, and attempt to govern new conditions by the same means and the same methods as were found adaptable to smaller organizations. But no one man can now get and keep in personal touch with all details of a fair sized practice without producing confusion and loss through adherence to those relics of management which are applicable to small practices. In the final analysis, allowing that this manager, whose control and direction are supreme, is proficient in all functions, in the absence of the development of subordinates to head important departments, there is no pyramiding of system, and should he leave the organization, the foundation of the architect's practice would collapse.

(To be continued)

Building Costs and Earnings

The Office Building Outlook

By WILLIAM MARSHALL ELLIS

President of the National Association of Building Owners and Managers.

THE sudden ending of the great war has at once confronted the entire civilized world with the most far-reaching and intricate problems affecting every department of human life. Not only will the maps of three continents have to be redrawn in many important particulars and the inter-relations of the nations determined upon new principles and in the light of fresh conceptions of mutual co-operation, fair dealing, and friendliness, but in every land the social customs of the people will be profoundly modified; and, last, but not least, much in the business structure of each nation must be readjusted and reconstructed.

Office buildings present no exception to this general rule but rather seem to demand that the greatest courage, vigor, and skill be exercised without delay in re-establishing such a proper balance between income and expenditures that convenient, comfortable, and efficient service can be rendered to the business public and at the same time produce net earnings sufficiently large fairly to compensate capital now invested and to attract the new capital necessary to supply the constantly growing office requirements of our country. If we hope to make these important adjustments intelligently and promptly, it is necessary to face present conditions as they exist, without flinching and without false optimism.

The War Industries Board was clearly right in classifying office buildings among the essential industries of our country for, in general, the business of the country is directed and controlled in these great fire-resisting structures. They make a vital contribution to the growth and prosperity of all modern cities.

As in the case of the railroads and other industries supplying an essential service, the renting public can well afford to pay whatever it costs to provide suitable office facilities for its use, plus a reasonable return on the capital invested in so doing. Office rentals are such a small proportion of the total business expense of individuals and companies paying them that it is comparatively easy from the standpoint of the consumer to make any upward modification in rates that an accurate analysis of the situation may show to be justified.

What then is the general situation as regards office building earnings? While conditions vary in

different cities, and in any city there may be isolated examples of buildings already paying a satisfactory return on invested capital, it is frankly admitted by owners and managers generally that current income has in no adequate measure kept pace during recent years with the startling increases in operating costs.

An analysis of the advance in prices of a few of the leading items in office building construction during the past five years shows the following comparisons:

APPROXIMATE INCREASE SINCE 1913

Structural steel	90 to 100%
Brick, tile and terra cotta.....	40 to 50%
Lumber (interior trim, maple flooring and rough lumber).....	45 to 50%
Elevator construction and repairs.....	35 to 50%
Steam fitting and piping.....	50 to 60%
Plumbing	90 to 100%
Electric wiring	90 to 100%
Plastering	45 to 50%
Marble	20 to 25%
Glass	150 to 200%
Painting and decorating.....	30 to 40%

The cost of building repairs, alterations and general maintenance has also advanced in like proportion.

A review of wages paid to building employees engaged in the operation and maintenance of a large group of Chicago office buildings shows average increases amounting to about 3 per cent per annum for the years 1907 to 1917, with much larger increase during the past year.

General taxes, the largest single item entering into the cost of building operation, had steadily advanced for many years prior to the war. The tax bills for a similar group of downtown properties in Chicago shows an average increase of 3.9 per cent per year for the years 1907 and 1917. With city, state, and federal governments constantly broadening the scope of their activities, it seems reasonable to expect further increases in taxes.

Fuel is another large and important item in building operation which should not be overlooked. Present prices of coal are about 100 per cent above those charged three years ago, and there is no immediate relief in sight. It is generally believed that the present high prices of fuel will be somewhat reduced in the post-war readjustments, but all items of cost entering into the mining and distribution of coal have increased to such an extent that we cannot expect to return to pre-war prices.

With the development of these increases in operating costs, building managers throughout the coun-

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try immediately began to check up to see whether they could curtail any expenses which might have crept in through channels of unwise competition, or otherwise, thereby endeavoring to avoid making general increases in rentals. Though they have in some instances eliminated numerous small items, the readjustments that can be made without seriously depreciating the quality of service rendered are so unimportant as to produce but slight effect upon total expenditures. The most important of these adjustments have been the metering of electric current furnished to tenants and the elimination of expensive, and in many cases unnecessary, alterations for tenants, the aim being in both cases to charge direct to each tenant the cost of any special service furnished by the building.

Labor is such an important item in building operation and there is such small opportunity for the substitution of mechanical devices for hand labor that it is very difficult to make extensive readjustments without demoralizing the service.

Service is the keynote of building operation, and the quality of service required by tenants should largely regulate the rental to be paid for offices. If a large measure of special service is to be rendered, the tenant should pay for it outright, or the rental should be adjusted to the volume and quality of service required. Low rentals and high-grade service cannot be reconciled, and it is my observation that most tenants in modern office buildings demand and can well afford to pay for high-grade service.

In the analysis of new office building projects all the above items, together with the question of land values and rates of interest, must be given careful consideration. Where the land is owned in fee, the income tax and other forms of ever increasing taxation make higher earnings on such fees imperative. Where leaseholds are to be negotiated, a higher rate of interest must be secured for the same general reasons. The day of 4 per cent fees has apparently passed. Where a building loan is to be negotiated it is conceded that higher rates of interest will prevail. Investors who in recent years have been fortunate enough to secure ninety-nine year leases on a 4 per cent basis, and long term building loans on a $4\frac{1}{4}$ to $4\frac{1}{2}$ per cent basis, hold a decided advantage over their competitors who are financing building operations to-day. Comparatively fortunate also are those who built at pre-war prices of both material and labor, and yet many buildings erected under those favorable conditions are to-day paying an inadequate return.

Building owners frequently have accepted heavy losses during the past few years without materially raising rentals in the hope that the conditions which produced such losses in net income were only temporary, but now I believe it is the consensus of well-

informed opinion that regardless of fluctuations in prices of material and labor there will be no receding to pre-war levels, at least for years to come. Higher rentals are therefore inevitable.

We are told by leading representatives of organized labor that they propose to maintain at any cost the gains which they have made during the war, and that no increase in hours of labor or decreases in wages will be permitted without a desperate contest. The labor item is a very large factor both in the construction and operation of buildings and observation leads me to believe that increased efficiency does not follow advances in wages. In fact, it seems to be generally conceded that the keen demand for labor created by the war and the high wages paid in the war industries, regardless of efficiency, has had a demoralizing effect upon many workmen and that it will take time for labor again to restore its efficiency to a peace basis. There will undoubtedly be a large volume of work where the need for buildings for certain requirements is so urgent as to make the cost a secondary matter. There are also many railway terminals and other great projects where the work has already begun and where it will be an economy to push on to completion as rapidly as possible regardless of cost. This work should tend to stabilize both the material and labor markets and give those who have considerable supplies of material on hand a chance to move them at current prices and at the same time provide employment for a large volume of labor pending permanent readjustment.

The modern office building industry is in its infancy, relatively speaking, dating back only a little over thirty years at the outside, while the great majority of existing buildings have been erected within the past twenty years. Because of the much talked of permanent character of these structures and the comparatively short time during which they have been erected, depreciation and obsolescence have hitherto been frequently minimized or entirely overlooked by owners and managers. This has resulted many times in establishing rental schedules that have produced, we will say, 4 to 6 per cent net on the investment without, however, deducting any depreciation charge. In reality, after deducting a reasonable depreciation and obsolescence charge—which in my judgment should not be less than 2 per cent on fire-resisting office buildings—these owners have been receiving a net return of 2 to 4 per cent or less, a return certainly not compatible with the risk incurred and service rendered by them. The filing of Income Tax Schedules has recently aroused building owners to the necessity of taking cognizance of this item when computing the income tax on their investments, and I believe the federal government should establish depreciation rates on all types of

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buildings that would be uniform throughout the country. Investors who disregard this important item are misleading themselves, and will in time face crushing replacement charges which cannot be met from current income.

I believe all fair-minded men—and in this category I include most tenants—will agree that 6 per cent net after deducting depreciation charge is certainly not an unreasonably high rate of return on office building investments, and that owners are fully justified in revising their rental schedules sufficiently to produce such results.

I have scrutinized with great care the conditions surrounding the operation of office buildings to-day and I do not hesitate to admit that from the standpoint of earnings the situation requires the most skillful and energetic attention, but I am still decidedly optimistic about the outlook for office building investments. Some of the most important reasons on which this optimism is based I would sum up as follows:

1—The essential character of the service rendered by office buildings, and the ability of the rent-

ing public to pay an equitable price for this service.

2—The fact that readjustments and reconstruction are in the air, and that it will be relatively easy to make proper modifications in business practices.

3—My knowledge of the high character and intelligence represented in building owners and managers, and my confidence that in the light of up-to-date experience they will endeavor to revise their rental programs to produce 6 per cent after deducting all charges against income, including a proper depreciation and obsolescence charge.

In regard to the erection of new buildings, I am strongly opposed to the artificial stimulation of office building investments by over-emphasizing in any locality the demand for more office space, or by exaggerating the rate of income that has been secured by existing office buildings. I am, however, firmly of the opinion that the assured business activity of this country will be constantly demanding new office buildings of the highest type, and that with an intelligent and prompt adjustment of income to modern operating conditions the necessary capital will be available for such investments.

How Office Building Managers Have Met War Conditions

By EDWIN S. JEWELL

MANAGER, CITY NATIONAL BANK BUILDING, CHICAGO

THE business of managing office buildings does not differ radically from other lines of business, except that office space is usually sold under contract for a period of years and this makes it difficult to meet unexpected changes in conditions such as were brought on by the European war.

Up to the year 1917 there had never been a disturbance in the operating cost department of office buildings except the occasional ripples caused by discontented labor.

The first problem that office buildings had to face following the declaration of war was the enormously increased cost of fuel. The records of most buildings will show a fuel cost for 1917 about double the cost in previous years.

Operating conditions became so binding in the Fall of 1917 that office building managers began seriously discussing ways and means for preventing heavy losses. The following letter sent by one office building to its tenants will fairly illustrate the conditions with which office buildings were confronted, following the declaration of war by the United States:

"The present rates for rental were adopted nearly eight years ago and were based upon 6 per cent earn-

ings on what the property cost the present owners, plus expense for operation, maintenance, service and taxes.

"Since that time the cost for coal, supplies, taxes and payroll for the forty or more employees required for the care, service and maintenance of the building is more than \$25,000 per year greater than when this schedule was adopted. The increase of expense is equivalent to about \$5 per month on each single room that now rents at \$18 per month, and in that proportion for all other rooms.

"It does not seem advisable to lower the quality of service nor the standard of tenants. It, therefore, seems right and necessary to ask the tenants to pay a part of this increased cost, from such time as their present leases expire."

The rapid increase in operating expenses prompted building owners' and managers' associations throughout the country to investigate every kind of outlay, with the result that several cities discovered that the tax situation was becoming alarming.

The Omaha Association explained the tax conditions to tenants by enclosing a card with January, 1918, rent bills, which gave the following information:

INFORMATION FOR OCCUPANTS OF OFFICE BUILDINGS AND APARTMENT HOUSES IN OMAHA

January, 1918

This is a ten-year record of general taxes assessed to the Omaha National Bank Building. The experience of other Omaha office and apartment buildings has been similar.

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1909.....\$ 8,585.50	1914.....\$14,073.04
1910.....10,208.00	1915.....13,962.96
1911.....9,933.30	1916.....17,062.40
1912.....10,296.00	1917.....17,362.20
1913.....14,757.60	1918.....20,193.20

The taxes to be paid in 1918 are \$11,607.70 more than in 1909—an increase of 135 per cent.

The tendency to increase the taxes and operating costs from year to year makes it self-evident that increasing rentals are justified and necessary, if buildings are to pay a fair net interest return upon such investment.

PUBLICITY COMMITTEE,
Building Owners' and Managers' Association of
Omaha.

By Spring of 1918 the cost of building and painting materials had advanced to a point which made alteration a real problem. This condition was met in Portland, Oregon, and some other cities by building managers adopting the following rule:

In the case of Office Buildings, the cost of moving, removing or erecting partitions, installing plumbing and changing electric wiring in excess of 4 per cent of the term rental provided for in the lease, shall be charged to the tenant.

The enforcement of this rule will have a tendency greatly to reduce the cost of alterations in some cases and in other cases where extensive alterations are necessary it will help the owner or manager to secure a longer lease than normally would be made.

Since the army draft law went into effect, labor conditions in office buildings have taxed the ingenuity of building managers and tried the patience of tenants.

The Equitable Building of New York explained the cause of poor service to tenants in its monthly publication. The following is an epitome of the Equitable Building's remarks on the labor situation:

PLEASE BE PATIENT

If now and then, during the period of the war, the service does not come up to your expectation, have confidence that the Building Managers are doing the best they can under the circumstances.

The elevator men are in the army and navy.

The porters are in the factories.
The cleaning women are in the packing houses.
The engineers are with the railroads.
The firemen are on the transports.
The carpenters and painters are in the shipyards.

Notwithstanding the inferior and uncertain service rendered by office buildings, the pay roll has jumped up during the past year from 10 to 25 per cent.

In cases where operating costs cannot be further reduced without impairing the service and where it is not advisable to make greater increases in rents, a method of economizing has been adopted which because of its eminent fairness is proving very practical.

The following notice sent by one office building to its tenants will illustrate this method of holding down expense:

NECESSITY COMPELS US TO CONSERVE

For years many odd jobs have been done for tenants, and materials have occasionally been furnished free because the value seemed small.

On account of the greatly increased cost of everything, the practice of furnishing "extras" to tenants must be discontinued and services rendered that are not a part of the care and maintenance of the premises will be charged on the basis of time and material plus 10 per cent.

The tendency has been for office building managers to take tenants into their confidence and lay everything on the table face up. Tenants have met building managers good naturedly and in a very generous spirit.

As a result of these strenuous and trying times, office building managers and tenants will understand each other much better and will work in greater harmony in the future. The false notion that office buildings yield their owners large profits will fade away and greater appreciation on the part of the tenants and more sympathetic attitude on the part of owners and managers should logically follow.

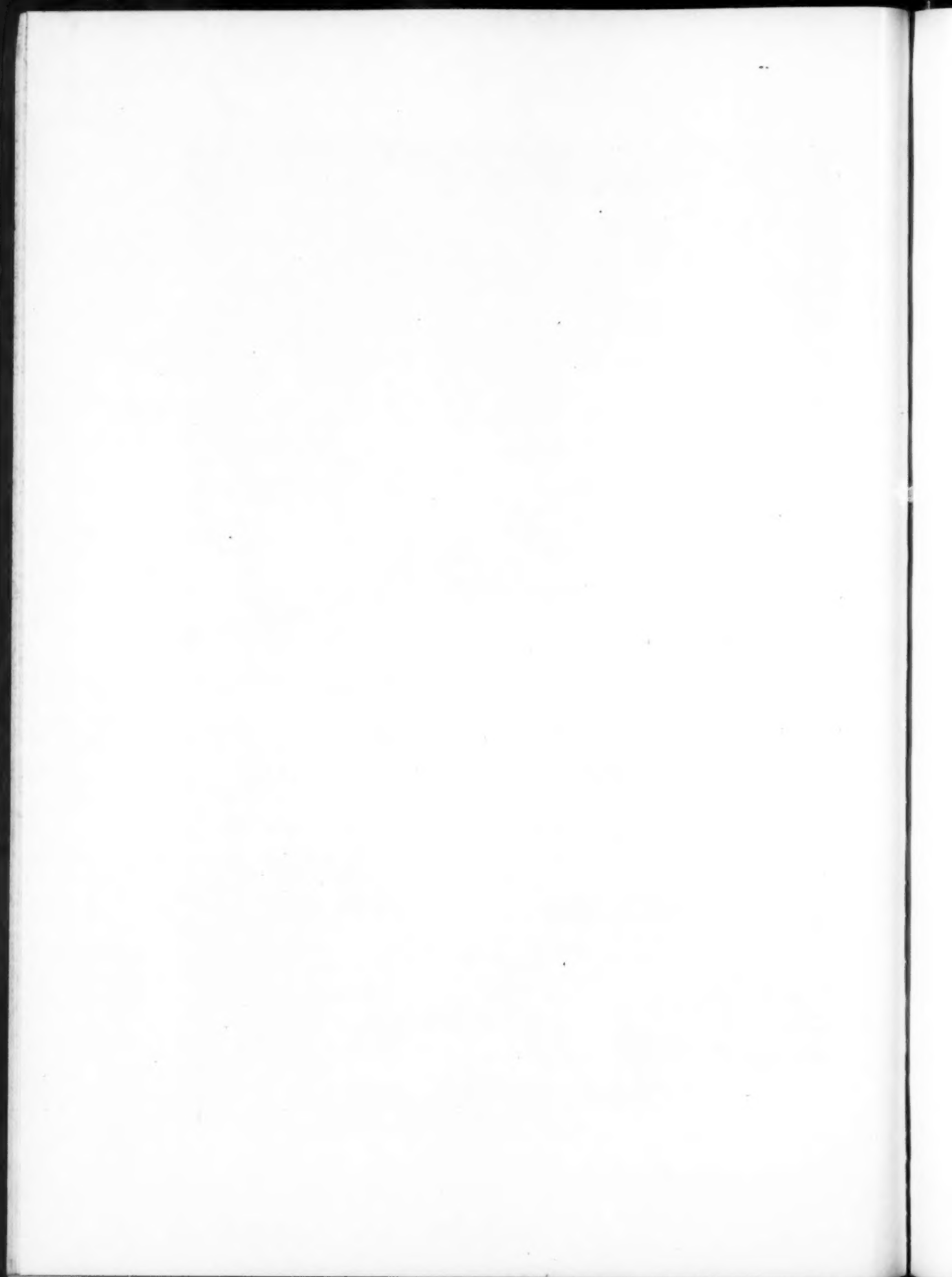


A CARVED WOOD DETAIL BY GRINLING GIBBONS.



PLATE I

JOHN KINSEY SCHOOL, SIXTY-FIFTH AVENUE, PHILADELPHIA, PA.
HORACE COOK, ARCHITECT

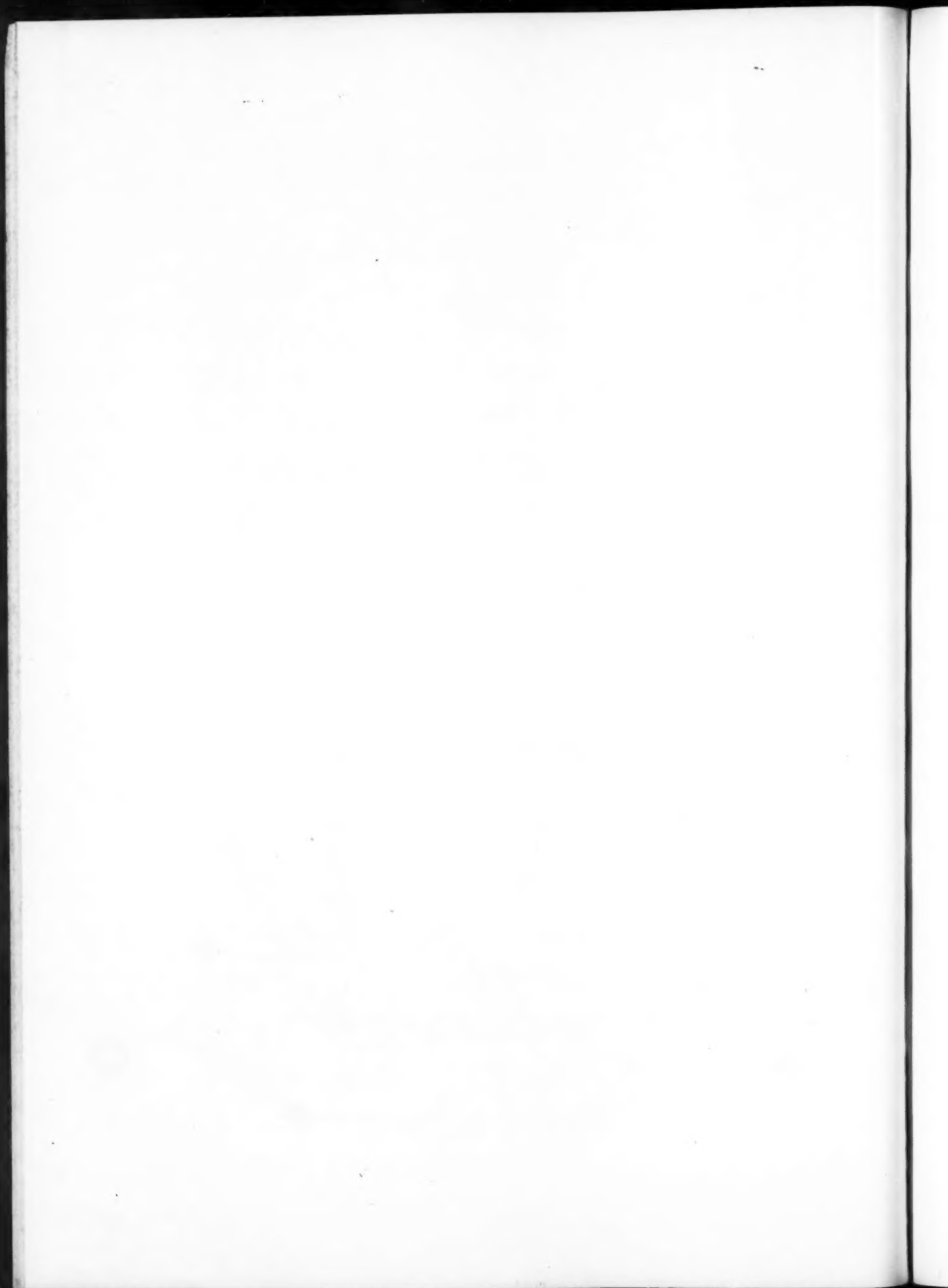


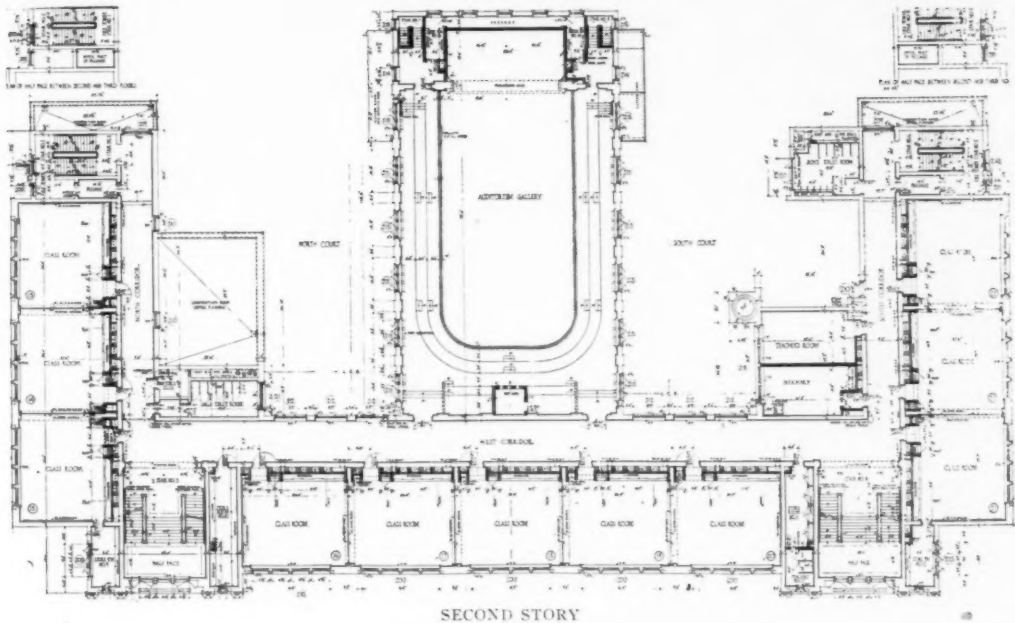


FIRST FLOOR PLAN

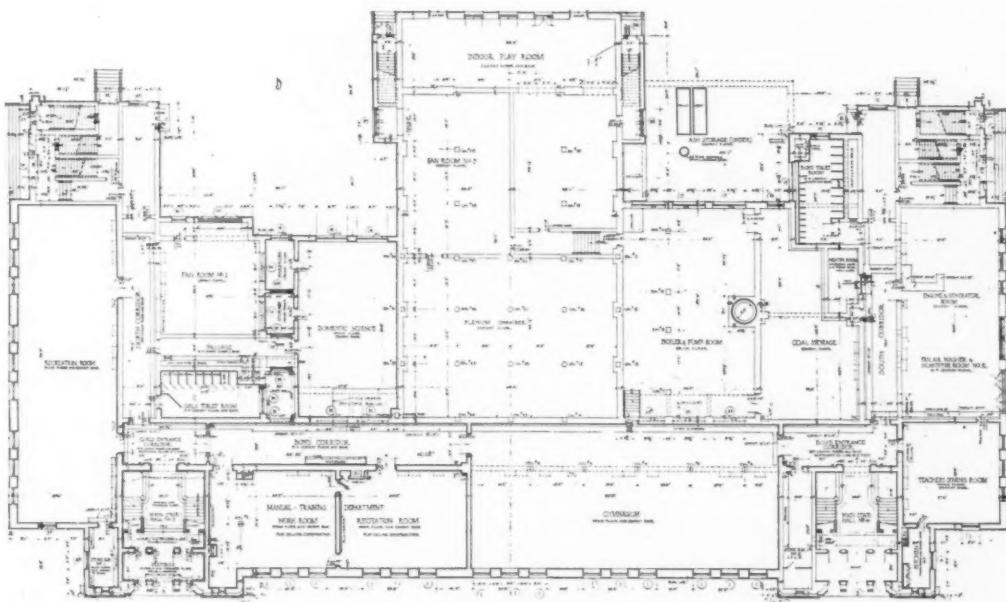
JOHN KINSEY SCHOOL, SIXTY-FIFTH AVENUE, PHILADELPHIA, PA.

