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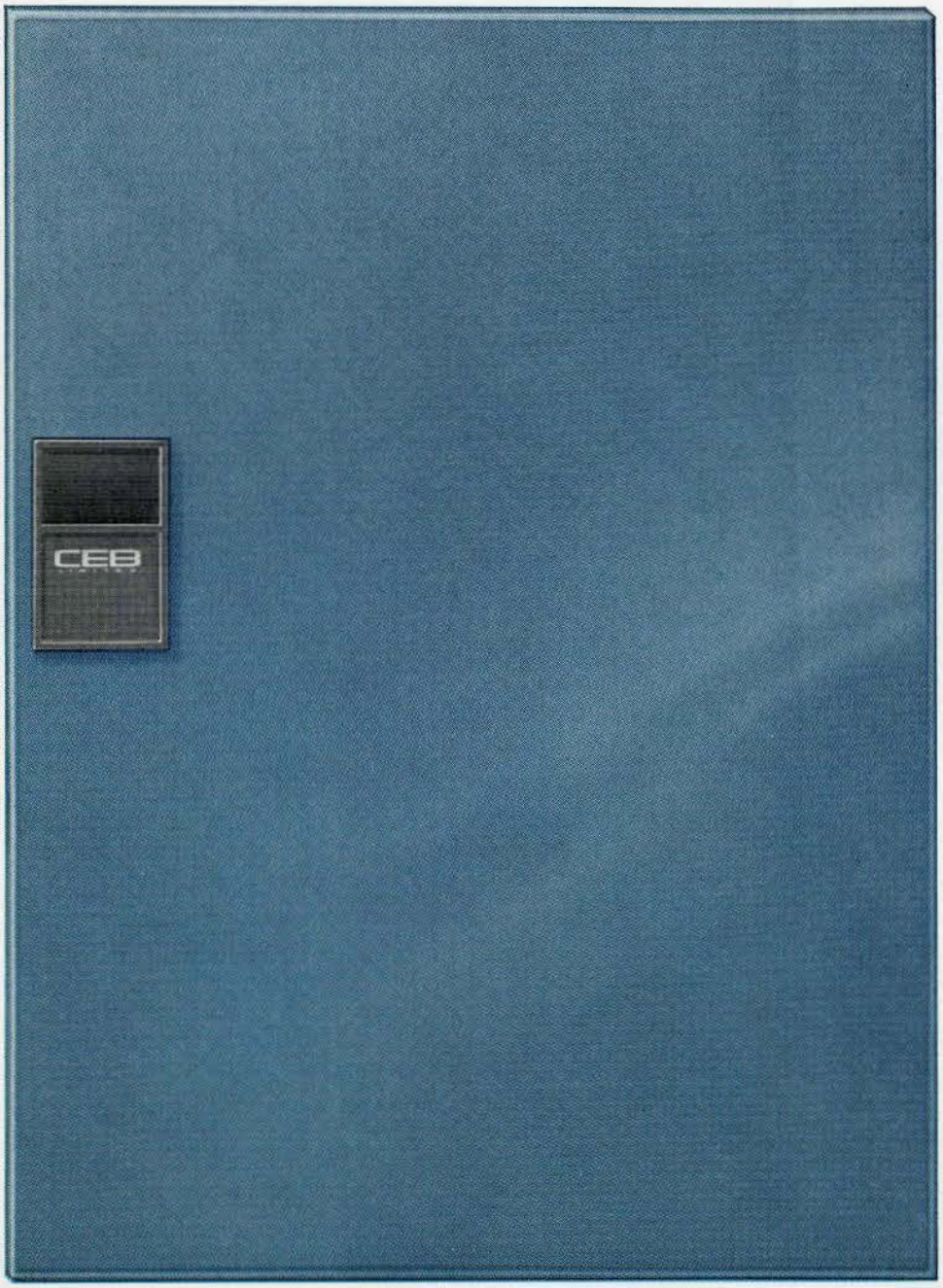

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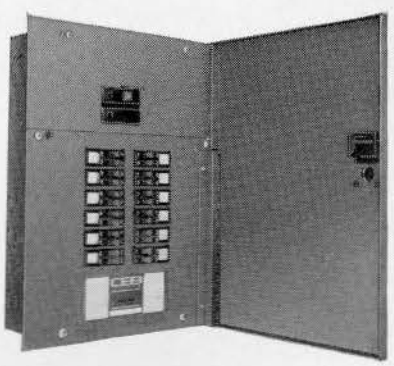

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First Volume of RAIC new Allied Arts Catalogue, Containing Work of 48 Artists, out in October

The first volume of our new Allied Arts Catalogue, containing illustrations of the work of 48 contemporary Canadian professional artists, executing or considered capable of executing sculpture, murals, fine craft work etc. for the embellishment of buildings and structures, will be on sale in October. The Catalogue, available bound or in loose sheets in a portfolio, is designed as a working tool to assist architects and others concerned in the commissioning of artists to execute works of art for buildings.

The project is an extension of the work of *Architecture Canada*'s Allied Arts Department, under the editorship of Anita Aarons, who has travelled extensively throughout Canada and enlisted the co-operation of architects and artists, art galleries and photographers in obtaining material for the Catalogue.

A four-page brochure showing the design and format of the Catalogue, and containing a sample page from the first volume, will be found in the September issue of *Architecture Canada*.

OAA Committee Suggests More Schools of Architecture for Ontario

New schools of architecture should be established in Ontario to help the profession meet the current unprecedented demand for its services, a committee of the Ontario Association of Architects has decided. At present there is just one – at the University of Toronto.

Pointing out that in the past 15 years "the number of architects in the province barely kept pace with the increase in the volume of construction," the committee estimates that between now and 1970 the situation will worsen.

During the period 1950–1964, the committee reports, while the number of registered Ontario architects increased by 94 per cent – or an average of only 7 per cent per year – construction volume increased by 133 per cent, or about 9.5 per cent per year. Recent forecasts indicate that between now and 1970 residential and social capital construction will rise by about 8 per cent annually, and industrial, commercial and financial construction will increase by about 14 per cent each year.

"The School of Architecture at the University of Toronto – the only school presently in operation in this province – has established a good staff-student ratio and its enrolment has now reached the ultimate size for maximum efficiency," the committee reports. "Therefore, the establishment of another school of architecture in the province of Ontario should be urged, rather than the expansion of the Toronto school."

The report notes that at the University of Toronto enrolment into first year Architecture has been limited to 60 students for the past few years. There are usually about 250 students in the entire five-year course. The committee thought that an enrolment of 250 to 300 students was ideal and "the best choice for locations for new schools of architecture would be in large urban centres.

The report concludes, "The Ontario Association of Architects stands ready to provide every assistance in this program."

The OAA Committee on the Expansion of Architectural Education was formed in late 1964 and consisted of Warren M. Smale of Simcoe, chairman of the committee and president of the Association; James A. Murray (*F*) and Douglas Haldenby, both of Toronto.

The Committee's report will be published in the October issue of *Architecture Canada*.

Centennial Year Housing Awards

The Canadian Housing Design Council announces 1967 Awards for Residential Design, open to architects, builders, designers and developers, for single family houses, duplex and multiple housing. Closing date for entries is November 30, 1966. Conditions and entry forms are available from the Council at Room 245, Central Mortgage and Housing Corporation, Ottawa.

RAIC-CMHC Housing Tour of Three US Cities

A four day tour of Philadelphia, Baltimore and Washington to examine city building and architecture, particularly private and public re-development and urban renewal, is being planned by the RAIC-CMHC Joint Committee on Housing. Accommodation is limited to 35 persons. Participants will meet at Philadelphia on the evening of October 19, and the tour ends at Washington October 23rd. Registration is $25.00. Further information is available from Andrew Hazeland at CMHC, Ottawa.

1966–67 Architectural Directory Annual (ADA) now Available

The 1966–67 issue of the RAIC's Architectural Directory Annual has been mailed to all members of the Institute. This third edition of ADA contains the product literature filing index to the new Building Construction Index, with names of manufacturers or distributors accompanying each product listed. There is also a conversion list giving the new BCI numbers for the old RAIC-AIA standard filing system.

The Directory also contains the RAIC membership list by provincial associations, list of architectural firms, and listings of other professions and organizations in the building construction field.

Copies are sent without charge to members of the RAIC. Cost to others is $15.00 per copy, with discounts of one dollar off for additional copies up to five (3 for $26.00 — 5 for $50.00). Five per cent provincial sales tax must be added for orders delivered in Ontario.

La Bourse Francou

La bourse André Francou, d'une valeur de $2,000, a été décernée à une jeune architecte de Montréal, Mlle Michèle Bertrand, 2219 avenue Maplewood. Mlle Bertrand ira faire des études de perfectionnement en France.

Cette bourse doit être accordée aux termes des dispositions du testament d'André Francou, industriel français. Le legs Francou à l'Institut Royal d'Architecture du Canada a pour objet de fournir des bourses à des étudiants et des diplômés de l'Ecole d'Architecture de l'Université de Montréal "afin de leur permettre de venir en France étudier les caractéristiques de l'architecture française."

Mlle Bertrand est née à Montréal, et a obtenu de l'Université de Montréal un baccalauréat ès arts en 1961 et un baccalauréat en architecture en 1966. En 1965, elle s'est classée première au concours d'architecture organisé par l'Ecole sous le patronage du Ministère de l'Education de la province de Québec et de l'association des architectes de la Province.

Ses activités extra-scolaires ont compris la rédaction du *Quartier Latin* et la présidence du Comité des conférences de l'Association des étudiants de l'Ecole d'Architecture. Mlle Bertrand a été aussi durant cinq ans membre de la compagnie de Ballet de Ruth Sorel.

Elle est maintenant au service de la maison Affleck, Desbarats, Dimakopoulos, Lebensold et Sise, de Montréal.

Les recherches qu'elles se propose de faire conduiront Mlle Bertrand dans les vieilles villes de France construites d'après des plans et, pour la plupart, à des fins militaires, appelées Les Bastides.

Members' Subscription Verification Forms

In order that professional organizations such as the RAIC may obtain the low cost bulk postage rates for their official publications, post office regulations require that each member be informed and acknowledge that the cost of his subscription to his professional publication is included in his annual fees. This requirement has presented a problem to the RAIC as members' fees are paid to their provincial associations which, in turn, remit to the RAIC Headquarters the agreed part of the fee which goes to support RAIC activities and Headquarters costs. Signing of a statement to this effect is acceptable to the Post Office Department as proof of eligibility for the low postal rates, and all members have been sent the form with a request that it be signed and returned to Architecture Canada in the stamped and addressed envelope enclosed.

Members are asked to cooperate in this matter of signing and returning the form by return mail.

Canadian Council on Urban and Regional Research

Eric Beecroft, Professor of Political Science at the University of Western Ontario, and a former executive director of the Community Planning Association of Canada, has been elected president of the Canadian Council on Urban and Regional Research. He succeeds Peter Dobush (*F*) of Montreal, who headed the organizing group for the Council and was its first president. The Council was founded in 1962 to encourage and support studies on the problems of Canadian urbanisation and urban administration. Incorporated as a non-profit society, it has been supported by the Ford Foundation and under the National Housing Act. Gifts to the Council are deductible under the Income Tax Act. Since early 1963 the Council has made 50 grants for urban research projects and given 14 fellowships for advanced urban studies, amounting in total value to over $400,000. The Executive Officer of the Council is Alan Armstrong, and the Council's Offices are at 225 Metcalfe Street, Ottawa 4.

25 Projects in Architectural Section of 1966 RCA Exhibit

The Architectural Section of the 1966 Annual Exhibition of the Royal Canadian Academy of the Arts will be displayed in the attractive Sculpture Court of the Art Gallery of Toronto. The opening date is October 28, following its Toronto showing, the Exhibition will open at the National Gallery in Ottawa on December 15, and at the Sarnia Art Gallery on January 14 of next year.

Of 29 projects submitted by architects, 25 were selected by the jury, composed of L. E. Shore (*F*) Chairman and Gordon Fowler, Toronto, and Ray T. Affleck, Montreal.

Architects and their buildings selected were:

Gordon S. Adamson & Associates – London Free Press.

Affleck, Desbarats, Dimakopoulos, Lebensold & Sise – Stephen Leacock Bldg., McGill University, and Confederation Centre, Charlottetown, PEI.

Craig, Zeidler & Strong – Willow Park, Public School, Scarborough, and Beth Israel Synagogue, Peterborough.

Fairfield & Dubois – Dow Corning Silicones Ltd, Toronto.

Jerome Markson – Group Health Centre, Sault Ste Marie, Ont.

Page & Steele – Montreal Trust Tower, Toronto.

Somerville, McMurrich & Oxley – Men's Residence, Trinity College, Toronto.

Shore & Moffat & Partners – Arts Library Building, University of Waterloo, and Research and Development Centre, BA Oil Co Ltd.

Thompson, Berwick, Pratt & Partners – Totem Park Residence, and the Henry Angus Building, University of British Columbia.

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John B. Parkin Associates – McKinnon Industries Limited, and Warner Lambert Research Institute.

Rounthwaite & Associates – Sault Ste Marie Air Terminal Building.

Smith Carter Searle Associates – Liquor Control Commission, Office & Warehouse, Winnipeg.

Erickson, Massey – Simon Fraser University, Burnaby, BC

Libling, Michener & Associates – Public Safety Building, Winnipeg.

New Brazilian Architectural Magazine

Brazilian architect Sergio Teperman is establishing a new magazine "Architecture and Construction", and invites architects in Canada to submit examples of their work for publication. Material should be addressed to Mr Sergio Teperman, a/c Revista AC-Arquitectura e Construcao, C.P. 30493, Sao Paulo, SP. Brazil.

Third Australian Building Research Congress

The third Australian Building Research Congress is to be held 14 to 17 August 1967 at Monash University, near Melbourne, G.P.O., Australia.

Australian Building Research Congresses are held every three years. The first was in Melbourne in 1961; the second in Sydney in 1964. The purpose of these Congresses is to bring to the attention of all those interested the most recent developments in the science, technology, and practice of building, and the program has been chosen to cater to a wide range of interests. Ample time will be available for discussion, thus permitting the free exchange of ideas and experience that is so essential for progress.

Building Research Publications, 1947–1965

A new list of publications is available without charge from the Division of Building Research, National Research Council. The

list contains the titles of the more than 800 papers available from the Division, dealing with the many aspects of building research. An author and a subject index are also included.

Further information is available from the Division of Building Research, NRC, Ottawa 7, Ontario.

Fourth UIA Seminar on Industrial Architecture

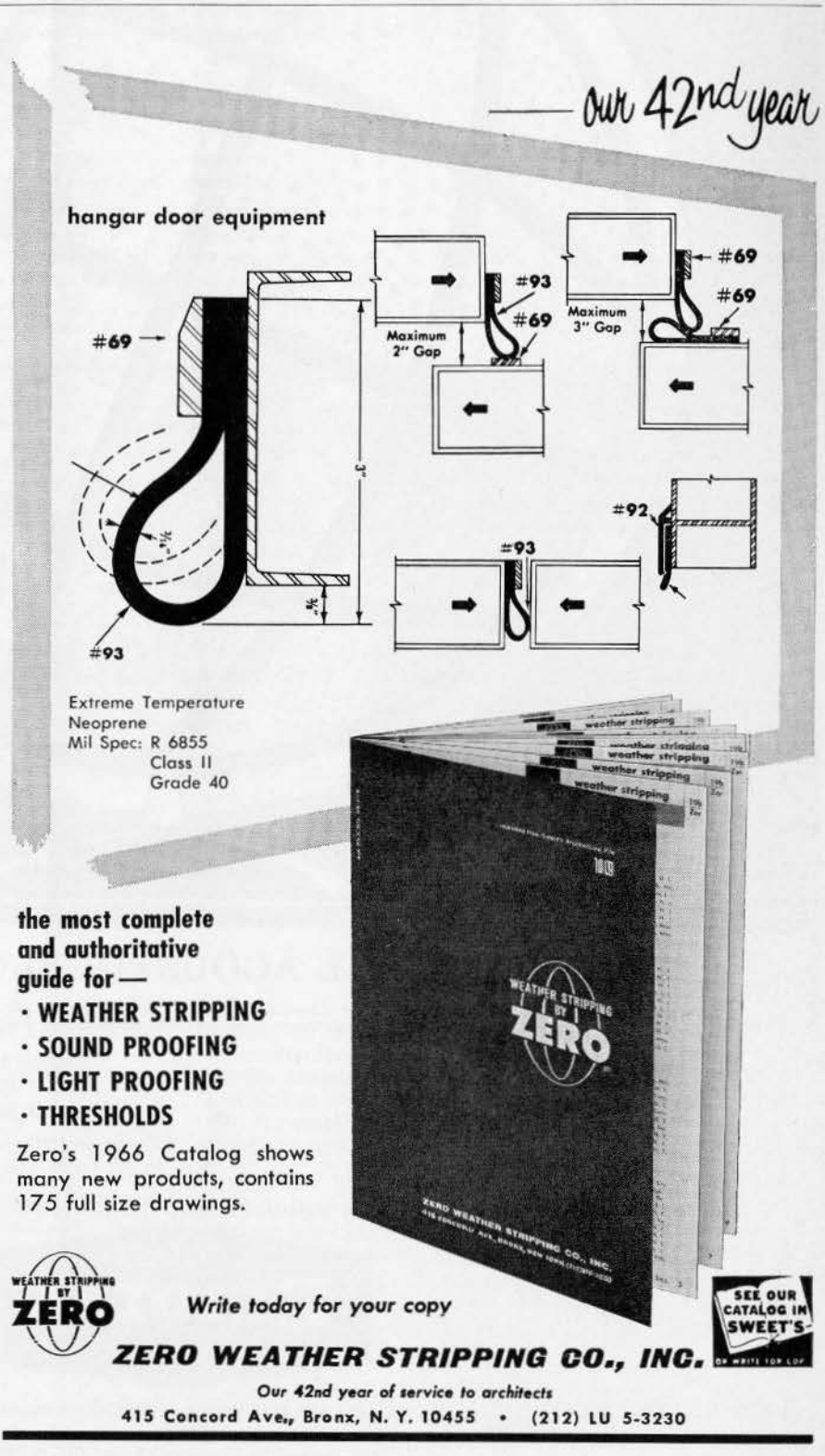
To skim up the Rhone valley in a Swissair jet between snow-clad mountains glistening in the morning sun is an inspiring way to start an architectural seminar. Particularly a seminar with the challenging and rather formidable theme of "The Architect and Town Planner faced with Great Works (Energy, Traffic and Public Health)" which was the subject chosen for the Fourth Seminar on Industrial Architecture sponsored by the International Union of Architects held in Montreux, Switzerland during the week of May 13, 1966.

The type of buildings and structures discussed were normally those which architects tend to consider as engineering projects but toward which no architect should remain indifferent. Of all human undertakings these are the structures which modify the landscape and change man's way of life to the greatest extent.

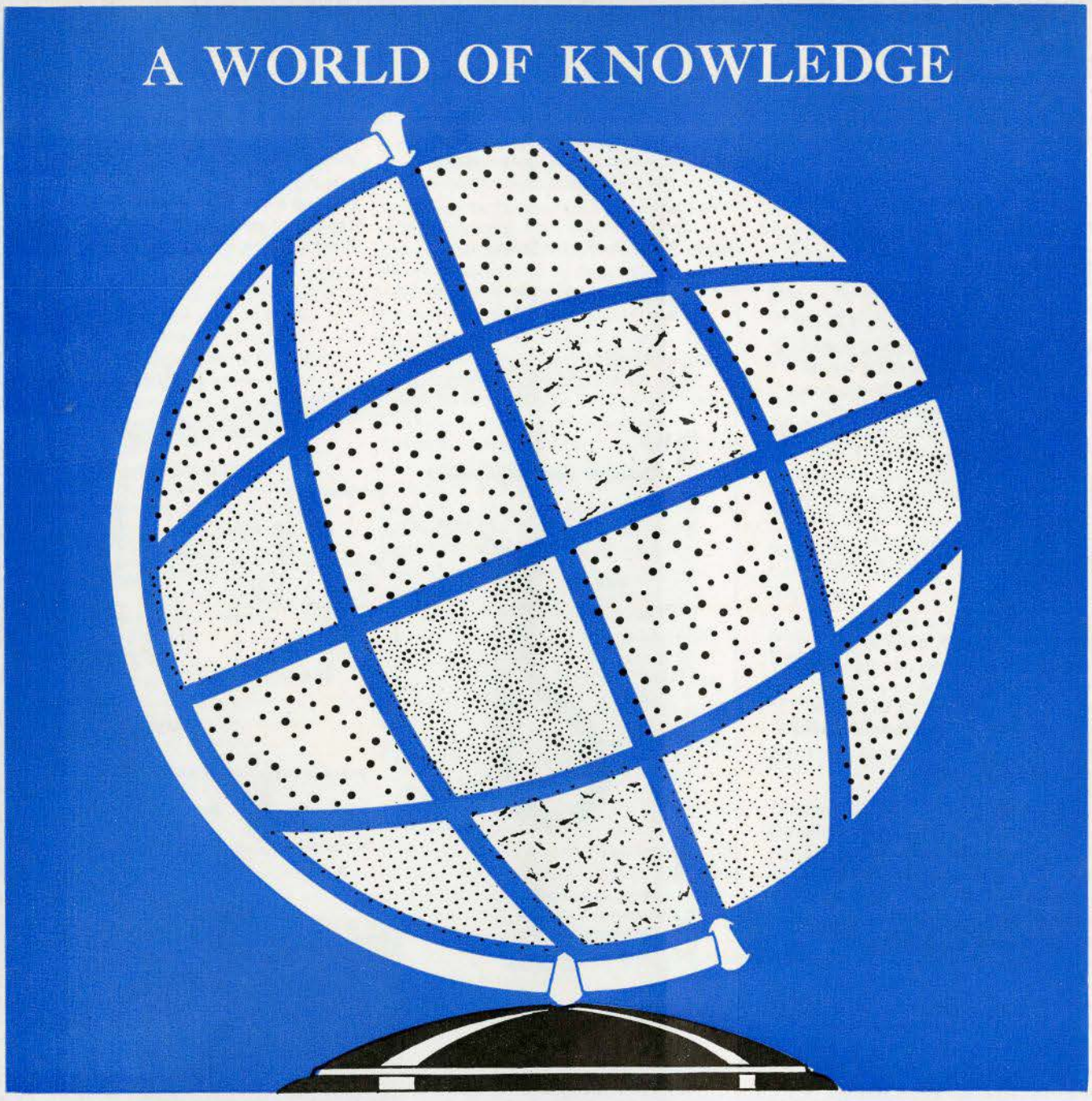
The choice of Montreux as the location for this seminar was a most propitious one as the Lac Leman district afforded excellent examples of each building type. Field trips were made to the Grand Saint-Bernard tunnel, Grande-Dixence Dam, Chavalon power station, CERN nuclear energy plant at Geneva and sewage treatment and refuse incineration plants at Lausanne. Previous to or during these visits lectures were given by the men responsible for the design and operation of the respective buildings and throughout each of the studies some mention and attention was paid to the part the architect had taken or could have taken in the project.

On the final day of the seminar conclusions were drawn up outlining the problems arising from major schemes for the production of energy, road communications and public health and how the architect could use his talents and training to surmount them. The problems of noise, air and water pollution and the possible waste of land and money if developments are unrestricted or unplanned are ever increasing with our exploding population. The expansion of existing installations to meet enormous future demands requires examination and evaluation. The architect should be present right from the start in the conception and execution of major projects as a member of the team responsible for the design in all stages from the town planning point of view through to the completion of the project. He should concern himself with the siting of the project and its adaption to the site and its integration in social and economical terms. He should also ensure coordination between the different design specialists and in particular be responsible for conception of form and all problems of construction and materials.

Sixty-five architects from twenty-two countries attended the seminar precipitating the inherent difficulties of language and translation which our hosts had adequately anticipated but which inevitably led to a few misinterpretations and tended to minimize spontaneous discussion. In my opinion this was the only difficulty which arose in a well planned and well balanced program carried out with typical Swiss efficiency.
Frank Newton, MRAIC, Toronto



A WORLD OF KNOWLEDGE



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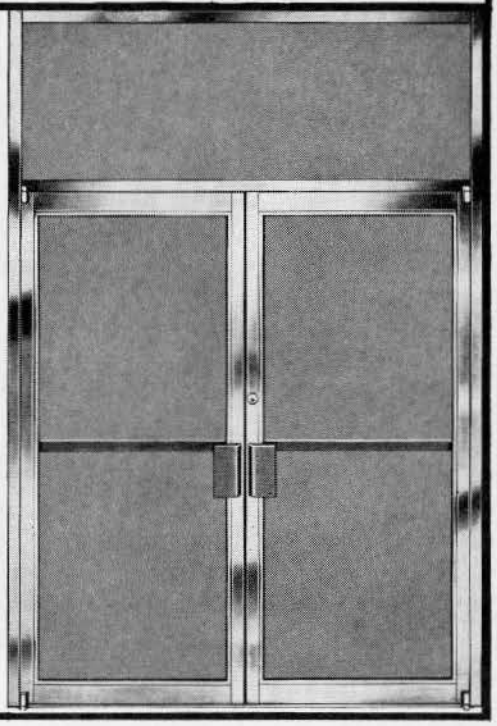

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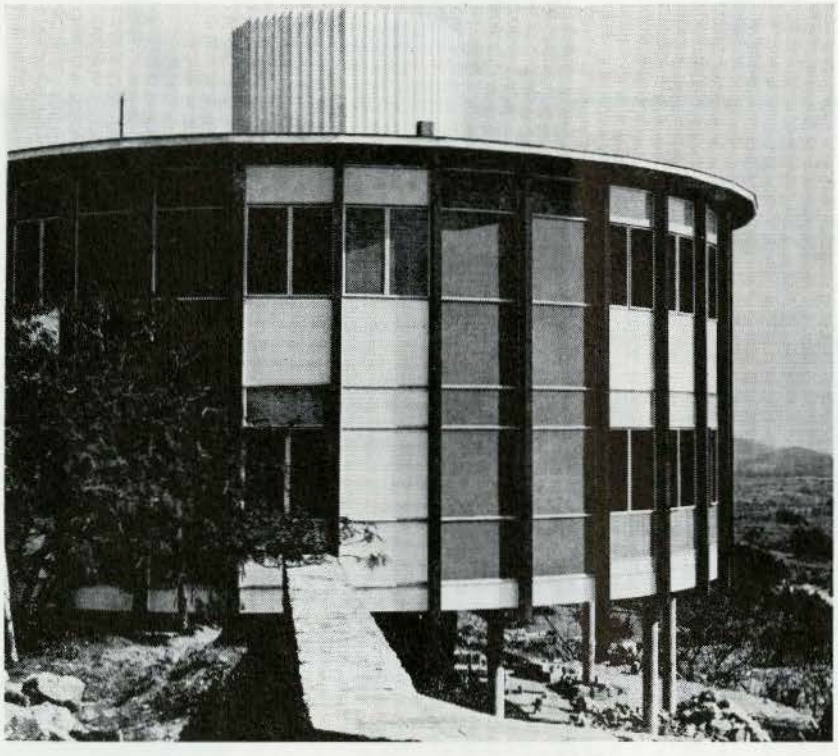

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Communiqué 2

From Institute Headquarters

The 1967 Congress of the International Union of Architects will open in Prague, Czechoslovakia, on July 3, according to the latest advice received. "Architecture and the Human Environment" is the theme, and provision is being made for open discussion, in addition to presentation of papers.

The Wallenstein Palace and Gardens will be the main centre. Attractions (apart from the many interesting buildings in Prague) will include exhibitions of historic and modern Czech architecture and an international display of student design work.

As at Paris in 1965, there will be a Festival of Architectural Films; also a day (July 2) devoted to the meeting of women architects.

All members of RAIC are eligible to attend, and information is available from Headquarters on request. The provisional program will be ready for distribution shortly. Registration required in advance, by February 28, to Prague.

The July issue of *UIA Review* carries a full record of the UIA-WHO Seminar on Public Health Facilities held in Athens, Greece, recently: "Programming, Planning and Design of Hospitals", "Hospital Planning for Mental Diseases", "Use of Materials" and other papers of interest to many architects. Subscriptions available through this Headquarters ($5 annually). Among the 65 delegates, representing 45 nations, was George Peck MRAIC, of the Department of National Health and Welfare, Ottawa.

Another report of wide interest is that of the UIA Seminar on Industrial Architecture, held at Montreux, Switzerland, in May. It was concerned with "the challenge of major schemes for the production of energy, road communications and public health". The well-illustrated report (in French) is available from UIA, 15 Quai Malaquais, Paris 6e, France.

In June, the UIA Commission on School Building met in San Francisco. Prefabrication and new systems in school building were major subjects. The final report stressed the need of well-designed industrialization and modular co-ordination in school construction, with the architects showing the way.

This was the first UIA meeting to be held in the United States, and its success has led to the hope that other UIA events will follow there.

The first UIA-sponsored conference in Canada is scheduled for September 1967, in Montreal. This is a Seminar on Museum Design, initiated by the International Council of Museums. Sessions will be held in the Montreal Museum of Fine Arts, which will be given over to a large exhibition (photos, plans and models) of outstanding museum buildings around the world – with an important section devoted to Canada's new contributions.

Edward Lawson, of the Montreal Museum, is in charge of arrangements on behalf of the Canadian Museums Association. RAIC assistance is being directed by John Bland (*F*), head of the School of Architecture, McGill University.

The Japan Architects Association has expressed "sincere thanks to your Institute for the kind assistance you are giving us in respect to our program for sending architectural apprentices to your country". The letter notes that since 1962, nineteen young architects have been engaged by Canadian firms for a minimum period of one year – and that five candidates are now looking for suitable appointments. Firms interested should write to Japan Architects Association, Kenchi-Kaikan 1, Ginza-Nichi 3 – Chome, Chuo-Ku, Tokyo, Japan.

The Commonwealth Association of Architects has good news to report concerning the new Foundation instituted by the Commonwealth Governments through their Secretariat:
"The Trustees of the Commonwealth Foundation meeting in London on June 28th have generously agreed to make the Association a grant of £10,000 per

Du siège de l'Institut

D'après les derniers renseignements reçus, le congrès de 1967 de l'Union internationale des architectes s'ouvrira à Prague (Tchécoslovaquie) le 3 juillet. Le thème sera "L'architecture et le milieu humain" et le programme prévoit des discussions libres, en plus de la présentation de documents.

Le congrès se tiendra surtout dans le palais et les jardins Wallenstein et les attractions comprendront (outre les nombreux édifices intéressants de Prague) une exposition d'architecture historique et moderne tchèque et une exposition internationale de travaux de composition d'élèves en architecture.

Comme à Paris en 1965, il y aura un festival de films d'architecture et une journée (le 2 juillet) sera consacrée à la rencontre d'architectes féminins.

Tous les membres de l'Institut ont le droit de participer à ce congrés et ceux qui désirent de plus amples renseignements n'ont qu'à les demander au siège administratif. Le programme provisoire sera distribué dans un avenir prochain. Les inscriptions doivent être faites d'avance, avant le 28 février, à Prague.

Le numéro de juillet de la *Revue de l'UIA* présente un compte rendu complet du Séminaire de la santé publique tenu récemment à Athènes (Grèce) par l'Union et l'Organisation mondiale de la santé, notamment des documents sur "L'élaboration des programmes et projets des hôpitaux", "L'élaboration des plans des hôpitaux pour maladies mentales", "L'utilisation des matériaux" et autres de nature à intéresser de nombreux architectes. On peut s'abonner à cette Revue par l'entremise du siège administratif à raison de $5 par an. Parmi les 65 déléguées, représentant 45 pays, se trouvait M George Peck, MIRAC, du ministère de la Santé nationale et du Bien-être social d'Ottawa.

Un autre rapport de grand intérêt est le compte rendu du séminaire de l'UIA sur

annum for two years from July 1st, 1966, and contingently a like sum in the third year. Beyond 1969 the Association would be expected to increase its resources in other ways but help from the Foundation on a diminishing scale is not excluded.
"Our application was for £15,000 for five years but the help now promised us is very generous and will make it possible to get ahead with the plans of expansion prepared at Malta, in particular the setting up of an active Commonwealth Board of Architectural Education, information and advisory services and the holding of a Conference in Delhi in 1967.

"At their meeting the Trustees of the Foundation approved grants totalling in all £25,000 of which £20,000 comes to the Commonwealth Association of Architects. We have therefore cause to be particularly grateful to the Foundation and there are grounds for supposing that the principles on which we operate and the objectives set are looked on by the Trustees as precisely the kind of scheme of professional collaboration in the Commonwealth which they were set up by the Commonwealth Governments to help."

Of the 660 persons who attended the Building Science Seminars (Roof Design) of NRC/DBR this Spring, one-third were architects. The next series of Seminars, in November 1966, will be devoted to the National Building Code, followed by Foundations for Buildings in 1967.

The Canadian Council on Urban and Regional Research advises that two important publications are now available – *Urban and Regional References* ($6) and a *Supplement* (including *Urban Research in Progress*). The two volumes cost $8. Write CCURR at 225 Metcalfe, Ottawa 4.

The Gustave Magnel Gold Medal will be awarded for the third time in 1967 by the graduates of the University of Ghent, Belgium. This commemorative medal is awarded every three years to the designer of a building in which concrete or pre-stressed concrete has been employed in an exceptional way. Details available from this Headquarters. Closing date: March 1, 1967.

Ontario Housing now sports a new look and well-illustrated articles. This bi-monthly magazine is available without charge from the Ontario Housing Corporation, 950 Yonge St., Toronto.

Fred W. Price
Executive Director

l'architecture industrielle tenu à Montreux (Suisse) en mai. On y a traité "des grands travaux de l'énergie, du trafic et de l'assainissement". On peut obtenir ce rapport bien illustré de l'UIA, 15 Quai Malaquais, Paris 6e (France).

En juin, la Commission de l'UIA sur les constructions scolaires s'est réunie à San Francisco. Les principaux sujets d'étude ont été la préfabrication et les nouveaux systèmes de construction scolaire. Le rapport final a souligné le besoin d'une industrialisation bien conçue et de la coordination modulaire dans la construction des écoles et la nécessité pour les architectes de battre la marche dans cette voie.

C'était la première réunion de l'UIA aux Etats-Unis et elle a remporté un tel succès qu'elle a fait naître l'espoir d'autres activités du même genre de l'UIA dans le même pays.

Le premier congrès organisé par l'UIA au Canada doit avoir lieu à Montréal en septembre 1967. Il s'agit d'un séminaire sur les modèles des musées dû à l'initiative du Conseil international des musées. Les séances auront lieu au Musée des Beaux-Arts de Montréal où se tiendra une grande exposition (photos, plans et maquettes) des principaux musées du monde entier; une importante section sera réservée aux récentes constructions canadiennes dans ce domaine.

M Edward Lawson, du Musée de Montréal, est en charge des préparatifs pour le compte de l'Association des musées canadiens. L'IRAC y apporté aussi son concours, dont la direction a été confiée à M John Bland (*F*), chef de l'Ecole d'architecture de l'université McGill.

L'Association des architectes du Japon a exprimé ses "profonds remerciements à votre Institut pour l'aide précieuse que vous nous accordez dans la réalisation de notre programme d'envoi d'apprentis en architecture dans votre pays".

La lettre ajoute que, depuis 1962, dix-neuf jeunes architectes ont été embauchés par des maisons canadiennes pour un minimum d'un an chacun et que, actuellement, cinq candidats se cherchent des places convenables. Les maisons intéressées sont priées d'écrire à L'Association des architectes du Japon, Kenchi-Kaikan 1, Ginza-Nichi 3 – Chome, Chuo-Ku, Tokyo, Japon.

L'Association des architectes du Commonwealth a de bonnes nouvelles à communiquer au sujet de la nouvelle Fondation établie par les Gouvernements du Commonwealth par l'entremise de leur Secrétariat:
"Les administrateurs de la Fondation du Commonwealth se sont réunis à Londres le 28 juin et ont généreusement consenti à verser à l'Association une subvention de £10,000 par année durant deux années à compter du 1er juillet 1966 et peut-être une somme du même ordre une troisième année. Après 1969, l'Association sera censée augmenter ses ressources par d'autres moyens mais une aide moindre de la Fondation n'est pas exclue.
"Nous avions demandé £15,000 durant cinq ans mais l'aide qui nous est promise est très généreuse et nous permettra de mettre à exécution les projets d'expansion tracés à Malte, en particulier l'établissement d'une Commission active du Commonwealth sur la formation des architectes, des services de renseignement et de consultation et la tenue d'un congrès à Delhi en 1967.
"A leur réunion, les administrateurs de la Fondation ont approuvé des dons au total de £25,000 dont £20,000 ont été attribuées à l'Association des architectes du Commonwealth. Nous avons donc raison d'être reconnaissants à la Fondation et de croire que les principes dont nous nous inspirons et les objectifs que nous nous sommes fixés correspondent au genre de collaboration professionnelle que les gouvernements du Commonwealth voulaient favoriser en créant la Fondation."

