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R. A. I. C. JOURNAL

MARCH 1947

THE meeting in Montreal will be a memorable one and all out of town architects will be grateful to Mr. David and his committee of arrangements for a well planned assembly. Not a little credit must go to Miss Cory whose competence and assurance, to mention only two of her qualities, were the admiration of all who knew she was attending her first meeting.

THIS was perhaps the first assembly at which architects who had been on active service appeared in considerable numbers, and it was good to see them. We were not alone in the war years in allowing our thoughts to stray, at an annual meeting, from the dull routine of report reading and financial statements, to those architects who were prisoners of war; those who were at sea, in the army or in the air. In 1942, how far off, how improbable even, did it seem that we should ever again be together. We shall never all be together, for some will never return, but faces we had not seen for many years were with us once more. Also present were many of those architects who disappeared as the war advanced into government offices like Wartime Housing, or into the services where their skills were employed in wartime building. We are not unaware of their services to Canada or of the credit which they brought to the Institute for outstanding service of a high professional order. It was the first post war meeting in which architects from all these different groups could again lend their presence and their counsel to the Institute in its deliberations. If for that, alone, this was a memorable assembly.

WE were one of those who, catching trains for remote places like Kingston and Toronto, had to bend low at the annual dinner, and creep out under the stern gaze of the President, and during the speech of the evening. We have done that before, but never with more regret. Not for a minute, did General Young make one feel that this was one of the many occasions on which he is asked to speak about housing. His was a carefully prepared address delivered at a critical time in housing in Canada, and addressed to an audience that can and should help him. We don't suppose that the Institute has ever had a more sincere speaker, and it was our personal regret that General Young could not have spoken in the afternoon with two hours for debate and discussion.

ALL our thoughts in regard to the conduct of the Annual Meeting are influenced by our zeal for material for the *Journal*, but, with that as a warning, we have a few observations to make. We have never attended an annual convention of the medical profession or the R.I.B.A., but we get the impression from their literature that those bodies conduct their meetings on a higher intellectual plane than we do. It may be wishful thinking that we assume their councils do most of the business that we do quite unnecessarily in general meeting — such as the perfunctory reading of abbreviated reports followed by discussion — not always well informed because the report is read for the first time. The elimination of time consuming routine matters would allow for the reading of papers by our own members, or guests, who are experts in a field. A time limit would be set on each paper and the discussion, and the result would be a body of material suitable for publication that would stimulate those who were present, and enrich the *Journal* by adding to our store of knowledge on vital matters. It is an ancient custom of ours to terminate meals (except breakfast) with speeches on set subjects. The alternative would be to put these into the general programme, and reserve for after meal speeches those generalities that go with good company, good food and good liquor. Especially now that we have ladies at most of our meals, this would seem highly appropriate. It is done at the R.I.B.A. annual dinner with great charm and wit. The danger is that, if housing can be selected for one year as an after dinner topic, plumbing might, with equal logic, be chosen for next year — in fact we remember vividly when it was, at a dinner in Toronto (though not of the R.A.I.C.). We were still enjoying our coffee when the speaker launched into a lyrical description of a well designed grease trap.

IF there were any merit in a proposal to hear and discuss great problems, we can offer several as suggestions. Perhaps first on the list we should put Housing. General Young may not require much persuading to return next year and give us both barrels because his problem may be even more acute in February, 1948, than it is now. If he did, it would be unprofitable for him and for us if we could not return his fire with such well meaning peashooters as we may collect between now and then.

Editor

THE ARCHITECT AND MASS PRODUCED HOUSING

By D. C. SIMPSON

ARCHITECTURE as a profession grew from the development of group life and the demands of priestly and civil rules, and the word "architect" is derived directly from the Greek word meaning "chief builder". Not only in the Greek civilization was the architect the chief builder, but throughout all early civilization of which we have record, the functions of the two have been interchangeable.

With the development of modern civilization, architecture seems to have shifted more and more away from structural building to the more specialized field of pure design — to the expression in the physical structure to the stylistic extravagances which have persisted to the present day. This illogical tendency in the domestic architecture of Europe and America has estranged housing design from true aesthetics and the popular conception of architecture has naturally followed that of the architect himself.

Two thousand years ago the Roman architect Vitruvius said that architecture should meet three requirements; utility, strength and beauty. These three ancient touchstones are still valid to-day, but the profession has come to be associated with matters of style — the type of roof, the shape and arrangement of windows, and even those of ornamentation. Thus, until only very recently, architecture has become just plain imitation of something that has been, and which might have been all right when it was created. But this is copyism, not creative work. Real creative work in architecture is building to express the spiritual needs and physical necessities of one's own time. If the Greeks who devised the Greek architecture of 500 B.C. were alive to-day they would not create such buildings as they created at that time. They were not imitators. They would create an architecture that would express "to-day".

Architecture should therefore signify the art of building in all its phases — sound construction, practice of applied mechanics, selection and proper utilization of materials and specifications, as well as attaining esthetic effects. It thus includes engineering problems, although their detailed solution belongs properly to the engineer.

In its broader sense, the term "architecture" implies the co-ordination of community needs as related to shelter in such a way as not only to promote sound construction, convenience, and comfort, but at the same time to express the aspirations of the times. This co-ordination has been fulfilled with the utmost skill as far as the modern office building or skyscraper is concerned, but in so doing the architect has overlooked the small

home with its dominantly social motif and its bewildering conglomeration.

The defects of domestic architecture are due not so much to lack of ability or imagination on the part of the architect as to the fact that his energies have mostly been devoted to larger structures. In these he holds a brighter prospect of profit and, he thinks, wider opportunity for the exercise of his talent. Some reasons for the architect's lack of interest in houses are the average home-owner's willingness to purchase a house already built; his satisfaction with a stock building plan that roughly duplicates his neighbour's dwelling; and his desire to avoid the expense of an architect. But while these facts are true, the outstanding fact remains that a large number of leading architects have deliberately ignored the field of residences in order to concentrate on larger undertakings.

It should be self-evident that the dwelling-house, serving a basic and indispensable need of mankind, is worthy of the best effort of the architect. He can hardly be blamed for devoting himself to those branches of construction which offer the largest reward in fame and fortune, but the design and construction of dwellings is a field which should have received more of his attention.

This lack of social consciousness partly explains why the architects of this continent are so far behind their European colleagues in the field of domestic design. Furthermore, we are inclined to regard the single-family detached dwelling as the ideal, while Europeans think more in terms of group life and group housing as related to definite conditions of European life. City planning is no novelty there.

According to some estimates, fully 80 per cent. of the houses of this country were erected without the direct assistance of an architect, and until only recently the remaining small percentage of architect-designed houses as a whole has received the following criticisms:

Too much concerned with style and too little with plan.

Too much impressed with tradition and charm.

Too little interested with new developments of construction and too conservative in their use.

A criticism made with special frequency is that the architect, ignoring changes that have occurred in materials and in purpose, has attempted to apply the traditions of Greece or Rome in an age when the steam railroad, the automobile, the airplane, the elevator, not to mention

steel and concrete construction, have revolutionized social conditions.

In the past, the architect has failed to recognize his opportunity for public service in the design of the home. He has been lured away not only by the big unit but by a false notion of the function of domestic architecture. The charming lines and texture of the English cottage and the Colonial home have been his models. He has overlooked the fact that those forms and textures reflect the materials and social life of former times. The basic needs of the contemporary home have been matters of secondary importance. Not until only quite recently has he shown interest in expressing current industrial and engineering technique.

Tradition has dominated not only appearance but structure as well. Our average suburban development has been drab, and even our most expensive homes are chiefly modifications of traditional types. Although such architecture has some worth, it certainly cannot be termed creative. The architect has thus become a follower and not a leader. Insistent upon old forms lacking the features expressive of the present, the architect has ignored new ideas in house construction until they were forced upon him by public demand.

Along with such criticisms however, one should remember that the first duty of the architect is to his client and he cannot afford to experiment freely with any new device at his client's expense. But a conservative attitude, while nearly unavoidable under the present scheme of things, none-the-less makes it extremely difficult for improved methods of building to make their appearance, since the facilities to test new methods are nearly non-existent at the present time.

The architectural profession is not unaware of the difficulties confronting it. Some of its leaders have urged that the architect must assume leadership and direction of the entire building industry if its present disorganized condition is to be improved. One difficulty lies in the attempts of competing interests, chiefly producers of building materials, to promote the acceptance of houses which will provide the largest market for their particular product. In the absence of some central authority, such competition can only make matters worse instead of better. If the architectural profession is to assume this authority, it must prove itself receptive to organic creative design and adapt itself to an industrial age in the use of materials and methods of construction.

As things are nowadays, the owner cannot afford as much of a house as he needs and wants, or indeed get a house at all. The one he can get, if he's lucky, is poorly adapted to his family life. The building of the house is a clumsy, antique, laborious process and the aesthetic result, usually negative, is marred by pretensions and false decoration. What with the conservatism and false motives of domestic architecture, the building

industry's diverse and unresponsive organization, and the innumerable unrelated and obsolete building codes, it is not strange that house structure is still undeveloped.

The large church, office building or capital building forces a standardization of materials and methods for itself alone. The relative smallness of each house and the obvious restrictions of individual needs handicap such standardization. Nevertheless, the architect of individual homes can serve the needs of the many through communal features of design; this would bring to the people the economic advantage of standardization which the great building enforces by its very size. Only thus can the small home command the architectural service it deserves.

In many European countries domestic architecture has broken away from tradition, especially in community housing. This school of architectural thought places first emphasis upon utility or function. The resulting work has been simple and direct, compact and economical. The general effect of such developments is harmony and balance, in sharp contrast to the miscellaneous individuality so characteristic of our communities in this country. While some criticize the result as repellant monotony, the more honest opinion is distinctly favourable, even from the aesthetic viewpoint. Lewis Mumford has said in this connection: "Under the cloak of individuality, personality, free expression, the partisans of the free-standing house have accepted the utmost refinements in monotony and unintelligent standardization . . . That is the paradox of modern architecture: we can achieve individuality only on a communal scale; and when we attempt to achieve individuality in isolated units, the result is hideous monotony, uneconomic in practice and depressing in effect."

These European developments, while most conspicuous in apartment houses, have also been successfully applied in single dwellings. Their best features are improved orientation in order to utilize the sunlight more fully and, more appropriately, making it available to every family; improved surroundings such as garden spaces, playgrounds, and the relation to public ways.

From these examples of outstandingly successful housing development emerges a very apparent fact; that the neighbourhood is the true unit of design from every point of view—architectural, financial, social and civic—as well as from the standpoint of layout of public utilities and other factors.

It is thus apparent that the best possible solution to our housing problems will be through intelligent application of modern mass production techniques in building, and through co-ordinated city planning and progressive social organization. The modest home of the future will come from similar methods of design and similar tools, in infinite variety and at reduced cost. It will better satisfy the changing wants of community life, and

increased variety of form and charm will mark its architecture.

The most obvious need of our time is improved productive efficiency per capita, and better distribution. But together with such practical aim, we need fresh ethical and spiritual stimulus and a higher motive than that of mere profit. In no department of economics are these truisms more bitterly true than in all that relates to housing. And housing is to-day perhaps the very crux of our whole economic, monetary, moral tangle.

Many individuals have asserted the inability of large portions of our population to possess a "respectable" home. Some say that one third of our people live in squalor and indecency because of lack of income. Have our lives become so controlled by the almighty dollar that spiritual values have disappeared? Unselfishness, industry and love will make a home decent and healthy, however humble and simple it may be. Not all the bathtubs and radios in the world will make decent a home that is ruled by love of pleasure, selfishness and animosity.

In these days of social and political reconstruction, when an over-stimulated public interest moves hastily over dangerous ground, any action dealing with this fundamental necessity, shelter, should be most carefully scrutinized. Housing plays such an important role in the economic life of every country that its position as a revenue producer, alike to individual and state, should be safeguarded and improved by every possible means.

Better housing throughout the country is economically possible and socially urgent, but it must first develop modern efficiency within itself. At the moment the housing industry is out of date and it is necessary to rationalize its methods. This will inevitably utilize extensive research, every possible improvement in machinery, elimination of waste, better methods of distribution, all resulting in lower real prices to the immediate consumer. We need to use more definitely the modern scientific, economical technique in the provision of shelter.

Instead of disorganized, heterogeneous, over-numerous units of the present building industry, handicapped by seasonal demands, we should have a much smaller number of plants manufacturing material for houses, products finished to the point of final assembly. These establishments would work all year round, and serve the entire country.

Structural reform also would integrate the house as a product. Each house, composed of mass produced units, would be assembled on the chosen site at a speed now incredible. Such construction is not only desirable but it is long overdue.

The development of a structural system is necessary. This system could be based upon a convenient planning

module employing lightweight, easily handled panels with highly standardized details and capable of full industrialization in their production. The system can be made extremely flexible in plan, form, and texture of materials, and capable of producing almost any size or shape of building for all its detailed standardization in production. What is needed is a new and larger building unit than brick or concrete block and capable of much more rapid assembly.

As to the individual adjustment of the small contractor under this system, it is impossible to generalize, unless to suggest that building many houses quickly and well is sure to mean both pleasure and profit to any builder who had been previously building comparatively few houses and not nearly as well as modern science can permit.

These houses can be built of the same material as they are now, and of others too, but in no single house will go the many varied materials that are now so wastefully combined. Certainly modern manufacturing technique will meet no insurmountable difficulty in fashioning and finishing major parts of the house so efficiently that they may flow quickly from the factory into the completed home; and do so without the messiness, confusion, expense, and intolerable waste of time, labour and materials incidental to the present methods of building. But it is well to remember that the parts of the house can only be partially assembled in the factory, then transported to the site and completely assembled. Thus flexibility of plan to suit requirements of site or individual is assured. And instead of twenty or thirty agencies, each supplying portions of a house, one complete and independent house-building agency, selected by the purchaser for its characteristic quality, will in each case be the means by which materials and accessories will be brought together and the completed product prepared for actual use.

In this new and entirely different setup, we have a smaller number of agencies and processes, and fewer channels of distribution. The purchaser can deal directly with the agency he selects, and the products can be certified. The producer gives complete service skillfully, assuming full responsibility for his product. He would not build speculatively, though where desired he could arrange financing for the purchaser.

When a standardized unit of structure becomes the unit of production cost, commercial value, and the unit of specification for the Architect and Engineer, the difficulties of financing, regulation and legislation will be greatly lessened. Hampering, unscientific ordinances can be replaced by unified, rational codes; usury laws will be healthfully regulated, and tax legislation restored to a logical basis.

Socially, industrialization of housing is so desirable that the effect it would have on labour and employment

cannot be harmful. The change might seem revolutionary but all to the advantage of low-income groups and to the average man generally. The building trades would be equally benefitted by the steady employment mass production would promote.

In our present economic system, real costs and real wages are defined in terms of individual time-effort, the number of man-hours required for production. Our people are either piling up too much of their hard-earned wealth in housing structure or they are not getting the housing they properly demand. The reason is obvious, the present cost of building is too great. The only answer to this insistent need is a new conception of the structural elements with which our shelter is to be designed and of the manner by which they are to be made and combined into a home.

If our people are to continue to live under the present economic regime, reduction in the cost of shelter seems essential. Through reduction of building costs those who are now unable to pay an economic rent for what they require could make the grade, and all classes would benefit by increased housing production.

The annual savings that might be expected from re-engineering of the building industry would count heavily in our national reconstruction program. By eliminating waste and improving the character and amount of housing provided, this essential industry would brace and fortify our entire economic structure.

Thus far we have apparently ignored the objections to mass production and standardization that arise most speedily to almost anyone's mind. "My home ordered from a factory, one of forty-thousand exactly alike? No, thank you!" says the proud house-owner. "Miles of modern dwellings, monotonous as so many bricks? No, thank you!" says the city planner. "Machine-made houses? *Quelle horreur!*" says the conservative *Beaux Arts Architect*.

If such things were advocated literally, their reactions would be justified. Of course, dull monotony in design and effect, since ever-present, could appear in factory-made houses. But mass production of houses does not necessarily mean the building of a hundred thousand dwellings all of the same design and form and texture and colour. It means first of all determining the greatest common denominator of modern building structures, and then making it freely available in multiform types.

As regards beauty, a rich variety of effect and a wide range of form, colour and texture can be made available for the benefit of the whole people by mass production. The Architect will be able to plan freely and the effort now wasted in estimates, altered specifications, salesmanship, and above all, the attempt to arrange infinite irrelevant detail for each separate house, would be saved for creative work and efficient service.

The scope of the Architect, his practical opportunity to meet individual demand, community demand, esthetic and utilitarian requirements, will be enlarged without harmful restrictions being imposed upon play or design. The best designs, because of their adaption to use, will be the most successful, and therefore the most common. Thereby common, or community beauty will be increased and aesthetic needs be better satisfied.

In the realm described as "social invention" there will be made possible finer developments than any achieved so far. Comprehensive, intelligent planning for cities and whole regions can make maximum use of efficient building methods. The recent trend in planning to decentralize the large city into satellite towns would be well served by an industrialized housing industry that can deliver for swift assembly "adequate dwellings at the lowest possible cost."

Nor are these statements Utopian visions. Two things emerge clearly from the maze of social, political and economic problems confronting us to-day: Authoritative evidence such as is to be found in such recent surveys of the building industry as made by *Life* (December 17, 1945) and the Government's own Reconstruction Advisory Committee report on Housing in 1943, makes it clear that the building industry as such is obsolete and incapable of producing sufficient housing to meet our demands. The technique of building construction is underdeveloped but can be harmonized with other productive means to much better advantage than at present.

To suit mass production, a new conception of building structure is needed, a conception that will annul the present obvious disabilities of the industry. Such a conception would precipitate the rationalization of housing with the attendant benefits described heretofore.

The new line-up of productive forces may be revolutionary. It will be a revolution spread over a decade or more, however, for the struggle against tradition, reaction and inertia may be difficult. But it is surely coming eventually. Nobody can prevent it.

In some length of time the disturbance will be absorbed, and the new conception of this basic industry will inevitably stimulate economic and physical reconstruction and spiritual recovery.

The change in methods of building needed to adapt housing to mass needs is clearly an architectural engineering problem of great size and moment. Its solution, even in part, will have vast social significance. We must direct our efforts to establish building research in this country, and apply its results with scientific efficiency so that our new building structures will fulfil the requirements of modern industry, mass production and social progress, and will also open new fields to invention, design, and to the creation of domestic and civic beauty.

