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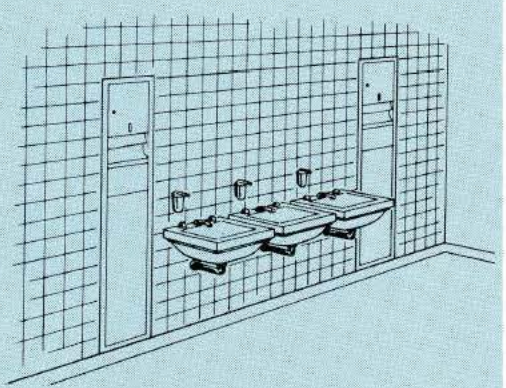

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April 1964 avril 464 Vol 41 No 4

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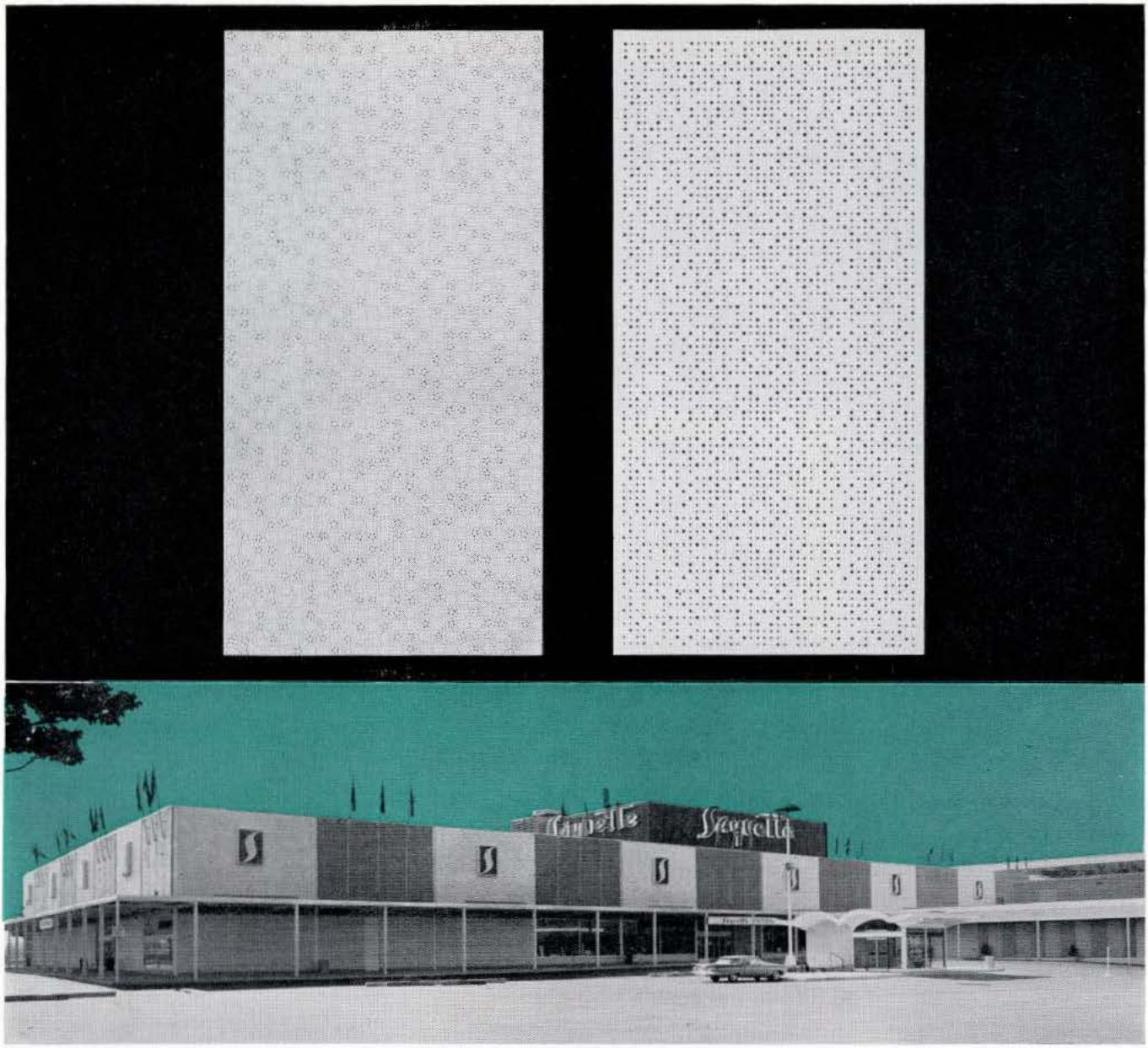

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Institute News

Jacques Roy, Assembly host committee chairman, announces one more distinguished guest at St. Andrews by-the-sea, New Brunswick, June 17 to 20. Gordon Ricketts, the well-known RIBA secretary, has accepted our invitation to join Sir Robert Matthew there. We are looking forward to Mr Ricketts' participation in the Assembly program.

Dr Thomas Howarth has issued an outline for sessions of the Canadian Conference of University Schools of Architecture, at Nova Scotia Technical College (School of Architecture), Halifax, June 15-16. Guest of honor at CCUSA is Sir Robert Matthew.

R. Schofield Morris (*F*) and W. Gerald Raymore (*F*), accompanied by Executive Director Fred W. Price, visited AIA headquarters in Washington, on March 9 and 10. They were welcomed by William G. Scheick, AIA executive director, and members of his staff. Purpose of the mission was to study procedures and results of the AIA study on the profession, for the benefit of the RAIC study now under way in this field.

They report that the Octagon people gave them cordial hospitality and all the information they required. Prof. Raymore's survey this summer will incorporate several features drawn from AIA experience.

Executive Director Fred W. Price represented the Institute as a co-operating member of the Canadian National Commission for UNESCO, at the Commission's annual meeting on March 12 and 13, in Ottawa. Its work is chiefly concerned with educational and scientific assistance to developing nations. The Commission chairman is Dr Henry Hicks, president of Dalhousie University, Halifax.

Reports were presented by various committees and by the Canadian representative at UNESCO headquarters in Paris, Lionel Roy. Guest speaker was the Minister for External Affairs, Hon. Paul Martin; in his absence, the Minister's address was read by Marcel Cadieux, under-secretary of the department.

The Doon School of Fine Arts will hold its first National Design and Planning Seminar at the University of Waterloo, May 4-6. Discussion subjects include product design, design management and civic design. A number of well-known Canadian and American architects and planners are participating.

The UIA has informed the RAIC that, at present, a competition for a hydropathic establishment at Montecatini, Italy, does not comply with international regulations. Members are cautioned not to enter this competition unless its status changes.

Central Mortgage and Housing Corporation has an interesting photo exhibit illustrating the contemporary urban scene — in new construction in the heart of the city, urban renewal, and housing built with government assistance. It includes historical photographs of Canadian cities chosen from the famous Notman collection. It is available through any CMHC office.

The Commonwealth Arts Festival, 1965, will bring together artists, groups and exhibits on an invitation basis. A conference of architects is planned. The festival chairman is the Duke of Edinburgh. Dates: September 16 - October 2, 1965. Place: London, England.

Fred W. Price

COMPETITION

An architectural competition for the design of a Student Union Building for the University of British Columbia was announced recently. Provisional estimate of the cost of these facilities is $3,000,000, excluding architect's fees. The competition is in two stages: four finalists shall be chosen to compete in stage II.

The Board of Assessors shall consist of: William W. Wurster, San Francisco; Prof Henry Elder, UBC; Guy Desbarats, Montreal; James Murray, Toronto; Dean Feltham, Alma Mater Society, UBC (non-voting). Notification of the contest was sent direct to all registered architects.

ONTARIO SEMINAR ON ARCHITECTURE

Members have been invited to register for a five-day seminar on architecture, organized by the School of Architecture, University of Toronto and the OAA, to be held 9 to 14 September aboard the *SS Norgoma* cruising Georgian Bay. Accommodation is limited to 50 and confined to architects. Inclusive cost will be about $200. The theme will be "The Architect, Client and Society", a discussion of the performance of buildings (and architects) in the world of today and tomorrow. Non-architect guests invited to participate include Arnold Edinburgh, Marshall McLuhan, Peter Pragnell and Murray Adaskin. Applications should be sent to the School of Architecture, 230 College St, Toronto.

POSITION VACANT

Established firm requires experienced architectural designer. Applicant must have proven ability in design and rendering presentations.

Position also available for an experienced job captain to expedite Institutional and Commercial projects.

Apply to Venchiarutti & Venchiarutti, Architects, 194 Wilson Avenue, Toronto 12.

POSITION WANTED

Man, 33, seeks position in Canada as architect in the field of town planning. An associate member of the Indian Institute of Architects, he worked for six years in the Central Public Works Department, and on the Zoological Park, New Delhi. He was awarded a scholarship for studies in Milan (Italy) and completed a post-graduate course in town planning and landscape architecture at the Polytechnic of Milan. Since 1962 he has been working on the master plan of Delhi. Write: I. S. Madan, 5A/10946 Sat Nagar, Sat Bhavan, New Delhi, India.

FILM ON ARCHITECTURE

A 25 minute film on architecture as a career, produced by the N.F.B. for Shell Oil Company's Television series "Careers" is available without charge from Shell Canada Ltd., Film Library, Box 400, Terminal A, Toronto.

DESIGN CONFERENCE

The Harvard Graduate School of Design 8th Urban Design Conference will be held on Friday/Saturday, May 1/2, 1964. Theme of the conference is The Role of Government in the Form and Animation of the Urban Core. Registration fee $5. Enquiries to: Urban Design Conference, 1964, Robinson Hall, Harvard University, Cambridge, Mass.

AWARD WINNERS ANNOUNCED

The Ontario Association of Architects has announced the first winners of its annual competition for design of tourist facilities in the province.

In making the announcement, William E. Carruthers, Toronto architect and chairman of the awards jury, said, "The interest shown by owners, as well as by architects, in this competition clearly indicates a trend towards good design in

tourist facilities. The OAA hopes that these annual awards will help to encourage the highest design standards in this vital industry".

The winning submissions were: Camp Manitou-Wabing, Parry Sound District — Jerome Markson, architect; Valhalla Inn, Etobicoke, Ontario — George A. Robb, architect; Restaurant and Service Station for Canterbury Foods and Shell Oil Company of Canada, on Highway 401 near Trenton — Ashworth, Robbie, Vaughan and Williams, architects; Battle Memorial Building, Morrisburg, for the Ontario St Lawrence Development Commission — Elken and Beckstead, architects; YMCA Leadership Training Center, Geneva Park, Lake Couchiching — Gordon S. Adamson and Associates, architects.

In addition to Mr. Carruthers, the jury of award was: Alexander B. Leman, Toronto; James E. Secord, St Catharines; E. H. Zeidler, Peterborough (all architects); and F. A. Venn of the Ontario Department of Travel and Publicity.

GRANTS OF $22,000 FOR URBAN AND REGIONAL RESEARCH

The Canadian Council on Urban and Regional Research has made grants to six individuals and organizations. The assisted research will be conducted by the Niagara Peninsula Municipal Committee on Urban and Regional Research with Prof Henry Mayo of London; by Profs Guy Bourassa of Montreal, Eugene Mattyasovszky of Toronto and Peter Pineo of Ottawa; and by Messrs C. Howard Naphtali of Vancouver and Julian G. Suski of Edmonton.

The Annual Canadian Muskeg Research Conference will be held at Prince George College, Prince George, BC, May 21 and 22, 1964. The theme will be "Research and Development in Organic Terrain" and papers will feature an appraisal of progress in muskeg research and its implementation over the past decade. As a continuation of the conference, a one-day seminar on muskeg problems will be held at Prince Rupert, BC on May 25. Inquiries to I. C. MacFarlane, c/o Division of Building Research, NRC, Ottawa 2.

OBITUARY

Oliver Roy Moore, who died at his home in London on March 11th, 1964 at the age of 74 was the son of a well known London architect, John M. Moore, with whom he served his apprenticeship and whose reputation and practice he carried on upon his father's retirement. By following his father in the profession of architecture, Mr. Moore helped to shape the appearance of London. He was a member of his father's firm when the first buildings on the present site of the University of Western Ontario were constructed in 1926 and followed with his own company the style of architecture which sets it apart from most other campuses. Among other London landmarks with which his firm was connected are: Hotel London; London Life Insurance Company original building; the Dominion Public Building; YMCA-YWCA Building; and the Salvation Army Children's Village. Mr. Moore was a Fellow of Huron College, a member of the London Hunt and Country Club, The London Club, and a former director of the Ontario Loan and Debenture Company. He was a member of St John the Evangelist Anglican Church. For almost half a century Mr. Moore left as his monument a group of distinguished buildings, both in London and through Western Ontario. *R. E. Murphy*

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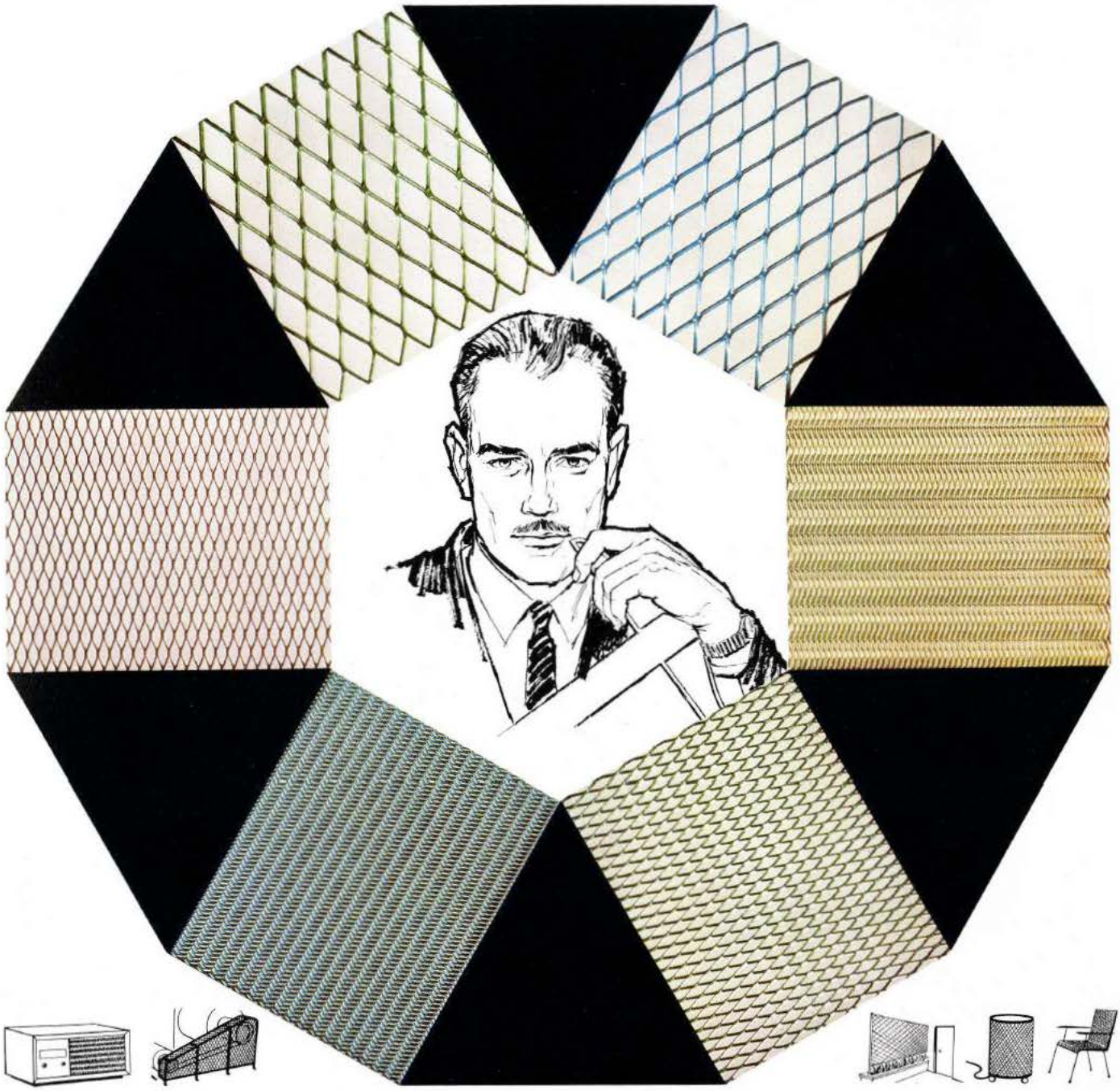

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Provincial News

AANB ANNUAL MEETING

The Architects' Association of New Brunswick held their 1964 Annual Meeting at the Lord Beaverbrook Hotel in Fredericton on Friday and Saturday Feb. 21 and 22.

A very good representation from all parts of the Province resulted in an excellent assembly. Friday was spent on committee reports and general business and the election of officers for 1964.

Gerald J. Gaudet of Moncton was elected president. Alfred Chatwin of Saint John is vice-president, and John R. Myles of Saint John secretary-treasurer. H. Claire Mott is registrar. Councillors are H. P. J. Roy of Moncton, D. W. Jonsson of Fredericton, Stanley W. Emmerson of Saint John and Cyrille Roy of Moncton. Delegates to the RAIC Council are Neil M. Stewart Fredericton and John R. Myles.

Saturday morning was devoted to a discussion on the new act proposed for the AANB. In the afternoon the ladies met for a discussion on National Assembly arrangements followed by tea at the home of Neil Stewart. The men enjoyed a challenge match at the Fredericton Curling Club.

The annual dinner Saturday evening was attended by representatives of government, city and the Association of Professional Engineers.

1964 CONVENTION AND ANNUAL MEETING OF THE OAA

Amidst headline competition of a turmoiled Cyprus, Liz 'n Dick, a coroner upsetting an old architectural adage and the subsidance of the Beatlemania phenomenon on this continent, the 74th OAA Convention and Annual Meeting quietly got underway, February 20th at the Royal York Hotel, Toronto.

A special study session was given the first day on the "Critical Path Method". Presided over by Prof W. G. Raymore, Ian McKenzie of the Canadian General Electric Company conducted the lecture and gave a clear, logical and precise introduction to the technique and application of CPM as related to building. Afterwards, Messrs R. Johnston, McNamara Construction; J. Thompson, Perini Ltd, C. Jarrett, Page and Steele; and D. Peters, Shore and Moffat and Partners, gave brief talks on actual applications dealing with specifications, office and field aspects of CPM. It was the concensus of the panelists and members that CPM has great merit and will undoubtedly be employed on more building projects. Thus, another item is added to the continually growing responsibilities and changing complex of this profession.

The exhibitors display of new building materials and techniques is always an interesting part of the Convention. Much credit must be given to the OAA reception committee for their splendid work as well as the close liaison of the manufacturers. Here, one may slacken the pace, observe the increased number of pipe smokers; the abundance of shaggy-faced individuals who apparently did not receive a free stainless steel razor blade in the mails; the astonishment and delight of new salesmen at the receptivity of architects on such a spirited occasion and all the informative and well exhibited

OAA President-elect D'Arcy Helmer

displays, especially the beautifully designed and executed eight foot high brick fan column.

It is during this event that old and new acquaintances discuss a pot-pourri of topics and, walking along the crowded aisles, one hears portions of conversation such as:

"What special charm do you have that you can do both Protestant and Roman Catholic Churches . . ."

"The new Regulation 48a will cost us $10,000.00 in new stationary and forms alone . . ."

"Have you read Fanny Hill . . ."

"How would you diagram the mating of an American Bald Eagle to a Yellow-Bellied Sap Sucker . . ."

"What's her name . . ."

And so, on to the wee hours many members pursued their own critical path.

The Friday morning seminar conducted

(continued on page 16)

Executive and council for the 1964-65 season of the AANB. Front row, from left: H. Clare Mott, St John, NB, registrar; Gerald J. Gaudet, Moncton, NB, president; H. P. J. Roy, Moncton, councillor. Back row, from left: D. W. Jonsson, Fredricton, councillor; Neil M. Stewart, Fredricton, past president and delegate to the RAIC Council; Alfred Chatwin, St John, vice-president; J. R. Myles, St John, NB, secretary-treasurer who is also a delegate to the RAIC Council. Not present, were Stanley W. Emmerson, St John, and Cyrille Roy, Moncton.

JOWETT

1

Features

NATIONAL DESIGN CENTRE

Canadian designed products have been displayed in most parts of the trading world. The National Design Council has now opened a permanent display centre in Toronto. These centres are eventually to be extended to other major Canadian cities.

Located in the Colonnade, along a busy and diversified pedestrian way, this centre presents to the public a selection of Canadian manufacturers' products that show a degree of design quality. By comparison with graphics of the primitive product, (1, 2) the suitability of material to use, ornamentation to design are accentuated to illustrate both to the consumer and manufacturer the superiority of a well designed object.

With such a display, public taste and the awareness of design in useable products, should be enriched.

2

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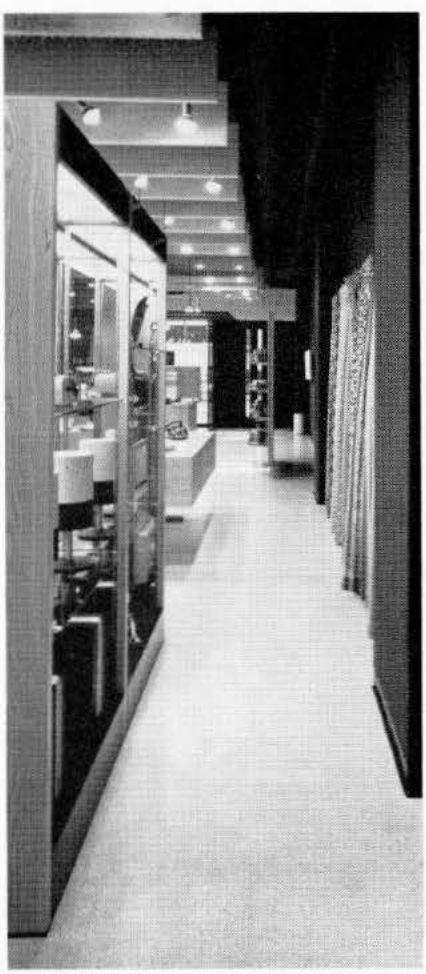

JOWETT

Book Reviews

TYPOGRAPHY, by Aaron Burns. 112 pp. Reinhold Publishing Corporation. 1961.

There is today an increasing amount of lettering and sign-writing in the urban and rural scene that instruct, suggest, warn, identify and even decorate. The present situation is one mainly of vulgar free expression which whatever the justifications of social function and economic necessity, often results in people, vehicles and buildings being completely confused. There is a great need for a co-ordinated system of communication which as Sartre has written, would "spring directly to the senses without explanation", a system which would contain visual interest but one that would also be based on simplicity, precision and clarity, contributing positively to the overall environment.

Not only do letters, signs and symbols greatly affect the environment with which architects are concerned, but also they are in many respects subject to the same principles as are involved in the design of a building and it is by following these principles that a co-ordinated system of communication may be achieved. Function, spatial relationship of words or components, structure, stability and strength, materials affecting economy and durability, solid and void relationship, scale, colour, size, shape, style and refinement are all aspects involved in lettering and symbols; so are fundamental problems of form and content, simplicity and standardization. Both buildings and signs should convey a clear message, possess inherent quality, relate to their immediate environment, reflect an economy of means, and if possible, simplify life. In lettering and signs as with architecture, function generally comes before form, and fashion has little place. First must come the idea, and technique follows. The problem is reduced to its essentials, these are then analyzed, and a simple and economical solution is sought. This solution may be either rhetorical or communicative, but it should be disciplined. Within the last forty years, similar influences have affected both architecture and display typography — the de Stijl movement, and the Bauhaus through Moholy-Nagy and Herbert Bayer. Furthermore, neither discipline depends today on a long-accumulated and established vocabulary.