Des 660 personnes qui ont assisté aux séminaires sur la science du bâtiment (modèles de toits) tenu le printemps dernier par la Direction de la recherche en bâtiment du Conseil national de recherches, le tiers étaient des architectes.

La prochaine série de séminaires, en novembre 1966, sera consacrée au Code national du bâtiment, et sera suivie d'une autre série sur les Fondations des bâtiments, en 1967.

Le Conseil canadien de recherches urbaines et régionales nous informe que deux importantes publications sont maintenant disponibles: *Références urbaines et régionales* ($6) et un *Supplément* (comprenant les *Recherches urbaines en cours*). Le prix des deux volumes est de $8. S'adresser au Conseil canadien de recherches urbaines et régionales, 225 rue Metcalfe, Ottawa 4.

En 1967, la Médaille d'or Gustave Magnel sera décernée pour la troisième fois par les diplômés de l'Université de Gand (Belgique). Cette médaille commémorative est décernée tous les trois ans à l'auteur du projet d'une construction comportant une application importante et remarquable du béton armé ou de la précontrainte. Pour détails, s'adresser à notre siège administratif. La date limite est le 1er mars 1967.

Le directeur général,
Fred W. Price

How does the Sunnyday 25 Hydronic Generator stack up?

It doesn't!

Here's an all-new Forced Draft Spacesaver designed to eliminate the need for *expensive chimneys* . . . only a vent of sufficient size to carry off the products of combustion is required. It's the Sunnyday 25 Generator . . . perfect choice for small or medium sized commercial installations. Engineered for economic installation and operation, this compact unit with BIG boiler capacity and performance reduces boiler room space requirements 30% to 45%. And with the Sunnyday 25 Generator's wet base construction—with the combustion area completely surrounded by a water-backed heating surface for increased efficiency—a small bag of granular floor insulation is all that is needed in the combustion area. There are no expensive refractories to install or maintain.

The Sunnyday 25 Generator is available in six giant capacities ranging from 381,100 to 921,200 BTUH Net I-B-R rating. For complete details on this Forced Draft Spacesaver, write for Warden King Catalogue No. 4A-1 to: Warden King, P.O. Box 2270, St. Laurent, Montreal 9, P.Q.

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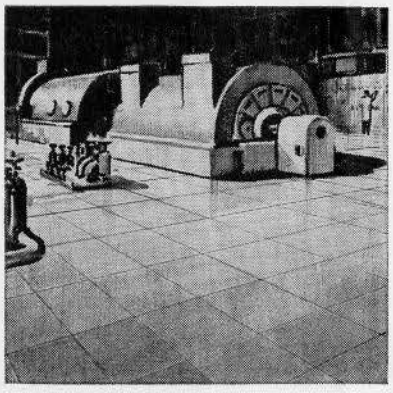
GRACE
CONSTRUCTION MATERIALS

Notes on floor specification

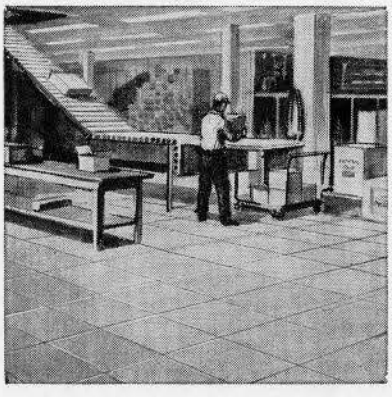
THE designer or contractor who plots floor finishing costs against ultimate hardness or durability recognizes the almost straight-line ratio between material cost and desired results. Despite overlapping claims from a multiplicity of products, no one product is a cure-all. The key to long-range performance and cost reduction lies in tight specification of the hardener, curing method and sealer.

Simplification of the labor process and reduction of "dead time" for curing are as important as selection of the proper hardener. Engineering which avoids "second step" finishing is both desirable and practical in reducing costs and meeting performance requirements.

Where possible, a good metallic or emery hardener can be incorporated into the surface of a freshly placed floor to provide abrasion resistance, hardness and safety. While the advantage of this monolithic method lies in a single curing and finishing requirement for the base slab and its surface treatment, the same products can be utilized in toppings where necessary. Colorant hardeners fall in this category also, and are ideal for commercial and light industrial applications, particularly where dustless floors are desired.



Horn Colorundum colorant hardener produced this handsome, linoleum brown powerhouse floor which has outstanding appearance and wear characteristics.



After six years this packing house floor is a solid testimonial to Horn Ferro-Fax metallic floor hardener.

Metallic hardeners (1) provide high resistance to rolling and crushing loads; emery hardeners (2) deliver abrasion resistance and safe footing even when wet or oily. Colorant hardeners (3) in addition to decorative effects, should be considered for permanent, low-maintenance color coding of safety zones and other floor areas.

Curing can't be over-emphasized in any concrete work and is of particular importance in the durability of floors. Once again, where the floor is monolithic, a combination curing agent, hardener, dust-proofer and sealer (4) can eliminate extra steps and shorten "dead time". Such a curing agent can be used in conjunction with other hardeners or on plain concrete. For the after-treatment of virgin concrete, fluosilicate hardeners (5) provide increased durability at low cost.

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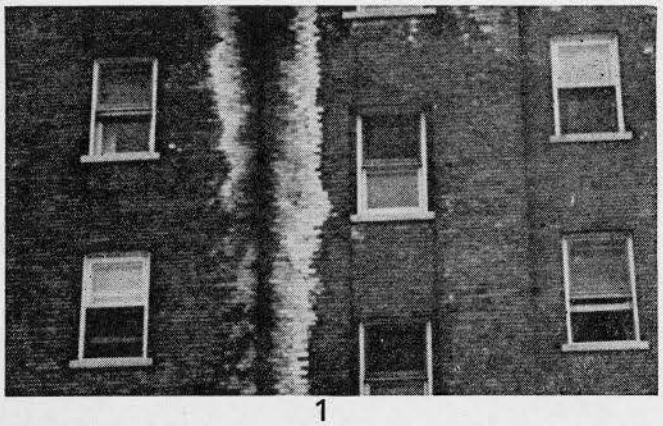
Could your contractor name these 4 common masonry failures?



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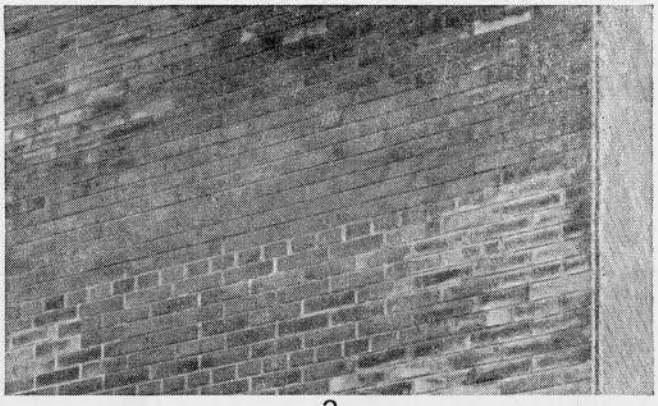

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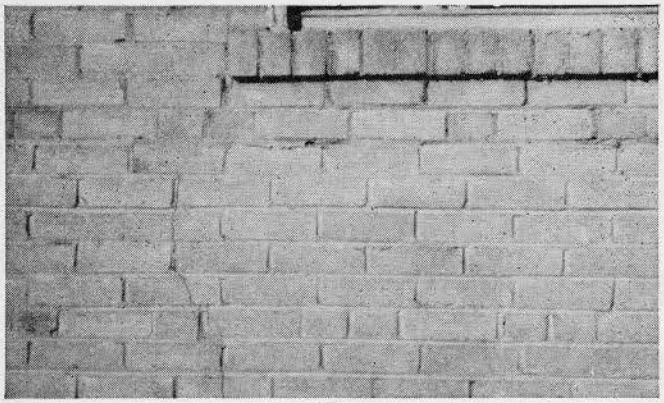

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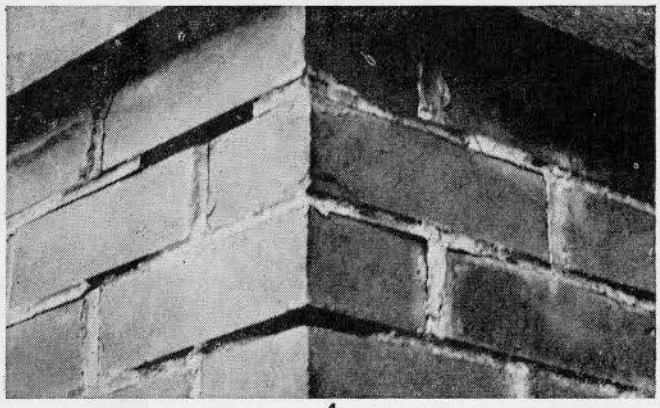

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They're ugly evidence that the wrong mortar can make a mess of a fine architectural concept and that no one mortar is "just right" for all applications.

1. WATER PENETRATION Efflorescence appears to be the problem, but it is only a symptom of the real one — water penetration. One of the causes of water penetration is cracks developing in the bond between the mortar and the masonry unit. Selection of the lowest strength mortar, to meet the job requirements, will reduce this problem.

2. EFFLORESCENCE Unsightly efflorescence as shown in pictures 1 and 2 is caused by masonry with high alkaline salt content. By selecting a lime mortar with low salt content, such as Domtar 2-1-8, this effect can be reduced.

3. CRACKING Invariably the result of too strong a mortar. As with most things increased strength lowers flexibility. Too strong a mortar does not allow for normal building movement. The compressive strength of the mortar should always be less than that of the masonry unit.

4. POOR BOND Generally caused by mortar dryout. Mortar should be selected with particular attention to the initial rate of absorption of the masonry unit. If the water in mortar is absorbed too quickly, it results in excessive dryout. Conversely, if there is not sufficient suction, the masonry unit tends to float, thereby reducing the bond. The self healing characteristics of lime always improves the bond — even after normal building settlement.

How can you be sure you're selecting the right mortar for the masonry unit? Just consult your Domtar Technical Mortar Brochure No. 402, Binder 1, or mail the coupon below.

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New Forms - Sculpture and Architecture Totems or Monuments?

1
Uncatalogued, but dominantly obtrusive, Yves Trudeau's vibrant orange sculpture
Sculpture en orange par Yves Trudeau. Cette pièce n'est pas cataloguée, mais ressort d'une manière vibrante et pénétrante

Sculptors and architects, historically speaking, rate equally as "monument" makers in their ability to construct edifices of unnatural form to "mark the place". Architecture has often sought collaborative statement with sculpture where mere function was not fully expressive of aspiration – the temples had their "gods". However, with the death of the gods (even paperbacks ask "Is God Dead?") the "totem" struggles for new form with architecture.

Totems

Totem is a comparatively new term in general use coined from the North American Indian (Odjibewa – Algonkin) by anthropologists to define symbols which not only mark the place of man but identify his tribe or clan. Totemic, then is the ability of a form not only to be monumental and mark the place of man, but to identify its maker.
Thus Stonehenge, architectural in form, is is an early monument of man to mark a sacred place. The Sphinx, however, is a monumental totem established by a "tribe" of men – the Egyptians and no other.

Architecture, by declaring itself to be purely functional, proceeds to monumentality alone. However, a more romantic persuasion has forced an issue where there is a fusion of totem and monument in the scheme of "total" architecture. Rejecting the artist collaborator, the architect produces an edifice more like a piece of sculpture. One may ponder on the validity of this – Can the temple be itself a godhead?

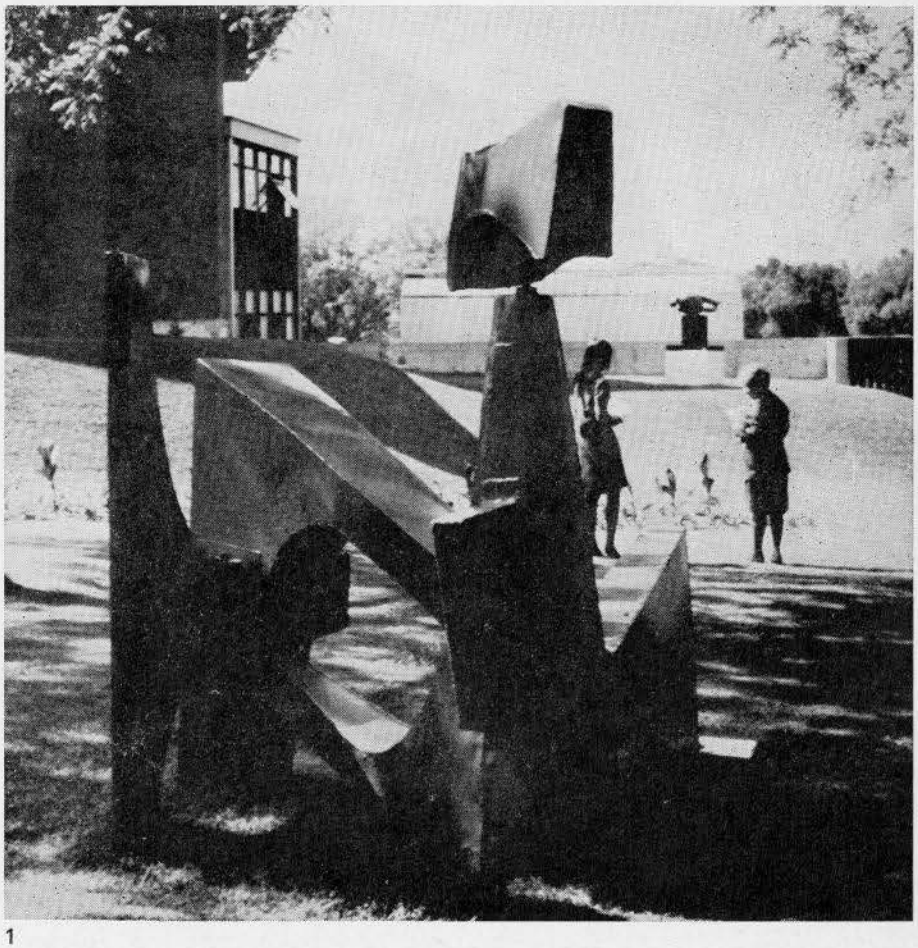
Towards Monumentality in Sculpture?

What of pure sculpture? Has it become a lost art to society or has it survived? The pursuit of "pure form" in three dimensions has always been the pace-setting business of the sculptor. He forecasts the shape of things to come for architecture or otherwise. Since the death of Man-God (Greek) and God-Man (Christian), sculpture has become non-figurative. The passing era of Moore, with "Man and Nature" as a form, led to an anguished, expressive organism, erupting passionately, seeking for its own delineation – the soul of man in search of definition –the "Angst" post-war (1945) school of Paolozzi and Company.

All post-war configuration has perched perilously between high romantic and geometric classicism or, if you like, constructivism. "Pop" barely touched the big scene but "Op" has. It is found in the field of small kinetic indoor sculpture, where light and color become form makers in themselves fabricated by geometric construction.

The most significant movement, however, is the growth away from totemic image to a new monumental assemblage of girder-like forms, bright with raw color and architectural in scale. Using architectural material, at last sculptural forms compete with architecture on its own terms. This lively interplay of planes decries the architect's unimaginative assembly of girders devoted solely to function. The new Caro's (see *Time*, June 1966) and others have made a totem out of monumentality itself.

Just as architecture is sliding through a period of pseudo-romantic yearning, sculpture after a forthright and agonized burst of romanticism has re-affirmed a



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2
Charles Daudelin's "Espace, Silence et Nuit"
3
Françoise Sullivan's "Chute en Rouge"
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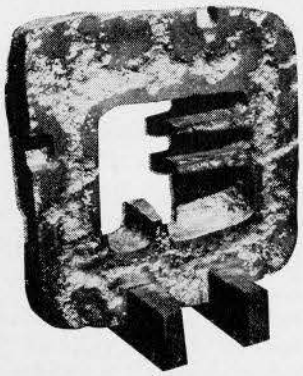
"Duet" by Bob Murray at International Sculpture Symposium, Long Beach State College
"Duet" par Bob Murray montré au Symposium international de sculpture, Long Beach State College



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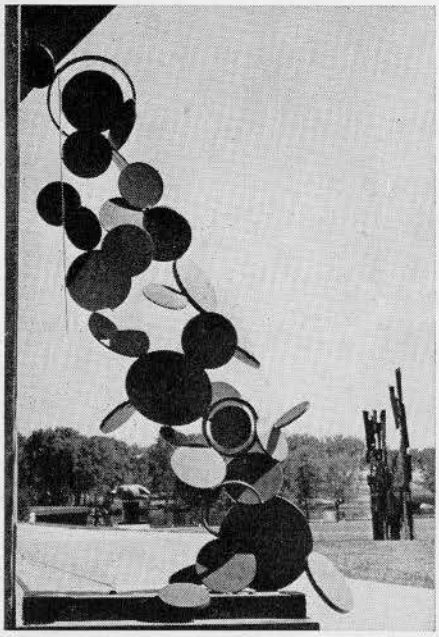

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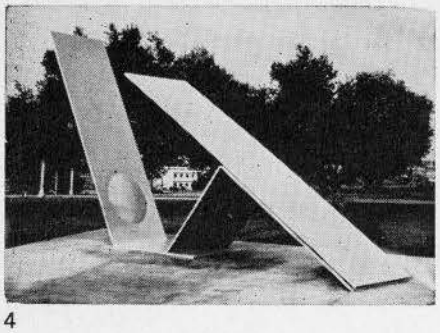

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faith in classic geometry and monumentality. The new "gods" are of steel and latex paint. A metropolis of materialism has evoked from its own substance, a symbol, cool detached, unemotional, *and* architectural in form.

Quite a thought if the "monument" becomes a totem.

What of the new sculpture and architects? Will they use the artist-sculptor to create a dialogue of girder commenting on girder, and engage in contrapuntal activity of function and functionless form?

Some of these thoughts prevailed while reviewing the present outdoor sculpture show, sponsored by Rothmans at the Stratford Festival for 1966.

Stratford Sculpture Exhibition

This year the second outdoor sculpture show brings together the best work of the virile young sculptors of Quebec. The promotors profiting from last year's (Ontario sculptors) experience, selected work of a more worthy scale for outdoors. It is all there – all schools from "Brancusi" to "Angst" to "Now".

Polished stone, polished brass, rusting girders, and enamelled constructions find imagery to give a brief survey of movements from 1914 to 1966. As a show, it is of an excellent, even standard if not totally exciting. It would be quibbling to pull down general performance by selecting weaker pieces for chastisement. A whole afternoon spent in late spring sunshine gave time to become familiar with individual works. After impact of the moment the changing patterns of afternoon sun and shadow established the pieces best able to hold attention.

The "latest" school, the monumental girder, came off best. Bold constructions, sturdy and colorful, dominated the hours.

In detail, Françoise Sullivan's "Chute en Rouge" succeeded in engaging attention, despite deep shadow, making this reviewer wish to find a more compatible wall, where its energetic discs might parasitically cling and engage some flat or urbane plane in lively discourse.

Charles Daudelin with his sensuous bronze, half polished, half crenellated, makes a brooding tombstone to mark the end of an era of "Angst" into the new era of classic coolness.

Fortier, Nesbitt and Poliquin have interest as competent constructivists, but are not as yet clear minded monument builders, as are Caro of England or Bob Murray of Canada (now working in the USA). Gord Smith's decorative assemblages fail to call the time of the future, but Paul Borduas does, and the bright red-activity of the Yves Trudeau and the brooding energy of Poliquin's "Episode" hint at potential unleashed. Ulysses Comtois' work is perhaps the least compromising of all the sculpture and points to the new hard cool school of thought where clear form and vibrant polychrome insist on their visual place in a "pop" landscape. Accidental or not, the amusing juxtaposition of three newspaper containers as a "greek" chorus in the same dramatic colors as the stripes of Comtois' cheerful "letter-box sans bouche" had an ambiguous significance.

Finally, the show is professional and competent but wobbles in philosophic statement. Perhaps that is why one remains unexcited, missing forthright statements necessary to explode a new movement. Benign weather, spaciousness (where unfortunately subtlety often suffers and lesser scale screams for isolation) add to the lessening of tension, which gives way to contemplation rather than excitement. The public probably thinks that this essay of "Brancusi to Moore via Constructivism", is avant-garde. It is not!

Toronto's promised outdoor show may see the end of Moore's tomb-like mountains as the last seal of finality, the passing era of the figurative totem. By that time, more forthright statements may emerge on the new monumentality in sculpture.

Anita Aarons

Allied Arts Catalogue

Catalogue des Arts Connexes

Volume 1 Nos 1–48
October/octobre 1966

Royal Architectural Institute of Canada
Institut Royal d'Architecture du Canada

1

A New Working Tool for Architects and Others Concerned in the Arts Allied to Architecture

In October the first volume of our new publication, the RAIC Allied Arts Catalogue, comes off the press. The Catalogue is not an "art book" in the ordinary sense, but a working tool for architects and others concerned in the commissioning of works of art — sculpture, murals, fine craft work — for the embellishment of buildings and other structures.

This and succeeding volumes will provide a continuous record of the current work of contemporary Canadian professional artists already collaborating with architects, and will introduce new artists whose work is considered worthy of attention.

The Catalogue is an extension of the work of the Allied Arts Department of *Architecture Canada*, the Journal of the RAIC/la Revue de l'IRAC, under the editorship of Anita Aarons. The co-operation and support of the many architects, artists, art galleries and photographers, and of the Canada Council, in the research, gathering of material and production is gratefully acknowledged.

In format the Catalogue consists of single sheets, 8½" x 11", printed one side only on heavy paper, each devoted to the work of a single artist (reproduced at right is sheet illustrating the work of ceramist Merton Chambers). Illustrations are representative of the scope of the artist — figurative and non-figurative, different media, etc. Color reproduction is used where color is essential to a proper appreciation of the work. Data on each sheet, in English and French, includes name, address and a brief biography of the artist, and the location, nature and date of the examples illustrated. Sheets are number consecutively, and will be issued semi-annually. Volume One contains sheets 1 to 48 and illustrates the work of 48 artists.

The Catalogue pages are available in loose sheets, contained in an attractive cardboard portfolio; or bound in book form, or banded in packages. Cost of each format is shown on the order overleaf. Orders must be for the complete volume; individual sheets will not be sold.

Published by *Architecture Canada*, the Journal of the Royal Architectural Institute of Canada — la Revue de l'Institut Royal d'Architecture du Canada, 160 Eglinton Avenue East, Toronto 12, Ontario.

W. N. Greer, MRAIC
Chairman,
Publications Board

Walter B. Bowker
Managing Editor

Cover, Detail of Wall in Expo 67 Administration Building, Artist Ted Bieler, Architect Irving Grossman

Un nouvel outil pour des architectes et d'autres s'occupant des arts connexes relatifs à l'architecture

Le mois d'octobre verra la parution du premier volume de notre nouveau Recueil des Arts connexes.

Ce Recueil n'est pas un "livre d'art" ordinaire, mais un instrument de travail pour ceux qui s'occupent de la commande d'oeuvres d'art pour l'embellissement d'oeuvres d'architecture.

Publiée deux fois par an, cette suite de volumes va constituer un dossier des oeuvres d'artistes canadiens contemporains qui travaillent déja de concert avec l'architecte et va introduire de nouveaux artistes dignes d'attention.

Une prolongation de la section des Arts connexes de la revue *Architecture Canada*, rédactrice, Miss Anita Aarons, ce Recueil a été créé grace au concours de nombreux architectes, artistes, galeries, photographes et au Conseil canadien.

Notre Recueil consiste de 48 pages simples en papier lourd, imprimées sur un côté, dont chaque page est consacrée à l'oeuvre d'un seul artiste (La réproduction est d'une oeuvre du céramiste Merton Chambers). Les illustrations, allant du figuratif au non-figuratif, seront en couleur où il le faut pour l'appréciation de l'oeuvre et sur chaque page, en anglais et en français, figurent tous les renseignements nécessaires à notre compréhension de l'artiste et de son oeuvre. Ces volumes seront numérotés consécutivement; le premier volume comprend les numéros 1 à 48.

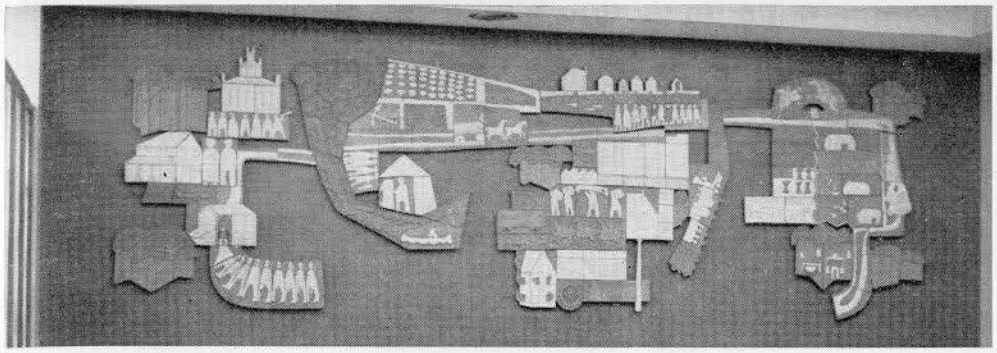
On pourra se procurer le Recueil soit en feuilles mobiles, soit en carton, en forme de livre ou en paquet; les prix respectifs se trouvent au verso. Ces pages ne se vendent pas séparément.

Publié par *Architecture Canada*, the Journal of the Royal Architectural Institute of Canada — la Revue de l'Institut Royal d'Architecture du Canada, 160 Eglinton Avenue East, Toronto 12, Ontario.

W. N. Greer, MRAIC
Président,
Commission des publications

Walter B. Bowker
Rédacteur gérant

Couverture, Détail du mur du Bâtiment d'Administration à l'Expo 67, artiste Ted Bieler, architecte Irving Grossman



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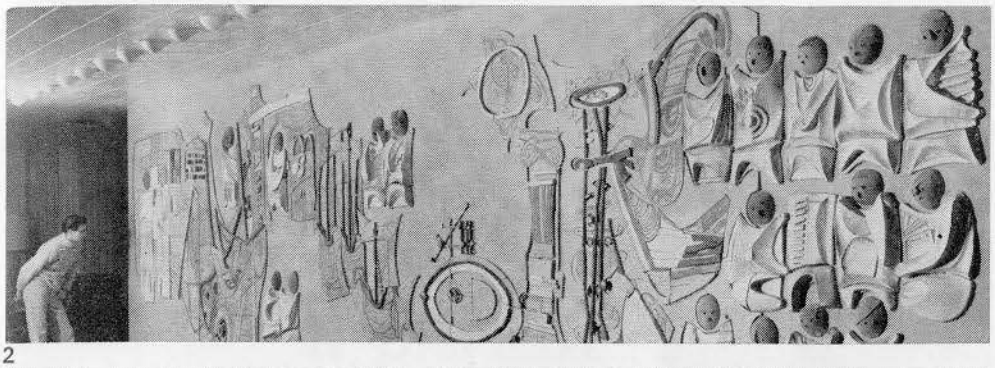

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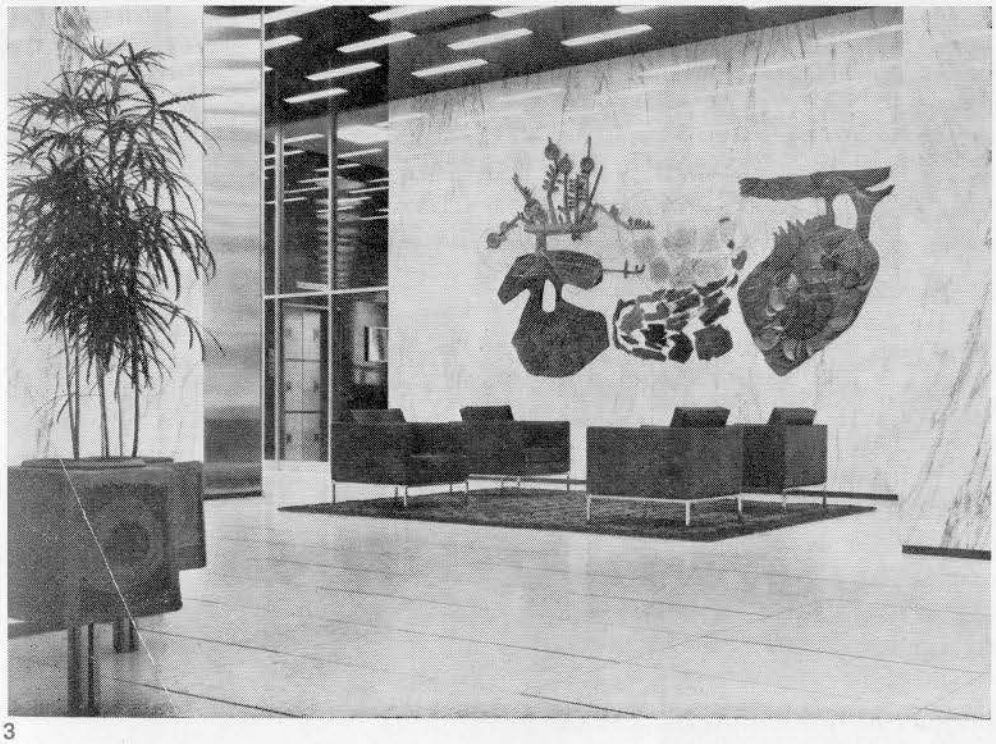

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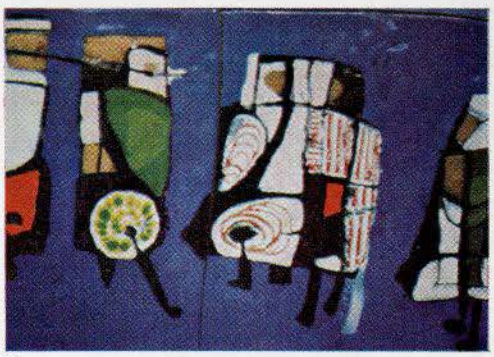

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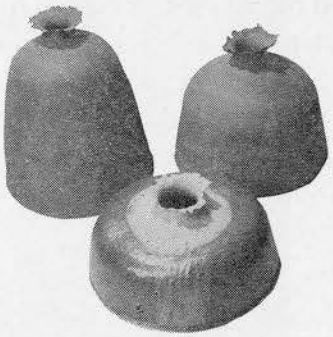

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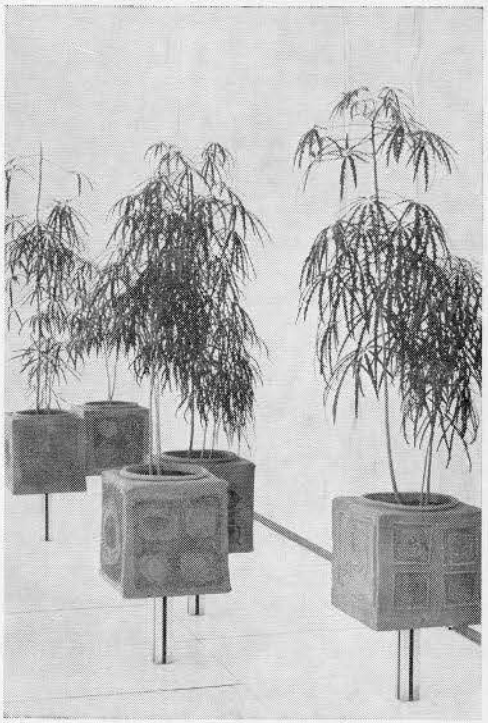

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Photographers: Panda 2 & 6, Ian Samson 3

Allied Arts Catalogue/Catalogue des Arts Connexes RAIC/l'IRAC

Page 10, Vol. 1, Oct. 1966

1
Ceramic mosaic, York County Hospital, Newmarket, Ontario; Architects, Somerville, McMurrich & Oxley; Commissioned by York County Hospital
Mosaïque en céramique; commissionné par York County Hospital
2
Ceramic mural, 9′ x 30′, glazed in white, yellows, reds and terra cotta; 6th floor lobby, Education Centre, Toronto; Architects, Page & Steele
Murale en céramique, émaillée en blanc, et dans des nuances de jaune, rouge et terre cuite, 9′ x 30′
3
Ceramic and metal mural, 8′ x 18′; Lobby National Trust Building, 21 King St. E., Toronto; Architects, Page & Steele; Commissioned by Alan Jarvis Associates. Wind Form by Ron Baird
Murale en céramique et métal, 8′ x 18′; commissionnée par Alan Jarvis Associates; réalisation de la conception du vent par Ron Baird
4
Detail, enamel on copper mural in Executive Suite, Education Centre, Toronto; Architects, Page & Steele
Détail d'une murale en émail sur cuivre
5
Floor pots, 18″–24″ in diameter, up to 24″ high
Cache-pots, de diamètre 18″–24″, hauteur jusqu'à 24″
6
Terra cotta planters on stainless steel supports, 18″; Lobby, National Trust Building, 21 King St E., Toronto; Architects, Page & Steele
Cache-pots en céramique sur pieds en acier inoxydable

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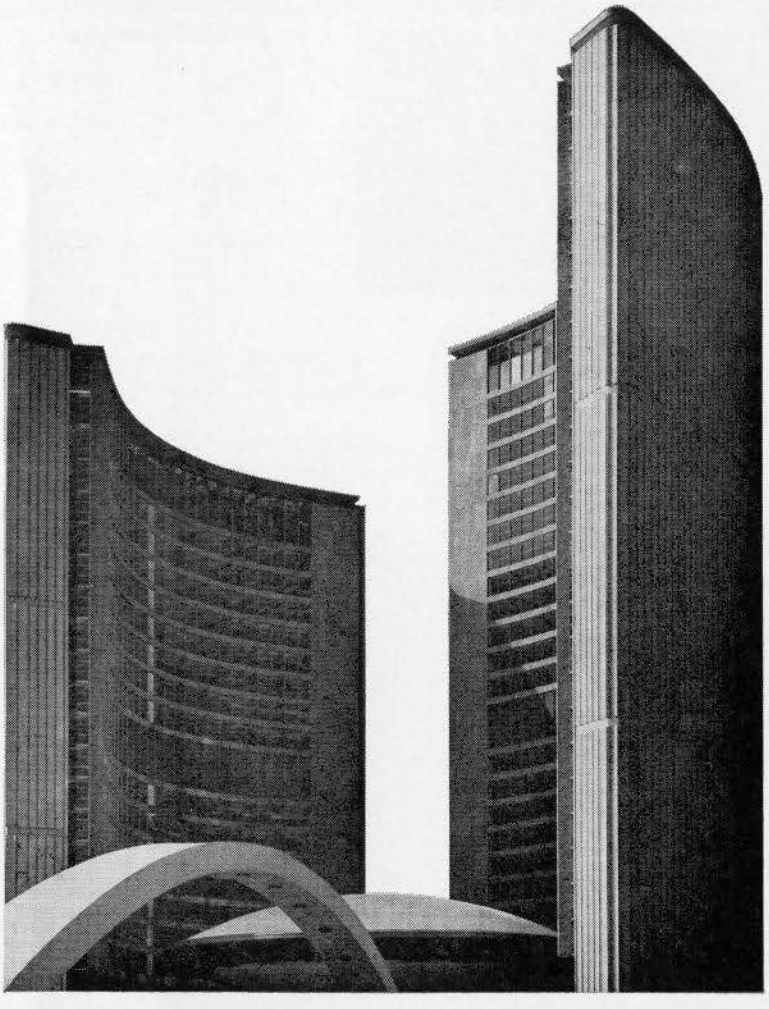

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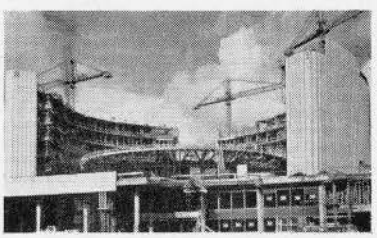

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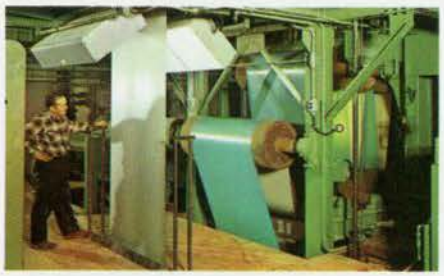

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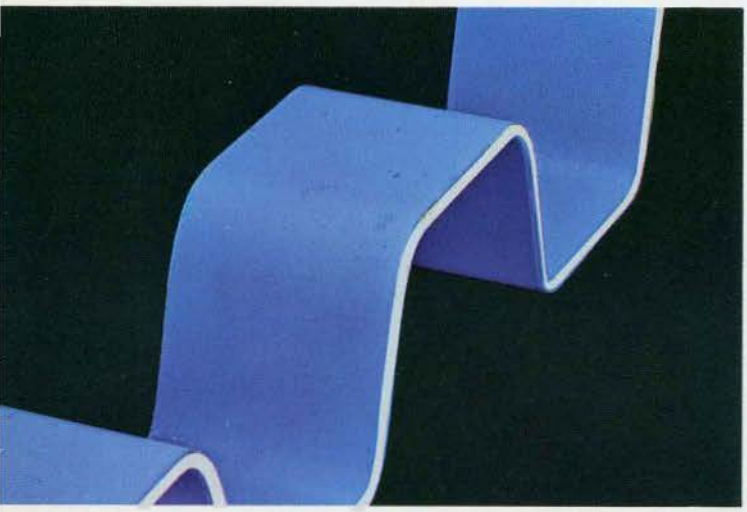

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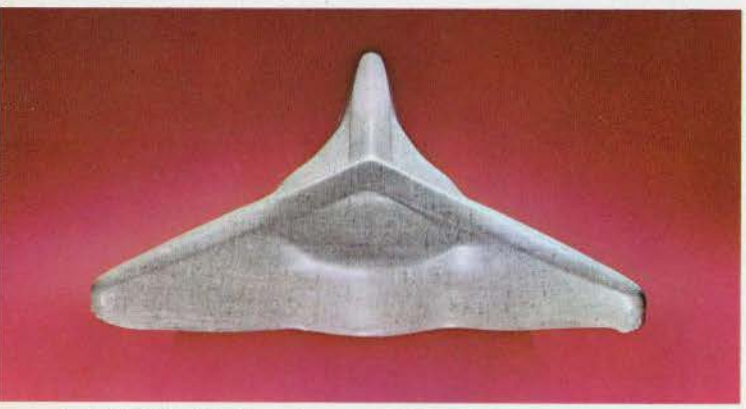

DRAWING— Medium draws▲ pose no problem.