THE FORTIETH ANNUAL ASSEMBLY OF THE ROYAL ARCHITECTURAL INSTITUTE OF CANADA

SEANCE d'Ouverture de la Quarantième Assemblée Annuelle de l'Institut Royal d'Architecture du Canada, tenue à Montréal en l'Hôtel Windsor, vendredi le 21 ième jour de février 1947, à 10.30 a.m. M. Charles David, Président, est au fauteuil.

RAPPORT DU CONSEIL

C'est avec une légitime fierté que je souhaite, en ma qualité de président, la plus cordiale bienvenue aux membres de l'Institut Royal d'Architecture du Canada, réunis en Assemblée Générale Annuelle, pour recevoir un compte rendu de l'administration de leur Conseil, pour le terme qui prend fin avec ces réunions.

Il me serait aussi bien agréable de rapporter ces événements dans le langage familier à la plupart de mes compatriotes de cette province, mais sachant leur bienveillance à l'égard de nos invités, leur désir d'expédier d'une façon pratique les affaires de cette réunion et la générosité qu'ils apporteront aux discussions qui surgiront, je prends donc pour acquis qu'il ne leur déplairait pas d'entendre et de discuter ce dernier sous une forme plus accessible à la plupart des membres présents.

On behalf of your Council, I extend a cordial welcome to all our members present at this Fortieth Annual Assembly of the Royal Architectural Institute of Canada.

Since last year's Report of Council, trends have become more definite and the Architectural Profession has received a generous share of the prosperity which has been experienced throughout the Country. From all signs, we have now entered the long expected post-war period of reconstruction and there are further indications that the existing favourable conditions will continue for some time.

We have also witnessed, with satisfaction, the return to civilian life of most members of this Institute who had served with the Armed Forces during the last World War. May the resumption of their professional careers bring to them an equitable share of the spiritual, as well as the material awards which attend prosperity and progress. For those who are never to return, may I suggest that they be remembered each year at the Annual Assembly of this Institute, through the observation by all present, of a reverent period, in silent tribute.

It is with an expression of deep regret that we have to record the loss through death of the following members during the past year. I would invite the members here present to stand once more during the reading of their names.

Mr. Theo Korner, West Vancouver, B.C.

Mr. J. H. G. Russell (F), Winnipeg, Manitoba (Past President of the R.A.I.C.)

Mr. W. Fingland, Winnipeg, Manitoba.

Mr. F. S. Adamson, Winnipeg, Manitoba.

Mr. Ernest Irving Davidson, Toronto, Ontario.

Mr. Stafford M. Hodder, Fort William, Ontario.

Mr. Guy Buller-Colthurst, Windsor, Ontario.

Mr. D. R. Brown (F), Montreal, P.Q. (Past President of the R.A.I.C.)

Mr. J. E. C. Daoust, Montreal, P.Q.

The passing of these members, many of whom have been active in our Institute, is a serious loss to the architectural profession, and a very personal loss to their many friends.

Acting upon recommendations adopted at the last General Assembly, your Executive Committee undertook consideration of the following items:

Recommendation to Provincial Governments regarding the establishment and subsidy of Town Planning Courses in the various Schools of Architecture.

The minimum years of experience required for graduates of Schools of Architecture, before acceptance as members by Provincial Associations.

The centralization of all Housing and Town Planning programmes under one Federal Department.

A Lecture Tour on the subject of "Appreciation of Physical Environment".

The location of the Institute's headquarters in the National Capital.

With regard to the recommendation to Provincial Governments to subsidize Town and Community Planning Courses in the various Schools of Architecture, your Executive Committee forwarded a request to each of the Provincial Governments in Quebec, Ontario, Manitoba and British Columbia. The requests expressed the Institute's conviction that, in these days of great social progress, the Provincial Governments should insure a sufficient number of qualified technicians in this field, by providing for the necessary courses in Town and Community Planning in collaboration with the established Schools of Architecture. Very encouraging replies were received, most of them admitting the necessity of expert training in Town and Community Planning, and promising that the matter would be studied further with the Schools of Architecture. It would now appear that tangible results could be obtained, if a much closer follow-up policy were adopted by interested Schools, assisted by the component Societies of the Institute.

On the question of minimum years' experience for graduates of Schools of Architecture, your Executive felt

that, after a five-year course or a seven-year post-graduate course, any graduates should be entitled to immediate membership and an active part in Architectural Associations affairs. The feeling was recognized that most graduates desired experience before practising on their own, and there were very few cases noted wherein the graduates did not undertake the necessary acquirements. The motion of the General Assembly, along with the opinion of the Executive Committee, was sent to Provincial Associations, inviting them to forward additional opinions on the matter for further consideration.

In this connection it is interesting to note that, at the recent Annual Meeting of the O.A.A., a resolution was passed which implied that the Ontario Association felt that the period of practical experience after graduation, and before registration, should be extended.

Again according to the expressed wishes of the last Annual Assembly, your Executive urged the creation by the Federal Government of a special department to centralize and control all its Housing and Community Planning activities. Our request received satisfactory consideration and we note with some pleasure that the recently created Central Mortgage and Housing Corporation is rapidly achieving the desired goal.

Your Executive took great pains and interest in the organization of a Lecture Tour on the Appreciation of Physical Environment, that was to be presented to the Teaching Profession throughout the country. The Chairman of your Public Information Committee succeeded, after many laborious efforts, in obtaining the services of a very distinguished and qualified lecturer from England: Mr. Oswald P. Milne, F.R.I.B.A. The Institute, in arranging the tour, was acting upon a desire expressed by the membership at the last Annual Meeting. It was agreed at that time that component Societies would contribute their share in defraying the expenses, on a *pro rata* basis. Unfortunately, unforeseen financial commitments of some of these Societies forced them to relinquish their support, which had been relied upon. Under such circumstances, your Executive, with little choice in the matter, regretfully cancelled arrangements for the tour.

The possibilities of establishing the Institute headquarters permanently in the National Capital were examined during the year by some members of the Executive.

However, apart from other considerations which remain unfulfilled, the matter of acquiring suitable accommodation proved to be a stumbling block of some magnitude, and no definite solution of the various attendant problems can be reported at this time. In the circumstances, it was agreed to leave the matter in abeyance until more favourable conditions become apparent.

Members will recall that, during the Past President's term of office, every effort had been made to promote the revival of the Town Planning Institute. Early in the

year, it was reported to your Executive that the Prime Minister of the country had taken an interest in the revival of the T.P.I. Representatives of the T.P.I., the E.I.C., and of the R.A.I.C. were invited to meet and prepare a joint brief that could be presented to the Dominion-Provincial Conference, called to assemble in Ottawa. The brief had a very sympathetic reception, and the representative of the Government, Major-General Young of the Central Mortgage and Housing Corporation, advised that the Government had consented to support the promotion of such an organization, and to provide the necessary funds. He suggested, however, that the name of the revived organization be changed to "Community Planning Association of Canada", and that the title of the original Town Planning Institute be reserved for a technical institute, as developments might warrant.

Following these preliminary discussions, a general meeting was called in Ottawa late in June, when Federal, Provincial and Institutional representatives were present. The outcome of this meeting was the creation of the Community Planning Association, designed to stimulate a public understanding, as well as the benefits, of participation in Community Planning in Canada. The R.A.I.C. has a very definite interest in this venture and is endeavouring to make the most of the opportunity presented.

Your Executive is pleased to report that the efforts of the Architectural Training Committee have been crowned with success in the publication of a brochure called "Architecture as a Vocation". The need for this type of brochure has been felt for quite a number of years, and our most sincere thanks are offered to Mr. Raymore for having so graciously supplied the Institute with his text on "The Training of an Architect", which formed the basis of the Brochure. This booklet has been received with much appreciation, particularly by the Provincial Departments of Education. At the moment, it is being translated into French, in order to meet a further request.

Your Institute received during the year an invitation from the Federal District Commission to appoint two nominees to act as representatives of the R.A.I.C. on the National Capital Planning Committee. Mr. A. S. Mathers of Toronto and your President were appointed.

Pursuing a policy suggested by former Executives, comprehensive reports of monthly meetings of the Executive Committee are now being published in each issue of the *Journal*. This innovation should undoubtedly keep the membership informed of all the Institute's important activities.

A comparison of the various Architects' Acts of the country has been in the course of preparation for quite a while, and by the time of this Annual Meeting, your Executive hopes to have a report on hand for distribution.

During the Fall, the National Film Board was invited to organize, in a very limited time, an exhibition of Canadian Architecture, which was to be displayed in

Paris in connection with the UNESCO Meetings. The very short time allotted for the accumulation and mounting of suitable material for this exhibition, emphasized the desirability, as well as the necessity, for the establishment of a permanent Library of photographs illustrating Canadian Architecture. With this end in view, the National Film Board offered its co-operation to the R.A.I.C. in the organization of such a library, and your Executive, after consulting the *Journal* Editorial Board, has under consideration a proposed agreement with the Film Board. Further developments will be reported in due course.

A Blue Cross Health Insurance proposition was submitted to the attention of your Executive. After discussion, it was agreed to submit the matter to Provincial Associations, for study and discussion at their Annual Meetings, with a request that they advise the Institute of any action they might take in this regard.

Following up the excellent relations established by last year's Executive with the Civil Service Commission, your Executive renewed its offer of co-operation, in respect to the qualifications of candidates for architectural appointments in the various departments of the Federal Government. The offer was favourably received by the C.S.C., and Mr. Forsey Page, Past President, was appointed to represent the Institute, in an advisory capacity, when the appointment of Architects is concerned.

Your Executive also made representations to the Department of External Affairs, urging them to use the services of Canadian architects actively engaged in the practice of the profession, for the planning and construction of any embassies or legations that the Department might consider erecting in foreign countries.

The membership of the Institute will be pleased to learn that a new School of Architecture has been organized in Vancouver at the University of British Columbia, and that Professor Fred Lasserre, formerly of McGill University, has been appointed as Director. The University of British Columbia, and Dean Finlayson in particular, are to be congratulated for the creation of this new department, and the Institute's best wishes for success are extended to them.

Your Council has been pleased to confer Honorary Fellowships of the Institute on the Right Honourable W. L. Mackenzie King, Prime Minister of Canada, and on Mr. L. Sylvester Sullivan of London, England, in recognition of the valuable services rendered to the R.A.I.C. in the past years.

Your Executive reports with regret the resignation of our Executive Secretary, Miss Constance Griffith, who proved such an efficient and industrious assistant in the administration of the Institute. The position has been filled by the appointment of Miss Anne M. Cory.

Before closing this report, may I be permitted to commend most highly, the excellence of the work achieved by the Editorial Board in their publication of

the *Journal* during the last year. This magazine has truly become an asset to the Institute.

I also wish to express the thanks of the Institute to the Committee of Arrangements for the excellent work they have done in planning this Annual General Meeting.

REPORTS OF STANDING COMMITTEES

ARCHITECTURAL TRAINING

Mr. Murray Brown (F), Chairman of the Committee on Architectural Training, reports as follows:

The Brochure, after passing through a number of vicissitudes, was at last approved, printed and issued. The purpose of this Brochure is to guide prospective students who propose to take up the profession of Architecture. Copies were sent to the various Provincial Departments of Education across the Dominion, and approved by all in varying degrees. The Brochure will be furnished to the Collegiates, Vocational Schools and Universities for distribution—in fact, to date several hundred copies have been forwarded to Provincial Departments. A translation of this is being prepared in French, so that a similar publication may be issued in this language.

With regard to the exhibition of students' work, it is still felt by some members of the Committee that a certain amount has been lost by the lack of competition between the Schools. Perhaps drawings could be exhibited of some subject common to all the Schools, not with the idea of making any award, but it would be interesting to see how each School would handle the same subject. This matter will again be discussed at the coming meeting.

ART, SCIENCE AND RESEARCH

Mr. P. C. Amos, Chairman of the Committee on Art, Science and Research, reports as follows:

The only subject of major interest to Architects, which has come to the attention of this Committee, is a plan for the Co-ordination of Dimensions and Standardization of Building Materials and Equipment, known as "Project A62". This was organized under the procedure of the American Standards Association, and is based on the Modular system of Co-ordination.

A Module, or basic unit, of 4 inches has been adopted in America. All dimensions of buildings and sizes of building materials are therefore based on multiples of 4 inches. Four-inch squared paper is used for nominal layout of plans and elevations, dimensions being kept to multiples of 4 inches.

The design being based on multiples of units, it follows in theory that all materials, the dimensions of which are based on the same units, must of necessity fit. This permits of the Standardization of building materials, thus enabling manufacturers to greatly increase production, to lower costs and to keep on hand large

quantities of their products ready for immediate shipment wherever required. In addition, much of the cutting and fitting on the job is eliminated, work is speeded up, and the general cost reduced. Instances have been reported from Sweden where savings of up to 40 per cent. on the cost of construction have been effected.

While the scheme is excellent and the nominal layout, or plan, is quite simple, the actual dimensioning and location of parts relative to the nominal layout is somewhat complicated, and requires very careful study. This is due to the presence of fractional parts of the Module, or unit, such as mortar joints, clearances in fitting of materials, overlapping of parts, fractional dimensions of materials, etc. This introduces a new factor in the calculations.

A dimension that varies by an increment M , (the 4" Module), is represented by $kM \pm d$, where k is any positive integer and d may have any value. The range of values for the dimension as it varies by the increment M , is given by the substitution of different integers for k . By a suitable selection of k , d may be made numerically less than M . The term kM then becomes an approximate dimension, while d is a small difference determined by Assembly Details. Thus masonry wall dimensions are $(kM - d)$ where d is the thickness of the mortar joints. Width of masonry openings are $(kM + d)$. Wood frame wall dimensions are $(kM + \frac{3}{8})$, assuming the width of 2 x 4 studs to be $3\frac{3}{8}$ ". Standard Assembly Details are therefore imperative, as they establish the values of d both for the Architect and for the manufacturers of building materials.

Basic Standards have been authoritatively established by the American Standards Association, and have been published in a volume called "A62 Guide, Modular Co-ordination", which contains complete Assembly Details and the necessary information for the design of nearly all classes of buildings. This volume may be obtained for \$10.00 from the Modular Service Association, 110 Arlington Street, Boston 16, Mass., U.S.A.

The scheme is well adapted to mass production of housing units, and is rapidly progressing in the U.S.A. and some countries of Europe, where many manufacturers are producing units of Modular dimensions. In Canada, however, little if any progress has been made in the Standardization of Building Materials to conform to the dimensions established by "Project A62". Manufacturers are reluctant to change over their machinery until architects design buildings on the Modular system and create a demand for their products. Architects are reluctant to so design buildings until manufacturers produce the necessary size materials.

The adoption of Standard sizes for building materials is very greatly to be desired, and should be encouraged by all Architects. Whether or not the recommendations of "Project A62" should be adopted in principle for

Canada is worthy of serious discussion at the Annual Meeting.

The Canadian Standards Association

During the year, the Canadian Standards Association has added to its already long list of Standard editions on Welding of Bridges, Buildings and Machinery, Welding Qualification Code, Welding Electrodes, etc. Standard methods of testing prefabricated units of building materials have been under study, and new Standards from Great Britain, Australia and the U.S.A., covering a variety of subjects, have also been reviewed.

Copies of C.S.A. Standards on subjects under Civil, Mechanical and Electrical Engineering can be obtained for fifty cents from the Director, Canadian Standards Association, Room 3010, National Research Building, Ottawa, Canada.

DUTY ON PLANS

Mr. Maurice Payette (F), Chairman of the Committee on Duty on Plans, reports as follows:

The R.A.I.C. and the profession at large felt some concern in the decision of Parliament at its last session in adopting an Amending Act Affecting the Customs Tariff, pertaining to certain plans to enter Canada from the United States duty free. The Memorandum Circular of the Department of National Revenue, series D No. 47, T.C. 223, No. 890-C, includes on page 3 the tariff item 180e, which specifies that the following plans enter this country duty free: engineers' plans, drawings of blueprints of machines and plant equipment, plant layouts, foundations for machinery and other plant equipment, structural supports and towers and similar outside structures, dams, spillways, and other hydro construction, wiring, piping, platforms, ladders, stairs, etc., not to include office or other buildings.

The Finance Minister stated, pursuant to an enquiry, that the Amendment did not apply to architects' plans for buildings, and he further stated that, if the change should prove injurious to the engineering profession, it would be reconsidered, but he thought it should be tested first. The purpose of such Resolution, in including engineering plans on the free list, was to lower the cost of production in Canada by lowering the cost of reconstruction on industrial plants and the installation of machinery.

Notwithstanding this statement, consideration was given to the problem arising, since more than several members expressed the fear that plans of buildings might be let in free, either because of a soft application of the Amendment, or because of some difficulty in interpreting it.

In addition to the objections expressed by other parties concerned with this duty free importation of engineers' plans for industrial construction, it is understood that reciprocal arrangements do not exist with the

United States, and that in fact duty is levied on Canadian plans entering that country.

On the whole, the matter has been under review by the Executive Committee of the R.A.I.C., and it has been decided that it seems unwise to make any formal protest to the Government at the present time, in view of the Financial Minister's assurance that the amendment does not apply to architects' plans for buildings, which assurance is presumably based on the wording of the Amendment, which states "not to include office or other buildings".

However, through investigation, adequate information should be obtained regarding the type of plans that are coming in, and it is felt that a close check can be kept on what is happening in the course of the practical application of the tariff.

The Institute could keep in touch with other interested parties, and so be advised of any development in this regard, also in investigating duty on plans coming into Canada, in order to ascertain whether or not duty is collected on architectural projects.

EDITORIAL BOARD

Mr. F. Bruce Brown, Chairman of the Editorial Board, reports as follows:

You will be glad to hear that the healthy pattern of growth is continuing. We can report increases in the number of pages of text, of illustrations, and of advertisements, and the financial statement for the first three quarters shows improvement in each quarter over the corresponding quarter of last year. We published an average of 1,350 copies per month in 1945, we started 1946 with 1,450 copies per month, and we start 1947 with publication of 1,650 copies per month. The increase is due to paid-up subscriptions, greater student demand, and increased advertising.