HORACE COOK, ARCHITECT





SECOND STORY



BASEMENT STORY

PLATE 3

JOHN KINSEY SCHOOL, SIXTY-FIFTH AVENUE, PHILADELPHIA, PA.

HORACE COOK, ARCHITECT

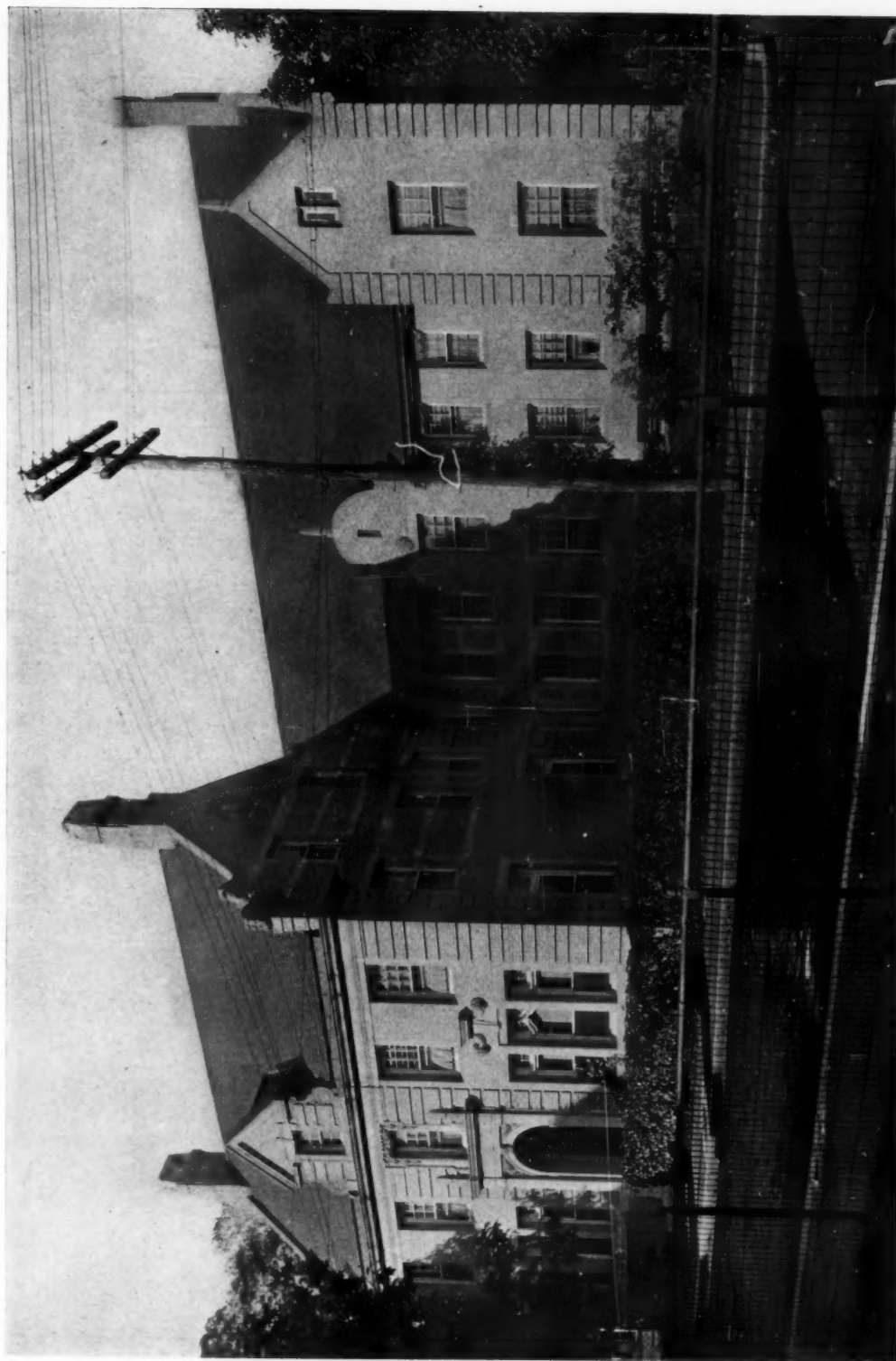
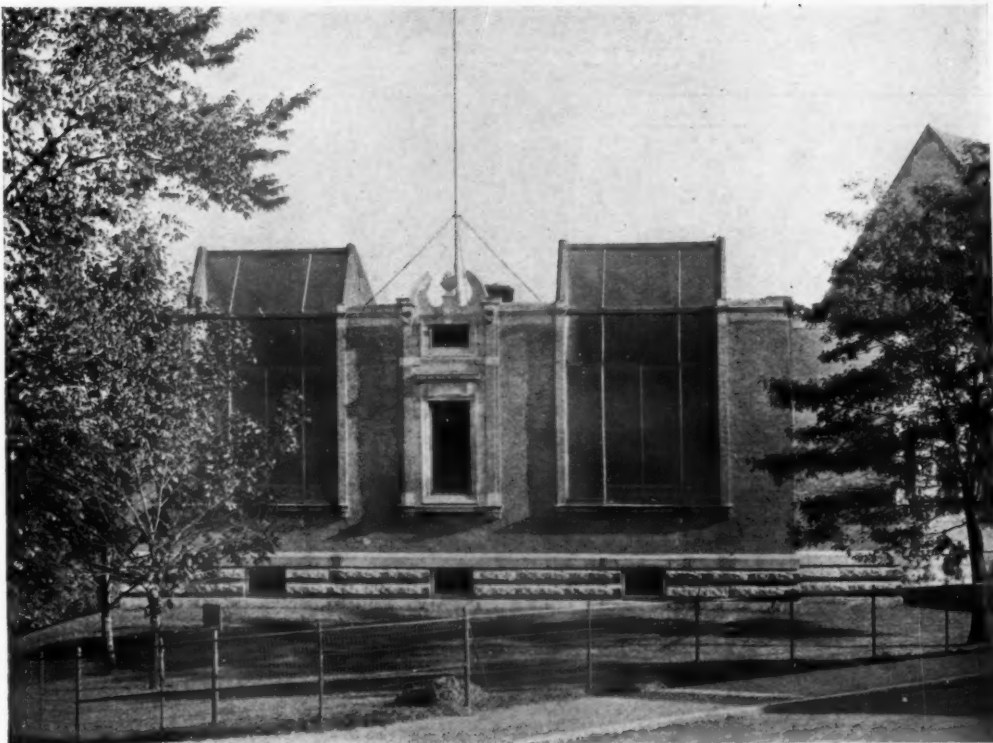


PLATE 4

FREE HOSPITAL FOR WOMEN, BROOKLINE, MASS.
COOLIDGE & CARLSON, ARCHITECTS



OPERATING BUILDING



LAUNDRY BUILDING

PLATE 5

FREE HOSPITAL FOR WOMEN, BROOKLINE, MASS.

COOLIDGE & CARLSON, ARCHITECTS

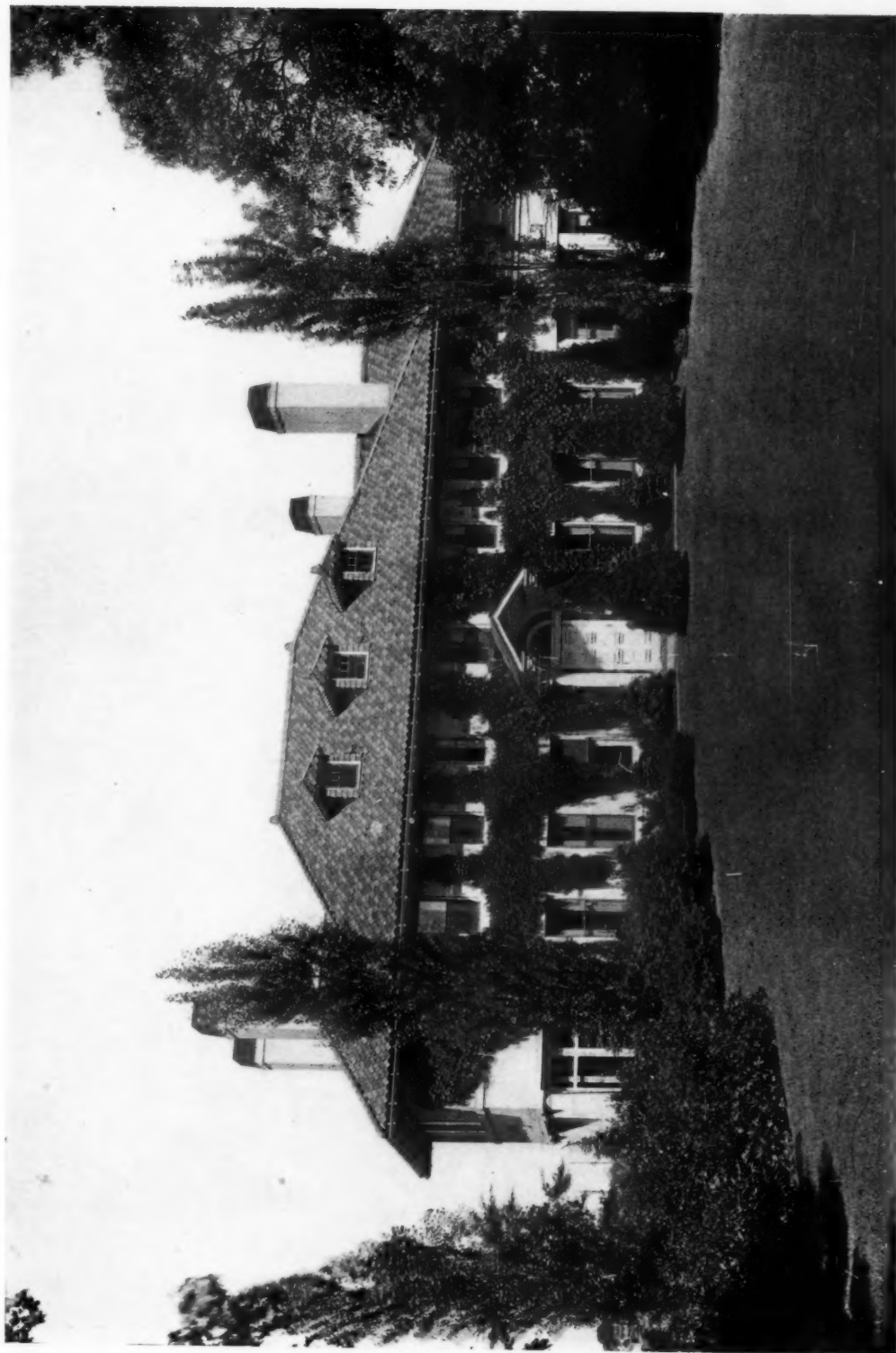


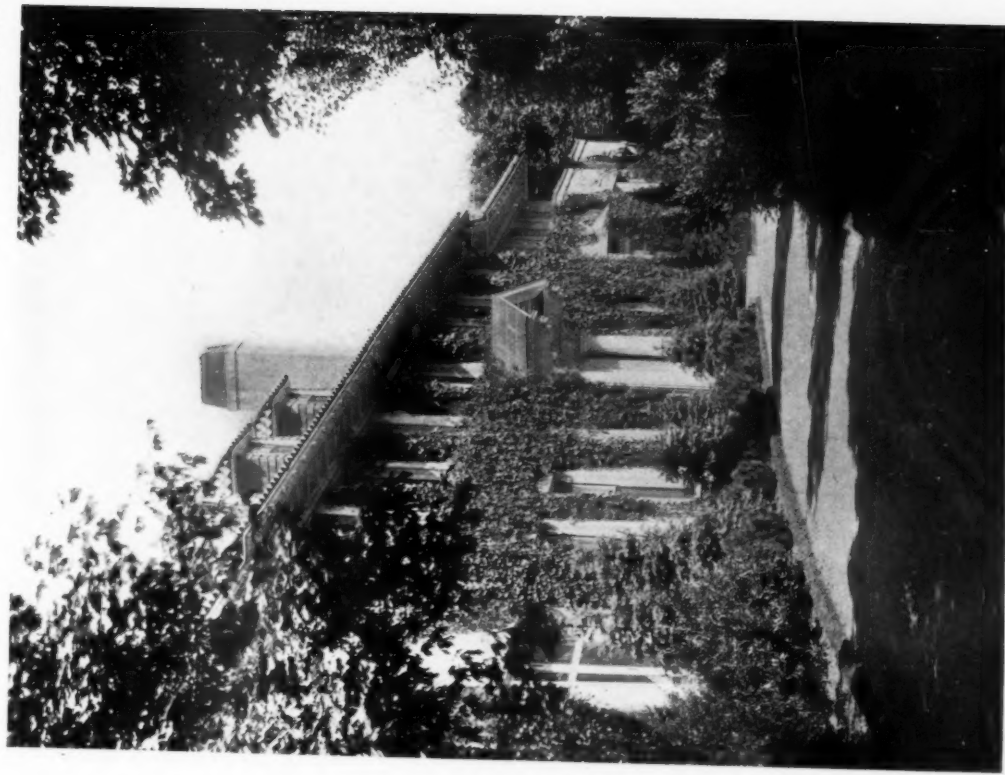
PLATE 6

HOUSE OF HENRY A. MORSS, MARBLEHEAD, MASS.
COOLIDGE & CARLSON, ARCHITECTS



PLATE 7

HARBOR FRONT



ENTRANCE FRONT

HOUSE OF HENRY A. MORSS, MARBLEHEAD, MASS.

COOLIDGE & CARLSON, ARCHITECTS



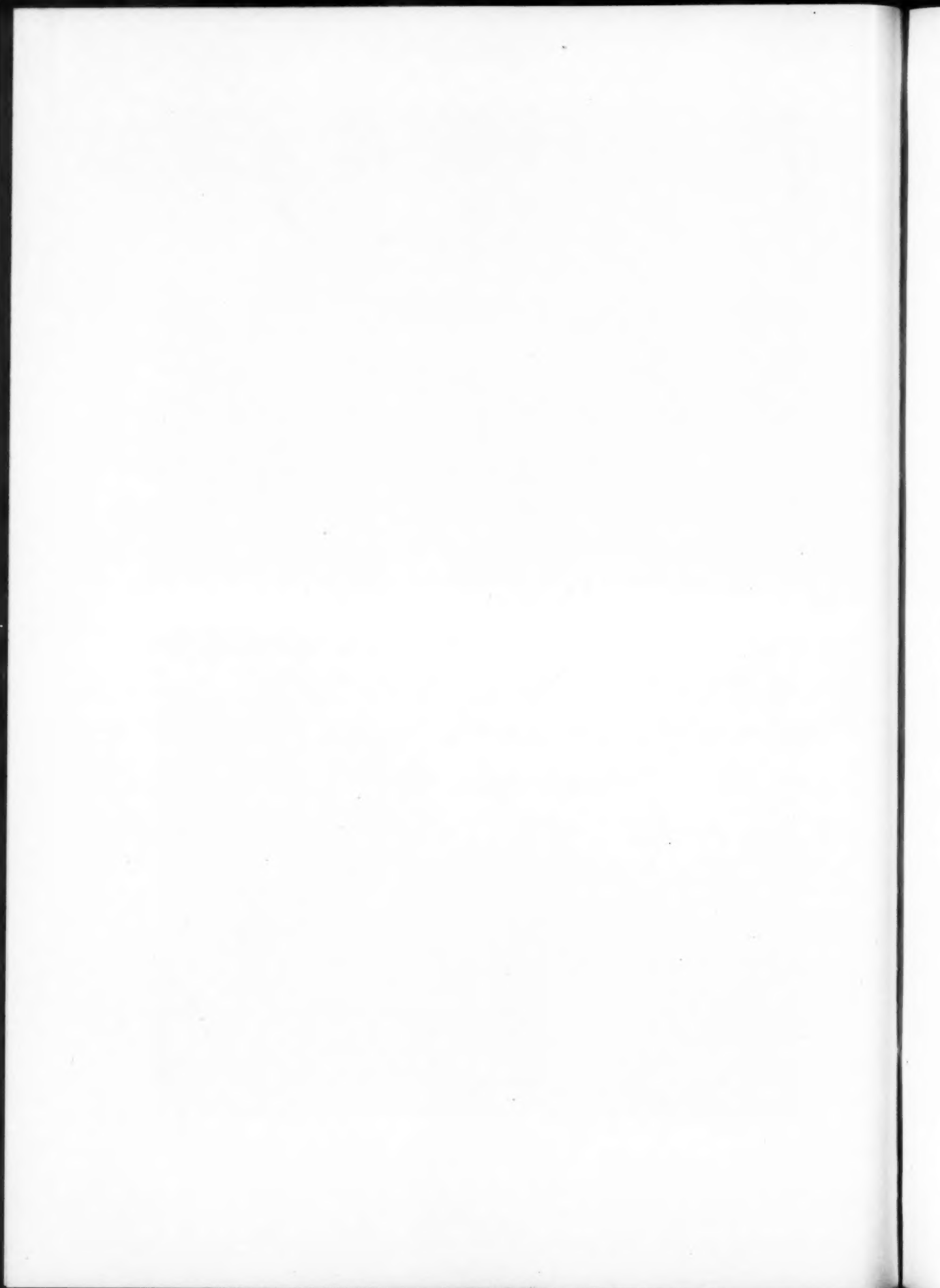
HARBOR FRONT



PLATE 8

HARBOR FRONT

HOUSE OF HENRY A. MORSS, MARBLEHEAD, MASS.
COOLIDGE & CARLSON, ARCHITECTS





DINING ROOM

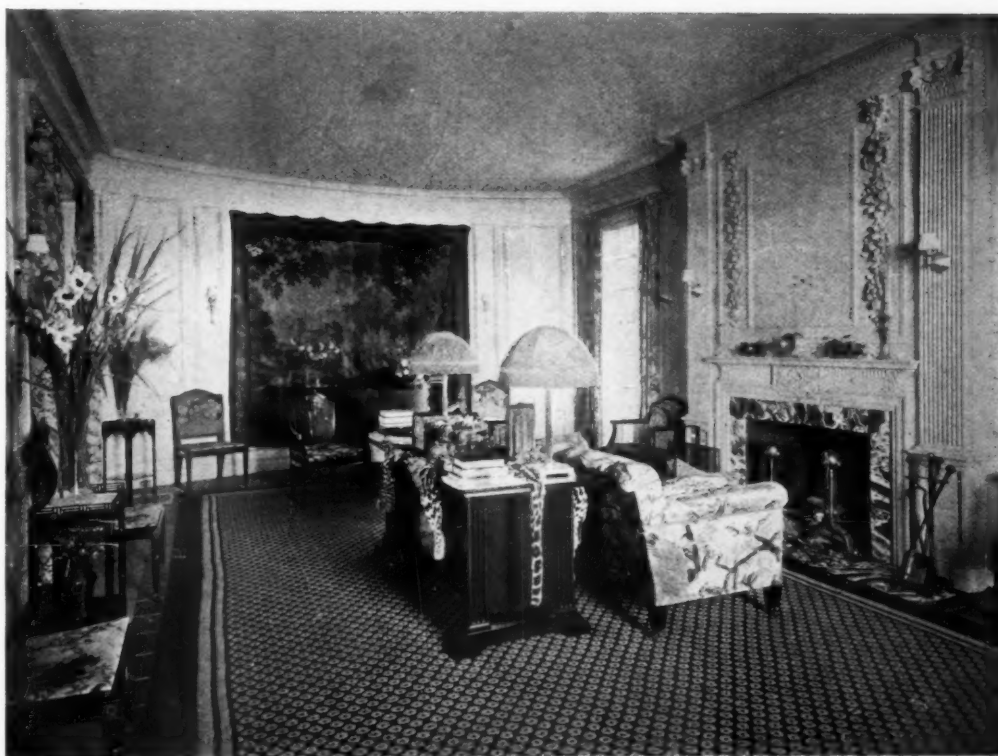


PLATE 9

LIVING ROOM

HOUSE OF HENRY A. MORSS, MARBLEHEAD, MASS.

COOLIDGE & CARLSON, ARCHITECTS



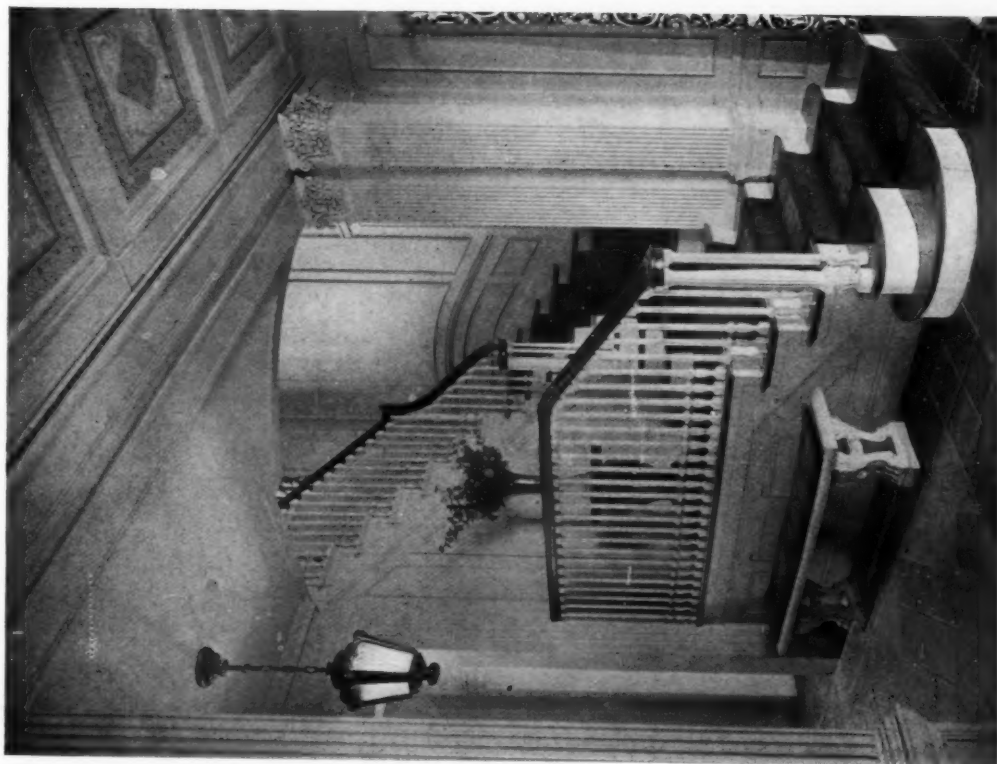


PLATE 10

STAIRWAY



DETAIL IN DINING ROOM

HOUSE OF HENRY A. MORSS, MARBLEHEAD, MASS.