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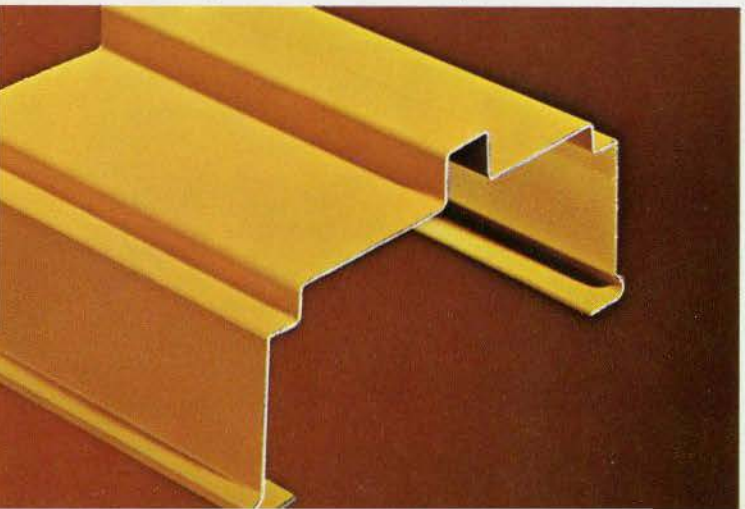

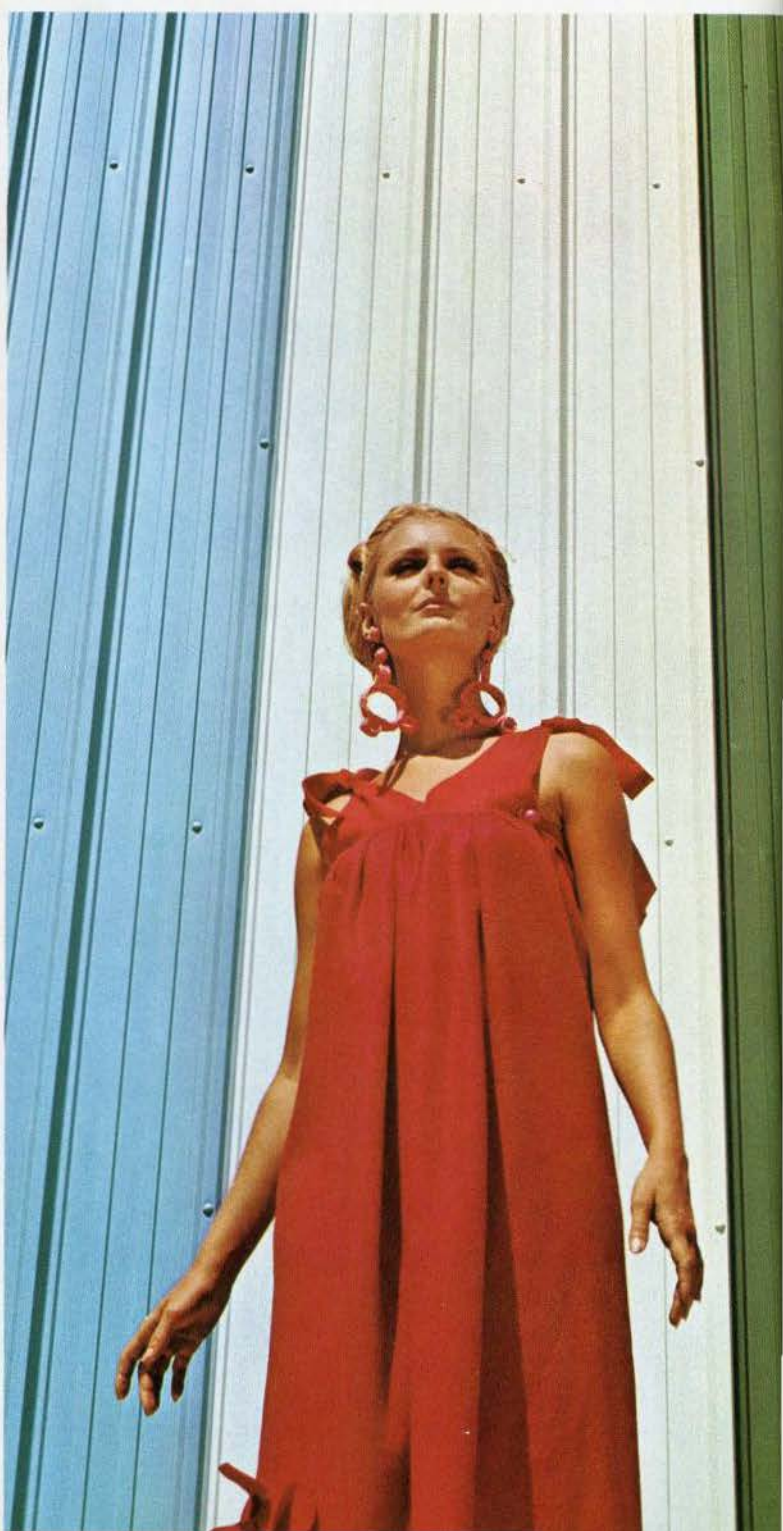

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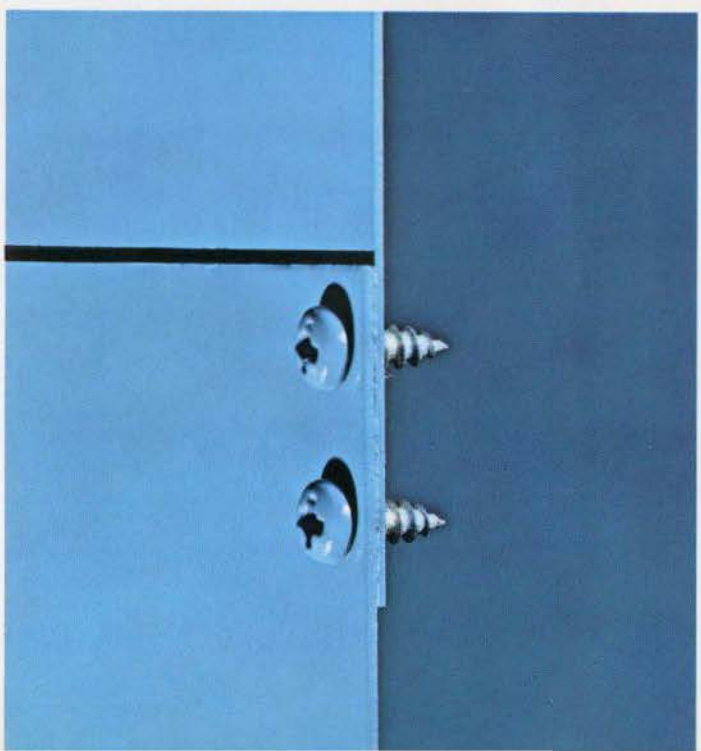
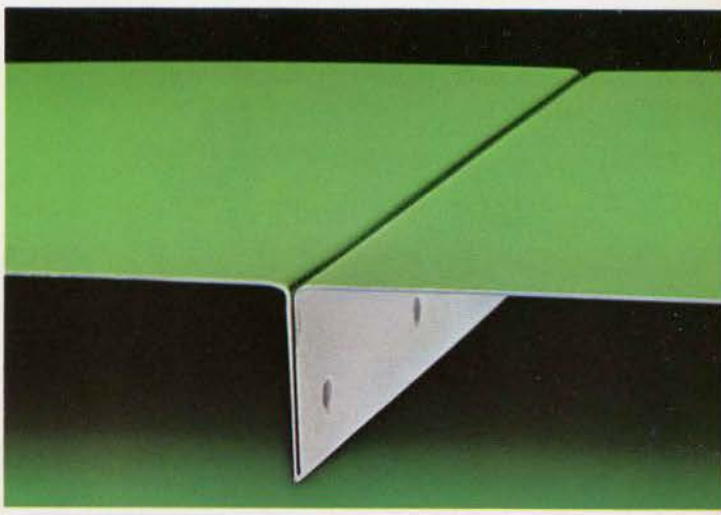
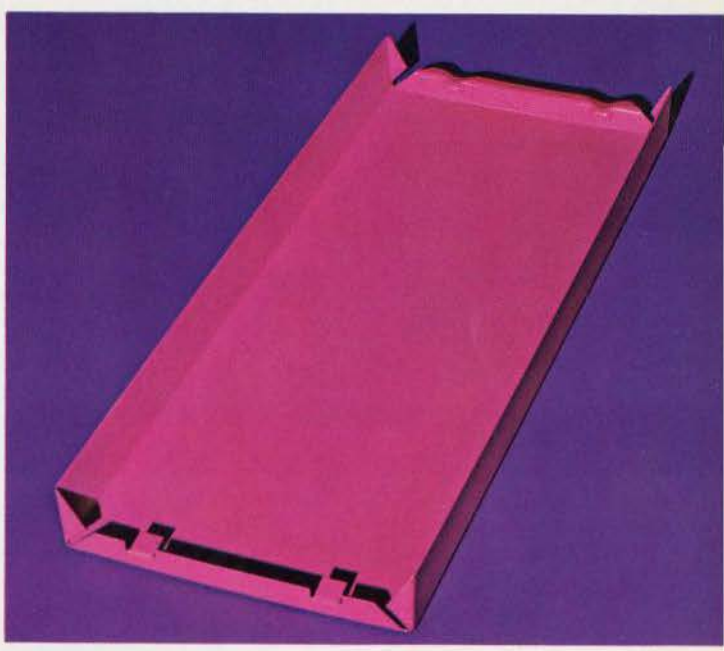




SPOT WELDING—Hidden joints can be spot welded. ▲



TABBING—Integral fasteners ▲ save material and time.

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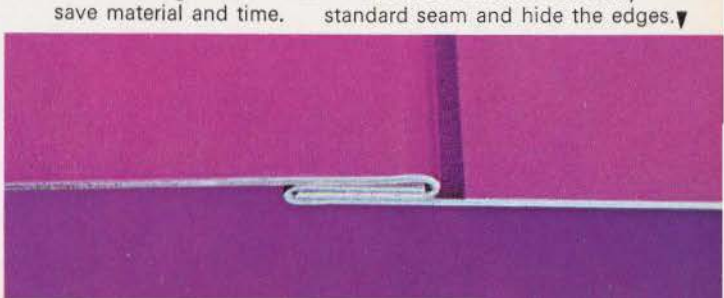

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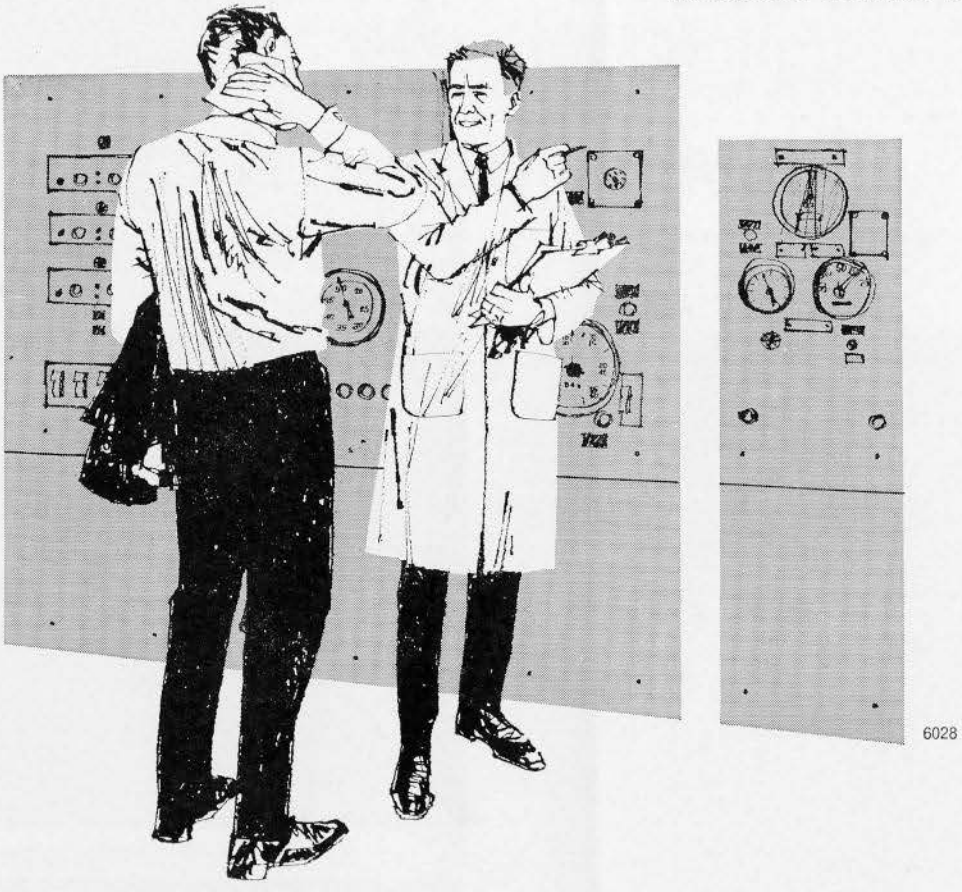

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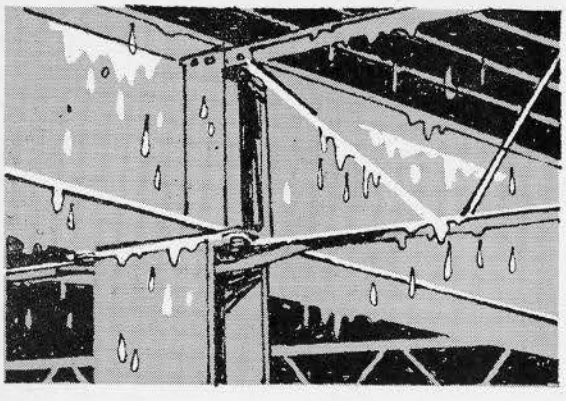

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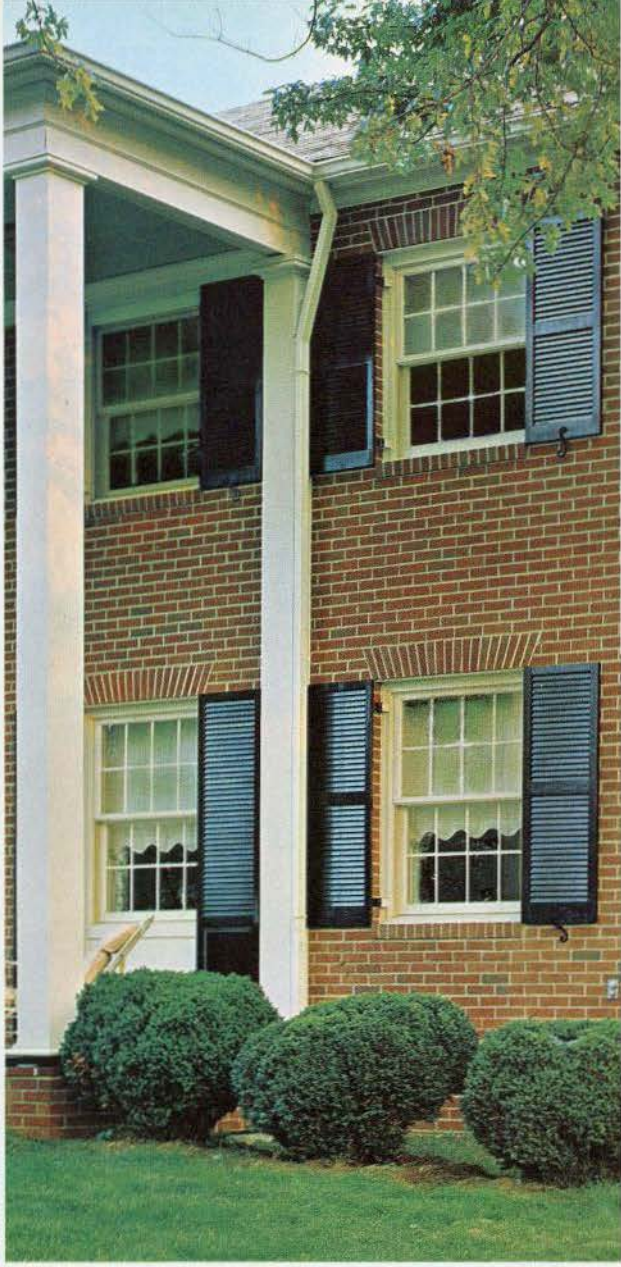

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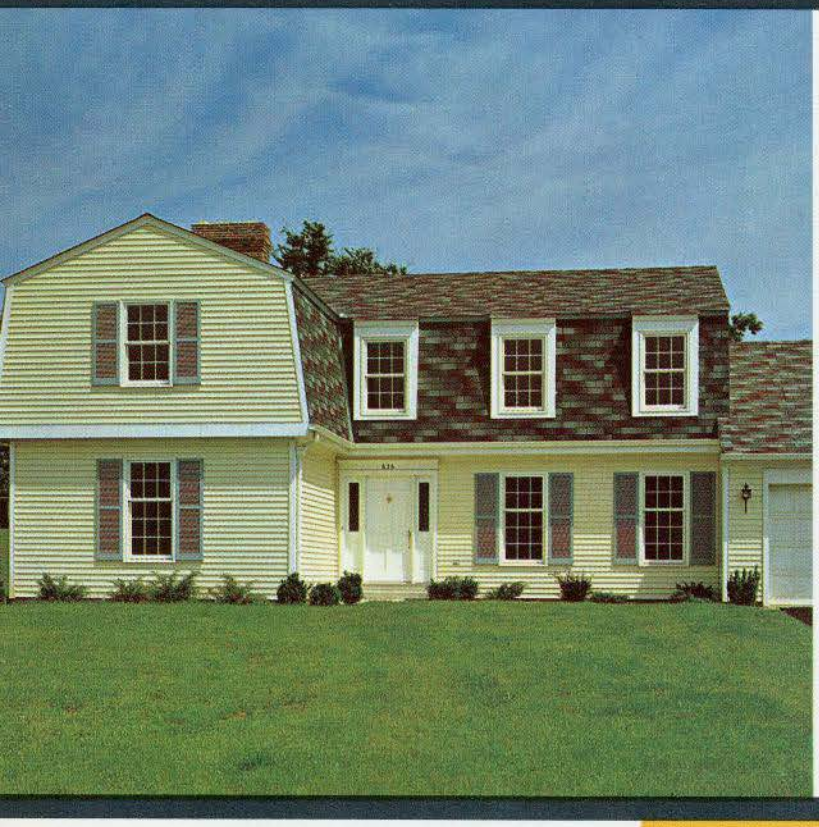

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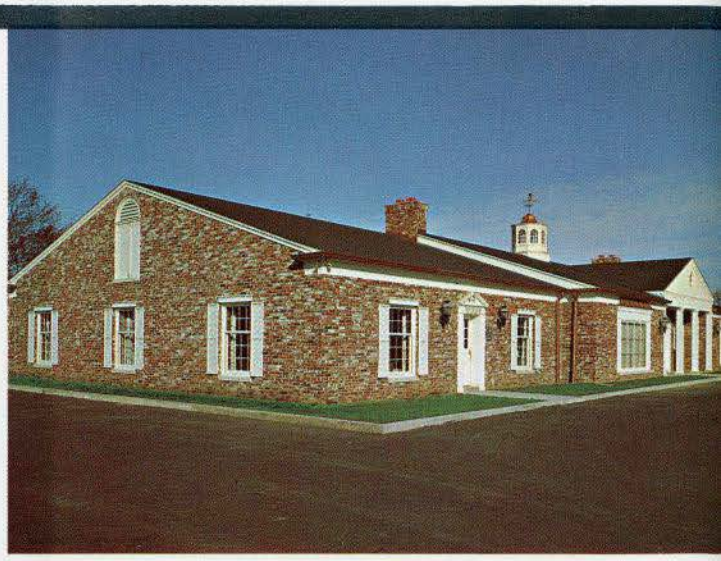

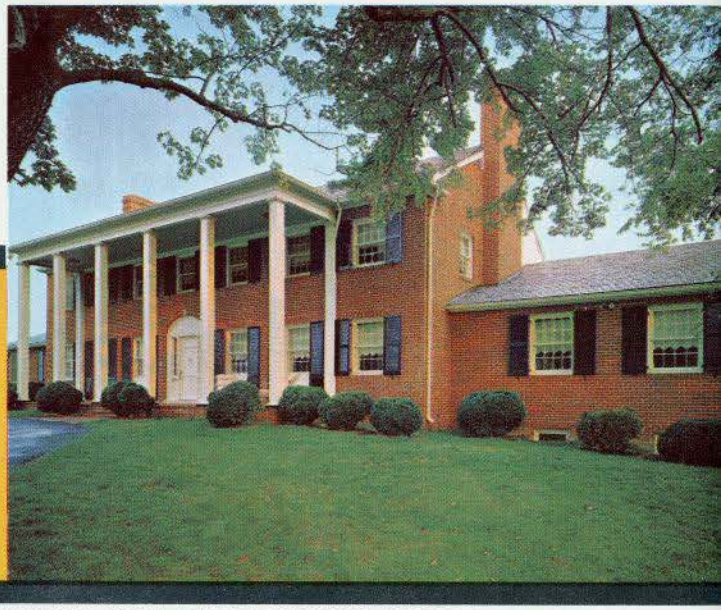

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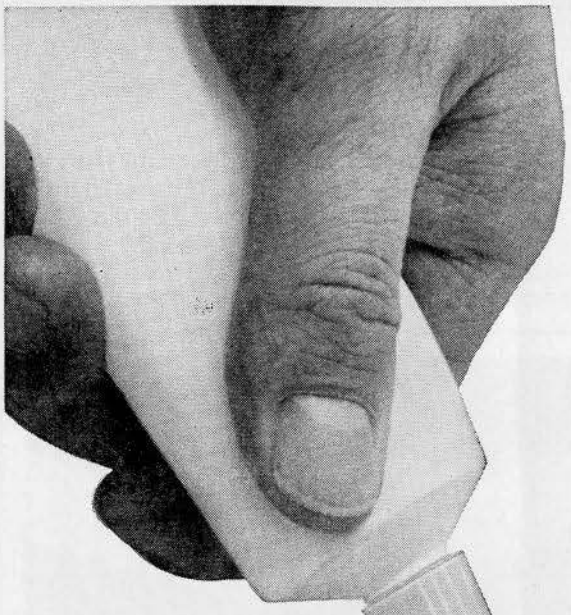

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ça de colle...ça vous colle?

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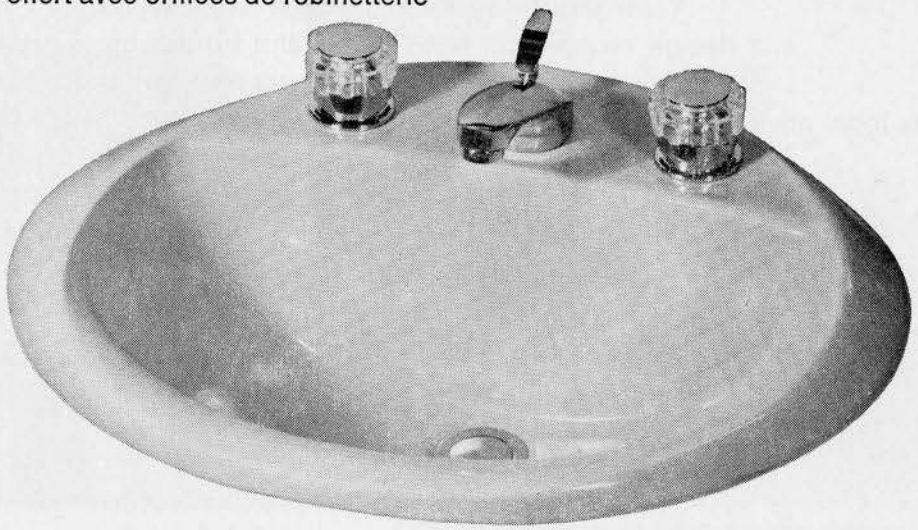

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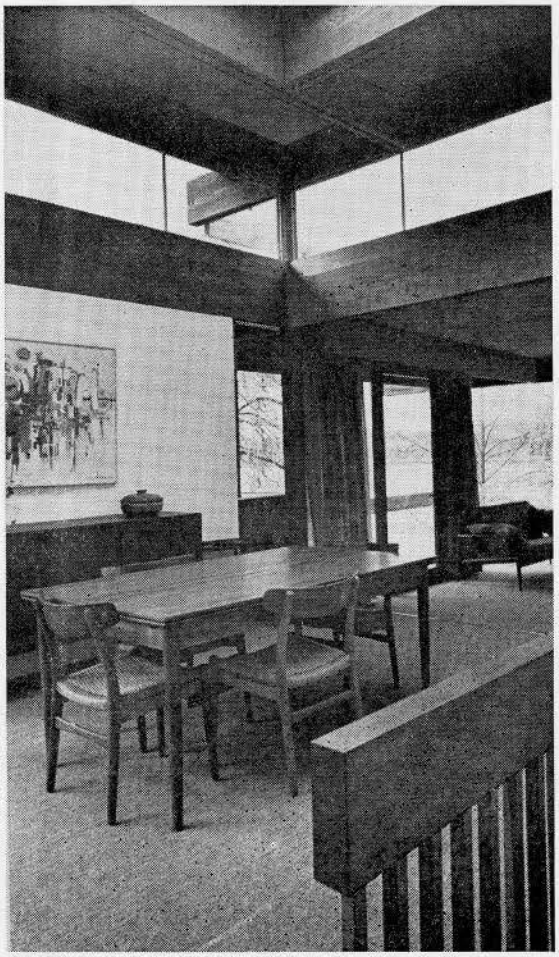

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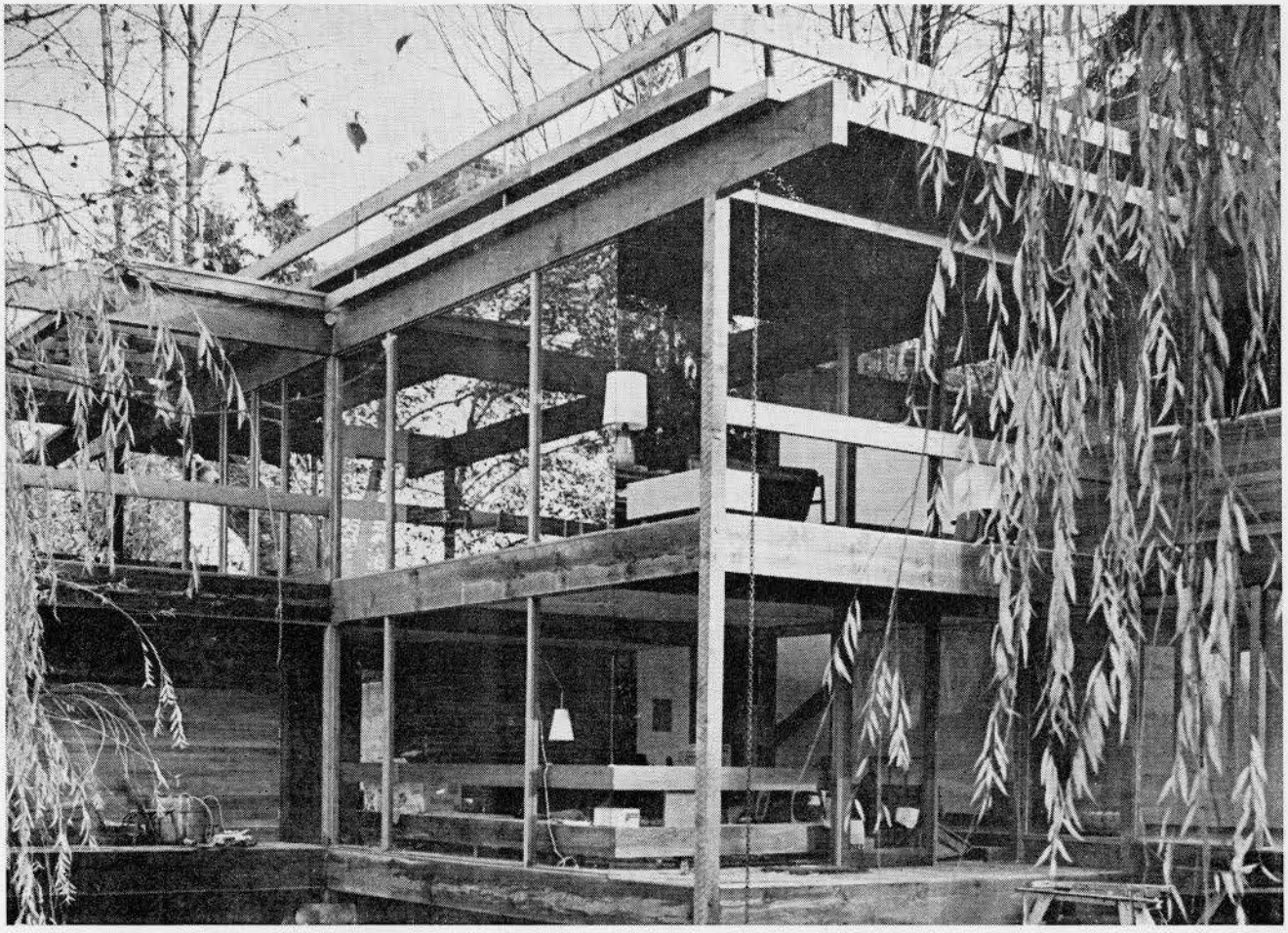
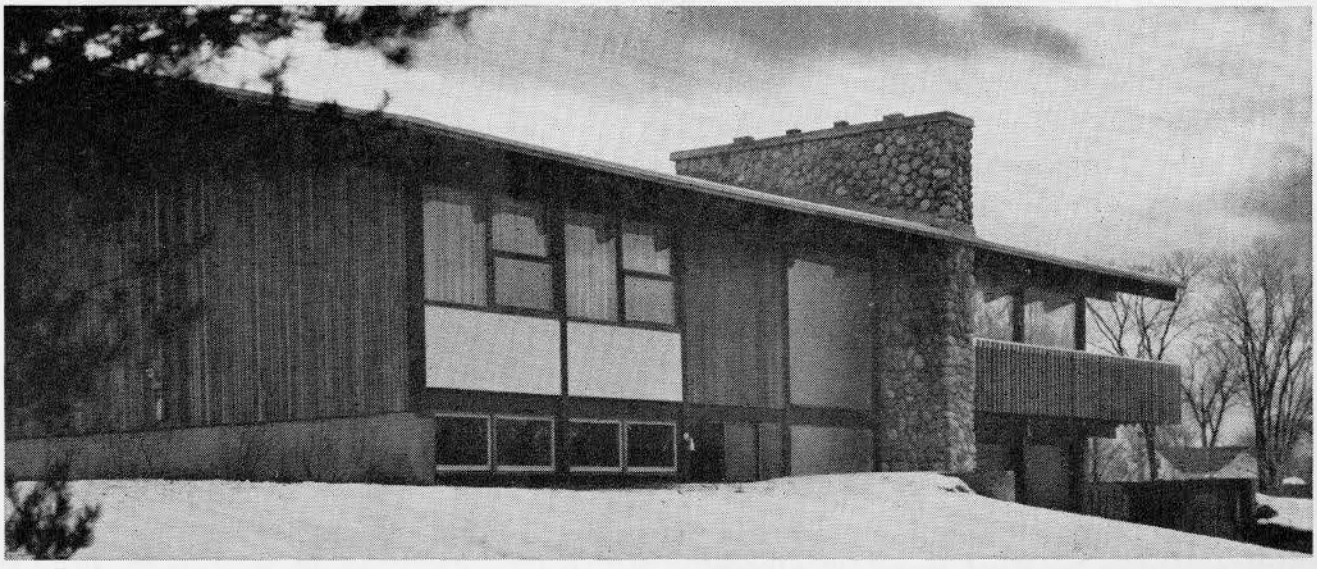
UPPER: Exterior view of the Burnaby, B.C. residence featured on the opposite page shows how rough sawn timbers and resawn cedar siding were combined, "to reflect architecturally the natural surroundings".

LOWER: Wood post and beam construction blends naturally with local stone in the Lucerne, Quebec home pictured. Architects, Ala-Kantti and Liff, Ottawa.





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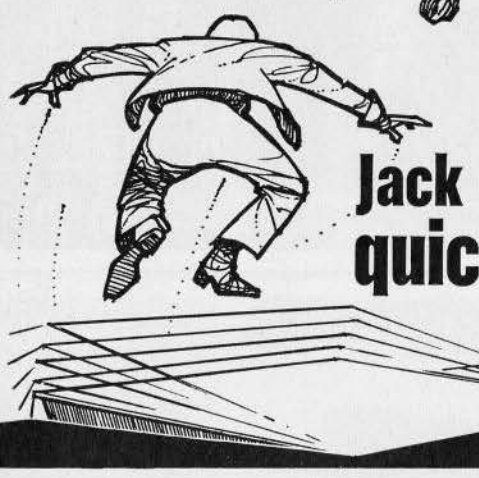

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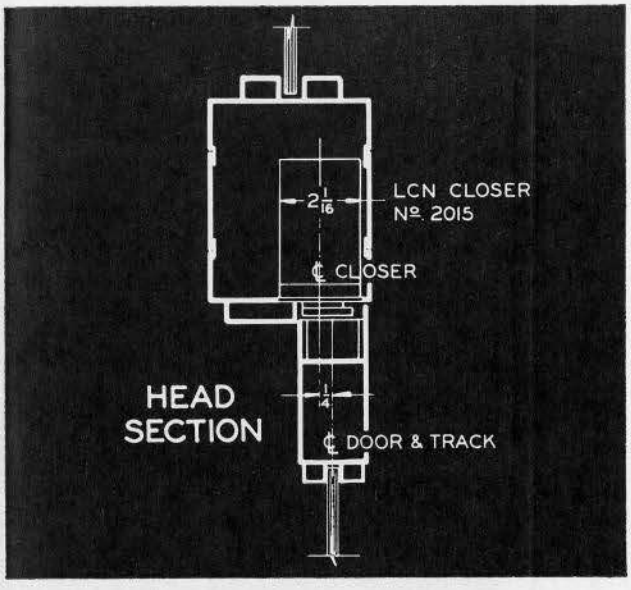

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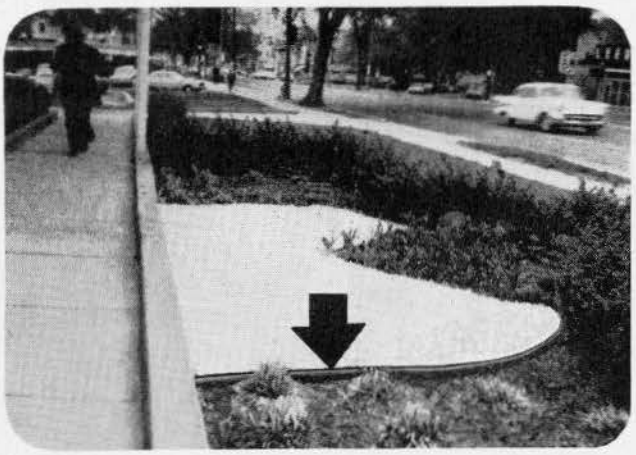

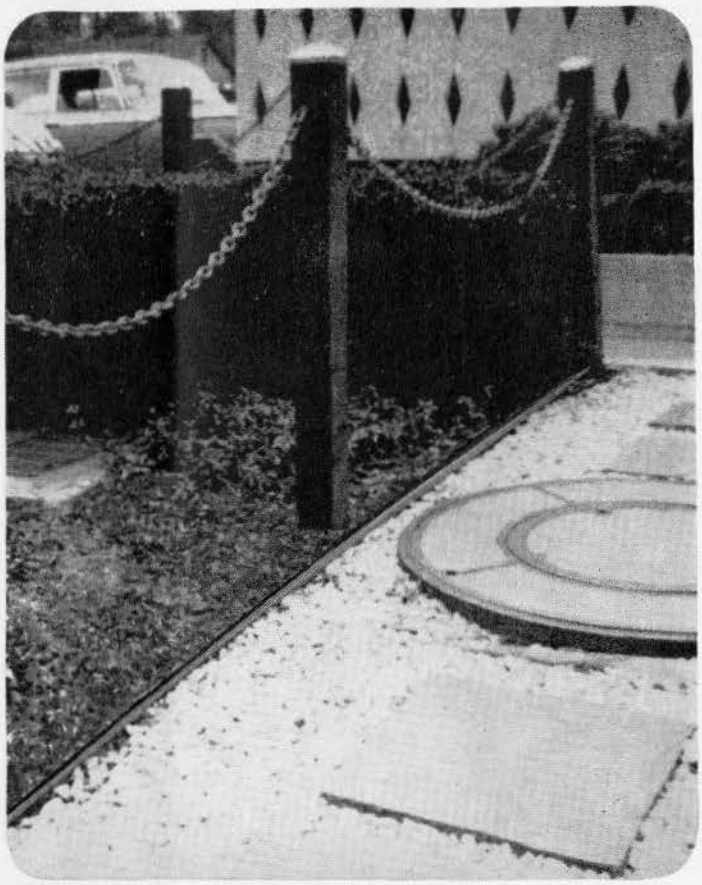

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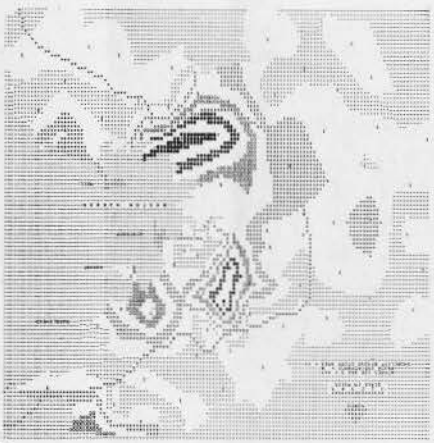
In a monumental issue the July *Architectural Record* attempts, under the title "The New Age of Architecture" to define the changing rôle and scope of the architect. While necessarily condensed, at times superficial and often mouthing the usual pious conventional wisdoms, such as the need for closer integration between disciplines, it does serve to focus many issues more clearly. Healthy too is the concern for the new complexities and scales, and the search for the means to order them. At last there are hints that serious attempts are being made to gain insights to the problems raised by an urban culture in organizational concepts rather than by scenographic design. Evidence of this awareness that the impact of even a single building may have on its surroundings, on the need for comprehensive services that cover everything from intelligent resource allocation to the urban social community, is the establishment at cabinet level in the United States of the department of Housing and Urban Development. The illustration (**1**) is from a new technique that enables a computer to show complex statistical material in graphic form.