Lettering may of course be physically independent of architecture, but if related it can make or mar a building. Whether the whole facade is treated as a signboard, as in Times Square or Piccadilly Circus, or whether the lettering is confined to a free-standing framework, lettering, along with street furniture, monuments, squares and other landmarks should obviously be integrated with architecture. Letters by their nature create a horizontal line which is suggestive of an architectural element; in contrast, a symbol creates its own identity, and the more abstract this symbol the longer its validity, and the less its likelihood of becoming obsolete. From this it may be deducted that letter-forms are most successful when complementing or even contrasting in their own right with a building

(continued on page 71)

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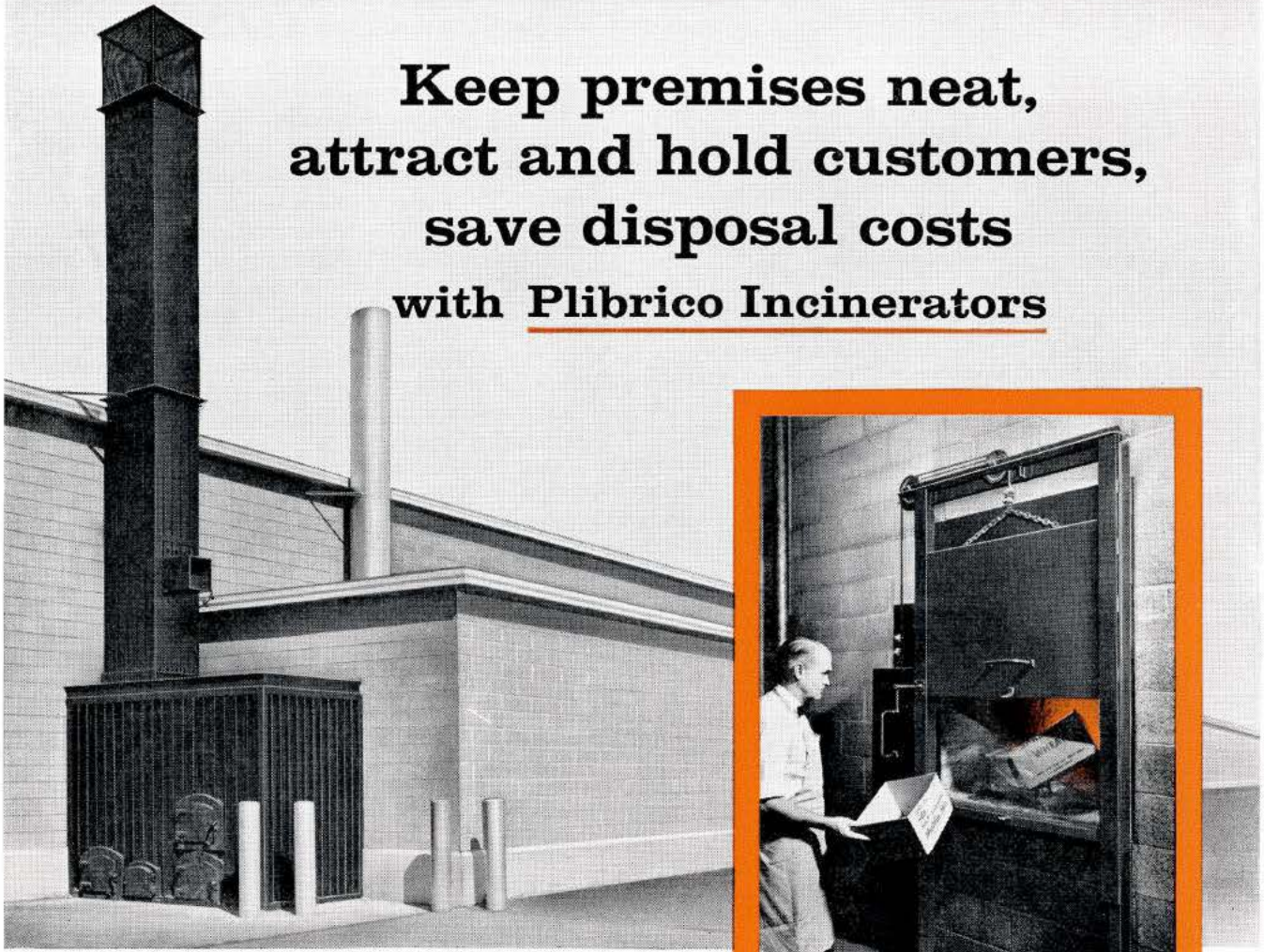

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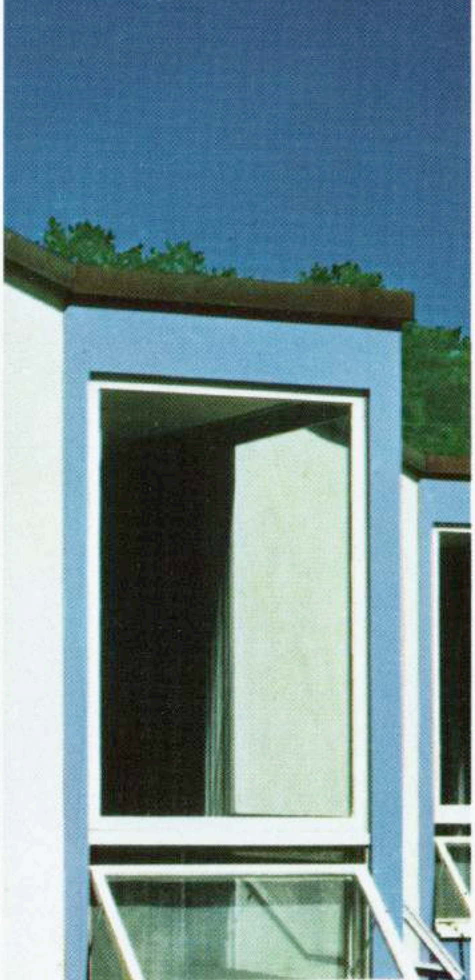

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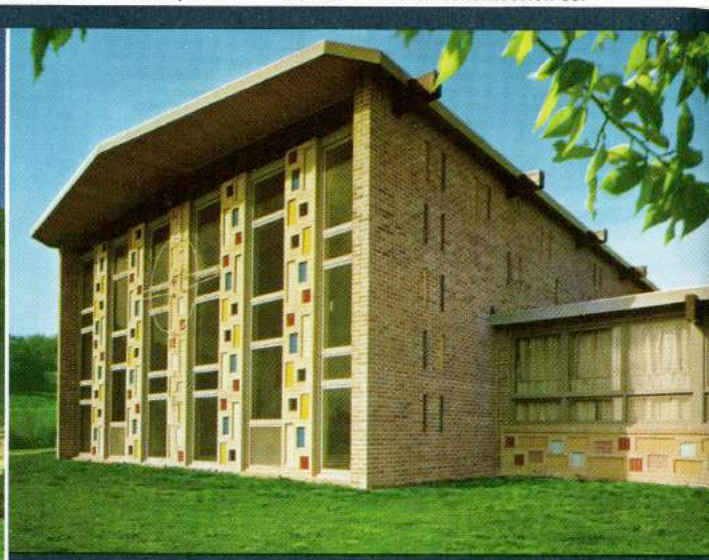

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Legal Notes

The Architect's Responsibility in Issuing Certificates

by Norman J. P. Melnick

The RAIC standard contract form (Stipulated Sum) provides that the owner will make payments on account "upon the architect's certificate . . .". Similarly, the Cost-Plus Standard Form contract states, with reference to percentage payments, that "no such payments shall be made except on the production and delivery by the contractor to the owner of a certificate in writing signed by the architect and certifying the amount to which the contractor is entitled . . .".

Where the architect's certificate is stipulated in a contract to be a condition precedent to payment, the architect must perform two roles, first, a role as agent of the owner and second, a quasi-judicial role, as certifier between the parties. Needless to say, these two roles are distinct and separate and although the architect is retained and paid by the owner, he must not be influenced by this fact but must decide objectively in his role as certifier.

What then is the legal position of the architect whose certificate is so important? In acting as certifier between the parties, the architect, in my opinion, is quite definitely sticking his neck out a mile. The courts have laid down certain strict rules within which the architect must work. They have said, for example, that: (1) the architect must act judicially notwithstanding that, to the knowledge of both the owner and the contractor, he is employed and paid by one of the parties; (2) he must act strictly within the power conferred on him under the contract; (3) the architect is not entitled to construe the contract unless the contract expressly gives him power to so do (this would be a rare exception); (4) similarly, he cannot, without express power, alter any of the terms or conditions of the contract; and (5) if he exceeds his powers under the contract in granting or refusing to grant a certificate and one of the parties seeks to rely on an unauthorized exercise of his powers, the other party will be released from the condition of the contract which requires the certificate as a condition precedent to payment; that is, neither party is entitled to take advantage of a wrongful exercise of the architect's discretion.*

Under both RAIC standard contracts, the architect is called upon to "decide the questions arising under the contract documents, whether as to the performance of the work or the interpretation of the specifications and drawings" and as to these questions, the architect is the sole judge and arbiter. He cannot, however, presume to interpret the contract generally or change any of its terms. His jurisdiction is to assess performance according to his plans and specifications. It is up to a court of law to pronounce on the interpretation and meaning of the contract. If the architect goes beyond these strict limits in the exercise of his discretion, he runs the risk of rendering his certificate no longer essential to the contractor's right to claim payment.

Because of this supra-professional role, that of arbiter between the parties, the architect must bear a rather extraordinary burden and, I think, must be an extraordinary person if he consistently fulfills this role properly and with wisdom. It is not only his skill as an artist, draftsman, or creator of ideas that is required for success in the profession, but also, great human understanding and a finely-developed sense of justice and fair dealing.

*Brennan Paving Company v. Oshawa, [1952] O.R. 540

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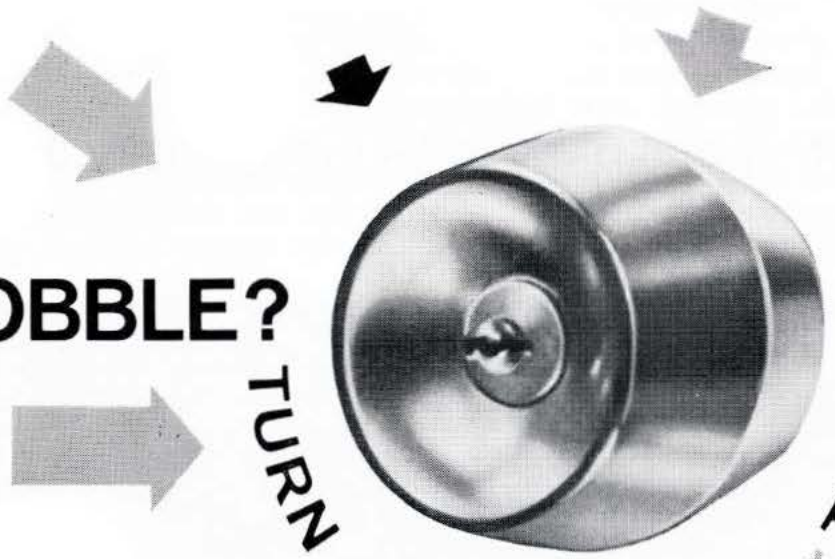

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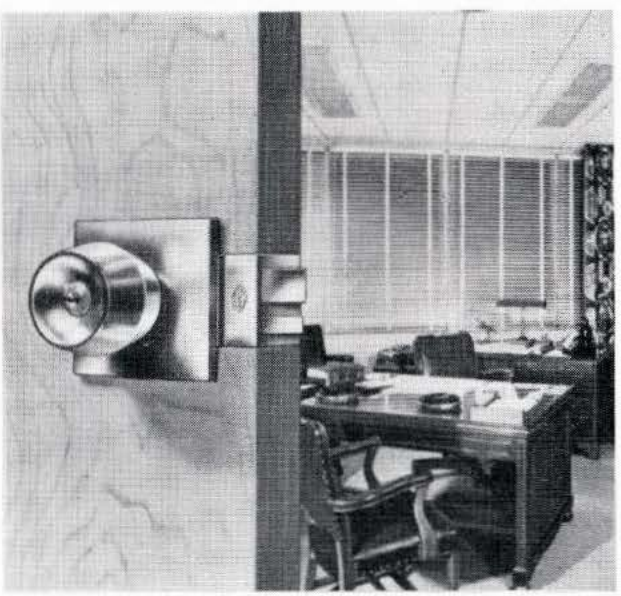

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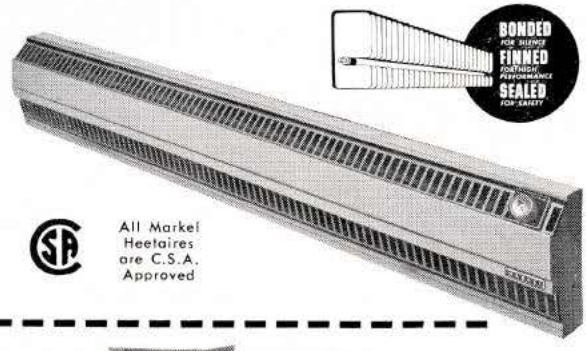

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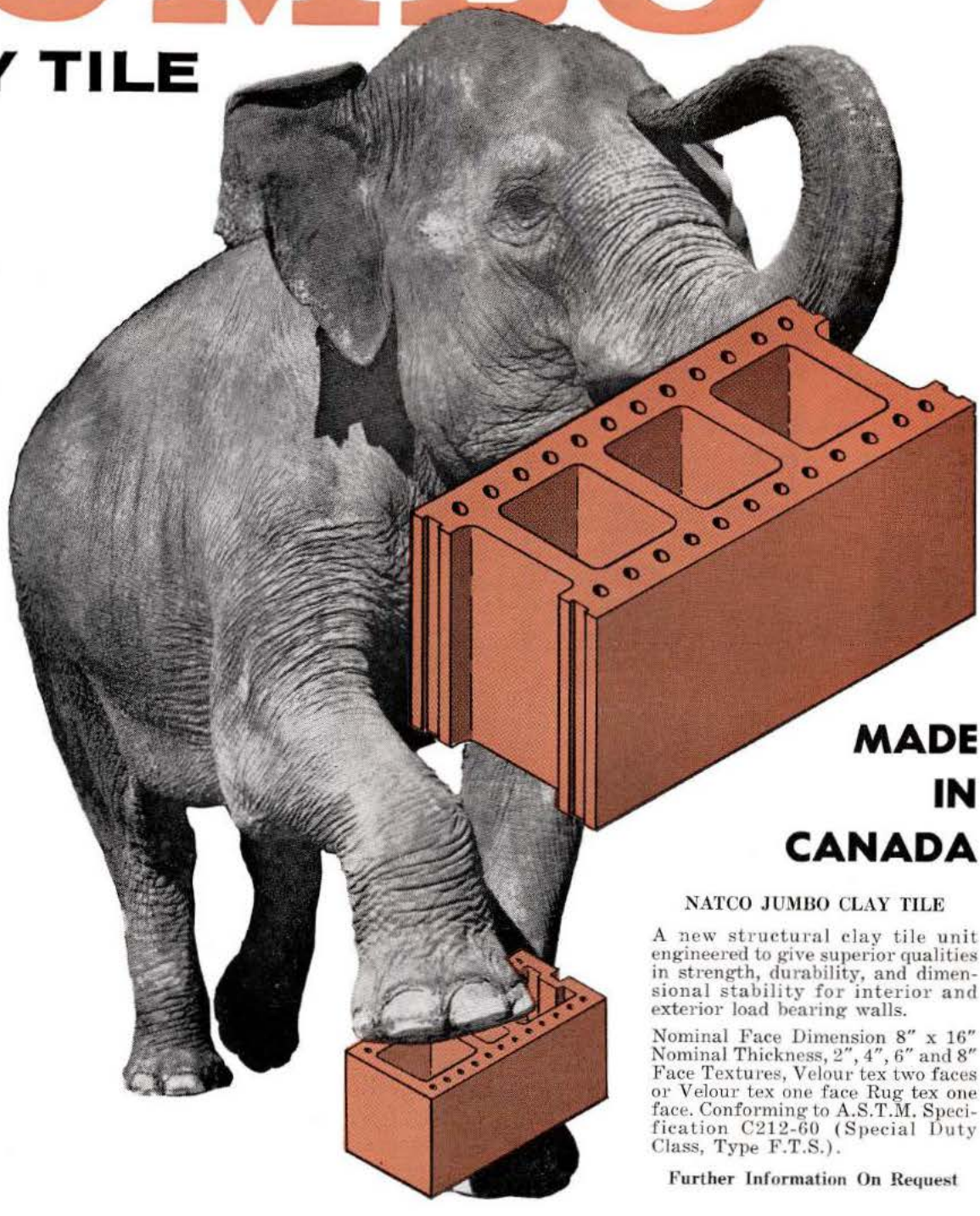

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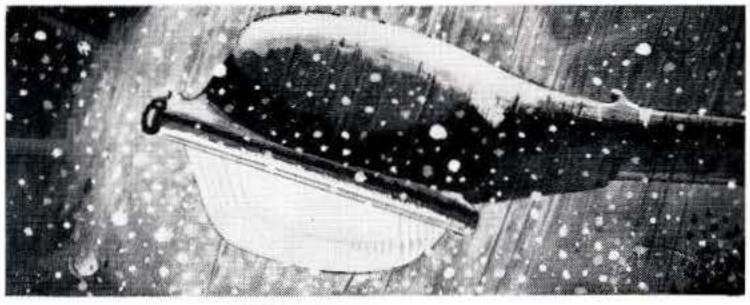

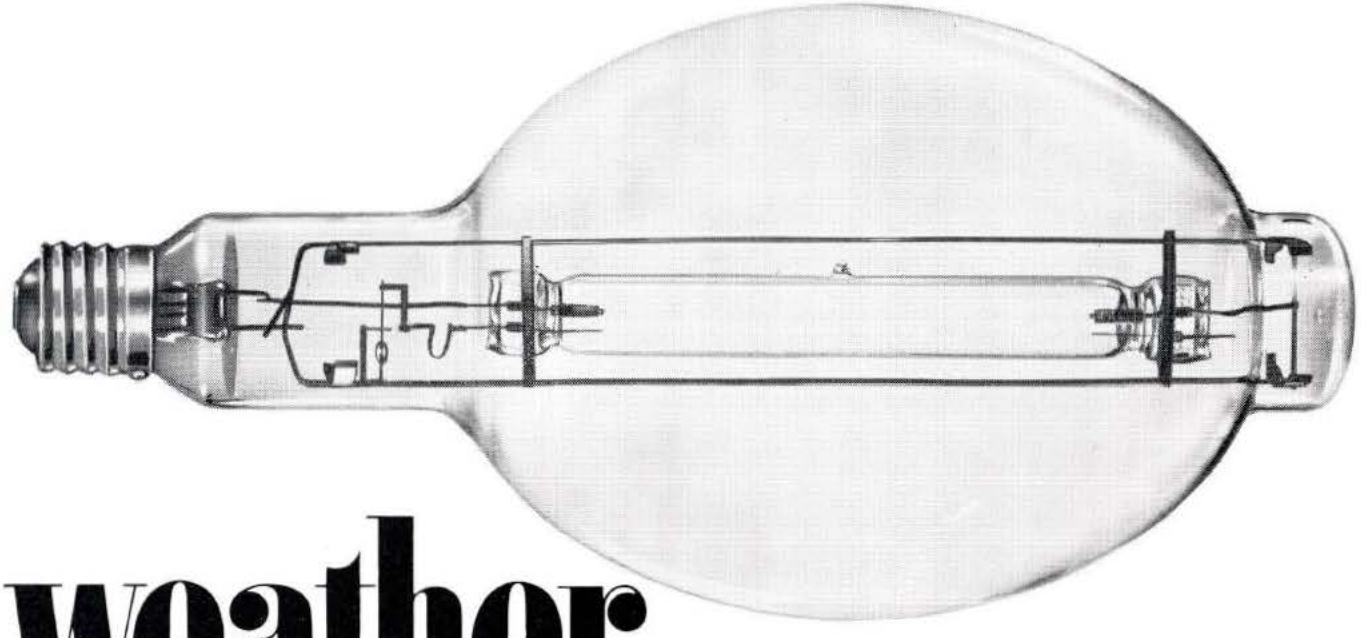

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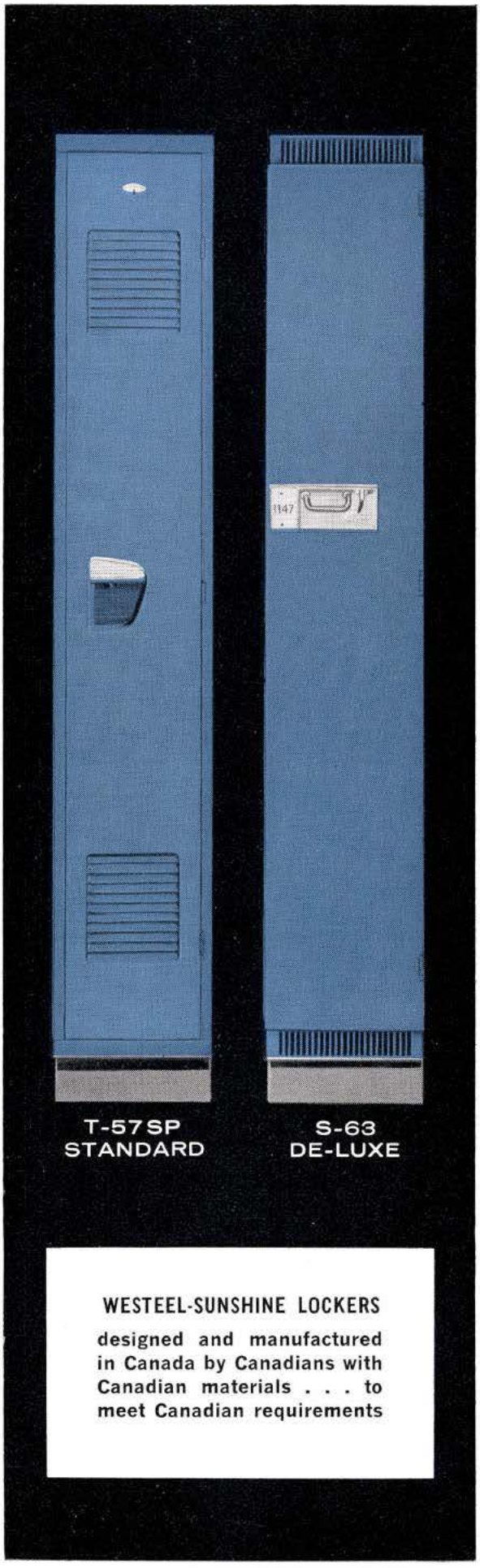

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Surveys of the Profession

No 1 The RIBA

Over the past several years leaders of the profession in the Western world increasingly have concerned themselves with the post World War II evolution in building construction and its effects on the training of architects and on the nature and scope of professional practice. The Royal Institute of British Architects and the American Institute of Architects both have conducted extensive studies of the question, and the RAIC, through its Committee on the Profession, is now following suit. (Journal, March, 1964, page 10) Prof. W. G. Raymore has joined the Committee to conduct field studies this summer. Last year's Assembly at Hamilton discussed "Architecture in a Changing World", and an extension of the topic is the theme of the 1964 Assembly at St. Andrews in June.

The RIBA and the AIA studies, particularly the latter because of greater similarity in methods, materials and practice, are of great value as background information to aid assessment of the situation in Canada. As the documents themselves will be available to relatively few members of the RAIC, the Journal asked P. M. Keenleyside and Ben Kaminker, of Govan, Kaminker, Langley, Keenleyside, Melick, Devonshire, Wilson, in Toronto, to summarize the studies and comment upon them. Part I, the RIBA Experience, by Mr. Kaminker, appears in this issue. Part II, the AIA Experience, and a commentary on the Canadian situation, by Mr. Keenleyside, will appear in May. Some comments by James A. Murray (F), in his report as retiring president of the OAA in February, are pertinent to the whole question, and we publish them on this page as a not inappropriate introduction to the topic of surveys of the profession. *W.B.B.*

I had thought originally to say something of my own views, shaped by serving as president, on the professional delirium today. If I say something it must be brief. R. W. Siddall, president of the AIBC said something of this delirium in his 1963 address to his general meeting: "We must drop the barriers which we have erected around our profession and free ourselves to enter into adjacent and related activities without regard to the traditional professional independence which is becoming a restriction we cannot afford. We must remove the restrictions which surround us, we must spread our sphere of activity and we must increase our competence". But this is only one side of a two sided prospect.

I fear we must address ourselves, and that very soon, to the essential question — what is a profession today?, for the answer to that will ultimately shape all our deliberations, all our activities. For a view of ourselves seen from without, let me recommend the Place of the Profession in the Urban Community by O. Hall, an essay in a small book Urbanism and the Changing Canadian Society. It makes devastating reading: it is not remote: it was written here in Ontario about you and concerning architects and other professions. He notes — "Among Toronto architects even fewer can make a livelihood as independent practitioners dealing directly with a body of clients. Thus among them in 1951 over 70% were classified as salaried workers. It is clear that, as one of the newer crop of professionals, they are far removed from the model of independent practice. Architects have achieved very little of the success of doctors and lawyers in establishing a wide and unchallenged demand for their distinctive services."

Two years ago R. S. Morris sent me a note touching on a long discussion we had earlier in which he said, "You and I did not agree about the Architectural tree which you think has 2 roots and which I believe in Canada has one. The two abstract qualities about which we were speculating are creativity and professionalism". In his subsequent excellent memorandum to the Committee on the Profession, this thoughtful architect quoted a definition of a profession by Allan A. Klass in the Journal of Canadian Adult Education. "A profession is a self-selected, self-disciplined group of individuals who hold themselves out to the public as possessing a special skill derived from education and training and who are prepared to exercise that skill primarily in the interest of others" . . . and "the most important function of professional institution lies in the supervision of standards of individual competence and of professional practice" . . . and from the same source "no professional man can evade the obligation to contribute to the advancement of his own group. His own knowledge is part of a common fund, an inheritance which he fully shares but to which he is obliged to add".

For me and for this tree, speculations on the paths of design righteousness is not the concern of the profession as such . . . provided the schools feed the profession with dedicated architects rather than the more limited product of dedicated designers. The concern of the OAA must be for a professionalism which primarily makes possible good architecture, and makes possible good architects as a secondary and necessary prerequisite to good architecture.

The RIBA Experience

by Ben Kaminker

The Royal Institute of British Architects recently has completed a "survey" and an "inquiry", the first entitled THE ARCHITECT AND HIS OFFICE, and the second, THE PRACTICAL TRAINING OF ARCHITECTS.

The office survey was conducted by a team which included architects and management consultants. Its object was to study problems of organization, staffing, quality of service and productibility in a representative group of architects' offices.

The inquiry into practical training was conducted by Elizabeth Layton, RIBA Under Secretary for Education and Training. It was made at the time the RIBA had decided to extend the period of practical training from one year to two years. It is concerned with the shortcomings of the existing system of practical training; how the training could be improved and broadened; the responsibilities of Schools as well as offices for this training; and the measures necessary to ensure that the system is effective.

Both survey and inquiry, as is suggested by the word "practical", are precisely that. They are confined to the functions of the architect as designer of buildings; they do not examine in detail his broader responsibilities in other fields, such as town planning or research. These are no dreamy-eyed documents trying to determine what the status of the profession will be in the year 2100. A basic assumption is made that architects have work to do. How are they doing it, and what can be done to improve the performance?

Within this framework both reports are admirable documents. There is no attempt to soft-pedal the findings, even though the answer to the first question is "not very well" and to the second "a great deal".

How fully the conditions they have found in England apply also to Canada, it is difficult to say—without a similar sort of Canadian survey. Yet undoubtedly many of their problems are our problems and many of their shortcomings are our shortcomings.

In an editorial in its issue of April 11, 1962, the ARCHITECTS' JOURNAL has this to say about the office survey:

"How can a profession be defended that allows unqualified assistants to control £100,000 jobs, that admits that 40 percent of the qualified staff had not the potential of an architect in the full sense of the word? Or how can one excuse a profession that has foisted much of its responsibility onto others—specialist consultants, quantity surveyors—that does not understand accounts and rudimentary bookkeeping or management, and that has such a poor exchange of information and experience that similar problems are usually approached "de novo" as though they had never been solved before".

Does anyone doubt similar conditions—leaving out the quantity surveyor—prevail in Canada?

The editor of the ARCHITECTS' JOURNAL, of course, goes on to answer his own question, pointing out that a confession of weakness is the first step on the road to improvement.

The survey points to three such roads called "Education and Training", "Fees and Earnings" and "Standards of Service".

Education and Training

The authors of the survey are concerned, as we have seen, with the large part of the architect's work which is "contracted out" —in fact, all the major technical skills. The architects generally, however, are not happy with this state of affairs, "we received an overwhelming impression of dissatisfaction with the service given by consultants, apart from structural engineers". Resemblance to Canadian conditions grows stronger. The authors feel that architectural education should be diversified in order to bring technical skills back into the profession. Architects who choose to specialize in these skills should not be debarred from membership in the RIBA.

Education and training of the architect should be planned as an integrated whole. Education is defined as the more fundamental and less professional function. Training covers the knowledge and skills which are part of the architects' professional equipment. The profession should recognize that the practical training of students in the office is an essential investment for the continuity of practice. Many architects felt that students should acquire a stronger sense of building economy and have a period of training in a builder's office.

"Technicians are needed in architects' offices. They should be given some form of organized training for work concerned mainly with technical administration and the preparation of production information. The technician should not be concerned with design. There should be an institute of technicians sponsored by the RIBA to ensure the maintenance of standards of education and training".

In this context, the technician is defined as one who is not obliged to concern himself with the total performance of the building, but is concerned with applying his skill to a specific task under the direction and supervision of the professional who, of course, is concerned with the total performance of the building. Design is defined as that which affects the performance of the building as experienced by the client.