The greater bulk of the *Journal* means that for each issue we need 60 per cent. more material than we required a few years ago. The greater strain of searching and selecting prompted your Board to ask the Institute to appoint a group of Representatives for Ontario as in the other Provinces, so that the work of the Board in Toronto could be narrowed down to matters of selection and policy.

Last year we asked and received permission to plough back into the *Journal* a portion of the increasing profits, with the object of raising the standard of both the text and the illustrations. By this means we have been able to order and pay for some photographs and articles. We believe you will agree that in quality as well as quantity there has been a definite improvement due to this policy. We are not completely satisfied in all respects, but we think we have made a positive advance.

We wish to thank sincerely those architects who have continued to submit articles and photographs without

cost to the *Journal*, and we hope that loyalty to the profession will prompt increasing numbers to do likewise.

During the year, we published a special issue in June on l'Ile d'Orléans, and in November a special issue on Community Planning. Both were well received and brought forth many favourable comments.

One feature of 1946 under the title "Aedificavit" has been discontinued due to lack of interest. The Provincial Page, which had caused some concern formerly, has undergone a certain metamorphosis. It is now the Institute Page and features each month a report on the Activities of the Council of the Institute. The number of monthly letters from the component Associations has grown from two to five. We sincerely hope that 1947 will include regular monthly letters from Manitoba and the Maritimes to make the family representation complete.

The question of establishing a national library of Architectural photographs was brought up at the last annual meeting. The Board believes that the establishment of such a library would be of great value to the profession, especially as a constant source of photographs for local and foreign exhibitions. As reported the Council is now negotiating with the National Film Board to bring this about, and we are happy to co-operate with them.

During the year we bade farewell to our loyal and hard-working secretary, Miss Griffith, now Mrs. Hood. In her place we have welcomed Miss Anne Cory, whose interest and zeal promise well for the future. As Chairman, I cannot complete this report without a word of appreciation for the help and co-operation of all Board members, Representatives and their Chairmen. In conclusion, I would like especially to express my thanks for the loyalty and resourcefulness of your esteemed Editor, and also to make special mention of our genial and ever-willing Publisher.

EXHIBITIONS AND AWARDS

Mr. Harold Lawson (F), Chairman of the Committee on Exhibitions and Awards, reports as follows:

The work of this Committee during the year has been pleasant and far from onerous.

Medals were presented to the following for outstanding ability in their respective Schools of Architecture:

Cecil White, University of Manitoba.

Sheila Pamela Baillie, McGill University.

P. F. Tillman, University of Toronto.

Arrangements were made for the presentation of these medals by the Provincial Associations of Manitoba, Quebec and Ontario, at a meeting which would permit some simple ceremony in this connection. We understand these presentations have come off nicely and to

the satisfaction of the recipients, at least, but the point has been raised more than once that the medal should be presented more publicly — say at a University Convocation or an Annual Meeting.

No exhibitions were held under the auspices of the R.A.I.C. during the year, unless one excepts the exhibition of work of students of our Schools of Architecture, displayed on the walls at this Annual Meeting. Mr. Pierre Amos kindly consented to supervise the hanging of the students' work, in collaboration with the two directors of Montreal's architectural schools.

Members who recall our dignified pre-war exhibitions and who feel they should be resumed may wish to notify the incoming Committee to this effect. The volume of work passing through architects' offices all over Canada should enable many to supply ample quantities of photographs of their works during the coming year, if there is a demand for the resumption of these exhibitions.

PLANNING

Mr. P. Alan Deacon, Chairman of the Committee on Planning, reports as follows:

The activities of the R.A.I.C. Committee on Planning this year have been largely restricted to participation in the organization of the Community Planning Association of Canada. A full report on the organization and set-up of the C.P.A. appeared in the November issue of the *Journal*.

Your Committee reported at the last Annual Assembly that representatives of the Association of Professional Engineers of Ontario, the Ontario Land Surveyors and the Ontario Association of Architects had been requested by the Minister of Planning and Development for Ontario to assist in the drafting of a Bill on Town Planning. The draft, as drawn up by these representatives, was accepted with minor modifications, and the Planning Act (1946) has been adopted by the Provincial Government of Ontario and embodied in the present Legislation.

PROFESSIONAL PRACTICE AND USAGES

Mr. Gordon McL. Pitts (F), Chairman of the Committee on Professional Practice and Usages, reports as follows:

The comparative analysis of the various Professional Acts governing the practice of Architecture in Canada is still in the course of preparation. At the time of this report, a questionnaire has been sent to all Component Associations covering the information required for such a comparison. A number of Associations have replied, but we are still waiting for an answer from one or two. When these questionnaires are finally completed, this material will be turned over to the Institute's Legal Adviser for its technical compilation.

Word comes from Saskatchewan that the C.C.F.

Government of that Province is taking steps to socialize some nineteen of the important professions through the medium of a new enactment bringing them directly under the control of the State. The professions affected include lawyers, medical men, land surveyors, chartered accountants, architects, engineers, dentists, pharmacists, music teachers, registered nurses, embalmers, optometrists, osteopaths, physical therapists, chiropractists, veterinarians, astrologists. The whole idea has a distinctly Communistic flavour, and definitely does not tend to attract professional men to that Province.

The Institute has agreed that the National Building Code compiled by the National Research Council is satisfactory as a reference for data and information, and to be used as the basis for the preparation of local Codes, and that in the absence of local By-laws, municipalities would be well advised to take advantage of this National Code as it can be applied to their communities.

In Quebec, a proposed revision of the Professional Engineers' Act of that Province contained definitions and provisions calculated to undermine, if not entirely invalidate, the present Architects' Act. Upon its presentation to the Private Bills Committee of the Quebec Legislature, this proposed Bill was dropped on the advice of the Prime Minister, the Honourable Maurice Duplessis.

The Institute finds that it is permissible for members of the staffs of the Schools of Architecture to practise Architecture in accordance with the provisions of the Provincial Acts governing the practice of Architecture by the Association of which they are members.

As a Component Association of the Canadian Council of Professional Engineers and Scientists, the question of "Industrial Relations and Disputes Investigations" and its inherent feature of "Collective Bargaining" has come up for consideration as a peace-time policy of the Institute, and possible Dominion and Provincial legislation.

In considering where the Architect stands in respect to "Collective Bargaining" and any benefits that may accrue to us through such regimentation, the following should be noted:

1. Architecture is definitely a profession.
2. It is a comparatively small group of artistically and scientifically trained men.
3. The majority of the profession are in private practice. They are essentially individualists and exponents of private enterprise and initiative.
4. Those of our members not in private practice are mostly in the employ of fellow architects, as assistants or as student draughtsmen.
5. Of those in the employ of others than Architects, a number are engaged as heads of departments and would thus be excluded from the provisions of any legislation on Collective Bargaining. Of the balance employed in

non-professional offices or in plants, these are comparatively few in number, usually one or two, in any office.

6. The remuneration of an employed architect is definitely based on his personal ability and experience, and not on any Collective Bargaining schedule.

7. The practice of the profession of Architecture in Canada is very precisely and effectively regulated by Provincial Professional Acts similar to the professions of Medicine and Law, to which it very closely corresponds in the high standard of training and experience required and in close Professional regulation.

8. On the Canadian Council of Professional Engineers and Scientists, Architects are associated with Engineers in the best interests of the community; however, there is a great difference between the practice of Architecture and the practice of Engineering, which gives rise to a differentiation in approach to any Collective Bargaining legislation. As noted above, Architects practise their profession as individuals and largely as private practitioners. On the other hand, by far the greater majority of Engineers (over 90%) are employees. The work of these brings them into contact with industry and labour, and, as a matter of fact, in the training stage, the work of many falls in the labour class. For this reason, certain engineers have made a strong argument that the Engineers should form a Collective Bargaining unit. Such a situation does not exist in the Architectural Profession. Many Architects feel that we should take the same professional position as the Doctors and the Lawyers in this matter.

PUBLIC INFORMATION

Mr. J. Roxburgh Smith (F), Chairman of the Committee on Public Information, reports as follows:

The aims of this Committee were fully explained and discussed at the last Annual Assembly, held in Quebec City.

At that time the general support of the members present, as evinced by the Minutes, was encouraging. During the ensuing months, approaches were made through the Council on Visual Education in England, and ultimately Mr. Oswald P. Milne, F.R.I.B.A., was invited to lecture in Canada.

However, we regret to report that the Annual Assembly unanimity was not sustained. The expected financial support dwindled considerably, and after reviewing the situation in December, it was regrettably deemed advisable by the Institute to cancel the original arrangements. The interested parties were duly notified.

This brings to an end the efforts of about two years on behalf of the "Appreciation of Physical Environment" as a means of stimulating a more widespread interest in Architecture and our Profession.

As for the idea — *sit tibi terra levis!*

Mr. H. Claire Mott (F), Registrar of the College of Fellows, reports as follows:

We are sorry that the ranks of our Fellows have been depleted in the year that is past through the passing of Mr. David R. Brown and Mr. J. H. G. Russell. These men had been active members of their Provincial Associations, and contributed much to the progress of our profession, both in their home Provinces and to the good of our Institute.

At the Convocation of the College of Fellows held in Quebec on February 15th, 1946, the following new Fellows were received:

Mr. Eric Ross Arthur
Mr. Edward James Gilbert
Mr. A. J. C. Paine
Mr. Maurice Payette

Honorary Fellowship was conferred upon Mr. Ernest Wilby, F.A.I.A., who, although retired from practice at the time of our honouring him, and now living in Windsor, Ontario, can look back upon an enviable record of achievement during his long practice, particularly in the U.S.A. and in his contributions to the advancement of our profession in both that country and this.

At that Convocation, the following gentlemen were elected as officers of the College of Fellows, each to serve for a term of one year:

Mr. W. L. Somerville, Chancellor
Mr. A. J. Hazelgrove, Dean
Mr. H. Claire Mott, Registrar.

By unanimous resolution of the Executive Council, Honorary Fellowships are to be conferred upon

Mr. L. Sylvester Sullivan, F.R.I.B.A.
The Right Honourable William Lyon Mackenzie King, Prime Minister of Canada.

Following recommendations from the Executive Committee of the Institute and under By-law No. 7, three additional members have been accepted by ballot for admission to the College of Fellows. These are

Mr. William Frederick Gardiner, a member of the Architectural Institute of British Columbia.
Mr. John Y. McCarter, a member of the Architectural Institute of British Columbia.
Mr. Oscar Beaulé, a member of the Province of Quebec Association of Architects.

CANADIAN ARTS COUNCIL

Mr. Leonard E. Shore, Representative of the R.A.I.C. on the Canadian Arts Council, reports as follows:

The Canadian Arts Council is composed of an Executive of four persons as well as five Committee Chairmen.

These main Committees are: Copyright, Foreign Relations, Community Centres, Promotion and Constitution. The Canadian Arts Council is a composite body representing sixteen component societies of all the Arts. Your representative attended seven meetings of this organization. In addition to these meetings, a special Conference was called on the 22nd of June which was attended by Mr. Murray Brown, Mr. Gordon Adamson and your representative.

The prime purpose of the Canadian Arts Council is to further the cultural development of the Canadian people, to work for the encouragement and advancement of the arts in Canada, and to serve the highest interests of Canadian creative artists.

A brief summary of the activities of the Canadian Arts Council during the year may be of interest:

Representatives of all societies agreed that Canadian Exhibitions, i.e., Trade Exhibitions, Art Exhibitions, Book Fairs, World Fairs, in general had not always been of the best quality and sometimes had been poorly handled. The C.A.C. took immediate steps to offer what help it could to those agencies which are now responsible for exhibits abroad. This offer resulted in the preparation of several small exhibitions to foreign countries. It is expected that this initial step will result in greater co-operation in the future.

Pressure has been exerted for the promotion of a National Arts Board. This National Arts Board might be a body which would co-ordinate the work of all the various agencies now interested in art in a unified cultural programme for the country. This Board would be concerned with the external as well as the internal distribution of cultural information and services.

The Canadian Arts Council has been very interested in the United Nations Educational, Scientific and Cultural Organization. Due to this interest and the recommendations which were made to the Government on various matters, two representatives were sent to Paris in November, 1946, to attend the First Conference of U.N.E.S.C.O. It was indeed a compliment to the C.A.C. to have two of its members selected, as only a total of eight delegates were officially sent to the Conference. This Conference lasted for seven weeks and the representatives felt a worthwhile work had been accomplished even if only a certain amount of policy was determined for future conferences.

As well as the exhibitions prepared for the U.N.E.S.C.O. Conference by various countries, Paris was full of many special exhibits, plays, concerts, etc., arranged by the City for the occasion. Actually very little occurred in the Creative Arts Section concerning Architecture, as it was supposed to be taken care of by Social Sciences, but it evidently was not adequately covered.

The general idea of arranging for Conferences of specialists in the various professions was approved.

The second U.N.E.S.C.O. Conference will occur in Mexico this year.

Direct requests were received by the C.A.C. from several of the previously occupied countries desiring information concerning planning and construction of emergency housing such as was constructed in Canada during the war years, and other requests for information in the fields of music, painting and sculpture. It was possible to forward a small amount of this information.

All component societies made a contribution to the Canadian Arts Council to defray expenses for printing, posting, etc. The R.A.I.C.'s share of this amounted to \$30.00. Your representative suggests that similar financial help during 1947 will be of great assistance to this organization.

The R.A.I.C. is now supplying to the Canada-Netherlands Society at The Hague copies of our *Journal* for the forthcoming year to assist in advising this previously occupied country of the type of buildings which are being constructed in Canada.

CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS AND SCIENTISTS

Mr. W. J. Abra (F), representative of the R.A.I.C. on the Canadian Council of Professional Engineers and Scientists, reports as follows:

This report will be short for several reasons. First, I have only been on the job for a short period of time. Secondly, those of our members who read the *Journal* thoroughly will have a very good idea of the purposes and activities of the Council which were published in the Ontario Letter of the November *Journal*; and lastly, because 30,000 pamphlets describing the origin, aims and objects of this Council have been printed and are available to all members of the participating bodies of the Council. The R.A.I.C. have ordered 1,100 copies of this pamphlet and they will be distributed very shortly.

During the year, a permanent Secretary has been appointed and an office located in Ottawa, and while the finances of the Council are very limited, good results are being secured, and full information of the Council's activities reach the members promptly, and this service will no doubt be greatly improved as the organization grows in influence.

The Council's representations to the Civil Service Commission have been well received, and we believe they are leading to very definite results which will prove of great value to all professional workers in the Civil Service, the raising of standard requirements for all applicants to the Public Service, and consequently a benefit to all Professional and Scientific organizations.

That this trend is a very definite one was evidenced by the attendance at our December meeting of the Chairman of the Civil Service Commission, Mr. C. H. Bland, Commissioner Nelson and the Director of Organization and

Classification, Mr. Jackson. Their visit and the exchange of views proved very conclusively that they are alive to the need of giving all the aid and encouragement possible to secure properly trained professional men for the Service.

At the close of the second year of the Council's activities, one cannot but feel that the progress has been definite, and encouraging in a good many ways, and that the influence of this Council is becoming increasingly important.

Government circles seem to be now well aware of the existence of this co-operative activity of National Engineering and Scientific organizations, and are learning to turn to it for information and guidance regarding the opinions of the membership on subjects in which they have an interest.

Your Council believes that this development is one of great importance, not only to all members of the supporting societies, but also to citizens as a whole. There never has been a time in our history when such collaboration between Professions and Government is so vital to national progress.

COUNCIL OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS

Mr. Gordon McL. Pitts (F), representative of the R.A.I.C. on the R.I.B.A. Council, reports as follows:

In reporting on the activities of The Royal Institute of British Architects for the past year, the predominant note has been re-organization for peace in the best interests of the public and of the profession. Good progress is being made in every department.

The R.A.I.C. was represented on the Council of the R.I.B.A. for the year 1946-47 by Mr. L. Sylvester Sullivan, F.R.I.B.A. and your representative.

It was a source of gratification and pride to all members of the profession that the President's devoted services had been marked by the Honour of Knighthood. We all extend to Sir Percy Thomas our warmest congratulations, coupled with our appreciation of the great contribution he has made to architecture and the community during three most difficult years.

At the General Meeting of June 25th, Mr. Lancelot Herman Keay, O.B.E., of Liverpool, was elected President of the Institute for the year 1946-47.

The Royal Gold Medal of Architecture of 1946, with the approval of His Majesty the King, was presented to Sir Patrick Abercrombie, M.A., F.R.I.B.A., Professor of Town Planning, London University.

The modifications of the form of presentation of the "Journal" and certain steps in the scheme of development generally approved some months ago, on the recommendation of a Special Journal Committee, are

being gradually put into effect, as exemplified in the new cover design of the November Issue.

The various Standing Committees of the Institute have been active during the year, their efforts being re-oriented from War to meet the demands of reconstruction and a peace-time economy.

Demobilization of members, assistants and students in the Armed Forces has been a matter of great importance to, and activity by, the Institute.

A Committee on Building Research has proposed a comprehensive report on the whole question of Building Research, which has been submitted to the Government for appropriate action.

The Institute has had a part in the investigations carried out by the Allied Control Commission on building techniques in Germany and its representatives have submitted reports on their observations to the President.

The question of the employment of Architects in Public Works has been carefully investigated by a committee of private practitioners and official Architects. Their recommendations have been approved by Council and have been of considerable assistance to Public Authorities in the employment of Architects.

Post-War Hospital building has received the special attention of the Institute in collaboration with representatives of the Medical Profession.

The work of the Board on Architectural Education has been most comprehensive in its various Departments and Sub-Committees during the year. The Board has maintained close contact with the Ministry of Education. It has a Special Committee on Town Planning Education. The Board has resumed its pre-war practice of bringing the educational programme and activities of the R.I.B.A. to the notice of the Public and the Secondary Schools. The Visiting Board has visited a number of the Architectural Schools, and in addition the Board has performed its usual functions in connection with examinations for admission to the profession, prizes and student awards.

The Architectural Science Board, whose terms of reference are — "To promote the use and facilitate the acquisition of science in the advance of Architecture" — appointed the following Committees: General Purpose Committee, Lecture Committee and Standard Specifications Committee.

The Board sponsored a Conference on Human Needs in Planning, the Contribution of Social Studies to Architecture and Planning. The results of this Conference were summarized in a report to Council.