Architectural Design, July 1966, has published two new projects by James Stirling, one a university residence whose (**3, 4**) structure is of large precast concrete units, the other office headquarters and research centre for the Dorman Long Steel Company (**2**). In both the forms are results of the structural systems employed, as well as the organizational goals. The residences have all windows oriented towards a magnificent view; the promenade gallery, running the length of the building at the mid-level is the main circulation route and socializing element, and eliminates the necessity for elevators. The stairs that ascend and descend from this level have wide landings off which entry is made to different levels. In the Dorman Long Building the glass skin is disassociated from the steel structure, exposing the frame completely. The site is alongside the existing steel mills, and the atmosphere heavily polluted. The glass membrane totally encloses an airconditioned space.



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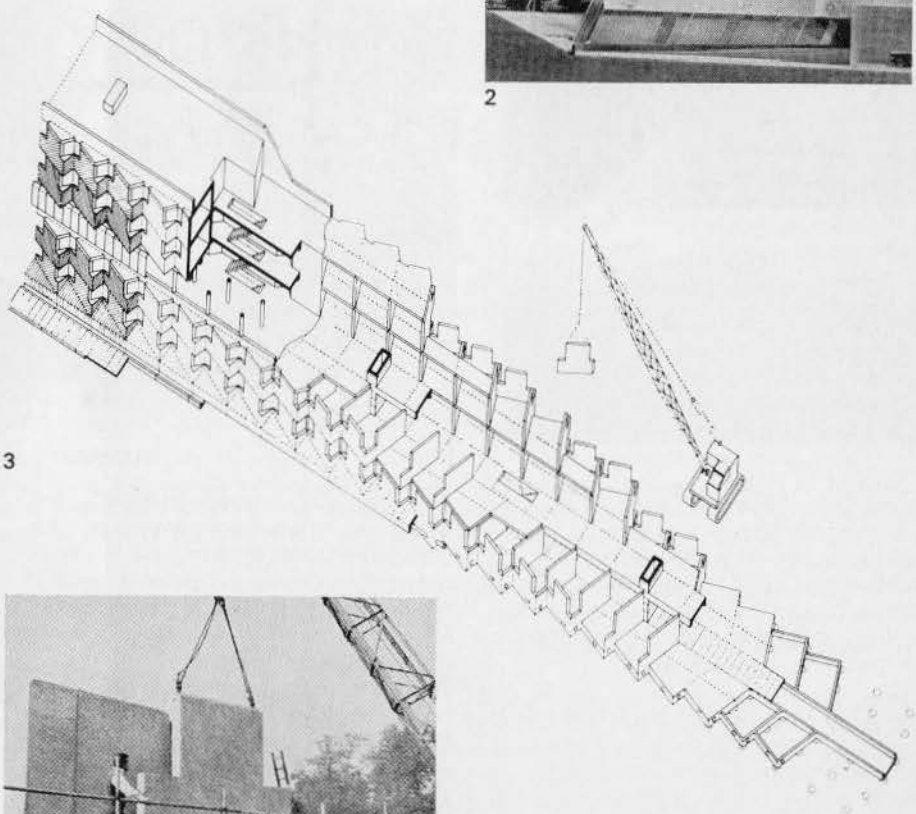

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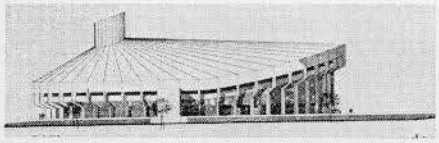

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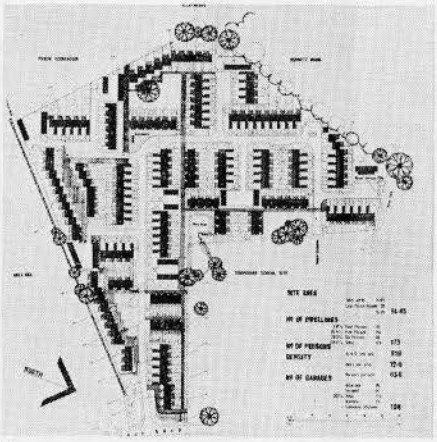

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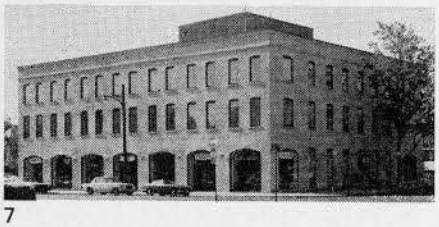

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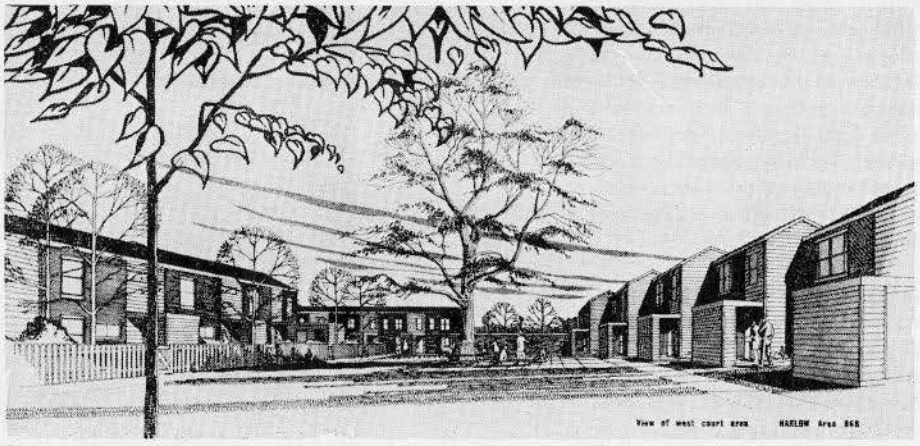

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This elegant multipurpose arena (**5**), designed by Murray and Murray, Ottawa, is to be built for Carleton University. The seating will accommodate 3,000, to view divers spectacles from ice hockey to pageant theatre. Besides the arena, stage and dressing rooms, there is a lunch area at the mid-level.

Before and After photographs (**6, 7**) of a do-it-yourself urban renewal project — Prack & Prack of Hamilton, Ontario, have moved into the top floor of this old factory building which they have renovated. The only quibble one could have with such a successful job is the mechanical housing on the roof — the old metal firestacks and other appurtenances were treated in a much less self conscious way.

As a result of the cooperation between the British and Canadian governments, and the work of the Central Mortgage and Housing Corporation, Ottawa, the implementation of this housing project (**8, 9**) is to proceed at Harlow, England. This is after the successful erection of frame houses built in Britain by the Canadian Government in 1964, to demonstrate their ability to contribute to housing, via efficiency in construction, in adaptability to change, and in comfort standards. While it seems the British construction industry can learn from our methods and techniques, it is evident that we can learn from their attempts at high density - low rise design; also at Harlow is this scheme (**10**) by Michael Neylan. *Architectural Review* July 66.

We were appalled at a statement by Dr P. D. McTaggart-Cowan, president, of all things, Simon Fraser University: "... The environmental engineer should determine the space required, the control necessary for flexibility and the environment needed. It is at this point that the architect should be brought in. The architect will be under restraints, such as the general arrangement of rooms and window locations will have been determined, and the acoustical requirements set out ... the architect is, after all, an artist and not an environmental specialist." Even presidents of universities can display a lack of knowledge. The speech was to the American Society of Heating, Refrigerating and Airconditioning Engineers. Are these what is meant by "environmental engineers"?

Résumé

Résumé de la Discussion au sujet de l'Architecture paysagiste (page 39)

L'objet de cette réunion de quatre architectes-paysagistes, Messrs. Englar, Hough, Strong et Vandermeulen, était de nous renseigner sur leur rôle et leurs attitudes à l'égard de leur profession et des professions alliées.

Les contributions de divers spécialistes sont nécessaires pour réussir un projet: puisque l'architecte-paysagiste se concerne de tous les aspects d'aménagement paysager, il est mieux équippé que tout autre spécialiste pour voir l'effet d'un spécialité sur l'autre; parce qu'il s'occupe de domaines divers – la planification, les sciences naturels, le dessin – les limites de son rôle et de ses attitudes sont difficiles à établir.

M. Hough a cité l'intégration des arts professionnels en Hollande comme exemple de co-opération entre les professions. M. Englar trouve les architects-paysagistes trop complaisants et timides lorsqu'il s'agit de faire valoir leurs opinions. Selon M. Strong, on insiste trop sur le régionalism et l'orientation scientifique – des domaines où l'architecte-paysagiste se heurte sans y être bien qualifié. Notre vrai rôle, ajoute M. Hough, pourrait venir de notre capacité de voir *l'ensemble* d'un projet et de pouvoir poser les questions appropriées, par la suite.

Par exemple, le planificateur voit l'usage d'un terrain du point de vue politique et sociologique; l'architecte-paysagiste, du point de vue des fonctions, de l'organisation des fonctions et de l'usage des terrains; sa contribution devrait être d'associer les sciences naturels à l'aménagement urbaniste en tant qu'élément significatif dans l'exploitation des terrains. M. Hough continue: jusqu'à maintenant, la profession s'est préoccupée de l'environnement à petite échelle plutôt que sur le plan régional. Notre technologie moderne pourrait détruire le paysage si le paysage total n'est pas impliqué dans la planification. Une compréhension du système complexe des procédés biologiques produisant le paysage naturel devient donc nécessaire à la planification afin de déterminer l'usage optimum des terrains.

M. Vandermeulen ajoute que ceci est peut-être la contribution la plus significative de l'architecte-paysagiste, et M. Strong rappelle que leur rôle dans l'équipe de professionels s'occupant de l'environnement total est limité par le fait qu'ils ont peu d'influence dans bien d'autres sphères. M. Hough insiste qu'ils n'ont pas l'intention d'annexer les fonctions des autres professions associées.

M. Englar demande quelle est la contribution de l'architecte-paysagiste à l'aménagement des grandes villes. On conclut qu'il faudrait surtout reétudier la fonction des espaces ouvertes, des parcs et facilités de recréation dans notre société moderne. Si l'idée traditionnelle des espaces ouvertes ne réponde plus aux besoins sociaux fondamentaux actuels, leur usage pourrait devenir indésirable et pour faire une telle décision, l'architecte-paysagiste devra considérer le côté psychologique et sociologique, aussi bien que le paysage soi-même. L'attitude officiel est typifié par la SCHL lorsqu'elle impose des solutions aux problèmes d'environnement. Une reévaluation des questions fondamentales des loisirs et des espaces ouvertes est essentielle; l'architecte-paysagiste a rarement le temps à faire les recherches nécessaires et ce n'est que par des récherches en profondeur que la profession pourra influencer l'attitude officielle.

Les exigences des facilités de recréation du monde moderne sont bien diverses et ont bien changées. L'architecte-paysagiste devra y adapter ses façons de penser afin de satisfaire à de nouveaux besoins. Il doit aussi se préoccuper d'autres domaines, telles que des autoroutes, des systèmes d'assainissement, de la conception totale des environnements spécifiques; domaines appartenant traditionnellement au Génie. Tout ceci a besoin de considération et doit faire partie de la vue compréhensive de l'environnement physique.

Résumé de l'article de George Banz sur la page 48, l'Ordinateur et le design d'habitations multiples

La complexité du problème des habitations peut être attribuée au grand nombre de personnes associées à chaque étape du planning, du dessin et de la construction. Ainsi, un seul individu n'est plus capable de diriger un projet et la communication entre plusieurs dirigeants devient presque impossible. Le besoin d'habitations multiples s'accroît et le cerveau humain ne peut plus faire face aux exigences complexes des habitations de nos jours.

Les ordinateurs, dont il existe deux sortes, "analog" et "digital", peuvent être appelés des "cerveaux géants". La plupart d'ordinateurs modernes sont du type digital; le cerveau humain fonctionne principalement sur ce principe. En termes des fonctions qui peuvent être exécutées par des organes actives des mêmes dimensions générales, le cerveau humain se montre environ 10,000 fois plus efficace que la machine. Un ordinateur travaille les éléments successivement, le cerveau humain, simultanément, c'est à dire que l'ordinateur possède une grande précision, pendant que le cerveaux humain a moins de précision mais plus d'exactitude. En fin de compte, la supériorité essentielle du cerveau humain sur l'automata pourrait être basée sur la probabilité que les concepts logiques et mathématiques sur lesquels l'opération des ordinateurs sont fondés ne seront que l'expression apparente d'une forme logique et mathématique bien plus complexe employée par le cerveau humain. Le cerveau peut percevoir et exercer un "contrôle" aussi bien que faire des simples tâches intellectuelles, mais l'ordinateur peut devenir une menace s'il exerce un contrôle excessif. Donc, en employant un ordinateur, la considération la plus critique est d'appareiller sa fonction de contrôle à ses capacités perceptives et intellectuelles.

Il faudra prendre l'ordinateur en tant qu'outil, comme prolongation du cerveau humain, pas comme son remplaçant. A cette époque, le problème de la production est devenu secondaire à celui de trouver le moyen le plus efficace de communication entre l'homme et la machine. L'efficacité de cette communication déterminera le rapport entre le cerveau et ses "prolongations". Eventuellement, l'ordinateur pourra inter-

préter des dessins et produire des représentations graphiques des "computations" en forme de plans, d'élévations, d'isométriques et de perspectives.

L'emploi expérimental de l'ordinateur est basé sur l'analyse logique rigoureuse de la structure du problème. Un modèle mathématique est construit incorporant les principes nécessaires à produire les renseignements. Son utilité est limitée au degré d'exactitude des conditions véritables simulées par le modèle mathématique et par la perfection des données. Lorsqu'il s'agit d'un problème complexe, l'ordinateur donne rarement une solution mais plutôt un aperçu de l'organisation des systèmes, une détermination de la structure des problèmes complexes. L'application pratique de l'ordinateur est le but ultime. plutôt qu'immédiat. Les recherches sont dirigées actuellement vers l'application de l'ordinateur aux problèmes de la planification urbaniste. Eventuellement, la planification des projets d'habitations sera basée sur les modèles mathématiques de la ville hors-tout. Par contre, il n'y a qu'un seul exemple d'une analyse logique des procédures de dessin (C. Alexandre, Notes on the Synthesis of Urban Growth, Harvard '54) basé sur la supposition que "les constituents physiques d'une forme réussie sont définies par la structure causale" (ibid p. 215). La méthode évoluée pourrait être utile pour le dessin de prototypes d'habitations ou pour déterminer l'emplacement d'autoroutes.

L'approche "théorique" à l'application de l'ordinateur commence avec une théorie générale, avance par étapes de plus en plus exactes et arrive au détail spécifique d'un programme; l'approche "pratique" est basé sur les exigences d'un problème spécifique dont la portée devient de plus en plus complexe jusqu'à sa fusion éventuelle avec un programme expérimental. Cet approche "pratique" est appliqué actuellement aux problèmes de l'analyse et du dessin structuraux, de l'analyse de l'environnement, des subdivisions et au méthode "C.P.M." de programmation d'un projet. Les deux méthodes de computation employées sont lentes et dérangent complètement toute communication directe entre l'homme et la machine. Puisque l'équipement et les méthodes de nos jours sont en train de remplacer les fonctions routines plutôt que créatives du cerveau humain, il ne faudrait pas s'attendre à des solutions radicales lorsqu'ils sont appliqués à l'architecture. Le travail courant de l'architecte sera fait plus vite et plus efficacement par l'ordinateur; l'architecte sera donc libéré pour effectuer un travail plus créatif et intellectuel.

L'étude scientifique et approfondie de l'application de l'ordinateur à la solution des problèmes d'architecture n'a pas été faite. Là où les éléments répetés déterminent le dessin général, l'application immédiate de la technologie de computation doit être un but évident, qu'il s'agisse de constructions industrielles, commerciales, scolaires ou d'habitations.

Le problème du dessin des habitations urbaines se base sur les conditions gouvernant la distribution des gens dans l'espace urbain. L'architecte ne peut pas trouver une solution à ce problème sans la collaboration de ceux qui se concernent de tous les autres aspects du problème. Un rapport significatif doit être établi entre tous les facteurs portant sur le dessin des habitations et un programme de dessin tenant compte des habitants du secteur de ce projet, leurs rapports les uns aux autres, doit être la base de l'application de l'ordinateur. Les relations interhumaines dominent tous les autres facteurs de l'environnement urbain. Ces facteurs se groupent en trois "blocs de données": 1. les rapports perceptuaux entre les gens et l'environnement, 2. les facteurs scientifiques et techniques relatifs au dessin des habitations, 3. les facteurs economiques et politiques. (Voir les tableaux "Factors Influencing Housing Design", et "Blocks of Data".)

Dans l'application de l'ordinateur au problème du dessin de logements, l'ordinateur peut manipuler peu des concepts impliqués. Les autres concepts peuvent être groupés en "unités de dessin" (design units) avec chaque unité et/ou combinaison d'unités associée avec des facteurs perceptuaux, techniques et économiques spécifiques. "L'unité de dessin" la plus appropriée à l'application de l'ordinateur est l'habitation et il pourrait être possible de couvrir toutes les exigences essentielles de l'aménagement en 14 "unités de dessin" d'habitation (Voir le tableau). Les principaux critères conceptuaux des "unités de dessin" sont les suivants: le nombre maximum possible de combinaisons en trois dimensions, les simples interconnections avec le moins possible de raccords horizontaux (couloirs) et de noyaux verticaux (escaliers, etc), la possibilité de simple intégration des unités avec les facilités de stationnement, et l'option de transformations géométriques controllées permettant la variation de certaines dimensions des pièces sans nuire aux autres critères. Chaque "unité de dessin" devra être conforme aux Codes en vigueur, les fondations pourront être prédessiner, ainsi que les services mécaniques et électriques; les frais de construction, les quantités de matériaux, pourront être déterminées de la même manière. Les critères déterminant les relations spatiales entre les unités pourront être basés sur la distance minimum entre les murs ayant des fenêtres. Etant donné toutes ces exigences et limitations, les résultats d'une telle programmation seront banals si l'architecte n'est pas équippé pour exercer un contrôle esthétique rigoureux.

La séquence d'une telle opération est anticipée comme suit: I. Les données suivantes seraient emmagasiner dans l'ordinateur: (a) une série de dessins d'unités d'habitation et leurs variantes, (b) des facilités de stationnement optionales appropriées, (c) les données relatives aux occupants éventuels, (d) les données des prix de chaque variation possible de chaque unité et leurs combinaisons possibles. II. L'ordinateur serait alors alimenté des données suivantes afin de définir un projet spécifique: (a) l'alimentation graphique (plan d'implantation, etc.), (b) données supplémentaires (nature du sous-sol, etc.), (c) nombre d'habitants (adultes et/ou enfants, etc.). III. Pourvu que ces données ne soient pas contradictoires, l'ordinateur émettra une présentation visuelle d'un dessin basée sur les premières ébauches et les autres données et pourrait, par exemple, imprimer les données du coût total du projet proposé en forme de plans, élévations ou perspectives. Le succès de ce programme préliminaire dépend de deux conditions: le maximum d'ingénuité devra être appliqué à la représentation des "unités de dessin", et l'alimentation graphique devra être contrôlée par des architectes experts comprenant l'opération de l'ordinateur.

Dans l'avenir, il serait relativement facile d'adapter l'ordinateur à la production de dessins d'exécution conventionnels et de devis descriptifs. Lorsque les projets d'habitation consistent d'un nombre limité "d'unités de dessin" et leurs combinaisons prédéterminés, il sera possible de mettre sur microfilm les dessins détaillés de tous leurs éléments et leurs combinaisons et les faire imprimer avec les schémas généraux et devis descriptifs couvrant tous les articles relatifs aux procédures conventionnels des soumissions et de construction. Il est évident que dans l'avenir, la construction sera de plus en plus industrialisée, donc, la préfabrication accrue entraînera l'application de l'ordinateur à la planification et au dessin des unités.

Les limitations inhérentes dans l'automation du dessin sont fondées sur les motifs des exploiteurs, soit le profit, soit dans l'intérêt du publique. L'importance des valeurs humaines devra être soulignée avant tout autre considération matérielle pour tout programme d'automation.

Un résultat de l'application de l'ordinateur sera une approche plus rationnelle aux problèmes, moins de répétition de fautes; l'ordinateur pourrait devenir éventuellement l'outil libérant le dessin des habitations de son triste état actuel. Les habitations pourront être conçues adaptées à n'importe quelle combinaison de besoins individuels et il est peu probable que les boîtes à beurre conventionnelles seront reproduites. Puisque d'autres spécialistes, tels que les sociologues, physiologues, etc. alimenteront l'ordinateur, l'architecte perdra le contrôle absolu d'un projet, mais deviendra le contrôleur du "dessin" seulement. Son rôle de "dessinateur" sera néanmoins bien plus développé qu'il l'est à cette époque.

Introduction Landscape Architecture

by Richard Strong, MASLA, MCSLA

Mr Strong is a principal in the Landscape Architecture firm of Sasaki Strong & Associates, Toronto.

The material well being that our high consumer demand society has established, has, as a corollary, effects which conspire against the very mores we value: rapid rates of obsolescence of almost all products we manufacture; a voracious appetite for natural resources; and often poor allocation of time and effort spent in our enterprises.

Many agencies are showing concern and activity in this field of conservation, planning and design – it is fortunately no longer necessary to make the point, for example, that there is more to highway design than alignment: the effect on land values and on the appropriate scale of adjacent usage, whether the highway becomes an edge or joint to sectors of the country or city, or whether it becomes a barrier to growth are among some of the now well known considerations affecting their design, besides the visual aspects.

Landscape architects are in the forefront of those addressing themselves to the broad problems of planning and designing the physical resources we have. The need for services of this complexity and breadth has wrought profound changes in the profession. The landscape architect has changed from the horticultural dilettante, to the professional involved in a spectrum of design problems that range from land planning at the regional scale, to the design of parks and courts in tight urban conditions.

As in the other design professions today concerned with the physical environment, no clear lines of reference have been drawn, nor boundaries of competence enunciated. While this might be confusing, it is also evidence of a healthy organism that has much important work to do. And definitions are not important, while crucial problems that concern the national community lie untackled.

In our world, unlike Pangloss', all is not for the best in the best of all possible worlds. It is ironic that the *planning* professions do not have all the co-ordination they might have, nor are their interrelationships organized as well as they might be. Agencies such as the Department of Agriculture, Public Works Department, the Department of Highways, and the Department of Northern Affairs and Natural Resources, compounded by their equivalents at provincial and municipal level, commit avoidable sins of omission and commission when their interests overlap.

However, because of the rising concern for the improvement of our physical surroundings, the husbanding of our natural resources, and the standard of the physical legacy we shall leave to following generations, improvements in working methodologies and comprehensive goal formulation must come. The improved results that this will produce, it may be hoped, will provide further incentives to community pride, to further alter the balance from chaos to order. The following pages will, we hope, indicate the responsible role landscape architecture plays in Canada. □

Landscape architecture is primarily a fine art, and as such its most important function is to create beauty in the surroundings of human habitations, and in the broader natural scenery of the country; but it is also concerned with promoting the comfort, convenience, and health of urban populations, which have scanty access to natural scenery, and urgently need to have their hurrying work-a-day lives refreshed and calmed by the beautiful and reposeful sights and sounds which Nature, aided by the landscape art, can abundantly provide.
Charles W. Eliot (1859–1897)

Mawson - A Landscape Architect at the Turn of the Century

by E. G. Vandermeulen, MASLA, MCSLA, MOALA

Mr Vandermeulen is president of the Ontario Association of Landscape Architects and Associate Editor of the Canadian Landscape Architect.

Thomas H. Mawson, F.L.S., 1861-1933

Honorary member RIBA, ASLA, past president British Town Planning Institute

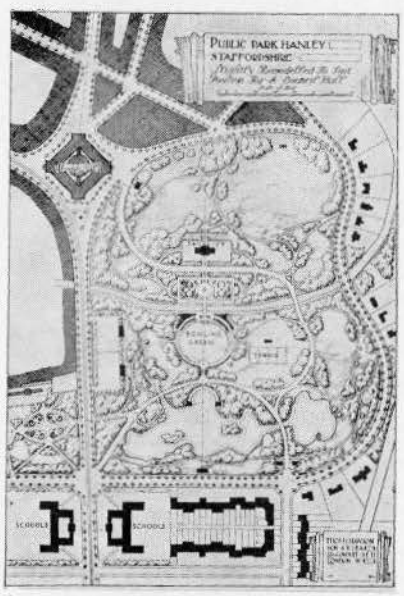
Mawson in his early life was influenced by reading the theories of Loudon, Repton and Uvedale Price. His knowledge and ability in garden design grew steadily by reading, sketching and intelligent observation. With early association with architects, his excellence of work and an increasing knowledge of applied design, he eventually began professional practice. After years of diligent work, study and acquainting himself with the design processes as understood in the late 19th century, he designed estate gardens, municipal parks and small town site developments which were acknowledged as representative of genuine professional ability. (No schools of landscape architecture or town planning were then in existence in England.)

Before visiting the USA and Canada and becoming involved in landscape architecture and town planning here, Mawson had done work from his London office for clients ranging from wealthy industrialists, government officials, municipal councils to Parks Commissions in England and on the Continent.

His work took him from the Middle East, where he prepared town development plans for Athens and Salonika for the King of Greece (1917), through France where he designed layouts for private estates, the Netherlands, where he won a competition for, prepared and supervised plans for the grounds of the Palace of Peace (Carnegie Foundation) in the Hague, to the American Continent. There he lectured extensively at American and Canadian universities and to clubs in many cities. Harvard, Cornell, University of Illinois, Toronto and Montreal universities were but a few of these institutions.

Mawson was a remarkable man, driven by an unceasing urge to give rational form and an "atmosphere of Beauty" to cities, towns, transportation routes and neighborhoods alike, at a time when the industrial revolution had produced so much wasteland, dreary landscapes and monotonous suburban settlements. His intelligent planning of the environment oriented men to gear their interests towards new ways of planned development. He deplored the lack of university training for landscape architecture and civic design in England in contrast to established schools in the US. His continuous urging contributed to the establishment of a School of Civic Design at the School of Architecture, University of Liverpool in 1909. (Mr W. Lever, Founder and chairman of Lever Brothers, actually made it possible by a large donation to establish the new department.) Writes Mawson: "The school I contemplated, which I maintain is sorely needed, would hold out good prospects for students possessing a fair share of imagination, and prepared to take the full course and make themselves proficient. It was not to be modelled altogether on the very strict technical lines of the American schools, for which I have nothing but the sincerest regard, but to be a school for the training of architectural minds on the widest possible basis. Not alone is it the purpose to plan, design, and allocate buildings, but in addition we must marshal the landscape, and when called upon, be able to respond with a general indicative design for any part of the *tout ensemble*."[1]

He undoubtedly belonged to the school of thought of the day, a mixture of the Ecole des Beaux Arts' approach and that of the City Beautiful and the Garden City movement. However, his social awareness, concern for people, particularly for the less privileged, made him stand out above the typical designer of that period, although in his garden and architectural details he was still a captive of the stylistic and eclectic tendency of the period. In spite of this he criticizes his contemporaries for their "frills and irrelevant decorations and for their artificial, shallow attitude towards site planning". "The training was grounded on wrong principles as a preparation for the practice of landscape architecture, by which I mean that the young architects were taught everything except design, and were sub-



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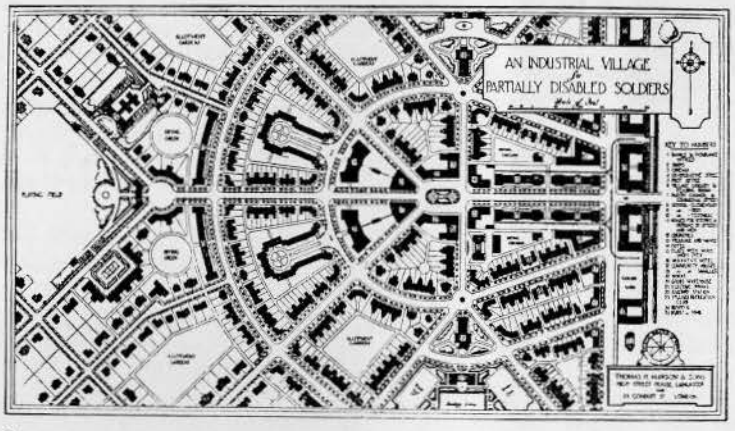
Plan of Hanley Park
Plan de Hanley Park

[1] Mawson, T. H., *The Life and Work of an English Landscape Architect*, London, The Richards Press, p. 177

2
Plan for Disabled Soldiers' Village
Plan d'un village pour les invalides de guerre
3
Plan of Salonika
Plan de Salonique

merged in details long before they had learned the elementary principles of composition. Imagination instead of being encouraged, was suppressed . . . the aspiring architect was taught to regard the quaint eccentricities and irregularities of mediaeval architecture as ideals to be followed, and instead of the relation of a residence to its site and environment being studies, the plan of the house was often evolved around certain predetermined details."[2]

Mawson's many works contributed to a conservation oriented and civic-use directed landscape architecture; for example; the redevelopment of industrial wastelands such as at Hanley, England, a pottery town (**Fig. 1**) where waste heaps and pits were transformed into parklands and lakes for community use, the planning of industrial villages for disabled soldiers of World War I (**Fig. 2**), city plans in Greece (**Fig. 3**) and his projects in Canada. He makes reference to Ruskin in a manner that leaves no doubt that he sees in him a true exponent of the ideal relationship between man and his natural environment. This concern for existing geographic features brought him enemies as well as friends, such as when he opposed a railway company for its disregard for proper urban development in favour of real estate aspirations.



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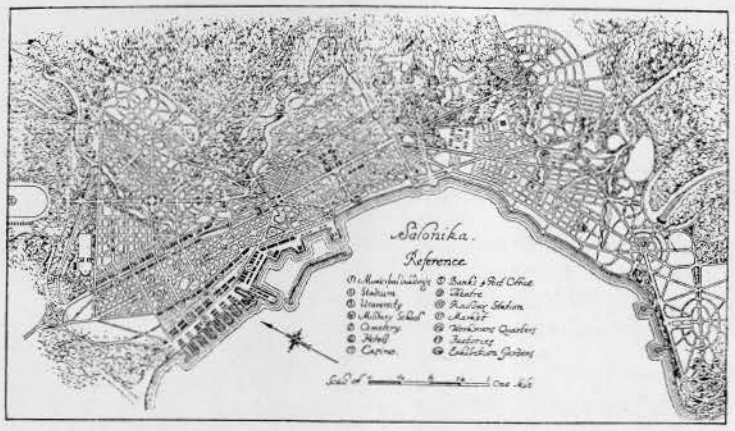

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His persistent endeavour to achieve environmental improvement by public lecturing on planning and civic design and writing several books brought him to the American Continent. His impact on the Canadian urban scene is illustrated by his involvement in the planning process in various areas. In Ottawa, his friendship with Sir R. W. Borden, then Premier and later with Sir W. Laurier allowed him to be instrumental in precipitating the Government's concern for and interest in the then called "Federal Plan Commission" (1913). It is of interest to note here that another landscape architect, F. G. Todd, of Montreal had been engaged by the "Ottawa Improvement Commission" to outline a general scheme for Ottawa (1903). This plan and report eventually paved the way for the appointment of the Holt Commission in 1913 to air the whole problem of planning the National Capital.[3]

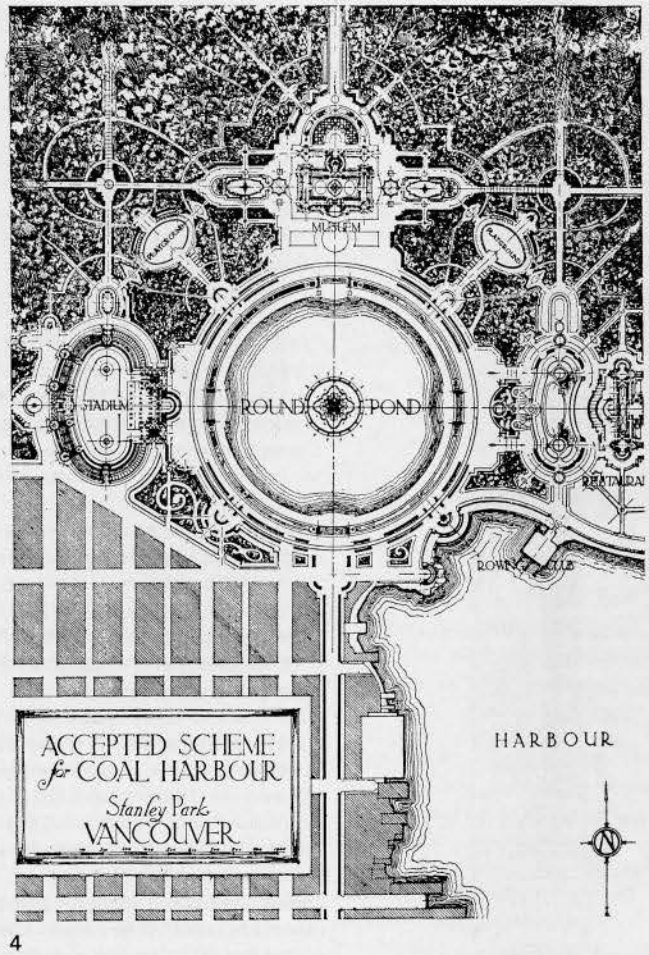
Several projects by Mawson for Canadian communities, parks departments, and universities are notable for their directness, clearness and absence of overt ornamentation, a weakness from which many of his continental estate layouts suffered.
His original Coal Harbor (**Fig. 4**) and Brockton Point (**Fig. 5**) development plans for Stanley Park, Vancouver possibly best illustrate his ability to express a site function clearly, and at the same time to structure a manmade complex in natural surroundings with exactness. He was also able to blend his designs with the topography and shoreline ecology.