COOLIDGE & CARLSON, ARCHITECTS

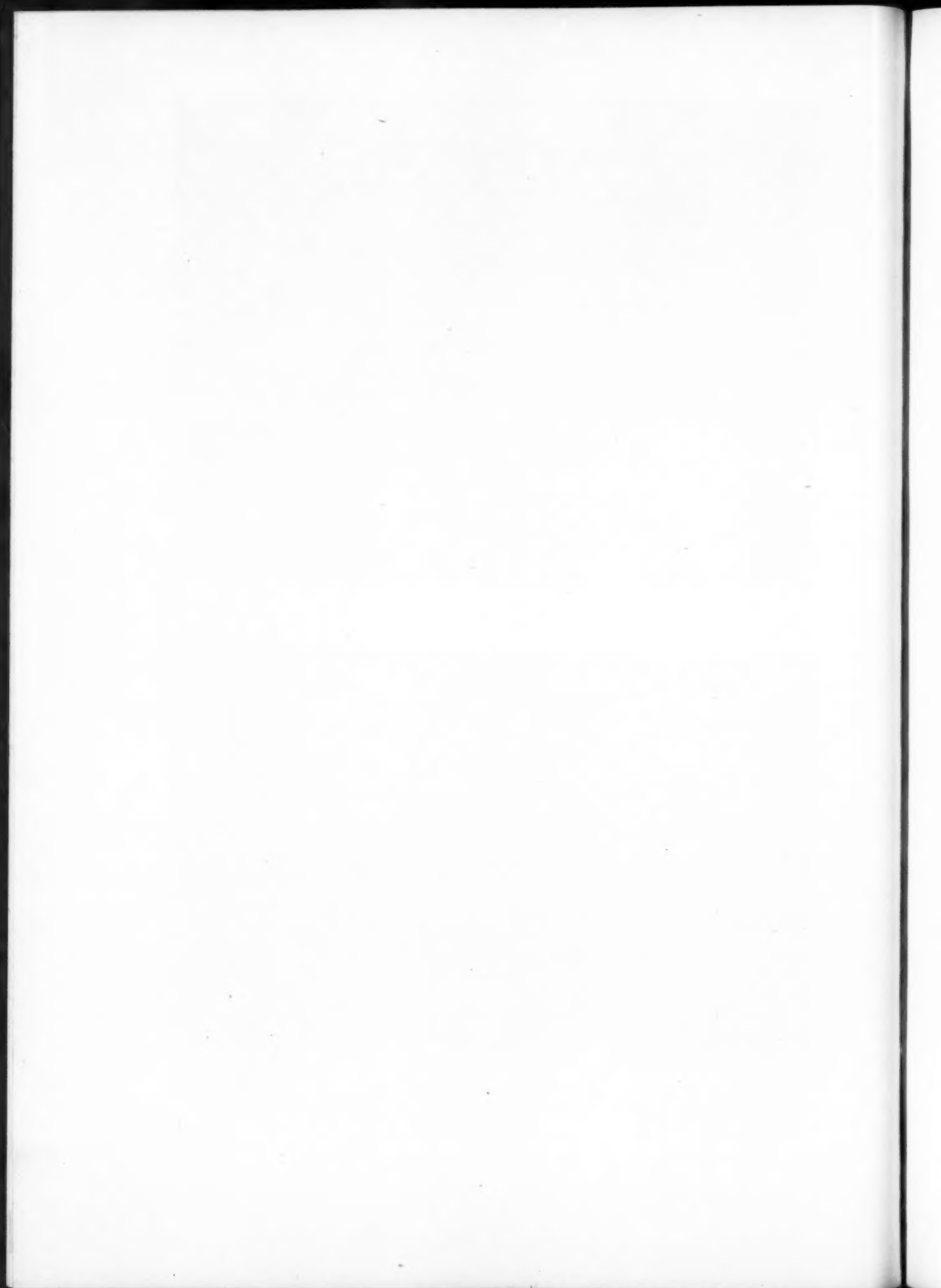




PLATE 11

BUILDING FOR THOMAS CUSACK COMPANY, BROADWAY AND FIFTH AVENUE, NEW YORK

BUCHMAN & KAHN, ZIMMERMAN, SAXE & ZIMMERMAN, ASSOCIATED ARCHITECTS

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Criticism and Comment

An Opportunity to Aid a Worthy Cause

(THE AMERICAN ARCHITECT will be pleased to receive any remittances that may be sent to it, in aid of this object, and will see to it that they reach their proper destination.)

The Editors, THE AMERICAN ARCHITECT:

I am enclosing copy of a letter received from Mr. Lavanoux, who is a New York draftsman now in France. I can make no better appeal than he has already made in this letter.

FRANK E. WALLIS.

New York.

Fontainebleau, November 28, 1918.

MY DEAR MR. WALLIS: Knowing draftsmen as you do, and being acquainted with their many shortcomings, you will, I hope, pardon my long silence, which is due not so much to laziness but rather to the "put it off to another day" habit.

Before coming to Fontainebleau about a month ago to enter the artillery school, I spent a few weeks in Paris visiting churches and roaming around my favorite haunts, l'Île de la Cité and the quais. In the course of my wanderings I came upon the old church of Saint-Gervais, near the Hotel de Ville. This church, as you know, was hit on Good Friday by one of the Big Bertha shells. The damage, loss of life, etc., was undoubtedly spoken of in the home papers. I spent a few hours in the church, viewing the damaged vault, the spots of blood on the stone floor, and ended my visit by interviewing Monsieur le Curé, l'Abbé Gauthier. We spoke of a thousand and one things, among which, naturally, was the question of reconstruction of the vault and pillars. M. le Curé told me that some persons had expressed a desire to help him financially, but nothing was ever done. He also told me that he had written to Cardinal Gibbons, asking His Eminence to head a campaign for funds, but that Cardinal Gibbons pleaded an overwhelming amount of work and his age, which prevented him from taking any active part in such an undertaking. It was then that I suggested to M. l'Abbé Gauthier that I endeavor to interest architects of New York in the matter. He seemed to be pleased with the idea, saying that he would feel most grateful for any help the members of the profession would give him. With your help and influence, I believe an appeal might be written up and published in a leading architectural publication. Any sum would be gladly received and could be forwarded to M.

l'Abbé Gauthier. The example would spur others, and in the end substantial aid could be given the Parish of Saint-Gervais, thus enabling the authorities to rebuild. Do you think the idea a good one?

With very sincere good wishes for Christmas and New Year, I remain,

Very sincerely,

(Signed) M. LAVANOUX.

Federating Architecture

The Editors, THE AMERICAN ARCHITECT:

A conference, such as is suggested in your issue of Nov. 27 under the article "Federating Architecture Among the Allies" would, undoubtedly, be of great benefit to the profession of architecture throughout the country.

You suggest an organization "that will stand for architecture wherever it will be practiced in the United States." It does not seem desirable to me to have centralization of all architectural activities in one society, as it eliminates rivalry, competitive thought and action. It would be more satisfactory if there were two great architectural societies in this country instead of one. Where there is only one organization, that body appears to become quickly infected with dry rot and finally with stagnation.

One can readily imagine what would happen to the progress and liberty of the United States if our political activities were governed by the Republican or the Democratic party alone.

During the period of the war the profession of architecture was almost totally ignored in all great undertakings erected by the Government, except in a few isolated instances. The work was almost universally turned over to contractors to execute. This being the case, it does not appear that at the present time any architectural society held much weight in the national councils. That those in authority selected builders to carry out great projects without securing the assistance of architects should be a matter of profound regret to all who understand the value of architectural counsel and service.

As to what part American architects should play in the reconstruction of the buildings destroyed in Europe I would not hazard a guess. While the European architect and builder can learn many lessons relating to problems of plumbing, heating, ventilating and utilitarian building ideas in general

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from the American architect and engineer, I am of the opinion, when it comes to a matter of artistic development of European building, it may be left to the European architect, who appears, in every case, to have developed the most reasonable scheme of architecture to fit the environment and locality in which it is placed.

Viewing the architectural reconstruction of Europe from the broad standpoint of artistic development, it is hoped that the European architects will be free to design their own buildings in their own way. Leaving patriotism out of the question, I wonder how many artists would like to see Paris or Rome reconstructed to correspond with New York City or Chicago?

It would be very fine for architecture in this country if American architects could become pupils of European architects during the period of reconstruction in Europe.

It would be a splendid idea if some of our wealthy Americans established trade schools in France and Belgium where the young American craftsman could be properly educated in the fundamentals of his trade. This would be of infinite benefit to the workers in arts and crafts, the woodworker, the stone carver, the bronze and metal worker, and the various branches of the building profession calling for artistic craftsmanship.

I have no doubt that under such conditions the standard of American art and art appreciation in general would be brought to a higher standard in this country than exists at the present time.

It is useless to hope for any material artistic development in the United States as long as at least 80 per cent of the building in this country is executed by speculative builders and our city building departments are permitted to issue building per-

mits to these speculative builders on plans not prepared by responsible architects, and which violate every code of correct sanitation and good building.

TOM P. BARNETT.

Improving Farm Buildings

The Editors, THE AMERICAN ARCHITECT:

I have read with interest your editorial on farm architecture. I am confident that the day is fast approaching when our farmers will invest considerable sums of money in permanent farm buildings. The present excellent condition of the farmers with reference to income will be one of the chief factors in bringing about the expenditure of large amounts in the erection of substantial buildings which will replace, in many instances, the rather forlorn structures that characterized the early stages of our agricultural development.

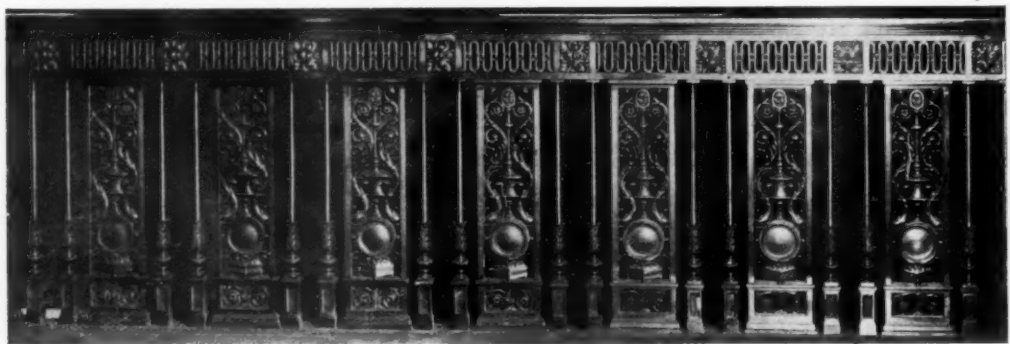
The farm home, which has developed into a paying proposition, soon must have modern conveniences such as running water, improved heating methods and sanitary fixtures, as well as other items of convenience and beauty which are necessary to keep the most desirable class of citizens upon the farm. Furthermore, the natural beauty of our state provides unusual opportunity for the development of the very finest type of homes in the rural districts if only sufficient income can be established and maintained to justify the investment. The matter is one of the most important things in connection with making farm life in Utah what it should be.

That the subject is being given attention is reflected in the biennial report of the president of the Utah Agricultural College.

SIMON T. BAMBERGER,

Salt Lake City, Utah.

Governor.



Architects as Bridge Builders

By THOMAS HASTINGS, F.A.I.A.

STEAM and the rapid development of the railroad as a new method of transportation in the first half of the nineteenth century and probably the consequent discovery of steel as a new and economical material in construction have had a dominating influence upon modern design in bridge construction.

The railroads had to bridge the rivers and pierce the mountains, and the rapid demands upon what was practically a new profession, the position occupied by the modern engineer, are responsible for many unfortunate results which will take generations of changing conditions before they are rectified. The engineers and architects were separated as never before. Design in the construction of these larger and all important problems was almost eliminated, and quite naturally the æsthetic viewpoint was practically disregarded in the hurried development and changing conditions. The engineer saw primarily the quantitative side, while the architect continued to see first the qualitative side. Fortunately, the educated engineer in recent years more generally realizes that when a design looks well it will build well. The realization of this fact is so true in Europe that the engineers are given the theory of certain first principles in architecture, while the architects have always been given perhaps too much engineering. The architects at the École des Beaux Arts lecture at the École Polytechnique, while their professors lecture at the École des Beaux Arts, more especially on the analytical side of construction.

While much interesting architectural work has been accomplished with the proper use of iron, most of the iron bridges have been considered as purely engineering problems. In recent years bridge builders, even when building for railroads, have been inclined to consider favorably the return to masonry construction in order to save in maintenance or upkeep. This is an encouraging sign of

the times, and it is to be hoped that under these conditions architects will be employed rather than engineers. A stone bridge is unquestionably, both as a matter of appearance and economy, an architectural problem. The mathematics involved are rather descriptive than analytical, involving interesting problems of stereotomy entering into the architect's legitimate practice—problems with which he must of necessity be familiar. The Romans were the first great roads and bridge builders of the world, and their aqueducts and bridges, splendid in design and beautifully constructed, are to be found all over Europe, and even in Asia Minor and Northern Africa. These Roman bridges are to be found crossing the rocky channel of the Jordan River and the swift running waters of the Rhine, as well as on the River Tiber and the Pau. Some of the most splendid bridges were built in the Gothic period; indeed, outside of their cathedrals, there are perhaps no more imposing, lasting and beautiful monuments standing to the genius of the Mediaeval architects than such bridges as Pont St. Benegal, crossing the Rhone at Avignon, Le Pont des Consuls over the Tarn at Montauban or those at Albi and Villeneuve. Spain, too, is rich with bridges—Roman, Moorish, Mediaeval and Renaissance, many illustrating oft-times in their great simplicity splendid architectural problems well solved. These great engineering achievements either make a landscape more beautiful than nature unadorned or totally destroy the natural surroundings. We associate with Europe the well-built roads with walls or terraces, great bridges and other features which have been designed or guided with art. These create an atmosphere which, together with the well-planned avenues and park systems, often attract us more while traveling in Europe than do the pictures and sculptures or *objets d'art* in the galleries and museums frequented by the average man abroad.





TENTATIVE MODEL FOR THE NEW MADISON STREET BRIDGE OVER CHICAGO RIVER

Submitted by the Municipal Art Committee of the Illinois Chapter of the American Institute of Architects

Co-operating with Municipal Governments

Being an Account of the Work of a Special Committee of the Illinois Chapter, A. I. A.

THE constructive value of co-operation on the part of architectural societies with committees of city governments having to do with municipal art has been many times demonstrated. A concrete example is presented in the work of a special committee of the Illinois Chapter of the A. I. A. Even casual survey of a city's needs in the proper control and direction of its activities in the field of constructive art will disclose opportunity for the most valuable co-operation on the part of architects.

In Chicago these opportunities were more apparent than in most cities. The large engineering problems in which the city has been engaged soon suggested that there was a good opportunity for the counsel of architects to impart the saving touch of good art to well-planned constructions, and that among the largest possibilities was the architectural refinement of the many bridges which the city had within its limits.

To quote an admirable report made by George W. Maher, who at that time was chairman of the Municipal Art Committee of the Illinois Chapter:

The river bridges had always been a mooted issue in the minds of the people of Chicago. Here seemed to be the opportunity to demonstrate the assistance the profession could effectively render in improvements of this character which would materially assist the city beautiful idea.

The problem was at once entered into with enthusiasm although the outlook at first was certainly discouraging. It required considerable effort on the part of the committee to convince the city authorities that the architects were really in earnest and intended to be of real constructive value in this important undertaking of assisting in beautifying the bridges. It also required the consent of the City Plan Commission so that we could properly co-operate with them.

The first bridge improvement the committee interested itself in was the Chicago Avenue bridge. Sketches were made and approved by the City Bridge Department and later architectural details prepared and employed in its construction. The design proposed, however, was not fully carried out, but the appearance of this bridge was a distinct improvement and formed the entering wedge for greater opportunity.

The committee early recognized that it should interest itself in the important bridges since these would form a precedent for future bridges. As Madison Street bridge was to be one of these, since from its location it forms one of the main gateway entrances to the city from the great depots to the west, permission was asked by the committee to assist in designing this particular bridge. The accompanying illustration, taken from the architect's model, shows the principle of design that was established by the com-

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mittee—namely, that the bridge proper should be a bascule deck type bridge; the usual overhead steel construction being placed under the bridge or as executed on the Jackson Boulevard bridge.

The architectural features, however, to embellish the Madison Street bridge consist of granite abutments instead of concrete as on the other bridges, also at the east and west approaches to the bridge proposed monumental pylons on which will be placed electric lights beautifully to illuminate the bridge. The tower houses and balustrades to be constructed of matt glazed terra cotta in close imitation of granite. Pedestals have been suggested by the committee to be of granite and to extend out from the pylons for future bronze statuary. The statuary to typify notable historic events.

At the present moment the Franklin-Orleans Street bridge is being erected following this principle of design. The Monroe Street bridge, which had already been designed, has been changed at the suggestion of the committee to conform to the Madison Street bridge.

The designs of the Madison Street bridge are completed and approved and the bridge will be erected according to the designs and recommendations of the Municipal Art Committee, Illinois Chapter, A. I. A.

This report has been quoted at some length, as it affords an opportunity to become familiar with methods of action and architectural treatment.

Just at this time, when there will undoubtedly be put under way a great many projects of civic improvement that have been delayed on account of

the war, there is an opportunity larger than ever before for the profession of architecture to take up its rightful position in our communities, and by a proper and unselfish co-operation with the city governments and their engineers exert a very strong and beneficial influence on these matters.

Many important bridges and municipal engineering works are to-day monuments of good art because this close co-operation between the engineers and architects has been effected.

Glenn Brown's Q Street Bridge at Georgetown, D. C., Edward Pearce Casey's work on the Washington bridges, the work of Carrere & Hastings on the bridges spanning the East River in New York are all earlier good examples. To these we must add the very strong and good influence exerted by the Illinois Chapter of the Institute.

It is in work of this character that the profession of architecture may hope to secure and maintain all its rights to recognition as a profession, and there is no more danger that the architect and engineer may lose their respective identities than there ever was that the diagnostician and the surgeon might at any time be merged.



Two Opinions on Architectural Advertising

By THOMAS CRANE YOUNG

THE American Institute of Architects having removed the article in its code of ethics which condemned the practice of advertising, further agitation along that line no longer seems to be necessary. Nevertheless, as few architects have as yet taken advantage of their new-found liberty, some further discussion may be desirable to create a better understanding of the sort of advertising which may be permissible.

It is quite natural that this prohibition should have been included in the code at the time it was written, for then the whole practice of advertising was in disrepute for the reason, probably, that the prevailing modes were offensive to the sight, the printed matter being frequently unreliable and often deliberately calculated to deceive. It was quite general for publications to print any sort of matter indiscriminately, provided only that they were paid the current rates for space. Probably the first blow was given to this practice by the United States Government when it was made a crime to issue false statements concerning food and drugs offered for sale to the public. Then the subject was taken in hand by the Advertising Associations, and since, largely through their efforts, a thorough reform is in the process of accomplishment.

The influence of the higher class of magazine has always been a potent factor in the improvement of advertising methods, and now their advertising pages are full of interesting and valuable information. [So, too, the automobile industry has produced forms of advertising of attractiveness and character, and at times of real artistic merit.]

While many forms of advertising still in use are extremely vulgar, the same criticism may be made of much of our national architecture. Nevertheless, it must be admitted that from a purely evil thing has been developed a new field of work for the artist as well as a most valuable means of spreading public information. This usefulness has been recognized by the United States Government as illustrated in their exploitation of the recent War Loans, in which they enlisted the patriotic services of the greatest artists that the country has produced.

There has been much complaint from a certain class of architects that the public has not been properly informed as to the character and value of architectural service, and this is no doubt true in part. But the means is at hand by which this ignorance may be dispelled, and if the architectural pro-

fession contains within itself the amount of good taste and artistic merit which are a part of their claim for recognition, there need be no fear of a loss of professional dignity through the proper form of advertising. The quality of advertising would be as difficult to control as the quality of architecture produced by the individual. Whatever method of expression may be adopted, it will probably show some indication of the character of the one who advertises. But the one requirement that could and should be rigidly enforced is that the truth and nothing but the truth be contained in any advertised statement.

By F. E. DAVIDSON

SINCE the ban on architectural advertising has been removed by the Institute I have been studying the problems connected with the subject from various angles and have made some investigation as to the probable financial return which might reasonably be expected from display advertising. The data secured lead me to believe that as a financial proposition alone, display advertising by a professional man would probably not yield a sufficient return on the money invested to justify it.

At the present moment it is my thought that the only advertising that any architect should do, in addition, possibly, to signing his buildings during construction, would be to have his professional card appear in the publications that his particular class of clients read, particularly if he specializes in a certain line of work. I very much doubt the wisdom of an architect's attempting anything in the way of display advertising, for I not only believe that such advertising would be in bad taste, but that it should be condemned from every other viewpoint as well.

I am, of course, speaking of the architect as a professional man. If the only object in life of an architect is to make money, then obviously he would not be an architect.

I think it quite probable that those architects who in the future may combine the functions and responsibilities of the contractor with those belonging exclusively to the profession of architecture, may and probably will do a considerable amount of display advertising. It is after all a question of viewpoint.

Why is any man following the profession of

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architecture? Certainly not to make money. Money is, after all, a very insignificant thing. But if the acquisition of money alone is the only thing to be desired, then the architect should cease to call himself an architect and become a contractor; in which line of work, no doubt, it will be necessary to do some display advertising, for the reason that contractors as a class are advertisers and the public expects it of them.

For myself I am not practicing architecture expecting to get rich. I am in the game because I love it and know of no other profession that is

bigger or embraces so many subjects of interest, or that provides so many opportunities for patriotic and unselfish labors for the general good. My work is my play. It never gets tiresome. I never get weary of it, and I am satisfied with enough financial return to live decently and enjoy some of the luxuries of modern civilization. I believe that such a return is all that any professional man, or for that matter, any man, is entitled to. But I must add that the professional fees commonly paid architects are not in all cases sufficient to secure even this minimum of net financial return.

The Architect and Engineer

By EDWARD PEARCE CASEY

EVER since the Renaissance there has been a continued tendency toward specialization, which is quite in keeping with the ever-expanding field of knowledge. At that time there were many geniuses in the arts and sciences, frequently well versed in all of them as far as they were then developed. The various artistic and engineering professions were concentrated in the same individual. Design, in its common sense and constructive aspect, was generally governed by good taste; since the practical and the artistic were combined in the same mind, there was a logical give and take to secure the best all-around result.

Now specialization has reached such a height that many of our leading architects seem totally indifferent to their lack of knowledge of anything but pure design in its various phases.

One would think their work would be illogical in a constructive sense, as it often is, thereby suffering in its attainment of good results.

In order to obviate the difficulties of present-day specialization, it is necessary to co-ordinate, as far as may be, the product of many minds. Architects frequently employ, or are in close association with, experts in the various subjects closely allied with architectural design, and thereby secure a thorough and exact working out of these particular parts. But often this is done to such an exaggerated extent that it results in an injury to the whole, which can be prevented only by a dominating spirit well versed in the fundamentals and possibilities of the numerous subjects involved and possessed of knowledge how to balance their various claims.

The situation is analogous, on a small scale, to that of an army. One might as well say that the head of an army need not be versed in the possibili-

ties and limitations of the engineers, infantry, artillery, cavalry, supply, and other branches of the whole. What would be the result if he were not possessed of a general knowledge of the functions and methods of the various branches of the complete organization?