A Lecture Series was carried out covering such subjects as, "Painting", "Plastering", "Painting Plaster", "Colour in Buildings", "The Relationship of Air Photographs to Architecture and Town Planning".

The Library of the Institute is being extended and

enlarged on the recommendations of the Report of the Library Reconstruction Committee.

The R.I.B.A. 1946 Exhibition, "Building Now", was opened on April 11th by the Minister of Town and Country Planning. The Exhibition was termed "The Shop Window" of the Architectural Profession, and as such contained a selection of the goods which the profession can offer to the Nation in the immediate task of re-building its homes, schools and social amenities. The Exhibition Committee aimed principally at getting schemes which were in the design stage, with supplementary photographs and drawings of work executed during and immediately before the War, to provide ideas for post-war building. The Exhibition was a great success and stimulated much public interest. It is at present on tour through the Provinces.

Mr. Lewis Mumford, the celebrated American sociologist and writer, gave a lecture at the Institute on July 12th. His subject was "A World Centre for the United Nations".

The annual subscription rates for Membership in the Institute have been raised this year. From January 1st, 1947, the subscription of Fellows shall be raised Two Guineas, of Associates and Licentiate by One Guinea, and of Students by One-half Guinea. The subscriptions of those classifications resident in the Overseas Dominions, who are also members of the Allied Societies of those Dominions, will be raised by One Guinea. In Canada, the subscription of a Fellow is Four Guineas, of an Associate or a Licentiate Three Guineas. Of these amounts members of the R.A.I.C. are subject to a rebate of one-third.

This is a review of some of the highlights in the activities of a year of much progress by the Institute.

The R.A.I.C. takes this opportunity of extending to Mr. L. Sylvester Sullivan our thanks and appreciation for acting as our resident representative on the Council of the R.I.B.A. for the past year.

NATIONAL CONSTRUCTION COUNCIL

Mr. James H. Craig (F), representative of the R.A.I.C. on the National Construction Council, reports as follows:

The National Construction Council functions as a service organization to the Construction Industry for the interchange and clearance of ideas between the various Constituent Bodies. During the last year, meetings of the Executive Committee were held in April, June, September and December; the annual meeting of the Council for the year ending April 30, 1946, was held May 16, 1946, and a general meeting on December 12th.

Future of the N.C.C.

A discussion on the future of the Council at the April meeting is reported in the following excerpt from the minutes:

"It was pointed out that in several instances during the past few years, the Council had found it necessary to withhold action on certain of its decisions to avoid duplicating the efforts of some of its Constituent Organizations. It was the consensus of those present that while it was natural for each Constituent Organization to look after its own rights and those of its members, the Council, representing as it does all sections of the Construction Industry and being interested solely in its overall problems, was in an excellent position to present the views of the Industry to the public and to Government Bodies. It was also felt that the Council should offer its assistance to Constituent Organizations whenever desired and in such instances where certain sections of the Industry might suffer as a result of the actions of a Constituent Organization, the Council should, if necessary, have the privilege of criticising such actions."

Construction Control

Early in the year the Dominion Government placed the control of construction with the Municipalities. Following this procedure, much confusion arose due to lack of uniformity of action. It was then suggested that there should be some central controlling authority and that the National Construction Council with its Regional Committees would be a suitable body to administer these controls. However, it was agreed unanimously that the Council had neither the resources nor personnel for such an undertaking and that even if we had, it would be wise to steer clear of such an entanglement.

Standardization of Building Materials

With reference to Standardization of Building Materials following the pattern set up in the United States by the A.I.A. and the Producers' Council, A.S.A. Project A62 known as the Modular System, the Council contacted the Constituent Bodies and urged that they should ensure that this project be referred for careful study to the Canadian Standards Association and that the C.S.A. make a full report as to the possibilities of this project as applied to the Construction Industry in Canada. Correspondence direct with the C.S.A. ensued, and Mr. McGolpin, who was conversant with the American project, was requested to advise the C.S.A. of the specific items of materials that might be included in studying the possibility of standardization.

Shortage of Building Materials

On July 3rd the Council wrote the Federal Minister of Reconstruction requesting the release of a copy of the report submitted by the C.C.A. on shortage of building materials, for the study of this Council. The reply expressed regret, as the report was of a confidential nature, the Committee having acted as advisers to his Department.

Later a letter was sent to the Minister supporting the representations made by the Canadian Paint, Varnish

and Lacquer Association in connection with the shortage of pig-lead. A reply from the Administrator of Non-ferrous Metals, later corroborated by correspondence with the C.P.V.L.A., informed us that there would be enough pig-lead for domestic use.

The Council was informed by Mr. LeClair of the Canadian Lumbermen's Association that it was impossible for the manufacturer to supply the domestic market with all their requirements, because of better prices obtained in the export market, which market was necessary if the Industry was to remain solvent. Shortage of men to work in the Bush was another bottleneck. He could see no improvement in the help situation in Ontario unless there was increased immigration. There was very little Fir coming from the West Coast and no Oak from the United States. He was of the opinion that the situation would become progressively worse for these woods.

Correspondence with the Minister of National Defence urging him to have as many wartime buildings declared surplus as possible, in order that the materials therefrom might be salvaged, met with a satisfactory reply.

Housing

Attention was given to a Release issued by the Department of Reconstruction and Supply, September 22nd, giving results of a study on the Manpower and Materials Requirements for a Housing Programme in Canada, made by the Economic Research Branch of the Department, in which it was pointed out that a housing target of 60,000 units during 1946-47 is well within the production capacity of this Country.

Mr. Hodgson advised the December meeting that priorities for materials for housing would be increased from 30 per cent. to 50 per cent. and that these priorities would apply generally to all types of housing.

Removal of Controls from the Construction Industry

The following questionnaire was sent to the Constituent Organizations suggesting the removal of Controls on both wages and prices, with a view to improving conditions in the Industry, and asking the Constituent Bodies if they had:

1. Any objection to the Council itself moving to obtain the removal of controls.
2. Any objection to the Council taking measures to encourage the Organizations represented on the Council to express their views on this matter direct to the Ottawa authorities.
3. If in their opinion the Council should take no action whatsoever in the matter.

At the December meeting several replies were read indicating that some of the Constituent Bodies were in agreement that the removal of controls would bring

about an improvement in the supply of materials but were doubtful if such action should be taken at the present time.

The meeting was reminded that since this letter had been sent to the Constituent Organizations, the Government had removed all controls from wages.

FINANCIAL REPORT

The following is a summary of the Report of the Honorary Treasurer, Mr. A. J. Hazelgrove (F).

Revenue

Pro rata contributions received from Component Societies	\$5,489.00	
Sale of Contract Forms	784.69	
Sundry Receipts	130.00	
Re the Journal, R.A.I.C.	3,155.55	
Total Revenue		\$9,559.24

Expenditures

Secretary's Salary	\$1,669.50	
Convention Expenses	1,561.85	
Travelling Expenses	868.00	
Rent—Toronto Office	\$228.00	
Montreal Office	100.00	328.00
Allied Societies, Fees		253.67
Printing, Stationery and Office Expense		473.81
Telephone, Telegrams, etc.		447.22
Scholarship and Competition Awards		13.29
Insurance		15.76
Legal		300.00
Audit Fee		50.00
Architectural Training		43.46
Cost of Contract Forms		992.34
Journal (\$1,200 Grant)		440.60
Sundry Expenses		146.90
Total Expenditures		\$7,604.40
Provision for depreciation of furniture and fixtures — Toronto Office		45.09
		\$7,649.49
Gross Surplus		\$1,909.75
Less Transfer to Capital Savings Account		500.00
General Surplus		\$1,409.75

Summary of Assets:

Cash, Bonds and other Assets in General Account	\$7,651.94	
Capital Account, Bonds, Cash in Bank (Fellowship Entrance Fees)	\$8,736.43	
Scholarship Account, Bonds, cash in bank (Fellowship Annual Dues)	\$5,472.70	
		\$21,861.07
Total in cash, bonds and other assets		\$21,861.07

In submitting this report on the activities of your Council, may I express my thanks to the members of Council, to the Chairmen and members of Committees, and particularly to the members of the Executive Committee of the Council and the Executive Secretary, for all the assistance, support and co-operation which I have received during the past year.

CHARLES DAVID, *President*

'PIFFICATIONS'

Reprinted from the Journal of the Royal Institute of British Architects

"The following is reprinted by permission from the Manchester Society of Architects' Newsletter to their members in the Forces, June 1944. Apologies are due to those members who have already seen the following effusion, but it seems to deserve a wider audience than the Service members of the Manchester Society, for which reason it is included in our New Year Nonsense.

"It's not good enough," said the new typist (looking at the draft specification which she had been left to type out.) "Mr. Blank's writing is awful, and it really doesn't make sense at all. I do wish he had read through it for me before he went out. However, here goes."

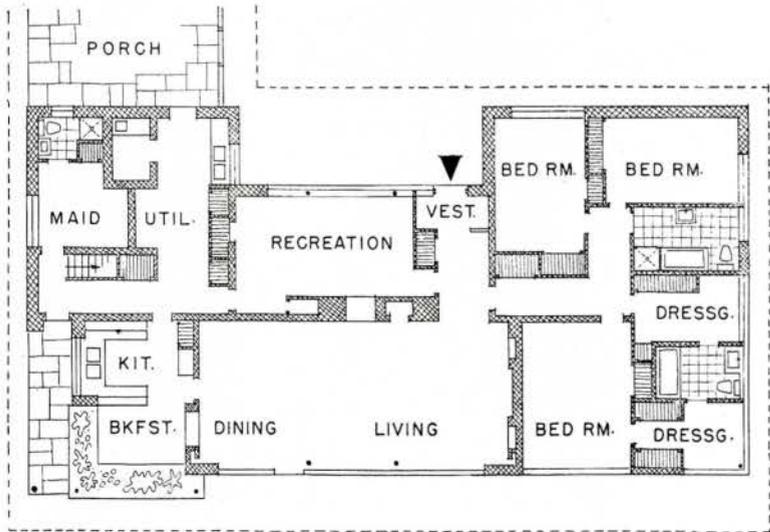
1. The work consists of clearing all exacting strictures and in wrecking a building without horses and stables.
2. The drawings referred to in this spification comprise
 - (a) A Black Plan.
 - (b) A Grand Floor Plan.
3. The procession on the site will be allowed as soon as the Contract is let.
4. If reproved by the Architect the gravel and sand excavated may be used on the Contractor.
5. The hole on the works must be computed and sanded over within six weeks of the order to convince.
6. The contractor shall sit out on the site and shall be responsible for any terrors that may arise and for making necessary alterations if in a curate.
7. Keep an important four men on the job during all waking hours.
8. For the use of the four men the contractor must correct and keep in repair a private officer and all drainings must be kept in a large drawer. Provide beards for and count the working drawings.
9. The contractor is to provide all fools, plants and tickle for the job and is to remove same at completion.
10. Proper sanitary conveniences for the use of the weakmen are to be provided.
11. Work which is defective will be condoned by the Architect.
12. The workmen must not wonder about the premises unless absolutely necessary. The contractor shall make special provision to enforce this role.
13. The contractor is to allow for making good all damage due to filthy workmanship.
14. All old materials, dirt, rubbish, etc., to be renewed from time to time.
15. Remove surface oil and whirl and deposit it where infected.
16. Excavate for stenches (and easement if any) to the depth shown on the drawings.
17. Excruciate all planking stuttering and shaving necessary.
18. Cement to be Yiddish of depraved manufacture.
19. Lime to be fishily burnt and free from perfection.
20. The corncrake to be composed of a grey gate of brick or stone, and sand and a deficient quantity of water and to be mixed on a bearded platform.
21. Drains to be laid with glazed stoneware twisted pipes with all bands and functions and to be nested in the presence of the architect.
22. Give no ice to the vocal authority and pay all fees for connecting to sour pipe.
23. Interesting chambers to be built in common brick.
24. Eternal walls to be built with a fair pace in rusty brick.
25. All walls to be bulged throughout to the precarious heights and pretensions shown in the drawings. No footlings are required.
26. Phlegmish bond to be used and all curses to be well shushed up.
27. Lime water to be of an approved colour (may be mixed by hand or in a pill).
28. The roof to be constructed with four trestles as shown. Cover the roof with 1 inch bearding and well burnt patent tites on buttons and belting. Clean out all garters at completion.
29. Timber for joining to be round and clean and to be free from flakes, loose or dead nuts.
30. Cased frames to windows to have withered and chick throated cills with a paralysed iron water bar let in.
31. The doors to be 2 inches in two loafs; mouldy both sides, hung with 2 pairs of rotten butts to 1½ inches jammed linings.
32. All lime to be properly faked—
For ceilings use a coarse stiff composed of . . . and add to every 3 cub. ft. a good long cow hair. The hair to be well beaten and evenly distributed on the coarse stiff.
33. Expensive metal lathing to be used over wool lintels and to be fixed with galvanised steeples.
34. Use sheet glass for gazing generally except for the bathroom window which is to be obscene. The paint for all woodwork to be composed of benign old white lead.
35. Knit slime top and taint all woodwork with two coats of boils. Each coat of paint to be a distinct pint, and sample pints to be submitted to the architect for his approval.
36. The promises to be made clean at completion, all widows to be washed inside and out and all pawings cleaned.
37. The employer does not bend himself to accept the lowest or any fender."

J.P.N.



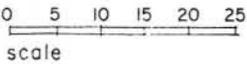
Photography Rapid Grip & Batten Ltd.

VIEW FROM GARDEN, HOUSE IN ROSEDALE, TORONTO, ONTARIO



GORDON S. ADAMSON,
ARCHITECT

H. B. DUNINGTON-GRUBB,
LANDSCAPE ARCHITECT





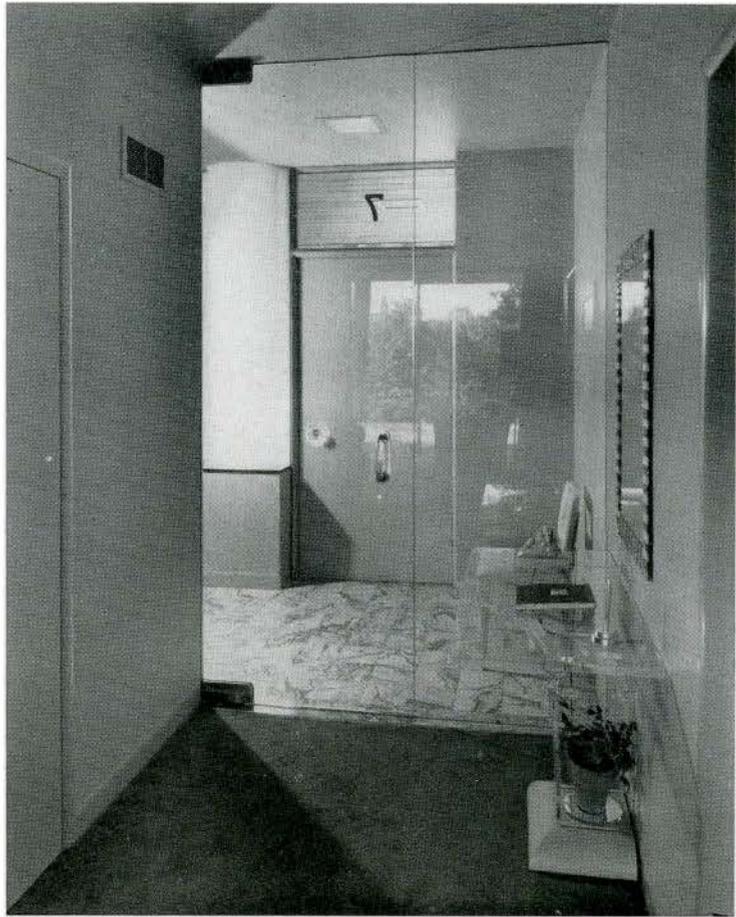
LOOKING SOUTH FROM LIV-
ING ROOM ACROSS RAVINE



DINING SPACE AT WEST
END OF LIVING ROOM



M A S T E R B E D R O O M



MAIN ENTRANCE FOYER



RECREATION ROOM

1938-40 LE PAYS ENTRE EN GUERRE;
L'INDUSTRIE DU BATIMENT N'EST
PAS ENCORE GRAVEMENT TOUCHEE

1938-40 BUILDING WAS AS YET
UNAFFECTED BY WARTIME SHORTAGES

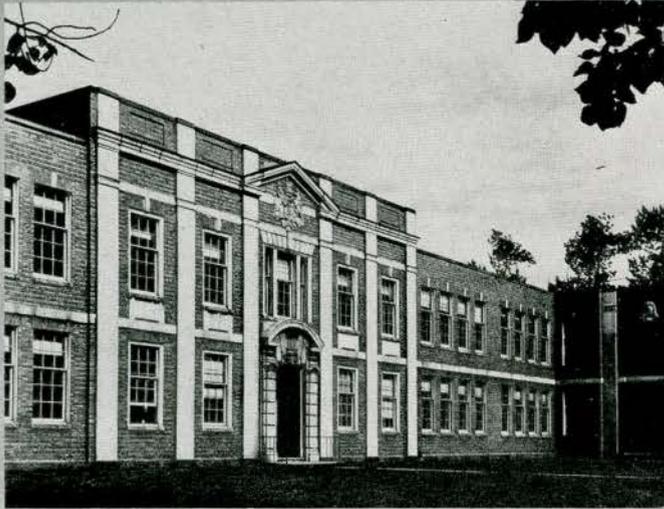
1



AUDITORIUM - MONTREAL, PROVINCE OF QUEBEC
RUE DU PARLOIR



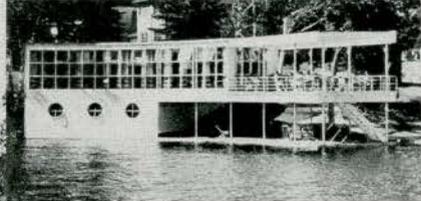
PENITENCIARIUM - DENHAIR, PROVINCE DE BRUXELLES
RUE DES SAINTS



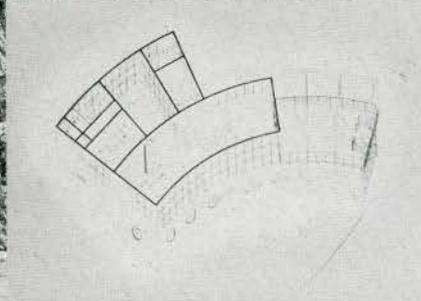
COLLEGE DU PRINCE DE GALLES - CHARLOTTETOWN, P.E.I.
PRINCE OF WALES COLLEGE - CHARLOTTETOWN, P.E.I.