The well known Wascana Centre, Regina, the inception of which J. A. Langford, now assistant Deputy Minister for Design, D.P.W. has played such a vital role, is in a sense an extension and elaboration of Mawson's master plan for the Civic Centre, and the site of the House of Parliament (**Fig. 6**). Many of Mawson's plans for new towns and suburbs in Canada, although not as widely publicized as their American counterparts and sometimes not even built, express the

[2] Mawson, T. H., *The Life and Work of an English Landscape Architect*, London, The Richards Press, p. 142
[3] W. Eggleston, *The Queens Choice*, Ottawa, Queens Printer

4
Plan of Coal Harbor
Plan de Coal Harbor
5
Scheme for the improvement of Brockton Point, Stanley Park, Vancouver
Projet pour l'embellissement de Brockton Point, Stanley Park, Vancouver

6
Plan of Civic Centre, Regina, Saskatchewan
Plan du centre municipal à Regina, Saskatchewan



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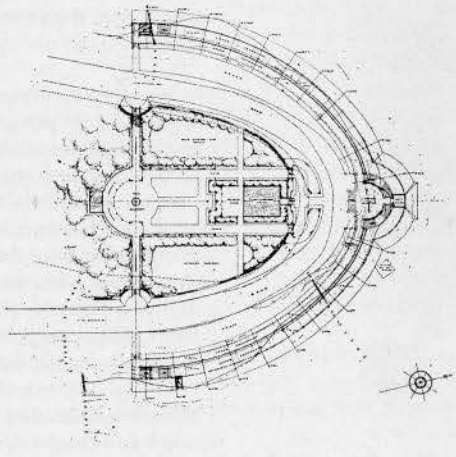
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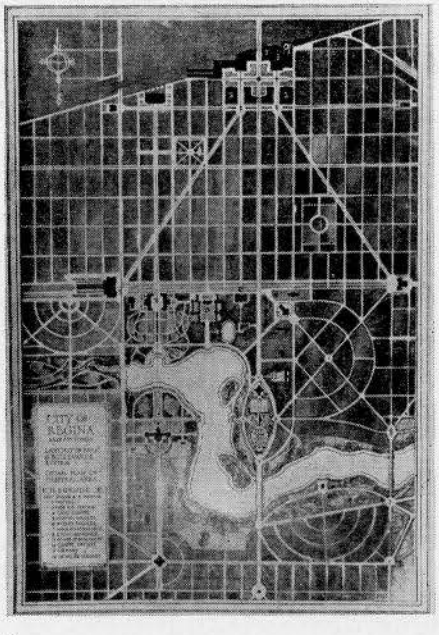
same growing expertise of fitting settlements, buildings and road systems sympathetically and rationally into the topography and biogeography of a site (Plan of Meadlands Estate, B.C.).

The Saskatoon Campus of the University of Saskatchewan was his plan and layout, as well as many studies, proposals and plans for various projects from Calgary and Winnipeg to St John, Dalhousie University, Montreal and Ottawa. In Ottawa he designed a 600 acres subdivision "Borden Park" near Lac Deschene which never materialized due to sudden land devaluation in the twenties.

Largely unknown even in the profession in Canada today, Mawson deserves to be recognized for his efforts in advocating and establishing the need for sound planning and design principles, applicable to individual or collaborative efforts today. □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Discussion Landscape Architecture

The following is an attempt to pursue in discussion the spectrum of problems outlined in the Introduction. The participants are Gerald Englar, Michael Hough, Richard Strong and Emile Vandermeulen.

Brief biographies of Mr Strong and Mr Vandermeulen appear on pages 35 and 36 respectively. Mr Englar, BSLA, MLA, is a landscape architect. Mr Hough, MASLA, MCSLA, RIBA, is in private practice and is acting head of the new Landscape Architecture course at the University of Toronto.

VANDERMEULEN : The purpose of this discussion is to give people an insight into what we are trying to do, what our attitudes are to our profession, and the professions that relate to ours such as architecture, planning and engineering. It seems to me that in North America we are still producing people that are concerned only with their own particular set of problems.

HOUGH : The problems we are faced with today are much more complex than they used to be. Every major project involves a whole range of specialists each contributing something to the overall concept.

VANDERMEULEN : At one time one man could comprehend and execute work that now takes many people. No one today is capable of assuming this role. As landscape architects, we are more concerned with problems of the total landscape and our profession is involved with the work of many related professions. We are better able than most to see the impact of one field on another.

STRONG : This is why our profession is so difficult to practise today. We are involved in so many areas – planning, natural sciences, design – that it is difficult to establish exactly what our role or our attitude should be.

HOUGH : In Holland we have an example of how people have tackled their complex problems which have arisen from necessity. The various professions have worked together to develop an overall plan related to the region, and within that plan are contained the agricultural, industrial, housing and recreation areas. Over the years the Dutch have developed a capacity to integrate their forces and use their various professional skills to the full. For instance, they are turning over large areas of land to recreation knowing full well that it won't be used efficiently for many years. The landscape architects' role in this field is an extremely important one.

ENGLAR : In Holland the necessity for reclaiming land is vital to survival. However, in North America we do not have a land shortage, which radically affects our attitudes to its use. As a result, we have traditionally been much more wasteful of land which in turn has affected our attitude to integrating our various professional skills in the way the Dutch have.

Another thing that may have some importance is that we have never really suffered as a nation. Landscape architects are too complacent and too little inclined to make a fuss in order to achieve an end. We are unwilling to express our feelings about issues that are important to us as individuals or as professionals.

HOUGH : In 18th Century England, landscape architects were extremely concerned with their landscape and influenced the total pastoral landscape of the English countryside.

ENGLAR : Were they trained as landscape architects?

HOUGH : No. Most of them, like Kent, and Edgar Allan Poe and Horace Walpole, were writers and practised landscape gardening as amateurs. However, they were big men, they were concerned with life as a whole; they designed their parks and gardens in accordance with ecological principles but without the scientific background that we have today. They dammed whole rivers and made large lakes. The valleys became green pastures; they brought sheep in to crop the land; and they planted woodlots on the hills. This approach to the land has its influence on the total regional landscape of the 18th Century. What is interesting to me is that we are again just beginning to think at this scale.

ENGLAR : Yes, it is obvious that our approach tends to be more scientific because modern technology has created far more demands on the land than it did in the 18th Century. But why are we only now beginning to think again on this regional scale when the precedent was set two centuries ago?

HOUGH : I think that this can be traced back to the 19th Century with the advance of technology, the founding of the Royal Horticultural Society and the birth of the romantic movement. Landscape attitudes degenerated into a sentimental adoration of nature on the one hand, and a scientific interest in collecting and growing plants as an end in itself on the other. The present public attitude to landscape was exemplified by University Avenue and other excruciating examples of decorative folk art at the municipal level is the direct outcome of this degeneration.

STRONG : This is what disturbs me somewhat. I think that there is too much emphasis on regionalism and the scientific approach. We are not trained as planners or scientists, and there are many things we don't understand about the fields we impinge on.

HOUGH : The fact that we touch on many fields is potentially our real strength since it could provide us with an opportunity to see the whole picture and to ask the right questions. We are concerned with land use and organization of function on the land regardless of the scale.

STRONG : The planners are also concerned with land use of course, but in a different way.

HOUGH : Yes, the planner tends to work from a sociological and political point of view. The contribution the landscape architect can make is to bring the natural sciences into the planning process as a significant element in the determination of land use. Up until now the profession has been concerned more with the small scale environment than with the larger issues of the region. Modern technology is moving at such a fantastic rate and has the potential to destroy the landscape on such a large scale, that the total landscape becomes involved in the planning process. Since the natural landscape responds to a complex system of biological processes, an understanding of these becomes central to the planning process and should be introduced into all considerations of land use. Analysis of the human use of the land, the role of surface and ground water, soils and vegetation, regional and local climate, the

1
University Avenue, Toronto
2
Plan for the Valleys by Wallace, McHarg. Natural Process as a basis for land use planning on a regional scale. Perspective of the region as proposed. The valleys are retained as agricultural land, valley slopes as forests, no restriction imposed on development on the open plateau.
Plan pour les vallées par Wallace, McHarg. Procès naturel comme base pour la planification sur une échelle régionale. Perspective de la région comme proposée. Les vallées ont été maintenues comme terrain agricole, et les pentes comme forêts, aucune restriction a été imposée au développement du plateau ouvert.
3
Central Park, New York, Olmstead's romantic concept of the city and nature. The concept of the urban park requires re-evaluation in our contemporary society.
Central Park, New York, l'image romantique de la ville et de la nature. Ce concept doit être revisé conformément à notre société contemporaine.

relative permissiveness of different types of landscape to human intervention, will determine optimum land use patterns. Danger areas such as valleys subject to flood may be prohibited to urban development; areas of great scenic, scientific or educational value may be set aside as wilderness; areas that are ideally suited to water conservation, flood and erosion control, on which limited types of development could occur, may be identified and zoned accordingly; areas that are tolerant to human use and suited to intensive urban development may be similarly identified. A significant study has been made by Wallace McHarg Associates for the three valleys region of Baltimore, USA, in which this was done at a regional scale.

VANDERMEULEN: This is probably one of the most important contributions landscape architects can make, particularly to the architect who is not trained in problems of site analysis. His chief concern is for building, whereas the landscape architect's concern is chiefly for land.

STRONG: I think this brings up the point touched on earlier in the discussion that we are considering our role in a very large team of professionals concerned with the total environment. There are many areas of inquiry in this team in which we have little say.

HOUGH: In stressing the necessity for our contribution in the planning process, we are not trying to supercede anyone else's role. We are not suggesting that political or economic implications are unimportant, we are merely saying that a study of natural processes in the planning process will point out the consequences of various actions. For instance, if one were considering the potential of certain valley lands, and one knew that uncontrolled development would likely spring up along that valley as a result of strong political and economic forces, one could point out the consequences of such action. One could show that for example due to the nature of underground water and impervious soils, buildings using septic tanks would be likely to poison the water supply of adjacent urban areas. The political criteria might be so strong that such consequences would have to be risked; however, those responsible for the decision would be aware of the consequences of their actions and would be better able to take remedial action.

ENGLAR: So far, we've discussed the landscape architect's role in the larger landscape. What of his contribution to the city? The design of parkland, open space and recreation where he is potentially a designer becomes an important aspect of the city environment. For instance, Olmsted's work in Boston was significant because his plan for the Fenway turned a stinking open sewer and dumping ground into a valuable park and recreation area. His work in Central Park, New York, justifies to me the necessity for open space in the centre of the city, not only from the point of view of recreation and amenity but also on economic grounds as well.

HOUGH: I think this is true up to a point. We've been saying that open space is important to the city for so long that it becomes a sort of sacred cow. The excuse we make for large open spaces in the city is the need for recreation and contact with nature. Central Park was originally conceived with this romantic concept in mind. In Olmsted's day it was probably valid. Today the star gazer will probably get mugged by gentlemen with bicycle chains and leather jackets. This does not say that open space is no longer valid, it indicates to me that the whole concept of open space planning needs a new approach.

ENGLAR: I agree with this. The whole question should be re-evaluated. The sociological problems that evolve from the lack of the right type and distribution of recreation facilities in the city must have an influence on this kind of social chaos.

HOUGH: I think that part of the problem lies in the type of space that the city provides, and where it is. You can have all the space


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4
Amsterdam Forest Park, once salt water, was reclaimed as a major park
Le Bois d'Amsterdam, autrefois partie de la mer, il a été défriché comme parc principal
5
An integrated land use plan of Oostelijk Flevoland Reclamation Project of 133,000 Acres. The plan shows the long range development. Area predominantly agricultural land with land allocated for villages and towns, forest and recreation lands, leading to the major town. Coastal lands have been allocated to forest and recreation, including camping, fishing, swimming which is part of an overall recreation plan for Amsterdam and other population centres.
Plan intégral d'un projet de défrichement de 133,000 acres à Oostelijk Flevoland.
Le plan démontre un développement à long terme. L'aire consiste principalement de terrain agricole et de terrain alloué pour des villages et des villes, des forêts et des centres de récréation, conduisant à la ville principale. Les côtes ont été allouées aux forêts et des centres de récréation comprenant le terrain nécessaire pour le camping, la pêche, la natation ce qui fait partie du plan général pour les centres de récréation pour la ville d'Amsterdam, et pour d'autres centres de population.
6
Zuider Zee Polders and neighbouring reclamation areas, Holland. The Barrier Dam has turned the salt water bay into a fresh water lake
Les polders de "Zuider Zee" et du terrain de défrichement voisin en Hollande. Le barrage a transformé la baie dans un lac à eau douce

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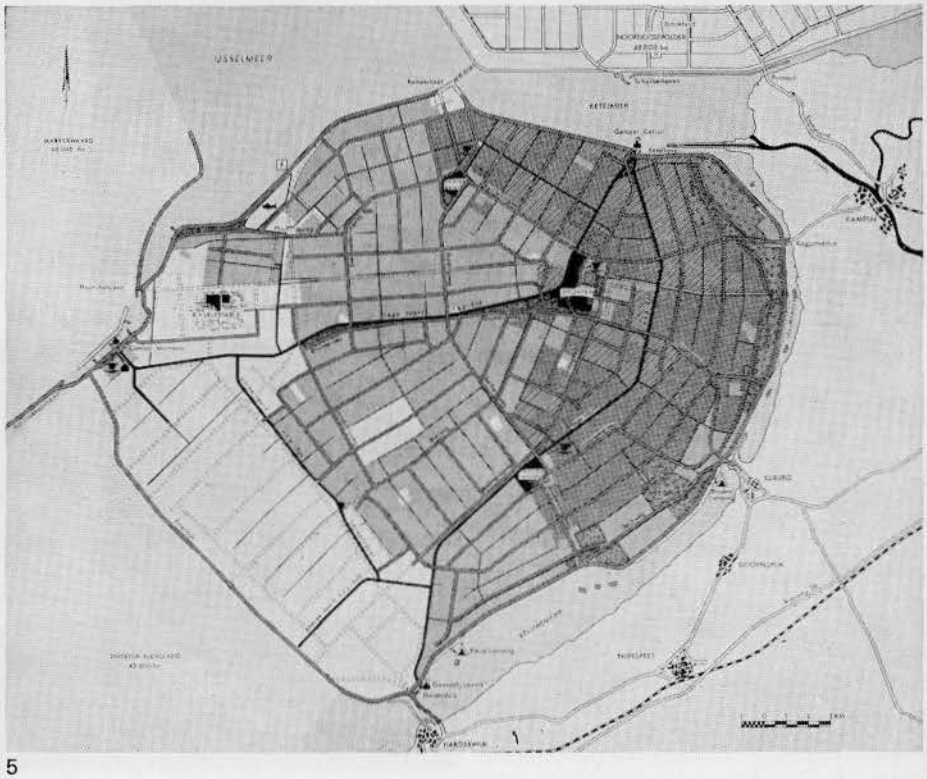

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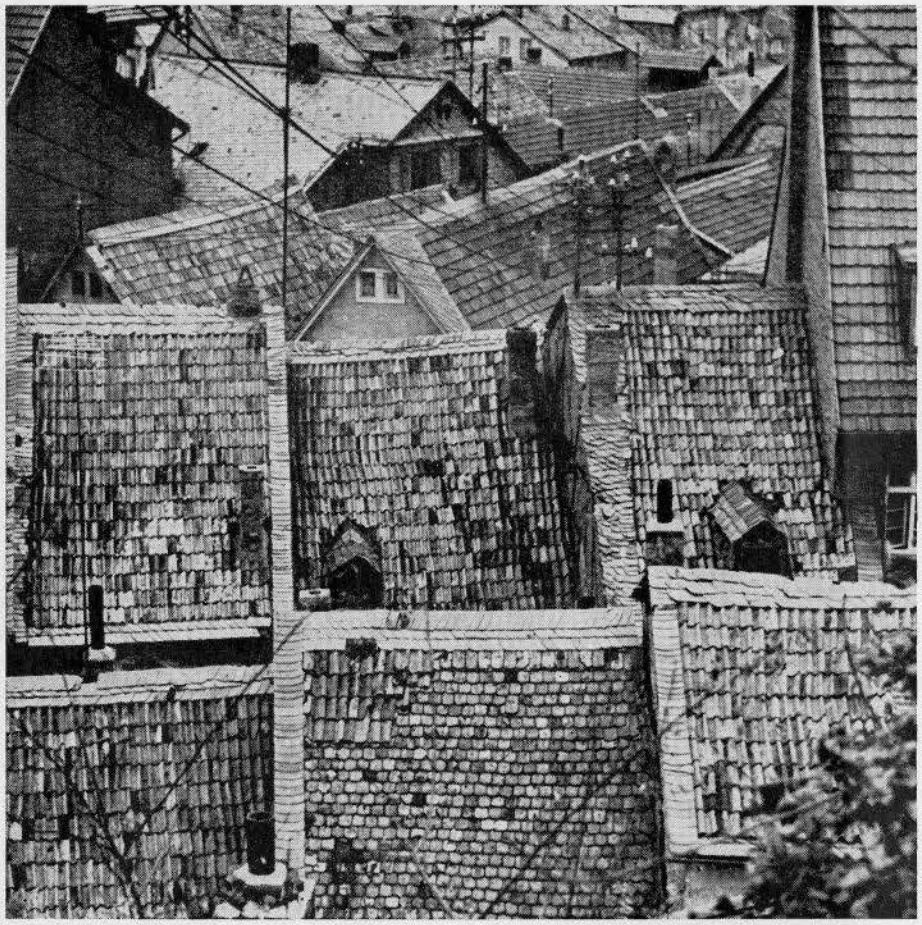
6
City spaces
Les espaces dans nos villes



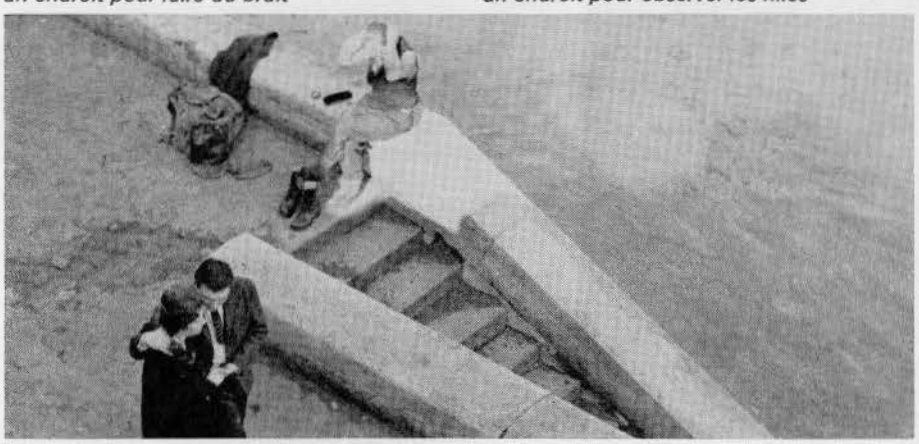
places for cats / un endroit pour les chats

In North America the problem of too much land affected our attitude to its use
Dans l'Amérique du Nord le problème d'avoir trop de terrain a affecté notre attitude relative à son utilisation

places for large gatherings / un endroit pour des rassemblements

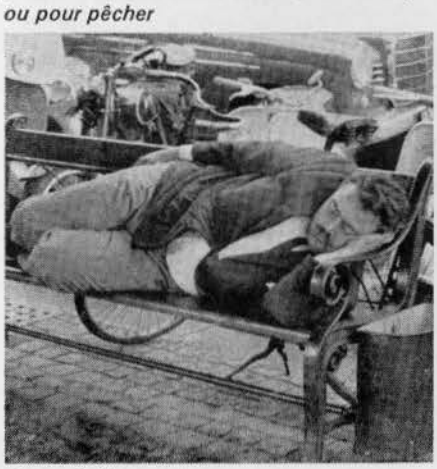
places to make a noise
un endroit pour faire du bruit

places for girl watching
un endroit pour observer les filles



places to make love – or fish / un endroit pour faire l'amour – ou pour pêcher

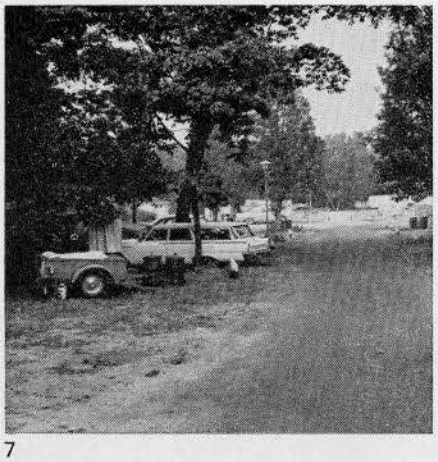
places to relax / un endroit pour flémarder



places to have a nap
un endroit pour faire la sieste

Places to feed birds / un endroit pour nourrir les oiseaux

7
Present day camping – Suburbia extended
Camping d'aujourd'hui – la banlieue qui s'étend
8
Point Pelee forest regeneration on sand dunes, a very fragile area which needs protection
Point Pelee – le premier projet de régénération sur des dunes de sable, un terrain très fragile qui a besoin de protection
9
Point Pelee National Park – Recreation at the regional level
Point Pelee, Parc National – Centre de récréation à l'échelle régionale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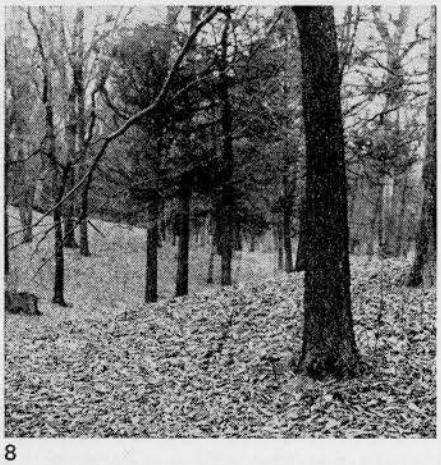
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in the world, and this won't prevent it from becoming a hot bed of undesirable activity if it does not answer basic social needs.

STRONG : We don't want to say that open space is necessarily bad, but that our approach to open space is often wrong. We must find out first how much is necessary, or even whether it's necessary at all. We seem to be getting into the area of the psychologist, sociologist and other disciplines who are concerned with humanity and how it ticks. This gets down to dealing with human beings rather than with regions.

ENGLAR : CMHC seems to have solved all these problems. They have a little bible that tells you how many rooms a building should have, and how big they should be, what kind of spaces we should have and how we should behave. This kind of pat answer is typical of the official attitude towards present day environmental problems.

HOUGH : It is essential that we re-evaluate the basic issues of leisure and open space. I think that the way this must be done is through original research. It is difficult to acquire this body of knowledge, and to practise at the same time, because most of us are too busy to think these things out and make all the necessary inquiries. Only by inquiring in depth into these matters can we make a contribution that will influence monolithic bodies like CMHC who persist in their pat answers until proven wrong.

ENGLAR : There are already indications that we can evaluate from experience that certain types of space are more valuable than others in solving recreation needs. The needs of recreation are enormously varied and must satisfy all kinds of people. We need drag strips for the leather jacket gang ; we need the honkey-tonk of Centre Island for the teenage gang with their transistor radios and chewing gum ; we need areas like Yorkville with its cafés and where there is night life, booze and women ; and we need places like St James churchyard and Queen's Park where one can relax during the lunch hour.

STRONG : During this conversation we've discussed our role in the region, our role in the city, and problems of recreation and the public attitude to our profession. There are other areas that we've hardly discussed at all. For instance, we are increasingly involved in areas such as highway design, sewerage treatment plants and other work that has traditionally belonged solely to the engineers. We are also concerned with problems of land reclamation, public utilities and, of course, provincial and national parks. All of these need consideration, and have to form part of a comprehensive view of the physical environment. □


9

Our Private Garden

by Norbert Schoenauer

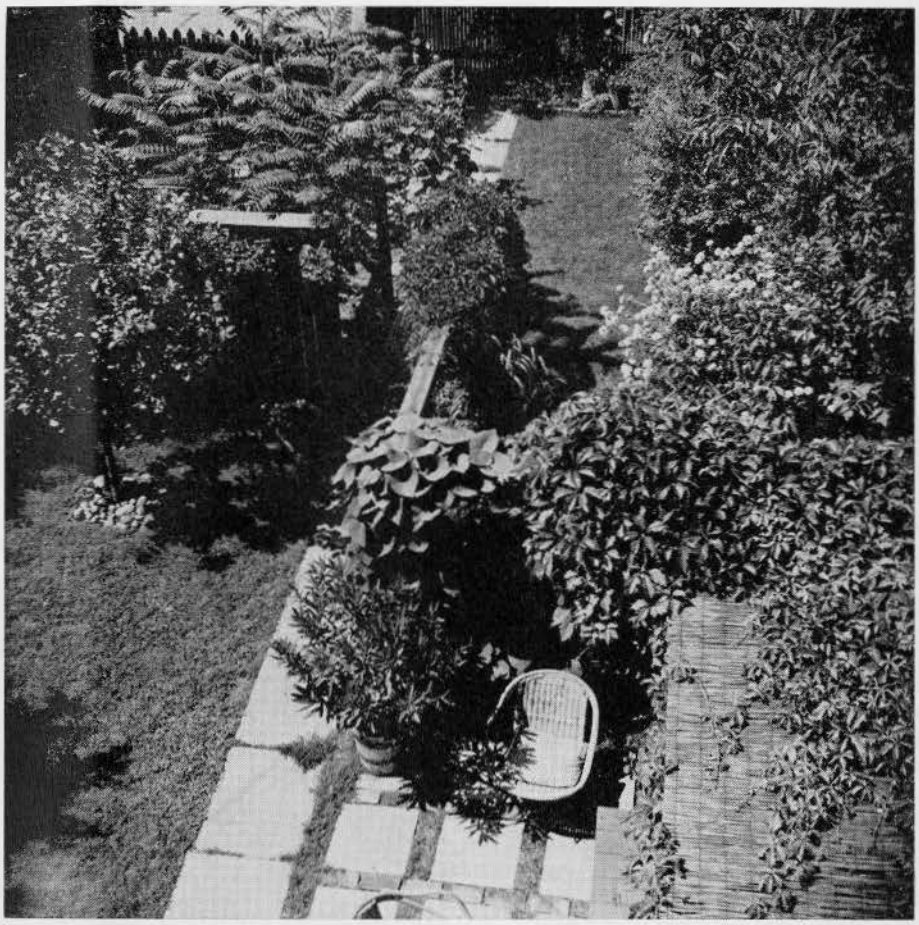
Professor Schoenauer of McGill University studied Architecture and Town Planning in Hungary, Denmark and Canada. He has written a number of articles, and with Stan Seeman is author of "The Court-Garden House".

Confinement and definition of space are the most intrinsic elements of a small private garden. Without some sense of enclosure a "garden" does not conform to the real meaning of the Old-Germanic root of the word from which it is derived. Perhaps this realization more than anything else was responsible for the design ideas that eventually shaped the physical appearance of our intimate garden.

Four years ago the area of this garden was a crushed-stone parking lot open to the public lane but separated from the two neighbouring properties by low picket fences, the one to the right painted red and the one to the left, green. There were no trees or flowers and hardly any other form of planting with the exception of a small lawn and a cluster of ferns, the latter adventurers from one of the neighbouring gardens. The view offered a disheartening sight to a novice gardener.

The first stage in converting the open back yard to an enclosed garden was the construction of high unobtrusive fences. But the theme of enclosure was carried a step further by the erection of a number of wood and bamboo screens, similar in detail and height to the fencing. The garden was thus divided into a series of compartments, each linked visually with its neighbouring spaces by means of apertures between the screens (**1**). One window-like opening was left in each of the two fences facing the adjacent gardens not only in order to afford extended vistas but also in a spirit of neighbourliness which in this case did not involve the usual sacrifice of complete privacy. The garden's fragmentation into subspaces brought about a constant interplay of enclosures and openings (**2**). This maze-like arrangement, in turn, complemented the relatively small size of the garden simply by making it impossible from any given point to survey the total extent of the garden; moreover, since the screens and fences look alike, it became difficult to locate the true boundaries of the property.

In addition to the visual effect of continuity, the divisions also fulfill useful functional



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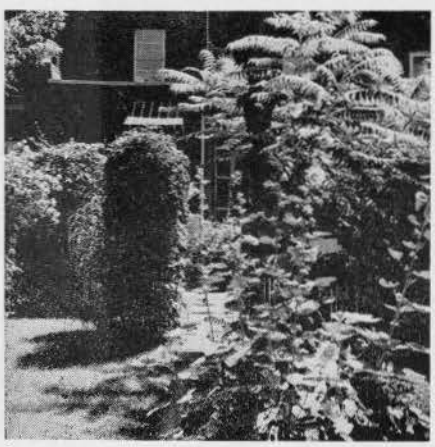

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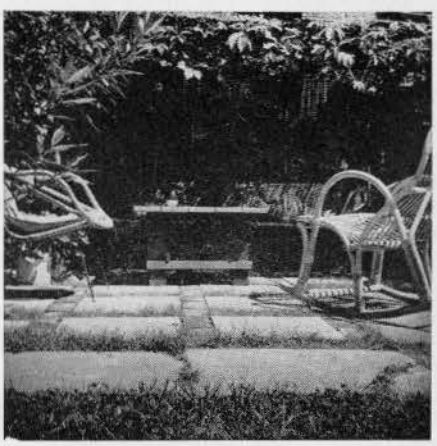

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requirements. For example, one compartment serves as a patio for outdoor living, another is designated for car parking, while the residual areas are left for gardening with the added opportunity of creating distinct milieus in the various bays of the garden. The first area to be seen when emerging from the house is the patio (**3**). A considerable portion of this concrete-tile and brick paved area is shaded by a low pitched bamboo roof devised primarily to give protection when necessary from intense sunlight (**4**). Because of the absence of trees another means of shad ng had to be found, and bamboo matting, which permitted some sunrays to penetrate and thereby gave an effect not unlike to that of a tree, was chosen. Exotic plants such as Rosebay (Nerium oleander) and Orange tree (Citrus taitensis) together with a collection of various types of Geranium are kept in pots in this area. A Russian Olive tree (Elaeagnus angustifolia) is tucked in a corner of the patio, in an area paved with large pebbles. The screens and fences are complemented by a variety of climbing vines. The two Silver Lace climbers (Polygonum auberti) are spectacular during late summer and fall, while the more common Virginia creepers (Parthenocissus quinquefolia) and Dutchman's Pipe (Aristolochia sipho) are at their best during the first few months of the growing season. Creepers are also used against the house to soften the contrast between its brick walls and the garden; Boston ivy (Hedera helix baltica) and Wintercreeper (Euonymus fortunei acuta) are the species used here.

Trees were selected which would be in harmony with the scale of the garden. In addition to the Russian Olive, an apple tree, a Sumac (Rhus typhina) and about sixty Chinese Elms (Ulmus pumila) were planted. The Chinese Elms were placed adjacent to the fences and in one particular location they were crowded together to form a miniature forest which in the spring, as anticipated, provides an ideal condition for the cultivation of wild flowers.

A well was placed near the existing cluster of ferns (**5**) and a bird feeder erected close to the living room window (**6**). Here and there chimney pots and stone adornments collected from some demolished homes in the vicinity were placed to add interest and scale to the various pockets of verdure. These objects together with the fences were important elements particularly at the beginning when the garden was in its infancy. In summer these objects have now lost some of their visual impact because they are no longer dominant in the garden setting; but in winter, when a snow blanket covers everything and the foliage is gone, both the "objets trouvés" and the fences are significant architectonic aspects of the winter garden-scape.

Of the various species of perennials planted, the most rewarding are the Heliopsis (H. patula) which bloom practically throughout July, August and into September if the weather is congenial; their profuse yellow flowers give a cheerful note to the garden even on cloudy days. Another favorite is the dependable Geranium (**7**); pot-bound, these houseplants produce numerous flowers and are admirably suited for the patio garden.

In conclusion, it ought to be repeated that this is a small garden. Its total area including the parking space is about 1660 square feet, which represents an area about the size of a front lawn of an average suburban home. Its width is only 27 feet, its median length 62 feet, but its height is infinite. However, given these dimensions it was possible to convert a back yard into a "spacious" garden which complements our home with intimate and agreeable outdoor spaces. □

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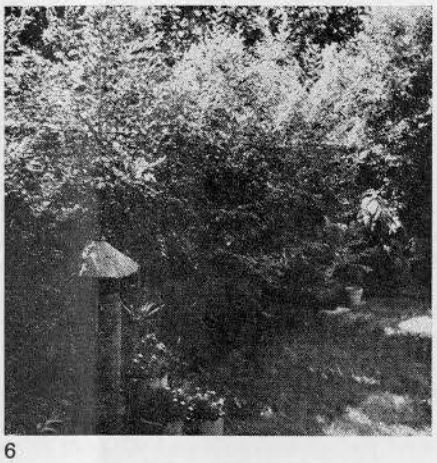

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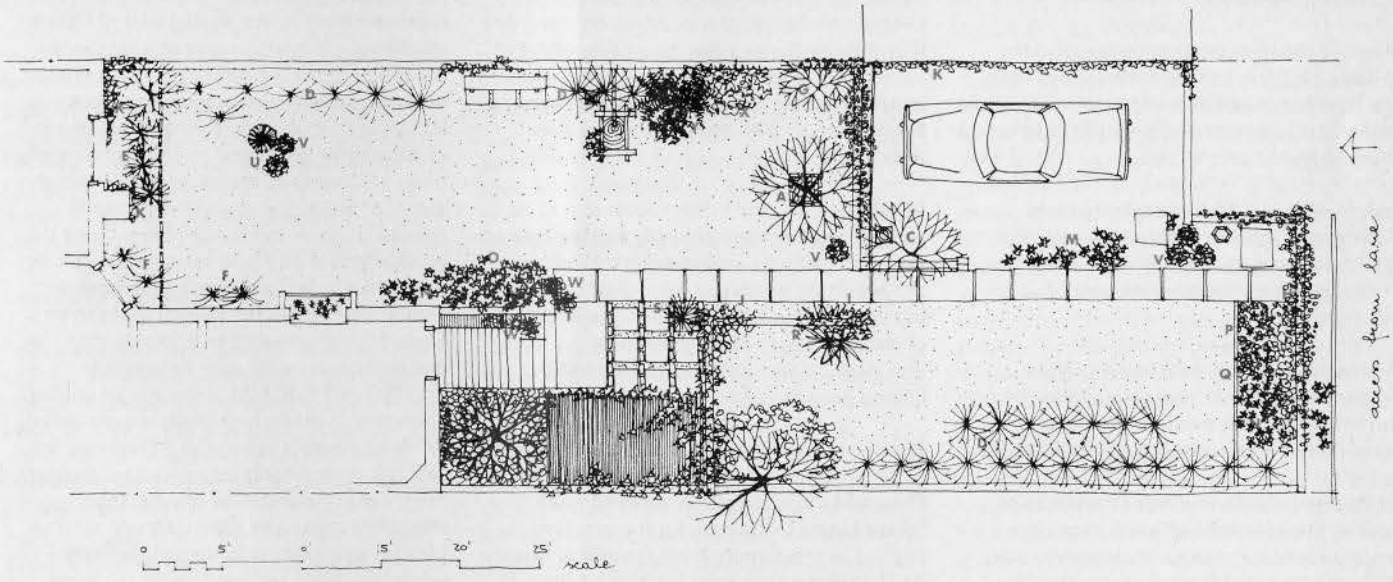

Trees:
A Apple Tree (Malus)
B Russian Olive (Elaeagnus angustifolia)
C Sumac (Rhus typhina)
D Chinese Elm (Ulmus pumila)

Shrubs:
E Arctic Willow (Salix purpurea nana)
F Bridal Wreath (Spiraea vanhouttei)
G Golden Bell (Forsythia intermedia)

Climbing vines:
H Silver Lace (Polygonum auberti)
I Virginia Creeper (Parathenocissus quinquefolia)
J Dutchman's Pipe (Aristolochia sipho)
K Boston Ivy (Hedera helix baltica)
L Wintercreeper (Euonymus fortunei acuta)

Perennials:
M Hollyhock (Althaea rosea)
N Sunflower (Heliopsis patula)
O Black-eyed Susan (Rudbeckia speciosa)
P Bellflower (Campanula carpatica)
Q Geum (G. borisi)
R Daylily, common (Lilium)

Potted plants:
S Rosebay (Nerium oleander)
T Orange tree (Citrus taitensis)
U Finger Aralia (Dizygotheca elegantissima)
V Marigold (Tagetes signata pumila)
W Geranium, common red (Pelargonium)
Geranium, scented (P. Dr. Livingstone)
Geranium, ivy (P. peltatum 'Willy')
Geranium, miniature (P. Hortorum 'Pigmy')

Ferns:
X Asparagus Fern (Plumosus nanus)
Y Fern, common (Filicales)

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The Computer and the Design of Multiple Housing

by George Banz, MRAIC

The Growing Complexity of Planning and Design Problems

Not long ago the planning, financing and construction of dwellings was a rather simple affair. Cities and towns were small and there was ample land available for building. Houses were built one at a time and their relation to each other as well as the financing of their construction were problems involving very few individuals at a time. Their solution was correspondingly simple.

In the course of the last half century conditions have changed radically and with increasing speed. These changes can be expected to further accelerate well past the end of this century.

Much of the increasing complexity of the housing problem can be attributed to the vast increase of people involved in every single step of the planning, design and construction of dwellings:

the physical planning process involves owners, professional planners, people on neighbouring properties, various administrative departments on several levels of government;

the financing of a construction project involves consultants, real estate firms, banks and other financial institutions and in many cases one or more government agencies;

the design process involves in addition to most of the parties mentioned above not only professional architects, designers and engineers, but, at least indirectly, building contractors and materials suppliers;

the construction stage finally is controlled by the multitude of decisions made at all preceding stages and in addition by such factors as the degree of training and organization of site labour, availability of labour, building components, and construction machinery, etc. not to speak of weather conditions, soil conditions and "acts of God".