Our various architectural schools are at present attempting to give instruction in subjects allied to architecture, subjects, which are often parts of architecture: painting and sculpture; engineering, civil, mechanical, sanitary and electrical; in acoustics, ventilation, heating, etc.; but many seem to think this is not very essential, and the general result in producing a broad vision over the entire field is as yet not especially marked in the profession.

It became apparent at the last convention of the American Institute of Architects that the profession is not a little annoyed by the slight attention paid it by army authorities, who evidently, and with some justification, have assumed that there was nothing architects could do in connection with war or an army.

How they have changed since the old days when they were the first called upon to erect fortifications and fashion engines of war! Possibly, as a profession, they have but themselves to blame for this general attitude, since for many years prominent members of the profession have given the public the impression that they are but slightly interested in the purely engineering and other scientific aspects of their art; so much so, in fact, that the erroneous idea has gone abroad that an architect is one practiced principally in the ornamentation of buildings and structures. Many will recall occasions when a well-intentioned engineer,

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having fully designed and calculated a structure, calls upon an architect to make it more presentable by the addition of ornament—a few frills.

This misconception is reflected by the novice in the study of architecture, who is apt to be carried away with the fascination of detail, moldings, ornament, etc., until he really thinks this is the most important part of the art, but as he progresses he becomes convinced how much more important are the beauties of the fundamental composition and proportions of a design, and how often buildings failing in this respect try to redeem themselves by relying upon details, moldings and ornament. But he will learn that redemption by this means is impossible, both as applied to buildings and to purely engineering works.

It is true that the Government has recognized that in some parts of design, the architect, even as it conceives him to be, might be useful, and has given him some share in the plan of hospitals, cantonments and housing schemes, but as for considering him sufficiently accomplished in all-around constructive work, making him eligible as an engineer officer of the army, there has been very little done.

Specialization has without doubt come to stay, and architecture and engineering will remain separate professions. Each will doubtless continue to be still further subdivided into specialties, but no specialist should allow his line of vision to become so narrow that it becomes the source of difficulty.

The two professions of architecture and engineering do not seem to have the respect for each other that should exist between two branches of the same calling. This is all the more to be regretted because they formerly were substantially the same profession. Architecture was held to include everything constructable from building temples to constructing catapults. The remedy for this really unfortunate attitude is for each profession to extend its knowledge more widely over the field of the other, and not look with contempt upon such knowledge. This is not as difficult as many seem to think, and is at present really attempted more on the part of the architect, in the architectural schools, than it is on the part of the engineer in the schools of engineering. The architect should study the broad principles of engineering in all its branches, but need not go deeply into their details; while the engineer should devote more study to the æsthetic side, to the beauty of proportion and form, of composition and character in design, but he also need not delve deeply into sculpture, painting, and ornament, nor into the planning and designing of build-

ings. This broadening of the point of view and extension of knowledge might be accomplished with great benefit to the work of all specialists in each of the two professions.

Although at the present time some architects have extended their studies on the scientific and purely engineering side, even to the extent of becoming graduates of engineering schools, the practice is not as yet general enough to impress the public that the profession as a whole can be entrusted with work which it undoubtedly could accomplish.

Artistic and practical natures are not at all incompatible, as the history of art abundantly shows. Many of the best architects and painters of the Renaissance were also engineers. One of the best-known architects of antiquity, Vitruvius, seems, judging from his writings, to have been able to make almost anything, useful or ornamental.

Probably of all the works commonly assigned to engineers, viaducts and bridges are the most conspicuous and require the most attention on the æsthetic side. Until recent years the works of man, structures nautical and terrestrial, utensils and machines, were, even from the most remote periods, generally made with a view not only to their usefulness, but also with a view to their good looks. This tendency still prevails in some fields, but is lamentably lacking in others, notably in that of the design of bridges. As a building, involving the combination and harmonizing of many arts, sciences and trades, one mind, or at least harmonious minds, should direct the whole from beginning to end, both inside and out and round about, in order to avoid discord both in the process and in the result, so in works of engineering. Often both an architect and an engineer are appointed for the construction of a bridge. If they are of a harmonious mind, the one possessing a knowledge and respect for engineering, and the other a knowledge and respect for pure design and æsthetics, they will work together and in entire accord, and something presentable may be accomplished; but if they are not harmonious, as so often happens, each looking askance at the other and holding his profession in contempt, working separately, each making his own designs and then trying to harmonize them, the result is a failure. The two should begin their work at the same time, harmonizing and balancing the requirements as if they were one individual, so that the result may be æsthetically correct and at the same time rational and stable. Then one might say the work has beauty with character and is entitled to be called a work of art.

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Stop Work on Tent Camps

Abandonment of all construction work in progress or projected at "tent camps," originally laid out for mobilization of the National Guard and later used for general training purposes, was ordered by the War Department. Exception is made in cases where it is shown that the completion is necessary in the interest of health of troops.

The camps affected by the abandonment order are Sevier, South Carolina; Bowie, Texas; McClellan, Alabama; Logan, Texas; Beauregard, Louisiana; McArthur, Texas; Hancock, Georgia; Wheeler, Georgia; Kearney, California; Wadsworth, South Carolina; Fremont, California; Sheridan, Alabama; Doniphan, Oklahoma; Cody, New Mexico, and Greene, North Carolina. These camps will be used for demobilization, but when this is complete they will be closed. Base hospitals at the camps will be used as convalescent hospitals.

Orders also were issued to-day for the abandonment of proposed buildings for a motor school at Camp Taylor, Kentucky, and for additional construction at Camp Funston, Kansas.

Academy of Arts and Letters

At the recent annual meeting of the Academy of Arts and Letters the following officers were elected: William Dean Howells, president; William M. Sloane, chancellor; Robert Underwood Johnson, secretary, and Thomas Hastings, treasurer. In addition to the foregoing, members of the board of directors are: Dr. Nicholas Murray Butler, Edwin H. Blashfield and Augustus Thomas. Others present at the meeting were: Daniel Chester French, Hamlin Garland, Cass Gilbert, Robert Grant, Brander Matthews, Gari Melchers, Paul Elmer More, James Ford Rhodes, William Roscoe Thayer and J. Alden Weir.

Things to Remember

There are reasons why we must live up to the principles of permanent peace and a new order of society, based not on rival national claims, but on a reign of justice. It is not only a matter of honor, but a matter of practical wisdom, of protection to ourselves, of insurance to the world. We must remember two things as we face the responsibility of victory: The first is that there are no more parochial problems; all problems are to-day world problems. The form of monarchy in Greece, or the labor problem in Sweden may become vital elements in affecting the fate of the world. So much

the war has taught us. Secondly, we need above all else, at this juncture, clarity of purpose and sanity of judgment. There is no room for sentimentalism, whether it takes the form of forgiveness and pity, or whether it takes the form of revenge and hate. We must be sane in understanding the world's vital need of the moment, and in devising means to secure it.

From a recent address by Henry Crosby Emery before the Economic Club of New York.

Survey of Labor Situation To Be Made by Employment Service

An immediate survey of the labor situation in industrial centers throughout the country will be made by the United States Employment Service, according to a statement issued by the Department of Labor. The machinery for this survey has been set in motion by the Employment Service at the request of the Secretary of War and the chairman of the War Industries Board.

The purpose of the information sought is, it is said, to enable the War Department and the War Industries Board as far as possible to avoid labor difficulties through the too rapid curtailment of war contracts and demobilization of the army. It is expected that the information will give the Government a view of the immediate labor situation, so it will know as early as possible in which centers there is a shortage or a surplus of labor, and how rapidly demobilization in these centers can be effected.

International Reconstruction

In war we have made common cause with the Allies. We should likewise make common cause with them in seeking the solution of the immediate problems of reconstruction which they face, because of the efforts they put forth in the war. These problems peculiarly depend for their solution upon commerce.

Raw materials and industrial equipment which we possess the Allies urgently require, that they may reconstitute their economic life. We should deal generously with them in sharing these resources.

In order that we may share our materials with the Allies, we must also provide them with credits through which they may make the necessary payments.

Our ocean tonnage must supply our troops overseas and help to provision the inhabitants of war-

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devastated regions. The part of our ocean tonnage not required for these paramount needs, and vessels of associated countries which are in a similar situation, should be entered in the common service of all nations. This common service should secure to all nations their immediate needs for food, raw materials, and transport for their products.

Industrial Co-operation

The war has demonstrated that through industrial co-operation great economies may be achieved, waste eliminated and efficiency increased. The nation should not forget, but rather should capitalize, these lessons by adapting effective war practices to peace conditions through permitting reasonable co-operation between units of industry under appropriate Federal supervision. It is in the public interest that reasonable trade agreements should be entered into, but the failure of the Government either clearly to define the dividing line between those agreements which are, and those which are not, in unreasonable restraint of commerce, or to provide an agency to speak for it on application of those proposing to enter into such agreement, in effect restricts wholesome co-operation and deprives both industry and the general public of its benefits. The conditions incident to the period of readjustment render it imperative that all obstacles to reasonable co-operation be immediately removed through appropriate legislation.

After the War

Now that the war is over, says *The American Contractor*, the reconstruction of the world becomes the dominant question of the hour. American railroads will have to be rebuilt and enormously expanded, making a greater demand for steel rails than the entire steel rail capacity of the country. American highways will require the expenditure of billions of dollars to develop a system worthy of the name.

Our rivers and harbors will have to be deepened and the water transportation interests utilized in keeping with the vast traffic of that hour. Building activities which have been halted for the last four years will then have to leap forward, and building supply materials will be in a great demand. More than \$1,000,000,000 will have to be expended upon the reconstruction and restoration of the industrial interests of France, and hundreds of millions upon the rebuilding of Belgium.

All Great Britain will have to take up enormous house building construction work, for houses are badly needed, and for reshaping its railroads, its merchant marine and other activities. Russia will be opened up to broad world encircling business development. South America and Africa, Canada and Australia and other countries will all begin a period of construction work, because for the last four years the world has concentrated its whole thought upon war. Then it will turn with equal eagerness to the work of the upbuilding influences brought into existence by peace. Great enterprises and small will be in evidence everywhere throughout the world.

The man who fails to keep this situation constantly before his mind, and so shape his business as to be ready to turn his activities upon the mighty opportunity which will then come to the brain and the machinery and capital of the world, will miss a chance such as may never again come to him. It behooves every business man in all the land to be ready to make the most of the unusual situation.

Gift for a National Portrait Gallery

Announcement has been made that Christoffer Hannevig, a banker of New York and former Norwegian shipbuilder, has donated \$100,000 to lay the foundation for a national portrait gallery in the United States similar to that in London. The money is to be used in buying portraits of officials who have "formed the driving force of America's efforts in the great war."

The first portrait to be painted will be that of President Wilson, who will sit soon after his return from France. Others who have been invited to have their portraits painted are Secretaries Lansing, Baker, Daniels, McAdoo and Lane, Generals Pershing and March, and Admiral Sims.

The World's Rubber Supply

The world's rubber supply comes in part from Ceylon, Malaya, South and Central America, Asia and Africa, but the "Middle East" is really the great rubber area, and Singapore, Penang, Batavia and Colombo the chief rubber ports of the world. Before the war a large proportion of our supply reached us indirectly via England, and London was the world's real rubber market. But that has been changed, and now two-thirds of all rubber imports come to us directly from the ports of the British and East Indies. Brazil, which in 1912 supplied

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us with more than two-fifths of our rubber, now supplies but one-ninth. This shift is due largely to the change from wild to cultivated sources of supply.

To Plant Memorial Highways

Active co-operation of the Governors of all the States in the Union is expected in the plan to plant, along transcontinental highways and public roads, memorial trees for the nation's dead soldiers and sailors. Charles Lathrop Pack, president of the American Forestry Association, who originated the idea, says that it already has been taken up by many towns and cities. The General Federation of Women's Clubs has before it a proposition to plant memorial trees along the Lincoln highway.

"There can be nothing more appropriate," said Mr. Pack recently, "than to have each State through which a motor highway passes plant 'victory oaks' or 'victory elms' for her soldiers or sailors who have died in battle. The motor has played a mighty part in the winning of the war, and it would be a fine thing for these highway organizations to take up plans for memorial trees.

Business Conditions

A report by the Comptroller of the Currency shows that on June 30, the close of the last fiscal year, the aggregate resources of the 28,000 State and National banks in the United States amounted to \$40,310,000,000. Of this amount \$22,371,000,000 was credited to the 21,175 State, savings, and private banks and trust companies, and \$17,839,000,000 to the 7705 National banks. Deposits of the State banks amounted to \$18,567,000,000 and loans to \$12,426,000,000, an increase of 5 per cent in the deposits and of 6.5 per cent in the loans as compared with the record of a year previous. National banks showed \$14,021,000,000 deposits, an increase of 9.8 per cent, and \$9,620,000,000 in loans, an increase of 9.1 per cent. The deposits of all banks, State and National, totalled \$32,589,000,000, and loans, \$22,046,000,000.

The readjustment of business to peace conditions is proceeding, but is still affected by the uncertainty as to when and how fast prices will return to normal levels. It is observable that consideration of the labor problem is entering insistently into all calculations, and while in some quarters opinion inclines to the belief that labor must soon accept sharp reductions in wages, there is a very strong drift toward the view that now, if ever, is the time to seek that co-operation of capital, management,

and labor which will result in increased production, cheaper prices, and fairer returns to these elements. A notable event of the period is the recommendation of the American Iron and Steel Institute that steel prices be revised downward, but that the wage scales be left at present levels, for a time at least. The note of optimism is dominant at all gatherings of business men to discuss readjustment problems. Announcement has been made that Government stores of food and other articles available for civilian use will not be dumped on the markets.—

From the Bulletin of the Guaranty Trust Co.

Labor

The labor problem, says *Hardwood Record*, is causing more worry than any other feature of the reconstruction program. There can be no arbitrary reduction of wages to the pre-war basis. Were such folly attempted employers would suffer as much as employees, and capital as much as labor. That there will be a gradual readjustment is inevitable, but we should remember that for every loss there is some compensation.

The difficulty lies in the fact that the workingmen of the country have, in the main, raised their living standards to comport with the extravagant war-time wages, and they do not want to give up those standards now, even to make room for returning soldiers. When the armistice was signed, the Department of Labor announced that it would control the demobilization of our army and thus prevent it from swamping the labor market. Apparently, however, the Department of Labor overestimated the docility of the War Department, as General March, Chief of Staff, has announced that demobilization would be made by the army at the rate of 30,000 men a day. A demobilization at that speed threatens to overrun any channel into which the Department of Labor might seek to lead it. As a matter of fact, the Department's program for an "industrial demobilization" has hit a number of snags. One of these is the opposition of the Governors of the Western States, who fear it will prevent an adequate return of labor to the farms.

Secretary McAdoo injected an element of confusion into the general wage readjustment by an eleventh-hour increase to railroad telegraphers, totaling \$30,000,000 a year. At the same time the United States Shipping Board is advertising widely its intention of maintaining its generous wage scales, and is even showing signs of hoping to maintain the overtime schedules. Wages will have to be readjusted to cope with conditions. To reduce wages at once, however, with the cost of living still

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unreduced, would be dangerous. On the other hand, it is difficult to see how present abnormal standards can possibly be maintained under normal conditions. Mr. Gompers has declared that labor means to retain all it has gained during the war in better wages, better working conditions, and shorter hours, and it may be that there are stormy times ahead of us in this regard. It is hard, however, to get away from the old law of supply and demand, and if the supply of labor greatly exceeds the supply of jobs, the price of labor is pretty sure to react accordingly, regardless of the views of Mr. Gompers or anyone else. No real drastic reduction in wages paid to labor will be possible until costs of living decrease. It will be at least a year before the countries of Europe can produce enough of their own food to bring about lower food prices, and during this year wages will remain fairly high and perhaps will never go back to the pre-war basis.

Labor will probably go down very little during the next few months.

Southern California Chapter, A. I. A.

The one hundred and twenty-first regular meeting of the Southern California Chapter, A. I. A., was held Dec. 10, 1918. The meeting was called to order by the president, J. J. Backus.

As guests of the Chapter there were present State Senator Dwight Hart and Mr. Prine, of the *Southwest Builder and Contractor*.

Minutes of the one hundred and twentieth meeting were read and approved.

There were no reports from the executive committee nor from the standing committees.

Under the head of "New Business" the secretary read the following communications:

From the assistant secretary, George B. Robinson, of the Technical Societies, calling the Chapter's attention to a vacancy on the State Railway Commission, and suggesting that the Chapter communicate with the Governor recommending that an engineer be appointed to this commission. The letter was ordered filed.

From Architect Anton Cervený, suggesting that the Chapter interest itself in the establishment of a Museum of Architecture. The letter was ordered filed.

The secretary reported the death of Francis W. Young, which occurred on Nov. 24. Mr. Wackerbarth moved, and it was duly carried, that a resolution of condolence be drafted.

The following officers were elected for the coming year:

President—H. M. Patterson.

Vice-President—Lyman Farwell.

Secretary—H. F. Withey.

Treasurer—August Wackerbarth.

Executive Committee—S. B. Marsten, Robert H. Orr and Walter E. Erkes.

Under the head of "Debates," the subject of the desired changes in the State Hotel and Housing Law was brought up, and generally discussed. It was moved by Mr. Allison, and duly carried, that the Chapter go on record as favoring the elimination of that clause in the Hotel Law which limits the construction of hotel buildings to the height of one and a half times the width of the abutting street, and that the height limit of 150 ft. be retained, as the bill now stands. The president thereupon instructed the committee on permanent legislation to draft a recommendation to that effect in proper form and submit to the Legislature.

Department of Architectural Engineering

Daylight vs. Sunlight in Sawtooth-Roof Construction¹

By W. S. BROWN, Assoc.-Mem. Am. Soc. M. E.²

[The building is an important element in all production processes. A space with four walls and a roof, in which men and machines were housed, was at one time considered to constitute a manufacturing plant. It is now universally agreed that such a plant must, in addition, have light, heat, ventilation, sanitary arrangements and contented and healthy workmen.]

The new world competition in manufacturing will necessitate an increased production to compensate for the American wage scale and properly constructing the building in order to make these increased productions possible. The designers of industrial buildings may not have considered the sawtooth skylight except in a very general way and the complete and scientific analysis of its function here printed, we believe, is the first analysis of that kind which has been made. The necessity of utilizing daylight, which is to be had without cost, fully justifies a careful consideration of this kind of lighting. To properly design the sawtooth skylight may involve some concentrated study, but all correct designing involves real work to which the owner is entitled when purchasing architectural service.

THE AMERICAN ARCHITECT voices a sincere appreciation of the successful effort to place the sawtooth skylight among the measurable factors in building construction and of the generosity displayed by the investigator in making the data public.]

Empirical research of the amount of direct sunlight and the intensity of daylight to be admitted on the working plane in sawtooth construction.

An equation is derived to determine the time of admission of direct sunlight and the number of hours of its duration with a given orientation of sawtooth buildings and the slope of the lighting area.

Further considerations are made in regard to the influence of the size and slope of the sawtooth lighting area on the relative intensity of daylight received from the northern sky. Special examples are given illustrating the manner of computing the amount of diffused light entering a building under several specified conditions.

MANY processes of manufacturing require for best results, natural illumination consisting of sufficient and well-diffused daylight with, at the same time, however, the important limitation that little or no direct sunlight shall fall upon the working plane.

2. That is, there is a sharp distinction between daylight and sunlight and their relative desirability. The former consists of illumination by reflected and refracted light, properly designed fenestration, resulting in an evenly distributed, well-diffused light with consequent lack of sharp shadows and contrasts. The latter, or illumination by direct sunlight, is objectionable for many reasons of vary-

ing relative importance, such as the following: Its heating effect, especially in warm, southern climates; its color, which has a sensation value containing a greater proportion of red rays than daylight; its actinic effect upon materials used in manufacturing processes; and the fact that it is unidirectional and of excessive intensity, resulting in glare, sharp shadows and contrasts.

3. *Diffusion of daylight* in sawtooth buildings is obtained by placing the sawteeth so that the glass or lighting area faces the northern sky; sufficient intensity being dependent, among other things, upon the size and slope of the lighting area. *Evenness of distribution* is procured by properly apportioning the lighting areas. The amount of direct sunlight admitted daily, the time of its admission, and its duration are evidently dependent upon three considerations, the last two of which may be varied within certain practical limits. They are:

- a The day of the year, determining as it does the sun's path across the sky.
- b The direction in which the lighting area faces as regards the points of the compass.
- c The slope of the lighting area.

4. For a given lighting area, a variation in its slope is accompanied by a very appreciable change in the amount of daylight admitted, as will be demonstrated later. That is, as the pitch of the lighting area is made steeper, the amount and duration of direct sunlight entering the building is lessened, and at the expense of the general illumination. Conversely, as the slope of the lighting area is *decreased*, the intensity of daylight is correspondingly *increased*, but there also is concurrent therewith a greater amount and duration of direct sunlight.

5. The question then becomes: How steep should this slope be? What is the proper balance between the two contending requirements of little sunlight and much daylight? Also at what time of day will the direct solar rays fall upon the working plane, in what locations and volume, and for how long a period?

6. Naturally, no general answer can be given to these questions. Each individual problem should be worked out only after careful study has been made

¹ Presented at the annual meeting of the American Society of Mechanical Engineers, December, 1918.

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of the particular conditions and requirements which have to be met, not excluding first cost. In the Southern States, for example, the tendency is to adopt a more nearly vertical lighting area than in the northern part of the United States or Canada, on account of the greater altitude of the sun and its intense heat. Occasionally it has been found advantageous to so locate machinery as to avoid any direct sunlight during the working hours.

7. With a view, therefore, to clearing up such questions as these, the writer's firm, F. P. Sheldon & Son, undertook to work out, in conjunction with what empirical data they already had, a rational method of design for sawtooth roof construction.

8. The subject is necessarily divided into two closely related parts, the first concerning *direct sunlight*, its amount, time of admission, duration, and location on the working plane; the second part relating to intensity of *daylight* upon the working plane.

PART I. THE ORIENTATION OF SAWTOOTH BUILDINGS AND THE SLOPE OF THE LIGHTING AREA AS RELATED TO THE REQUIREMENTS OF LEAST DIRECT SUNLIGHT

9. The amount of direct sunlight admitted daily, its time of admission and duration are dependent upon the factors given in *a*, *b* and *c* of Par. 3.

10. In the practical problem of the sawtooth roof, the effective slope or *vertical angle* of the lighting area, on account of projecting jets, gutters, and sash rails, and the interference of roof rafters, etc., is *greater* than the pitch of the glass itself. This often amounts to as much as 7 deg. or 10 deg. Similarly the *horizontal angle* or bearing of the lighting area with respect to the sun's rays may be greater or less than the nominal angle on account of projecting vertical sash bars, etc. This difference often amounts to as much as 5 deg. or 8 deg.

11. The position of the sun at any given time depends upon the latitude of the place, time of day, and calendar date, and may be obtained from standard altitude and azimuth tables. Knowing this, the time of admission and duration of direct sunlight for any day of the year may be calculated as follows:

12. In Fig. 1, let the plane determined by the three points, *A*, *C* and *D*, represent the lighting-area plane, and let points *A*, *B* and *E* define a plane parallel with the horizon. These two planes intersect in line *AF*. The acute angle *v* is then the effective slope or vertical angle of the lighting-area plane. Also let line *AB* represent the horizontal direction or bearing of the sun with respect to the building at any assumed calendar date and time. That is, angle *h* = the difference between the sun's true bearing or azimuth and the true corrected bear-

ing or azimuth of the lighting-area ridges, each azimuth being read easterly or westerly from north, according to whether morning or afternoon conditions are being computed.