HOTEL TEGORAC - TROUSVILLE, PROVINCE DE QUEBEC
RUE D'ALEXANDRE



PENITENCIARIUM - DENHAIR, PROVINCE DE BRUXELLES
RUE DES SAINTS



RESIDENCE - MONTREAL
ROBERT, LINCOLN, JOSEPH



TRINITY DE LAROCQUE - VANGOUVER, B.C.
CONTEMPORARY HOUSES



UNIVERSITE DE QUEBEC - PROVINCE DE QUEBEC
COURT CARRE



PALAIS DE JUSTICE - SUPERIEUR COURT BUILDING - QUEBEC, QUEBEC



HOTEL INTERNATIONAL - NIAGARA FALLS, ONTARIO
EXPERIENCE TO INTERNATIONAL BUILDING - N.Y. STATE



HOTEL PICKERS - NIAGARA FALLS, ONTARIO
HOTEL PICKERS - NIAGARA FALLS, ONTARIO

UNESCO

CANADIAN ARCHITECTURE SHOWN AT THE UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION IN PARIS

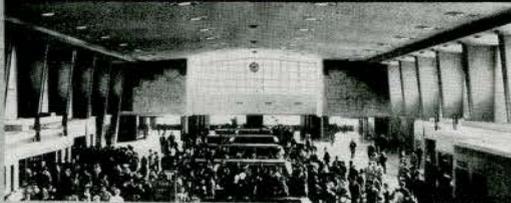
AU COEUR DU CONFLIT ON ELEVE
ENCORE UN CERTAIN NOMBRE
DE CONSTRUCTIONS CIVILES

4

THE WAR ALLOWED ONLY A SMALL
AMOUNT OF NORMAL BUILDING



RESIDENCE
MOORE
E.S. FAJOU, ARCHITECT
MONTREAL, QUEBEC



HOME OF "PROGRESSIVE NATIONAL"
CLUB, STATION
MONTREAL
JOHN SCHIFFELS



RESIDENCE "ESTERELLE"
MOORE - MITCHELL
WINDSOR, QUEBEC
LAFRANCOISE AND THORNTON



RESIDENCE
MOORE
MONTREAL, QUEBEC
E.S. FAJOU



RESIDENCE DE "ROSEMARIE"
STONE
MONTREAL, QUEBEC
C.B.K. VAN NOORDEN



RESIDENCE DE "SANDRINE"
HOUSE OF ARCHITECT
MONTREAL, QUEBEC
E.S. FAJOU, VAN NOORDEN

LE CHAMP D'ACTIVITE DE L'ARCHITECTE
S'ETEND AUX PROBLEMES
EDUCATIONNELS ET SOCIAUX

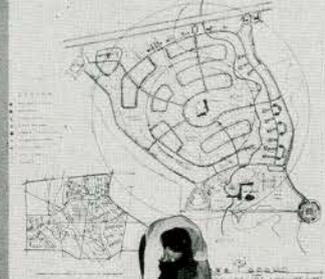
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ARCHITECTS ARE NOW ASSUMING
WIDER SOCIAL RESPONSIBILITIES

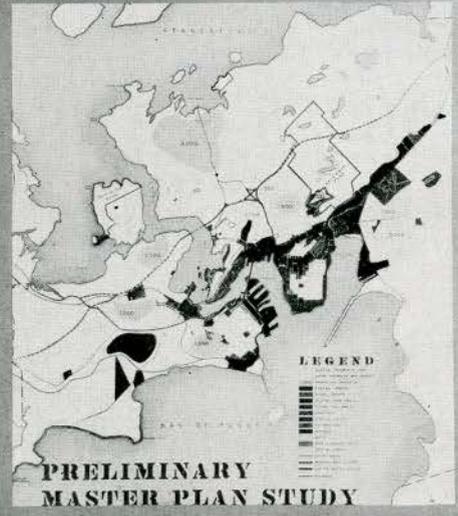
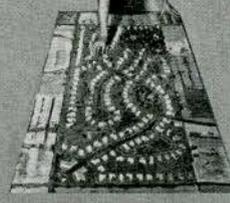


PROPAGANDA D'URBANISME - TORONTO, ONTARIO
TOWN PLANNING EXHIBIT - TRANSPORTATION CLUB

NEIGHBORHOOD UNIT



"PROJECTS D'URBANISME"
PLANNING PROJECTS - E.S. FAJOU, E.S. FAJOU



PLAN DIRECTEUR - SAINT JOHN, NEW BRUNSWICK
MASTER PLAN PROJECT - CAMPBELL BERRETT



PROPAGANDA D'URBANISME
TOWN PLANNING EXHIBIT
STONEDONT, ONTARIO
E.S. FAJOU



BOULETTE DE DEVELOPPEMENT URBAIN
HAMILTON, ONT.
E.S. FAJOU



PANORAMA DE PROPAGANDA D'URBANISME - OTTAWA, ONTARIO
PANEL OF TRAVELLING SHOW-BACK RESEARCH GROUP-OTTAWA

THE USE OF HEAT INSULATION IN BUILDING DESIGN AND CONSTRUCTION

By E. A. ALLCUT

Professor of Mechanical Engineering, University of Toronto

The subject

"Heat insulation" is evidently too large and too diverse a subject for detailed exposition in a single article, and therefore, the present discussion will be limited to a consideration of the various principles and factors involved, including some references to their applications. New kinds of insulation are continually appearing on the market and, if the principles governing their functioning are understood, their relative values may then be recognized with comparative ease by the architect or builder concerned. The ultimate criterion is always the amount of protection afforded per dollar expended on the material and its installation and therefore, questions of relative cost and rates of deterioration are important factors in the problem. The list of references given is not intended to be comprehensive, but is a reasonable cross section of comparatively recent literature on this subject, with some bias in favour of Canadian sources, which may be expected to apply more particularly to conditions existing in the Dominion. Many of them contain additional bibliographies, relating to some specific aspects of the subject.

The general treatment has been arranged under four headings, namely, (a) the Problem, (b) Materials, (c) Infiltration, (d) Application. These divisions must necessarily overlap to some extent, but they constitute a convenient method of approach.

(A) The Problem

Any building (apart from its artistic characteristics) is essentially a place in which people live, work, or congregate. Its primary function, therefore, is so to segregate a portion of the atmosphere that the enclosed space may be maintained, in the most economical manner, at a suitable condition which usually differs from that of the external atmosphere. It amounts, therefore, to a species of blanket, through which heat will flow inward or outward, according as the temperature inside the building is lower or higher than that of its surroundings. It must also have the necessary structural strength to support its own weight and to resist any external forces that may be applied to it. If the insulating material itself has structural strength and stability, that is all to the good as otherwise, some additional framework must be provided for its support.

In the early days, when fuel and structural materials were cheap, when thick walls were used in building and

when people wore thick clothing indoors, the question of insulation was comparatively unimportant. Now, however, with rapidly increasing costs of fuel, materials and labour and with the rising demand for comfort both in winter and summer, the situation is very different. Also, while small domestic furnaces have given test efficiencies ranging from 60 to 85 per cent., it is probable that their average operating efficiency does not exceed 50 to 55 per cent. and thus the saving in fuel consumption

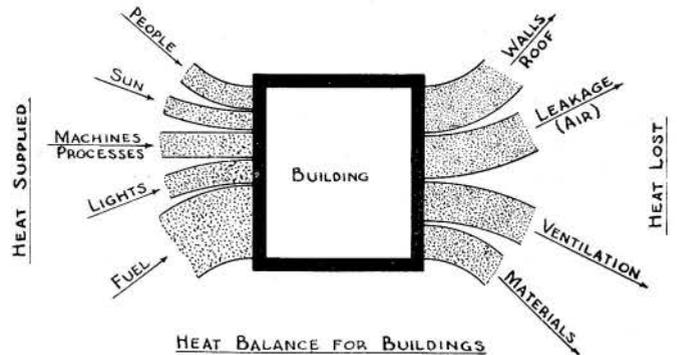


FIG. 1

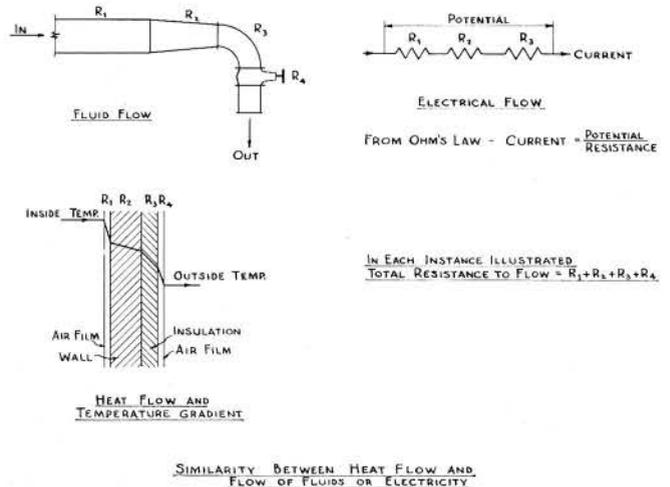


FIG. 2

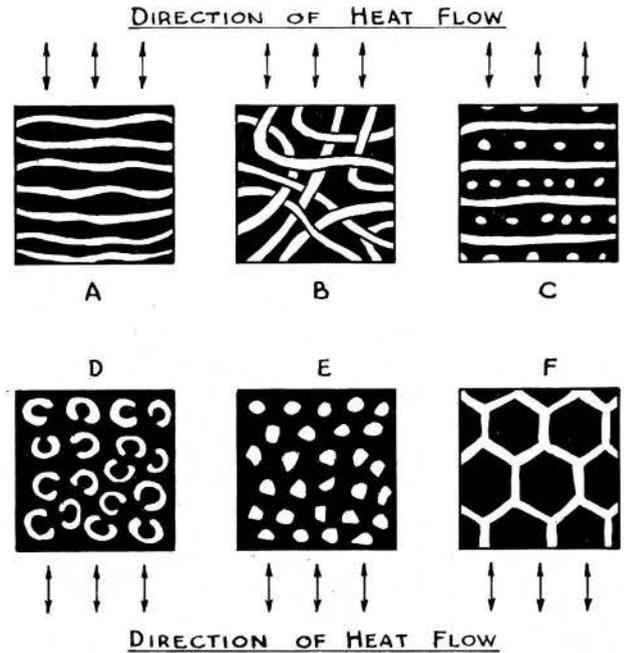
is roughly about double that of any saving of heat loss from the building. In 1927 it was estimated that, if all the residential buildings in Canada were properly insulated, an annual saving of at least 9,000,000 tons of coal (or its equivalent in oil) would result. Since that

time many old buildings have been insulated, but new ones with little or no insulation have been built and it is possible that the saving from this source alone might now amount to over 5,000,000 tons; most of this fuel is now being imported from other countries.

After any building has reached its designed temperature, all of the heat entering the building must flow out (Fig. 1) and, therefore, the conditions that govern the outflow are important. These laws are similar to those that control the flow of fluids or electrical energy (Fig. 2) as, in each of them, the resistance opposing the flow is the governing factor. If these resistances are added together ("in series") the total resistance is the sum of the individual resistances ($R_1 + R_2 + R_3 + \dots$). Further, just as the same quantity of fluid or current passes through all of these resistances so, with steady flow, the quantities of heat flowing into, through and out of the wall must be the same. This is frequently a convenient method of approach in solving heat flow problems. The same laws hold good, both in the cases where heat flow is to be encouraged (as in a radiator), or discouraged (as in the wall of a building). Thus, a conductor is a material in which the resistance (R) is low and an insulator, one in which the resistance is high — what is meat for the one is poison for the other. The objective, therefore, is to obtain maximum economic resistance. Conductance (C) is the reciprocal of resistance and applies to the material or structure as actually employed, while conductivity (k) is the conductance of unit thickness (one inch or one foot). The latter is frequently referred to as the "k factor".

The mechanism of heat flow in all cases is some combination of conduction, convection and radiation. Conduction is dependent on the transmission of molecular vibrations from one particle to the next, while both of them remain in fixed relative positions. Thus, the more closely the particles are packed together, the better they are likely to conduct heat, so that metals are good conductors and gases or vapours (if stationary) are good insulators. If, however, the particles are able to move or circulate in streams, they may transmit considerable heat by convection or bodily movement. Thus, gases and liquids that are free to move are good convectors — and bad insulators. Radiation is independent of both these factors and is transmitted in straight lines through transparent media (such as air) generally in a manner similar to that of light. In a cast iron radiator of conventional design from 60 to 75 per cent. of the heat is transmitted to the room by convection and the remainder by radiation. The heat reaches the radiator surface, from steam or water, by conduction. And yet the writer has seen in a local hospital of modern design, radiators over which closely fitted screens or cabinets are installed (cutting off much of the convection) and the surfaces of which are painted with aluminium paint (reducing the radiation by about 50 per cent.!) The system looks nice but is woefully inefficient.

The design of the insulator or heat barrier, therefore, must reduce each of these factors to a minimum. Rock



AIR CELLS SHOWN IN BLACK

- A - PARALLEL ARRANGEMENT OF FIBRES
- B - RANDOM " " "
- C - LATTICE " " "
- D - VESICULATED OR "SHELL" TYPE
- E - POWDERED TYPE
- F - CELLULAR STRUCTURE

PHYSICAL STRUCTURE OF INSULATING MATERIALS

FIG. 3

wool or glass wool, for example, consists of 94 to 99 per cent. of air by volume, the remaining 6 to 1 per cent. of solid matter being designed to intercept radiation and to reduce convection to a minimum by dividing the air into small cells, the surfaces of the filaments acting as frictional resistances¹⁵ to oppose internal air circulation. (Fig. 3). Where large air spaces exist, as in hollow walls, the radiation is important and this loss may be reduced by providing surfaces of low "emissivity" such as bright copper or aluminium, but these must be placed on one or both sides of an air space, so that they may be effective in this regard. The loss by convection must be treated separately.

When the building is heated intermittently, while its temperature is being raised, or when the external temperature is fluctuating (as it usually is), the heat entering the walls may be greater or less than that leaving. This introduces an additional factor, namely, the heat capacity of the solid materials present, which act as storages or reservoirs of heat. High heat capacity may be advantageous, as in cases where thick insulation is

used to counteract the effects of short intervals of low external temperature⁶— or disadvantageous, as in summer, when heat stored in the material may counteract the cooling effect of the night air. The heat capacity per unit volume is proportional to the bulk density of the material⁴. The ratio $\frac{\text{heat capacity}}{\text{conductivity}}$ is called the "thermal diffusivity" and Fehling states that this has a distinct minimum for a bulk density of 0.7 to 0.9 (44 - 56 lbs. per cu. ft.). This factor is important where heat flow is intermittent, but such problems are so complicated and their effects vary so much in different circumstances that in most instances, the heat flow is assumed to be steady. Those interested in this matter may refer to the calculations and tables of E. G. Smith⁵ and to various papers on the subject in the Journal of the American Society of Heating and Ventilating Engineers.

Smith indicates the occasional importance of this factor in a comparison of the heating loads for Guion Assembly Hall, where the continuous heat loading was less than one fifth of the rate of heat supply required to raise the auditorium temperature from 40° to 70°F. in 2½ hours after heat had been applied to the boilers (outside temperature 20°F.). He also refers to a test by Robertson, in which the corresponding ratio was 1 to 4.

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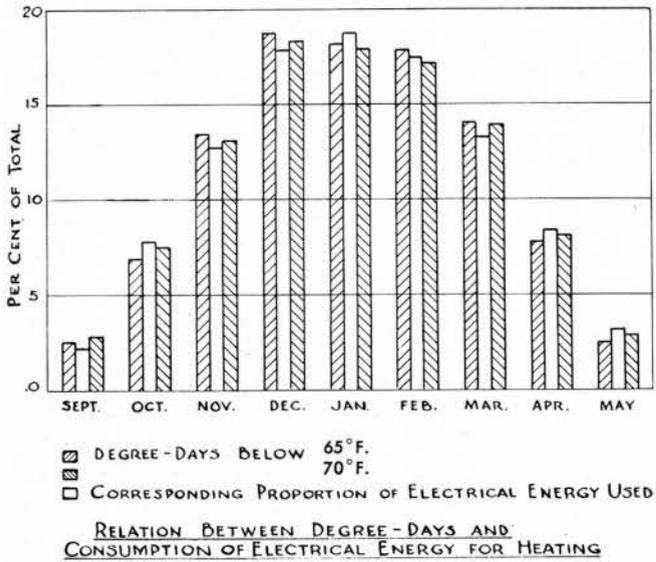
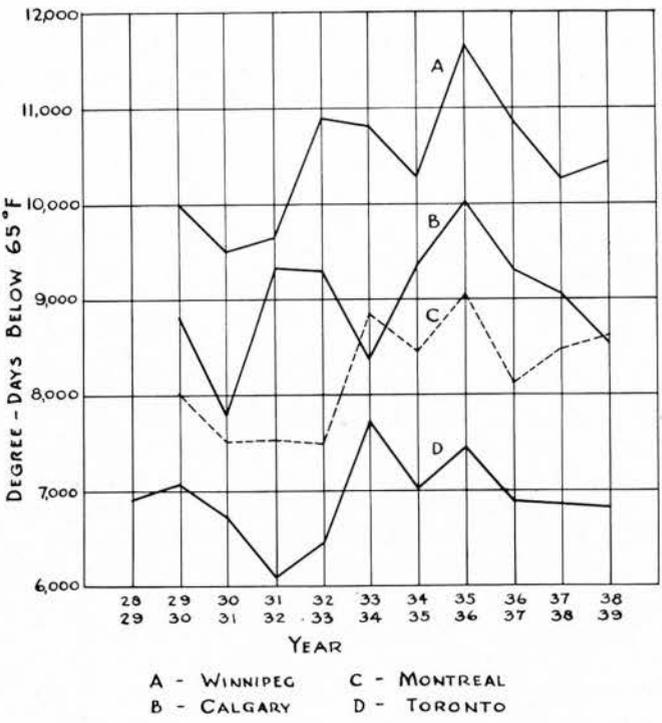


FIG. 4

The heat requirements of a building are usually expressed in degree-days, which are based on the difference in temperature between 65°F. and the prevailing outside temperature. A survey by Lawton² on fifteen electrically heated houses in the Saguenay district showed that, in a monthly survey from September to May, the energy consumption corresponded fairly closely to the degree-days below 70°F., the maximum error due to departure from strict proportionality being about 4 per cent. (except during the mild weather in September). (Fig. 4.)