Fees and Earnings

In this category, the survey felt that the RIBA should collect regular information on a standard basis about the movement of costs and productivity of offices as a check on the adequacy of fees, and that the information should be widely disseminated to encourage offices to increase their productivity.

This sounds like something much easier to recommend than to achieve.

Standards of Service

Under this heading the survey team recommends:

1) Immediate steps should be taken to widen the scope of the school curricula to include management theory and practice.
2) Refresher courses for practising architects to cover management, technical and design subjects.
3) Uniform methods of costing, overhead analysis and budgetary control.
4) Assistance from accountants in the interpretation of accounting information and advice on matters of financial policy.
5) A study of the purpose and use of drawings to clarify the architect's own design process and to see how far these compare with other methods of communicating information.
6) The RIBA should gather and disseminate information for user requirements for different building types.
7) Possible advantages of group practice should be studied.
8) Study of all forms of placing contracts.
9) Importance of joint action within the profession and other parts of the building industry.

Thoughtful architects will find themselves in agreement with nearly all these recommendations with, perhaps, one reservation. The implementing of these recommendations will require manpower, money and time. Shortages in manpower and money can be overcome but time is finite and limited. Five years seems to be the accepted length of a school course; how do we add narrow professional training subjects without sacrificing the broader concept of a liberal education? Do we really want more Management and less Milton in our schools?

The place for management, if it must be formally taught (and architects are not quite as stupid about accounting and office management as the survey team and the editor of the Architects' Journal would have us believe) is surely in the post graduate period of professional training.

With the recommendations for refresher courses, central dissemination of information, training of technicians, and especially with the need for bringing back the specialist consultants into the profession, one can only add, "hallelujah"!

No brief outline such as this can do full justice to these reports which, combined, run into several hundred pages. You have to read them to appreciate them. They are full of meat, but the meat is frequently garnished with highly seasoned sauce such as:

"In some offices the professional staff gave considerable thought to the manner of presentation, making use of booklets, charts, diagrams, models, and drawings where appropriate. In other offices the information presented to the client consisted solely of a few drawings which snapped themselves into a tight roll the moment they were laid out. In these cases, we frequently found that the office complained bitterly about clients changing their minds after the job had started!".

The RIBA Office Survey: Summary of the Main Conclusions

The following list summarises the main conclusions (but not the many subsidiary ones) that emerge from the team's findings on which early action is called for, under three main headings: education and training, fees and earnings, standards of service. Some items appear somewhat arbitrarily under one heading, although they may in fact be relevant to all headings.

EDUCATION AND TRAINING

Diversification of architectural education

Architectural education should be diversified in order to bring technical design skills back into the profession. Architects who choose to specialize in the application of these skills ('architechnologists') should not be debarred from membership of the RIBA.

Relations with engineers

At the same time, closer relations should be established between architects and engineers in order to reach a better understanding of (i) what the architect requires and (ii) how the best use can be made of the consultants' services.

Integration of education and training of architects

The education and training of the architect should be planned as an integrated whole, a seven-year period in which the stage or stages of practical training are co-ordinated with the School syllabus to ensure that both aspects are complementary and together cover the necessary ground.

The profession should recognise that practical training of students in the office is an essential investment for the continuity of practice. There should be close co-operation between the office and the School, to ensure that the necessary standards are maintained throughout the training period, and that the experiences gained in each are integrated.

Training of technicians

Technicians are needed in architects' offices in order to raise productivity and standards of service. They should be given some form of organised training for work concerned mainly with technical administration and the preparation of production information. The technician should not be concerned with design, and his training should exclude this aspect.

The existing National Certificate courses in Building, with modifications, would provide a suitable medium for training technicians, as their work will have much in common with that being done by technicians in other parts of the building industry. It would be beneficial to the whole industry if they were to some extent interchangeable.

Technicians, as non-professionals, should not be admitted into a class of membership of the RIBA, but there should be an institute for technicians sponsored by the RIBA to ensure the maintenance of standards of education and training.

Changes in existing Scale

There should be an increase in the Scale for small jobs, through a more gradual reduction in the percentage charged at the lower end of the Scale as the size of job increases.

The possibility of a uniform higher percentage charge for custom-built private houses should be considered.
Consideration of reductions at the upper end of the Scale for large simple jobs should be linked with the possibility of charging more for complex jobs.
The RIBA should collect regular information on a standard basis about the movement of costs and productivity of offices over the next few years, as a check on the adequacy of the Scale of Fees. This information should also be widely disseminated to encourage offices to increase their productivity.

Differential fees
No recommendation for a differential fee scale by type of building can be offered, because the evidence was not sufficient to establish a basis that would genuinely reflect the variations in design costs that occur. A possible alternative would be to have a negotiable element in the scale to provide for higher fees for more complex work, and this should be looked at.

Research into the costs of the design process
Research should be carried out into the time taken at various stages of the design process to provide the basis for a more rational fee scale, as well as providing aids to the planning and programming of work.

Standard of service
The RIBA should exercise greater control over the standard of service given by its Members, in return for the protection given them by the Scale of Fees.

Earnings
It has been possible to establish four main levels of responsibility, apart from that of the principal, within the architect's office. The report gives information about the range of salaries paid at each level of responsibility, analysed by age and type of office. Salary information on a similar basis should be collected and published at regular intervals.
The level of salaries and responsibilities of senior architects in the larger offices should be examined in relation to different forms of work organisation to ensure that more satisfactory career prospects are available. This might help to solve present staff shortages and to attract new entrants of high quality into the profession.

Management
The RIBA Management Handbook should be published as soon as possible.
The RIBA Management Advisory Service should be set up as soon as possible.
Immediate steps should be taken to widen the scope of the school curricula and the Professional Practice syllabus to include management theory and practice. More systamatic use should be made of the practical training period, emphasising office and job management problems and techniques.

Refresher Courses
There should be more refresher courses available for practising architects. These should cover management, technical and design subjects.

Financial management
Uniform methods of costing, overheads analysis and budgetary control should be developed throughout the profession. Architects should be encouraged to obtain from their accountants, in addition to auditing services, the wider range of services which accountants can provide, such as assistance in the interpretation of accounting information, advice on matters of financial policy.

Drawings
A study of the purpose and use of drawings should be put in hand, (a) to clarify the architect's own design processes, distinguishing 'constructional design' drawings from 'production' drawings, and (b) to see how far these compare in efficiency with other methods of communicating information to the other members of the building team.

User requirements
The RIBA should gather and disseminate information and experience on user requirements for different building types. Greater attention should be paid by practising architects and by Schools of Architecture to the application of work study techniques to problems of this kind.

Standardisation and industrialisation
The profession should promote and encourage the application of standardisation and industrialisation to building in such a way that the architect's position is strengthened rather than weakened; and to that end the RIBA should disseminate information on the design implications of dimensional coordination and on the economics of standardisation.

Group practice
The possible advantages of group practice and various forms of consortia should be studied as a means of (a) strengthening the technical resources of the individual office and (b) achieving a more rational distribution of the work load among offices. This would make it possible to combine individual jobs into a building programme of sufficient size to enable the economic advantages of industrialisation to be realised.
Ways should be sought of reducing fluctuations in work load which lower the output and efficiency of the individual office. These should include
(a) an objective examination of existing methods of allocating jobs and
(b) review of the RIBA Code of Conduct with a view to liberalising the 'professional' attitude towards getting work.

Contract procedure
A study should be made of all forms of placing contracts, for there is evidence to suggest that traditional forms of competitive tendering lead to increased building costs, introduce delays, inhibit technical development and prevent the application of good management procedures to the building process.

Need for joint action within the profession and with other parts of the building industry
Effective action on all these points depends on joint work by all the members of the building team. Architects, no matter in which field they are employed, should act in concert as one profession. Whenever possible they should bring the related professions on the design side into their deliberations, and should strengthen contact with the manufacturing and constructional sides of the industry.

The Practical Training of Architects: Summary of the Report

Scope of the Inquiry

The inquiry is concerned with the shortcomings of the existing system of practical training; how the training could be improved and broadened now that it is to last two years; the responsibilities of Schools as well as offices for this training; and the measures necessary to ensure that the system is effective.

The inquiry raised many controversial questions about the aims and methods of practical training, and the relationship between work in the Schools and the complementary training. Only some of these could be answered within the scope of this report. Much of the work in the Schools which bears on training could not be pursued at depth.

A review of the shortcomings of the present arrangements reveals where many of the present difficulties arise. They show that in future a much closer co-operation between Schools and offices is required and that during training students need a broader range of contracts with other parts of the building industry.

Comparisons

Comparisons were sought with other professions and other countries. Those that seemed most relevant and valuable were medicine and engineering in Great Britain, and the training arrangements for architects in Germany and America.

Specially interesting were:

(a) the earlier introduction of practical training and the lower ratio of theoretical to practical training in medicine;

(b) the more systematic methods of providing and testing the practical experience of civil engineers;

(c) the higher proportion of practical to School work in German Schools of Architecture and the later age for full qualification;

(d) the methods used in America to control practical experience.

Objectives

The objectives of the proposed scheme of practical training are to:

(a) integrate School and practical training throughout the seven years and to place the main responsibility for this integration on the Schools;

(b) make the training in offices more effective;

(c) encourage a wider range of training with other members of the building team, particularly builders;

(d) place more emphasis on management training both at School and during the period of practical experience;

(e) make the Part 3 examination a more effective test of the architect's competence.

These objectives would encourage a greater diversification of skills among architects, since students would be able to pursue special interests during some of their periods of practical training, and to link this with specialisation in their fourth and fifth years in School.

Management training is defined. It is taken to cover costs, office and project management, roles of other members of the building team, law, ethics and regulations.

The Proposals

The success of the proposed scheme of practical training relies on eight key points. These are listed.

Variety and Length of Different Types of Experience

There is a strong case for greater variety of experience to include experience with other members of the building team, including contractors, engineers, quantity surveyors and manufacturers.

Much greater use should be made of the period of practical training to give experience before, as well as after, the Final examination Parts 1 and 2. This is intended to introduce a much needed break into the five year period of full time education, to allow Schools to base the work of the last two years on greater practical experience, and to enlarge the students' outlook.

It is recommended that the Schools should introduce a break for six months or a year, probably but not necessarily after the Intermediate examination.

Out of the two years of practical experience at least 12 months should be in an architect's office. More often it will be nearer 18 months.

Periods of less than five months in an architect's office should not be allowed to count towards the total period of 24 months. Offices cannot be expected to take their responsibilities for training seriously for shorter periods.

For the balance of six to twelve months students and trainee architects should take the opportunity to gain a wider range of experience for short or long periods.

Shorter periods on building sites or as a 'spectator' with quantity surveyors, building manufacturers, etc., should be allowed to count provided they do not total more than about five months out of a total 24.

Students should normally be required to have had at least five months of their practical experience outside architects' offices before the Part 3 examination.

Responsibilities of the Schools for Practical Training

The Schools are already responsible for five sevenths of the full time student's training. They should make themselves responsible for co-ordinating the whole and integrating theory and practice. This is both inevitable and desirable.

Types of Experience

Special efforts should be made to place students with building contractors on organized schemes of training lasting perhaps for five to six months and occasionally longer.

A formal approach should be made to the National Federation of Building Trades Employers to secure the co-operation of building firms in taking students. The long term objective should be for all students to have such training. For a few years it would be unrealistic to expect the builders to provide for organized periods of training for more than about 25 per cent of students. Other students should be encouraged to do vacation work on sites.

Periods of experience with engineers, quantity surveyors and

building manufacturers should also be sought, but usually for quite short periods. The co-operation of their professional or manufacturing organizations should also be enlisted to make this possible. Longer periods would be for individuals who wished to specialise.

If students cannot be persuaded to undertake periods of experience of a week or two in the vacations without pay, the Schools should consider the introduction of such experience during term.

Index of Architects' Offices

The RIBA should institute an Index of architects' offices which are willing to offer good opportunities for training, on the lines of the Civil Engineers' Index.

Offices on the Index would be required to give certain undertakings about these opportunities and to appoint a supervisor in the office to keep in regular contact with the trainee and vary his experience as necessary.

Arrangements will have to be made to keep the Index up to date and to ensure that offices honour their undertakings.

The aim should be for all young architects to train in such offices. In the early years it will not be practicable to make this compulsory.

Offices expressed anxiety about the costs of such training. These anxieties are natural, but usually exaggerate the burden.

The Log-book

A log-book, on the American model, should take the place of the present Practical Experience form. It should be given to a student at the end of his first year and continue until qualification. The RIBA should appoint a small sub-committee to draw it up in suitable form.

The demands for experience in the log-book should be realistic in relation to the age of the young architect. The log-book should be signed by the employer and countersigned by the School or adviser every three months to ensure a regular review of the trainee's progress and range of experience.

Realism in the Schools

In addition to supervising practical training, the Schools should introduce more realism into School courses.

The methods of doing so include:

(a) live and realistic projects;
(b) development groups;
(c) ateliers

Schools which use none of these methods to introduce realism should consider doing so.

There is a need for training in management at three levels and by different methods:

1) up to Intermediate examination as an integral part of normal work;
2) by special courses in the fourth and fifth years;
3) by special courses, probably full time and lasting in total three to four weeks, between Final Parts 1 and 2 and the Part 3 examination.

The Schools should be encouraged to increase 1 and 2 above and to start 3.

Uncertainty about the aims and methods of introducing studies of costs is particularly noticeable. Schools need to review their training to give more attention to costs.

Much more discussion is needed about methods of teaching management. There is a strong case for an immediate conference or colloquium to pursue the ideas started at the Roffey Park conference in 1960. As the result of such a conference, advice could be given to the Schools on methods of giving training in management.

There is also an acute shortage of teachers competent to train students and to give lectures on management. Urgent steps are needed to train the teachers.

It appears the Institute of Advanced Architectural Studies at York might be able to help both in organising a colloquium and in training teachers and would be able to act quickly. Advantage should be taken of this possibility at once.

Post-graduate Courses and Research

There is a shortage of post-graduate work and research in Schools of Architecture. As one means of encouraging this it is recommended that a year of approved post-graduate work or research should be permitted to count towards the two year period of practical training.

The Committee on Post-graduate Training and Research should give guidance on methods of approving such work.

Demands on the Schools

The Boards of Architectural Education should press urgently for improvements in staff/student ratios to enable the Schools to carry out the increased responsibilities recommended in this report.

The Part 3 Examination

At present this examination is an insufficient check on the competence of young architects. As it is the gateway to full professional status it should be made more effective. Registration implies a guarantee of service to the public and the examination should provide this guarantee.

Only candidates who have obtained the full range of experience as set out in the log-book should be passed.

Various methods of improving the effectiveness of the oral and written examinations are suggested. These include a longer interview, separate marks, for practical experience, use of the log-book and a summary report of experience, and the possibility of a two-stage examination.

The Board of Architectural Education should appoint a sub-committee to consider these changes.

Reservations and Special Cases

Professional Qualifications after Seven Years

I have a serious reservation about a system which gives the right to practise as a principal after only two years' practical experience. It is suggested that the Board should review the regulations so that the right to practise as a principal is obtained separately and later than the right to practise as a qualified assistant.

Evening and Part-time Students

The regulations for practical experience for evening and part-time students should be the same as for full time students.

Studio Work

It is recommended that the Board should initiate an inquiry into the aims and methods of studio work.


ROYAL BANK

Architects/Underwood, McKinley, Cameron & Associates
Structural Engineers/Choukalos, Woodburn & McKenzie Ltd
Mechanical Engineers/D. W. Thomson & Company Ltd
Electrical Engineers/Simpson & McGregor
General Contractor/Halse-Martin Construction Co Ltd

the Royal Bank Building, Vancouver

The corner of Granville and Robson Streets in downtown Vancouver has been the site of a branch of the Royal Bank of Canada for the past half century, a tradition which seemed to be threatened when the city announced their intention of passing a planning bylaw restricting the location of banks on corner sites in the downtown area. Anxious to retain their location the bank acted quickly, requesting permission to redevelop the site incorporating in the building a feature of interest to the passers-by which would eliminate the objectionable dead corner occasioned by banking hours.

The building was designed and approved and while working drawings were being prepared, temporary premises were set up in a nearby theatre and the old building demolished.

The site is extremely narrow. Of the original 50 ft. lot width, 7 feet was ceded to the city for road widening and a further foot lost because of a party wall on the north side. Restricted horizontally, the bank space was distributed vertically over three floors — storage vaults and staff rooms in the basement, savings and securities departments on the ground floor and current account department on the second floor. This arrangement, unusual in so small a branch, was only possible if escalators connected the two floors with the contradictory result that a large area on each of the floors was lost to escalator space.

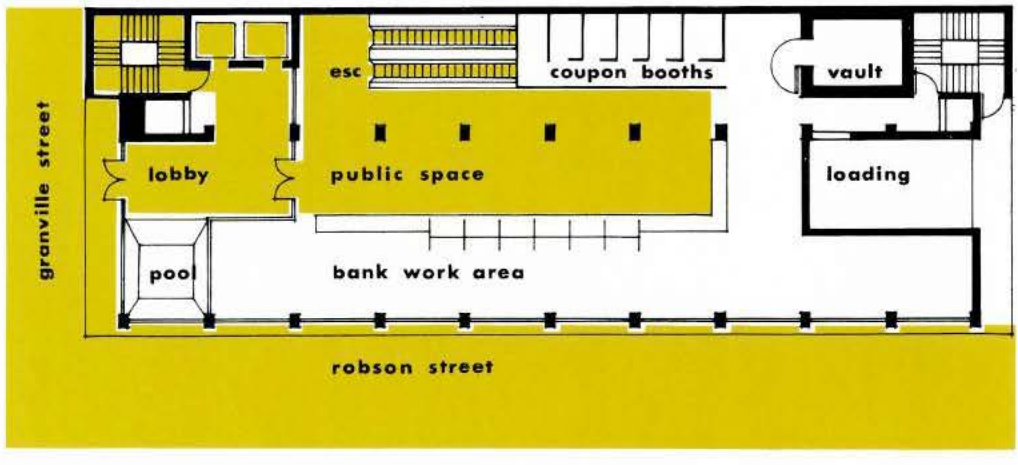
The small site demanded compact planning (thoughts of a mezzanine with a free standing escalator were discarded at the outset) and, although an open well alongside the escalator lasted into the working drawing stage, it too was finally given over to usable floor space.

The plan is simple, the area on each floor being divided into three parts. The major space is towards the streets and is defined on the interior by the row of free standing columns and the drop in ceiling height. The secondary spaces, lavatories, stores and stairs have been placed against the blank party wall and the corridor with a duct shaft at either end serves and separates them. This division is expressed externally in the solid granite returns of the party wall around the stairs at each end, the white glass mosaic duct shafts set back between them and the glazed walls of the main portion of the building.

The circulation of the air conditioning system follows a similar pattern, the corridor and vertical shafts being the servant element between the two types of space. One vertical shaft supplies air into the ducts over the corridor ceiling, the other exhausts the corridor which acts as a return duct. In addition the variable perimeter is controlled by induction units behind the spandrels.

Horizontally, differing elevational treatments were used to define the mechanical floor, the four office floors and the banking floors, without an abrupt change of materials which would have tended to divorce the bank from the remainder and

GROUND FLOOR



deny their position as the owners of the building.

Selection of materials was in the bank tradition — granite, aluminum, marble, glass mosaic, hardwood veneers and vinyl fabrics (there are no painted surfaces on the two bank floors) and a conscious attempt was made to avoid the heaviness associated with these materials by the use of fine lines of metal and undivided glass surfaces.

The counters and cheque desks are standard bank fixtures with the design modified by the architect to suit this particular building. The interesting feature promised by the bank at the outset eventually took the form of a fountain sculpture of aged copper in a shallow pool sunk into a granite surround. This has proved to be the subject of controversy and public interest beyond the original intention and is a commendable example of a commercial concern contributing to the artistic development of a piece of townscape.

Underwood, McKinley & Cameron

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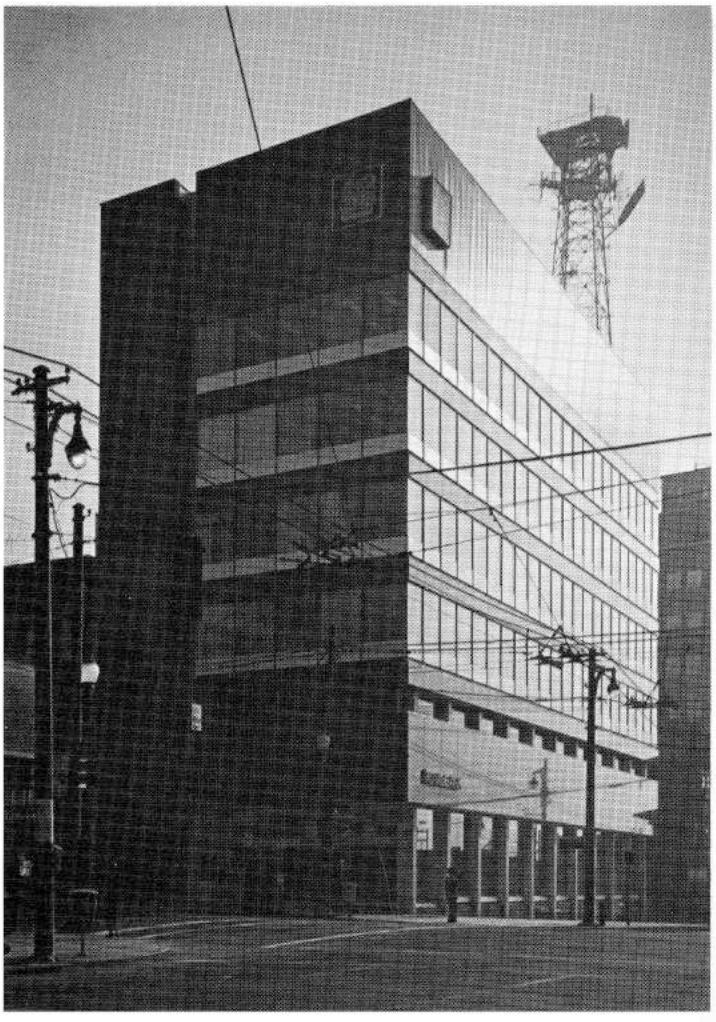

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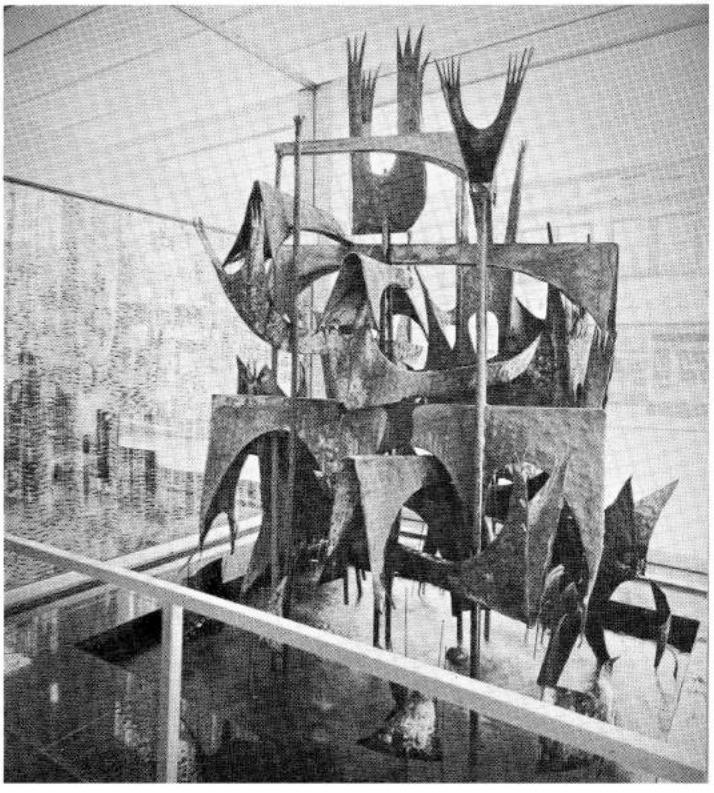

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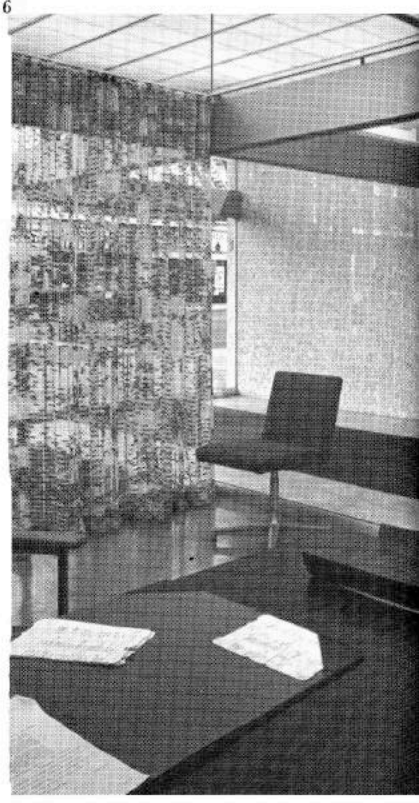

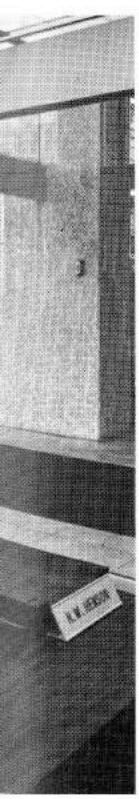

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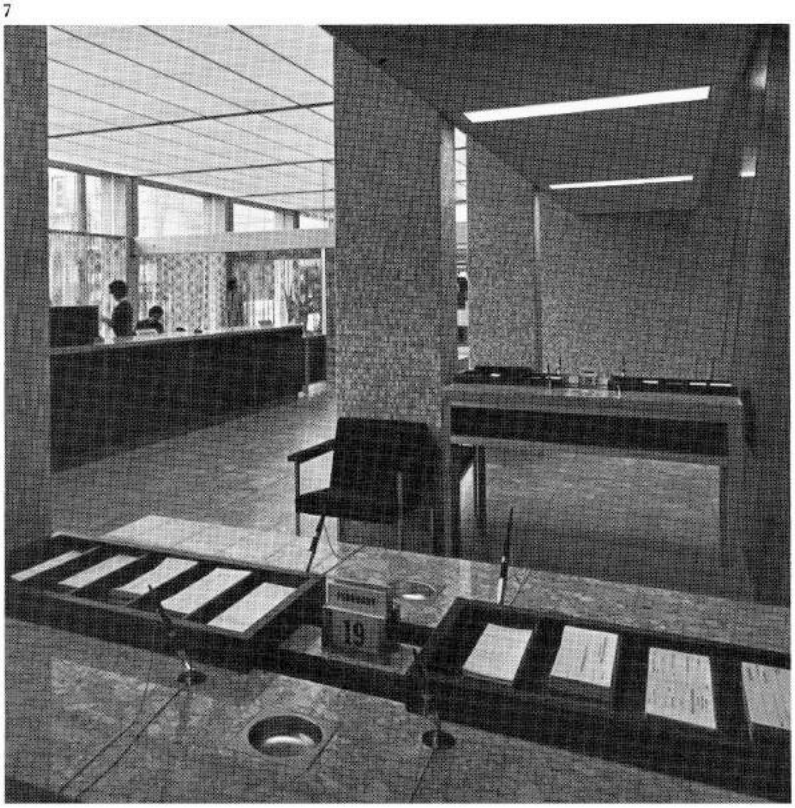

2 (Page 41) North-west elevation on Granville Street.