13. Now pass plane *ABC* through *AB* perpendicular to plane *ABE*, cutting the lighting-area plane *ACD* in line *CD*. By construction this plane also contains the sun's altitude line through point *A*. Consequently, it is evident that if vertical angle *x* is greater than the altitude of the sun, a condition

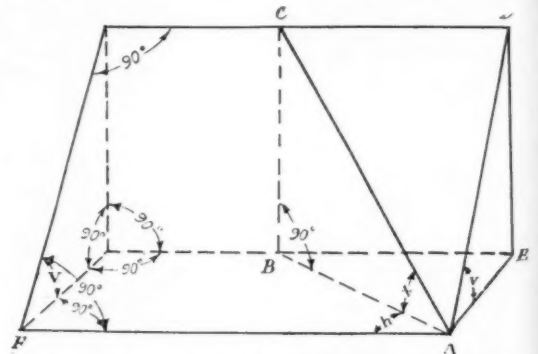


FIG. 1. TO ILLUSTRATE ADMISSION AND DURATION OF DIRECT SUNLIGHT.

of total shade exists within the building at the given time. And contrariwise, if *x* is less than the solar altitude, the sun is in front of the plane of the lighting area and some direct sunlight is entering the building.

14. Now, to find *x* in terms of *v* and *h* (see Fig. 1),

$$AE = ED \cot v$$

$$\text{and} \quad AB = ED \cot x$$

$$\text{and} \quad \cos (90 - h) = \frac{AE}{AB}$$

Substituting in the last equation the values of *AE* and *AB*,

$$\cos (90 - h) = \frac{\cot v}{\cot x}$$

$$\text{whence,} \quad \sin h = \frac{\cot v}{\cot x}$$

$$\text{and} \quad \tan x = \sin h \tan v \dots \dots \dots [1]$$

15. From the above equation, exact information may be obtained as to the time of admission of direct sunlight and the number of hours of its duration. The following example illustrates the method of procedure:

EXAMPLE I. *Given*, a sawtooth building located in north latitude 36°. Orientation of building is such that azimuth of sawtooth ridges = 99° 08' E. Angle of glass = 73°. *Required*, to find sunlight conditions on June 10 (sun's declination 23° N.).

16. By inspection, according to azimuth table, sunlight will enter the building from sunrise until

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at least 9:20 a. m. apparent time, because the sun's azimuth up to that time is less than that of the sawtooth ridges. The method now consists in finding by trial at what time the sunlight entirely disappears from the shed.

17. Assume 10:20 a. m., at which apparent time, according to the tables, the sun's azimuth = $114^{\circ} 08' E.$, and its altitude $64^{\circ} 46'$. Now, $v = 73^{\circ}$ plus a correction for projecting jets, gutters, etc., as previously explained. (This may be found from detailed section of building and will here be assumed as 7° .) Then $v = 73^{\circ} + 7^{\circ} = 80^{\circ}$. Applying the correction as explained in Par. 10,

$$h = 114^{\circ} 08' - (99^{\circ} 08' - 5^{\circ}) = 20^{\circ}.$$

Entering Equation [1],

$$\tan x = \sin 20^{\circ} \tan 80^{\circ}$$

whence

$$x = 62^{\circ} 43'.$$

18. Since at this time the solar altitude ($64^{\circ} 46'$) is greater than x , a small angle of sunlight is entering the shed. The above process may be repeated with a slightly larger assumed value of h , with the result that within a few minutes all direct sunlight will be found to be entirely excluded from the building.

19. To obtain afternoon conditions, the operation should be further continued until such time as sunlight is found to re-enter. In this case, instead of assuming the time and computing h , the reverse method will be pursued and, as a further short cut, it may be reasoned that since the lighting area faces slightly toward the east (that is, $N. 9^{\circ} 8' E.$), h at the transition period will be less than in the morning.

20. The westerly azimuth of the sawtooth ridges is now used for reference with the tables and equals $90^{\circ} 0' - 9^{\circ} 8' = 80^{\circ} 52'$. Try $h = 6^{\circ}$, at which time the sun's azimuth becomes $(80^{\circ} 52' - 5^{\circ}) + 6^{\circ} = 81^{\circ} 52'$, the apparent time being, from the tables 4:34 p. m., and the sun's altitude being from the tables $30^{\circ} 10'$. Entering Equation [1],

$$\tan x = \sin 6^{\circ} \tan 80^{\circ}$$

whence

$$x = 30^{\circ} 41'$$

21. Since x is $0^{\circ} 31'$ greater than the solar altitude, it is evident that no direct sunlight is entering. However, this angular difference is very slight and if the computations were carried on a step further, sunlight would be found to come in approximately five minutes later.

22. In this case then, on June 10 a condition of total shade exists within the building from approximately 9:20 a. m. until 4:34 p. m., *apparent time*. Where the apparent time is different from standard time, the proper allowance should, of course, be made. Furthermore, an additional correction must be applied in places where the daylight saving plan is in effect.

23. Generally it will be found advisable to solve a given problem for at least two sets of conditions,

that of the longest day of the year (June 21, declination $23\frac{1}{2}^{\circ} N.$) and the average day of the year (March 21 and Sept. 23, declination 0°).

24. In the example above, it will be noted that the duration of total afternoon shade is 4 hr. and 34 min. and is considerably greater than the duration of morning shade, which is only 2 hr. and 40 min. This is due to facing the lighting area slightly ($9^{\circ} 8'$) toward the east, and suggests quite a range of possibilities as regards orientation.

25. By applying the principles of descriptive geometry, the amount and location of direct sunlight at any given time may be obtained, if desired, by finding the lines in which the solar rays through the top and bottom limits of the lighting area intersect the working plane—the direction of these rays being taken from altitude and azimuth tables. It may also in this case be necessary to include the effect of side walls, division walls, etc.

26. For convenience, Table 1 is appended, giving different values of x for assumed values of h as applied in the second method of Example 1. Its use makes unnecessary any reference to trigonometrical tables, unless closer results are desired, for angles not given.

PART 2. THE RELATIVE INTENSITY OF DAYLIGHT RECEIVED FROM THE NORTHERN SKY AS IN- FLUENCED BY THE SIZE AND SLOPE OF THE SAWTOOTH LIGHTING AREA

27. It doubtless has been noted that, by essence, Part 1 lends itself to exact mathematical solution. This is not the case, however, with Part 2, for which, as will be explained later, the answer is not to be found so precisely on account of the necessity of introducing certain more or less arbitrary and variable factors. It should therefore be applied only with discrimination and strict regard for its practical limitations.

28. The total amount of diffused daylight entering a building through sawtooth sash and made available for use (direct sunlight being excluded) may be analyzed as consisting of:

d = light from the sky *directly* incident upon the working plane.

rd = light from the sky *directly* incident upon the under side or ceiling of the sawtooth roof and thence being diffusely *reflected* to the room below (one reflection).

r,c = *combined* light from the sun and sky, diffusely reflected from the upper outdoor surface of the adjacent sawtooth roof directly to the room below (one reflection).

r_2c = *combined* light from the sun and sky, diffusely reflected from the upper out-

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door surface of the adjacent sawtooth roof, to the under side or ceiling of the sawtooth in question and thence being again diffusely reflected to the room below (two reflections).

29. The total amount of light entering the building and due to the summation of the above four elemental quantities is therefore

$$L = d + rd + r_1c + r_2c \dots \dots \dots [2]$$

30. In the following derivations for each of the above four quantities, it will be noted that the individual values obtained (and therefore also the total value L) are purposely not expressed in terms of any particular standard unit of flux or intensity of illumination. On the contrary, they represent only the relative or comparative amounts of light fur-

31. However, the intensity of illumination in foot-candles could doubtless be approximated, if desired, for a given set of conditions, by applying a theoretically or experimentally determined constant, based correspondingly on the sun's position, general atmospheric conditions, kind of glass, whether single- or double-glazed, whiteness of roof, etc.

Determination of the quantity d or light from the sky, directly incident upon the working plane, see Fig. 2.

32. In arriving at the quantity of light represented by this heading, one of the basic assumptions is that: *The intensity of skylight upon, or the amount of skylight transmitted through, a given point in space is directly proportional to the extent or solid angle of sky to which it is exposed.* This carried a

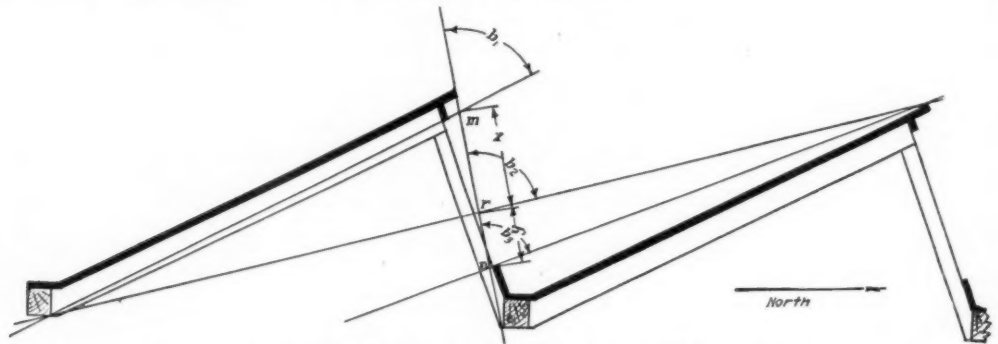


FIG. 2. TO ILLUSTRATE THE AMOUNT OF DIRECT SKYLIGHT.

TABLE 1.—SHOWING VALUES OF (x) IN TERMS OF (λ) AND (ϕ)

λ°	x for $\phi=70^\circ$	x for $\phi=75^\circ$	x for $\phi=78^\circ$	x for $\phi=80^\circ$
3	8° 11'	11° 03'	13° 50'	16° 30'
5	13° 28'	17° 59'	22° 18'	26° 16'
7	18° 29'	24° 28'	29° 52'	34° 36'
10	25° 30'	32° 57'	39° 24'	44° 32'
15	35° 28'	44° 01'	50° 40'	55° 44'
20	43° 15'	51° 55'	61° 05'	62° 43'
25	49° 15'	57° 36'	63° 20'	67° 22'
30	53° 59'	61° 49'	66° 59'	70° 34'
35	57° 36'	64° 58'	69° 41'	72° 56'
40	60° 30'	67° 22'	71° 42'	74° 40'
50	64° 36'	70° 43'	74° 30'	77° 03'
60	67° 15'	72° 48'	76° 12'	78° 30'
70	68° 49'	74° 05'	77° 18'	79° 22'
80	69° 44'	74° 47'	77° 50'	79° 52'
90	70° 0'	75° 0'	78° 0'	80° 0'

nished under their several respective headings. And for the analytical purposes of design, it is believed that, on account of the extreme variability of natural light from day to day and from hour to hour, the use of these values should prove to be fully as satisfactory as if they were expressed in some such term as "foot-candles" of intensity. Especially is this true in view of the fact that they may be employed in conjunction with values computed for buildings already in service and of known degree of excellence as regards natural illumination.

step further and accommodated to the requirements of the problem in question, reads: *The intensity of skylight upon, or the amount of skylight transmitted through, a given point or horizontal line is directly proportional to the vertical angle of the sky to which it is exposed, providing the exposures in a horizontal direction on either side of that vertical angle are equal and symmetrical.*

33. The verity of the above statement, of course, presupposes the sky to be of uniform brilliancy throughout, whereas, as a matter of fact, it is known to be brightest near the sun and near the horizon. However, in the particular problem under consideration any error due to this circumstance should be relatively small for the reason that the sky angle to which a sawtooth roof is exposed, ordinarily embraces a fair average of, and at certain times of day, practically the complete variation of the extremes noted.

34. Now referring to Fig. 2, it is evident that the amount of direct skylight admitted by the typical construction shown is directly proportional to the sum of the total number of degrees of sky which each unit area of the "true effective area" passes, and may therefore be expressed by a summation

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of the product of the above unit areas and their respective sky angles.

35. By inspection, points m , r and n transmit directly to the working plane sky angles b_1 , b_2 and b_3 , respectively, the average sky angle transmitted by all points between m and n being very closely

$$a = \frac{x \frac{b_1 + b_2}{2} + y \frac{b_1 + b_2}{2}}{x + y}$$

measured in degrees.

36. For parallel light rays making an angle a with the lighting plane, the "true effective area" would be $s_{x,y} \sin a$, where $s_{x,y}$ = the area of the

ance should be made for the obstruction due to vertical sash bars, etc.

Determination of the quantity rd or light from the sky directly incident upon the under side or ceiling of the sawtooth roof and thence being diffusely reflected to the room below. See Fig. 3.

39. By inspection, point m transmits to the under side of the roof, sky angle e and all points below m in the lighting-area plane transmit continually decreasing angles until the value zero is reached at r and below.

40. Therefore, the average sky angle transmitted

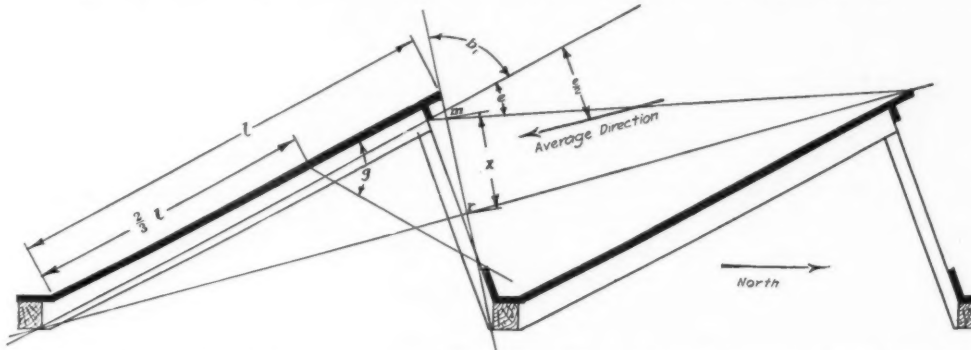


FIG. 3. TO ILLUSTRATE THE AMOUNT OF PURE REFLECTED SKYLIGHT FROM CEILING.

opening in the lighting-area plane as defined in Part I, having a height of $x + y$. But in this case, as will be seen by inspection, the angular direction of the light rays passing any point varies in respect to the plane between the average limits of zero and a . Therefore, the "true corresponding effective area" may be expressed by $s_{x,y}$ times the average sine of this variable angle, between the limits of zero and a . This average sine by simple integration is found to

equal $\frac{\text{vers } a}{a}$ where angle a is in radians. If expressed in terms of degrees as before, it equals $\frac{180 \text{ vers } a}{\pi a}$. Whence

$$\text{True effective area} = s_{x,y} \frac{180 \text{ vers } a}{\pi a}$$

37. Let F = the floor area in sq. ft. over which the light from area $s_{x,y}$ is effective, that is, one bay long and a properly chosen assumed width corresponding to the width selected for $s_{x,y}$. Then,

$$d \text{ (per sq. ft. of } F) = \frac{s_{x,y} \frac{180 \text{ vers } a}{\pi a}}{F} \dots\dots [3]$$

38. In computing the value of $s_{x,y}$ proper allow-

between points m and r is closely $\frac{e}{2}$, being effective in this case over the upper part only of the opening in the plane of the lighting area, this portion being expressed by area s_x in sq. ft.

41. Some of this light will be absorbed by the ceiling itself, the amount depending upon the color and other surface characteristics of the latter. Let R_1 represent the coefficient of reflection of this surface.

42. Furthermore, on account of the diffuse reflection from the under side of the roof some light is reflected back through the glass without being utilized.

43. For simplicity of computation the proportion of reflected light utilized to the total may be taken

with sufficient accuracy as $D = \frac{180^\circ - g^\circ}{180^\circ}$, since

the amount of light obtained under this heading is usually relatively insignificant.

44. As e is always small the "true corresponding effective area" may be assumed with sufficient accuracy as being measured at right angles to the average direction of light ray. Whence,

$$\text{True effective area} = s_x \sin \left(b_1 + \frac{e}{2} \right)$$

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Then,

$$rd \text{ (per sq. ft. of } F) = \frac{R_1 D \frac{e}{2} \sin\left(b_1 + \frac{e}{2}\right)}{F} \cdot [4]$$

Determination of the quantity $r_1 c$ or combined light from the sun and sky, diffusely reflected from the upper outdoor surface of the adjacent sawtooth roof direct to the room below (see Fig. 4).

45. The relative illumination obtained under this heading is dependent, among other things, upon the amount of light incident upon the roof and the capacity of the latter to reflect it to the interior of the building.

46. Let K represent the average ratio of the intensity or quantity of direct sunlight and skylight incident upon 1 sq. ft. of roof surface as compared with the intensity or quantity of skylight only inci-

and [4], the measure of the quantity of direct skylight incident upon and passing area $s_{x,y}$ was taken

as $d + \frac{rd}{R_1 D}$ then it follows that

$$r_1 c = K S_1 R_2 P_1 \left(d + \frac{rd}{R_1 D} \right) \dots \dots \dots [5]$$

Determination of the quantity $r_2 c$ or combined light from the sun and sky diffusely reflected from the upper outdoor surface of the adjacent sawtooth roof to the under side or ceiling of the sawtooth in question, thence being again diffusely reflected to the room below. (Two reflections.—see Fig. 5.)

51. The relative illumination obtained under this heading is also dependent, among other things, upon the amount of light incident upon the roof and the capacity of the latter to reflect it to the interior of

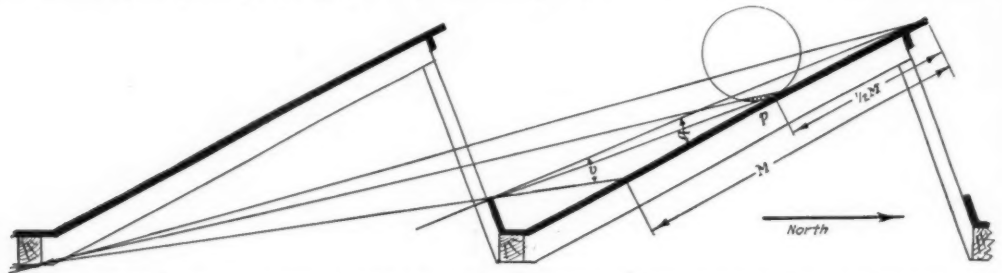


FIG. 4. TO ILLUSTRATE THE AMOUNT OF PURE REFLECTED SUNLIGHT AND SKYLIGHT FROM TOP OF ROOF

dent upon and passing 1 sq. ft. of lighting area $s_{x,y}$.

47. The relative intensity K is present over the roof area within the useful angle v of the figure. Let S_1 represent the ratio of this effective roof area to the lighting area $s_{x,y}$. As before some of this light will be absorbed by the roofing itself, the amount depending upon the color and other surface characteristics of the latter. Let R_2 represent the coefficient of reflection of the roofing material.

48. The reflection of this amount, R_2 , will very closely follow the cosine law of diffuse reflection, the proportional amount included within any vertical angle q from any point p being

$$\frac{q}{\pi} - \frac{\sin 2q}{2\pi} \text{ (where } q \text{ is expressed in radians)}$$

and represented graphically by shaded portion of tangent circle (Fig. 4).

49. As the amount of light obtained under this heading is usually relatively insignificant, it will be sufficiently accurate to compute the total proportional amount as

$$P_1 = \frac{q}{\pi} - \frac{\sin 2q}{2\pi}$$

50. Now, since from the previous equations [3]

the building. Let K and S_2 represent the ratios of light intensity and areas as explained previously, with the exception, however, that (on account of the fact that for a portion of the year the sawtooth valleys may be shaded from the sun's rays and consequently are useful only in reflecting a negligible amount of skylight) the ratio S_2 in this case should be computed for a roof area included between the sawtooth ridge and a horizontal line part way down the roof representing the average shade line on the average day of the year. This may readily be obtained by applying the principles of Part 1.

52. As before, let R_1 and R_2 respectively represent the coefficients of reflection of the ceiling and roofing material. Furthermore, the proportion of reflected light included within any vertical angle α from any point on the roof equals, according to the cosine law of diffuse reflection,

$$\frac{\alpha}{\pi} - \frac{\sin 2\alpha}{2\pi} \text{ (where } \alpha \text{ is expressed in radians)}$$

and is graphically represented by the shaded portion of the tangent circles (see Fig. 5).

53. The average value for this expression between the limits $\alpha = 0$, and $\alpha = \theta$, is therefore

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$$P_2 = \frac{\int_{\theta_1}^{\theta_2} \left(\frac{\alpha}{\pi} - \frac{\sin \alpha}{2\pi} \right) d\alpha}{\frac{\theta_2 - \theta_1}{2\pi} - \frac{\sin(\theta_2 + \theta_1) \sin(\theta_2 - \theta_1)}{2\pi(\theta_2 - \theta_1)}}$$

where θ_2 and θ_1 are measured in radians.

54. The above expression may be taken as the proportional amount passing the lighting area since the amount excluded between the limits ϕ_2 and ϕ_1 is usually relatively insignificant. However, this proportion may be calculated from the same formula if desired and subtracted from P_2 .

55. Since the intensity of light received by the ceiling varies considerably from ridge to valley, the total useful quantity may be obtained accurately only after a more complex operation than that involving P_1 and P_2 above; and for simplicity, therefore, as in computing rd , this proportion may be taken as $D = \frac{180^\circ - g^\circ}{180^\circ}$. It is believed that this assumption is sufficiently accurate for the purposes of the problem, D usually representing a considerable proportion approximating 70 per cent. Therefore, following out the same reasoning as for Equation [5],

$$r_c \text{ (per sq. ft. of } F) = KS_2 R_1 R_2 P_2 D \left(d + \frac{rd}{R_1 D} \right) \quad [6]$$

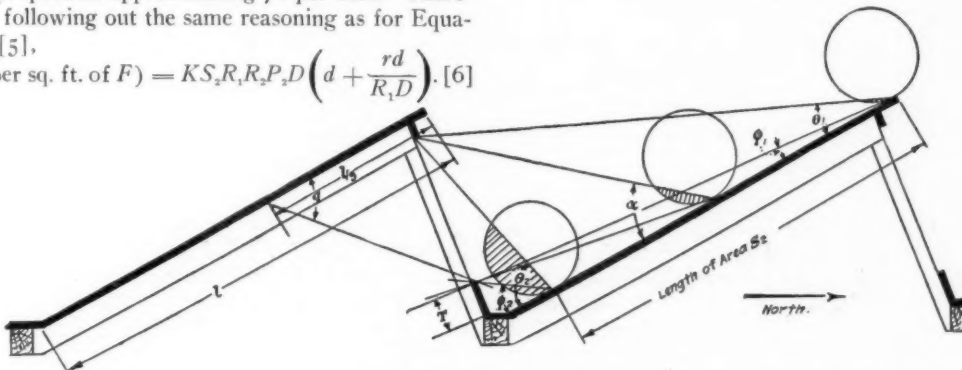


FIG. 5. TO ILLUSTRATE THE AMOUNT OF DOUBLY REFLECTED SUNLIGHT AND SKYLIGHT

56. The following example illustrates the method of procedure.

EXAMPLE 2. Given the same typical sawtooth roof as in Example 1, having angle of glass = 73 deg.: Required to find the total amount of daylight entering — that is, quantity L , Equation [2].

First to find quantity d , Equation [3]. From the detailed building sections, it is found that

$$b_1 = 72^\circ 30'; b_2 = 86^\circ; b_3 = 80^\circ; x = 44''; y = 22'';$$

whence

$$a = \frac{44 \frac{72.5 + 86}{2} + 22 \frac{86 + 80}{2}}{66} = 80^\circ 30'$$

and

$$\frac{180 \text{ vers } a}{\pi} = \frac{180 (1 - 0.165)}{80.5 \pi} = 0.592$$

57. Let the computations be based on a section of the sawtooth having a length equal to the width of one sash, i.e., 8' 3", the latter having a net width of glass equal to 7' 3". The length of span between valleys is 17' 0". From the foregoing,

$$s_{x,y} = 7.25 \times 5.5 = 39.9 \text{ sq. ft. and } F = 17 \times 8.25 = 140 \text{ sq. ft.}$$

Therefore entering equation [3],

$$d = \frac{80.5 \times 39.9 \times 0.592}{140} = 13.6.$$

To find quantity rd , Equation [4].

58. From the detailed building sections it is found as before that $b_1 = 72^\circ 30'; x = 44''; e = 25^\circ 30'; g = 40^\circ$. Basing the computation on the same length of sawtooth as before,

$$s_x = 7.25 \times 3.66 = 26.5 \text{ sq. ft.}$$

$$F = 140 \text{ sq. ft.}$$

also,

$$D = \frac{180 - 55}{180} = 0.7$$

59. Assume that ceiling of sawtooth roof is

painted white having coefficient of reflection $R_1 = 0.60$. Then, entering Equation [4],

$$0.6 \times 0.7 \times 12.75 \times 26.5 \times \sin(72^\circ 30' + 12^\circ 45')$$

$$rd = \frac{\quad}{140} = 1$$

which is relatively small compared with d .