Under such circumstances, it is quite impossible for any one individual to remain in effective control of a project of any size. Increasingly it is becoming equally impossible for the people sharing such control to remain in meaningful communication.

Lack of control through partial breakdown of communications has already resulted in various inadequacies of present day housing. It is significant that these shortcomings are the more pronounced the larger the concentration of people in the particular urban area. Some new housing projects in places like Manhattan and Hong Kong may indeed be considered unfit for human habitation. If projected world population increases have any validity at all, housing for four to fifteen times[1] the present population will have to be provided in the course of the next century, almost all of it in urban environment. It is difficult to see how the conventional approach to housing, planning and design, already starting to prove inadequate, can begin to cope with the problems of the near future.

In other words, *the human brain due to its more or less constant capacity cannot keep up with the radically increasing complexity of the problems it is faced with.* Just as conventional machines extend the limited physical strength of the human body, other tools will increasingly have to extend the limited capacity of the human brain.

Brain and Computer – a Comparison

Computers are commonly referred to as "giant brains". The awe for the machine implied in this term is hardly justified. Present day computers are anything but intellectual giants even if some of the brightest of their species can beat a human player at checkers, and chess.

There are basically two classes of computers: "analog" and "digital", depending on the way in which the numbers, on which the machine operates, are represented. In the analog machine numbers are represented by physical quantities, such as the angle of rotation on a disc or the strength of an electric current, the measurement of which corresponds to given numbers.

In the digital machine numbers as well as other symbols are represented by groups and sequences of binary digits, each of which may correspond to an on-off valve of an electric current. Components such as switching devices in electric machines permit the basic arithmetic and logical operations to be performed at high speed, making possible through more or less complex combinations and sequences any desired mathematical computation. Analog and digital principles may be combined in "mixed" machines, but most modern electronic computers are basically digital.

The human brain similarly appears to work primarily on the digital principle, although there is some indication that chemical action, corresponding to the analog part of "mixed" machines, plays a considerable part in the functions of the human brain. A superficial comparison between machine and brain indicates considerably shorter reaction time of transistors compared to the corresponding brain components. However, space requirements of electronic components vastly exceed those of the human brain. Thus the comparison in terms of actions that can be performed by active organs of the same overall size shows the human brain to be some 10,000 times more effective than the machine. This factor may be closer to 100,000 or 1,000,000, if the partial analog character of the human brain is considered. While computers consist of a relatively few and fast components compared to the human brain's many but slower organs, the efficiently organized computer will tend to pick up and process items successively where the brain will tend to do the same work simultaneously. The sequential character of the computer's work necessitates a high degree of accuracy, since any inaccuracy may increase out of proportion in sequences of operations. Due to the way in which numerical data are transmitted in the human brain, it works by contrast on a low level of accuracy, but a remarkably high level of reliability.[2]

In the final analysis the basic superiority of the human brain over automata may well be founded on the probability that while

[1] Doxiades, "Ecumenopolis – The City of the Future, *Bauen & Wohnen*, Jan. 64; see also Charles Abrams, *Man's Struggle for Shelter*, Cambridge, Mass, 64.
[2] John von Neumann, *The Computer and the Brain*, Yale 1958.

[3] see *Sketch pad I* by I. Sutherland, and *Machine Perception of Solids* by L. G. Roberts, published by Lincoln Laboratories, Lexington, Mass; *Sketch pad III* by T. Johnson, published by Electronic Systems Laboratory, M.I.T.
[4] "information" in the sense used in information theory; measured quantitatively in terms of equally likely yes or no decisions.
[5] F. Stuart Chapin and Shirley F. Weiss, *Factors Influencing Land Development*, and Thomas G. Donelly, Chapin & Weiss, *A Probabilistic Model for Residential Growth*. Both published by the Institute for Research in Social Science, University of North Carolina, 1962 and 1964 respectively.
[6] Richard L. Meier, *A Communication Theory of Urban Growth*, M.I.T. 1964.
[7] Christopher Alexander *Notes on the Synthesis of Form*, Harvard '64.
[8] ibid p. 215.

the operation of computers is based on logical and mathematical concepts, these concepts may well be only the outward expression of a much more complex logical and mathematical form used by the human brain.

Even if the intellectual capability of computers compares rather unfavourably with that of the brain, it is as dangerous to dismiss computers as diligent "morons" as it is to hail them as "giantbrains". The function of brains is not only to think but to perceive and to exercise "control". While the perceptive capabilities of computers are highly specialized and very limited, any control function can be delegated to a machine as easily as simple intellectual tasks. A bulldozer can only do what a human body directs it to do – nevertheless, such a machine can do extensive damage in the wrong hands. If given excessive control functions the computer can become infinitely more of a menace. *The crucial consideration in the application of a computer must thus be to match its control function with its perceptive and intellectual capacity.*

Computers as Brain-extensions

Computers must be regarded as extensions of the brain just as conventional tools and machines become extensions of the human body. Not even the most sophisticated automata will replace the human brain, at least not at any foreseeable stages of computer development.

In the present stage of computer development, the production problem has become secondary to that of finding the most effective means of man-machine communication. Effectiveness of such communication determines how close the brain and its "extensions" can be linked together and thus interact.

The conventional means of man-machine communication is through typed alpha-numeric input and output. The languages employed consist of a minimal number of carefully defined words, and are created for specific purposes, such as FORTRAN for the programming of problems that can be expressed in algebraic notations, or COBOL for the programming of business problems.

More recently cathode ray tubes, similar to television tubes, have made direct graphic output possible, while "light pens" permit direct input of graphic information into the computer (by drawing on the face of the cathode ray tube). Computers are furthermore capable of converting alpha numeric data into graphic forms (e.g. charts) and vice versa (e.g. the conversion of contour maps into digital data).

Input and output techniques will without doubt become even more sophisticated. Computers will be able to interpret sketches and print out graphic representation of the results of "computations" in the form of plans, elevations, isometrics and perspectives of objects.[3]

Experimental Computer Uses in Planning and Design

A prerequisite for any computer application is rigorously logical thinking in determining and analysing the problem's structure. On the basis of the logical structure, a mathematical model can then be constructed which incorporates the principles of collecting, coding, storing, retrieving and processing information.[4] The immediate practical usefulness of a computer program is limited by the degree of accuracy to which the mathematical model simulates actual conditions, and by the extent to which available information is complete.

Systems such as cities or regional economies are obviously so complex that neither structure nor data can be grasped clearly and completely. Computer programs directed toward such problems will of necessity be limited to approximations of actual conditions or to limited aspects of the problems, or both. Computers when applied to problems of such magnitude are thus seldom expected to yield solutions but are more often used to gain insight into the organization of systems. In this way computers are enlisted in the effort to determine the structure of complex problems with practical application of computer control the ultimate rather than the immediate aim.

Approaches to physical and economic planning have been basically of two kinds: *Deterministic Models* are based on the principle of directly related cause and effect at every point of a program, while probabilistic or *Stochastic Models* are based on decision processes in which a decision determines not a specific outcome but a distribution of possible outcomes. While deterministic models are limited to relatively simple problems, stochastic models have the added advantage of permitting complex problems to be simplified at the outset by replacing sequences of rational decisions by probability considerations.

A great deal of research is currently directed toward the application of computers to urban planning problems. Of particular theoretical importance are the studies conducted at the University of Michigan under Richard L. Meier and at the University of North Carolina, under F. Stuart Chapin. The latter has been experimenting with some success with probabilistic models simulating the urban land development process,[5] while Meier is considering communication requirements as a basis for the study of urban patterns.[6]

Research of this kind is of great importance for the study of urban residential areas and clusters, since *it is likely that the planning of individual housing projects will in time be guided by decisions reached on the basis of mathematical models of the overall city.*

In contrast to the multitude of experimental approaches to computer applications in planning, only one serious attempt at logical analysis of design procedures is well known.[7] From the assumption that "the causal structure of the problem defines the physical constituents of a successful form",[8] a method is derived by which known design requirements are investigated as to their interrelationships and are then ordered into significant sets of requirements with help of a computer. They in turn are ordered into a

[9] see Architectural Forum Oct. '63, p. 89-91 (an attempt to apply this method to the housing design problem is presented in Chermayeff & Alexander, *Community and Privacy*, New York '63).
[10] See "Computer Helps Design Mechanical Systems", *Architectural Record*, January 1965.

[11] see *Precision Incremental CRT Display 340* by Digital Equipment Corporation (Digital Equipment of Canada Ltd.) and "Graphic Data Processing" in *IBM Data Processing Information Series C-1*.

simple hierarchical structure pointing to a definite form. The method might be useful in stimulating new approaches toward, for instance, the design of housing prototypes. Since there are however grave doubts if the architectural design problem per se has indeed a causal structure, too much in the way of practical results should not be expected from this initial attempt. To date the only promising application of this method has been to the problem of determining the location of express-highways.[9]

Current Computer Uses in Planning and Design

Where the "theoretical" approach to computer application moves from a general theory through progressively more accurate approximation toward the particular detail of a program, the "practical" approach starts from the demands of a specific detail problem which through expansion of its scope may increase in complexity and eventually merge with an experimental program. A multitude of detail programs are operational, some of which are listed in the following:

a Structural Analysis and Design – most conventional structural framing systems can be analyzed and designed today on commercially available computer programs. Programs are also commercially available to list and detail reinforcing steel at a fraction of the cost of conventional methods.

b Environmental Analysis – a complete computer program to determine complete heating and cooling data for any building has been developed and is available.[10] The program permits almost instant reading of all significant data, comparisons between various orientations, different fenestration patterns, the effects of different wall construction techniques on heating and cooling loads, cost comparisons considering numerous variables, etc.

c Subdivision Analysis – a program which in its presently available form permits all computations required for field staking and lot registration to be made, on the basis of a draft plan of a sub-division, its boundary survey, and standard data such as desired minimum lot areas, frontages, depths, etc. More sophisticated programs permit the analysis of excavation and grading work required on the basis of contour maps.

d CPM – Project Planning – The application of the critical path method to the planning of projects of any size has recently become so common that no explanation of the principle is necessary. The obvious advantages of computer applications for larger projects is the ease of re-scheduling in case of unforeseen developments and the possibility to quickly evaluate alternatives in all their implications.

Common to all these programs is the disadvantage that all information has to be translated into alpha-numeric data before it can be automatically processed. The output similarly is in alpha-numeric form. Automatic plotters permit translation into visual images and similar semi-automatic machines can speed up the reverse process, e.g. the translation of contour maps into digital form. Both methods are slow, however, and completely disrupt direct man-machine communication.

The recent introduction on the market[11] of cathode ray tube-light pen combinations previously mentioned will for the first time permit the application of computers to problems of architectural and industrial design which depend for their solution on quick if not instant visual feed-back.

The present-day equipment and methods are in general characteristically designed to do tasks which had previously been done by the human brain. They are furthermore replacing its routine rather than its creative functions. The first computer applications to architecture similarly should not be expected to point to radically new solutions. Computers will initially do some of the routine "thinking" average architects' brains had been doing before, but they will be able to do this work much faster and as a result more thoroughly.

As computers take over routine human functions, it can be expected that time thus freed for more creative intellectual tasks will initiate an accelerating rate of startling innovations in all fields, including that of architecture.

The Structure of the Housing Design Problem

In view of the work that has been done in the application of computer technology and, more important, of logical, scientific thinking, to physical planning on the one hand and the solution of detail problems on the other, it is surprising that no attempts have been made to apply the same disciplined approach directly to the solution of architectural problems. Wherever repetitive units, be they spatial or functional, or structural, etc. determine an overall design to any extent, and wherever the exact determination of the physical characteristics of such units involves the study of interrelationships of any complexity between variables, the immediate application of computer technology should be an obvious aim. This applies to all kinds of industrial, commercial and school buildings as well as to the housing design problem.

To understand a problem, to find its structure, it is best to put it in its simplest and most general terms:

The urban housing design problem is concerned with the conditions governing the distribution of people in urban space.

A *specific* housing design problem is thus concerned with the distribution of a *specific* group of people in a defined "project space". The architect's particular interest in the problem is that of providing the permanent individual and communal shelters required within the project space. He cannot therefore be expected to find a housing solution without the collaboration of people concerned with the wider aspects of the problem. He does however play a key role since the distribution and design of dwellings determine the eventual physical environment of the people in the project space to a very large extent.

[12] Multiple Housing is here defined not only in terms of physically interconnected but of any spatially related housing units and may include conventional arrangements of detached dwellings as well as any other conceivable groupings.

[13] The 23 variations of one typical layout ranges from bachelor apts. to units for families with up to 8 children, see Le Corbusier *The Marseille Block*, London 1953 (page 54)
[14] Bachelor, 1, 2, 3, and 4 bedroom units, number of types estimated from *Siedlung Halen housing estates near Berne, Switzerland*, Architectural Design, Feb. '63.
[15] Bachelor, 1, 2, and 3 bedroom apts; number of types estimated from *Harvard's New Married Students Housing*, Progressive Architecture, Dec. '64.
[16] Bachelor, 1, 2, 3, and 4 bedroom apts; number of types estimated from *Habitat '67 Montreal*, Architectural Design, Dec. '64.

The dwellings within such a space are arranged in accordance with a multitude of requirements ranging from basic physiological, psychological, economic and engineering considerations to whims of owners, building code administrators and zoning officials. This mass of factors influencing housing design must be meaningfully interrelated. While the conventional housing design procedure starts with considerations of finance and codified physical restrictions, a design program forming the basis for computer application can start with the consideration of people in the project-space and their relation to each other.

Man's environment is made of up inanimate nature; plants, animals, people and human artifacts. In the urban setting interhuman relations usually dominate all other environmental factors. The people in the project-space may be stationary or moving

if stationary they may be sheltered in their dwellings or they may be resting outside their shelters

if moving they may roam idly or play in the open or they may purposely follow set paths of circulation, as pedestrians or in vehicles

The primary links between the individual and his environment are his senses. Secondary links are intellectual in nature and are equivalent to communication.

The number of possible perceptive links within the project space can be considered limited. A second set of perceptive links is independent of the spatial arrangement of people and housing units within the project-space. They are functions of conditions such as sun-orientation, climatic data, sources of sensory stimulation outside the project space (factory smoke, view, traffic noise, etc.), in short, all factors directly affecting people within the project-space from outside. Such factors may be defined as border-conditions of the project-space.

All the factors affecting multiple housing design[12] discussed so far can be summed up as the perceptive links between individuals within the project-space and their environment. A great number of factors however affect people only indirectly. Thus advances in science and technology may for instance affect building products and codes which in due course may change the design of housing. In contrast to such slow and gradual changes, major policy shifts of governments or lending agencies may have an immediate impact on housing design.

The three distinguishable "blocks of data" which determine housing design are therefore based on the following factors:

Perceptual linkages between people and environment

Scientific and technical factors relevant to housing design

Political and economic factors

Their interrelations are indicated diagrammatically on the table and diagram on page 52.

Computer Application to the Housing Design Problem

Computers can manipulate directly only a small though important portion of the concepts involved in architectural design. Other concepts can however be combined in "design-units" each answering a number of perceptual, technical and economic requirements. Such "design-units" may be complete apartment or housing units, room units or building components. The only essential requirement is that each unit and/or possible combination of units is associated with specific perceptual, technical and economic factors.

Until prefabrication of large scale building components becomes a dominant design consideration, the "design-unit" most obviously suited to computer application is the dwelling. The layouts of currently produced dwellings fall into very few types, particularly if luxury units are excluded from consideration. As the tabulation on page 52 indicates, it might be possible to cover all basic layout requirements in 14 housing-unit designs. Twice that number should be entirely adequate for an initial computer program, particularly if additional units could be added as experience might indicate gaps.

Minimum Number of Basic Housing Types
(* indicates senior citizen units)

	Bach.	1 BR.	2 BR.	3 BR.	4 BR.	5 BR.
Ground access	1 *	1 *	1	1	1	1
Walk-up apts.			1	1	1	1
Elevator access	1	1	1	1		

Total – 14

By comparison the following well-known modern housing projects are composed of similar small numbers of "design units":

Unité d'habitation, Marseille 23 basic units[13]

Halen, Berne, Switzerland 8 basic units[14]

Harvard Married Students' Housing 16 basic units[15]

Habitat '67, Montreal 15 basic units[16]

The main criteria for the conception of the "design-units" are the following:

a Maximum number of possible functional three dimensional combinations.

b Simple interconnection with the least possible number of horizontal links (e.g. corridors) and vertical cores (stairs and elevators)

c Possibility of simple integration of units with parking facilities (e.g. through the use of structural modules compatible with parking bays, turning radii for cars, etc.)

d Option of controlled geometric transformations to permit variation of certain room dimensions and possibly angles without prejudice to the above-mentioned other criteria.

Each of the design-units as well as certain of their combinations in the case of exits, etc.

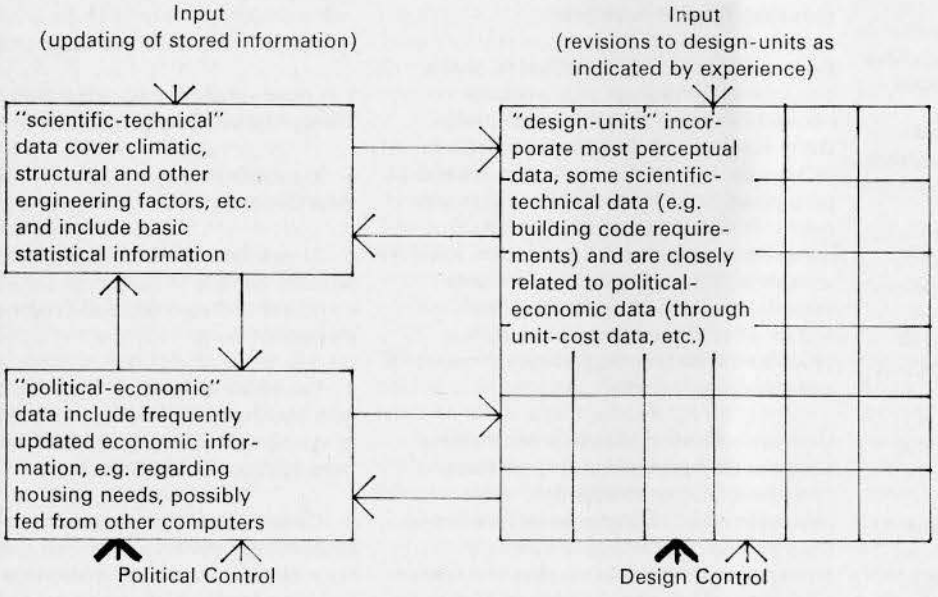
Factors Influencing Housing Design

Man's relation to his environment is determined by his Perceptual Links to it which may be sensory or intellectual (the latter being equivalent to "communication" in the case of interhuman links)	sensory links	visual	positive: visual stimulation (e.g. beauty) negative: need for privacy
		aural	positive: sensory stimulation (wind, leaves, birds, music) negative: need for privacy
		kinetic	positive: sensory stimulation (solar radiation, pets, textures) negative: withdrawal from stimulation
		nasal	positive: sensory stimulation (smell of plants, earth) negative: protection from excess pollen, smells
	intellectual	direct	random: (face-to-face meeting in public) selective: (visiting)
		indirect	random: (radio, TV) selective: (telephone)

Housing design is directly affected by a multitude of scientific and technical Factors Technical factors are dependent on research and development work done by specialists in fields relevant to housing design	sociological physiological technological demographic ecological

Economic factors are affected by (and in turn influence) political decisions at all levels of decision making	political	direction of leadership public opinion
	economic	availability of land availability of capital availability of labour availability of material

Blocks of Data Resulting from Regrouping of the Factors Influencing Housing Design



CANADIAN
BUILDING DIGEST

DIVISION OF BUILDING RESEARCH • NATIONAL RESEARCH COUNCIL CANADA

Selecting the Foundation

by R. F. Legget and C. B. Crawford

UDC 624.15

For all but the smallest structures, the design of foundations consists of three essential operations:

1) calculating the loads that must be transferred from the structure to the strata supporting it;

2) determining the exact character of subsurface conditions, including groundwater conditions, to a depth of at least twice the width of the structure; and

3) designing a foundation structure that will safely transfer the loads from the structure to the foundation beds that have been found at the site.

The very small buildings excluded from this general statement may be taken to be one- and two-storey residences and equivalent structures, the loads from which are so small in relation to the size of the area they cover that empirical methods of foundation design will usually, though not always, suffice. This Digest will present an outline of the way in which the type of foundation structure best suited to a particular site can be selected.

There is a wide choice of types of foundation structure. If the loads from building columns can be transmitted directly to the ground beneath, the column base can be enlarged in some suitable way — by a concrete slab, a concrete-encased grillage of steel beams or even heavy timbers. The result is a *spread footing*. If it is necessary to have many spread footings beneath a structure, it may be economical to join all of them together into one large concrete slab on which the columns bear. This is then a *raft foundation* (or continuous footing). The name is a good one, since it implies that the structure is "floating" on the ground beneath. The actual principle of flotation is sometimes used when the foundation structure is located well below the ground surface. The whole basement of a building then acts as a *box foundation* or, if specially designed, as will be explained below, a *floating foundation*.

The types so far described are all used very close to, or at the surface of, the ground. If the building loads have to be transferred to strata well below the surface, it must be done through sub-surface columns. If these consist of cylindrical holes filled with concrete, they will be called caissons, which are generally used for very heavy loads. More usually the columns can be more slender units and may be driven into the ground or formed of concrete in smaller diameter holes that are specially formed. These are *piles* and may be of concrete, steel or wood.

Whatever type of foundation structure is used, its object is to transfer the load from the building to the ground safely. The *bearing capacity* of the soil or rock clearly must not be exceeded. Very few cases are on record where this has happened and an actual failure has taken place, the tilting of the Transcona Elevator near Winnipeg being one of the few major examples and one that is world famous. Much more frequent is the development of *excessive settlement* when the full load is applied. With modern soil mechanics techniques and adequate subsurface investigation, there is today no reason why building settlements cannot be predicted with accuracy and the foundation design so proportioned that the inevitable settlement will be within allowable limits.

Such design is the work of an expert in foundations. Every designer, however, whether architect or engineer, must have a broad appreciation of the principles of foundation design so that he may select, from the various types available, that best suited to his structure. The design of foundations is not something that, as one designer was heard to say, "can be left to the piling company." The following notes suggest the main determinants that govern the solution of the type of foun-

dation to be used.

Variations in Site Conditions

Subsurface conditions at any building site can be grouped into three main types:

1) solid rock – may exist either at ground surface or so close to it that buildings may be founded directly upon it;
2) bedrock – may exist beneath the surface but at such a depth that building loads may, if necessary, be transferred indirectly to it; and
3) bedrock – may be so far beneath the ground surface that it is neither practicable nor economical to transfer building loads to it, the loads having to be carried by the superincumbent soil.

The direct influence of local geology upon the conditions that may be expected in any locality will be obvious. There are few major examples of the first condition met with in normal Canadian building practice, although many of the major buildings in the city of New York are founded directly upon the Manhattan schist that constitutes so much of Manhattan Island. In many Canadian cities, such as Montreal, Toronto, Ottawa and Vancouver, there are some locations where rock is close enough to the surface to be used directly as the foundation bed, but only in some northern locations is this condition a general determinant of foundation design. The second condition is very widely experienced in Canadian cities, Winnipeg being a typical example, and many of its buildings are supported on caissons and piles that transmit the building loads to the underlying bedrock. The third condition – bedrock so deep below the surface that it cannot be used as a bearing medium – is also encountered in Canada, notably in prairie cities such as Saskatoon.

This variety of subsurface conditions is, in itself, an indication of the varied geology to be found in Canada. The fact that almost all of its surface has been glaciated is of unusual significance, since the form of the underlying bedrock may bear no resemblance to the contours of the ground surface above. Canada may not yet, like Oslo in Norway, have such a remarkable example as one in that city where one corner of a building, now famous, rests directly upon solid rock while the opposite corner is supported by steel piles that go down over 160 feet to bear on the same rock surface. There are, however, in many Canadian cities, buildings that have had to be founded on quite uneven rock, the Besserer Street Postal Building in Ottawa being a particularly good example. Even with bedrock close to the surface at one corner of a building site, therefore, no assumptions can be made that this condition will persist over the site. Test borings *must* be put down at intervals such that there can be no doubt as to where rock will be found when excavation commences. The Building Physics part of the Division's own building in Ottawa was originally planned as an extension of the main Building Centre. Test borings showed, however, that in a distance of 75 feet from the rear corner of the existing building, the level of the bedrock dropped over 90 feet. The extension was therefore built as a separate unit at a location where bedrock could readily be used. The fact that such great variations in rock level *can* be encountered must always be kept in mind in all Canadian building foundation design work.

Buildings Founded Directly in Rock

When bedrock is conveniently and economically available at a depth that can be used as direct bearing for the building to be erected, foundation design is greatly simplified. The solidity and continuity of the rock must naturally be thoroughly tested by diamond drilling over the whole site, especially with sedimentary rocks in which seams may be encountered. Only if very heavy concentrated loads have to be transmitted to the rock will loading or strength tests be necessary, as a general rule; but groundwater conditions will be of special importance, not only in connection with construction operations but also in relation to the design of the permanent drainage arrangements.

Buildings Founded Indirectly on Rock

It is impossible to specify the limiting depth to which building loads can be economically transferred to bedrock well below ground surface, since subsurface conditions as well as the size of the building and the nature of its loads will all be determinants. It is believed that the foundations for the Cleveland Union Terminal Tower in Cleveland, Ohio, still constitute the record for depth, caissons transferring the Tower loads to bedrock at a depth of 250 feet. At least one Canadian bridge is founded on piles that go somewhat beyond this depth, but these are extremes. With the advance of modern Soil Mechanics studies, solutions can now usually be found for problems of building foundation design where bedrock is very deep that do not necessitate such unusually long supporting columns. For whether piles or caissons are used, their function is to act as columns in transferring the loads from the foundation of the building to the bedrock beneath.

Piles used in this way are, therefore, *end-bearing piles* as distinct from *friction piles*, to be mentioned in the next section. As columns supported by the surrounding soil, they are subject to compressive stress. Wood, steel, or concrete piles can be used. The loads involved with modern buildings usually dictate the use of steel or concrete, but many older buildings are still supported by timber piles.

If any changes in the level of groundwater occur in the vicinity of such buildings, rotting of the wood may result and cause trouble. Settlement of the Boston Public Library was found to be due to this cause. Steel piles are easy to handle and to drive; their use will be dictated by economic factors if ground conditions are suitable and if it is known that no adverse groundwater conditions are present that might cause deterioration of the exposed steel. Concrete piles may be pre-cast or cast-in-place, the former requiring accurate knowledge of depths if cutting is to be avoided; the latter requiring that ground conditions be quite suitable for their use even if they are of the type utilizing a steel shell that is driven first and then filled with concrete.

If unusually heavy and concentrated loads have to be transferred from building to rock, then the maximum practicable size of pile may not be adequate and larger columns in the form of caissons must be used. Correspondingly, if preliminary investigations have indicated the presence of boulders or any other condition that will make pile driving difficult or impossible, caissons must be considered unless an altogether different type of foundation design is possible. Ingenious machines are now available for excavating the circular holes for caissons. With good soil conditions and lined holes, the shafts can be inspected down to bedrock before concrete is placed in position. The well known "Chicago well" is a widely used type of foundation caisson, many thousands having been used to carry building loads through the blue clay upon which Chicago is founded. Belling out the bottom of the caisson to obtain extra bearing area on bedrock is common practice if soil conditions are suitable.

It will be evident that for all these methods most accurate knowledge of subsurface conditions — and especially of bedrock levels — is essential. With such information, it is possible to estimate costs accurately, so that they can then be compared with the cost of the alternatives now available for founding structures directly upon soil.

Buildings Founded on Soil

Soils are solid materials not dissimilar to rock except that they are not so strong and may consist, as does sand, of small fragments of rock that have to be confined if they are to carry load. A stiff clay can be almost identical with a soft shale — to such an extent that one cannot draw a hard-and-fast dividing line between what is rock and what is soil. Accordingly, soils will be susceptible to stress and strain in exactly the same way as rock or any other solid material. It is, therefore, possible to calculate in advance the stress from superimposed building loads that will be in any soil. If the strength characteristics of the soil are known, it is also possible to calculate in advance of construction how the soil will behave when the loads are applied. The strength characteristics of soils can be determined by laboratory tests carried out on carefully obtained samples. These must be in a condition as close as possible to that of the soil in place. Since most soils contain water, this means that most soil samples must be very carefully protected as soon as they are taken from the ground, usually by the waxing of the containers, so that the water content of the samples when tested will be the same as that of the soil in the ground.

These procedures and associated theoretical considerations of soil action constitute the modern science of Soil Mechanics. The proper application of the results of such scientific studies now enables the foundation engineer to design a foundation for any given combination of loads on even the most unpromising soil, as also upon soils that have not caused problems when utilized in more pragmatic ways. If, for example, loads are relatively light and the bearing strata of soil are correspondingly strong, with no weak buried strata that might cause settlement at the surface when loaded, then spread footings or the common type of foundation raft of reinforced concrete may prove to be practicable foundation designs.

If there is a stratum of strong soil at some appreciable distance below the surface, as revealed by soil sampling and testing, then the use of piles may again be suitable and economical for transferring the loads from the structure to the good bearing material. Such piles may gain a part of their bearing capacity from the friction developed between their exposed sides and the soil with which they are in contact in penetrating the soils that overlie the strong bearing material. Alternatively, soil studies may show that merely by driving piles into the upper layers of soil, without any firm bearing stratum for the points of the piles, enough resistance can be mobilized from the "skin friction" (as it is called) between the sides of the piles and the surrounding soil to provide the necessary support for the calculated building loads. It is usual to conduct loading tests on one or more full-scale driven piles to check on such calculations. Standards methods for such loading tests are available, and means for transforming the results of a single pile test into a reasonable estimate of the bearing capacity of a complete pile group.

Before any decision can be made as to the use of piles, however, the most accurate subsurface information for the whole building site must be available. Not only must the presence of boulders be checked for, but also the possible existence of weak buried strata. This is particularly important if uncased cast-in-place concrete piles are to be used. These are versatile units and are quite widely used when piles have been called for, but their success depends upon the adequacy of the soils

through which they are driven. Subsurface information is also necessary in order to enable alternative foundation types to be investigated.

Some types of clay soils, although they have good strength properties, are so constituted that when loaded they will easily compress as water is "squeezed out" of them. This feature will cause undue settlement of any structure founded upon them. If, however, the water is squeezed out of such clay over the whole site in advance of building, the clay will provide quite adequate bearing capacity with no detrimental settlement of the structure. This can be achieved by *preloading* the whole site with a load that can readily be removed when erection of the building is to proceed — a heavy material such as sand may be handled easily. Preloading has now been quite successfully applied to a wide variety of building sites. The economics of the method naturally limit its application to rather special cases, but it is probable that its use will increase appreciably.

A far older method, but one now coming into prominence, is readily described as the use of a *floating foundation*. The word "floating" is used in its literal sense. When a body floats in water, it displaces a volume of water the weight of which is equal to the weight of the floating body. In just the same way a building can be floated on soil, the weight of the building and its loads being equal to the weight of the "displaced" soil, i.e., the soil that must be excavated to provide for the foundation structure of the building.

Before any soil has been removed, the stress at the level of the bottom of the necessary foundation (due to the weight of the soil that is to be removed) can readily be seen to be exactly the same as the stress that will be present when the building and its loads have been substituted for the excavated soil. Theoretically, no further settlement of the underlying soil will take place. Construction requirements may modify this desirable state slightly, but the basic idea is sound. It has already been applied to many large buildings.

It is not a new idea. The great Sir John Rennie quite clearly used it for the design of a warehouse in the West Indian Docks of London, England, in the early nineteenth century. Like many other ideas of those inspired early pioneer engineers, floating foundations had to wait until the twentieth century was well on its way before they were recognized again as one of the soundest of all types of foundation design when anything other than direct bearing on soil strata at or near the surface of the ground must be used. The Post Office Building in Albany, New York, was one of the pioneer North American buildings to be so founded. There are now some Canadian buildings floating on the soil beneath them, notably a fine multi-storey building in Ottawa founded on Leda clay. It seems certain, with steady advance in the art of foundation engineering, and especially since Canada has so many locations where the soils are actually weakened by the operation of pile driving, that floating foundations will be used to an increasing degree in this country when the combination of soil conditions and building loads warrants this type of design.

Expert engineering assistance is naturally necessary for the design of all major building foundations, as it is also for the conduct of all preliminary subsurface investigations. At the same time, building designers, architects and engineers should have a broad appreciation of the main types of foundation structure that can be used, and of the correlation of such designs with the over-all pattern of local subsurface conditions. A finished foundation design should be an integral part of the design of all buildings; it is not something that can, or should, be left to be worked out after construction has started.

Foundations for Small Buildings

The foundations for small buildings were excluded from the preceding discussion because they are rarely "designed" in the engineering sense, usually being based on common local practice. Simple calculations will show that the loads to be carried by the foundation bed beneath a single-family dwelling, for example, are small indeed. Factors other than loads and consequent bearing stresses accordingly influence such foundations. Amongst the most important of these, especially in some parts of western Canada, is the existence at ground surface of clay soils having well developed properties of swelling and shrinking with changes in water content. In such areas special measures are called for to avoid serious troubles with movements of the superstructure. More attention is now being given, therefore, to the foundations of smaller buildings. Long accepted practices, such as the inevitability of house basements, are being questioned. A future Digest will be devoted to this subject, with special reference to the potential for economy in building provided by the use of concrete slabs-on-ground for house foundations.

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would of course conform with all relevant code requirements.

The bearing structure for each unit and every combination of units could be predesigned including foundation structures for various soil conditions.

Mechanical and electrical services could be similarly predesigned as simple functions of orientation and basic climatic data.

Construction costs and, if desired, quantities of various materials could be determined on a similar basis.

It remains to determine criteria for the spatial position of the various units in relation to each other. A simple approach to this problem would be to determine the minimum distances between the window walls of units. More sophisticated programs might for instance specify in addition:

maximum height of structure as it affects the sun exposure of ground floor units

varying minimum distances between window walls of units as a function of unit size

minimum horizontal angle from window walls of units to control privacy between adjacent units

minimum distance from noise sources such as highways, expressed as function of anticipated noise levels

The constraints to housing design solutions indicated so far, combined with suitable requirements such as "maximum and equal distances from border of project space for all dwellings" in case a known number of units is to be accommodated, or "accommodate maximum permissible number of units within described constraints", would probably in most cases result in housing arrangements of a sort. They would however be trite in the extreme.

Housing must be more than a functional arrangement of containers. Buildings define urban space and must be conceived primarily on aesthetic principles if urban life is to be an emotionally satisfying and stimulating experience.

Architecture as art is basically the result of the manipulation of geometric elements in space which through a variety of associations convey sensual and intellectual values. There is no reason why computers cannot be applied as tools to ease such manipulations. As "sketchpad" type computer combinations will become commercially available at reasonable cost, it will be possible not only to feed data in visual form directly into the computer, but to obtain an almost instantaneous visual feedback of the consequences of such direct visual input in combination with all other data fed into or stored in the machine. Visual feedback will permit the exercise of design control, as feedback of selected other data will permit the exercise of political control.

The computer hardware needed for an initial housing design program would thus consist of display and plotting equipment, probably in the form of a cathode ray tube, in addition to more conventional data processing and printing equipment. The operation is anticipated to run roughly along the following sequence:

I Stored in the computer would be information, such as the following:

a A set of housing unit designs and their variations fitting together and interconnected in predetermined multiple combinations.

b Optional parking arrangements related to unit designs.

c Data on occupants the housing units are designed for as regards family size, and composition, family income, statistical data as to location preferences (e.g. open view versus containment, relation to out-door playareas, to street views, etc. expressed in percentages of the particular occupants' groups).

d Cost data for each possible variation of each unit and their possible combinations.

II The following information would then have to be fed into the computer to define a specific project:

a Number of desired occupants, their family compositions and incomes, parking requirements, etc.

b Supplementary data: definition of "border conditions" of site as to obstructions to view, noise, sources, sun orientation, climatic information, sub-soil data for foundations, etc.

c Graphic input: site plan and architect's initial basic layout proposal.

III Provided that the above data is not contradictory, the computer would then produce a visual presentation of a design based on the first layout sketch and the other given data and could, for instance, print out complete cost data for the proposed project. The visual presentation might be in form of outline plans, elevations and perspectives which may be compared with the results of any desired number of subsequent layouts yielding alternative designs.

Once the basic program has been developed, its success is dependent in particular on two conditions:

A maximum of ingenuity must be applied to the conception of the "design units".

The graphic input must be in the hands of highly trained architects understanding the program and the operation of computers.

The program can obviously be brought to any degree of sophistication. Heating requirements can be related to heat loss for various orientations and the resulting capital and operating costs evaluated against land and construction costs.