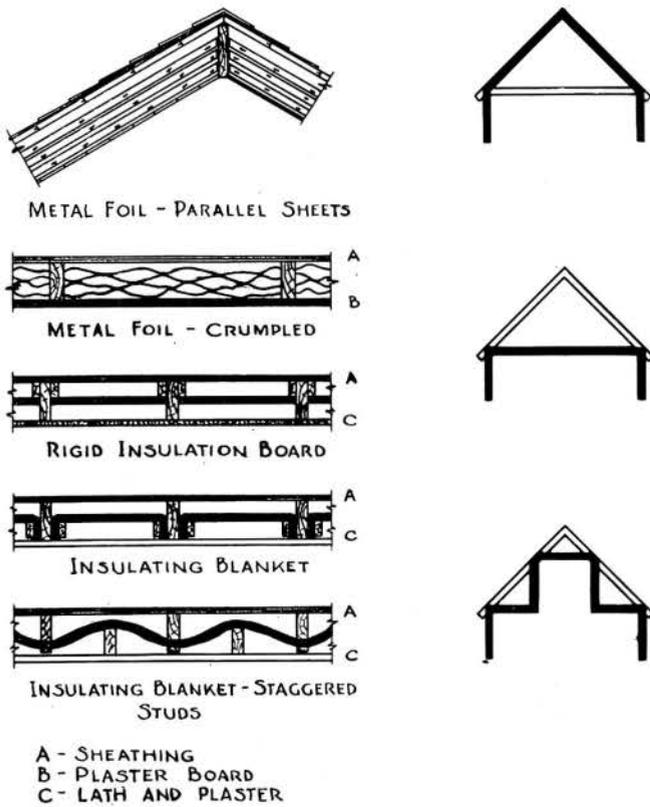
VARIATION OF HEATING LOAD 1929-1939

FIG. 5

Representative tables of temperatures and degree-days for the principal Canadian cities are given in the current issue of the A.S.H.V.E. Guide. (See also Fig. 5.) A more detailed and accurate list of atmospheric design temperatures is now being compiled by the Canadian Warm Air Heating Association and will be available early in 1947.

The importance of the temperature difference between the inside and outside of a building is obvious, but it is not always appreciated that temperature is not a quantity; it is a "potential" and so is similar to "voltage" in electricity or "head" in hydraulics (Fig. 2). The misuse of the word "heat" for "temperature" can and does lead to a great deal of confusion.

Heat losses may be divided into "avoidable" and "unavoidable" types. Doors and windows may be likened to necessary holes in the building—blanket and losses through them may be reduced by double glazing, weather stripping, caulking and other similar devices. Any claim or guarantee of fuel economy resulting from the addition of insulation must be scrutinized carefully, as no amount of insulation applied to walls or ceilings can affect losses that occur elsewhere. It has been computed that, in the average residence, about 30 per cent. of the total heat loss is unavoidable³¹ and that, of the remaining 70 per cent., about 40 to 60 per cent. may be economically prevented by insulation. This amounts to a possible saving of 28 to 42 per cent. of the total loss and that figure may be compared with some of the rather extravagant claims made in this regard. Nevertheless,



METHODS OF INSULATING ROOFS CEILINGS AND WALLS.

FIG. 6

very appreciable fuel savings are made through the use of suitable insulation and, in the case of new buildings, the size and cost of the heating plant may also be reduced correspondingly.

(B) The Material

The kind of heat barrier that is most appropriate will depend to a large extent on the construction of the building itself but, in any individual case, there is usually available a considerable variety of materials and different methods of arranging them (Fig.6). Comparisons made on the basis of published values of conductivity alone are liable to be misleading, as much depends on the conditions under which the conductivity was measured. A test report may mean much or little, depending, as it does, on the accuracy of the instruments employed, the experience and reliability of the observers, the manner in which the test was made and the size and nature of the specimen tested. There has been a considerable tendency to tabulate *minimum* rather than average test results and, while these are useful for advertising and general comparative purposes, they tend to give exaggerated ideas of the performances of the materials concerned.

Theoretically, the best kinds of test are those made on actual buildings, but, save in a few cases, there are too many uncontrollable variables to enable the probable performance of other buildings to be predicted from

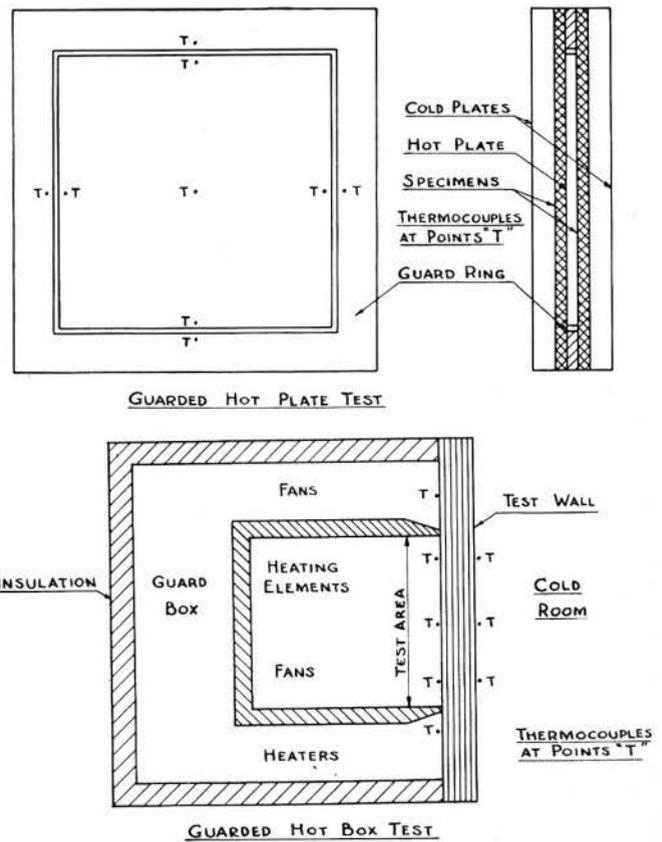


FIG. 7

such tests. Some comparative observations have been made, however, with useful results^{1, 5, 33}. Tests of wall sections in guarded hot boxes³³ are also of limited value, save for special and comparative purposes, because they are lengthy, expensive, difficult to control and the results obtained depend on workmanship and other incidental factors. Most tests, therefore, are made in guarded hot plates³, in which the uncontrollable variables are few and the results from which may be applied with a reasonable degree of accuracy to different kinds of construction. Two specimens of the material are sandwiched between a centre plate, which is heated electrically, and two outer plates that are cooled by water or brine (Fig. 7). The central plate has two heating elements, the outer or guard ring being provided to counteract any heat losses from the exposed edges, so that all the heat energy supplied to the middle element passes normally through the surface of the test specimen. Temperatures on the hot and cold sides of each specimen are measured by thermocouples. This procedure measures directly the conductance of a specimen of a *definite shape and size* and from this the conductivity is calculated using the relationship—

$$\text{Conductivity} = \text{conductance} \times \text{thickness} \quad (C = kx)$$

This relationship is based on the assumption that surface resistance of the material is negligible but, in the writer's experience, this is only true to a limited extent. Indeed, the surface resistance may be responsible for test con-

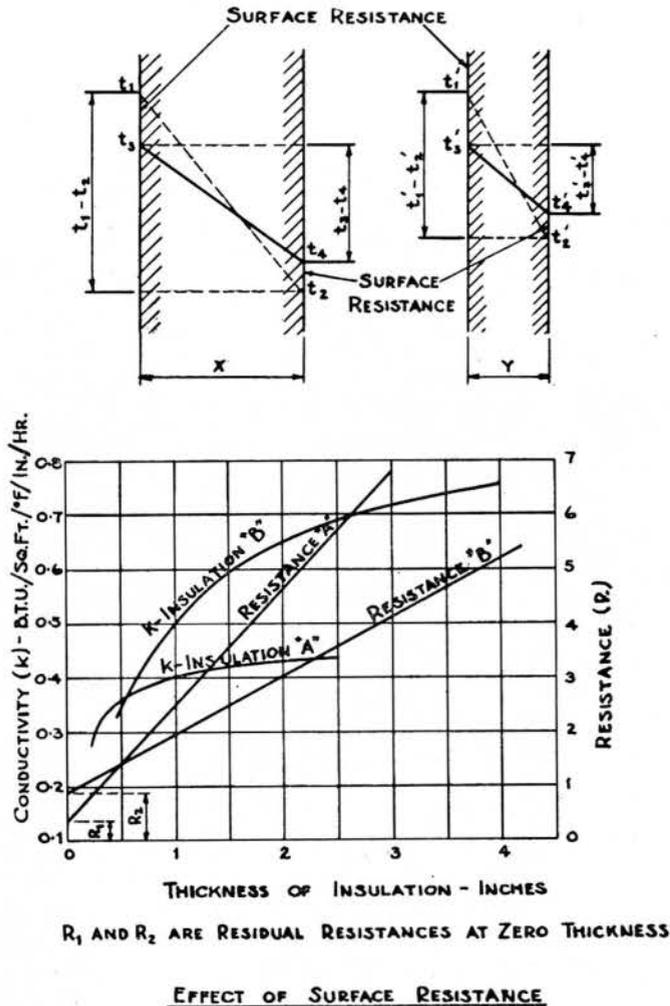


FIG. 8

ductivities from 30 to 50 per cent. higher than those quoted in the literature^{3 10} (Fig. 8). For these reasons, observed values of conductance are preferable (when obtainable) to calculated values of conductivity. Unfortunately the size and design of hot plate apparatus varies considerably in different laboratories and, so far, even in the latest test codes, little has been done to avoid this variable factor. It is to be feared that vested interests and published advertising material have tended to delay the standardization of this important piece of apparatus, and therefore, the published figures are not always comparable when the tests to which they refer are made in different places.

Another variable is the mean temperature, which is

— where t_1 is the temperature of the warm side of the

material and t_2 that of the cold side. Conductivities are reported at different mean temperatures and these, in turn, usually do not conform to the temperature of the actual installation. Fortunately, the relationship between mean temperature and conductivity is comparatively constant for the common insulating materials (Fig. 9) so

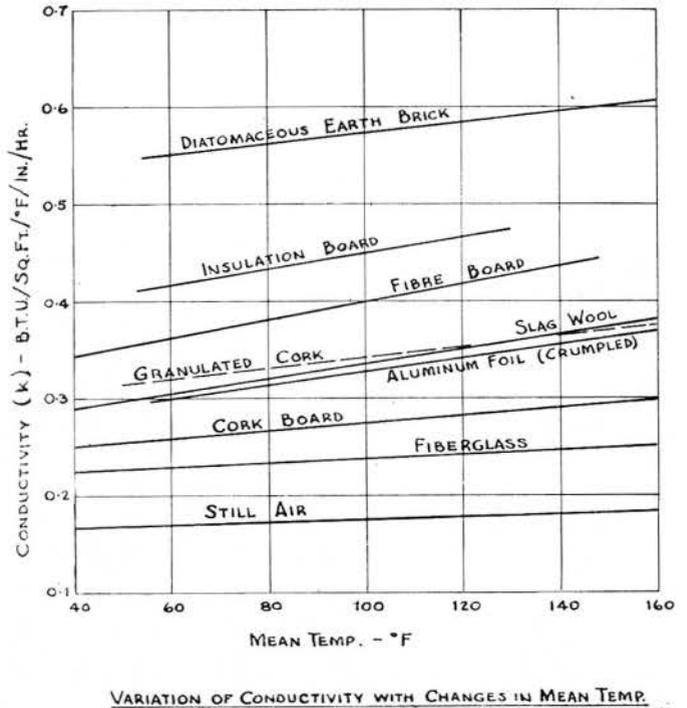
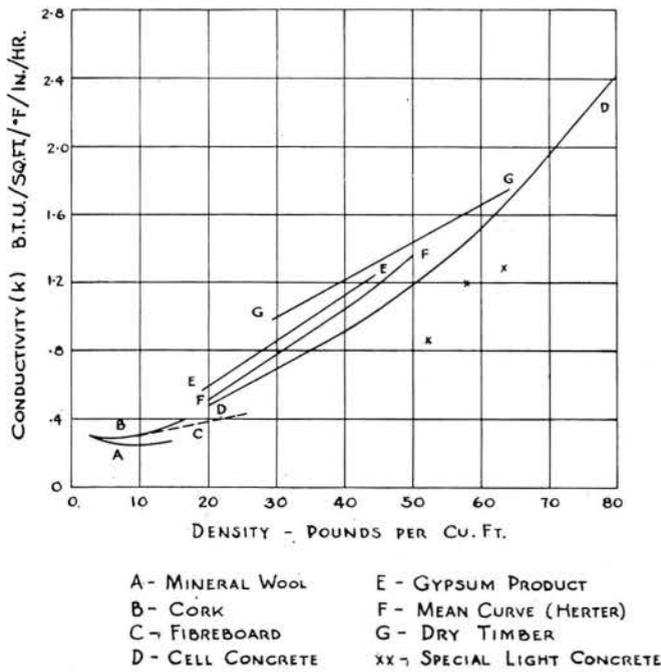


FIG. 9

that corrections for this variable may be made with a reasonable degree of accuracy. It is difficult to make tests at low mean temperatures (50°F. or less) because condensation of moisture takes place on the cold side of the material. Indeed, for this reason the 8-inch hot plate in the writer's laboratory has now been entirely enclosed, though at some sacrifice of accessibility. The superficial pressure used between the plates (within reasonable limits) does not appear to affect the test results obtained, save in the case of blankets, where the thickness and density may be affected by excessive pressure³. Care must be taken to avoid the latter contingency.

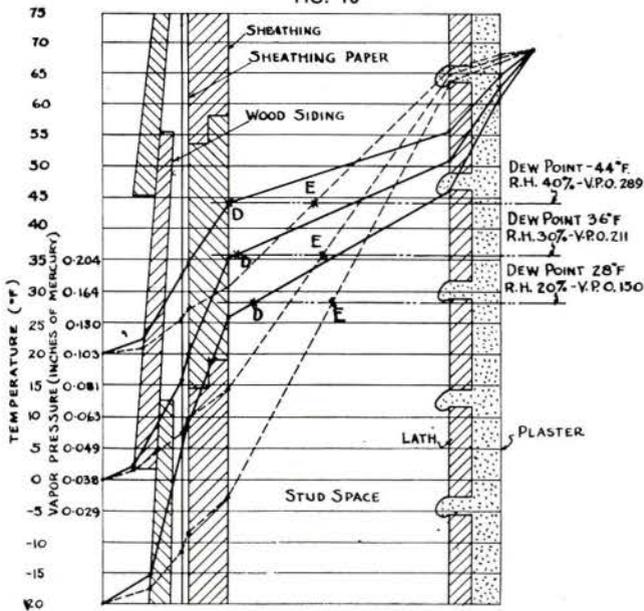
The physical properties and structure of the material have a very definite influence on the thermal properties. Most insulating materials rely on *still air* for their effectiveness. This has a conductivity of about 0.16 B.T.U. per sq. ft. per degree (F.) temperature difference per inch of thickness per hour and, as solid materials have higher conductivities than this, that structure having the smallest amount of solid material present is likely to have the lowest conductivity*. Light concretes, for example, have considerable porosities and low conductivities, but are correspondingly fragile; this applies to most cellular materials. Fibres may be arranged in various ways (Fig. 3) to give greater effectiveness but, as the air spaces become larger, the air may circulate inside the body of the material itself, thus increasing the conductivity at very low densities (Fig. 10). The probability of this was established by the writer some years ago^{3 10} and its effects

*Recently, statements have been made that some materials have conductivities lower than that of still air. This has been attributed to the very fine structure of the materials in question, but the validity of such claims has yet to be substantiated.



VARIATION OF CONDUCTIVITY WITH DENSITY OF MATERIAL

FIG. 10



EFFECT OF WALL INSULATION ON CONDENSATION CONDITIONS. (TEESDALE)

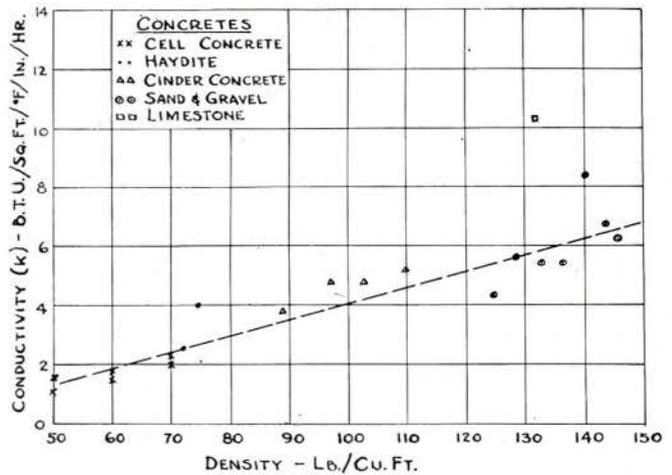
FIG. 11

have recently been confirmed by Wilkes and Vianey³⁰ in an investigation of ceiling insulation. They found that, because of internal convection, the heat transmissions of loose fill insulators were from 54 to 107 per cent. higher than the present accepted values and that those

for the batt type insulators were from 7 to 61 per cent. higher than the calculated values. Blanket insulators checked fairly closely with the values computed from conductivity tests.

One way of combining exceptional lightness with good insulating value is to use very fine filaments (as in Fiberglas) which have a large superficial area in proportion to their weight. The presence of "shot" or beads in mineral wools adds to the weight and contributes nothing to the insulating value. This ingredient may vary from 1.5 to 54 per cent. of the weight of material present¹⁵. The thermal capacity is also decreased as the weight of material is reduced.