To find quantity r_c , Equation [5].

60. From the detailed building sections, it is found that $q = 15^\circ = 0.26$ radians, whence

$$P_1 = \frac{0.262}{\pi} - \frac{\sin 30^\circ}{2\pi} = 0.004$$

61. According to a publication entitled *The Sun* by Charles G. Abbott, S.M., Director Smithsonian Astrophysical Observatory, the average intensity of sunlight plus skylight on this sawtooth roof may be deduced as being during working hours, and for ordinary atmospheric conditions, four or five times

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that of skylight on the lighting-area plane. Therefore, let $K = 4$.

62. S_1 from the detailed sections is found to be 2.3. Assume the roof to be covered with clean white slag having a coefficient of reflection = 0.5. Then, entering Equation [5],

$$r_1c = 4 \times 2.3 \times \frac{1}{0.5 \times 0.004 \left(14.8 + \frac{1}{0.6 \times 0.7} \right)} = 0.3$$

63. This quantity, represented by Equation [5], is usually so small that it may be omitted entirely from the computations.

To find quantity r_2c , Equation [6].

64. From the detailed building sections it is found that

$$\theta_2 = 80^\circ = 1.4 \text{ radians} \\ \theta_1 = 24^\circ = 0.42 \text{ radian}$$

whence

$$\theta_2 + \theta_1 = 1.82 \text{ radians, and } \sin(\theta_2 + \theta_1) = 0.97 \\ \theta_2 - \theta_1 = 0.98 \text{ radian, and } \sin(\theta_2 - \theta_1) = 0.829$$

Therefore,

$$P_2 = \frac{1.82}{2\pi} - \frac{0.97 \times 0.829}{2\pi \times 0.98} = 0.16$$

S_2 is found to equal in this case 2.7.

$K = 4$, $R_1 = 0.6$, $R_2 = 0.5$, and $D = 0.7$, as before. Therefore, entering Equation [6],

$$r_2c = 4 \times 2.7 \times 0.6 \times 0.5 \times 0.16 \times 0.7 \left(13.6 + \frac{1}{0.6 \times 0.7} \right) = 5.8,$$

whence, Equation [2]

$$L = 13.6 + 1.0 + 0.3 + 5.8 = 20.7.$$

This total quantity may be compared with a corresponding value computed for a sawtooth building already in service and of known degree of excellence as regards intensity of natural illumination.

65. In case additional illumination is required an alternate design having increased glass area or a flatter slope, or both, might be considered. It is interesting to note that if the pitch is decreased by only 10° , the glass area remaining the same, L figures out to be increased by about 15 per cent. Assuming the building placed as in Example 1 and applying the principles of Part 2, it is found that considerable sunlight will enter for the entire day. The period of total shade would be decreased on June 10 from over 7 hr. to zero, or a condition of continuous direct sunlight.

66. This information, when extended to comprehend that for other days of the year, including the days of average length, and when used in conjunction with the particular conditions and requirements of the problem in question should facilitate the selection of the most advantageous design.

67. Various means have been adopted to exclude direct sunlight from the interior of such buildings and all of them seem to have the disadvantage of reducing the total illumination. Sawtooth buildings

with glass vertical, that is, with the effective angle of the lighting area actually *overhanging*, are not uncommon; whitewashing the glass results in some protection against direct solar rays and a cooler interior, but also in glare and considerable loss of light, the latter being especially noticeable on dark days and when the sun is not shining in the shed; deeply ribbed glass produces glare.

68. Whatever glass is used, cleanliness is essential; the significance of Equation [6], indicating the possible average relative amount of reflected light, emphasizes the importance of adopting light-colored roofing materials such as white slag, and the use of white dust-resisting, washable paints upon sawtooth ceiling of buildings in which maximum daylight is desired. If either of the above surfaces had been black, the average reduction in daylight for Example 2 would have been equivalent to 30 per cent, or the increased light resulting from their use amounts to over 40 per cent.

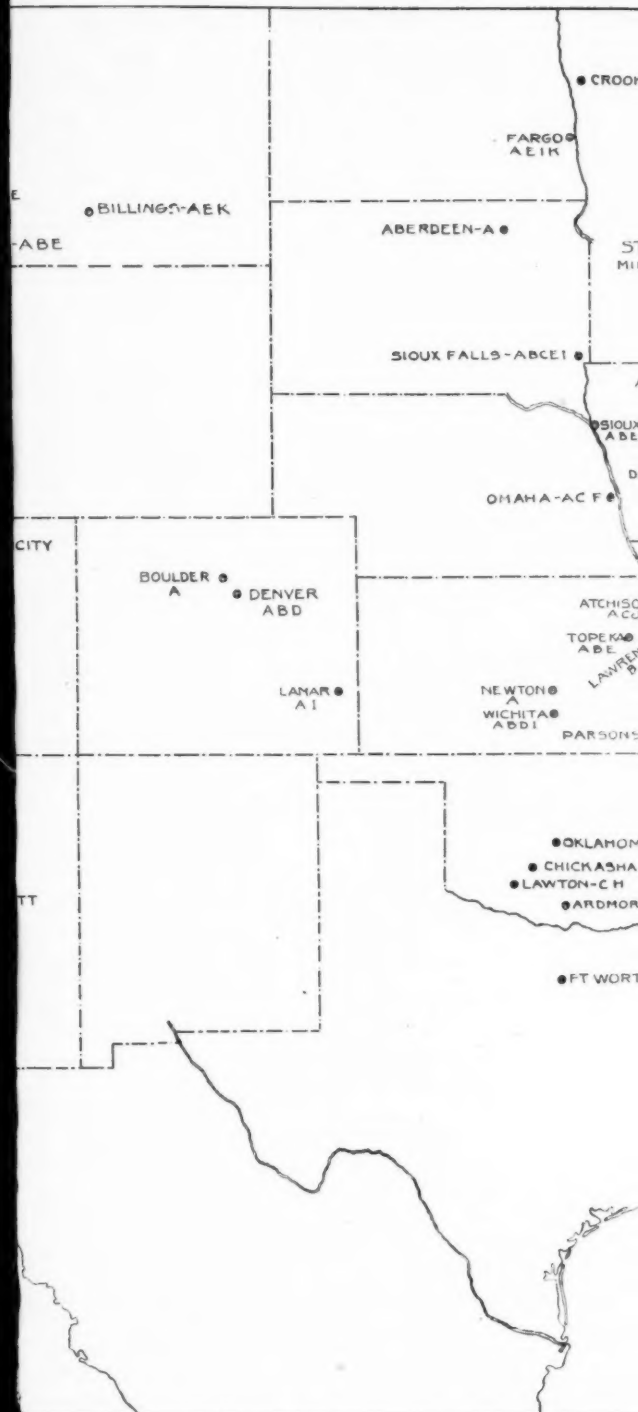
Part 2 should be applied with due regard to its practical limitations. It furnishes a means of comparison with known designs, is based on fair-weather conditions and with sunlight on the building as a whole. During cloudy weather the amount of useful light contributed from the top of the sawtooth roof is decreased, but the quantity of direct skylight, which has been found to constitute the major portion of the total, is often considerably increased, depending upon the relative brightness of the clouds.

69. From the foregoing analyses it is evident that the height of valley (T , Fig. 5) for a given construction should be made as low as consistent with protection against the elements, including snow and ice. It is a coincidence that in the South, where some difficulty is often encountered in obtaining the desired intensity of daylight (on account of the increased slope of the glass which it is felt necessary to adopt), the lighting area may be considerably augmented by using a shallower valley than would be considered advisable in the North.

70. It will be seen that for a given building the use of a *small* number of *large-scale* sawteeth as against a greater number of *smaller* units having the same pitch, results in considerably increased daylight due to fewer number of valleys of height T , and consequently less proportionate obstruction. This principle should be applied with due regard to structural limitations and architectural consideration which may be involved, together with the important question of evenness of daylight intensity.

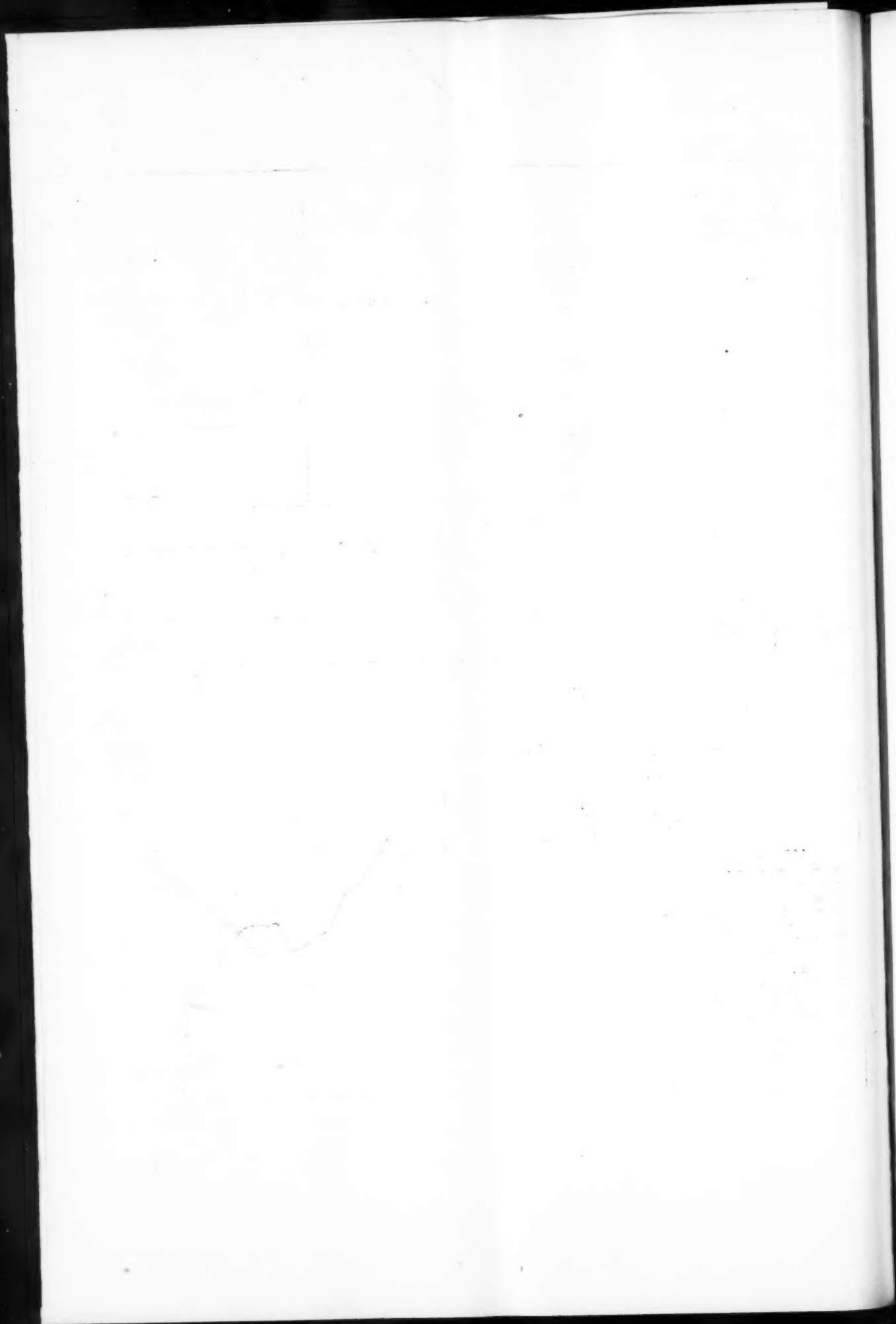
71. It is worthy of note that the adoption of flatter saw-teeth with increasing terrestrial latitudes works out well in conjunction with the heating requirements, since it results in less cubage and radiating surface.







-HIGH-LIGHT-
 -BUILDING-SURVEY-
 -OF-
 -UNITED-STATES-
 PREPARED BY
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Building Construction in the United States

The Present Needs of the Country

PRIOR to the war, building construction in this country was variously estimated as amounting to between \$2,000,000,000 and \$3,000,000,000 annually. Exactly what building construction amounts to in any one year cannot be definitely determined. One reason for this is that records of building permits are compiled in comparatively few municipalities and no records are kept of farm building construction. Another element of possible error is the fact that while building permits may be issued in a particular year, the actual construction is not completed within that year.

A major proportion of the total building construction is handled in architects' offices and built according to architects' specifications. For this reason architects are vitally interested in the building outlook.

Beginning about the middle of 1914 and continuing up to the time the armistice was signed on November 11th, there was a general diminution of the work in architects' offices, so that the estimated amount of building construction for the year 1918, outside of Governmental construction, amounted only to approximately \$500,000,000. It seems logical, therefore, to assume that during the past four years building construction has lagged behind normal activities to an amount, at a conservative estimate, somewhere between \$3,000,000,000 and \$4,000,000,000. With these figures as a basis and with the expectation that not only will normal building construction equal a pre-war figure but that the shortage created during the war will also be made up, it seems fair to assume that during the next five years building construction will average considerably in excess of \$3,000,000,000 annually.

As an indication of the shortage, it may be pointed out that, according to census figures, the normal residential construction, which includes apartment houses, amounted to 385,000 structures for the year 1913, while in the year 1918 it is estimated that, even with the great industrial housing projects of the Government, only 125,000 residences would be built. Figures show that the country is now short something over 700,000 residences alone.

Realizing the shortage in all types of buildings and desiring to secure an idea of the types of buildings most urgently needed in all parts of the country, the editors of THE AMERICAN ARCHITECT sent a questionnaire to architects, bankers, real estate

men and contractors in all parts of the country, asking for information on what types of buildings were most needed in their communities, and what factors might tend to encourage or discourage their construction. This questionnaire was sent out prior to the signing of the armistice and represented conditions existing while war was still being continued. For this reason the answers to some of the questions might be different now than it was in October and early November when replies were received, but the types of buildings needed would be the same.

The results of this investigation are shown on the accompanying pages, on which are given a map of the United States, showing the cities from which replies were received, and giving a key to the types of structures needed. This is followed by a tabulation of the questions asked, together with extracts from letters received in reply. It will be noted that, in some few instances, correspondents from the same city are not entirely in agreement.

Of the 114 cities represented, 84 of them reported a material shortage of residences, 50 of them reported the need of schools, 31 of them require additional business and office buildings, 30 of them could use more factories, 27 of them need warehouse accommodations, 16 should have apartment buildings, and 16 require public buildings of various characters, 8 of them could advantageously have greater hotel accommodations; 13 replies were received showing that there was great need of farm buildings in the agricultural communities surrounding those cities, and two mid-Western cities reported the need of greater grain storage facilities.

These replies have simply indicated the types of buildings actually necessary and no reference has been made in them to libraries, churches, theaters, fraternal buildings, or other structures of a similar character that form a considerable bulk of peacetime construction.

While reports are given from only 114 cities of the country, these are so distributed that they may safely be considered as representing average conditions in every community.

It is evident from the foregoing that architects should be very busy for at least the next five years to come. It seems logical to assume that those offices best fitted to handle the work will reap the greatest reward.

Information Supplied by Architects

CITY AND STATE	1. WHAT IN YOUR JUDGMENT IS THE PRESENT SHORTAGE OF PUBLIC BUILDINGS, DWELLINGS (CITY AND SUBURBAN), FACTORY BUILDINGS, FARM BUILDINGS, SCHOOLS AND OFFICE BUILDINGS?	2. ARE THERE IN YOUR VICINITY ANY PUBLIC BUILDINGS UNDER TAKEN, BUT NOT COMPLETED OWING TO GOVERNMENT RESTRICTIONS?	3. DO YOU ANTICIPATE SPECIAL ACTIVITY IN ANY PARTICULAR BRANCH OF BUILDING AFTER THE WAR?	4. WILL YOU GIVE ME BRIEFLY AN EXPRESSION OF YOUR OPINION AS TO THE REASONS FOR ASSUMING THAT THERE WILL BE OR WILL NOT BE UNUSUAL BUILDING ACTIVITY IN YOUR SECTION?	5. DO YOU BELIEVE THAT THE RETURNS IN RENTS OR OTHER INCOME FROM BUILDINGS WILL SERVE TO STIMULATE THEIR ERECTION?	6. ARE THERE IN YOUR JUDGMENT ANY FACTORS IN THE BUILDING SITUATION LIKELY TO OBSTRUCT A BUILDING REVIVAL? WILL LABOR, MATERIAL COSTS OR FINANCING BE THE IMPORTANT ELEMENT?
SYRACUSE, N. Y.	Houses under \$10,000 and schools.	Small schools.	Houses.	House building ceased and population increased.	No answer.	No answer.
ROCHESTER, N. Y.	There is a shortage in public buildings, but no apparent shortage in either city or suburban houses. Some factory buildings needed.	None.	Yes, in all branches.	Many projects have been held up. Think there will be decided era of prosperity after the war.	Yes.	Possibly labor and materials.
ALBANY, N. Y.	Municipal building and many schools.	None.	Not to any great extent.	Not until costs of labor and material decrease.	No.	Labor and materials.
PITTSBURGH, PA.	There is a shortage of dwellings, city and suburban, schools and office buildings.	None.	Does not anticipate any.	Pittsburgh activity in building entirely due to local industrial prosperity.	Yes.	Labor, material and money.
WILKES-BARRE, PA.	None at present.	None.	Indefinite labor problem complicates.	See 3.	No.	Labor shortage.
PITTSBURGH, PA.	Schools, apartment houses, dwellings.	Yes.	No.	Owing to action by labor unions and the uncertainty of wage scale only necessary building will be undertaken.	No.	Labor.
NASHVILLE, TENN.	Apartments, hotels, dwellings, schools.	None.	Yes, considerable.	Owing to large number of men engaged in Government power plant there will be great building activity.	Cannot give a satisfactory answer.	Scarcity of labor and materials.
FORT WORTH, TEX.	Hotel, office buildings, factory buildings.	None.	No.	Look for only normal conditions.	Yes.	Believe these matters will adjust themselves.
BIRMINGHAM, ALA.	Houses, schools, factories, office and public buildings and farm buildings.	Yes, U. S. Post Office.	Yes, but mainly in schools.	War time shortage has created big demand.	Yes.	Labor.
BIRMINGHAM, ALA.	Houses and schools.	Yes, bond issue \$3,000,000 for public buildings held up.	Yes.	No satisfactory answer.	No.	Labor and materials.
RICHMOND, VA.	Schools, apartments, suburban houses, warehouses.	Yes.	Yes, in retail stores.	Return of peace and "flush times" will create demand for stores.	No.	Labor and materials.
NORFOLK, VA.	Houses, factories, schools, office buildings.	No.	No.	Reconstruction.	No.	All.
LITTLE ROCK, ARK.	Houses, schools.	No.	Yes.	Personal observation while in Government work. Looks for great revival.	Doubtful.	Labor and materials.
FARGO, N. D.	There is a shortage in all.	None of importance.	Yes.	The general need for expansion.	Certainly.	Labor and materials.
DENVER, COL.	Houses, schools, office buildings.	None.	Houses, apartment buildings.	There is a dearth of sufficient housing.	Yes.	Labor.
LOS ANGELES, CAL.	Public buildings, houses, industrial buildings, farm buildings, schools, office buildings.	None.	Normal.	"The only reason I can give is the condition of my own clientele."	Not just now.	See his letter.
LOS ANGELES, CAL.	A new city hall, library, some industrial buildings.	None.	Normal.	Believe there will not be any large increase in population to warrant much building activity.	No.	Labor and materials.
SAN FRANCISCO, CAL.	The normal amount over a period of two years.	Bonds voted for schools and state buildings.	Must make up for lost time. Additional foreign trade should produce buildings of every character.	Answered in 3.	Yes on law of supply and demand. Rents will continue to be higher than before the war.	Plenty of labor and material. Financing will be difficult and expensive.

OAKLAND, CAL.	Dwellings costing \$2,000 up to \$20,000. Considerable shortage also in factories. Slight shortage in schools.	None.	Yes.	Building activities seriously retarded for four years. Population increased about 30 per cent and more.	Not in office buildings. Schools, department stores, factories, farm buildings, hotels, hospitals will go ahead.	Uncertainty of prices. Delivery of materials slow. Cost will be well supplied when business improves and also due to increased efficiency of women. Financing will be easier as people have been converted to nation of savers.
COLUMBUS, OHIO.	Buildings to properly house state institutions. Medium priced dwellings. Factory and commercial buildings.	About 20 per cent.	Public and semi-public buildings.	Believe there will be a strong demand for additional facilities for business. Activity will be unusual and above the normal.	Yes, decidedly.	Will probably be a number of years before marked decrease in prices of materials. Believes business will adjust itself to new conditions and people will be better able to build even at advanced prices of labor and material owing to the fact that the source from which they derive their profits will have increased proportionately. Financing will adjust itself.
CINCINNATI, OHIO.	Does not know.	No.	No.	Normal amount only.	No.	Labor and high price of materials.
COLUMBUS, OHIO.	With exception of schools comparatively few buildings erected past two years. A general shortage.	None.	Expect strong activity. Not confined to any particular branch.	Pronounced activity.	No.	Labor and materials.
CINCINNATI, OHIO.	School houses. Great shortage of factory buildings. Office space difficult to secure.	None.	See No. 1.	Unusual activity.	Decidedly, yes.	Labor.
DETROIT, MICH.	Dwellings, retail stores, schools.	Several planned but none started.	Very great activity.	Industrial buildings have been extended for a year. With peace they will more than take care of demand.	Yes.	No answer.
CHICAGO, ILL.	No shortage except small houses in vicinity of large industries.	None.	Schools, better class houses. Speculative building.	Do not believe there will be any unusual activity.	Do not believe income from rents will stimulate building.	Organized labor.
CHICAGO, ILL.	Only in the small houses.	None.	Not immediately unless perhaps remodeling.	Do not believe there will be any unusual activity.	No.	Labor and materials.
MILWAUKEE, WIS.	10 per cent.	None.	Yes, public buildings.	Yes, based on inquiries by people interested.	No.	Labor.
KANSAS CITY, MO.	10 per cent.	Yes.	Expect a gradual resumption.	"Restriction at present means a spasm when removed."	Yes.	Labor.
ST. LOUIS, MO.	About 70 per cent.	None.	Depends on cost of material.	No answer.	Yes, industrial buildings.	Labor and materials.
ST. LOUIS, MO.	No shortage.	None.	A fair activity not confined to any special branch.	There is plenty of office and store space available. Possibly some warehouse or loft buildings may be built.	No.	Labor.
PROVIDENCE, R. I.	Very great.	None.	No.	Normal resumption.	Yes.	Labor.
PORTLAND, ME.	Central fire station, schools. No building of good houses for past two years. Factory buildings.	None.	Yes, considerable.	See No. 1.	In some locations.	Labor and materials.
NEW HAVEN, CONN.	Schools, two- and three-family houses.	None.	Yes.	Strong activity.	Yes.	Think conditions will serve to adjust these matters.
BRIDGEPORT, CONN.	Industrial housing.	None.	Believes there will be continued depression.	See his letter. A very well expressed opinion why Bridgeport will see no unusual activity.	No.	Labor complications. See letter.
BOSTON, MASS.	Equivalent to three years' supply.	Yes, a great many due to Government restrictions.	Looks for great activity in public buildings, but little special activity in private work for some time.	See his letter for lengthy expression of views.	Does not look for much advance in this direction.	Division of capital in financing the Government and large corporations. Believes labor will be plenty but high.
BOSTON, MASS.	Moderate priced houses and schools.	A considerable number.	Very marked.	No satisfactory answer.	Yes.	Labor and material costs.
SALT LAKE CITY, UTAH.	Shortage of most kinds of buildings, vacant stores, buildings, offices or houses. Shortage of schools, some being erected to a limited extent.	No.	Yes, in most branches. Store and office buildings, apartment houses, schools, warehouses, residences then. Many projects held up. Exceedingly prosperous section.	Think there will be an era of building activity after the war dependent on resumption of construction. Many projects held up. Exceedingly prosperous section.	Yes, rents advanced in keeping with other advances all along the line.	Continued high prices of building materials. High wages, aggressive labor unionism. No difficulty in financing.