Maximum densities for any particular site can be determined and related to other requirements (such as view, privacy, construction costs, etc.).

Basic scheduling of construction operations and lists of construction material can be made part of the output. Alternatively the program can be oriented toward shortest construction times and the effects of this decision on costs can be quickly evaluated.

It would be a relatively easy task to adapt computers to the compilation of sets of conventional working drawings and specifications. Once housing projects are composed of limited numbers of design units and their limited predetermined combinations, it is obviously possible to store on microfilm, detail drawings of all parts and their combinations and print them in combination with overall layouts and specifications covering all items relevant to conventional bidding and construction procedures.

As architectural expressions and values will change so will methods of construction. It is vain to speculate on the effect of possible radically new materials, but certain trends are clear enough to permit intuitive prediction of specific future developments.

Long term trends certainly favour increasingly larger undertakings in the urban development field, whether predominantly commercial, industrial, or residential. From this trend eventual industrialization of all construction can be deduced. To what extent in the case of housing, this will take the form of prefabrication of panels, of room units, of structural frames or of whole dwelling units cannot be predicted at this stage. It is however obvious that any development in the direction of increased prefabrication will favour the application of computers to the planning and design process, if only because large amounts of capital will have to be invested in the prefabrication process and the resulting plants will want to avail themselves of the most sophisticated production planning methods possible.

Limits of Design Automation

Computers will inevitably find application in the housing design process. The basis for their application may be profit motive or alternatively public service. Considering the drastic effects the computer will indirectly have on our environment, it is imperative

[17] The terms "form" and "design" are used in the sense suggested by Louis Kahn; see *Progressive Architecture*, April '61.

[18] For particular application of art to new perceptual concepts of city see Hans Glauber "Die mechanische Stadt" *Atlantis*, Feb. '65.

[19] Le Corbusier, *Le Modulor*, Paris 1950.
[20] G. D. Birkhoff "Mathematics of Aesthetics" in *The World of Mathematics*, Vol. IV, James R. Newman, editor (New York '56).

that human values rather than consideration of production efficiency or maximum land use are the prime factors in any computerized design program. Any other considerations need not be ignored but relegated to secondary importance.

An immediate result of successful application of computers to the housing design process will be a more rational approach to the problem and less repetition of mistakes made due to lack of communications from project to project. The early computerized design programs are however unlikely to change the design approach radically; housing projects designed with the help of computers will at first not differ greatly in appearance from conventionally designed projects.

Our present housing projects have been forced into stereotype plans and appearance to a large extent because the overwhelming complexity of requirements made over-simplification a necessity. The computer can in time become the tool to free housing design from its present sad state. The architect will no longer be inclined to start out with the all too convenient preconception of building block "packages" containing certain numbers of units. Instead dwellings for a multitude of varying requirements can be carefully designed to fit almost any combination of individual needs. It is unlikely that they will often fit into either conventional box shapes or sophisticated geodesic systems.

Since data influencing the form of housing can be fed into a computer memory directly by experts in such fields as sociology, physiology and various branches of engineering, the architect providing the "perceptual" input loses full control over the "form" housing will take and may have to content himself with exercising "design" control[17] only. This is quite appropriate in a democratic society. The collective form of urban housing should be a reflection of the structure of society, not of the personality of the architect. Conventional and preconceived geometric forms may well be in violent contrast to the free forms appropriate for a community of free individuals.

In housing the function of the architect as "form-giver" of individual buildings will thus be reduced to the minimum. His control over design however may be vastly expanded in other respects and may be exercised at three levels:

control of design approach – the basic programming of the computer

control of form elements – the determination of "design-units", be they whole dwellings or smaller components

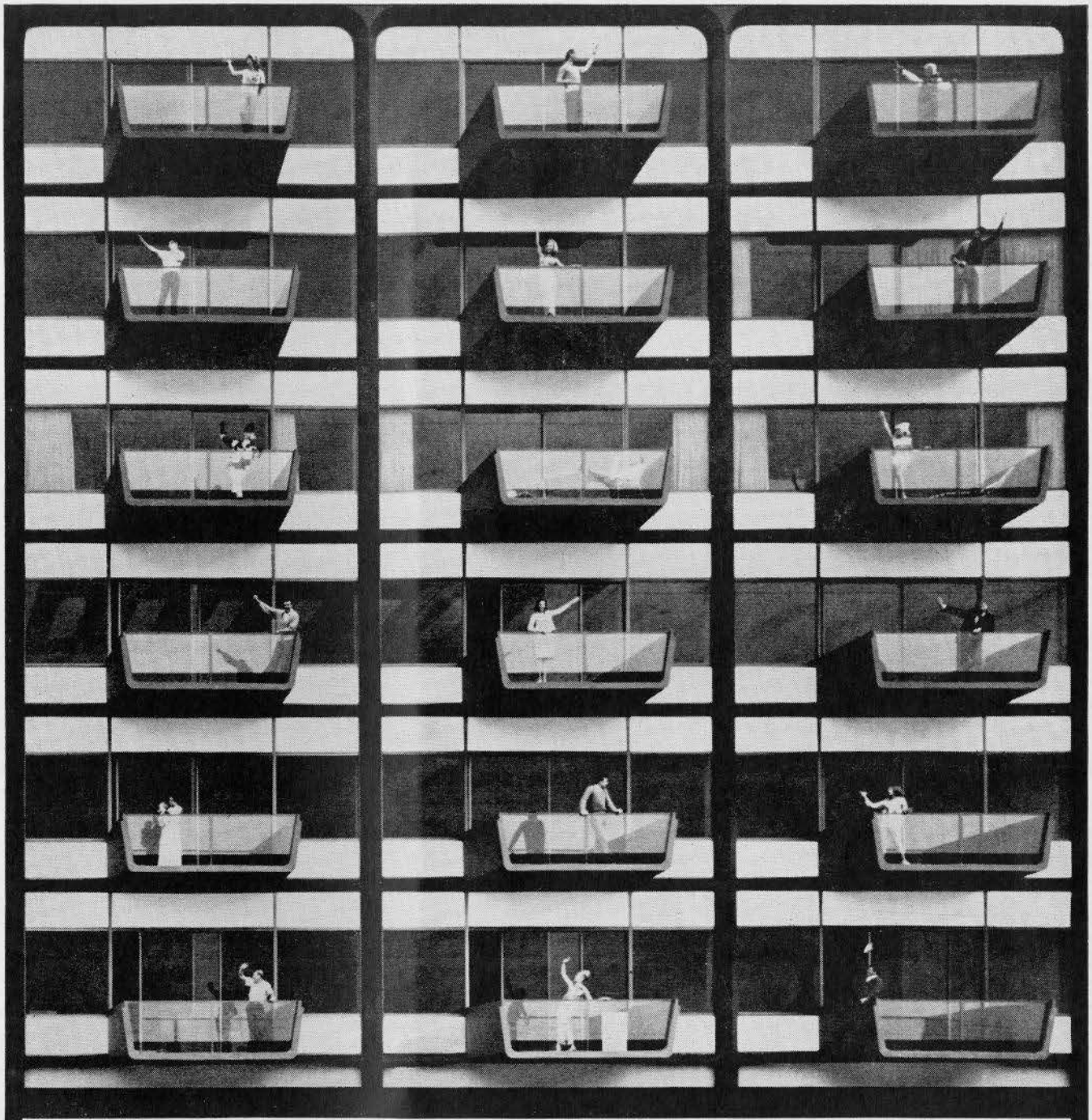
control of urban form – the control of "perceptual" input

Once preconceived building shapes have lost any validity as formal restraints, the new housing forms may appear at first glance unfamiliar and even chaotic. This will be in part due to the impossibility to anticipate every conceivable combination of a steadily growing number of "design units". As the programs will become more complex, the computer will furthermore in many instances be expected to make random decisions where a purely deterministic design approach fails.

The resulting random architecture is basically very similar to most pre-renaissance town scapes wherever the overall concept was under close control of a balanced society (control through limited space within fortifications, limited construction materials and know-how, combined with unanimity on basic purpose of society). A considerable sector of contemporary art shows similar concern with random effects within a compelling overall order. Exemplifying this trend are Tinguely and Calder in sculpture, Riopelle and Pollock in painting.[18]

It is furthermore possible to control such automatic random decisions through the introduction of additional restraints in the design process, for example by applying Le Corbusier's "Modulor" system of proportioning which restricts all dimensioning to an infinite number of measurements mathematically related to the human body.[19] This system of proportions not only yields pleasing proportions in all details but relates every detail of a building complex visually to its whole within the human scale.

Another approach to aesthetic control through the use of mathematical tools developed by Birkhoff around 1920 might complement Le Corbusier's mathematical system of proportioning.[20] While the value of the "Modulor" system of dimensioning has been repeatedly demonstrated, Birkhoff's approach is little more than a promising idea. It does however open the possibility that routine aesthetic decisions can be left to computers like any other routine control function. □



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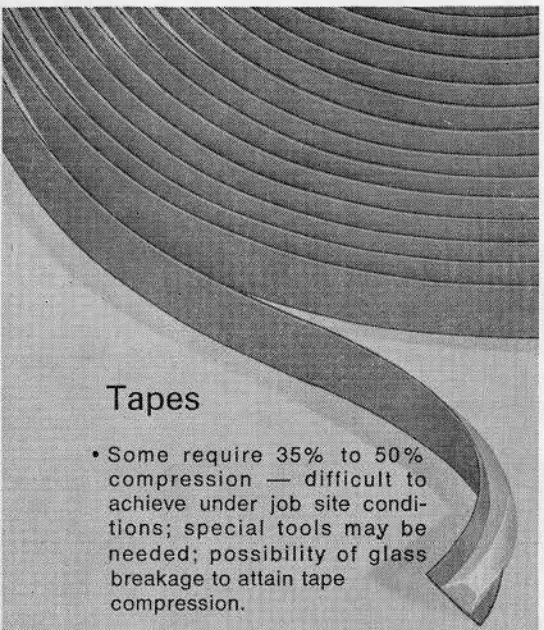

Tapes

- Some require 35% to 50% compression — difficult to achieve under job site conditions; special tools may be needed; possibility of glass breakage to attain tape compression.
- Most call for shims (interior and exterior) — improperly placed shims or missing shims cause leaks.
- Many demand careful placement — butting of tapes is critical. Corners of sash are vulnerable to leaks.
- Most present problems in controlling squeeze-out — which leads to excessive dirt collection.

However, tapes do eliminate costly scaffolding.

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- Require skilled labor, trained in proper glazing procedures.
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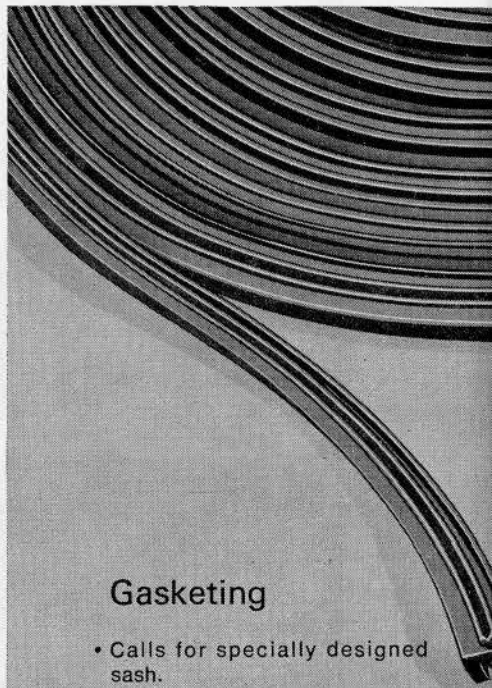

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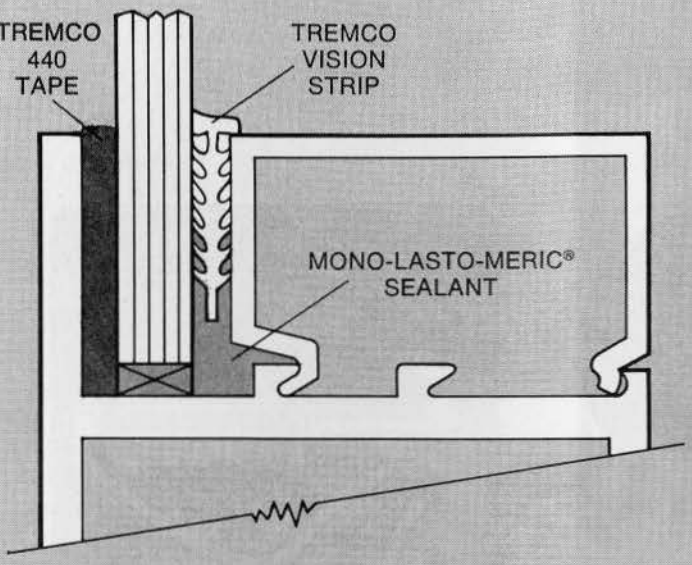

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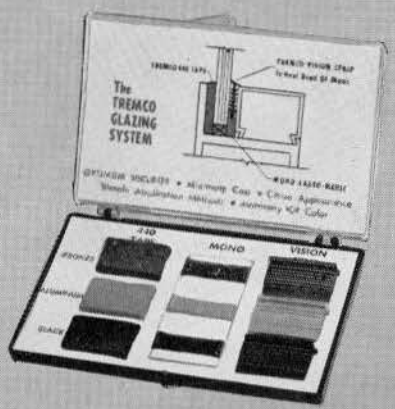

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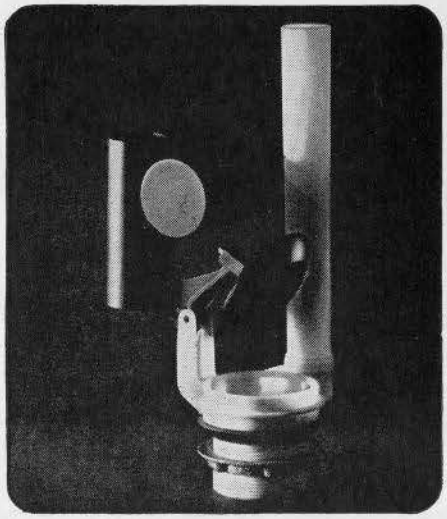

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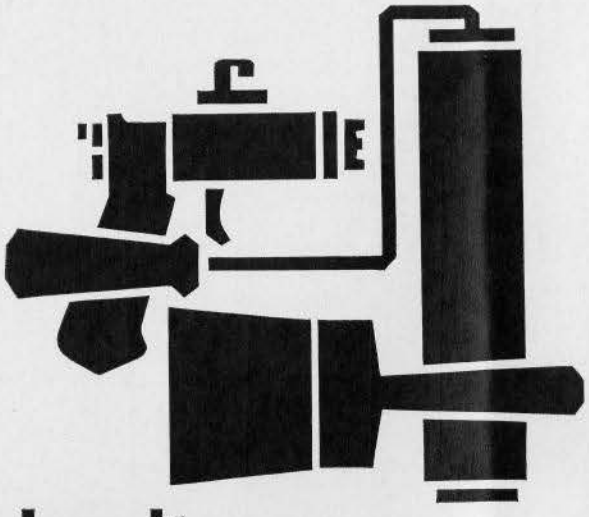

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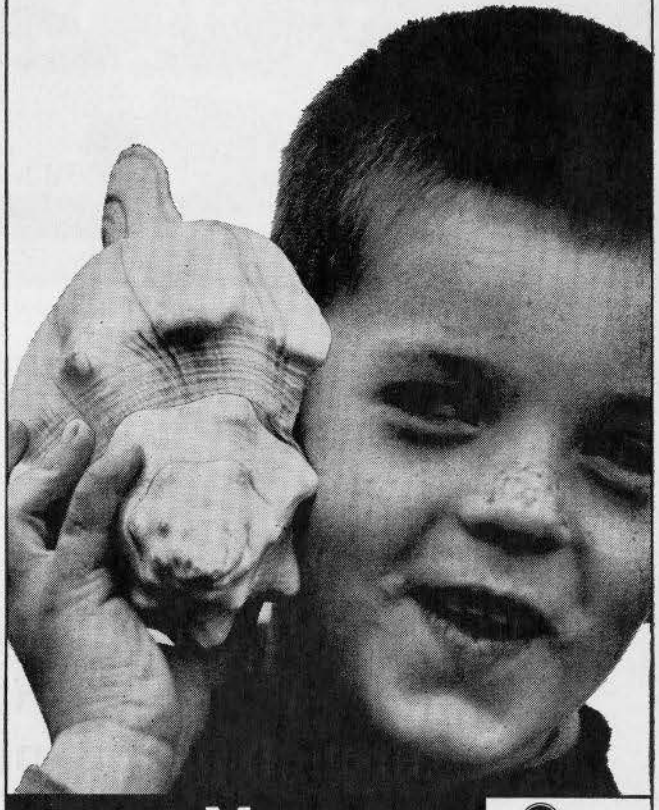

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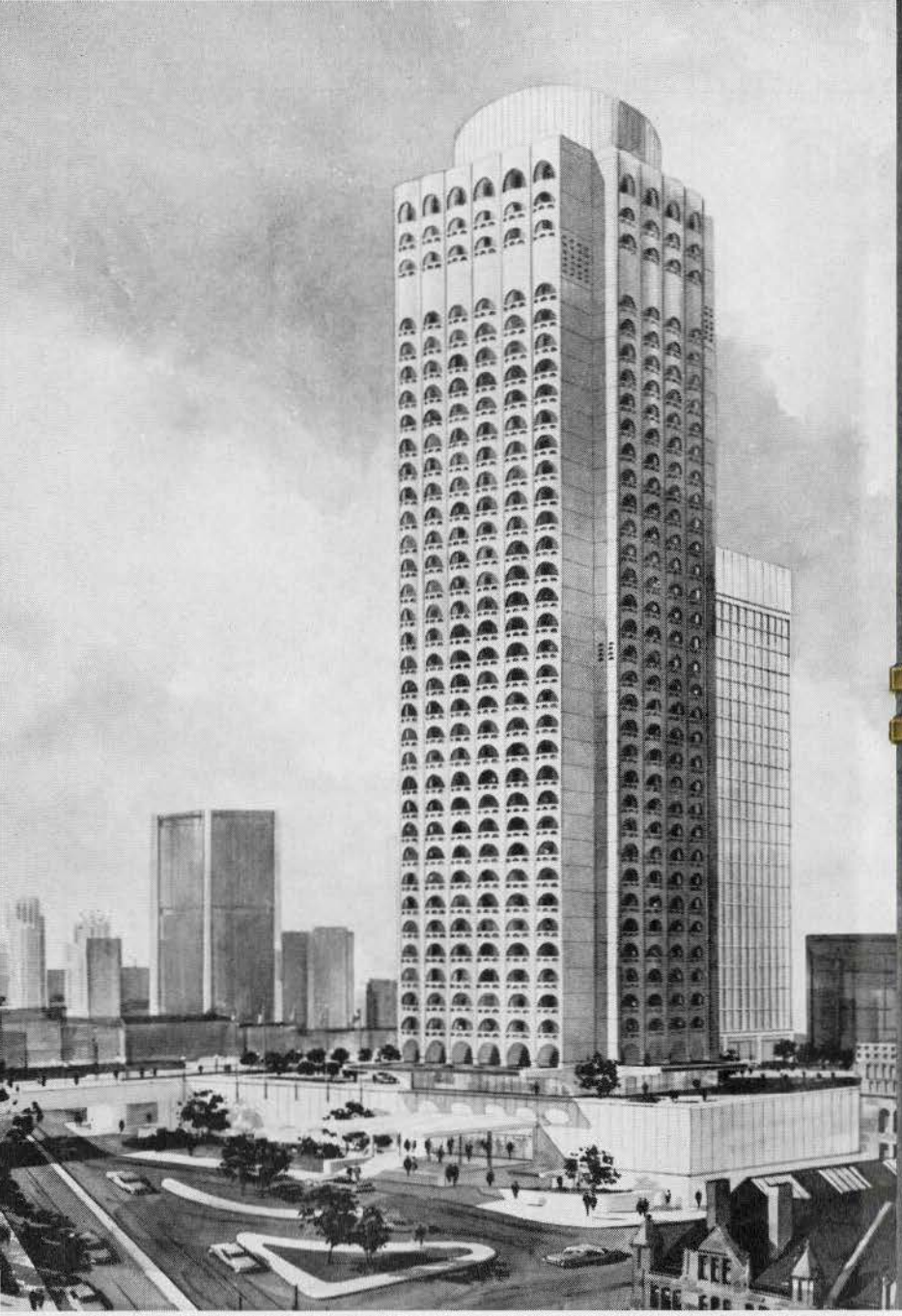

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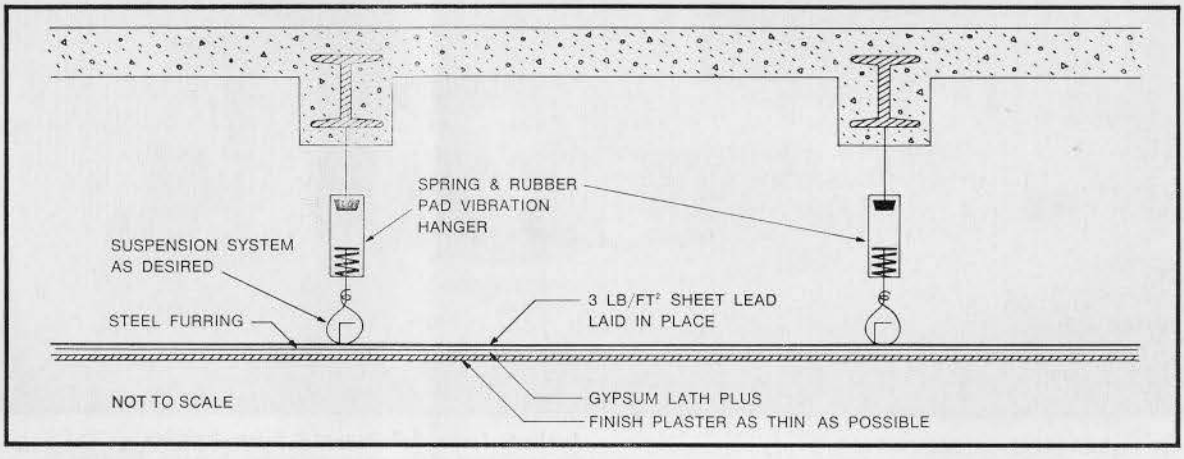

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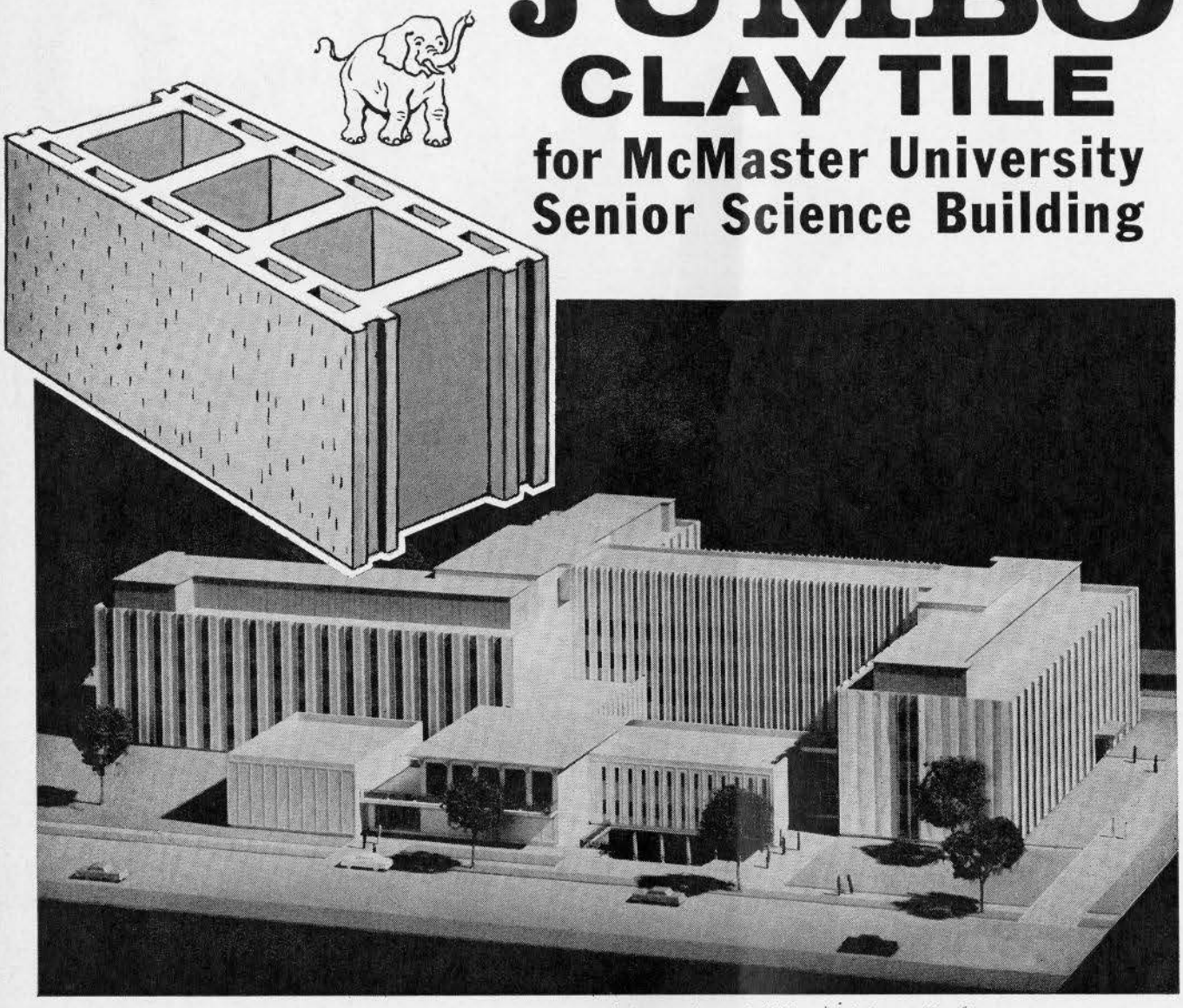

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Technical Technique 6

by A. W. Henschel, BA Sc, P Eng, MEIC

Mr. Henschel is a partner in the firm of Shore & Moffat & Partners, and Past Chairman of the Illuminating Engineering Society. This month's section on estimating is by A. J. Vermeulen, ARICS, PPCIQS of the Quantity Surveyor firm of Helyar, Vermeulen, Rae & Mauchan, and C. Randall-Smith.

By far the most important electrical installation in our buildings today as far as the visual environment is concerned, is the lighting. The architect can neither ignore this physical element which is introduced into the space, nor should he ignore the effect of the illumination.

Since there is such a diversity of factors involved in lighting, no standard or universal technique can be employed in selecting a system for all applications. Design of lighting involves choosing the system best suited to meet the building program; it should produce task illumination that is appropriate in terms of quality as well as quantity, brightness patterns, psychologically and aesthetically satisfying as well as comfortable.

The designer that understands the fundamentals of light can fulfil these objectives by integrating room surfaces, structural elements and light sources rather than by merely applying lighting equipment to produce calculated footcandle levels which may be irrelevant to the particular needs and character of the building.

In order to stimulate the architect's interest in acquiring more helpful knowledge in this field, the following article has been extracted from the just-published Illuminating Engineering Society "Lighting Handbook".

Architectural Criteria in Lighting Design

The architect is primarily concerned with the physical organization of human activities and the problem of providing pleasant, protective shelter to house these activities. Bringing light into the enclosed space is a major criterion in building design.

The contemporary designer has a greater degree of freedom and flexibility than his predecessors, but the increased freedom means that the designer must make decisions and selections with little guiding precedent. If he can now control light within narrow limits, how should he use it? How much does he need? Where does he need it? What color should it be? What combination of components and systems will give the results he needs?

The Criteria of Visual Accuracy

This criterion is often described and discussed as a numerical relationship of footcandles on a work surface. While this is unquestionably a significant consideration, there are other equally important factors to be considered.

1 Illumination level – is the level of illumination on the work surface compatible with the more difficult tasks commonly involved in the normal use of the space?

2 Color Rendering – is the selection of light source compatible with the color characteristics of the task?

3 Veiling Reflections on the Task – has the lighting equipment been placed and designed to minimize surface reflections on the task?

4 Form and Texture – is the lighting compatible with the visual objectives regarding the form of the task?

5 Visual Comfort – has the lighting system been designed to minimize distraction that may interfere with the normal activities, function, and comfort of the occupant?

The Criteria of Visual Pleasantness and Art

Light can influence an observer's unconscious interpretation of a space – for his judgment is based not only on form, but on form as modified by light. There are both aesthetic and psychological implications in this. Through the design and placement of lighting elements, the architect can specify the combination of surfaces to be lighted, or left in darkness. In this sense, the designer can specify how the pattern of brightness is to merge with the structural pattern.

This suggests that light can have the same strengthening or reinforcing effect as background music in achieving a mood.

Attention to light as a spatial influence involves an additional group of design decisions which should be resolved in the final system design: –

1 Lighting of Architectural Surfaces – what is the desired brightness relationship of walls, ceiling, and other vertical and overhead surfaces as part of the architectural composition?

2 Focal Centers and Focus of Attention – does the lighting system function to properly identify centers of interest and attention?

3 Color Atmosphere – is a warm or cool tone of "white" light desirable and is the selection of light source compatible with this objective?

4 Sparkle – to what degree is sparkle and high light appropriate to enhance a sense of vitality in the space?

5 Variation in and between spaces – such factors as changing luminance levels and differing colors of light become factors for analysis when considering the relationshp between adjoining spaces and activities.

Selection of Lighting Techniques

The foregoing has so far covered the design implications of light in a space. But light is a design objective – an end result to be achieved through the careful selection and assembly of lighting components.
An initial engineering estimate is needed, then, to determine the alternative techniques available to achieve the design objectives. The background for this estimate may come from the experience of the designer or from a consultant in this field.

A summary of the criteria for selection of lighting includes: –

1 Distribution Characteristics and Color of Light – is the selection suitable to achieve the desired result?

2 Dimensional characteristics and Form – are the physical characteristics regarding shape and size appropriate?

3 Initial and Operating Costs – is the selection compatible with the general quality level of other materials and systems in the building?

4 Maintenance – is the system accessible for lamp replacement and cleaning? And are the characteristics regarding dirt collection and deterioration compatible with the use of the space?

The Architectural Character of the Lighting System

Modern lighting techniques should be carefully assimilated into the basic architectural concept so that the system assumes an aesthetic significance far beyond the normal connotations of mechanical design. The mechanical elements of lighting design should therefore be analyzed by architectural standards as well as for their engineering function and performance: –

1 Brightness, Color, Scale, and Form – does the equipment assume an appropriate role in the architectural composition?

2 Space Requirements and Architectural Detailing – are the physical space allowances sufficient? Is the detailing and use of materials compatible with the detailing of other elements and systems in the building?

3 Co-ordination with other systems – is the lighting system functionally and physically compatible with other environmental systems in the design?

A study of architectural history reveals two basic alternatives in the approach to lighting design: the visually subordinate system and the visually prominent system.

Visually Subordinate Lighting Systems: – Throughout history some designers have attempted to introduce light in a way that the observer will be conscious of the effect of the light, while the light source itself is played down in the architectural composition. For example, in some Byzantine churches, small unobtrusive windows were placed at the base of a dome to light this large structural element. The brilliant dome then became a major focal center; and serving as a huge reflector, the dome became the apparent primary light source for the interior space.

Visually prominent Lighting systems: – A light source may itself compel attention, even to the extent that such elements become dominant factors in the visual environment. In architectural history, the large stained glass windows of the Gothic period are probably the most obvious examples of this approach. In contemporary building, trans-illuminated ceilings and walls are a similar dominant influence.

Detailing: – Once the general design objectives of distribution and brightness control are determined, the architectural factors of structural installation and material selection become a dominant influence in the design of the lighting system.

"Period" Designs: – Wall urns, chandeliers, and other "traditional" lighting units evolved from units intended for candles, oil lamps, and gas jets – and cannot supply illumination in accordance with modern standards without excessive glare. For this reason, "period" units must often be used primarily as decoration, while the basic illumination is provided by another system.

Co-ordination with Mechanical and Acoustical Systems: – The development of air-conditioning systems and the evolution of acoustical control techniques have combined with electric light to provide an extensive and unprecedented capacity for environmental control.

Co-ordinated Components and Modules: – It has become increasingly critical that electrical and mechanical components be compatible with other elements in the same building system so that the resulting assembly is an efficient and economical operating unit and an architecturally co-ordinated design. In this regard, an increasing number of luminaire types has been developed to supply both light and air to a space. This equipment offers the initial advantage of a simplified ceiling appearance. These units may also offer considerable flexibility in space planning. Within each standard dimensional module, there should be: (*a*) lighting, (*b*) air supply, (*c*) air return, and (*d*) sound absorption. Where this can be achieved, it means that modular floor and partition systems can be used to set off any module or any combination of modules as a separate room. Each room, then, would automatically include all of the basic elements of the mechanical-electrical environment. To achieve this degree of extreme flexibility with conventional equipment would require a luminaire, an air diffuser, and an air return in each module – usually an impractical approach.

Interior-Exterior Relationships: – With increasingly widespread circulation and activity at night, the problem of building aesthetics extends beyond daytime architecture. Particularly where there is an extensive use of glass, the organization and design of the interior lighting system will affect the exterior impression of the building at night and on days that are relatively dull and overcast.

Architectural Lighting Patterns

Architectural Emphasis: – Architectural emphasis may be obtained by the use of patterns: –

For Height – use vertical patterns from floor to ceiling, or from dado to ceiling, vertical troughs with opaque reflecting strips, vertical panels of glass or plastic, luminous columns, or luminous pilasters. Pendant luminaires with long chains help to give the impression of height. Wall brightness should be graded so that they grow less as they approach a dim ceiling.

For Width – accentuate lines of light across the room, either on walls or ceiling.

For Length – use lines that give perspective such as parallel, longitudinal lines.

Ceiling Patterns: – The use of the following luminous elements in the ceiling can provide a variety of ceiling patterns: –

Luminous Panels – large luminous areas resembling skylights. In some cases light sources are mounted in a natural skylight for use on dark days or at night.

Luminous Coffers – recessed panel in ceiling, or dome.

Luminous Troffers – rectangular lighting units recessed in the ceiling. They may be louvered to reduce glare and to shield the eyes from lines of exposed lamps.

Luminous Beams – Light sources in translucent glass or plastic forms to simulate a beam.

Luminous Cornices – luminous panels located at beam or wall intersections with the ceiling. Fluorescent lamps of small diameter fit easily into cornices.

Wall Patterns: – The following luminous elements can produce a variety of wall patterns: –

Artificial Windows – Light from lamps spaced behind windows may be projected above eye level, reflectors may be mounted above the window to produce daylight effect; or lamps may be used to light an opaque reflecting screen behind the window.

Lunettes – "light" openings in vaults. If lunettes are high, light can be projected obliquely downward, toward the opposite wall.

Luminous Columns – Brightness should be low, especially at points below eye level.

Luminous Panels – large luminous elements resembling shielded fenestration.

Mood in Architectural Lighting

Lighting may produce moods such as: gaiety, solemnity, restfulness, activity, warmth, and coolness.

For Gaiety – use higher levels of illumination with color and movement. Changing effects of color and changes in illumination should not be sudden, but should be smooth and stimulating.

For Solemnity – use subdued patterns of light with emphasis at dramatic points. Color should be used sparingly and with atmospheric effect. Changes of illumination should be imperceptible.

For Restfulness – use low brightness patterns, no visible light sources, subdued color, dark upper ceiling, and a low wall

brightness, decreasing upward to the ceiling.

For Activity – use higher levels of illumination, with proper local lighting for the more difficult visual tasks.

For Warmth – use colors at the red end of the spectrum; red, red-orange, orange, yellow, amber, gold, and pink, and such combinations as old gold, old ivory, etc.

For Coolness – use colors at the cool end of the spectrum, such as blue, blue-green, green, magenta, violet and blue. These colors mixed with white produce various cool tints.

Striking effects can be obtained if color spots are superimposed on an "atmosphere" of colored light. Red, blue, and purple light, if intense, seem to cause fatigue.

The color of an object may be dramatized if it is spotlighted by a beam of light of the same color.

Blue, blue-green, purple, and green detract from the human complexion, and produce ghastly effects. Light tints of red, such as pink and rose, improve the human complexion and produce pleasant effects. □

Electrical Service

This element may be considered under the following main headings: –
1 Service, 2 Power, 3 Lighting, 4 Standby equipment, 5 Miscellaneous services, 6 Indirect and site expenses

The total cost of the electrical service has been divided into subsections for the following reasons:

1 Service
The building service, with its related feeder, primary switchgear, transformers and distribution switchgear serve the entire building and are "matched" to provide optimum protection for items 2, 3 and 5. Due to a large number of factors, i.e. building proximity to hydro supply, type of load, engineers design, etc. the cost can vary greatly.