3 Perspective from SW corner of Granville and Robson Streets.

4 Banking concourse from entrance lobby.

5 Sculpture at main entrance by Lionel Thomas.

6 Entrance lobby. Elevator lobby at right.

7 Banking concourse.

Photos by Selwyn Pullan.

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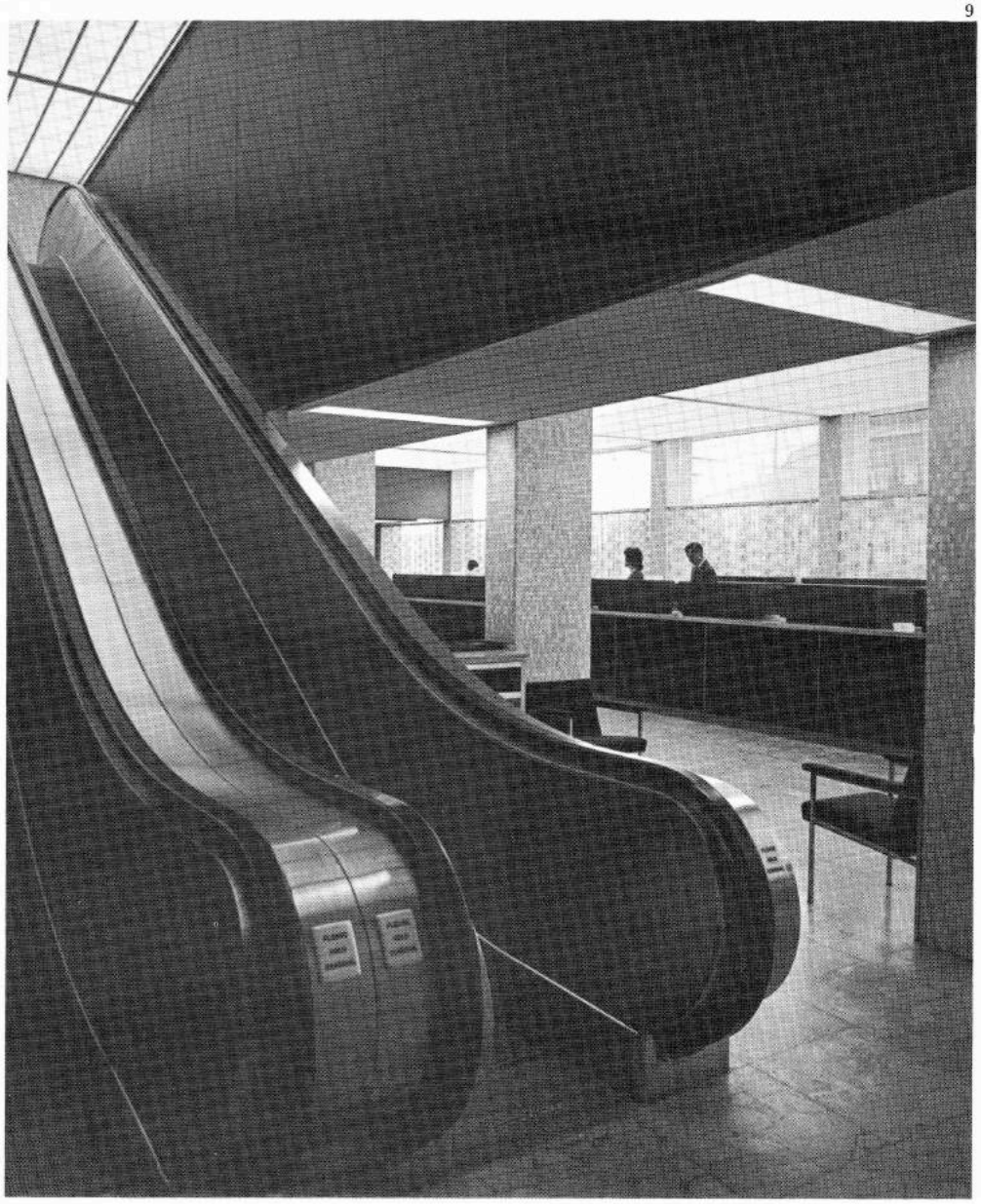

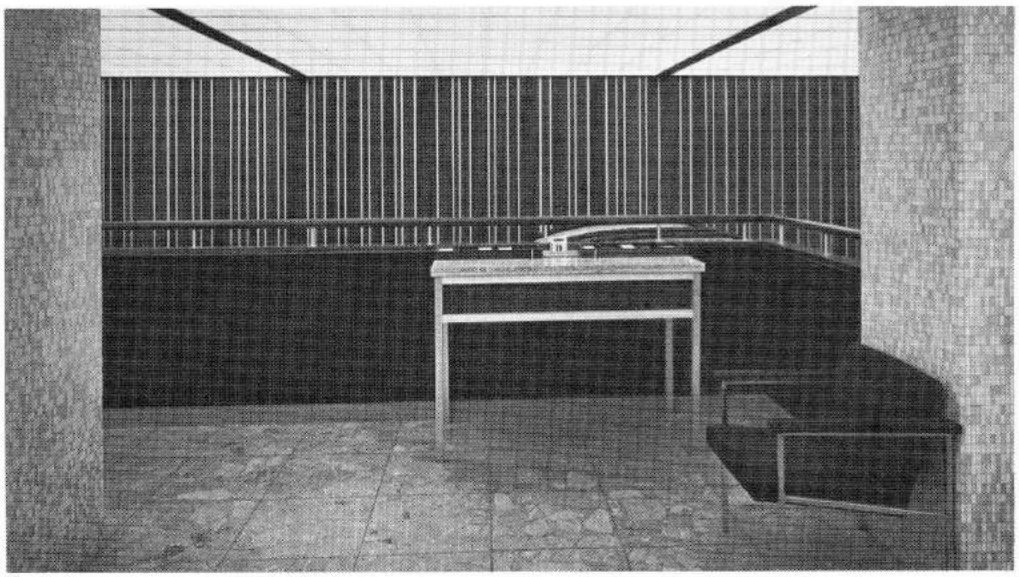

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8 Banking area and escalator to second level.

9 Second level banking concourse and escalator connection.

Manager's office in background.

10 Detail of interior finishes and banking desk.

11 Detail of counter and teller's cage.

Photos by Selwyn Pullan.

11

Notes

on the Royal Bank of Canada Building

by Abraham Rogatnick

If you think of architecture as the skilful handling of space, time, light and what-have-you, Vancouver's new Royal Bank building has only a little to offer. The banking floors, in shape, colour, arrangement and lighting are as predictable as the pages of the catalogues from which their fluorescent fixtures and plasticized textures came. And the office floors above have just the vinyl-tiled floors, the acoustic-tiled ceilings and the ceramic-tiled washrooms that you expected. There is really nothing to talk about except the facade and the fountain, but both of these are worth talking about because they have been attended to with a sense of aesthetic responsibility which radiates quietly but convincingly, albeit not one hundred percent successfully, onto the street.

The handling of the surface volumes, materials and colours and the proportions of the planes into which they have been separated results in a striking elegance on a street in which the vigorous but vulgar art of neon signs, theatre marquees and various overhead wiring systems dominate. The habitual greyness of the Vancouver air seems to be dignified by the dark grey granite, the light grey mosaic tile, and the narrow black horizontal recesses which articulate the crisp rectangular window spandrels of dull aluminum from the sharply delineated bands of the charcoal granite. In spite of the six or seven different materials which have been brought together here (including brown enamelled mullions, a brown corrugated metal wall around the top mechanical floor, off-white vertical blinds on the office windows and grey glass on the upper banking level) the cleanness of detailing, the tightness of the proportioning and the careful articulation of masses, planes and materials has led to an integration that clicks. Though it might have clicked more easily with one or two fewer materials. The pearly grey mosaic tile, for instance, is refreshing in colour, but tired as a texture, and unfortunately softens and cheapens the appearance of the columns so closely juxtaposed to the rich, hard granite wall surfaces.

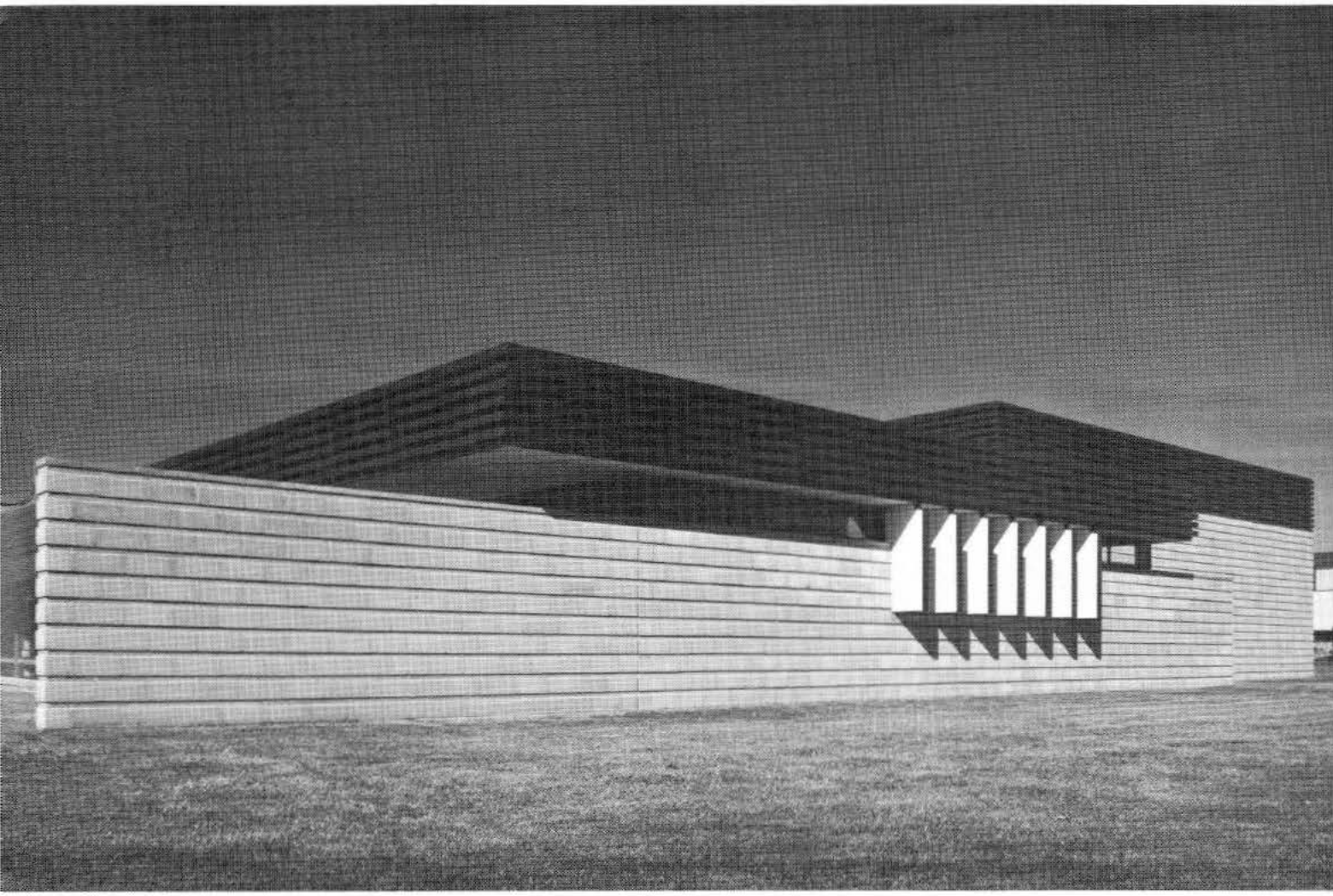
After all this, one might almost be embarrassed to add that the "Royal Bank" lettering and insignia appear in blue and white plastic framed in aluminum, were not these signs so handsomely restrained in design and so sensitively placed.

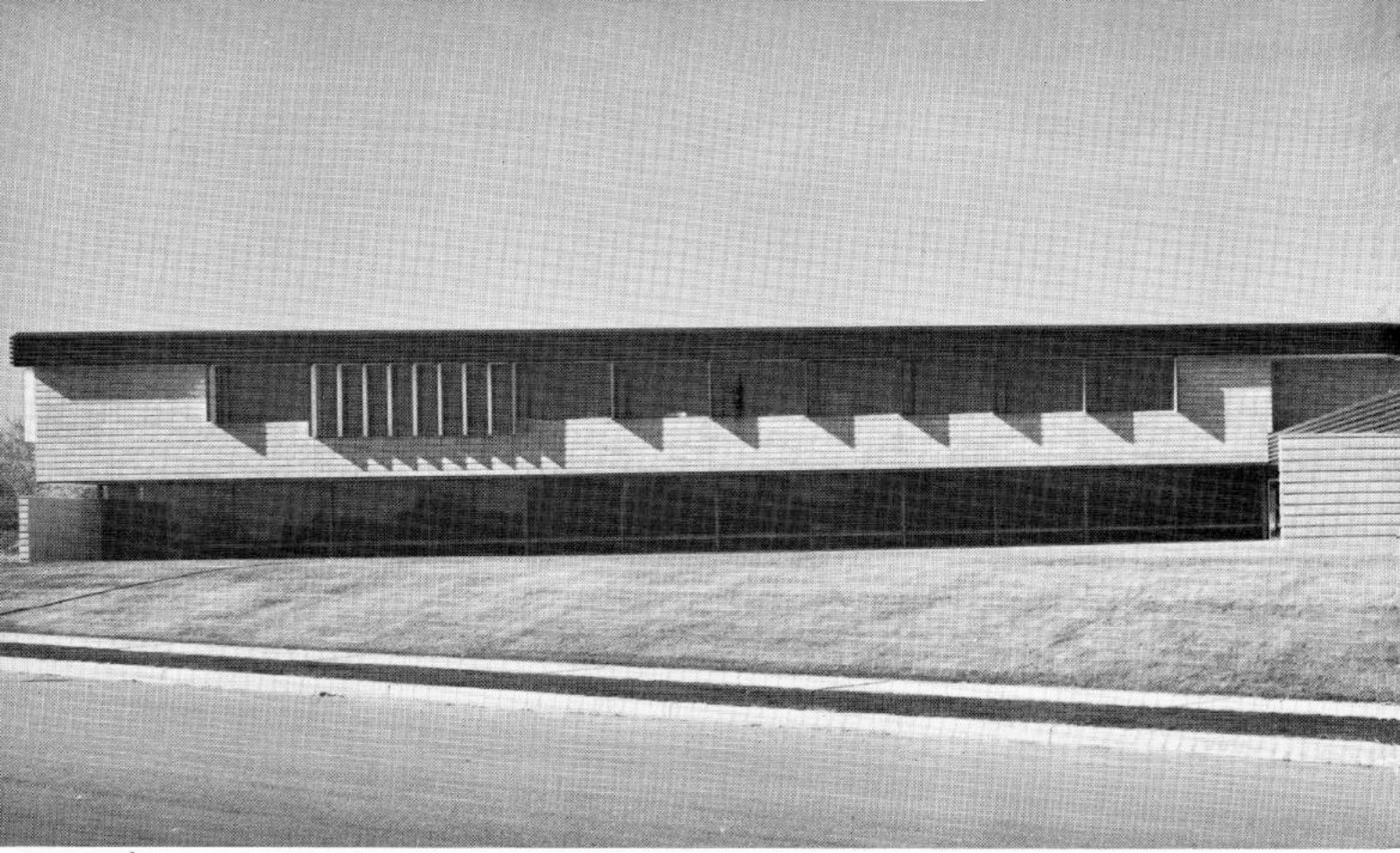
We evidently have the Vancouver City Planners to thank, rather than the builders, for seeing to it that the street floor corner would not be deadened by yet another dull bank window. Here too, the sculptor, who was asked to solve the problem, decided not to fight the rain-pervaded atmosphere, but to join it by adding to the scene a sort of rain-soaked metal evergreen from which the heavy dampness of the British Columbia rain forest relentlessly drips. Upon entering the vestibule one is immediately engulfed in the melancholy noise of an echoing forest downpour. Equally melancholy, however, is the fact that this romantic sound is heard not at all from the street, and the "tree" itself, glassed in on three sides, is poorly seen. Like one of the exotic birds in the Stanley Park zoo it seems trapped in a cage which is too small, and behind glass which too firmly separates its world from ours. It is a pity that the Royal Bank, having gone so far in its generosity, could not have gone further in its contribution to the urban scene by opening up the corner completely to physical as well as visual public use. An outdoor fountain would have been nice, but we might have settled for a sheltered newspaper kiosk, or even just a dry place to stand while waiting for the traffic light to change.

Abraham Rogatnick is an assistant professor at the School of Architecture, University of British Columbia.

Oxford University Press, Don Mills, Ontario

Architects/Fairfield and DuBois
Structural Engineers/Robert Halsall and Associates Ltd
Mechanical Engineers/R. T. Tamblyn and Partners Ltd
Electrical Engineers/G. E. Mulvey and Co Ltd
General Contractor/Milne & Nicholls Ltd





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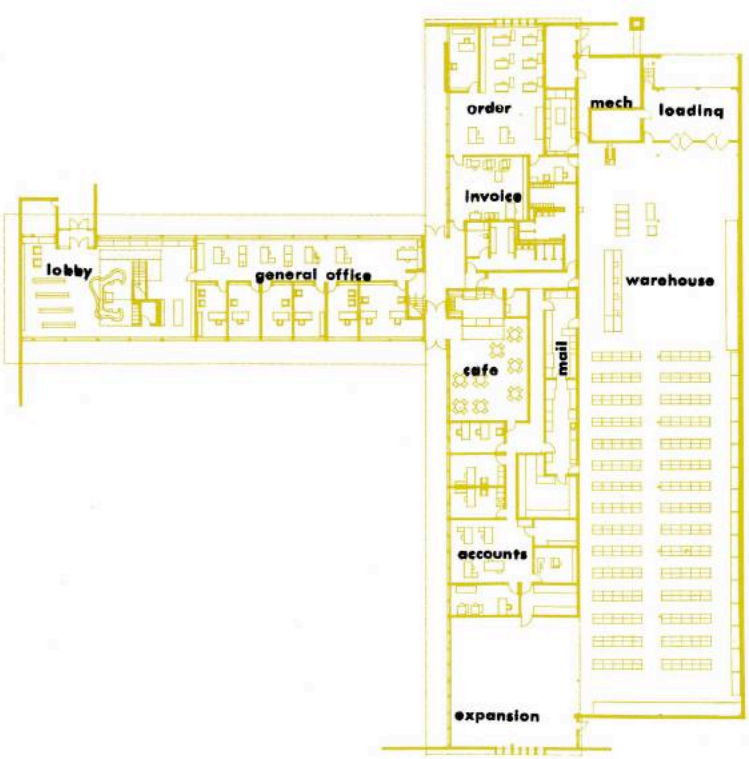
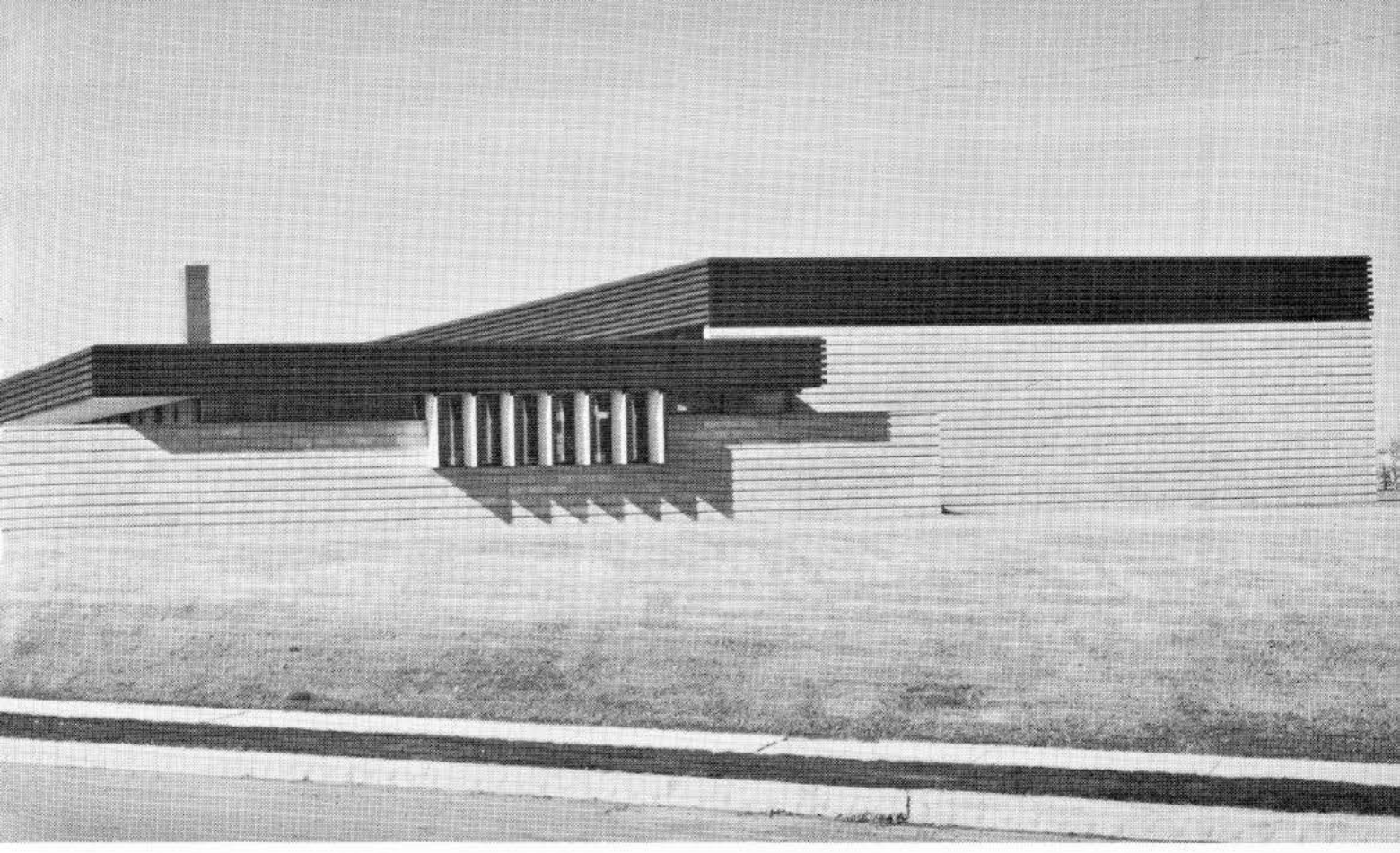
SITE PLAN

GROUND FLOOR





In this building we have endeavoured to emphasize the existence and utility of functions distinct from one another and at the same time united in a special purpose. Avoiding the universal space concept of office planning, we have attempted to bring out these distinctions of use without limiting functional flexibility, and so give form to the building which we felt would best express the aims and traditions of the owners.

The two-storey management and editorial block is the dominant stem of the T-plan.

Externally, the building masonry is of concrete block produced to our design by a modification of the block die. Concrete block was selected for scale reasons and to achieve a strongly coursed textured masonry of a natural variegated quality. All concrete block walls are treated with a protective coating of reinforced silicone.

The original design called for garden walls seven feet high creating two completely enclosed courtyards. The enclosure of these landscaped courts has been left to a later stage when the light industrial area in which the building is situated becomes more developed.

The building fascias are of deep-reveal standard metal desk material, vinyl coated in a deep olive colour before erection. The fascias are designed to reflect the same linear striations of the masonry and to unify the three roof planes of the total building.

As we designed all new office furnishings, it was possible to relate the interiors to the architecture, which we feel is essential to a successfully unified building. Curtaining of a deep blue yarn dyed cotton from Finland, provides a strong colour note both internally and externally. *Fairfield and DuBois*

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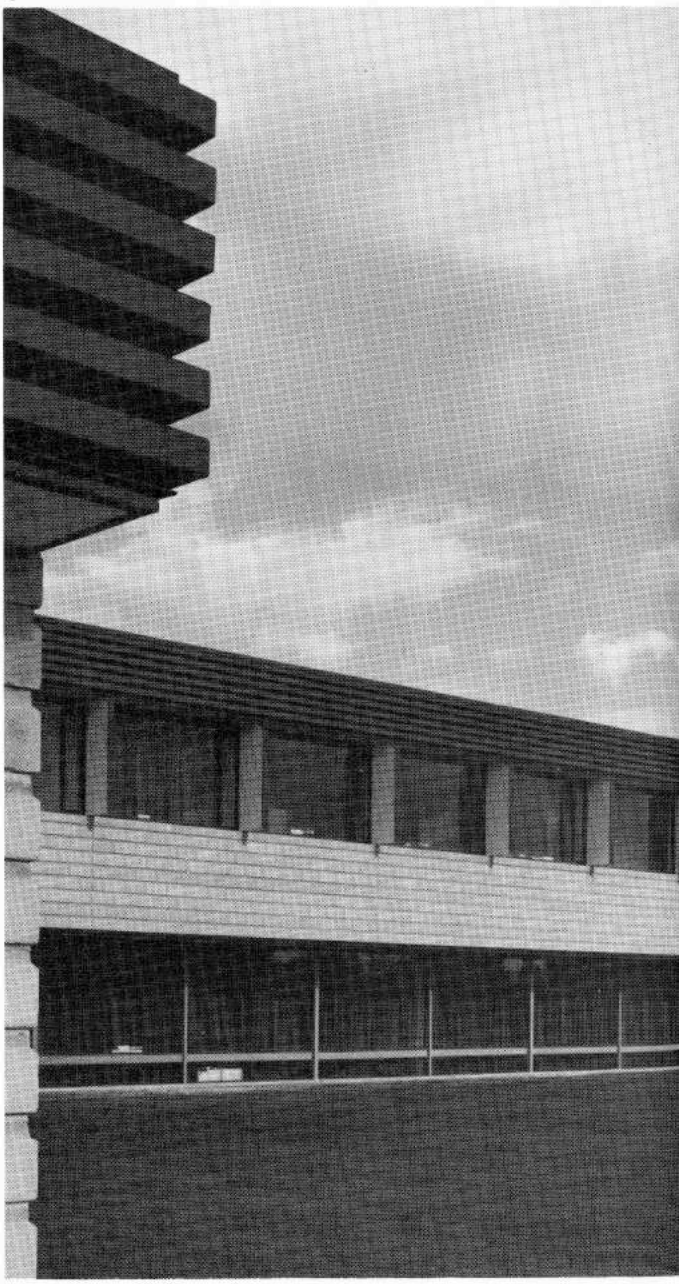

2 (Pages 48 & 49) East elevation. Two story office section—left; warehouse—extreme right.