Information Supplied by Architects—Continued

CITY AND STATE	1. WHAT IN YOUR JUDGMENT IS THE PRESENT SHORTAGE OF PUBLIC BUILDINGS, DWELLINGS (CITY AND SUBURBAN), FACTORY BUILDINGS, FARM BUILDINGS, SCHOOLS AND OFFICE BUILDINGS?	2. ARE THERE IN YOUR VICINITY ANY BUILDINGS (CITY AND SUBURBAN) WHICH ARE TAKEN, BUT NOT COMPLETED DURING THE PRESENT WAR?	3. DO YOU ANTICIPATE SPECIAL ACTIVITY IN ANY PARTICULAR BRANCH OF BUILDING AFTER THE END OF THE WAR?	4. WILL YOU GIVE ME BRIEFLY AN EXPRESSION OF YOUR OPINION AS TO THE REASONS FOR ASSUMING THAT THERE WILL BE A BUILDING REVIVAL? IS THERE ANY UNUSUAL BUILDING ACTIVITY IN YOUR SECTION?	5. DO YOU BELIEVE THAT THE RETURNS IN RENTS OR OTHER INCOME FROM BUILDINGS WILL SERVE TO STIMULATE THEIR REECTION?	6. ARE THERE IN YOUR JUDGMENT ANY FACTORS IN THE BUILDING SITUATION LIKELY TO OBSTRUCT A BUILDING REVIVAL? IF SO, WHAT ARE THEY? IS THERE ANY FINANCING AS THE IMPORTANT ELEMENT?
BALTIMORE, Md.	Need of schools, another hotel or two, extensions to public library system, a municipal hospital. Short on industrial buildings.	Nothing of material extent.	Shortage of industrial buildings must be made good. Will probably build.	Baltimore is a conservative city.	Buildings after the war will have to meet definite demands and not speculative investments.	High cost of materials and labor.
TACOMA, WASH.	Big shortage in housing. Scarce in public buildings, schools, etc. Also factories.	None of importance.	General commercial, dwellings of better class, schools.	Prosperous conditions. High wages and high cost of materials also building restrictions account of war holding up building.	Not at present time. Building costs too high to get returns.	Price of labor and materials.
SEATTLE, WASH.	Dwellings for workers. Also higher class residences, apartments, hotels and office buildings.	No.	See question 1.	Present demand of buildings of all kinds not equal to supply. Therefore buildings of all kinds to take care of population.	Yes.	Costs of labor and materials.
ST. LOUIS, MO.	Warehouse capacity, farm buildings, silos, grain elevators. Some new school buildings. Residences for rent or sale.	Yes, addition to U. S. Post Office.	Yes.	Trade demands of a growing and prosperous territory warrant it. Present demand of buildings of all kinds not equal to supply. Therefore buildings of all kinds to take care of population.	Impossible to put up normal residences, office buildings and stores and receive profitable return from them. In case of small apartments, rents are abnormally high and therefore satisfactory to owners. People feel this is a temporary condition and do not want to invest on the strength of it.	I. W. W. idea.
NEW ORLEANS, LA.	Shortage of public buildings in the state. Shortage of dwellings, city and suburban, schools, office buildings.	Several churches and schools.	All branches.	Actual need exists and must be satisfied.	No.	Labor shortage and congested condition of all manufacturing elements.
CHICAGO, ILL.	Small apartments, hospitals, schools.	Union Railway Station Terminal.	Perhaps small apartment buildings.	Labor and material costs too high. Impossible to get adequate return for the investment.	No.	Labor, material costs.
LOS ANGELES, CAL.	From 15 to 20 per cent.	Yes, especially schools.	All branches.	Actual shortage of building and good supply of money.	Yes.	Will have to go by higher schedule of costs. Matters will adjust themselves.
PORTLAND, ORE.	Dwellings, factory buildings and schools.	No.	War industries will readjust themselves on a peace basis.	Great activity in residences. Growth of city industrially warrants factories and plants.	Yes.	Believes there should be some Governmental financial aid to spur building.
PORTLAND, ORE.	Housing for shipyard workers, schools.	Post Office.	Not at present.	Overbuilt before the war especially in office buildings.	No.	Believes people will build regardless of high costs.
OKLAHOMA CITY, OKLA.	Warehouses, factory buildings.	School work.	Nothing unusual.	Dependent on labor and material prices and improvement of unsettled conditions.	Yes, providing labor conditions improve.	Labor conditions.
BOSTON, MASS.	Factory buildings.	Believe there are.	Factory buildings.	People stimulated by prosecution of successful war will spur building; also requirements of war and much depleted in its stocks of manufacturing articles.	Does not care to express opinion.	High prices of labor and material.
ST. JOSEPH, MO.	Hospitals, apartment houses, small dwellings, factories, store buildings.	No.	Yes, in store buildings and residences.	We positively need many buildings so we assume they will be built when conditions are more settled.	Yes.	Possibly high prices. Plenty of money.
CLEVELAND, OHIO.	Suburban dwellings, schools.	Auditorium held up. Jail and public library bonded and ready to let contracts after war.	Yes, in domestic work.	Many people have become wealthy and will desire better homes. Will build regardless of cost to satisfy their desire.	Doubtful.	Labor and material costs.
CHICAGO, ILL.	No distinct shortage in and around Chicago.	Yes, public schools.	Schools first to be built.	Expect considerable building activity.	No.	High cost and labor shortage.
ATLANTA, GA.	General shortage, particularly in dwellings.	No.	Do not look for special activity.	Building will be resumed in a general and steady way as conditions become normal.	Yes.	These matters will adjust themselves.

Information Supplied by Bankers, Real Estate Dealers and Contractors

CITY	1. IS THERE ANY SHORTAGE OF DWELLINGS, FACTORY BUILDINGS, WAREHOUSES, SCHOOLS OR OFFICE SPACE?	2. DO YOU ANTICIPATE SPECIAL ACTIVITY IN ANY PARTICULAR CLASS OF BUILDING AFTER THE WAR?	3. MAY WE HAVE AN EXPLANATION OF YOUR OPINION AS TO THE REASON FOR THIS ASSUMPTION? THERE WILL OR WILL NOT BE UNUSUAL ACTIVITY?	4. DO YOU THINK RENTS AND OTHER RETURNS FROM BUILDINGS WILL BE HIGHLY STIMULATED SUCH AS IN THE REVIVAL OF BUILDING? YES/NO?	5. WHAT FACTORS IN THE BUILDING SITUATION ARE MOST LIKELY TO STIMULATE SUCH INCREASE IN BUILDING? FINANCING? LABOR? MATERIAL COSTS?	SPECIAL COMMENT.	6. HOW HEAVILY HAVE RENTS ADVANCED IN THE LAST YEAR?	7. DO RENTERS EXPERIENCE DIFFICULTIES IN SECURING ANY PARTICULAR ACCOMMODATIONS?
TOPEKA, KAN.	Yes.	Dwellings.	Return of confidence and shortage of dwellings.	Yes.	Labor.		25 per cent.	Yes.
TOPEKA, KAN.	Yes, dwellings and schools.	Railway and warehouse work.	Much needed shortage will have to be filled.	No.	Labor and material costs.		No advance.	Modern houses.
WICHITA, KAN.	Moderate shortage of dwellings and office space.	All buildings, dwellings, factories, etc.	Prosperity of agricultural class as the result of market conditions after the war.	Conditional; depends on business activity.	Labor, high prices of building materials, and poor agricultural production and low prices of same.	Farmers' prosperity high factor in future building operations.	15 to 30 per cent.	No answer.
WICHITA, KAN.	Yes, dwellings and office space.	Only normal activity expected.	Normal.	Yes.	Labor and material costs.	Normal building operations expected.	10 to 20 per cent.	Dwellings and office space.
WICHITA, KAN.	Yes.	All kinds.	City growing rapidly on account of oil development.	Yes.	Government restrictions only.		Waiting lists for apartments.	Yes.
CARTHAGE, MO.	Yes.	All buildings.	Strong indication of rapid future growth.	Yes.	Labor, material costs.		10 to 25 per cent.	No.
CARTHAGE, MO.	No.	No.	Crop conditions bad; money scarce.	Rents about one-half what they should be to make a paying investment.	Demand and financing.		None.	Small modern houses.
NEVADA, MO.	No.	No.	Country can't support any more. Crop a failure.	No.	Buildings do not pay 10 per cent. for 3 years. Many vacant. Labor, material costs, etc.		No advance. Decrease noted.	Modern buildings desired but low cost don't warrant construction.
OMAHA, NEB.	Yes.	Dwellings.	Stimulation of rentals may serve to spur new building.	Stimulation of rentals as they are now low may encourage investment.	Material costs, labor and readjustments, financing.	This city will depend for its future building on the action of rest of the country.	10 to 15 per cent.	Great difficulty experienced in obtaining any dwellings especially with modern conveniences.
CLEVELAND, OHIO	No real shortage. Only war condition.	No special activity.	Future building necessary and will have to be accomplished to house munition workers.	Decrease in rents and returns likely.	Assimilation in commercial buildings. Labor, material costs and financing.	Normal building activity expected to house growth.	20 per cent.	Yes, at this time.
CLEVELAND, OHIO	Yes, dwellings, apartment houses, offices, school buildings.	Dwellings.	Constant growth demands it.	No.	None.	There is sure to be building activity following war because city is crowded.	25 per cent.	Dwellings.
CLEVELAND, OHIO	Yes, dwellings, factories.	Dwellings.	Much needed.	Yes.	Financing.		No answer.	Dwellings.
CLEVELAND, OHIO	Yes.	If conditions are favorable.	Depends on material and labor.	Yes.	Delivery of material.		25 per cent.	Yes.
CLEVELAND, OHIO	Yes, dwellings, factories, warehouses.	All kinds.	Growth of city demands it.	Yes.	Financing.		25 per cent.	Yes.
CHICKASHA, OKLA.	Yes, dwellings.	Dwellings.	No activity unless labor and material costs decrease.	No, not here.	Labor, material costs, financing.	If labor and material prices should be prohibitive, decrease, future building will be possible.	30 to 30 per cent.	Some difficulty. Good dwellings hard to get and cheap ones to be had.
TEXARKANA, ARK.	No.	No.	Plenty of building for present needs.	No.	Labor, material costs, financing.		16 2/3 per cent.	No.
LAWTON, OKLA.	Yes.	Factories and a hotel.	Big gas field opened and prospecting. Good prospects for future building.	Rentals are good.	Financing.	Irrigation plant to be built. More business houses and factories will be built.	No answer.	No answer.

Information Supplied by Bankers, Real Estate Dealers and Contractors—Continued

CITY	1. IS THERE ANY SHORTAGE OF DWELLINGS, FACTORY BUILDINGS, WAREHOUSES, FARM BUILDINGS, SCHOOLS OR OFFICE SPACE?	2. DO YOU ANTICIPATE SPECIAL ACTIVITY IN ANY PARTICULAR CLASS OF BUILDING AFTER THE WAR?	3. MAY WE HAVE AN EXPRESSION OF YOUR OPINION AS TO THE REASON FOR ASSUMING THAT THERE WILL OR WILL NOT BE UNUSUAL ACTIVITY?	4. DO YOU THINK RENTS AND OTHER RETURNS FROM BUILDING INVESTMENTS ARE SUFFICIENTLY HIGH TO STIMULATE SUCH INVESTMENTS WHEN PEACE COMES?	5. WHAT FACTORS IN THE BUILDING SITUATION DO YOU REGARD AS MOST LIKELY TO OBSTRUCT A REVIVAL OF BUILDING?	SPECIAL COMMENT.	6. HOW HEAVILY HAVE RENTALS ADVANCED IN THE LAST YEAR?	7. DO RENTERS EXPERIENCE DIFFICULTIES IN SECURING ANY PARTICULAR ACCOMMODATIONS?
NEWTON, KAN	Yes, dwellings.	Dwellings.	Number of families without homes. All dwellings occupied.	Yes.	Material costs.	Spur will come to building dwellings when war is over.	10 per cent.	Difficulty in securing rental in modern building.
St. Joseph, Mo.	No.	No.	No building because of there being very little return on money.	No.	Labor, material costs. Rental taxes and assessments.	City's charter in relation to rental taxes is very hostile. Land tax is very high and no building is possible.	Slight.	Difficulty because no capital will be put in building under present conditions.
St. Joseph, Mo.	Yes, dwellings and warehouses.	All kinds.	Curtailment has created the demand.	Yes.	Financing.		Slight.	Dwellings.
St. Joseph, Mo.	Yes, dwellings, factories, warehouses.	Dwellings and warehouses.	No vacant houses at present. Some more needed.	Yes.	Labor.		10 per cent.	None.
BLOOMINGTON, ILL.	No.	Dwellings.	Many buildings will be built if war conditions readjust themselves.	No.	Labor, material costs.		None.	To some extent.
AKRON, OHIO	Yes.	Yes.	Considerable activity.	Yes.	Labor, material costs, financing.		10 per cent.	Yes.
MINNEAPOLIS, MINN.	No.	Activity in all kinds of construction expected.	Activity will make up for lost time.	Yes.	Material costs.		None.	No.
WALLA WALLA, WASH. ...	Yes, dwellings.	Dwellings.	Building will be started after war because it is needed.	No; do not build here for investment; build own homes.	Material costs, financing.		No advance here.	Good homes at a premium; apartment houses wanted but financing lacking.
MONMOUTH, ILL.	No.	No.	Sufficient buildings to meet demands.	No.	No answer.		None.	No.
LOUISVILLE, KY.	Yes, modern residences, warehouses, factories.	Big building activity in all lines including repairs.	Yes, activity is expected.	Yes.	None.	Cessation of government work will lower material costs and labor.	10 to 15 per cent.	Cannot secure modern houses or apartments.
LOUISVILLE, KY.	Yes, dwellings.	All lines of building.	Ban on building stopped much needed building.	No.	Financing, material costs.	Permanent army camps close to this city will spur building.	20 per cent.	Apartments and dwellings.
LOUISVILLE, KY.	None.	Public buildings, residences.	Curtailment of construction has created demand.	No.	Labor, material costs.		No answer.	Apartments.
PARSONS, KAN.	Yes, dwellings.	None.	Nothing to cause it.	No.	None.		20 per cent.	Yes.
PARSONS, KAN.	Yes, dwellings.	Very little.	Very little more than normal.	Yes.	Labor, material costs.		15 to 100 per cent.	Dwellings.
ELDORA, IOWA	None.	Gradual activity expected.	Nothing unusual expected.	No.	None.		Very little.	More than needed now.
ELDORA, IOWA	No.	None.	Farming community and only normal building expected.	No.	Labor, material costs.		10 to 33½ per cent.	No.
SIKESTON, MO.	Yes, dwellings and business dwellings.	Yes, dwellings.	Great shortage of business buildings and dwellings that will have to be built.	Yes.	Financing.		25 per cent.	Yes.
SANDUSKY, OHIO	Yes.	Dwellings.	No building now and spur after the war is expected.	Yes.	Labor, material costs.		25 per cent.	Yes, small houses.
FORT DODGE, IOWA	Yes.	School buildings and dwellings.	Building will be active after the war.	No vacant houses.	Labor, material costs.		5 to 10 per cent.	Houses well filled up.

FORT DODGE, IOWA.....	No.	Slight activity in all classes.	Community is prosperous.	Yes.	Labor.	Country desirable and prosperous. Building boom is expected.	No advance.	No.
SANTA ANA, CAL.....	Yes, but to no marked extent.	Business buildings, dwellings.	City will build after the war.	Yes.	Labor, material costs.		10 to 25 per cent.	No.
FORT MADISON, IOWA.....	Yes.	No.	Building boom expected.	Pair.	Material costs.		10 per cent.	Yes.
FORT MADISON, IOWA.....	Yes, all kinds of buildings.	All kinds of construction.	Natural shortage will have to be supplied.	Yes.	Labor, material costs.		10 per cent.	Yes, generally and dwellings particularly
DURHAM, N. C.....	Yes, dwellings, school houses.	Factory buildings, dwellings.	Building factories is urgent and would be done if Government won't grant permits.	Yes.	None.		10 per cent.	Yes, good class houses.
DES MOINES, IOWA.....	No.	None.	No answer.	Yes.	Labor, material costs.		20 per cent.	Apartment houses.
DES MOINES, IOWA.....	Yes, all kinds of buildings.	All kinds.	Demand and proximity of cantonment demands new building.	No.	Labor, material costs.		10 per cent.	Dwellings.
DES MOINES, IOWA.....	None.	Very little; some dwellings.	Normal.	No.	Material costs.		Slight.	Apartment houses.
DES MOINES, IOWA.....	No.	No.	Oversupply of dwellings at present. Factories abundant.	No.	Material costs and financing.		20 per cent.	Small dwellings and cottages.
DES MOINES, IOWA.....	Dwellings, factory buildings, warehouses, schools.	Curtailment of building will spur activity.	No answer.	No.	Labor, material costs.	City was on verge of building program before war and it is thought this will be resumed.	25 per cent.	Apartment houses.
WATERLOO, IOWA.....	Yes, school houses.	Considerable.	Building boom expected in 1919. 500 dwellings yearly will be built.	Not impressed by rental returns.	Labor, material costs.	Steady volume of farm building continues. Public building construction will be resumed and prosperity will determine extent of activity.	Slightly.	Yes, well located modern houses.
WATERLOO, IOWA.....	None.	None.	None, except dwellings.	No.	Labor, material costs.		Declined.	No.
WATERLOO, IOWA.....	Yes, small dwellings and a business block.	Small dwellings, tenement houses.	Building demand in there and must be satisfied.	No.	Labor, material costs.	Growth of city and cessation of building will have to be satisfied.	None.	Small houses.
WATERLOO, IOWA.....	Yes, warehouses, farm buildings.	No, normal.	Normal building expected.	No.	Labor, material costs.	Bright prospects.	Slight.	Dwellings and apartments.
IOWA CITY, IOWA.....	No.	None, except apartment buildings.	Very little.	No.	No demand and financing.		No advance but reduction noted.	Yes, heated apartments.
BOULDER, COL.....	Yes, dwellings.	Yes.	Yes, people expect lower material prices and labor costs.	No.	Labor, material costs.	When lumber, cement and other materials are lowered in price, building will be boomed.	Yes.	Dwellings.
CHICAGO, ILL.....	Yes, factory buildings.	All classes except factory buildings. War industries now in operation will provide these.	Building boom expected but depends on the lowering of material costs.	No.	Labor, material costs.	Foregone conclusion that building will boom; depends on labor, material costs and financing.	Factory buildings advanced; office buildings same; dwellings same; and stores slight advance.	Factory buildings especially on track.
CHICAGO, ILL.....	No, except warehouses.	Dwellings and apartment houses.	Business man will build his own home after war.	No answer.	Labor.	No wonderful building spurt is looked for.	10 per cent.	Apartment houses.
CRESTON, IOWA.....	No.	Very little until material costs decrease.	Very little.	No.	Material costs and present crop situation.		None.	No.
ELGIN, ILL.....	No shortage except for small dwellings.	Very little special activity.	Very little change from normal.	No.	Labor, material costs.	A great number of workmen and families have left to go to cities of war industry.	40 per cent on farm proper.	No.
MACON, GA.....	Yes, dwellings and farm buildings.	Dwellings.	Considerable demand exists; growth demands a boom.	Yes.	Labor, material costs.		10 per cent.	Small houses, apartments.
MACON, GA.....	Dwellings, schools.	Industrial buildings and business construction.	Growth of city industrially.	Yes.	Labor, material costs.	Congested because of cantonment near here.	10 to 20 per cent.	Living quarters.

Information Supplied by Bankers, Real Estate Dealers and Contractors—Continued

CITY	1. IS THERE ANY SHORT-AGE OF DWELLINGS, FACTORY BUILDINGS, WAREHOUSES, FARM BUILDINGS, SCHOOLS OR OFFICE SPACE?	2. DO YOU ANTICIPATE SPECIAL ACTIVITY IN ANY OF THE ABOVE CLASSES OF BUILDING AFTER THE WAR?	3. MAY WE HAVE AN EXPLANATION OF YOUR OPINION AS TO THE REASON FOR ASSUMING THAT THERE WILL OR WILL NOT BE SUCH ACTIVITY? IF THE USUAL ACTIVITY COMES?	4. DO YOU THINK RENTS AND OTHER RETURNS FROM BUILDING INVESTMENTS ARE SUFFICIENTLY HIGH TO STIMULATE SUCH INVESTMENTS WHEN PEACE COMES?	5. WHAT FACTORS IN THE BUILDING SITUATION DO YOU REGARD AS MOST LIKELY TO OBSTRUCT A REVIVAL OF BUILDING? (LABOR, MATERIAL COSTS, FINANCING?)	SPECIAL COMMENT.	6. HOW HEAVILY HAVE RENTALS ADVANCED IN THE LAST YEAR?	7. DO RENTERS EXPERIENCE DIFFICULTIES IN SECURING ANY PARTICULAR ACCOMMODATIONS?
HARTFORD, CONN.	None.	Very little, if any.	If material costs decrease, new building will boom.	Yes.	Material costs.		Slight.	Desirable single houses.
KOKOMO, IND.	Yes.	Yes.	Boom is looked for.	Yes.	Material costs.		Small.	No.
KOKOMO, IND.	No.	Perhaps.	No answer.	No.	Material costs, labor and financing.		Slight.	No.
JOLIET, ILL.	Yes, particularly dwelling.	Yes, dwellings.	Situation demands it.	Rents not high.	None.		Practically none.	Yes.
PONTIAC, ILL.	Yes, dwellings.	Dwellings.	Dwellings will be built as they are necessary.	Yes	Labor and building costs.		No rise.	Modern houses of 5 to 7 rooms.
PONTIAC, ILL.	Yes, hotel.	No.	No.	No.	Material costs.		None.	Bungalows.
WILMINGTON, DEL.	Yes, dwellings and office space.	Dwellings and office buildings.	Demand for building office structures and dwellings must be satisfied.	Yes.	Material costs, labor and financing.		50 to 100 per cent.	Dwellings, rooms or offices.
WILMINGTON, DEL.	Yes.	Dwellings.	Prosperity and lack of building during past year will spur building.	Yes.	Labor, material costs.		20 per cent.	Yes.
ATCHISON, KAN.	Yes, dwellings, factory buildings, grain storage.	Nothing in particular.	Delay building because of costs at present.	Yes.	Material costs, labor.		None.	Yes.
BIRMINGHAM, ALA.	Yes, dwellings, warehouses, farm buildings, schools.	Dwellings.	If costs are reduced, building will boom.	No.	Material costs, labor.	Reduction of costs is the prime issue in regards to future building.	10 per cent.	Suitable residences.
BIRMINGHAM, ALA.	Yes, dwellings, factory buildings, warehouses, schools.	Dwellings, schools.	Normal amount of business expected in all lines.	Yes.	None.		10 to 20 per cent.	Dwellings and apartments.
POCATELLO, IDAHO.	Yes, dwellings and warehouses.	Dwellings and warehouses.	Building of dwellings will resume after the war.	Yes.	Labor.	Hotels are crowded and if dwellings were available they could easily be filled.	No answer.	Apartment houses.
AUSTIN, MINN.	No.	No.	No answer.	No.	Material costs.		Very little.	No.
KANSAS CITY, Mo.	None except school buildings.	Dwellings and office buildings.	New building activity if labor and material costs decrease.	Yes.	Labor, material costs, financing.		10 per cent.	Apartment.
KANSAS CITY, Mo.	Yes, dwellings, warehouses and factory space.	Dwellings and apartment buildings.	Congestion at present demands new building.	Yes.	Labor, material costs.		7 to 10 per cent.	Apartment.
Dubuque, Iowa.	No.	Yes.	Renewed building activity is expected because of curtailment by Government.	No.	Material costs.		No advance.	None.
Dubuque, Iowa.	None.	No.	Well supplied at present.	No answer.	No answer.		15 per cent.	None.
Sioux City, Iowa.	Yes, dwellings, apartments, warehouses.	None.	No increase in building activity.	No.	Labor, material costs.	Considerable construction in this city during past year. No great shortage exists.	7½ per cent.	Heated apartments.
Sioux City, Iowa.	Yes, dwellings, warehouses, schools.	Dwellings, warehouses, grain elevators, school buildings.	Growth of the city industrially, commercially, etc., demands building activity.	Yes.	Labor and material shortage.	Building activity is certain as this city is growing in all directions.	Considerable.	Warehouse space and dwellings
LANSING, MICH.	Yes, dwellings.	Dwellings and factories.	Need of homes and apartments and entrance of large companies demand new building activity.	Yes.	Labor.		10 to 15 per cent.	Dwellings and apartments.