Liability to absorb and retain moisture is important, as the conductivity increases with moisture content. Water vapour has a conductivity of 0.16-0.20 B.T.U. whereas liquid water conducts about 25 times and ice about 90 times as much heat as the vapour. All fibrous materials are liable to absorb vapour, which will condense on the fibres if the local temperature falls below the dew point (Fig. 11), but the form of condensation has an influence on the final result. If the fibres are oily, the vapour is condensed in small drops, whereas in other cases it appears as a continuous film, which affects the conductivity more seriously. In the former case, however, the drops may tend to drip into the lower strata, filling up the air spaces and producing a water-logged condition. The best policy, therefore, is to exclude water or water vapour as far as possible.



CONDUCTIVITIES OF CONCRETES OF VARIOUS DENSITIES

FIG. 12

The case of concrete calls for special mention as not only does the conductivity vary with composition and density, but also with the age of the specimen¹². Tests made at the A.S.H.V.E. research laboratory indicate that the conductivities of two concrete slabs were reduced 10 and 19 per cent. respectively after ageing for 3½ years and even then the value of "k" was still falling. Fig. 12, containing values from numerous sources for concretes of different densities, indicates that the conductivity value of 12 recommended by the A.S.H.V.E. is consider-

ably above the mean, but this error, if it be one, is on the safe side.

The use of wood waste in the form of shavings and sawdust has caused considerable controversy, particularly in connection with fire hazards. If properly packed they are superior to hollow walls in this regard and have, in addition, considerable insulating value if kept dry. There is no evidence to show that they are more likely to harbour vermin than are any other packed materials²⁴, but in many instances, as a further safeguard, they are mixed with 10 per cent. of slaked lime. The writer's experiments indicate that this treatment increases the heat transmission of sawdust by 3-4 per cent. Care must be taken to protect electric wiring passing through the insulation, but apart from that, the fire hazard does not appear to be serious.

The question of shrinkage is important in some cases (as in wood) because continuity of surface is generally necessary for effective insulation. Granular and powdered materials also, must not be liable to disintegrate or settle, leaving empty spaces at the top of filled walls. In this respect, batts or boards, which have permanent forms are decidedly advantageous. Usually, however, they are more expensive to install and it is frequently impossible to employ them in existing buildings.

The cheapest way of providing insulation in a wall is to make it hollow, but the size of the air spaces used may be such that a considerable amount of heat is transmitted through them by radiation and convection³. Rowley & Algren²⁵ investigated the effect of changing the size and the thickness of the air spaces, and found that beyond a thickness of 3/4-inch, the thermal resistance of the air space remained very nearly constant, so that this thickness has been taken as the optimum width for air spaces. Experiments made at the University of Toronto, however, indicated a progressive increase of resistance when thicknesses of 2, 3 and 4 inches of air were tested in a frame 24 inches square. In general, however, a thick air space is best subdivided into a number of thin ones placed in series.

The advantage of filling the air spaces in hollow blocks, tiles and walls, with sawdust, shavings or gravel, was indicated by Arkley²⁶ and Greig²⁷ and has been confirmed by the writer³.

The low "emissivity" (high reflective power) of aluminium and other metallic foils reduces the transmission of radiant heat across air spaces and, if a number of such barriers are used in series with each other, the conducted and convected heat are also reduced, so that the combination forms an effective insulator (Fig. 6). The following test results were obtained at the University of Toronto on air cells 24 inches square and 3 1/2 inches thick:

	Conductance
A. Simple frame with one air cell.....	0.67 B.T.U.
B. Two air spaces, each 1 1/4 inches wide formed by using a paper partition.....	0.40
C. Two air spaces as in B, but using a partition of corrugated paper containing small air cells.....	0.31

D. Similar to C, but one face covered with aluminium foil facing hot side.....	0.19
E. Specimen D reversed so that aluminum foil faced cold side.....	0.22
F. Air cell divided into three equal parts by means of aluminium foil.....	0.17

A further test was made to indicate the effect of a very thin layer of fine household dust on the specimen arranged as in D. It was found that the dust increased the conductance from 0.19 to 0.25 B.T.U.

MacConkey³⁰ gives the following conductances for air spaces over 3/4 inch thick:

Faced on both sides with ordinary building materials ...	1.10 B.T.U.
Faced on one side with bright aluminium.....	0.46 B.T.U.
Faced on both sides with bright aluminium.....	0.41 B.T.U.

Other characteristic figures for typical walls are given by Wilkes²² and Rowley²¹.

In some instances, aluminium paint may be used with beneficial results as is indicated by the following tests made at Toronto:

	Conductance
Air space 2 inches wide with light concrete slab on one side.....	.770
Same specimen with face of slab covered with aluminium paint.....	.545

The emissivity of a surface covered with aluminium paint is 0.3 to 0.5 as compared with 0.9 for a paper surface 0.04 for bright aluminium foil. The presence of oxide or a protective coat of transparent lacquer increases the heat transmission to an increasing extent as the coating is made thicker.

Increase in Emissivity of Aluminium Sheet When Coated with Oxide and Transparent Lacquer

Thickness of coating—inches	Oxide		Lacquer	
	Emits %	Reflects %	Emits %	Reflects %
0	3	97	3	97
2/100,000	11	89	5	95
4/100,000	30	70	8	92
8/100,000	63	37	28	72

Wilkes, however, gives a number of examples to indicate that aluminium foil retains its effectiveness for long periods of time in practical installations of various kinds^{22, 23}.

In the case of reflective insulation, most of the heat is transmitted by convection and varies with the 5/4 power of the temperature difference across the air cell. It follows that the amount of heat transmitted through a roof thus insulated is much less with the heat flowing downward than with the heat flowing upward^{22, 23}, the heat flow in summer being less than one-half of that under winter conditions. The conductance (C) also became less as the height of the air cell increased, as follows:

	Temperature Difference Between Surfaces	
	10°F.	40°F.
Air space 1 ft. high.....	C=0.42	C=0.57
Air space 3 ft. high.....	C=0.38	C=0.52
Air space 8 ft. high.....	C=0.36	C=0.50

This indicates the probable extent of the error when experimental determinations of heat transmission made in small apparatus are applied to larger air spaces in buildings.

Aluminium foil, being very thin (0.0005 inch thick)

has a low heat capacity, but is relatively easy to tear. The most effective arrangement is in parallel sheets (usually three sheets per inch), but this needs a frame and is easily damaged. The arrangement in crumpled form (Fig. 6) is not quite so effective³ but is more flexible and cheaper to install. Additional strength is obtained by mounting the foil on one or both sides of kraft paper, and rigidity by applying it to corrugated board or to some kind of wall board. All of these forms are obtainable commercially.

Another form of air space insulation is the double glazing of windows. In tests at Urbana on one house, the use of storm sashes gave an actual fuel saving of 15 per cent. as against a calculated 27 per cent. saving¹¹. Griffiths⁷ gives the following comparative figures, derived from Swedish experiments.

	<i>Heat transmission air to air</i>
Single pane of glass $\frac{1}{8}$ inch thick.....	U=1.024 B.T.U. per deg. F.
Two panes of $\frac{1}{8}$ inch glass placed close together.....	U=0.63 B.T.U. per deg. F.
Two panes of glass with $\frac{3}{8}$ inch air space.....	U=0.53 B.T.U. per deg. F.

(C) Infiltration

The leakage of air and water vapour through cracks and other discontinuities in the structure has been thoroughly investigated and the extent of the consequent addition to the heating load is well known. This section refers more particularly to the leakage of air or water vapour through the materials themselves. The latter are divided by Rowley²⁸ into three classes.

- (a) Permeable to gases and do not absorb water vapour.
- (b) Impermeable to gases but absorb water vapour.
- (c) Permeable to gases and absorb water vapour.

Experiments made by the writer at Toronto²⁷ indicated that the permeability of fibre boards of different thicknesses to the passage of air depended on their densities and was independent of thickness. Packed materials such as sawdust, mineral wool, glass wool, etc., were permeable to a much greater extent and in those cases both density and thickness were controlling factors. Lath and plaster construction was also permeable to a small extent, but in none of these cases was the transmission of water vapour investigated. The addition of aluminium foil to fibreboard provided an impenetrable barrier and two coats of aluminium paint reduced the air leakage by about 75 per cent.

The infiltration of water vapour*, however, is usually the more important factor, as the steam tends to condense in the air spaces and may possibly freeze there. The condition generally is similar to that for type (b) and the vapour always travels from the high to the low temperature side, so that any vapour barrier should be placed on the warm side of the insulation. The cold side should be adequately ventilated, allowing condensed water to escape by evaporation, otherwise the water will

*Water vapour is steam and its properties are given in the steam tables.
²⁷A tentative standard method of testing has been prepared and is now under consideration by a committee of the American Society for Testing Materials.

accumulate and cause considerable trouble. In some materials, this barrier is supplied by an asphalt coating e.g. Fiberglas board or cork board) but in others, some kind of paper or membrane should be employed.

An organization which annually erects large numbers of houses in Northern Ontario, has investigated the vapour resistances of a large number of such membranes. One side of the membrane was exposed to air having a relative humidity of 95 to 100 per cent., at 70°F., while the air on the other side was dried by sulphuric acid. The weight of water passing through the different papers varied from .08 to .34 oz. per square foot per day, so that there is evidently a wide variation in the resistance offered by "waterproof" building papers to the passage of water vapour. In general, the roofing felt types and heavier asphalt-coated paper types gave the best results, followed by the paper sandwich type. Common tarred building papers were not as good as the others.

As yet, there is no standard test for these papers* but Babbitt²⁹ has defined the "diffusance" as the number of grams of water vapour diffusing through one square metre of the material in 24 hours when a vapour pressure difference of 1 millimetre of mercury is maintained on the two sides of the sample. As a result of these tests it was considered that the maximum diffusance should be 0.5 gm. and the following were found to be suitable:

1. Asphalt saturated and coated sheathing felts (0.04—0.19).
2. Asphalt saturated and coated kraft papers (0.12—0.32).
3. Asphalt coated kraft papers (0.27—0.96).
4. Duplex papers (0.23—1.04).
5. Light weight waxed kraft papers with continuous surface film (0.07—0.79).
6. Heavy roofing papers (0.02—0.23).
7. Infused papers (0.29—0.54).

The wide variation in other materials is illustrated by the following:

8. Sheathing papers (89—113).
9. Asphalt saturated rag felts (0.30—20.4).
10. Asphalt saturated asbestos felts (0.09—8.62).
11. Asphalt saturated sheathing papers (0.95—10.6).
12. Tar saturated sheathing papers (6.55—15.0).

The tests indicated that an *impervious surface* is the essential factor and that the diffusance is independent of thickness, weight, type of paper, etc. The actual amount of diffusance is probably dependent on the number and extent of small pin holes present. The effects of a slit, such as would exist at a joint or break, are also discussed by the same author²⁷ and this investigation again illustrates the importance of an unbroken surface.

The mechanics of moisture distribution through structural materials has been studied by Babbitt^{24, 26} Rowley, Algren and Lund⁴⁰ and Teesdale³⁰. This is affected by

- (1) The temperature distribution through the wall.
- (2) The moisture content of the air, inside and outside.
- (3) The resistance of the various parts of the wall to vapour movement.

The temperature distribution through the structure can be calculated from the total temperature difference and conductances and, if the extent of moisture transmission is known, the point where the temperature line crosses the dew point indicates where condensation is likely to begin. The inside of the sheathing is at a lower temperature when insulation is present than it is when the air space is empty (Table and Fig. 11). Thus, insulation having a low resistance to vapour transmission (e.g. mineral wool) may actually promote conditions favouring condensation so that, in such cases, an efficient vapour barrier is essential²⁹.

Outside Temperature	Uninsulated		Insulated	
	Sheathing Temp.	Dew Point	Sheathing Temp.	Dew Point
20°F.	44°F.	44°F.	30°F.	44°F.
0°F.	35°F.	36°F.	15°F.	36°F.
-20°F.	27°F.	28°F.	-2°F.	28°F.

The deterioration of sheathing papers with time was investigated by the United States Bureau of Standards³⁰, using an accelerated ageing test. They reported that many papers did not satisfactorily retain their resistance to the passage of water and water vapour, the laminated papers being relatively unstable in this respect due to the partial separation of the plies, causing breaks in the asphaltic layer. Satisfactory performance was obtained with a saturated felt having one ply of plain kraft paper cemented to it with asphalt. Single ply asphalt treated papers should carry not less than 20 lb. asphalt per 500 square feet. Metal foil papers, as a class, were satisfactory but it was remarked that alkalis readily attack aluminium under some conditions and that aluminium foil should never be used where wet plaster, stucco and other masonry will come in contact with it. Resin sized papers were unsatisfactory.

(D) Application

Having decided on the general characteristics of the insulation required, the next problem is where to put it and the amount to be supplied. Insulating materials are available in various forms, but these may be divided into (1) *Rigid*, in which the material can support itself; (2) *Semi-rigid*, in which the material is applied in finished form (sometimes with vapour seal included) but must be supported by a framework (3) *Non-rigid*, in which the material must be poured or blown into spaces previously prepared. The cost of application, therefore, will vary somewhat in these three cases. The same material may be fabricated into all of these forms as in the case of Fiberglas, which is available as granulated or nodulated wool, bulk insulating wool, batts and rolls, blankets, sewn blankets, metal mesh blankets, semi-rigid batts and panels, insulating block and moulded forms. Each of these is specially adapted for some appropriate purpose.

The relative extent of the heat losses in different cases

depends on the form and size of the building but, in the case of the average six-roomed house with double windows and weather stripping, the table herewith gives an analysis by Lawton³ for several insulated houses, heated electrically. For comparison, an analysis by Segler is given, as representing the average figures obtained on 200 two-storey houses with unfloored attic spaces. Characteristic conductivity figures from various authorities are also given by McConkey³⁰.

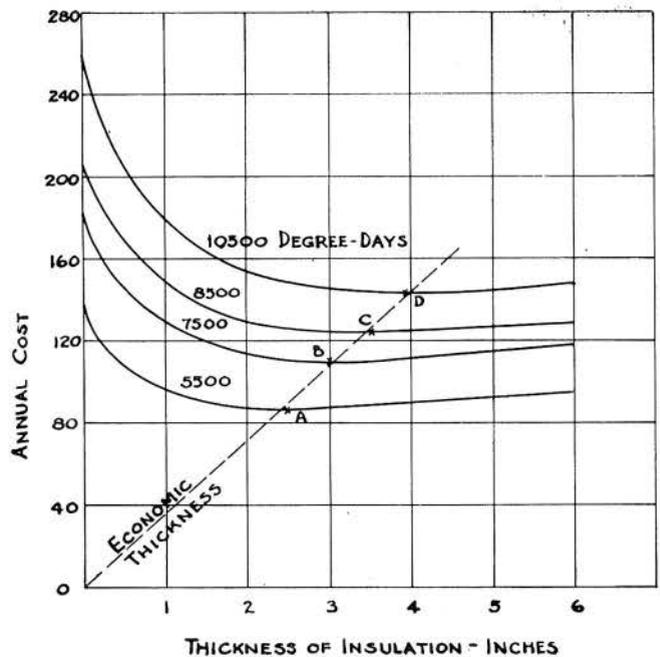
	Lawton (insulated)		Segler	Babbitt ³²
	B.T.U. per hour	Per cent of total loss	Per cent.	Per cent. (uninsulated)
Walls	10355	29.3	27.0	36.8
Doors	1814	5.1	4.3	2.1
Windows	7812	22.1	25.8	27.7
Air infiltration ..	5204	14.8	24.6	15.5
Ceiling and Roof ..	7441	21.1	16.2	17.8
Floor	2680	7.6	2.1	—
	35306	100.0	100.0	99.9

Base temperature — 30°F. (Lawton only)

In the electrically-heated houses the actual kWh consumed for heating per 1,000 cubic feet of gross volume, per degree-day below 70°F. were 0.0874 as compared with an estimated value of 0.1388³.

The optimum thickness of insulating material was calculated by Babbitt³² for a two-storey six-roomed frame house 28 x 30 feet, taking into account the amortised cost of insulation and the cost of fuel. His conclusions are shown graphically in Fig. 13 and in the table below.

Degree-days	Optimum thickness of insulation (k = .30)
5500	2½ inches
7500	3 inches
8500	3½ inches
10500	4 inches



OPTIMUM THICKNESS OF INSULATION WITH DIFFERENT HEATING LOADS (BABBITT)

FIG. 13

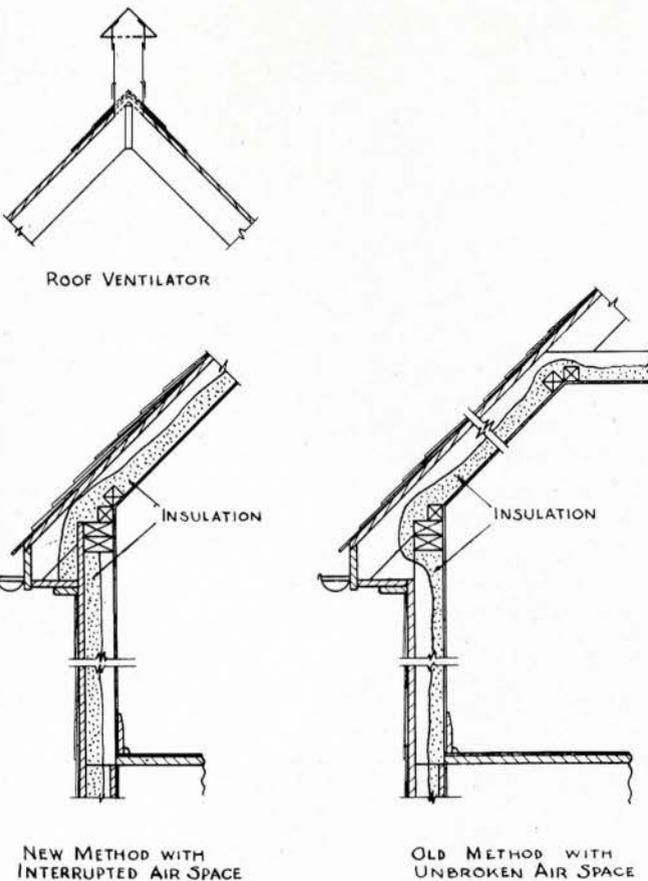
A similar estimate by the Mineral Wool Association (N.Y.) indicates that from 3,000 to 7,000 degree-days it pays to use full insulation (3½ to 4 inches). The general consensus of opinion, therefore, is in favour of thick insulation, particularly in ceilings and roofs, as about 30–40 per cent of the avoidable heat loss takes place through these surfaces. The heat gain in the summer is greatest through the roof, being about 66 per cent. of the avoidable heat transmission.