3 Two story office section, perspective of east elevation.

4 Office section — west elevation. Main entrance at right.

5 South elevation. Manager's office and conference room above main entrance area.

Photos by Roger Jowett.

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6 Entrance lobby and display areas. Stairs up to private offices and conference room.

7 Discussion area in manager's office. Furniture designed by the architects.

8 Desk designed by the architects for the private offices.

Photos by Roger Jowett.

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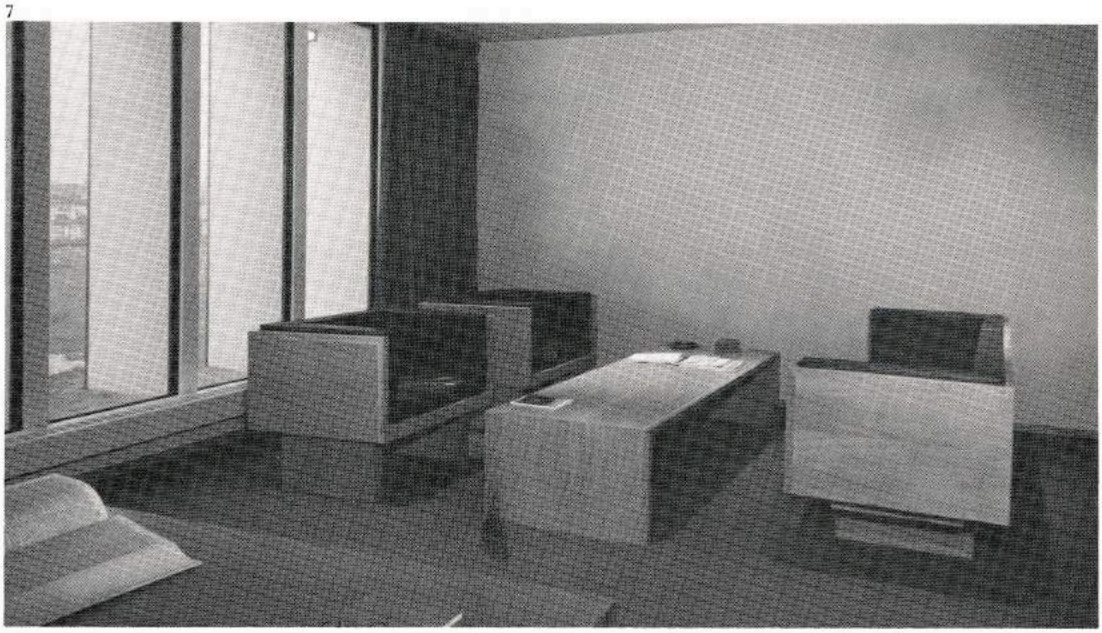

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Comments

on the Oxford University Press complex

For a very long time Oxford University Press, as a publisher, has been associated with the liberal arts. The Canadian branch, originally located in downtown Toronto, because of necessary expansion decided to build in the fine industrial section of Flemingdon Park located in North York.

The building contains three departments, a warehouse, offices serving this warehouse and offices housing executive personnel. In the entrance lobby to the executive wing are display and receptionist areas.

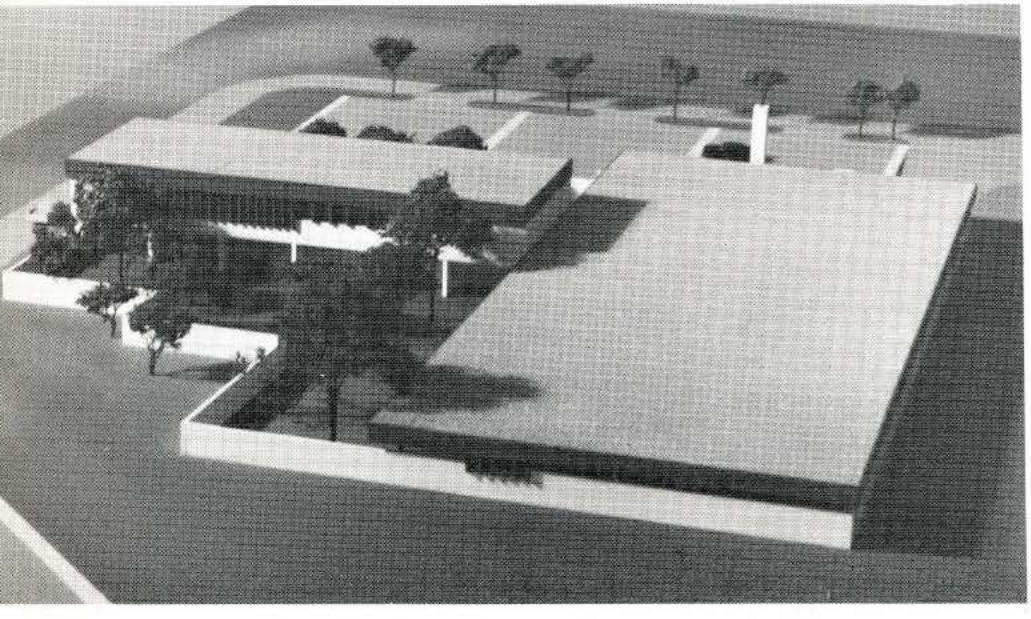
On realizing the relationship of these functions, as shown by the plan, there appears to be here no overriding factor to connect the executive wing with the warehouse operation in the manner of the T-shaped plan. This is evident in the forced and unsatisfactory visual connection of the two. Perhaps it would have been better to separate them completely, creating two building volumes and simply join the two masses by means of an unobtrusive link.

Also, a separate volume may have been able to absorb the variety of such areas as display, receptionist, stairs, etc., which are now brought into being and joined in a rather distorted manner and do not appear here to have grown from an organic conception.

However, in accepting the form of the building, the sensible selection of materials and sensitive use of concrete block and an E-Deck fascia, despite the problem inherent in turning corners with these articulated materials, has given this building a pleasant appearance. The elaborate program given by the client was translated with good taste not only in the design of the building but also in the design and selection of furniture, drapery and floor finishes.

In the near future it is the intention of the owner to extend garden walls according to the master plan. This will certainly enhance the overall face of the composition. No doubt, that when some mature trees are brought in and with the development of the undergrowth this building complex will be an attractive addition to this industrial development. *NH*

Model showing the garden wall in relation to the building volumes. The roofline of the warehouse, in the final scheme, has been raised above the adjoining offices. **Photo by Thompson and Waring Ltd.**



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Heat Transfer At Building Surfaces

by D. G. Stephenson

UDC 697.13

The calculation of temperature and heat flow through the walls, windows and roof of a building is the first step in preventing problems arising from thermal stresses and condensation. Digests on specific problems such as condensation on windows (CBD's 4 and 5) and the effect of temperature gradients through building envelopes (CBD 36) have, of necessity, used some simple heat transfer concepts without emphasizing the assumptions and limitations that are involved. This Digest is intended to supplement the others by discussing the various modes of heat transfer that occur at the surfaces of buildings, pointing out the complications that must be considered in some cases.

In an attempt to reduce abstractions to a minimum, the following discussion deals with a specific example — the heat flow through a double-glazed window — but the points about heat exchange at a surface or across an air space are valid for walls and roofs too.

Heat Transfer Through a Window

The average heat flow through a window can be estimated by the method outlined in CBD 36. This says that the heat flow through unit area of any wall is given by the expression

$$\frac{q}{A} = \frac{T_{inside} - T_{outside}}{Resistance}$$

where the resistance is the sum of the resistances of the various layers that form the wall. For a double window the total resistance is the sum of five components, viz: outside surface, outer pane, air space, inner pane and inside surface. Values for these resistances can be found in various reference books; one of the most widely used is the Guide and Data Book published by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).* This reference gives the over-all conductance for a double window with a ½-inch air space as 0.55 Btu/ft² hr °F, which is the same as 1.82 units of resistance. Table I contains the resistances of the various layers and the temperature drop that occurs across each of them when the outside temperature is 0°F and the inside temperature is 73°F. The heat flow through the window is

$$\frac{q}{A} = \frac{73}{1.82} = 40 \text{ Btu/ft}^2\text{hr}$$

This simple approach implies that the temperature is uniform over each of the four surfaces; a more detailed analysis of the way the heat is transferred through the window shows that this is only an approximation.

The real situation is complicated by the nature of heat flow to the glass surface on the warm side, the transfer of heat across the air space, and the exchange of heat between the outer surface and outside. Resistances to heat flow have been assigned to these elements of the heat flow path in the simple calculation of Table I, and these give reasonably accurate values of heat flow and temperature when there is no solar radiation falling on the surface. Under some conditions, however, they can lead to erroneous values, and for more accurate results it is necessary to use adjusted values or to adopt a more complicated method of calculation. Some knowledge of the heat transfer processes at surfaces and across air spaces is necessary for an understanding of when this is required. Windows present a particularly difficult case, because over 95 per cent of their resistance to heat flow is provided by surface and air space effects.

Modes of Heat Transfer

Heat energy always tends to migrate in the direction of decreasing temperature. The transfer can be by conduction, convection or radiation. Heat is the energy associated with the perpetual movement of the molecules and temperature is a measure of the vigour of this movement. When materials at different temperatures are in contact the more vigorous molecules transfer some of their thermal energy to less vigorous ones by collisions. This is the

* Chapter 23 of the 1963 Guide, which deals with heat transmission coefficients, has been reprinted with permission by the Division of Building Research, National Research Council, as NRC 7788, price 50 cents.

TABLE I

RESISTANCES AND TEMPERATURE DROPS FOR ELEMENTS OF A BASIC DOUBLE WINDOW

Layer	Resistance	Temperature Drop, deg F
Outer Surface	0.17	6.8
Outer Pane	0.02	0.8
Air Space	0.93	37.3
Inner Pane	0.02	0.8
Inner Surface	0.68	27.3
TOTAL	1.82	73.0

process of heat conduction. It is the only way in which heat can flow through an opaque solid.

Thermal energy can be transported through a fluid by conduction and also by the movement of the fluid from one region to another. This process of heat transfer associated with fluid movement is called convection. When the fluid motion is caused only by buoyancy forces set up by temperature differences the process is referred to as natural or free convection; but if the fluid motion is caused by some other mechanism, such as a fan or pump, it is called forced convection.

All objects continuously lose energy by the emission of electro-magnetic radiation and gain energy by absorbing some of the radiation from other objects that is incident on them. This process of heat transfer by radiation can take place without the presence of any material in the space between the radiating objects. These three modes of heat transfer will now be discussed in so far as they influence the temperature and heat flow through the double window considered above.

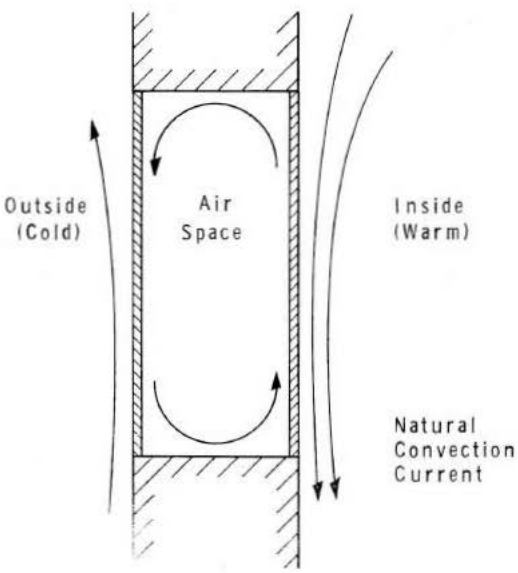


Figure 1 Vertical section through basic double window

How Heat is Transferred Through a Window

A basic double window is shown in Figure 1. The arrows indicate the direction of the air movement over the window surfaces that occurs when natural convection prevails and the heat flows through the window from inside to outside. There is radiant heat transfer between the inner and outer panes as well as conduction and convection by the air in the space; but the heat flow through the glass itself is only by conduction because glass does not transmit the radiation emitted by objects at normal room temperatures.

The variation of the inside surface temperature of a basic double window is shown in Figure 2. This variation is due to the air movement on both sides of the inner pane. The warm air of the room first makes contact with the glass at the top of the window, and as it is cooled it moves downwards so that the air in contact with the glass becomes progressively colder as it approaches the bottom of the pane. In the space between the panes the air flows down over the colder outer pane and rises next to the warmer inner pane. Thus the air is moving in opposite directions on the two sides of the inner pane, with the temperature of both streams much lower at the bottom of the window than at the top. As a result, the glass which separates the two air streams and has a temperature intermediate between them is colder at the bottom than at the top.

The cool air from the window continues to settle until it reaches the floor and there it flows horizontally away from the outside wall. This is the commonly-experienced cold draft that chills one's feet when one is near a large window. It can be counteracted by placing a heating outlet beneath a window so that the cold air will mix with warm air from the heater. If the heater discharges warm air onto the bottom of the window it can reverse the direction of the air movement over the lower part of the glass and will greatly increase the minimum temperature of the glass (and heat flow through the window), even though the room temperature remains unchanged. This is shown by the dotted curve in Figure 2.

In addition to convection there is radiation heat transfer occurring at the glass-air interfaces. The rate of energy emission from unit area of a surface, called the emissive power, depends on the temperature and nature of the surface. A "black" surface is one that radiates the maximum possible amount of energy at any temperature. Table II gives the emissive power of a black surface at temperatures the surfaces of buildings are likely to attain.* The

* A much more extensive tabulation of the emissive power of a black surface is available as NRC 5947 of the Division of Building Research, National Research Council, Canada.

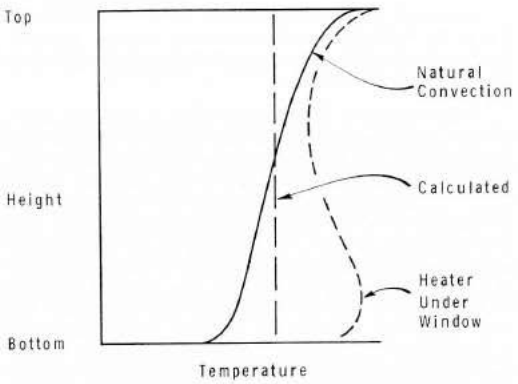


Figure 2 Temperature variation over inside pane of basic double window

ratio of the emissive power of a real surface to the emissive power of the idealized black surface is the emissivity of the real surface.

Heat Flow Across an Air Space

Heat is transferred across an air space between two surfaces by radiation and conduction or convection. The conductance by radiation between extensive parallel surfaces is the product of the conductance between black surfaces, $h_{r\ black}$, and a factor that depends on the emissivities e_1 and e_2 of the two surfaces:

$$h_r = \left(\frac{e_1 e_2}{e_1 + e_2 - e_1 e_2} \right) h_{r\ black}.$$

The emissivity of glass (and most other non-metallic building materials) is about 0.9, so that the emissivity factor in this expression for h_r is about 0.82. The value of $h_{r\ black}$ can be found from the data in Table II; for surfaces at 0 and 50°F, for example,

$$h_{r\ black} = \frac{(116-76)}{50} = 0.80 \text{ Btu/ft}^2\text{hr °F}.$$

The value of h_r between the panes of the double window considered above is, therefore, about 82 per cent of 0.80, i.e. $h_r = 0.66$ Btu/ft² hr °F. This indicates that 25 (i.e. 0.66 x 37.3) of the 40 Btu/ft²hr as calculated earlier are transferred across the air space as radiation.

TABLE II
EMISSIVE POWER OF A "BLACK" SURFACE

Temperature °F	Emissive Power Btu/hr ft²	Watts/ft²
−50	48	14.1
−25	61	17.9
0	76	22.4
25	94	27.7
50	116	33.9
75	140	41.0
100	168	49.2
125	200	58.6
150	237	69.3
175	278	81.4
200	324	95.0

The value of h_r is practically independent of the thickness of the air space, but does depend on the temperatures of the bounding surfaces. The summer value of h_r can be obtained by assuming the temperatures of the inner and outer panes to be 75°F and 100°F. In this case h_r for glass is 0.92 compared with 0.66 for winter. This is one of the reasons why a warm air space has a lower resistance than a cold one.

The conductance, h_c, associated with the conduction-convection heat transfer is dependent on the width of the air space and, to a minor degree, on the average temperature of the air in the space and the total temperature difference across the space. For spaces less than ½ inch thick there is very little convection and h_c is equal to the thermal conductivity of the air divided by the thickness of the air space. The minimum value of h_c obtains when the air space thickness is about ⅝ inch; as the thickness is increased beyond this the increase in convection more than compensates for the decrease in conduction. When the air space thickness exceeds 1¼ inches the conductance is practically independent of thickness. CBD 46 shows the variation of the over-all conductance of a window for air space thicknesses up to 3½ inches.

In an air space enclosed by horizontal surfaces the value of h_c depends on whether the heat flow is upward or downward. For downward flow the warmest air is next to the top surface and the coldest at the bottom, so that there is no tendency for convection currents to be set up and h_c for the space is inversely proportional to thickness, regardless of thickness. When the heat flow is upward through a horizontal air space, convection does occur and the values of the conductance for such a space cannot be calculated simply.

As radiation is the predominant mode of heat transfer when the enclosing surfaces have high values of emissivity, the resistance of an air space can be decreased by reducing the emissivity of the enclosing surfaces. Polished metallic surfaces have much lower emissivities than non-metals. Polished silver, for instance, has an emissivity of only 0.02 compared with values of 0.90 to 0.95 for most non-metals. The radiative conductance between two parallel, polished silver surfaces is only 1 per cent, and between polished aluminum surfaces 3 per cent, of that between black surfaces at the same temperatures. The foil type of insulation exploits this feature of polished metals. Each layer of foil that is positioned between and parallel to the enclosing surfaces of an air space increases the over-all resistance in two ways: it produces two thinner air spaces, which together have a greater resistance to heat flow by conduction-convection than one thick space; and it reduces the radiative heat transfer very significantly because of the low emissivity of the metal surfaces.

The effectiveness of foil insulation is greatly reduced if condensation occurs on the foil. Even a very thin deposit of water increases the emissivity to a value greater than 0.9. Any holes in or around the foil that allow an interchange of air between the air spaces on the two sides also increase the over-all conductance because of convection between the warm and cold air spaces. It is worth noting that most of the non-reflective insulations achieve their effect by breaking an air space into a multitude of small spaces, thus inhibiting the air circulation that is the basis of convection.

The complications in assigning suitable resistance values to air spaces can now be appreciated more fully. Resistances vary with temperature, orientation, thickness of air space, and emissivity of the surfaces involved. Values of the over-all conductance (or resistance) of air spaces can be found in NRC 7788 for the more common situations likely to be encountered in building.

Heat Transfer at an Exterior Surface

The use of a combined surface conductance ($h_c + h_r$) is based on the assumption that heat flow by both radiation and convection is proportional to the same temperature difference. This is valid for an air space, but at a free surface the ambient air temperature can be quite different from the temperature of the objects that are exchanging energy with the surface by radiation. For instance, the outside surface of a wall or window receives a great deal of energy from the sun, and this is quite independent of the temperature difference between the surface and the air. The effects of convection and radiation are combined, in this case, by the use of a fictitious temperature called the sol-air temperature (S.A.T.) rather than by a combined surface conductance. The sol-air temperature concept has been discussed in CBD 47, which deals with the extreme temperatures at the outer surfaces of buildings. The heat flow and temperature distribution through a wall or window are calculated as for the simple example above, except that the S.A.T. is used instead of the outside air temperature and the surface resistance is $1/h_c$. When there is direct sunshine falling on a wall the S.A.T. can be as much as 100 degrees above the air temperature; and at night when there is a cloudless sky the S.A.T. can be as much as 20 degrees below the ambient air temperature.

As the surface conductance is involved in evaluating and using the S.A.T., it is important that the same value be used in both operations. The choice of the value depends on whether the ambient air temperature will be between the values of S.A.T. and the surface temperature or not. If it is, the heat flows by convection and radiation are in the same direction and the net heat flow is greatest when h_c is a maximum. Thus the value corresponding to forced convection with windy conditions should be used. If, on the other hand, the surface temperature is between the S.A.T. and the ambient air temperature (as for most insulated walls when the surface temperature is at a maximum or minimum) the heat fluxes by radiation and convection are in opposite directions. In this case the net flow will be greatest when h_c is a minimum.

There are very few reliable data on the maximum conductance that can occur at the outer surface of a building. NRC 7788 gives values for the case where the wind is blowing parallel to the surface. When wind impinges on a surface at an angle the flow pattern over the surface is quite complicated and the conductance can vary considerably from point to point on the building. Projections from the plane of the wall, such as decorative fins or solar shading devices, affect the air flow and thus influence the heat transfer. An outside surface conductance of 6 Btu/ft^2 hr °F is commonly used for winter design calculations. In the absence of reliable experimental results this value is recommended for those cases where a high value of h_c is appropriate. A minimum value of about 1 Btu/hr ft^2 °F is appropriate for the case with no wind.

Heat Transfer at an Interior Surface

The inside surface of a wall or window exchanges heat by convection with the air in the room and by radiation with all the other surfaces that together enclose the room. It is often convenient to allow for the two independent heat transfer processes by using an inside surface conductance that is the sum of h_c and h_r, just as is done for an air space. This is quite all right so long as the surfaces that can be seen from the wall or window are close to the same temperature as the air in the room. This is usually the case for floors, ceilings and partitions that separate rooms at about the same temperature. It is not true, however, for a corner room, which has two outside walls; nor is it true for a room with a radiant heating system or a high level of artificial lighting. In these cases the radiation and convection can be combined by the use of a fictitious air temperature similar to the sol-air temperature for the outside surface.

If the window considered in the first example were part of the outer wall of a room with a radiant heating panel in the ceiling, the temperature of the inside surface would be about 4 degrees warmer and the total heat flow through the window would be about 9 per cent greater than that indicated by the simple calculation.

Conclusion

Whenever it is necessary to estimate the average heat flow and temperature at different planes in a wall it should be done by either the graphical or numerical methods described in CBD 36. The data that are required can be found, in almost all cases, in NRC 7788. The results of this calculation must be interpreted, however, with due regard for the approximations that are implicit in this simplified approach.

Monsieur Robert le Ricolais, invité à s'adresser aux membres de l'AAPQ dans le cadre de leur congrés tenu à Montréal en janvier dernier et consacré à l'architecture et à l'Exposition, prononça une brillante improvisation sur le thème qu'il avait traité dans un texte écrit dont il préféra dégager quelques points. C'est ce texte que le distingué professeur de l'Institut de Recherches Architecturales de l'Université de Pennsylvanie nous autorise aimablement à publier ici.

La conférence était intitulée: "Projet et esquisse d'un système de transport en commun aérien". Remarquant d'abord, après Freyssinet, que l'introduction de forces dans un système en accroit la résistance aux efforts et, ensuite, qu'une ligne de transport efficace ne saurait être que continue et de vitesse uniforme, Monsieur le Ricolais en vint à proposer, parallèlement aux moyens de transport traditionnels, un réseau aérien étagé formant des hexagones d'un quart de mille de côté, chaque angle comportant une station située à la cote de quelques centaines de pieds. Les portées seraient franchies par un système léger comprenant des diaphragmes et des cables d'acier en très haute tension. *J G*

an Aerial Mass Transit System

by Robert le Ricolais

I would like to clarify my intervention and make a few preliminary statements in bringing to your attention a few points: I am not a registered consultant engineer, I am not a business promoter, I am certainly not qualified to speak because of great personal experience in that very special field which I intend to discuss with you today.

The only reference I can produce, and the only excuse I may have to be here taking your time is that, perhaps more than many other technicians absorbed by their daily profession, I have always had a certain propensity to dream about things of tomorrow. Yet through a pretty long experience, I have painfully learned that patience is the cardinal virtue of the researcher.

For a long time I have always dedicated some attention to the art of arrangements, whether of materials or of forces, and I have been fascinated by the problem of "position". By position, I mean the occupation in space of immovable and sometimes movable bodies, and indeed this has been since Archimedes a very old problem. Really, whatever things are, pieces of steel or of wood, they are no more undeformable than motionless, and everything everywhere is concerned with changes and movements. It would be a commonplace to state that our age is the age of velocity, perhaps expressed more accurately in Newtonian language by saying that it is ruled by forces and accelerations.

Speaking in terms of structures, a great age has begun, and amongst many of our predecessors Freyssinet should be remembered, for he proved, around 1928, I believe, that the introduction of forces into systems could increase the strength of materials. Increasing strength equates reducing weight, worst enemy of the engineer. To me, even greater than the practical results is the beautiful and pure notion that forces of an abstract nature could be a substitute for concrete and ponderous materials.

Steel is still the prince of all materials, and through a more thorough understanding of the molecular arrangements of the crystals, especially the phenomenon of dislocation, we have learned a great deal in finding out the weakness of metals, more perhaps than in designing stronger ones. "Molecular Engineering", as it has been called, is yet at its beginning, but we know certainly that we should have steel enormously more resilient than we have available today. To solve those problems is the need to understand what is meant by complexity. Nature is the great teacher in those difficult tasks and we have to maintain a great humility. I have extracted from a report from Professor W. D. Robertson an interesting table:

	Tensile Strength	*Strength Density Ratio*
Spider Web	26.200 PSI	2.7×10^6
Nylon	100.000 PSI	6.1
Steel	300.000 PSI	2.6

This at room temperature. The spider is thus a better architect than we are, at least as far as metal is concerned. Despite this momentary shortcoming, for our structural application High Tensile Steel cable capable of 125.000 PSI proves to be an admirable material, and we will endeavour to show how it can be used to some advantage to solve our snarl problems in urban traffic.

Although I am not certain that this utensil of torture that we name a watch is to be blamed for the mad, mad world of today, it would be hard to deny that except in holiday time, when we can revert to a leisurely rhythm, the notion of time has

shaped our lives in an irreversible fashion. Our response has been the increase in the velocity of displacement, but if Detroit can supply every American family with three cars of rather immodest dimension, all the richness in the world cannot create an additional square inch of two-dimensional space, and it is really interesting, if not amusing, to see what the future will witness. Indeed, any Metro strike in Paris gives a preview of this inhuman situation when all vehicles are frozen in a jellylike immobility. In order to solve a problem of such paramount importance, it is interesting to give some information from the American scene. The estimated cost of public transportation in the Nation's major metropolitan areas is about $8 billion, most of which would fall upon the communities themselves. It will be interesting to see the reactions of the Congressman, those belonging to rural districts being generally indifferent to this situation. On the other side, the automobile industry and road building industry look askance at any proposal to divert traffic from highways to rail. So, the entire life of cities, nervous plexi of great nations, can look forward gaily toward complete paralysis, this in the very near future . . . .