FOND DU LAC, WIS.....	Yes, dwellings.	Dwellings.	No answer.	No.	Labor, material costs and financing.			None.	Yes.
JERSEY CITY, N. J.....	No answer.	No answer.	No answer.	Yes.	Labor, material costs.			Doesn't know.	Dwellings.
ALLENTOWN, PA.....	Yes, dwellings and schools.	Dwellings.	Scarcity of dwellings and demand needs filling.	Yes.	None.		This town is very congested and there is every reason to believe building of dwellings will be resumed on large scale.	50 per cent since war started.	Dwellings of all kinds.
SAN FRANCISCO, CAL.....	Yes, dwellings and warehouses.	No special activity.	Normal building expected.	No.	Labor.			None.	No.
DENVER, COL.....	Yes, dwellings, schools and office space.	Dwellings and office buildings.	Demand must be satisfied.	Yes.	Labor.			20 to 25 per cent.	Dwellings and apartment houses.
SOUTH BEND, IND.....	None.	Normal amount of residence building.	Normal activity expected.	Yes.	Labor, material costs.			10 per cent.	Dwellings.
LAFAYETTE, IND.....	Yes, dwellings.	No special activity.	Normal activity only.	No.	None.			Very little.	Dwellings.
TOLEDO, OHIO.....	Yes, warehouses.	School buildings, libraries, etc.	Growth of city in population demands activity.	Yes.	Financing.			8 per cent.	Dwellings.
PHILADELPHIA, PA.....	Yes, small dwellings.	Very little.	Very little and possibly a recession because of war construction not being needed.	No.	Labor, material costs.			No advance.	Small dwellings.
HANNIBAL, MO.....	Yes, dwellings, factory buildings, warehouses, and schools.	Residences and business buildings.	Growth of town industrially.	Yes.	Readjustments and the resultant difficulties.			No advance.	Cheaper houses.
HANNIBAL, MO.....	No.	Yes, business property and dwellings.	Centrally located city and will no doubt attract large factories.	Yes.	Labor.			No advance.	Small dwellings.
INDIANAPOLIS, IND.....	No.	Dwellings possibly.	Curtailment will serve to attract for an abnormal activity.	Yes.	Labor, material costs.		Dwellings will be built on large scale as apartments, renters are dissatisfied.	10 per cent.	Apartment houses and dwellings.
BUFFALO, N. Y.....	Large shortage of dwellings.	Dwellings.	Building boom expected because of shortage of houses.	Yes.	Labor and financing.			20 to 30 per cent.	Dwellings.
OTTUMWA, IOWA.....	No.	No.	None.	No.	Labor and financing.			None.	No.
OTTUMWA, IOWA.....	Yes, dwellings, farm buildings, schools.	Dwellings and farm buildings.	Curtailment of building has stopped much needed construction until after Germany surrenders.	Yes.	Labor.			100 per cent in two years.	Modern dwellings.
OTTUMWA, IOWA.....	No shortage of any buildings.	No.	No activity.	No.	None.			Decrease.	No.
KNOXVILLE, TENN.....	Yes, all lines of building.	All lines.	There will be a revival dependent on readjustments of labor.	No answer.	Material costs, labor.			No answer.	Dwellings.
PORTLAND, ME.....	Yes, dwellings, factory buildings and schools.	No special activity.	500 homes behind and with abnormal growth in population this need will have to be filled.	Not at present.	Labor, material costs.		Large manufacturing concerns settling here will be sure to spur after-the-war business.	10 per cent.	Dwellings.
CINCINNATI, OHIO.....	Yes, warehouses.	Factory buildings and schools.	Quite a lot of building going on and was stopped by war.	Yes.	Labor.			No answer.	None.
ST. LOUIS, MO.....	Yes, factory buildings, warehouses and schools.	Public buildings, dwellings, etc.	Population steadily increasing and ordinary construction held up.	Yes.	Labor, material costs.			20 per cent.	Dwellings and apartments.
ST. LOUIS, MO.....	Very little.	Very little	Not advisable.	Yes, after the war.	No answer.			Slight.	No answer.
WATERBURY, CONN.....	Yes, all kinds of building.	All lines.	Great need, demands great activity.	Yes.	Labor, material costs, financing.			100 per cent.	Difficult to get all classes.
BOSTON, MASS.....	Slight shortage.	Not for quite a time.	Readjustments will determine extent of activity.	No.	No answer.			5 to 10 per cent.	Not very much.

Information Supplied by Bankers, Real Estate Dealers and Contractors—Continued

CITY	1. IS THERE ANY SHORT-AGE OF DWELLINGS, FACTORY BUILDINGS, WAREHOUSES, SCHOOLS OR OFFICE SPACE?	2. DO YOU ANTICIPATE SPECIAL ACTIVITY IN ANY PARTICULAR CLASS OF BUILDING AFTER THE WAR?	3. MAY WE HAVE AN EXPLANATION OF YOUR OPINION AS TO THE REASON FOR THIS? IF THERE WILL OR WILL NOT BE UNUSUAL ACTIVITY?	4. DO YOU THINK RENTS AND OTHER RETURNS FROM BUILDING INVESTMENTS TO STIMULATE SUCH IN-VESTMENTS WHEN PEACE COMES?	5. WHAT FACTORS IN THE BUILDING SITUATION DO YOU REGARD AS MOST LIKELY TO AFFECT THE REVIVAL OF BUILDING? LABOR? MATERIAL COSTS? FINANCING?	SPECIAL COMMENT.	6. HOW HEAVILY HAVE RENTS ADVANCED IN THE LAST YEAR?	7. DO RENTERS EXPERIENCE DIFFICULTIES IN SECURING ANY PARTICULAR ACCOMMODATIONS?
BOSTON, MASS.....	No.	Apartments and residences.	Depends on prices of labor and materials.	No.	Labor, material costs, financing.		5 to 25 per cent.	No answer.
YOUNGSTOWN, OHIO.....	Yes, dwellings, apartments, schools.	House building.	Unusual activity expected because of shortage.	Yes.	Labor.		10 per cent.	Dwellings and apartments.
SPRINGFIELD, MASS.....	Yes, dwellings and schools.	Dwellings.	Prices of material and labor cause none to be built now.	Yes.	Labor, material costs.		20 to 25 per cent.	Dwellings.
KEOKUK, IOWA.....	No.	No.	No.	No.	Labor, material costs.		None.	No.
SEATTLE, WASH.....	Yes, dwellings and warehouses.	Dwellings, apartments, business buildings.	Growth in population and industry demand unusual building activity.	Yes.	Labor, material costs, and financing.	3,500 new dwellings being constructed this fall to house war workers. Active building expected after war.	33½ per cent.	Dwellings and apartments.
SEATTLE, WASH.....	Yes, factory buildings, dwellings, warehouses.	Dwellings, factory buildings, warehouses.	Actual shortage at present.	Yes.	Labor.		33½ per cent.	Dwellings and apartments.
COLUMBUS, OHIO.....	Yes, dwellings.	Dwellings and apartment houses.	Long cessation of building created a demand.	Yes.	Labor, material costs.		10 to 15 per cent.	Residences.
SPOKANE, WASH.....	Dwellings.	Residence building.	Increase of population and ban on building has created a demand.	No.	Labor.		No answer.	Residences.
SPOKANE, WASH.....	No.	Not immediately.	Very little activity expected because of low rents.	No.	Vacant properties, labor and material costs.		No advance.	Up-to-date moderate priced houses.
FORT SMITH, ARK.....	Yes, dwellings.	Dwellings and factory buildings.	Ideal manufacturing location and over 100 factories located here, and demands for more dwellings.	Yes.	Labor, material costs.	City is quite a manufacturing town and prosperous conditions demand more dwellings.	8 to 10 per cent.	Dwellings.
ATLANTA, GA.....	Yes, dwellings, factory buildings, warehouses, schools and office space.	Great activity expected in all classes.	Restrictions create demand which must be satisfied.	Not at present.	Material costs.		10 per cent up.	Difficulty in securing everything.
ATLANTA, GA.....	Yes, dwellings, warehouses, schools.	Dwellings.	Conditions demand an active building season.	No.	Material costs.	Fire recently destroyed \$5,000,000 of buildings, mostly residences.	Same.	Dwellings.
UPLAND, CAL.....	None.	No.	Many empty dwellings, stores, etc., small town and nothing more than normal building expected.	Not at present.	Labor, material costs.		Reduced.	None.
LOS ANGELES, CAL.....	No shortage.	Dwellings and apartment houses.	No unusual activity expected. Only necessary construction will be made in this city after war.	No.	Labor.		5 to 15 per cent.	None.
LOS ANGELES, CAL.....	No shortage.	Not immediately.	If vacant houses are refilled and people return from war, there will be activity.	Not at present.	Financing.		Decreased.	None.
MOBILE, ALA.....	Yes, medium priced houses.	Dwellings.	Increased population and growth of ship building interests in this city.	Yes.	Vacant buildings.		10 per cent.	Dwellings.
HUNTSVILLE, ARK.....	Yes, dwellings, farm buildings, schools.	Yes.	Demand greater than supply at present. Will have to be satisfied.	Yes.	Labor, material costs, financing.		Slight.	Yes

OAKLAND, CAL.	Yes, dwellings, factory buildings, warehouses, office space.	Dwellings, office buildings, apartment houses, etc.	Growth of population and demand of industries urge active building campaign.	Yes.	Labor, material costs, financing.	Oakland population has grown 50 to 75 per cent in last year and shipbuilding, iron works and other industries have been added.	25 to 100 per cent.	Dwellings, apartment houses and family hotels' office buildings, factory buildings.
SEDALIA, MO.	Yes, schools.	All lines.	Lull in building activity will cause a reaction.	Yes.	Labor, material costs.		No answer.	Public schools.
ARMORE, OKLA.	Yes.	Yes, general growth.	Growth of industries demands activity.	Yes.	Financing.		None.	Modern houses.
BILLINGS, MONT.	Yes.	Yes.	Yes, because city has not the facilities to handle the business offered it.	Yes.	Labor.		None.	Yes, all kinds.
ABERDEEN, S. D.	Yes, dwellings.	Dwellings.	Yes, shortage at present and general prosperity of the community.	Yes.	Material costs.		Little change if any.	Yes.
FARGO, N. D.	Yes, farm buildings, dwellings.	Farm buildings, dwellings and warehouses.	Curtailment of building has produced need.	Yes.	Labor, material costs, financing.		Very little.	Residences and farm buildings.
PADUCAH, KY.	Yes, factory buildings, warehouses.	Considerable expected if material costs decrease.	Prosperity is one of the greatest factors indicating big activity.	Yes.	None.		No advance.	Apartment houses.
TWIN FALLS, IDAHO.	Yes, farm buildings.	No special activity.	Normal building activity expected.	No.	Material costs.		No answer.	Dwellings.
HELENA, ARK.	Yes, dwellings.	Yes.	Great demand for dwellings at present. Curtailment produced this demand which must be satisfied.	Yes.	Labor, material costs.		25 per cent.	Dwellings and mercantile houses.
HELENA, ARK.	No.	No.	No answer.	No.	None.		None.	No.
OKLAHOMA CITY, OKLA.	Yes, dwellings and school buildings.	Dwellings and schools.	Actual need exists that must be satisfied.	Yes.	Labor, material costs.		25 to 35 per cent.	No buildings of any class for rent.
ANNISTON, ALA.	Yes, dwellings.	No.	Demand was created by proximity of cantonments but now there is an oversupply of some buildings.	No answer.	No answer.		Enormous gain.	No answer.
HOT SPRINGS, ARK.	No.	No.	Present supply seems adequate.	No.	Labor, material costs.	Nothing more than normal building expected as there is no stimulus.	No advance.	No.
DETROIT, MICH.	Yes, schools.	Dwellings.	Unusual growth in population will produce a shortage of dwellings.	No.	Labor, material costs.		No advance.	None.
CROOKSTON, MINN.	None.	None, except farm buildings.	Prosperity of farming community indicates spur in farm building.	No.	No answer.		No advance.	None.
SHREVEPORT, LA.	Great shortage of dwellings.	Dwellings.	Always has been shortage of dwellings and after war is logical time to build.	Yes.	No answer.	Have great oil and gas fields here and natural gas. This naturally increases industries.	Small advance.	Dwellings and all living quarters.
LAWRENCE, KAN.	None, except high school buildings.	No special activity.	Government has built barracks for 3,000 on university grounds. This has produced many vacant houses where the 3,000 formerly lived.	No.	Labor, material costs.		Decrease.	None.
BUTTE, MONT.	Yes, warehouses and schools.	No.	If price of labor decreases, some building may be expected.	Yes.	Labor.		None.	Storage.
SIOUX FALLS, S. D.	Yes, factory buildings, dwellings, warehouses, farm buildings and schools.	Dwellings, warehouses and farm buildings.	In addition to present shortage, a business expansion will take place after the war.	Yes.	Material costs, labor.		No advance.	Dwellings and warehouses.

Information Supplied by Bankers, Real Estate Dealers and Contractors—Continued

CITY	1. IS THERE ANY SHORTAGE OF DWELLINGS, FACTORY BUILDINGS, WAREHOUSES, FARM BUILDINGS, SCHOOLS OR OFFICE SPACE?	2. DO YOU ANTICIPATE SPECIAL ACTIVITY IN ANY PARTICULAR CLASS OF BUILDING AFTER THE WAR?	3. MAY WE HAVE AN EXPLANATION OF YOUR OPINION AS TO THE REASON FOR ASSUMING THAT THERE WILL OR WILL NOT BE UNUSUAL ACTIVITY?	4. DO YOU THINK RENTS AND OTHER RETURNS FROM BUILDING INVESTMENTS ARE SUFFICIENTLY HIGH TO STIMULATE RE-CONSTRUCTION WHEN PEACE COMES?	5. WHAT FACTORS IN THE BUILDING SITUATION DO YOU THINK MOST LIKELY TO OBSTRUCT A REVIVAL OF BUILDING? LABOR? MATERIAL COSTS? FINANCING?	SPECIAL COMMENT.	6. HOW HEAVILY HAVE RENTALS ADVANCED IN THE LAST YEAR?	7. DO RENTERS EXPERIENCE DIFFICULTY IN SECURING ACCOMMODATIONS?
QUINCY, ILL.....	No.	No.	Very little activity expected as there has been an abnormal exodus of war workers from this city.	No.	Low rents and present surplus of building.		None.	No.
SAN DIEGO, CAL.....	Yes, dwellings.	Dwellings and business buildings.	Needed, construction must be made.	No.	Labor, material costs and moderate demand.	If confidence in real estate is restored activity will be spurred.	None.	Dwellings.
WILLISTON, N. D.....	No.	No.	Poor crops. No indication of any great activity.	No.	No answer.		Decreased.	No.
MONTGOMERY, ALA.....	Yes, dwellings and other buildings.	No special activity.	City has been built up considerably to house visitors to local cotton-ventures. Normal activity expected.	No.	Possibly labor, material costs.		25 per cent.	No.
LAMAR, COL.....	No shortage.	Dwellings and farm buildings.	If crops are good and ban is lifted, some activity is expected.	No.	Material costs.		No answer.	No answer.
OGDEN, UTAH.....	No.	Only normal.	No unusual demand and therefore do not expect any unusual activity.	No.	Labor and material costs; also demand.		Advanced about one-tenth cost of construction.	Small modern residences.
OMAHA, NEB.....	Yes, dwellings, apartment houses, factory buildings.	Dwellings, apartment houses, factory buildings.	Population has steadily increased; investment in real estate is daily becoming a better investment and shortage today demands activity.	Yes.	Labor, material costs.		20 to 25 per cent.	Dwellings and apartments.
PRESCOTT, ARIZ.....	Yes, dwellings.	Even greater shortage of dwellings expected.	Growth of population demands new building.	Yes.	Labor, material costs, financing.		10 to 50 per cent.	Dwellings and apartments.
DAVENPORT, IOWA.....	Medium priced dwellings for rent.	Medium priced dwellings for rent.	Government closed private construction till close of war.	Yes.	Government buildings as proposed, labor, material costs.		25 to 30 per cent.	Moderate priced houses.
TWIN FALLS, IDAHO.....	Dwellings, warehouses and probably one school.	Dwellings, warehouses, school.	Anticipates activity after the war.	No answer.	None.	Knows several buildings that will go up after the war.	No advance.	No answer.
STOUC FALLS, S. D.....	Factory, warehouses and school buildings.	Factory, warehouses and school buildings.	Great demand warrants it.	Yes.	There will be a spark plug factory after war.		No advance.	No.
ADDMORE, OKLA.....	No.	Dwellings and factory buildings.	Prosperous community warrants it.	Yes.	None.	Abundance of oil, natural gas and asphalt create activity.	No answer.	No answer.
SEATTLE, WASH.....	Shortage in everything mentioned.	Dock, warehouse and office buildings.	Tremendous shipping passes through port of Seattle to Orient, Russia and Siberia.	Yes.	Cost of labor and restrictions on same.		20 to 45 per cent.	Yes.
MINNEAPOLIS, MINN.....	No shortage.	Homes, factory buildings.	Cessation of building because of ban will spur activity.	Yes.	Possible labor difficulties, material costs.		Moderate advance.	No marked difficulty.
ST. PAUL, MINN.....	Not noticeable except factory buildings.	All lines, especially factory, warehouse and farm buildings.	Anticipate unusual activity in building generally.	Yes.	Shortage of materials, especially steel.		About ten per cent.	Yes, especially high class apartments.
BUTTE, MONT.....	No.	No.	300 saloons thrown out of business, most of which will remain idle.	No.	Many vacant stores on account of prohibition.		Slight decrease.	No.

DUBOUE, IOWA.....	No.	Doesn't know.	No answer.	Doesn't know.	Doesn't know	Not much.	No.
COLUMBUS, OHIO	Factory buildings, rental property, schools.	Factories, apartment houses, high class residences, etc.	Many buildings already planned were postponed. Expect a good deal of activity.	No answer.	No answer	About 15 per cent	Modern apartments.
BILLINGS, MONT.	Dwellings, warehouses, schools.	Warehouse and dwellings.	Many building projects stopped. Community prosperous on account of high prices for farm products.	Yes.	High wages, high cost of materials.	20 per cent except for office space.	Residence and warehouse space.
SIOUX FALLS, S. D.	Moderately priced dwellings, warehouses, factories, schools.	Dwellings, warehouses, factories, schools.	Anticipate general building activity in any particular class of buildings.	No.	Possible labor shortage and labor unrest.	About 10 per cent.	Moderately priced dwellings, warehouses.
HUNTSVILLE, ALA.	Dwellings, factories, office space.	Yes, more dwellings.	Demand greater than supply. Prospect of striking oil fields.	Yes.	Securing land for building, financing.	10 per cent.	Dwellings.
WATERLOO, IOWA.	Schools, apartments.	Perhaps schools.	Does not anticipate activity. Not a paying investment for investor.	No.	Financing.	No advance; decline noted.	Apartments.
ST. LOUIS, MO.	Buildings of different types needed.	All lines.	Curtailment has created demand.	Cannot give definite reply.	Scarcity of skilled labor.	About 15 per cent.	Apartment houses, bungalows of five and six rooms.
WHEELING, W. VA.	Dwellings.	Dwellings, large hotel.	Business activities will scarcely be normal after the war.	Yes.	Labor, material costs.	Think there has been no advance.	No.
MINOT, N. D.	No.	Yes	A growing town.	Yes.	No answer.	None	No.
OKLAHOMA CITY, OKLA.	Yes, considerable.	All lines.	Because it is needed.	Yes, first class.	None.	30 per cent.	Yes, very much.
WILMINGTON, DEL.	Many buildings going up now will relieve present shortage.	Yes.	People have become wealthy. Will want better homes or improve their present ones.	No.	Labor and material.	Not much.	Small houses for renting.
CARTHAGE, MO.	No.	Not to amount to much.	On account of high prices of materials.	Rentals and high taxes will not justify returns.	Labor, material costs.	Not more than 7 per cent.	No.
HOT SPRINGS, ARK.	No.	No answer.	We depend altogether on visitors. High cost of living cut them down.	No.	Valley Mill Co.	Decreased.	No.
SACRAMENTO, CAL.	Modern dwellings, apartment houses, schools, office space.	Dwellings, apartment houses, municipal building.	Same as previous answer.	High enough to stimulate steady growth in building construction, but not sufficiently high to cause sudden expansion in building activities.	None.	No advance.	Same as No. 1.
BOSTON, MASS.	Considerable shortage in factory buildings, warehouses and dwellings.	Small residences and apartment houses.	Increased population warrants new building.	Yes.	Securing materials.	5 to 10 per cent.	Two- and three-room apartments.
CROOKSTON, MINN.	No shortage.	Farm buildings, Farmers have had a bumper crop this season	Depend largely on farming. Prosperous and will probably build.	No.	Labor and material costs.	Decreased.	None.

Industrial Information

In this Department there is published each week information as to the development of materials and methods, derived from reliable sources.

Improved Methods in Plan Filing

To practice what you preach may not always be convenient, but it is admittedly the way to give strength of your convictions. If an architect can bring his client to an office equipped for his own use with an eye to system and convenience, nothing perhaps would more impress said client with the importance of the architect as a factor in the practical administration of efficiency. Nothing superfluous, but everything, as far as possible, that represents the modern and progressive in equipment should be in use.

Among the many items of interest appropriate for such use the Art Metal Planfile may be mentioned.

The helpful attribute peculiar to this planfile, as manufactured by the Art Metal Construction Co. of Jamestown, New York, is the principle of compression in its construction. By a system of springs on the side edges of each pocket folder, tracings and blueprints can be placed within and held flat and smooth, in a vertical position without the inconvenience of fastening them on the top, and without any crumpling or breaking down of any sheets so filed.

An Art Metal Steel Planfile is built with double wall construction and lined between inner and outer walls with asbestos. It accordingly affords unusual protection against fire and water, as has been showed in many instances where subjected to accidents of this kind.

In capacity a 42 30 "Planfile" holds about 5400 tracings with space for 54 or more folders. It is said to be necessary to stack thirty plan drawers to a height of 9 feet 7 inches, figuring 200 tracings to the drawer, to equal the capacity of one Planfile.

Only 24 inches for aisle space are required to operate Planfiles.

The folders are double folded at top edges for extra strength and are scored for expansion. Heavy durable stock is used exclusively. No climbing or stooping is needed to operate this file, as the operator always stands on the floor.

The index is always in sight when the file is being used.

Locking of one Planfile protects from 4500 to 5000 drawings. It is necessary to lock 25 drawers to accomplish the same purpose.

The Planfile herein described is but one of a number of novel files for plans of different sizes, and, in fact, for filing of any kind. The Art Metal Co. of Jamestown will be pleased to give further information.

For Sliding Doors

The Coburn Trolley Track Mfg. Co. of Holyoke, Mass., has prepared an elaborate catalogue and price list descriptive of its sliding door hardware. Hardware of this kind has an important function to perform, and the illustrations in this catalogue seem to indicate that the sliding door equipment made by this company is effectual and durable in character.

A large variety of accessories are depicted, including hangers, stops and guides, locks, storm shields, etc. The numerous plans presented should be of assistance in specifying sliding door hardware. The makers state that Coburn products are designated to give maximum service at all times and are amply strong to perform their respective functions without undue wear or friction.