Walls behind radiators are particularly susceptible to radiant heat losses and, therefore, additional insulation should be provided at these points²⁷. Willey found that the temperature rose about twice as rapidly behind a cast iron radiator as it did behind a convector (concealed radiator).

High relative humidities are liable to be troublesome, causing internal condensation in cold weather. The Mineral Wool Association quotes the following as desirable maximum humidities for various outside temperatures:

Below zero	Internal relative humidity not over 20%
0–20°F.	Internal relative humidity not over 30%
Above 20°F.	Internal relative humidity not over 40%

The influence of external conditions is also indicated by Lawton² who estimates that, in Quebec, a wind of



CHANGE IN FORM OF CONSTRUCTION TO AVOID TROUBLE FROM MELTING ICE

FIG. 14

15 m.p.h. from the west increases heat consumption by 32 per cent., from the east by 27 per cent. and from the north-west by 34 per cent. The heating effect of the sun's rays obviously decreases the heating load in winter and increases the cooling load in summer.

Rain also affects the situation as Willey³⁰ found that a 15 m.p.h. wind in Oregon increased the heat loss from a frame wall by 17.4 per cent. but that if ¼ inch of rain per hour were added, the additional heat loss, as compared with still air, was 32 per cent. This was due to evaporation of moisture from the surface of the wall, which increased the heat loss considerably in mild weather.

Insulation of the roof tends to reduce the melting of snow in cold weather and so adds to the blanketing effect, as snow contains a considerable amount of air. When the snow melts, however, ice may form in the eaves, causing the water to "back up" under the roof shingles. These troubles were eliminated by a large Ontario organization by changing the standard form of construction (Fig. 14). The rock wool insulation was moved from the inside to the outside of the air space, a vapour proof barrier was placed on the warm side, a porous building paper on the cold side, and the flow of air from walls to roof space was prevented by stopping the top of the wall spaces with timber. A ventilator was placed in the peak of the roof instead of in the gables (where snow tended to sift into the roof space) and a special roofing material was used, in which the shingles were cemented together.

In a brief description of this kind, much relevant material must necessarily be omitted and details must be subordinated to the main theme. For instance, no mention has been made of the use of hollow glass blocks which transmit considerable light, have insulating value, reduce infiltration and have structural strength. The comfort value of insulation is obvious and may be a very potent reason for its use. The method of heating also has some influence on the kind and amount of insulation employed, but these and other matters require more extended treatment than can be given at this time.

As it is — *quantum sufficit!*

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ALBERTA

President's Address
Annual Meeting Alberta Association of Architects
January 31, 1947

Ladies and Gentlemen:

I should like first of all to extend to you a most pleasant welcome to this, the thirty-sixth annual meeting of our Association. To the new members particularly I extend a hand of welcome and the hope that they will take an active interest in the affairs of the Association, thereby contributing to the success of our activities and to the fellowship with other members. The year just passed has been a strenuous one in that a great effort has been necessary to meet the demands of society for industrial, commercial, public, and residential building. We have been faced with a continually increasing rise in the cost of construction and this, coupled with shortages and unrest in the labour situation, has made it extremely difficult to cope with the problems on hand. When this rising cost will cease is difficult to say, but it would appear from observation that the peak should be reached in the summer of 1947. It is unfortunate that, under the pressure of attempting to fulfill the demands for new construction, the lack of time denies the opportunity for

detailed research and study of new uses of materials and methods of construction. To this end, of course, I would draw to your attention the need for a united effort for the nationalizing and uniforming of building codes in Canada. The lead in this regard, as you will recall, was given by the Federal Government in 1942 through the publishing of the National Building Code of Canada. Concern is felt that the step thus taken is not being more actively followed-up in an effort to bring about standardization throughout the country.

Strangely enough the war years are fast receding from us, and the demands of the moment are rapidly dimming the memory of the realities of modern warfare.

There is much to be learned from the lessons of World War II, and although we in Canada were spared the scars of destruction, it may not always be so. Air and atomic warfare has touched its leperous finger on the vulnerable hearts of modern cities. Too densely congested town centres, insufficient fire barriers, conflagrations leaping across narrow streets and lanes, and the lack of concussion resistance in structural design, are only a few of the many problems that should be faced now. I would urge that the Federal Government be requested to appoint a special fact-finding commission to

study and recommend for National adoption basic and essential requirements in community planning as safeguard against modern warfare.

I would be very much remiss if I failed at this time to express my thanks and appreciation to our Secretary, Mr. Wynn, and to the members of council who so ably gave of their time and ability toward the carrying on of the affairs of the association.

M. C. Dewar

ONTARIO

Speaking about the little known and sparsely settled parts of Canada and the problems of the architect in such places, the Saskatchewan letter in a recent issue of the *Journal* prompted us to say something about our own Province. Obviously, we are not referring to the southern part, where, at the present time, there do not seem to be any problems attached to an architect's existence, (except wondering how the heck he is going to get the work out). We refer to the northern regions and more particularly that part known as the "mining country".

Is there a pioneering spirit in architecture to-day? We do not mean in the field of design itself, however much exploring there seems to be going on in that respect; we mean pioneering in the way of taking architecture to those who have not had the opportunity of coming in contact with the architect. Those people who don't know, as our Saskatchewan friend put it, what an arch-a-teck is.

It was just about the time that the well-remembered depression hit rock-bottom when, by some urge or other, we were prompted to get our few remaining rags together, along with a battered T-square and some pencil stubs, and set forth for that land of hope — the North Country. There had been reports that things were happening up there and it seemed a very good place to be, in view of the great decline in door-to-door sales of a well-known make of vacuum cleaner in Toronto.

It must be admitted here that the venture was not wholly altruistic. We were not then conscious of carrying the torch of the mother of the arts to that far flung and unknown country. (In fact, we were not sure whether it would be architecture or vacuum cleaners). However, we thought we would give architecture first chance, so, pitching our tent on the shores of a very attractive lake, we immediately put out our shingle.

Business was good from the start; but—did you ever try drafting in a tent? We hadn't either, and it was not long before we found out that a tent wasn't the only awkward place in which we were to wield a T-square. Upon getting a commission to help with the layout and design of the over-ground buildings of a new mine (*n.b.*, a new mine spends all its money under-ground—except in a few cases where it was spent on a good time) we were advised that suitable quarters would be made available at the mine site. It was considered more convenient to work at the property. The "suitable quarters" turned out to be a corner in a carpenter's shed built

against a compressor house. This was during the dead of winter with anything from 15 to 45 below outside and the only heat in the place, an old coal oil stove. The cold, the saw-dust, the odor of the heater and the intermittent pounding of the compressor provided a perfect atmosphere in which to study the lines of the soaring head frame, the masses of the ore-bins and crusher houses and the sweeping lines of the conveyor-ways. Well, despite the physical difficulties, everything turned out alright, thanks to the help of a very understanding process-engineer. We never passed that place in later years without a feeling of triumph, since it struck us as being the best looking group of mine buildings we had anything to do with.

Such was life in the north, but not all quite as rugged as portrayed above. There was great variety in the work and almost all of it was interesting, if not, perhaps, in the highest architectural sense. We learned in a very practical way the meaning of functional design.

Possibly the most interesting and instructive part of such a life is in dealing with people whose knowledge of what an architect can do is practically nil. (He is usually a chap who makes blue-prints). To gain their confidence it is necessary to meet them at their level, whatever it may be, and to try to see their point of view. This often meant soft-peddling on aesthetics as, with many, it stirred up the ingrown fear that anything that was going to be made to look beautiful was going to cost more. Aesthetics was a thing you kept under your hat, but it was invariably appreciated in the finished article.

Not intending to brag, the state of affairs finally developed where we were trying to figure out if a drafting board could be rigged up in a plane. This would have enabled us to get out our plans almost on time (which was usually the day before yesterday) at the same time allowing us to keep our appointments (which were usually "right away"). The volume of work seemed to indicate that there was a growing need and desire for the architect's services. This increased with the influx of businesses such as radio and publishing, and the need for more and better schools, hospitals, and homes. People of the north realize that it is not quite as temporary as they first expected. Many have spent their whole lives there with no signs of things petering out and their attitude is that they should have buildings just as good as comparable communities in the south.

One could point to many features which now help to give a permanency to life in the north country, such as agriculture and manufacturing industries, but the fact remains that it is still very much dependent on mining. The surprising point is the now evident permanency of mining itself. At the present rate of operations and barring any unforeseen economic upsets, the end of mining will not be in our day nor within the next two or three generations. With the reserves of the existing mines, the number of properties under development whose mineral extent is unknown and the vast areas

still to be prospected with new devices, there are many years of mining ahead.

The point we would like to make is that there is a wealth of experience to be gained in the north country by the young architect who can take it—and hand it out. It is to be regretted that the average younger man in the city office does not get the opportunity to rub shoulders with his fellow beings, outside of his profession, in a way related to the business of architecture. It is years before he has a chance to make contact with the man who is paying the shot. The tendency is that his psychology will not have that "good business" angle which is important in dealing with individuals or companies spending large sums of money on buildings.

The foregoing may be neither timely nor contentious. Nearly everyone connected with architecture these days is so busy on really "big stuff" that there is no thought of pioneering. If, however, there is a courageous soul or two amongst us we can guarantee that he will be well repaid in experience and a good living by spending a few years in the north country.

Ross Brisley

QUEBEC

L'Assemblée Annuelle de l'Association des Architectes de la Province de Québec est un événement traditionnel, et l'effort des organisateurs trouve une compensation dans le succès remporté pour la satisfaction des membres.

Il est agréable de noter que la cinquante-sixième Assemblée Annuelle de l'Association, tenue au Château Frontenac, les 24 et 25 janvier dernier, fut réussie à plus d'un point de vue. Le Conseil sortant remarqua avec plaisir une délégation de membres de l'extérieur plus nombreuse qu'à certaines convocations antérieures.

L'heureuse initiative mise en pratique cette année pour la discussion plus complète des sujets inscrits à l'agenda, procura une occasion inusitée et non moins appréciée de ceux qui assistèrent aux séances tenues durant les deux jours de la fin de semaine.

La présentation de l'assemblée fut attrayante pour plusieurs raisons, l'ordre dans lequel les items inscrits se succédèrent, laissa l'impression chez plusieurs que la réunion en ses quelques trois séances s'était écoulée rapidement, et la plupart de ceux qui y assistèrent semblent avoir témoigné leur satisfaction en ayant écouté ou pris part aux débats.

À la première séance, il s'imposait en ouvrant l'assemblée que l'Association exprime par son président ses condoléances au clergé pour le deuil dans lequel l'église était plongée par la mort du Cardinal Villeneuve; ses grandes qualités du sens du devoir, du coeur et de l'esprit ont motivé le chagrin général.

L'adoption des rapports des comités s'exécuta rapidement, quelques explications de la part des présidents furent données à l'assistance.

L'urbanisme, sujet d'actualité, ne fût pas ignoré, une

législation dans ce sens fût préconisée comme susceptible d'engendrer nombre de bienfaits si le gouvernement provincial y apportait une attention toute spéciale.

Sans imprimer aucune contrainte aux membres sur les nombreux avantages que renferme l'assurance-groupe contre la maladie et les accidents, il fut présenté un rapport oral exposant ce dont peut bénéficier la collectivité professionnelle dans cette Province.

Une discussion intéressante s'engagea sur le tarif pour la construction d'habitations en séries, et il fût présumé que cette question pourrait être de nouveau un sujet d'étude pour quelque comité.

La question intéressante pour tous, soit le dégrèvement d'impôt sur le revenu des architectes fût également touchée, plusieurs objections furent exprimées au sujet du mode actuel de prélèvement et quelques suggestions judicieuses touchant ce thème furent portées à l'attention.

L'assistance exprima son appréciation pour l'oeuvre déjà reconnue de l'École d'Apprentissage des Métiers du Bâtiment destinée tout spécialement à la formation des vétérans en artisans compétents, cette institution de mérite randra sans tarder des services à l'industrie.

Les classes d'initiation au dessin d'architecture, partie des Centres de Réadaptation à la vie civile pour les vétérans, furent jugées une initiative très à propos pour aider le jeune homme à se perfectionner dans l'occupation de son choix.

Les membres se plaisent à se retrouver à Québec où la profession et le métier ont commencé à être exercés pour faire naître des traditions et engendrer des oeuvres artistiques d'un caractère distinct, propre à notre Province. Les confrères semblent également apprécier l'occasion de se réunir dans la vieille capitale, tous étant désireux de renouer des liens d'amitiés.

Cette assemblée fût des mieux réussie grâce au zèle des organisateurs et de cette initiative de répartir en plusieurs séances l'étude et la discussion de questions pertinentes à la profession.

Maurice Payette

QUEBEC

C'est dans l'ancienne capitale et sous les toits accueillants du Château Frontenac qu'eut lieu la convention annuelle de l'Association des Architectes de la Province de Québec les 24 et 25 janvier dernier. À l'entrée, les traditionnels sapins illuminés de mille feux incitent les esprits à se manifester, parfois au cours même des assemblées, et c'est dans une atmosphère de franche camaraderie que se déroulent les différentes activités de l'Association que l'Honorable Secrétaire Honoraire se plaît à nous relater dans la présente édition du *Journal*. La Métropole eut également l'honneur d'accueillir les 20, 21 et 22 février dernier plusieurs honneurs distingués invités, délégués et représentants des différentes provinces du Dominion lors du congrès de l'Institut Royal d'Architecture du Canada. À l'Institut comme à l'Asso-

ciation Provinciale, offrons aux présidents respectifs ainsi qu'aux dignitaires élus et réélus nos félicitations sincères et nos meilleurs voeux de succès.

"The Client, Mr. Canada, an average Canadian in his middle 30's, has needed a house since the end of the war . . . He should not, however, exceed this expenditure (\$6,000.00) and is very desirous of obtaining a house compatible with his family's needs at a lesser cost . . ." Dans cet extrait du programme, en marge du récent concours de la Société Centrale d'Hypothèque et de Logement, les possibilités prévues semblent incompatibles à la réalité brutale des temps présents.

De fait, une infime minorité peut se prévaloir des avantages que procure ce concours et la grande masse, celle qu'on semble vouloir impressionner, ne pourra encore jouir d'une civilisation vraiment humaine sans cet élément essentiel qu'est l'habitation saine et confortable. La mesure de l'effort vis-à-vis ce problème capital et d'envergure, s'estime à près de \$0.002 par habitant. La contribution mérite d'être soulignée.

Pour un effort sincère et de portée plus grande, il y aurait peut-être lieu d'envisager le problème sous un angle différent. Beaucoup prétendent en effet, à une réorganisation de l'industrie et de la technique du bâtiment et plus immédiatement, à une formule autre que la maison isolée.

Quoiqu'il en soit, la tâche dépasse l'individu. Elle implique des centres de recherches où l'intégration des forces économiques, techniques et sociales soient mises en oeuvre pour un but commun. L'université, l'école professionnelle jouit déjà, à des degrés divers, d'être le milieu favorable à la création de tels centres.

Souhaitons que, par des fonds spéciaux, tous nos gouvernements se fassent un devoir de pourvoir généreusement, et à l'éducation comme à la création de centres de recherches et d'expérimentations. Nos professionnels pourraient y donner toute la mesure de leur esprit progressif pour le plus grand bien de la plus grande masse. La question est d'importance nationale.

Pierre Morency

SASKATCHEWAN

As this month's deadline approached, nothing had been contributed voluntarily by Saskatchewan architects. I therefore decided to beard some lion in his den and interviewed that prominent architect, Newel Post, of the firm of Post, Post, Post and Post, with offices on the top floor of the Post Building, Posthole, Sask.

When I called I found Mr. Post busy on caravansary plans in anticipation of the next drought, which he feels is just around the corner.

"People won't have money to buy gasoline", said Mr. Post, "and camels are the logical answer to the transportation problem. There is no accommodation for camels at the present gasoline stations, and a well designed caravansary is essential. I want to be prepared.

"Mr. Post," I began, "What is your opinion of modern architecture?"

He leaned back in his chair in deep thought, put the tips of his fingers together, and watched a few idle snowflakes drift past the window. Suddenly he leaned across his desk and said:

"Architects of to-day who were old enough to wear tailor-made pants at the turn of the century, will remember the revolt against Grandpap's jigsaw architecture, which resulted in the classic revival of the early 1900's. They will also remember the mission craze in furniture, when a table had to be heavy enough to pinch-hit for a loading platform. Jigsaw architecture and mission furniture were 'Modern' in their day, but they were fundamentally ugly, and people turned against them. I believe the time is coming when clients will refuse to pay architects for designing buildings that look like exalted cheese-boxes. They will demand something which displays some ability and imagination."

"But Mr. Post," I interrupted—

He held up his hand for silence and continued:

"The classic designer slavishly copied The Orders, with the aid of his Vignola. The modern designer copies what currently passes for architecture, just as slavishly. Personally, I think he is in as deep a rut as his Dad was forty years ago."

"Yours is an interesting viewpoint, Mr. Post, but you must admit that modern architecture is functional."

"Functional," he exploded, and crossed the room to return with a recent copy of a well-known magazine. "Look at that. There you have an example of modern functionalism."

He pointed to a boxlike residence where the stone garden wall had been looped up to form a blank windowless elevation.

"What's the function of that mass of stone unless it is to form a backstop for a machine gun target?"

He swung around and pulled another book from his bookcase. It was the Philadelphia Year Book for 1913. He opened the book.

"There," he said, "are houses that were good thirty-five years ago. They will be good thirty-three years hence. With modern plumbing, heating and lighting, those houses are modern. They are more livable than many of to-day's monstrosities. Remember, when this book was published the California Bungalow was modern."

He arose and shook hands to indicate that the interview was at an end and I thanked him for his time and courtesy. When I left the office he again was bent over his drawing board, the smoke from his cigarette dividing and curling up past his ears in twin spirals, like the smoke of Indian signal fires.

As I drove out of Posthole, a solitary magpie flew across the highway and I thought I heard him say:

"Brother, will that one be controversial." *E. J. Gilbert*