* * * *

Confronted with a problem of such magnitude, it may be fruitful to turn back to the past and repeat this remark made so happily by the writer Panait Istrati, that if two highways can cross, never be it so for rivers. Thus, by virtue of continuity, the paths should be superimposed and depressed. It is the observation of this very simple principle that has saved Paris with the Metro system, this for sixty years . . . . The true problem of mass transit appears to me as being much more a problem of acceleration and deceleration than a problem of velocity.

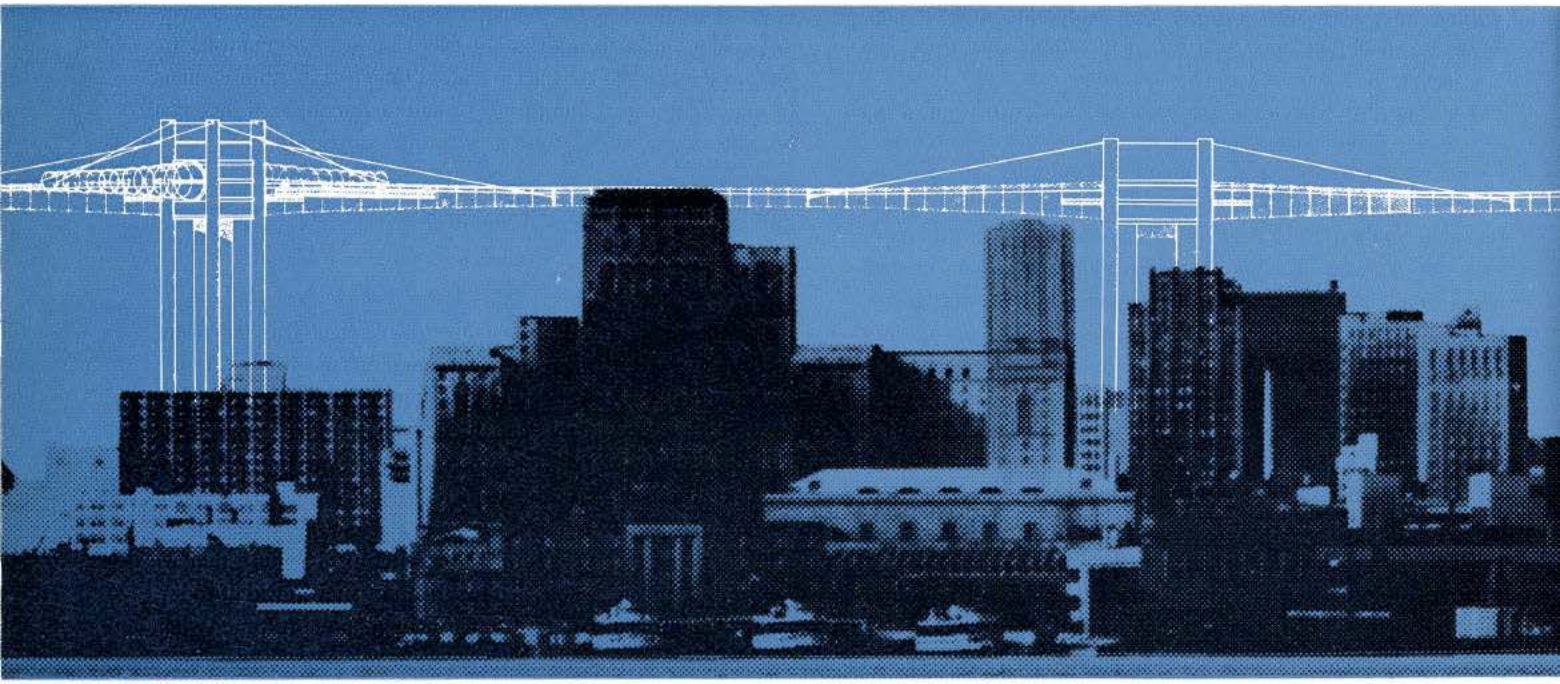
Equally important is good choice of the sites for the intersections and interchanges, this within a modular mesh for which the average distance of 500 meters or 1650 ft, approximately four blocks, chosen for Paris seems to me even today, and perhaps more so today than yesterday, perfectly adapted to the public need.

During the half century, the Paris Metro has seen very few basic alterations; interesting details: automatic gates both for the cars and the stations, and more recently the innovation of pneumatic tyres yielding greater comfort and noise reduction, together with a potential increase in acceleration.

Unfortunately, Paris has now around 8 million inhabitants and this is sure to bring some headache for platform extension and a smooth flow of circulation.

One cannot invent the complex internal life of a city, and this is just why it would be an impossible task for me to make any suggestion on the prospective design of a transit system. Perhaps all that is left to me is to state only in a more general way some opinions on different schemes, and suggest a few observations. My feeling is that the amplitude of the problem is such that one system only is not exclusive of another. What I mean is that with a good master plan, none of these systems should be redundant and from their combination many favorable points may be gained. Indeed, both of those systems have their respective advantages and inconveniences.

If I am more inclined in this talk to speak about Aerial Suspended Systems, it is not because they are the object of present day fashion, but because I really see the practical means to undertake such projects, without minimizing the considerable study and labor invested in them. If I may dare to say so, what seems to me of an extremely exciting value is to superimpose on the rather loose tissue of an existing modern Metropolis an ORDER directed toward integration rather than the disloca-



tion created by highways such as we see in towns like Los Angeles, for instance, and many other American cities.

The Forum of today is no more a Plaza of ancient Rome but a *nervous system* enabling each citizen to come in contact with others and with his own business in the *shortest and fastest way possible*. On this loose primeval tissue must be superimposed a new one, punctuating the city with *high building towers,* forming the interchanges loci and foci of *dense occupation;* very high towers indeed where the lower portion nearest to the ground level should be used as parking garages. Any dweller in these strong points could indifferently *choose* the most appropriate system of comunication.

What then should be this aerial network?

This aerial network is only compatible with segments of straight lines, since it is operating higher than the highest building. Straight lines are the most stable conditions for bodies in displacement.

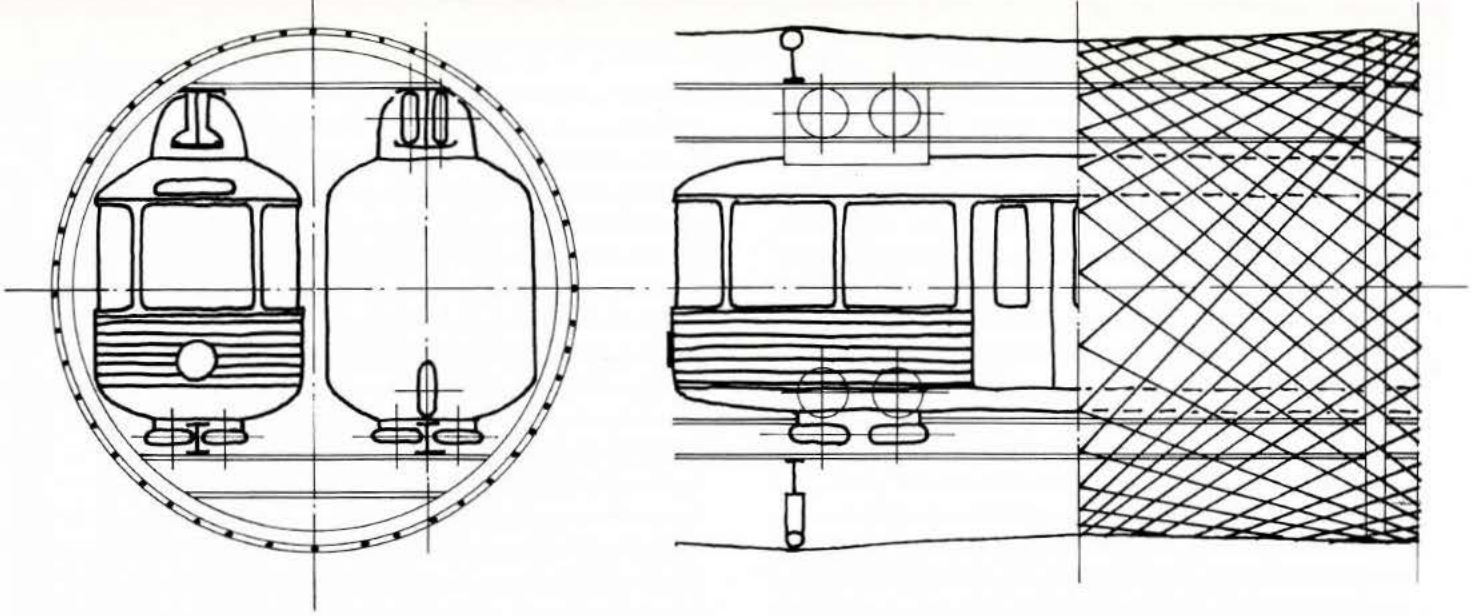
NATURE OF THE AERIAL NETWORK

I would really feel guilty of a "school-masterish" attitude in bringing to your attention some elementary propositions of geometry — so well known that there is no prowess in reminding you of them. Yet one of those, known as the Steiner problem, is quite interesting and of importance. In short, what is the shortest route to connect three points located on the apices of a scalene triangle? If we assume Mr. Steiner to be correct, the three roads at their common plexus should make between themselves a 120 degree angle. From there, it is not too difficult to infer than any *ideal grid* should be obtained by the intersection of three lines, yielding thus intersections of six branches. We are thereupon in a complete conflict with the anthropomorphic rectangular partition of space known as N,S,E,W, since age immemorial. Well, since we cannot rebuild our cities we will live with this little inconvenience, but, since our Aerial Network operates in three-dimensional space, where we can afford the superposition of three levels, I do not see why we should not take advantage of such an arrangement. Incidentally, this problem has some connection with the classical problem of the message in Cybernetics, where the message length is inversely proportional to the logarithm of the number of signs of the code transmitting the message. If, for instance, we compare a six-branch system to any four-branch system, the efficiency, related to the time of travel, is in the ratio of log5/log3, yielding a time gain of 46%.

I am, of course, perfectly aware of the extremely high altitude reached with a three-platform tower where such interchanges shou'd take place, and this is why, as a substitute, a space partition made with the tesselation of triangles and hexagons (Trihex) can reduce the interchange to two levels; of course, in this alternative, the efficiency of the traffic would be much less. It is interesting to note the apparent paradox: The more ways of communication that are available, the less you have to use them.

VERTICAL TRANSPORTATION

Both conditions of transportation time and occupied surfaces call for vertical circulation using express cabs to feed the station platforms, and local cabs for the tower occupants. From inquiry among specialists of high elevators (200 ft or more), the speed of 1000 ft per minute (5.08m/sec) is obtainable after a height of 75 ft. The convenience of standard cabs, capable of holding 27 persons, would allow an output of 450 persons per hour, assuming four minutes per trip. It seems thus that an average number of four to six cabs should handle the traffic



even in the period of peak load. Nevertheless, it is certain that the vertical problem of circulation is a delicate part of the project and would probably involve a cost of nearly the same amplitude as the cost of the structure of the bridges joining the stations. The autonomy of the electric power of the installation would allow, by sending electric current in the line, the recuperation of the potential energy yielded by the passenger weight.

It should be added that the vertical circulation should include also banks of escalators feeding the interchanges between the two or three levels of each station platform.

STRUCTURAL SYSTEMS

The series of bridges of approximately 1300 ft span (400 m) joining each station would be based on Tension Net Tubes. The principle is the pretensioning of tubular networks following a parabolic profile. The system is based on a particular weaving of the cables on toroidal diaphragms. The purpose of these diaphragms spaced at approximately 16 ft is to secure the stability of the section and support the suspended rails. Except the diaphragms, the system does not require any compression members, since the thrust is annulled by the connection to the adjacent span, the ultimate thrust being taken by the foundations at ground level in the peripheral stations of suburbia.

The deformation control is secured by hydraulic jacks, also governed by thermostatic action taking care of temperature. The design takes into account a slight denivellation of level to secure an acceleration due to gravity and deceleration when pulling in.

EXPERIMENTAL TESTS ON MODEL

A one hundredth scale model has been tested with the limited facilities available at our Institute for Architectural Research of the University of Pennsylvania. Last November we were fortunate to bring it to completion, having had a previous experience in this type of structure by building an automorphic tube in 1961. Briefly described, this model is composed of 40 stainless steel cables of 1/16-inch diameter, crisscrossed along a cubic parabola, using for the diaphragms 20 tubes in steel (½" OD). The system is hooked on a rigid tubular frame where three jacks enable a pretensioning of four or five tons. Those preliminary tests were intended more to give an order of magnitude than very accurate results for which our equipment was not adequate. However, it has been recognized that the principle was sound, effective in its action and most certainly rewarding for further studies and applications.

From those preliminary tests, it was possible to check the elastic behavior of the pretensioned tube compared to a rigid body, and find experimentally what we call the coefficient K, which is the ratio between the effective stiffness measured by deflection compared to the theoretical inertia of the tube.

Taking into account the dead structural weight (of an order of magnitude of 700 tons) for an actual bridge, it was thus feasible to find the available moving load for a given deflection. The result of a preliminary analysis showed us that the stiffness had to be increased by the classical device of the King Post or more exactly, Queen Post system (2 vertical struts). Our very next activity will be to check our computation, taking into account the laws of similitude. Thus for the moment it is perhaps adventurous to make any prognostication.

However, with all the danger involved in it, according to our figures, the bridge of 400 meters could be built with some 1000 metric tons of steel. This appears a rather encouraging result.

Nevertheless, it would be preposterous to rush toward a too optimistic conclusion. Tension Net Bridges should be certain in the future, but, as with everything good in this world, this has to be paid for by material and enormous work.

LABOR COST

Tension systems making full use of continuity are immune from the joint problem, welding or bolting, exacting and costly, as are met in compression systems. Friction, as has been noted by Freyssinet, is the only passive way of balancing the enormous forces potentially available in H. T. S. cables. Thanks to the coming favor of tension systems, all the hardware and equipment are available now and do not call for detailing studies.

It is wholly probable that labor economy in tension structures will take the precedence over material when building enterprises become more familiar with this type of structure.

The erection technique, due to the nature and small weight of the components, seems well fitted for the use of helicopters. Without undue optimism it seems that we are on the verge of a great structural age where the means meet the end. This is our sincere hope.

an Introduction to CPM

by Dennis Peters

Dennis Peters is a graduate of the School of Architecture, University of Toronto, and is an associate with the firm of Shore & Moffat and Partners. He is presently working on two projects using CPM.

The new owner, both corporate and single, is demanding realistic dates for stages of completion of a project so that special equipment may be ordered, delivered and installed and that special personnel may be hired in advance. The owner will look to the architect for accurate dates of completion and regular reports on job progress. The reporting must be quick and, above all, accurate. A major new tool to aid this requirement of project management is the Critical Path Method of scheduling. Most readers will know the heart of the Critical Path Schedule is the arrow diagram. The arrow diagram becomes a visual schematic tool; a diagram with each important activity arranged in a logical order showing a sequence of events and showing the independence and interdependence of all the activities of a project. The Critical Path Schedule differs from traditional "bar charts" by distinguishing between planning and scheduling, planning as a logical sequence of events; scheduling as a timing and duration of the events.

Upon completion of the arrow diagram, durations for each activity may be established. Because some activities cannot go ahead until the completion of other activities, CPM becomes a timetable showing earliest and latest starts for each activity. The greatest time and the path of the activities through the arrow diagram becomes the Critical Path and therefore the project duration. The benefits of preplanning in detail any project from a picnic to a large complex of buildings are obvious. By extending the CPM and establishing a manpower figure for each of the activities a remarkably realistic picture appears of the building project under consideration.

Consider the problem of a 3½ million dollar teaching and research building in a university building program. The university is commited to provide a teaching space for 400 new students within ten months. The mechanical and electrical services total 1½ million dollars or 40% of the building cost. The first question asked of the architect and of the contractor is "Can the building be built in 10 months"? No one can tell. The general belief is that it cannot but that somewhere in the future and at about the time required for occupancy some areas may be ready. CPM gives a much clearer picture. After drawing the arrow diagram a schedule for each of the activities is established, the duration of each activity is contracted to fit within the 10 month period. A manpower figure is given to each activity; the total number of men required on concurrent jobs can never be more than the number of men available. In my experience the above example was real and by this detailed consideration of available work force it was established that if there were no delays in progress caused by strikes, deliveries or changes, the project could remain on schedule and with the manpower available could be substantially completed within a 10 month period. By CPM it was established that to build the project in such a short time was physically possible. It also made possible such detailed analysis and considerations as the early stripping of concrete through the use of High Early Cement thereby gaining critical days.

However, there will always be delays caused by late deliveries or manpower shortages. With a CPM schedule, assessment of delays of the entire project are quickly done. Decisions of whether the delayed activities should be expedited or not are easily made. With this knowledge the architect is in a far stronger position to discuss progress. With CPM the doubts and uncertainties can be eliminated: the trade and area of work causing delay can be pinpointed, the delay expressed in work days, the effect on concurrent trades and the effect on the total job duration can be assessed. The frustrations of the owner, the contractor and the architect are overcome.

So we see that CPM becomes an administrative tool which will provide (1) schematic basis for planning and scheduling, (2) a means of evaluating alternative plans for the procedure of any task in least time and least cost, (3) a schematic plan showing the interdependence of all activities and (4) a method of checking progress on a task. On larger projects and certainly those costing more than 3 million dollars CPM will require an administrator with a technical background and training in the building industry. CPM will also require a periodic monitoring through the computer so that those items on the critical path, which have fallen behind can be rescheduled. Monitoring through the computer will also indicate those new activities which have become critical because of the delays.

Critical Path Scheduling appears to be complicated. It is not. However it demands detailed planning and on larger projects requires the attention of a man trained in building techniques. Although more contractors are beginning to use CPM, an architect must specify its use in order for it to become an effective tool.

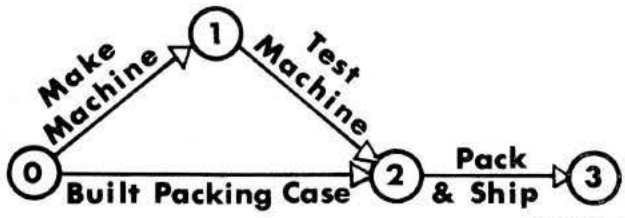


FIGURE 1

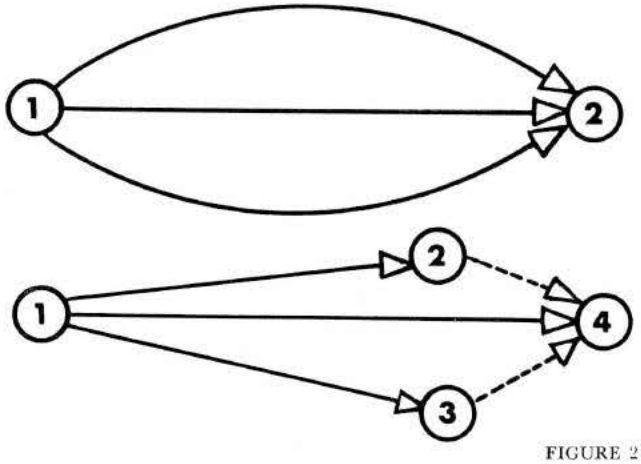


FIGURE 2

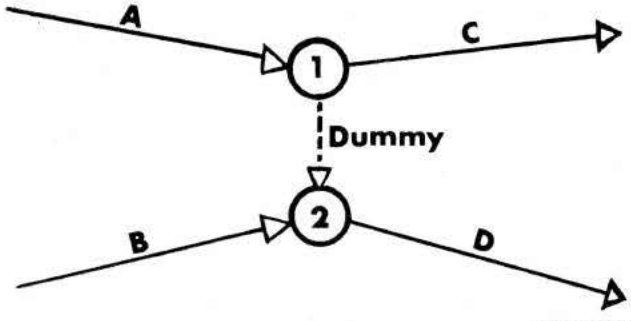


FIGURE 3

the Critical Path Method of Scheduling

by Ian McKenzie

The Architect will rarely need to use the Critical Path Method in its entirety for his own requirements although the simple application of it will solve many planning and scheduling problems in the office. However, owners are requesting it more and more and many general contractors are using it regularly whether it is specified or not. It is a proven and established technique. The architect must therefore be aware of the practical advantages of CPM and he also requires a general knowledge of its principles in order to decide whether it should be specified or not on a specific project.

Critical Path was originated in the mid-fifties by duPont Engineering Services. The basic principles have not changed since that time, but refinements are constantly being added and new uses found for it. In essence, it is a graphic representation of a logical plan. When we add time elements to the plan we arrive at a schedule. The longest path through the plan or network is the critical path. Any time lost on this path delays the project. It is equally important to know the non-critical paths, where there is free time or float—by adjusting scheduled start dates it may be possible to balance manpower requirements. This is a very general definition of Critical Path and we will examine its major advantages before looking at the details of technique.

ADVANTAGES

1 Critical Path assures everyone concerned—the owner, the architect and the senior staff of the general contractor—that sufficient pre-planning of construction has been carried out. The details are down in black and white to be examined.

2 Since it is in effect a model, it may be tested for validity and altered accordingly. It is far cheaper to change plans at this stage than in the middle of construction.

3 It shows areas of responsibility. Architects, for instance, can very easily be on the Critical Path with shop drawings.

4 It shows inter-relationships between the architect, the general and the sub-contractors. Exactly what effect will a late delivery have? How much time will be lost if a certain change is requested?

5 It is a continuing means of communication between all the parties to the contract. In particular, architects find that computer produced control reports are a very efficient way to obtain progress reports.

These benefits do not come about by themselves. The efforts made by the general contractor's staff produce the plan and the time estimates. The computer evaluates the information, calculates the necessary figures and produces the reports. These reports are so much waste paper unless they are translated into action. To do this requires knowledge of CPM principles.

PLANNING

CPM separates planning and scheduling. Planning is performed first and is based on logic. Man-power restrictions are not considered, only logical restrictions. To express the plan on paper, activities and events are used. An ACTIVITY, eg. cure and strip, is expressed as an arrow. An EVENT, which is a junction, a point in time with no duration, is usually shown as a circle.

The usual example is a project with four activities:—1 making machine, 2 packing and shipping, 3 testing the machine, 4 building a packing case.

Since we are not concerned at this point with manpower restrictions, we can plan logically by asking three questions about each activity.

1 What must be done before this activity?
2 What can be done at the same time?
3 What can be done only when this activity is completed?

Nothing must be done before making the machine. We can build the packing case at the same time. Testing can only be done when the machine is made. So No. 1 and No. 4 can start from the same event and No. 3 follows on No. 1.

Before packing and shipping we must test the machine and have the packing case built. Nothing can be done while we are packing and shipping and nothing comes after.

The machine must be made before it is tested. The packing case can be built at the same time. We can only ship the machine after it is tested.

Nothing must be done before building the packing case. While it is being built, the machine can be made and tested. We can only pack and ship after we have built the packing case.

These four paragraphs are graphically expressed in Figure 1 The arrows are not vectors. The length and slope have no significance. Building the packing case appears to take as long as making and testing the machine. This may or may not be true. All we are saying is that we can start to build the packing case when we start to make the machine and we must have it completed before we can pack and ship. It is as simple as that.

The numbering system is important. The number at the tail of the arrow is called the "i" number and the number at the head is the "j". The "ij" completely defines the activity. We can now say activity "01" instead of having to say "make the machine". In the manual solution and with some computers, the "i" must always be lower than the "j". On the General Electric 225 it does not matter. The network may be numbered at random or hundreds of activities could be added at a later date without difficulty. Each activity must have its own unique number set and a technique is needed to handle this.

A DUMMY is an activity with zero duration and we use it to keep ij numbers unique. If three activities can start from one event and must be completed before the next event, they might be expressed as in Figure 2a. But then we have not defined these activities. Which activity 1, 2, are we talking about? The solution is to use Dummies as in 2b. Since the Dummy, expressed by a broken line, has zero duration, there is no logical difference between Figures 2a and 2b.

The Dummy is also used to solve logical problems. If activities A and B must be completed before D can start but C can start when A only is completed, the Dummy is used as in Figure 3. When event 1 is reached C can start immediately. D must wait for event 1 and event 2. If the direction of the Dummy is reversed, then D is dependent on B alone but C must wait for both A and B.

The Lead Time DUMMY, by convention, usually starts a project. It is regarded as a spring which contracts or expands. Activities outside the control of the project superintendent, called RESTRAINTS, often start from the Lead Time Dummy. Permits and deliveries of materials or shop drawings are examples of Restraints.

To summarize planning, we use activities and events to express on paper the logical flow of construction. Physical restrictions, not manpower restrictions, form the basis of the three logical questions asked of every activity. For example "site preparation" comes before "excavate".

SCHEDULING

The schedule develops from the plan when time estimates are applied to the activities. Examples are "excavate—30 days", "delivery of structural steel—40 days" and "curing—4 days". The resulting schedule will only be as good as the original time estimates or DURATIONS.

When Durations along a path are summed, the EARLIEST START TIME for each activity is found and the Total Project Duration. Figure 4 illustrates this.

Event O starts at time zero and the Lead Time Dummy has a duration of zero, so activities 1, 2 and 1, 3 can start at time zero. 1, 2 starts at time zero and has a duration of 5, so 2, 3 and 2, 4 can start as early as time 5. Although 1, 3 starts at zero and has a duration of 8, activity 3, 5 cannot start until time 9, because it takes that long to complete the other path leading into event 3, i.e. 1, 2 and 2, 3. You may look upon an event as a railway junction. The train cannot leave there until it has picked up passengers from the trains that arrive.

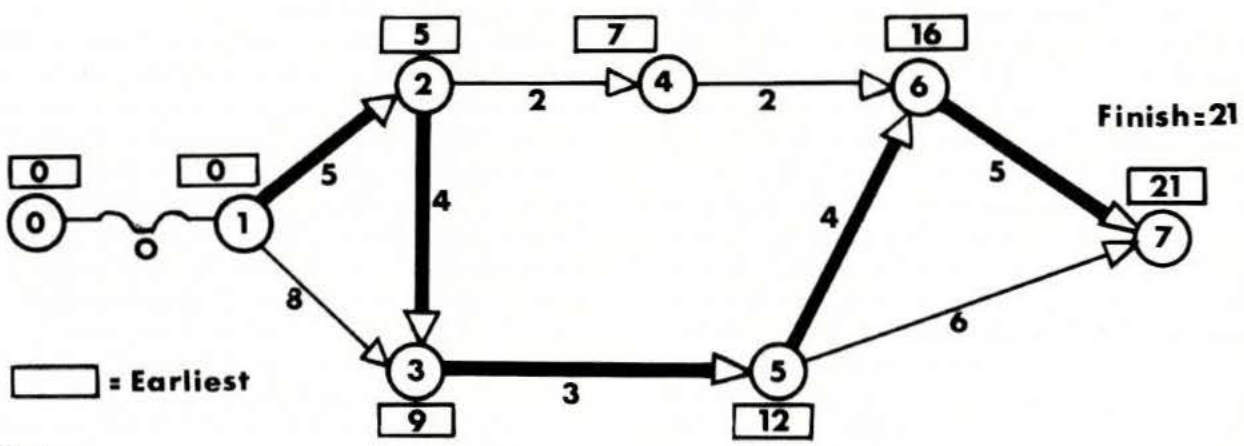


FIGURE 4

THE CRITICAL PATH

The Critical Path is the longest path through the network. It is the path where, if any activities are delayed, the project falls behind schedule. The longest path determines the shortest time in which the project can be completed.

The Critical Path is described in Figure 4.

IJ	EARLIEST START TIME	EARLIEST FINISH TIME
0, 1	0	0
1, 2	0	5
2, 3	5	9
3, 5	9	12
5, 6	12	16
6, 7	16	21

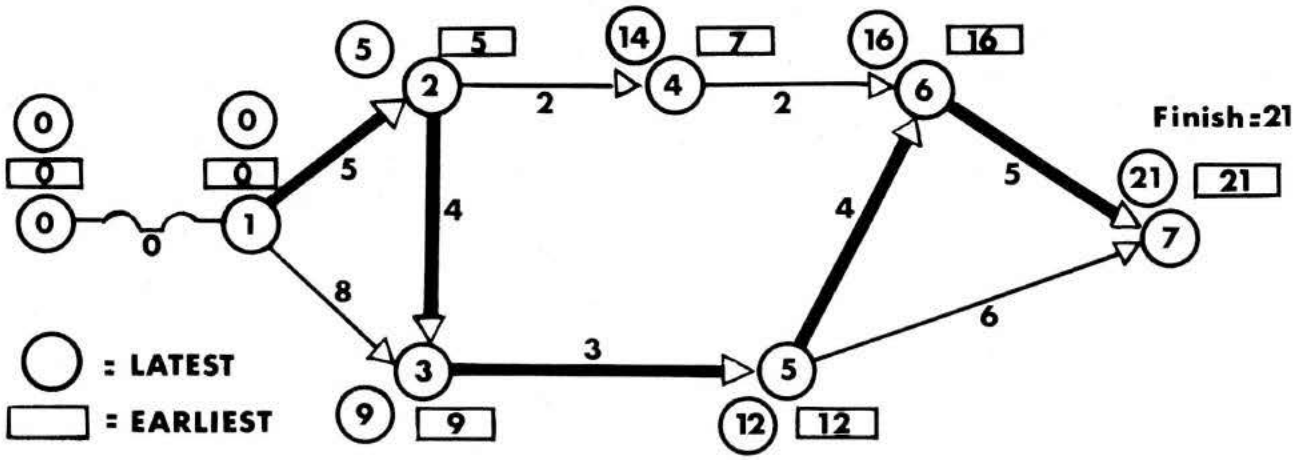


FIGURE 5

The project duration of 21 has also been determined. The 21 may be hours, days, weeks or months, it does not matter as long as a consistent unit of time has been used for all activities.

Not-critical activities have spare time which is called FLOAT. It is obvious in Figure 4 that we have one day's Float on activity 1, 3. Between event 2 and event 6 on the top line there is only 4 days work to do but 11 days available. Similarly there are 3 extra days on activity 5, 7. All this spare time is Float.

In complex networks, we calculate the latest times as well as the earliest times in order to determine the Critical Path and different categories of Float. Figure 5 illustrates this.

Assuming the earliest completion to be also the latest, 21 is entered at event 7. All activities leading into event 6 must be completed by time 16 if event 7 is to be reached by time 21. In other words, starting from the last event we deduct durations to arrive at the latest start times. Notice that at event 5 there appear to be two latest start times. Along the path 5, 6 and 6, 7 it is 12, but along the path 5, 7 it is 15. The answer is that we consider the event not the individual activities. We must be able to leave event 5 by time 12 or else the project will be delayed.

Activities are on the Critical Path when:—1 Earliest Start equals Latest Start and 2 Earliest Completion equals Latest Completion and 3 Start plus Duration equals Completion.

FLOAT

Float is broken down into three categories:—1 Total Float, 2 Free Float, 3 Scheduled Float.

Total Float is all the Float available for an activity. An activity does not have Total Float in its own right but only in relation to other activities on the same path. In Figure 5, activity 2, 4 has 7 days Total Float, but so has activity 4, 6. This Float does not belong to either activity in its own right. Total Float is the maximum time available, less the duration of the activities.

Free Float is some part of Total Float which does belong to an activity providing it begins at the earliest possible time. It cannot be passed on to other activities. In figure 5 activity 1, 3 has 1 day's Total Float which is also Free Float because it cannot be passed on. We saw that activity 4, 6 has 7 days Total Float. This is also Free Float, since the spare time cannot be passed on. Activity 5, 7 has 3 days Float which is both Total and Free. Free Float can equal but can never exceed Total Float. It is only present on the last activity where a path joins the Critical Path or one that is more critical than itself.

FIGURE 6

COMPUTER DATA CONVERSION PROJECT
SETUP FOR SAMPLE PROBLEM - COMPUTER DATA CONVERSION PROJECT

SELECTED FROM SCHEDULE 002 OF CPM-A
PROJECT DURATION IS 266 DAYS
START DATE= 010CT62 FINISH DATE= 170CT63

ACTIVITY I	J	STATUS	DURATION DAYS	WK/DA	SCHEDULED START	SCHEDULED FINISH	EARLIEST START	EARLIEST FINISH	LATEST START	LATEST FINISH	WK/DA SCHED	WK/DA TOTAL	FLOAT	COST	WT
0	1	CRIT	0	0/0	010CT62	010CT62	010CT62	010CT62	010CT62	010CT62				0	0
000000LEAD TIME DUMMY															
0	7		10	2/0	010CT62	150CT62	010CT62	150CT62	11JAN63	25JAN63	14/0	14/0		200	1
010001DELIVERY OF MASTER FILE LAYOUT															
0	17		3	0/3	010CT62	040CT62	010CT62	040CT62	22AUG63	27AUG63	3/2	45/2		0	1
010002DELIVER COMPUTER TIME															
0	22		180	36/0	010CT62	17JUN63	010CT62	17JUN63	18JAN63	020CT63	15/0	15/0		0	5
010003DELIVER COMPUTER															
1	2	CRIT	20	4/0	010CT62	290CT62	010CT62	290CT62	010CT62	290CT62				2000	1
020001DETERMINE DATA SOURCES															
1	6		60	12/0	010CT62	27DEC62	010CT62	27DEC62	080CT62	04JAN63	1/0	1/0		2500	3
030001HIRE AND TRAIN PROGRAMMERS															
17	18		0	0/0	290CT62	290CT62	040CT62	040CT62	27AUG63	27AUG63	42/0	45/2		0	0
000000DUMMY															

(1) SETUP FOR SAMPLE PROBLEM - COMPUTER DATA CONVERSION PROJECT
MONITOR RUN NO. 1 SAMPLE PROBLEM - COMPUTER DATA CONVERSION PROJECT

(2) SCHEDULED PROJECT FINISH= 17OCT63
EXPECTED PROJECT FINISH= 17OCT63

(3) EFFECTIVE 30OCT62 (4) PROJECT STATUS, ON SCHEDULE

OPTIONS- PUSHED

(5) ACTIVITY I	J	(6) STATUS	(7) DURATION SCHED	USED	(8) START DATES SCHED	EARLIEST	LATEST	(9) FINISH DATES SCHED	EARLIEST	LATEST	(10) WK/DA FLOAT	(11) EARLY LATE	(12) GAIN LOSS	(13) SL IP
0	1	LEAD TIME DUMMY	0/0	0/0				01OCT62	FINISHED	01OCT62				
8	9	DUMMY	0/0		19FEB63	15FEB63	18APR63	19FEB63	15FEB63	18APR63	+8/4			
10	12	DUMMY	0/0		08MAR63	22FEB63	26AUG63	08MAR63	22FEB63	26AUG63	+25/4			
11	12	DUMMY	0/0		03APR63	15MAR63	26AUG63	03APR63	15MAR63	26AUG63	+22/4			
11	13	DUMMY	0/0		03APR63	15MAR63	29JUL63	03APR63	15MAR63	29JUL63	+18/4			

DEFINITIONS

1 Project Identification.

2 Expected Project Finish compared to Scheduled.

3 Effective or cut off date of report.

4 Current project status, based on input data.

5 Activity identification.

6 Status of the activity, monitored against whether it is "OVERDUE" to start of finish.

7 Duration of Activity given as "Scheduled" and also as "Used", or actual time used.

8 Start Dates: scheduled, earlier or latest. Earliest is replaced by word STARTED if actual start is reported, and Latest is replaced by actual start DATE.

9 Finish Dates: Scheduled, Earliest, Latest. The Earliest finish is replaced by the word "FINISHED" if actual finish is reported. Latest is replaced by the actual finish date.

10 Float given in units of weeks/days. Float may be either + or — and indicates the amount of leeway currently available, or the amount of slippage currently apparent.

11 Indicates the amount of time an activity was started or finished early (+) or late (—) with respect to the scheduled dates.

12 Indicates the amount of time gained (+) or lost (—) with respect to duration used and actual start. (Did the activity start when its predecessors were finished, or did the activity lose time by not starting when it could have?)

13 SLIP indicates the accumulated number of times an extension has been made to activity duration or scheduled finish date.

FIGURE 7

Scheduled Float is the amount of available Float assigned to an activity. This may be done manually or by the computer.

Given the starting date of the project, it is a relatively simple task to translate the relative times into calendar dates, enter them on the network and so produce a working schedule.

The computer performs these tedious tasks quickly and accurately. It cannot plan, since this demands a creative mind: it cannot estimate activity durations, since these vary from project to project. It can harness the tremendous speed and memory of the computer to the great capabilities of the human mind. The computer is fed with the "ij" numbers, the activity descriptions and durations (and costs if available) and produces a detailed report showing the earliest, latest and scheduled starts and completions for all activities with the Critical Path shown and Float broken into scheduled, total and free.

This is an interim report and all times are shown as relative to time zero. At this stage, adjustments can be made. *The non critical path is more important than the critical path.* Where there is Float available, scheduled start dates can be adjusted to balance manpower requirements and machine requirements.

When the computer printed the original CPM report, at the same time it stored all the information on magnetic tape. The changes, the start date, the work week and statutory holidays are now fed into the computer and matched up with the tape. This produces the SET UP report, Figure 6, giving calendar dates for all activities. This is a practical working tool that is readily understood. The computer quickly produces copies for the owner, the architect, the contractor and the sub-trades.

This report, as well as the CPM and the control reports, can be requested in any order, e.g. Early Start Time, Scheduled Start Time, IJ number. It is also possible to turn out separate schedules for the sub-trades or a schedule listing only the activities directly under the control of the general contractor. If required, they may be produced in the form of bar-charts.

PROJECT CONTROL

Because the information is always retained on magnetic tape, it can be updated at any time. Thus we have the means for project control. With the GE 225 computer it is possible to: Add activities; Begin—report activities begun in the report period; Change durations, descriptions and so on; Delete activities; End—report activities completed in the report period.

Not only does the computer analyze the effect of actual starts and finishes compared with the calculated starts and finishes, it also takes into account the effect of added, changed and deleted activities. It adjusts the Earliest Start Times and Float for subsequent activities and shows whether the project is ahead of schedule, on or behind schedule and by how much. For instance, if an activity has minus 4 days Float, then the earliest it can start is 4 days later than the scheduled start and the project will be 4 days behind schedule.

Figure 7 illustrates the Monitor or Control Report. The GE 225 also produces the MONITOR CRITICAL PATH REPORT. This lists the five most critical paths through the network and is an example of management by exception.

The Critical Path and Control Reports are not paper exercises in an unreal world. Strikes, weather conditions, bad deliveries and a host of unforseen circumstances conspire against the best laid plans and it is precisely these things that make the technique so valuable.

C. I. McKenzie, MA, BCom, is an applications specialist in the Computer Marketing Department of Canadian General Electric. This article is based on a paper presented by him at the 1964 Annual Convention of the OAA.

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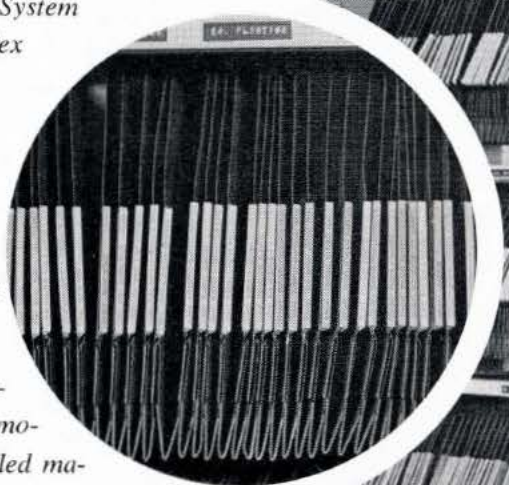

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OAA and be made known to the government of Ontario and the public. The annual report had made it known that such a policy statement would be read but, as it turned out, it was too lengthy a document for comprehension or acceptance at the meeting. Much discussion then followed. It was apparent that group therapy would be required to lead this one out of the wilderness. Resolutions should be short, sweet and precise; in their proper place and order. From this point, a great portion of the meeting became bogged down in procedural arguments and misunderstanding. The OAA represents all Ontario architects as individuals and herein lies the issue and fear of policy statements. Robert Fairfield touched upon this when he stated that he viewed with alarm the growing tendency of 'corporate invasion of private practice by various committees of the OAA' and questioned whether this was the best method by which to speak for the profession as a whole.

Heeding Jim Murray's suggestion, Fred Dawes moved that 'the Housing Committee be authorized to do all in its power to implement its housing policy, and that it be encouraged to prepare a brief for approval by Council to be presented to the Ontario Government in which it outlines a programme for the purpose of improving and encouraging good housing design in Ontario.' The motion was carried.

Warren Smale stressed the danger he witnessed at the Stratford Seminar Session of particular groups or organizations attempting to 'use' the seminar to push through statements of policy by resolutions for their own selfish interests which in turn may imply acceptance by other participating organizations.

Irving Grossman advanced the proposal that as individuals and as a body we are perhaps too cautious and afraid to make policy statements and 'meanwhile, our houses are sprawling and our cities are raped.'

It is apparent that the profession desires an improved and clarified public image but the means and methods are vague — there is still a strong tendency to cling to the shadowy confines of the ivory tower. Since architects are building for people, their concern in this role should be proclaimed as often as possible and in every permissible manner. The annual meeting offers a grand opportunity for debating and announcing ideas and issues on housing, community planning, urban renewal and other major issues dear to our expanding, complex society. It need not be a group statement of policy.

On the Incorporation of Companies, Lloyd Kyles stated that special acts of the legislature would be required. This is a subject that will occupy much discussion within the next few years.

The brief, forlorn report from the representative on the senate of the University of Toronto received no comment from the floor. Perhaps the time consumed during the lengthy housing discussion made members weary of more involvement or that our code of ethics makes this subject taboo on a public scale. As contrasted to Yale, future historians will find a lack of substance, content and depth when dealing with the majority of newer buildings on the Toronto campus.

The president of the RAIC, J. L. Davies, gave a short informal talk and brought members up to date on the national scene, forthcoming policies and events. He also stated that ". . . the Journal is doing well and is playing hell with the opposition."

Presiding over the meeting, the chairman, James Murray, in constant consultation with W. D. S. Morden, QC and John D. Miller, enlightened members on procedures, short-cuts and suggested alternative methods of submitting resolutions. His guidance, patience and stamina was a model of virtue.

At the Friday dinner, it was announced that D'arcy G. Helmer of Balharrie/Helmer & Associates, Ottawa, was the new OAA president for 1964. The distinguished philologist and Latin expert, Prof A. Adamson, introduced the evening's speaker, J. Alphonse Ouimet, president of the Canadian Broadcasting Corporation whose subject was "That's What You Think." Here, we gleaned an insight into what makes CBC run, its many diversifications, the problems of satisfying various tastes of various tongues in various locations, the nature of the appeal levels, future plans of CBC including an FM network plan employing high fidelity and stereo tape recordings. It is understandable that Mr. Ouimet's office is the recipient of much abuse and consternation. Being an opportunist, he took advantage of this captive audience of outstanding, educated and influential members and dealt at some length with the controversial problem of converting CJBC from English to French. I believe the Toronto papers are getting through to him.

The second part of the Annual Meeting on Saturday morning dealt mainly with fees. For reasons stated by the Fees Committee in the annual report, it was proposed that a special questionnaire, prepared by Woods, Gordon & Company, Management Consultants, be sent to all practicing firms registered in Ontario in order to investigate, analyse and make proper recommendations. Discussion was quite intense but the need for such an investigation was apparent and the motion was overwhelmingly passed. The success of this study will depend on the amount of participation, the completeness of the questionnaire form and its correct interpretation and evaluation. As to what degree this report may become a 'yardstick for efficiency and management' is rather questionable—a certain measure of individual analysis and house cleaning will be required. Council shall decide as to whether 'firms' or 'members' shall pay for the cost of this research. It will be interesting to note if the OAA can decide who and what a 'firm' is.

The resolution that 'the membership list of the Association include such military decorations and awards of distinction as may be approved by Council' went down gloriously in a roar of heavy artillery.

Alexander Leman's resolution that 'the annual meeting urge the Council to appoint a study commission which will thoroughly examine the present status of the profession and will bring forward comprehensive recommendations and the needed changes in architectural training and standards of practice and the resulting revision to our regulations and bylaws' was passed. A study along these lines was done by the RIBA and is currently being investigated by the AIA and the RAIC.

With the concluding remarks of the president, the meeting adjourned and members strayed towards the Ontario Room where, sitting unprotected under that bilious ceiling, the encounter of food once more brought frightful recollections to this person of meals served at wartime RAF stations. The luncheon speaker, Prof John Bland, Director, School of Architecture, McGill University spoke on the vital subject of "Architectural Education". This topic is receiving much deserved attention from architectural organizations throughout the world. It indicates the need during training for — a closer relationship between students and practicing architects—a greater connection with the building industry and with the process of building in the field and a greater liaison with engineering students. It seems to indicate the 'studio principle' of learning.

The Saturday night President's Reception, Annual Dinner and Dance, with all

(concluded on page 77)

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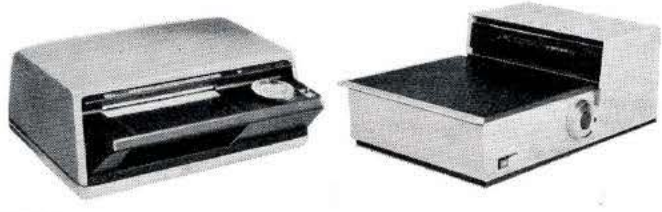


3M Business Communications Division Box 2757, London, Canada

(continued from page 18)

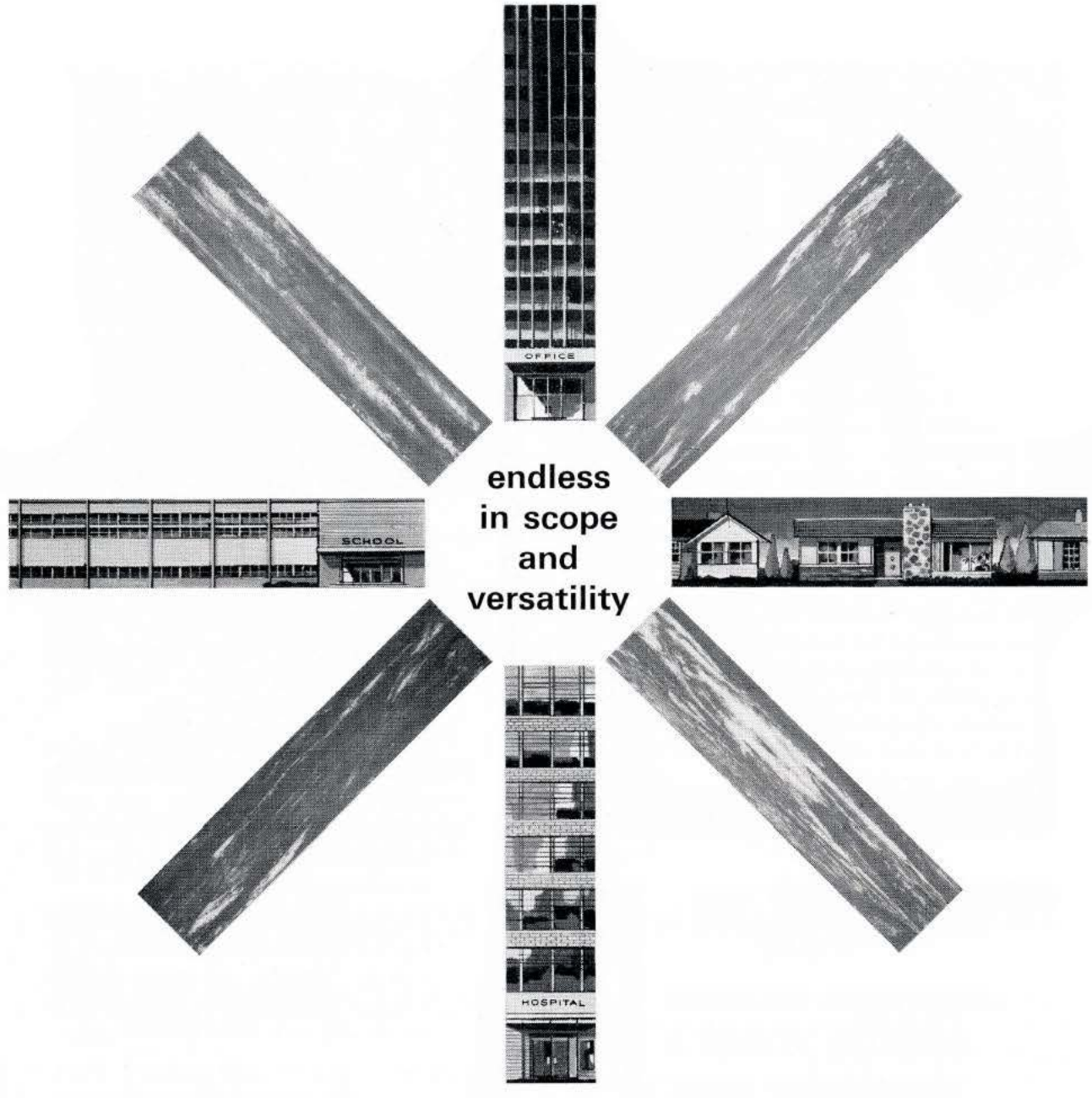
in scale, colour, texture and plane. This is also why the pinpoints and glow, the change and continuous lines, the precision or vagueness and the colour of neon are so successful when seen against the inky blackness of night. The sign may be seen as a spatial unit, read in depth, and composed of light, and it may be absent when not required.

The design of lettering and signs is also affected by how we see in the mid-twentieth century. Messages are communicated by print, sign shape, and colour. There is today a complete revision in the relation of black ink to white paper, and of letter to background (far more significant than the stylistic motifs of heavy rules and disappearing margins). The ground is now of almost as equal importance as the sign — just as the formation of external grace is considered as well as the building — and possibilities are greatly extended. The sign itself may be lit from within or by reflected light, the type of letter used has many implications, the placement of the word in the frame is invariably studied, the position of the frame in the landscape is of importance, and the speed at which it has to be read, whether by night or by day, is to be accounted for.

TYPOGRAPHY by Aaron Burns is a well-produced book, containing many examples of fine modern typography. Commencing with a series of highly imaginative examples, some of which are in colour, the author then gives over fifty varied full-page examples chiefly from the advertising world. In the last part of the book, these examples are subjected to detailed individual analysis and criticism.

Jonas Lehrman

(Book Reviews continued on page 77)



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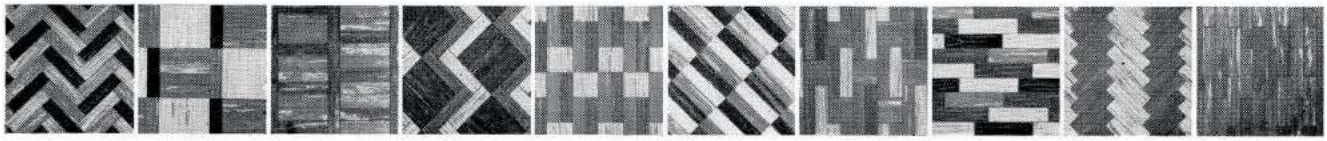

(continued from page 69)

its time-established formalities and colour climaxed this 74th Annual Convention. What with being spirited by the obvious generous use of refreshments, dulled by the haze of smoke, challenged by the din of voices, the night went all too fast and it again appears that the undying formula of good wine, good companions, and good talk, in the right atmosphere cannot but end in a meaningful success for this fine annual event.

William C. Karleff

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REGISTRATIONS

The following were admitted as members of the Manitoba Association of Architects at recent meetings of the registration board: C. R. Nelson, jr, M Arch, 192 Wildwood Park, Winnipeg 19; S. F. John Sigurdson, B Arch, 502/595 River Ave, Winnipeg 13.

The following was made a member of the Nova Scotia Association of Architects at a recent meeting of the registration board: V. F. Lyman, Apt. 1018, Spring Garden Terrace, 5885 Spring Garden Road, Halifax.

BOOKS

(continued from page 71)

LIBRARY BUILDINGS OF BRITAIN AND EUROPE by Anthony Thompson. Butterworth, London, 1963. 326 pages. $23.75. After more than seventeen years finally someone has produced another book on library architecture. The last comprehensive surveys on this subject were done by the American librarian-architect team of Wheeler and Githens in 1941, followed by the Englishman Ashburner's book in 1946. Anthony Thompson, an English librarian of varied experience, has divided his book in two parts. In the first part, which constitutes a small portion of the material, the step by step creation of a library building is discussed. In great detail with apt plans, diagrams and tables the author leads his readers through the whole process of creating a library building. In the second part, which constitutes the much larger portion of the book, the author examines existing library buildings of various types in Britain and Europe, with also quite a few examples from the rest of the world.

The book is excellently organized. All descriptions of the libraries in the second part of the book follow exactly the same pattern — this enables easy comparisons. The style is straightforward and readable, yet the number of examples the author quotes illustrating almost every point, seems rather overpowering. One may feel at times that the book consists of examples only. Also, by the time the reader reaches the end of the book, he may have a feeling that the book has given good examples of what has been done, but little of what is being done or should be done. Too many examples of older libraries, especially the British libraries, and not enough of the very new architectural examples have been used.

This book is an outstanding descriptive work with a good index and excellent bibliographies, yet the author's statement "In this book we are concerned with the creation of new buildings" (p. 91), is not entirely fulfilled.

Astra Roze

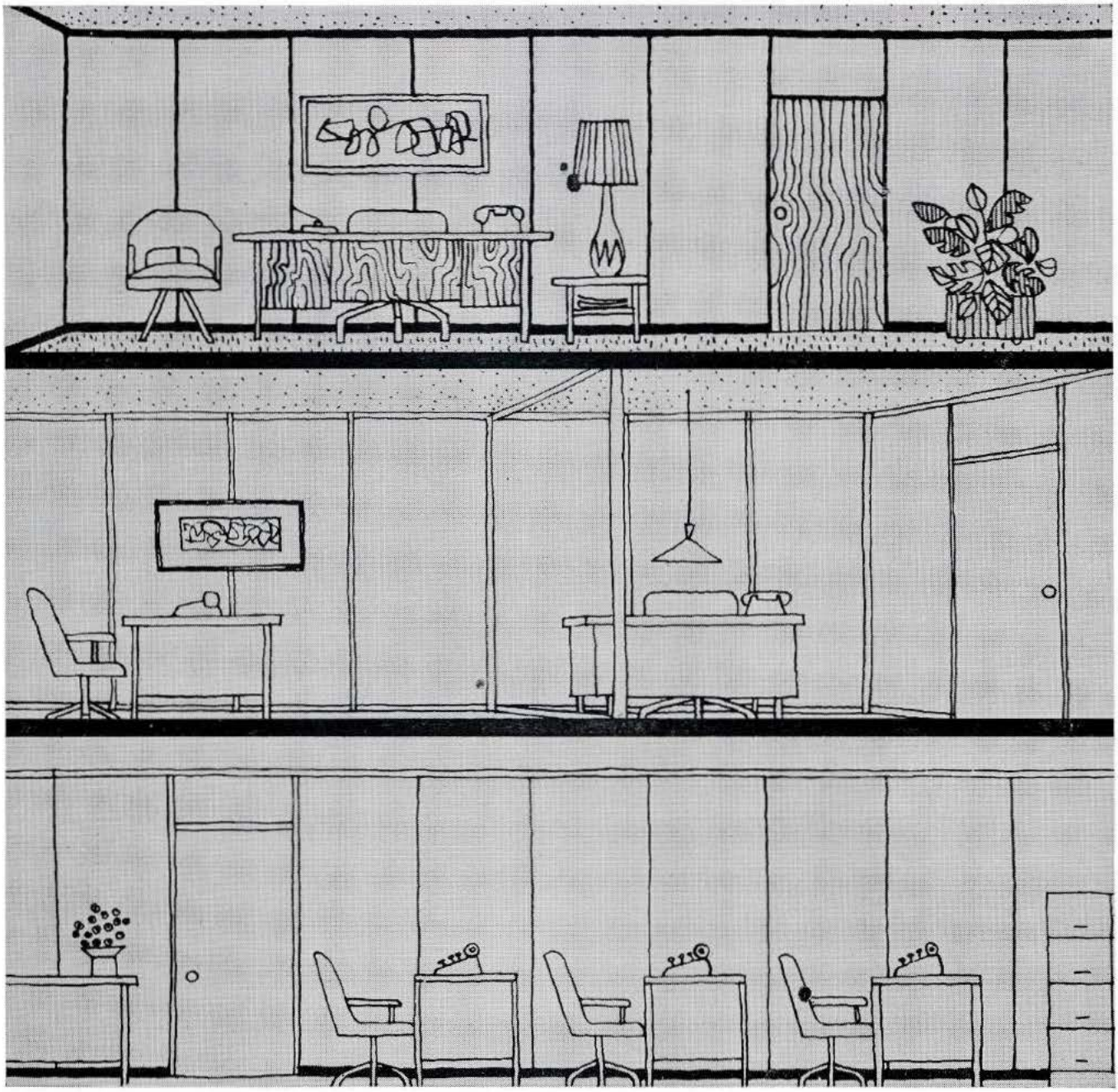
Astra Rose, B LS, is a librarian at the School of Architecture, University of Toronto.

NEW DBR PUBLICATIONS

Technical paper No. 156 (NRC 7551) of the Division of Building Research, Ottawa, is a pilot study on Manpower Utilization in the Canadian Construction Industry by David C. Aird of the Division of Industrial Administration, U of BC. In the chapter on the Conclusions and Recommendations of the study the following observations were made: "It was determined that the average worker was occupied productively for only 55 per cent of his time on the job; the remaining 45 per cent of his time was spent in a nonproductive way, about one half of this section of his time on activity necessary for the carrying out of the productive operations but the other half (or almost 25 per cent of the total) for really nonproductive operations or in idleness." The study also found that the low level of labour utilization is attributable to both worker and supervisor. Many of the delays are the result of poor scheduling, incomplete instructions, non-delivery of materials and general lack of specific planning.

Building Research 1962 by Division of Building Research, NRC, 85 pp. $1.00. Publications Section, Division of Building Research, National Research Council, Ottawa 2, Canada. This report continues an over-all review of the division's work presented in previous annual reports and is published primarily for the information of the construction industry of Canada.

The National Fire Code of Canada, publication NRC 7550 available at $1.50 per copy from the Publications Section, National Research Council, Ottawa 2.



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(Circle reply card item 2)

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(Circle reply card item 3)

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(Circle reply card item 4)

Improved fluorescent lamp ballasts. Reduce noise, open new opportunities for use of 800ma and 1500ma lamps. New fluorescent dimming system, DS-5000 controls up to 600 ballasts. *Canadian General Electric Co. Ltd., 940 Lansdowne Ave., Toronto 4.* 534-6511, Loc. 612, Mr. V. R. Young.

(Circle reply card item 5)

Rotaflex lighting fixture: solid walnut stem and white canopy. Known as Cosmos. Information from *Rotaflex of Canada Ltd., 609 King St. W., Toronto 2B.*

(Circle reply card item 6)

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Aqua-Chief hydraulic toilet valve. Corrosion-resistant polyethylene, kralistic and stainless steel construction. Operable over pressure range of 5 to 120 psi. *Sloan International Ltd., Box 156, Station R, Toronto 17.*

(Circle reply card item 8)

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Vane Axial fan, design 34. Sizes from 15 to 54¼ inch diameter fan wheels, and from ¼ to 150 hp. Tip speeds of 12,500, 15,500 and 18,500. Bulletin # VA-102. *Chicago Blower (Canada) Ltd., 901 Regent Ave., Transcona, Manitoba.*

(Circle reply card item 11)

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(Circle reply card item 12)

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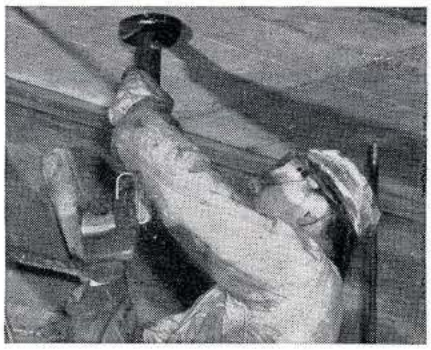

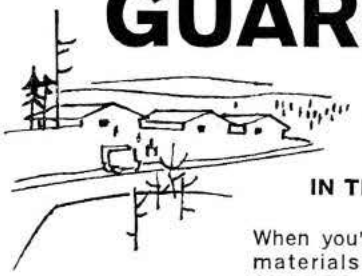

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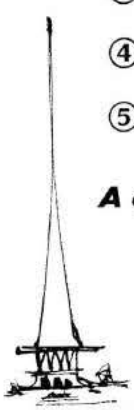

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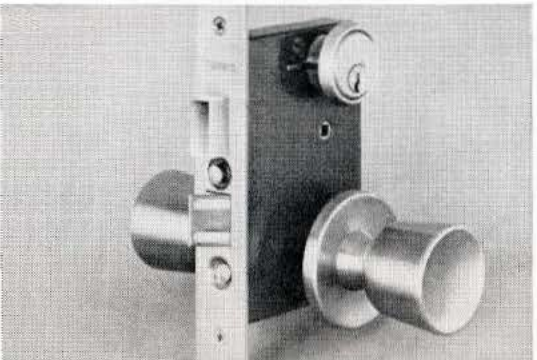

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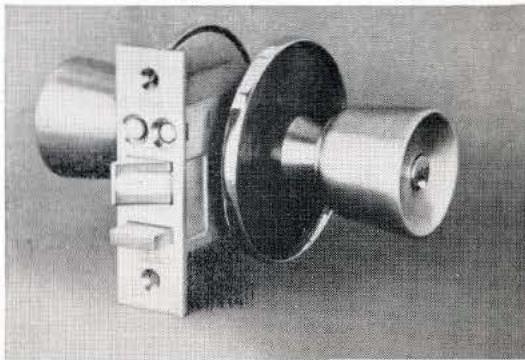

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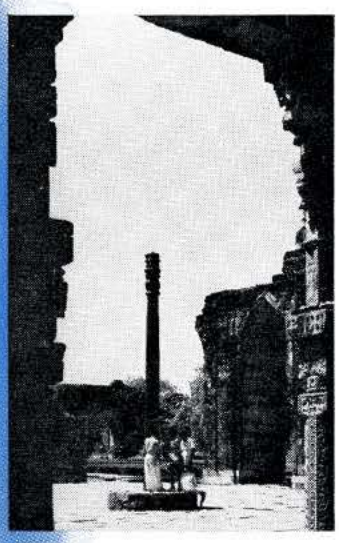

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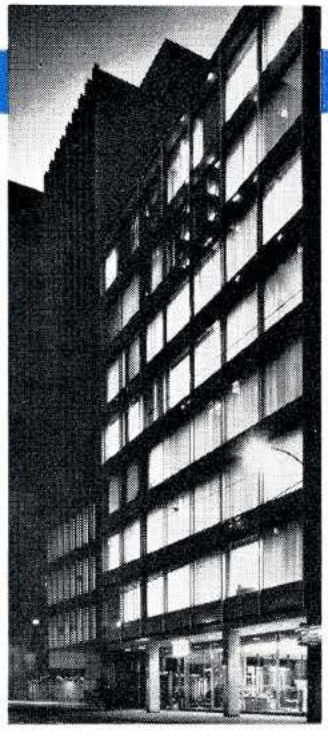

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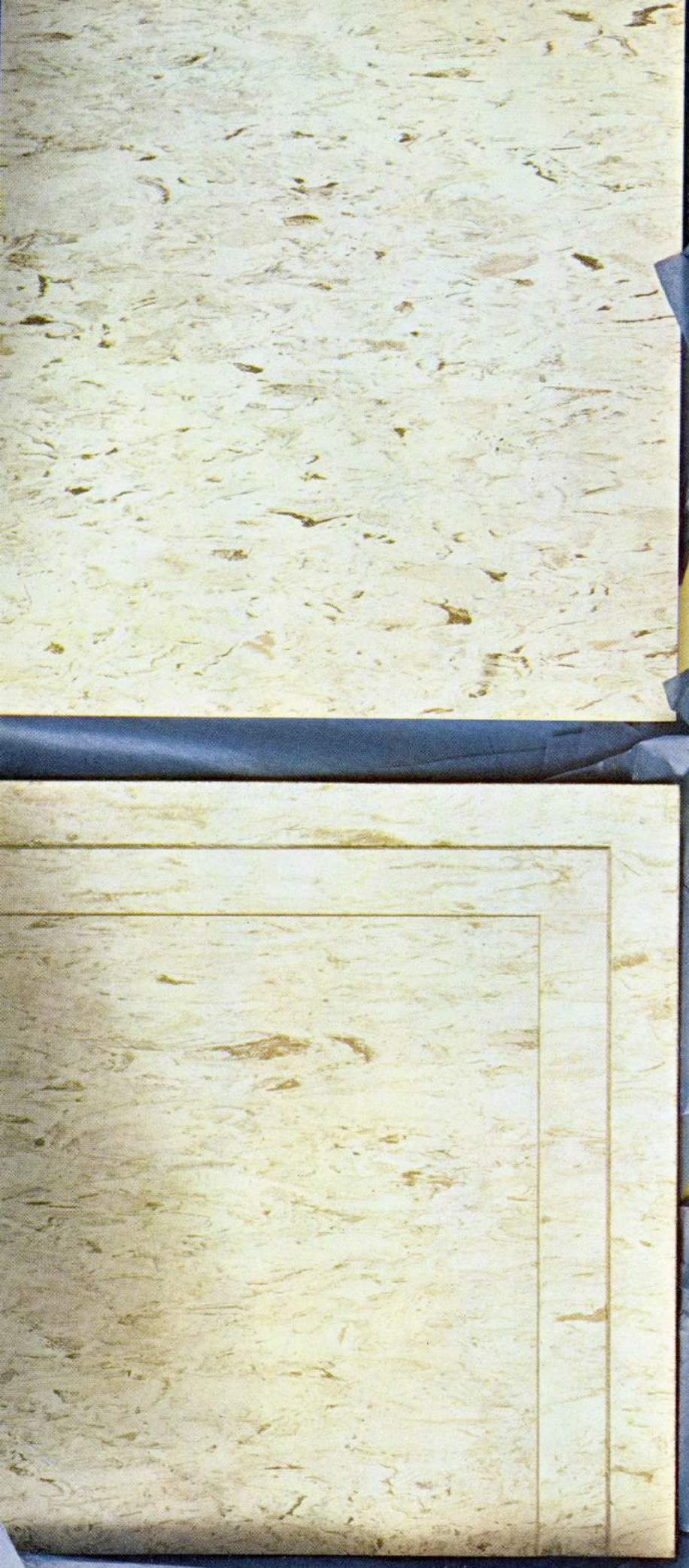

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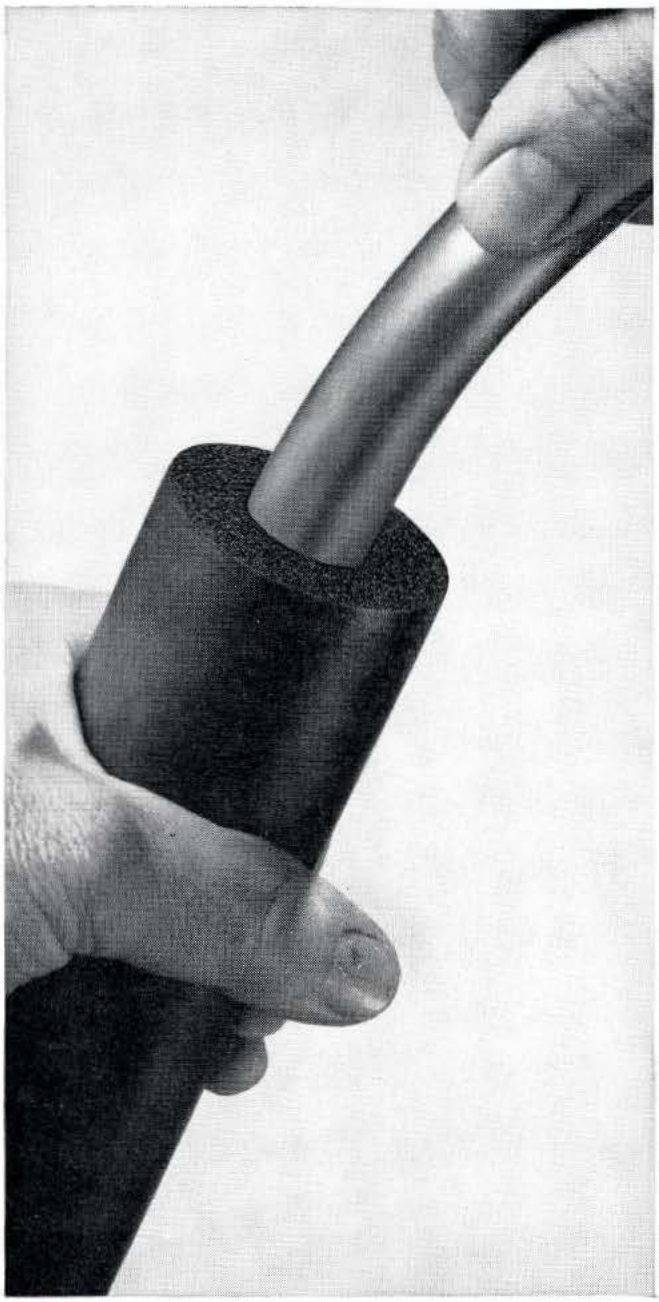

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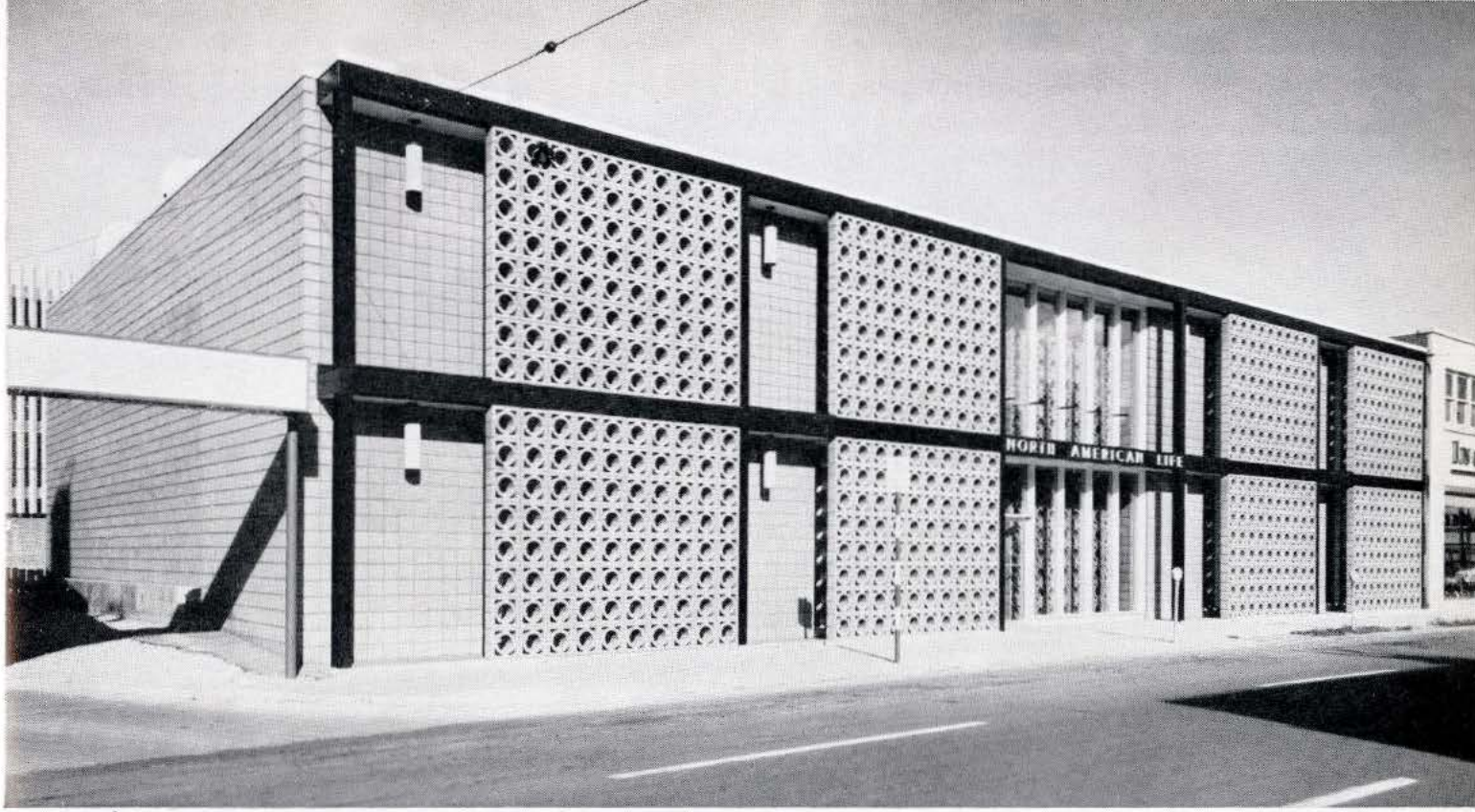

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5

6

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4. **North American Life Building, Winnipeg, Man.** Architects: Wald & Macdonald Associates. Consulting Engineers: Crosier and Greenberg. General Contractor: Malcolm Construction Co. Ltd. Masonry sub-contractor: J. Prau Construction Ltd. Supplier of concrete masonry units: Supercrete Ltd.
5. **St. Clare's Roman Catholic Church, Edmonton, Alta.** Architects: Blais, Sheddon and Associates. Consulting Engineers: C. C. Parker, Whittaker and Co. Ltd. General Contractor: McRae and Associates Construction Ltd. Masonry Sub-contractor: Julian's Masonry Ltd. Supplier of concrete masonry units: Edmonton Concrete Block Co. Ltd.
6. **Bishop Hall, Dining Room, McGill University, Montreal.** Architects: Bolton, Chadwick, Ellwood and Aimers. Consulting Engineers: McDougall and Friedman. General Contractor: Foundation Company of Canada Ltd. Masonry sub-contractor: Armand Croteau & Fils Inc. Masonry units supplied by: Dilco Concrete Products Ltd.

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1-Part Acrylic Terpolymer

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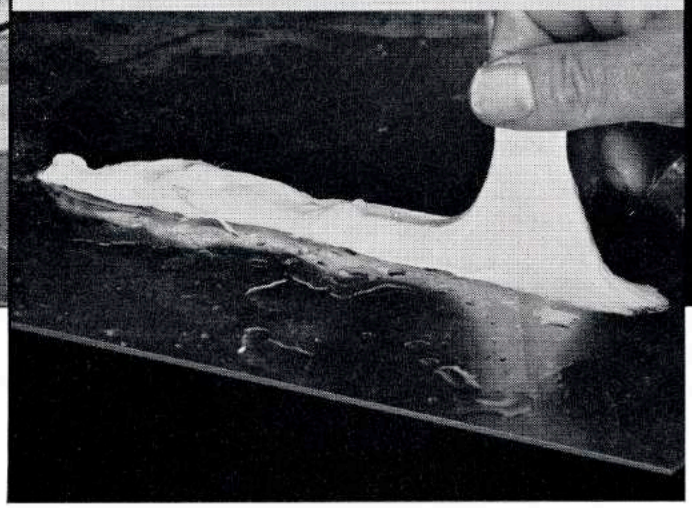

Mono-Lasto-Meric gunned onto ice block adhered solidly to metal plate when ice and water dissipated. It is the only quick-skinning type sealant that will adhere or reseal should moisture, dust or other deterrents prevent initial adhesion.

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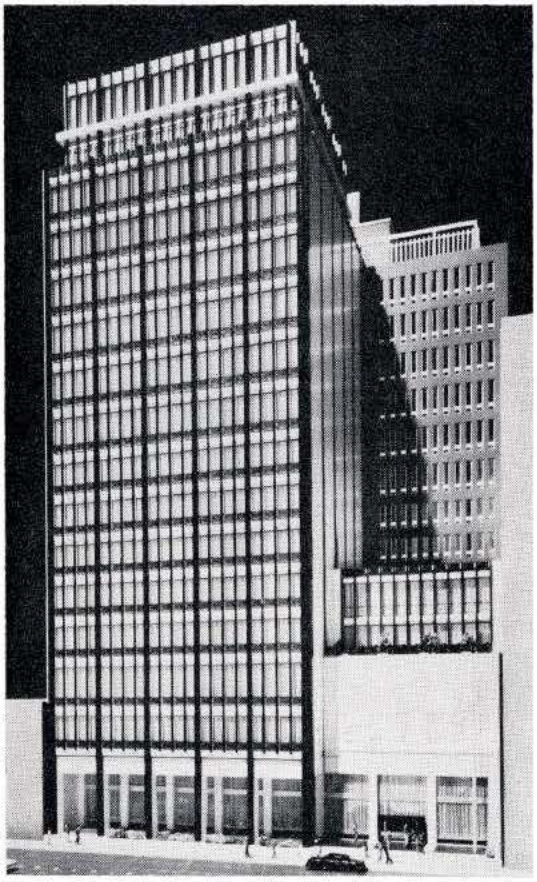
Saskatchewan Power Corporation Building, Regina, Sask.
Architect: J. Pettick, MRAIC.



Bell Telephone Company of Canada building,
76 Adelaide St., Toronto.
Architects: Marani, Morris & Allan.

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A well-travelled idea is revolutionizing ceilings!

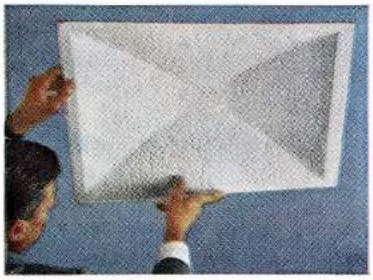
The ceiling concept shown above was born when Johns-Manville engineers developed "Topliner," a one-piece soundproofing ceiling unit for automobiles. Featured in all Rambler cars, this Topliner concept has been carried right into the home and office. Using the same materials—compressed and molded fiber glass—they designed ACOUSTI-SHELL. It's the world's first truly 3-dimensional acoustical ceiling panel. The 2-foot square lay-in panels create a unique ceiling.

Color has not been neglected by J-M designers either. Both the vaulted and coffer styles are supplied in white, but can be colored on the job to compliment any decor. In addition, the vaulted panels are available overlaid with woven fiber glass fabric in 3 striking pastel shades: Brighton-Blue, Celadon-Green and Beige-White. With ACOUSTI-SHELL you can achieve pleasing light and shadow effects, soften glare and make every installation a tribute to your imagination.

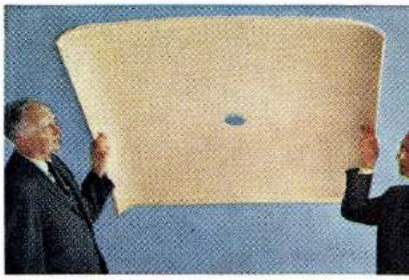
THUNDERCLOUD COLORVEIN WALLS are another new idea from Johns-Manville. In this rugged monolithic sheet, you get the permanent beauty and natural color contrast of stone—without the planes of weakness often found in natural stone.

MEERSCHAUM COLORLITH is made of asbestos-cement and has a finish of lasting beauty. It was used in both the steps and desk.

Call your J-M representative and discuss your next project. He will show you the many new interior ideas that J-M can offer. For prompt attention, write Canadian Johns-Manville, Dept. BA, Port Credit, Ontario.



ACOUSTI-SHELL . . . the first molded, fiber glass, acoustical ceiling panel ever developed. It adds a brand-new dimension to interior design.



TOPLINER . . . the first molded acoustical ceiling ever made for automobiles. Johns-Manville developed it. American Motors put it on the road.

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