2 Power
Under this heading we have the means to transfer power to the various loads throughout the building. Sub headings therefore include: – Bus duct, Motor Control Centres, Power distribution (to panels, switches and splitter troughs), Building Services (to pumps, elevators, motors, etc.) and connections to Heating, Ventilating and Air Conditioning equipment.

3 Lighting
Lighting should be kept separate to allow the owner to see the extent of his lighting costs. As lighting is such a large percentage of the total electrical cost, this is the first target to be considered when reducing costs. Generally we consider the sub-headings to be: lighting transformers (when applicable), lighting panels, fixtures and convenience outlets, all of which include related conduit and wire.

4 Standby Equipment
This is not required for all buildings but includes batteries, battery racks, and motor-generator equipment.

5 Miscellaneous
Here we group a variety of services which may or may not occur in all buildings, therefore the cost of this item is highly variable depending upon the extent and necessity for the following services: underfloor duct, telephone equipment, outdoor lighting, emergency services, signal equipment, TV and radio.

6 Indirect and Site Expenses
These costs are incurred by the electrical contractor to perform the work, but at the completion of the work nothing tangible remains in the building. Briefly the costs include supervision, equipment, tools, temporary storage or accommodation, head office overhead costs to purchase materials, prepare the payroll etc. and the contractor's profit.

The foregoing article has dealt with lighting, and as the divisions 1, 2, 4, 5 and 6 above would each require considerable attention to detail before any meaningful costs could be quoted, we shall endeavour only to give some broad ranges of costs for division 3 – Lighting.

As we have said in previous articles, the measurement can either be confined to a very broad enumeration of the subject. This is easy but makes pricing difficult, or one can go into much greater detail measuring all the components which make up the final installation, making the measurement that much more difficult but the pricing considerably simpler. For this purpose we are going to consider costs on a per square foot basis for various categories of buildings and include the installed cost of the fixtures, conduit and wire and lighting panels.

The types of buildings are:
1 Office buildings $.90–1.85 per SF
2 Schools $1.10–1.50 per SF
3 Industrial plants $.70–1.75 per SF
4 Warehouses $.20–.50 per SF
5 Bulk storage $.09–.40 per SF
6 Hospitals $1.50–2.50 per SF

The lighting fixtures generally constitute the principal cost of a lighting installation. Where fixtures are recessed the principal cost differences occur in lenses, a standard styrene lens can cost $5.00 less than a standard acrylic lens. With exposed fixtures there is more room for architectural considerations, and a wider price range results. Where aesthetics are a primary consideration there is almost no limit to the cost of prestige and custom built fixtures which are understandably far more expensive than standard catalogue fixtures, and, in the case of special chandeliers etc. could range as high as $10,000 per fixture. It is in these prestige areas that the lighting engineer and architect are permitted to work freely with the technical knowledge referred to in the article.

Although we have attempted to quote some cost ranges for the different kinds of buildings referred to above, we must bear in mind that special considerations can greatly vary these costs, and consider just a few such special considerations here.
1 The intensity of the lighting level has become of increasing importance as management has become more aware of efficiency and productivity. With the introduction of fluorescent fixtures with their high output, long life and low power consumption, these lighting levels have reached a standard in office buildings of 100 FC at the working surface and there have been recent examples where 400 FC have been installed.
2 The cost of lighting two similar buildings could vary widely if one utilises the heat from fixtures to heat the building, necessitating the use of air handling fixtures.
3 Explosion proof areas raise the cost of an installation due to the need for explosion proof fixtures, rigid conduit, seals, etc.
4 Rigid steel conduit is expensive to buy and install. The use of B X cable in office buildings is an important factor in keeping the cost of a lighting installation down. □

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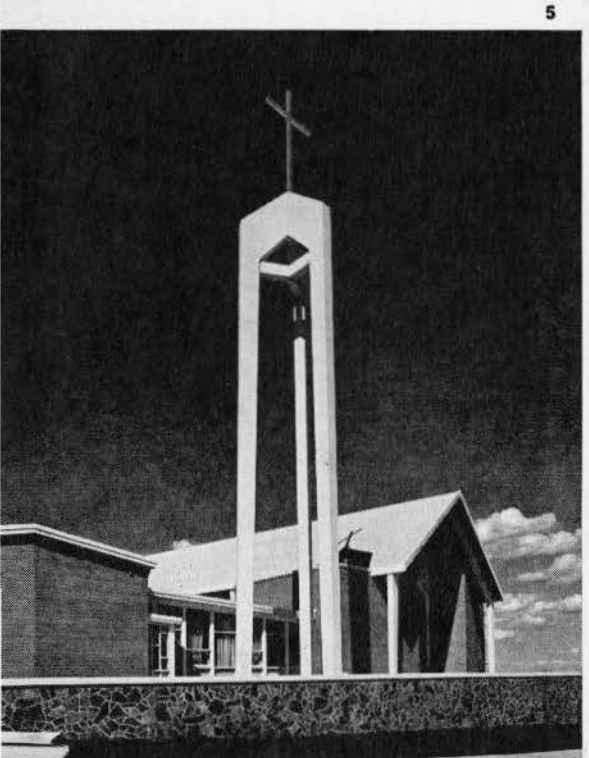

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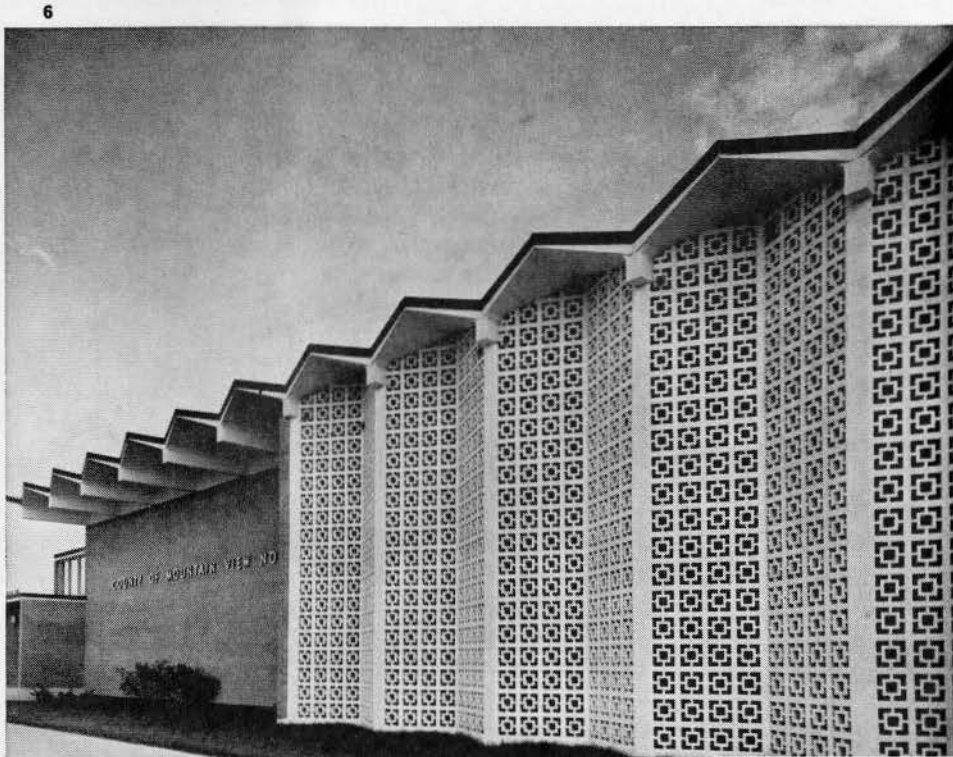

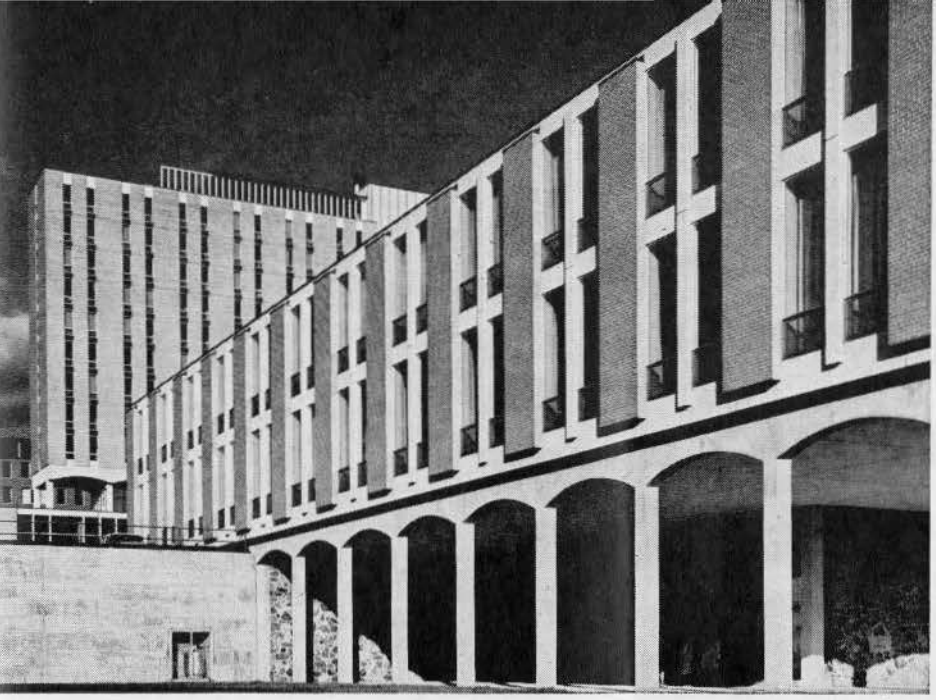

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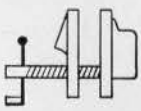

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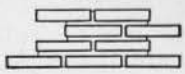

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4. Le Cherrier Apartment Building, Cherrier & Lafontaine Park, Montreal, Que. Architects: Shenkman & Hersen. General Contractor: Danmar Construction Co., Ltd. Masonry sub-contractor: A. Croteau & Fils Inc.

5. Riverview United Church, Calgary, Alberta. Architects: H. W. R. McMillan, Long & Associates. General & Masonry Contractor: Bird Construction Co. Ltd.

6. The County of Mountain View Administration Building, Didsbury, Alberta. Architects: J. K. English & Associates. General & Masonry Contractor: Borger Construction Ltd.

7. Castle Frank Station of the Bloor Danforth Subway, Toronto, Ont. Designed by owners: Toronto Transit Commission. General & Masonry Contractor: Anglin Norcross (Ontario) Ltd.

8. Forest Heights Collegiate Institute, Kitchener, Ont. Architects: Barnett and Rieder-Hymmen. General & Masonry Contractor: Ball Brothers Ltd.

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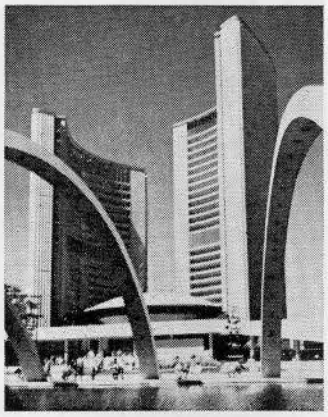

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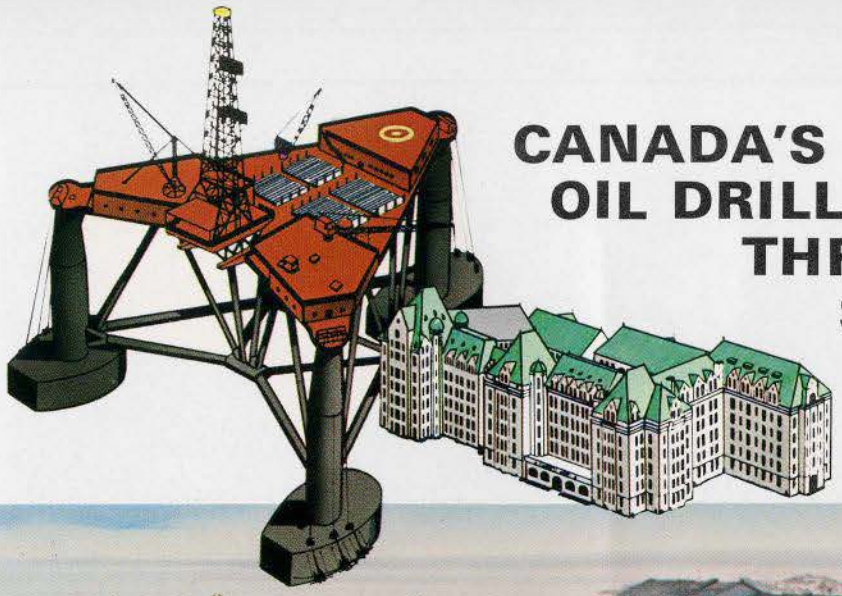

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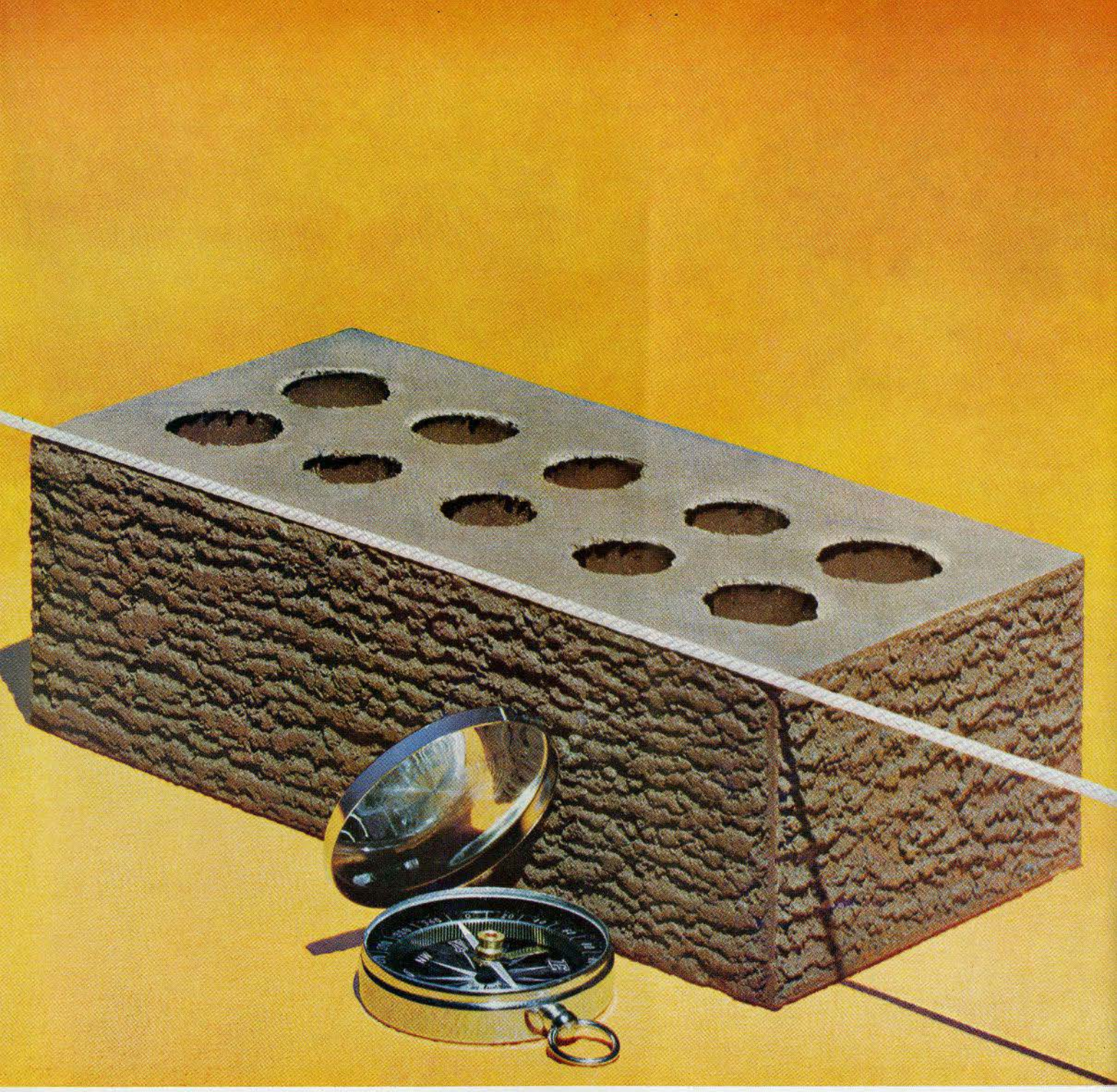

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Principal Scholarships and Prizes to Graduates: Attila Burka, University Gold Medal in Architecture; Alice Cheng, Bachelor of Architecture Thesis Prize; Cory William Cunningham, RAIC Medal; William Helgi Hurst, Alpha Rho Chi Medal; Arthur Muscovitch, Skidmore Owings & Merrill Prize.

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Principal Scholarships and Prizes: Fifth Year: C. Grout and J. B. Wilkinson, Specification Writers' Association Scholarship; H. H. Harrison and K. H. Dubbeldam, Jules F. Wegman Fellowship; S. G. McLaughlin, George T. Goulstone Fellowship; J. B. Wilkinson, Toronto Architectural Guild Medal (Silver); S. G. McLaughlin, RAIC Medal. Fourth Year: J. H. Jorden, First Prize, Ontario Association of Architects Exhibitors' Prize; J. B. Davidson, Second Prize, Ontario Association of Architects Exhibitors' Prize; T. E. Martin, Eric Ross Arthur Scholarship; A. G. Vinters, CMHC Travelling Scholarship; B. Randall, OAA Toronto Chapter Book Prize.

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Principal Scholarships and Prizes: Sixth Year: Ralph Bergman, Lieutenant Governor's Silver Medal; Richard Rabnett, Lieutenant Governor's Gold Medal, McLennan Travelling Scholarship; Witold Rybczynski, RAIC Medal, Turnbull Elevator Prize; Andrejs Skaburskis, Dunlop Travelling Scholarship. Fifth Year: John Billick, Turnbull Elevator Prize; Clifton Chin, Formica Travelling Scholarship; Alex Lam, Canadian Pittsburgh Industries Scholarship; Margaret Stovel, Central Mortgage and Housing Corporation Travelling Scholarship.

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Principaux Prix et Bourses: André Brassard, Médaille de l'IRAC; Louis Picard, Médaille du Lieutenant Gouverneur de la Province de Québec.

Nova Scotia Technical College

Graduates: Ernesto Armenteros, Louis Beaubien, H. Drew Sperry, Maurice Terceira.

Principal Scholarships and Prizes: Fifth Year: William Lydon, Central Mortgage and Housing Corporation Travelling Scholarship; Fourth Year: David Wooldridge, Maritime Lumber Bureau.

1966 Courses and Curricula

On the following foldout page is a recording of the courses and curricula of the seven Schools of Architecture in Canada.

Architecture Canada has attempted to co-ordinate these as closely as possible in order that standard comparisons may be made. Some simplifications have, of necessity, been instituted.

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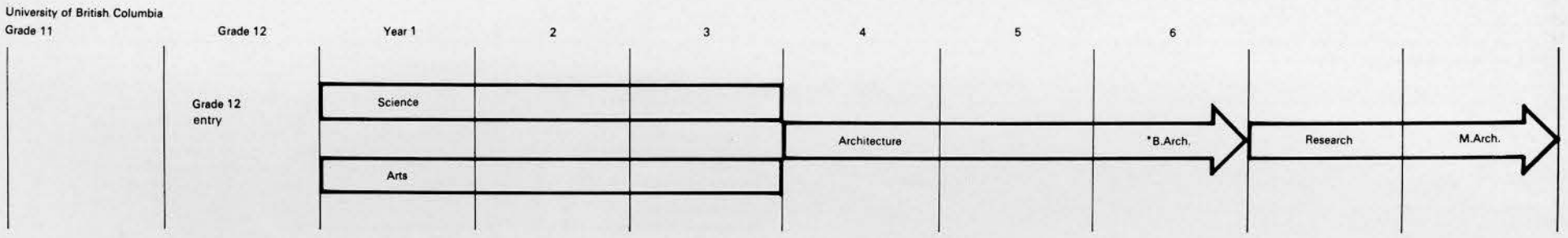
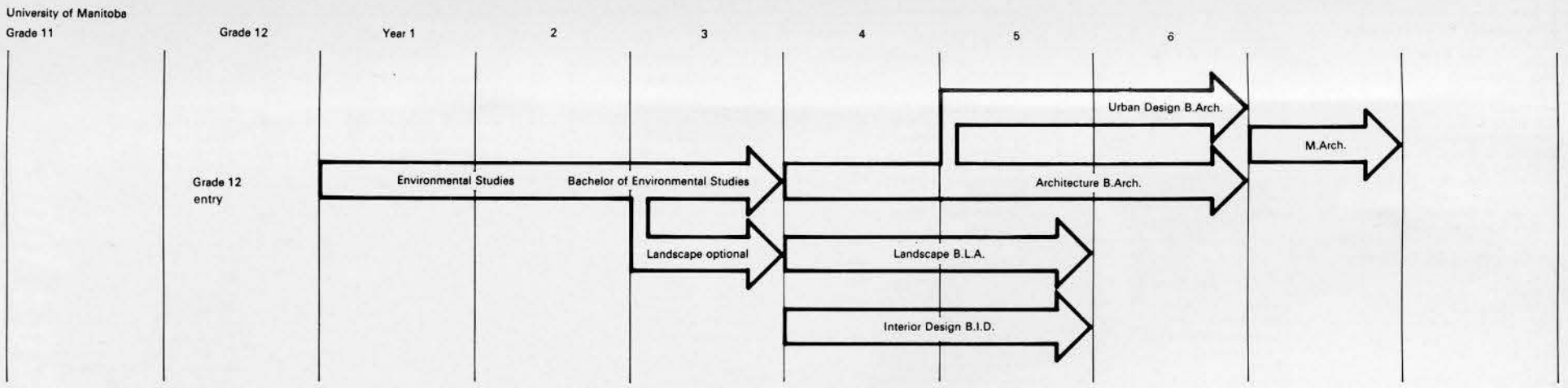
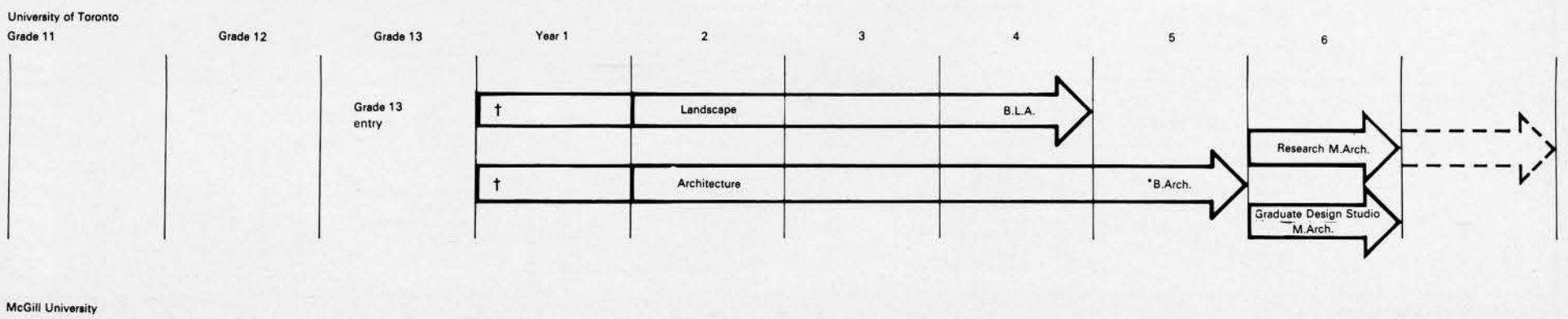
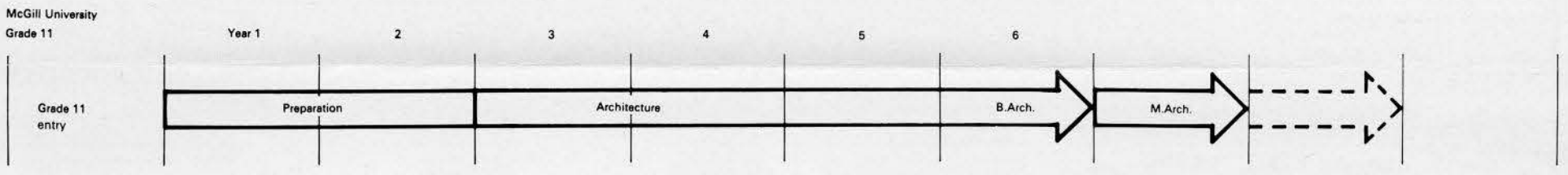
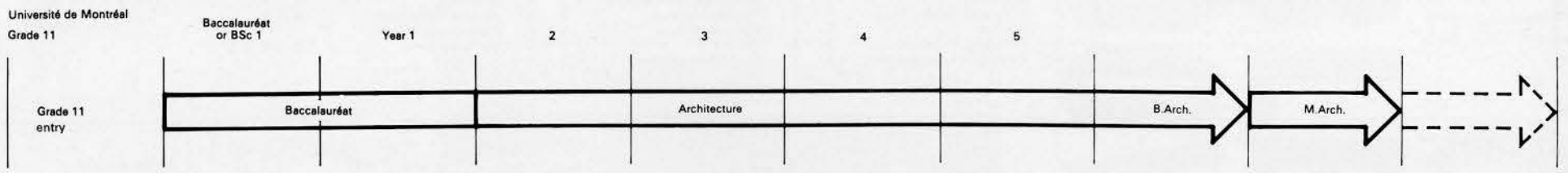
Courses in Architecture in Canadian Schools

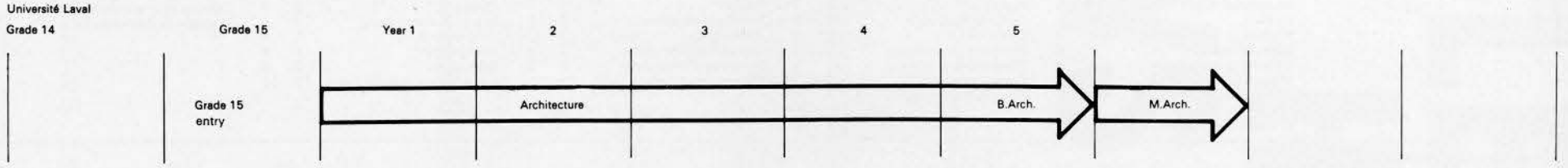


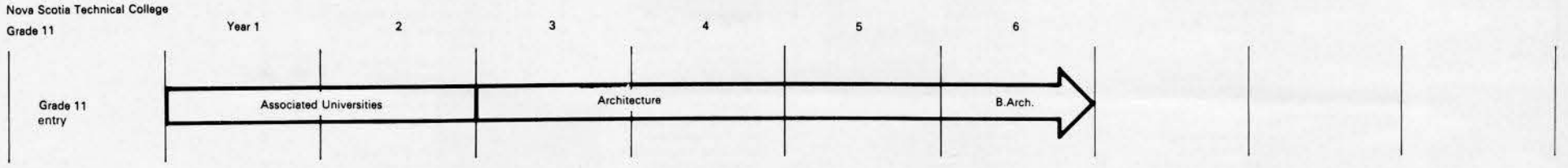












Note — grades 11 and 12 are not of standard value throughout Canada

* Thesis subjects may be in architectural science, history etc. instead of a design thesis
† some common subjects

Curricula

†University of British Columbia

1st Year	Hours	Credit
Architectural Design I	16	
Elements of Architecture	3	
Architectural History	3	
Architectural Workshop I (2 weeks)		
Building Principles and Practice	9	
Strength of Materials	5	
Structures of Buildings I	2	
Material Testing	2	

2nd Year	Hours	Credit
Architectural Design II	19	
Experiments in Space	1½	
History in Urban Form	1½	
History of Urban Planning	1½	
Architectural Workshop II (2 weeks)		
Building Principles and Practice Seminar	1½	
Structures of Buildings II	5	
Building Services (Mechanical)	1½	
Building Services (Electrical)	1½	

3rd Year	Hours	Credit
Architectural Design III	28	
Theory of Architecture	2	
Architectural Workshop III (2 weeks)		
Professional Practice	2	
Building Economics	1	
Structures of Buildings III	3	

University of Manitoba

1st Year	Hours	Credit
Cultural History	4	10
English	3	8
Anthropology	3	8
Introduction to Environmental Studies	3	8
Drafting	6	8
Engineering Computations	3	9
Mechanics	5/2	9
Strength of Materials	5/2	9
Survey School (Optional)		

2nd Year	Hours	Credit
Cultural History	4	10
Psychology	3	9
Urban Sociology	3	9
Theory of Environment	3	10
Basic Design	9	9
Freehand Drawing	3	8
Structural Systems	6/2	9
Structures I	6/2	9
Summer Work, Sketching Camp		

3rd Year	Hours	Credit
Cultural History	4	10
Philosophy	3	9
Theory of Environment	2	10
Environmental Design		10
Building Materials and Methods	6	9
Structures II	6/2	9
Foundations and Soil Mechanics	6/2	8
Summer Work, Measured Drawing		

4th Year	Hours	Credit
Cultural Seminar I	2	10
Philosophy	3	9
Man and Environment	2	10
Theory of Planning	3/2	9
Theory of Landscape	3/2	9
Architectural Design I		10
Advanced Materials and Methods	4	9
Environmental Controls	4	9
Summer Work, Field Trip		

5th Year	Hours	Credit
Cultural Seminar II	2	10
Nature of Man	3	10
Elective	3	8–10
Architectural Mutations	2	9
Architectural Design II		10
Technical Elective	3	8–10
Building Finance	3	8
Summer Work, Field Trip		

6th Year	Hours	Credit
Elective	3	8–10
Elective	3	8–10
Design Seminar	2	10
Architectural Design III		10
Thesis		10
Structural Seminar	2/2	8
Professional Practice	4/2	9
Summer Work, Thesis Report		

†University of Toronto

1st Year	Hours	Credit
Design	17½	
Mathematics	5	
Materials and Methods of Construction	3½	
Statics	2½	
Surveying	1	
Theory of Architecture	1	
Descriptive Geometry and Graphics	1	
English	2	
History of Architecture	1½	

2nd Year	Hours	Credit
Design	19	
Freehand Drawing	2	
Colour	1	
Materials and Methods of Construction	4	
Mechanics of Materials	3½	
Landscape	1	
Building Services	1	
English	2	
History of Architecture	2	

3rd Year	Hours	Credit
Design	17	
Freehand Drawing	2	
Heating and Air Conditioning	3/4	
Structural Design	6	
Illumination and Acoustics	3	
Functional Requirements of Buildings	1	
Materials and Methods of Construction	2	
Aesthetics	1	
History of Architecture	1½	
Public Speaking	1	

4th Year	Hours	Credit
Design	20	
Heating and Air Conditioning	1	
Structural Design	3½	
Foundations	3½	
Housing	½	
Town Planning	½	
Materials and Methods of Construction	1	
History of Painting and Sculpture	1½	
History of Architecture	1	
Philosophy of Science	1	
Political Science	2	

5th Year	Hours	Credit
Design	21½	
Structural Design	6	
Town Planning	1	
Specifications	1	
Architectural Economics	½	
Professional Practice	1	
Economics	2	
Modern World History	2	

McGill University

3rd Year	Hours	Credit
History	4	4
Technical Paper		3
Drawing	2	1.5
Elements of Design	5	3
Design and Construction	13	10
Structures	3.5	3
Mechanics	1.5	1.5
Surveying		3

4th Year	Hours	Credit
History	4	4
Technical Paper		3
Drawing	2	1
Design Workshop	1.5	1.5
Design and Construction	13	10
Civic Design	1	1.5
Foundations	2.5	2
Structures I	4	4
Electrical Services	2	2

5th Year	Hours	Credit
History	2	4
Technical Paper		3
Sketching		1
Design and Construction	16	10
Planning	2	3
Social Obs.	2	3
Structures II	1.5	1
Concrete	1.5	1
Mechanical Services	3	2
Acoustics	2	2

6th Year	Hours	Credit
History	2	4.5
Technical Paper		3
Sketching		1.5
Design and Construction	23	15
Specifications	1	1.5
Professional Practice	1	1.5
Economics	2	3
Law	1	1.5

*Université de Montréal

1ère Année	Hours	Credit
Atelier et laboratoire d'architecture	14	15
Etudes plastiques	3	3
Mathématiques	3	6
Construction, matériaux et méthodes	2	4
Méchanique et statique graphique	3	5
Géométrie descriptive	3	4
Méthodes de représentation graphique	2	3
Facteurs naturels	1	2
Traitement des sols	½	1
Théorie de l'architecture	1½	3
Histoire	2	4
Eléments d'économique	1	2
Statistiques	1	2
Sociologie urbaine	2	4

2ème Année	Hours	Credit
Atelier et laboratoire d'architecture	20	20
Croquis en plein air (camp de dix jours)		4
Mathématiques (calcul différentiel et integral	2	4
Méthodes de construction	2	4
Résistance des matériaux	2	4
Systèmes méchaniques	½	1
Equipement sanitaire	½	1
Arpentage	1	4
Théorie de l'architecture	1	2
Histoire	2	4
Architecture urbaine	1	2
Eléments de paysagisme	1	2

3ème Année	Hours	Credit
Atelier et laboratoire d'architecture	20	20
Croquis en plein air (camp de dix jours)		4
Méthodes de construction (30 séminaires-conférences)		2
Règlements de construction	1	2
Chimie industrielle	1	2
Résistance des matériaux	2	4
Thermotechnique	2	3
Electrotechnique	3	5
Histoire	3	5
Archtecture urbaine	4	4

4ème Année	Hours	Credit
Atelier et laboratoire d'architecture	20	20
Construction : rédaction des devis	1	2
Structures spéciales	2	3
Ventilation et air climatisé	2	3
Eclairagisme	1	2
Acoustique	2	4
Estimation	1	2
Histoire	3	5
Architecture urbaine	4	4
Principes et théorie de l'urbansime	3	6

5ème Année	Hours	Credit
Atelier et laboratoire d'architecture	25	30
Histoire	2	3
Economie du bâtiment	2	2
Législation	2	2
Pratique professionnelle	2	2
Mathématiques appliquées	½	1

Université Laval

1ère Année	Hours	Credit
Introduction à l'architecture	1	8
Matériaux and Méthodes de construction	3	8
Dessin	6	7
Histoire	2	7
Mathématiques	4	5
Géométrie descriptive	4	5
Mécanique	2	4
Géographie physique	1	3
Sociologie urbaine	1	3
Composition architecturale	9	10

2ème Année	Hours	Credit
Histoire	1	7
Matériaux et méthodes de construction	3	8
Dessin	3	7
Statique graphique	3	5
Calcul diff. int.	2	5
Systèmes mécaniques	1	4
Géographie urbaine	1	3
Economie politique	2	3
Composition architecturale	9	10

3ème Année	Hours	Credit
Histoire	1	7
Matériaux et méthodes de construction	3	8
Dessin	3	7
Systèmes structuraux	1	4
Théories de l'architecture	1	7
Equipement théorique	3	6
Principes d'urbanisme	2	5
Composition architecturale	15	10

4ème Année	Hours	Credit
Histoire	1	7
Matériaux et méthodes de construction	3	8
Dessin	3	7
Systèmes structuraux	3	4
Eclairagisme	1	4
Acoustique	1	4
Séminaires	2	5
Composition architecturale	18	10

5ème Année	Hours	Credit
Pratique professionelle	1	4
Séminaires	2	5
Devis	1	4
Composition architecturale et projet de Baccalauréat	27	10

Nova Scotia Technical College, Halifax

3rd Year	Hours	Credit
Technical Literature	2	5
Contemporary Affairs	2	5
Introduction to Architecture	1	6
Term Paper		6
Man and Environment	2	6
Architecture, Society and Culture	2	6
Programming and Planning	2	6
Architectural Design	19½	10
Design Workshop	7	9
Architectural Drawing	6½	8
Materials of Construction	3	7
Strength of Materials	5	7
Building Construction and Performance	6	7
Structural Analysis	6	7

4th Year	Hours	Credit
Architecture, Society and Culture	4	6
Term Papers		6
Programming and Planning	2	6
Problems of Design	2	6
Architectural Design	20	10
Sketching School (Summer)		6
Technical Report (Summer)		6
Building Construction and Performance	6	8
Structural Design	6	8
Mechanical Services	2	8

5th Year	Hours	Credit
Architecture, Society and Culture	4	6
Term Papers		6
Problems of Design	2	6
Architectural Design	20	10
Design Workshop	4	9
Field Trip (Summer)		6
Technical Report (Summer)		6
Building Construction and Performance	6	8
Soils and Foundations	5	7
Illumination and Electrical Services	2	8
Site Development	5	7
Acoustics	2	8

6th Year	Hours	Credit
Architecture, Society and Culture	3	6
Terminal Project Report		9
Problems of Urban Design	2	9
Architectural Seminar	2	6
Architectural Design	30	10
Terminal Project	36	10
Financing Buildings	5	6
Technical Report (Summer)		6
Field Practices Workshop (2 weeks Summer)		6
Documents		8
Professional Practice	2	

* Ecole Credit System. Courses taken from 65-66 calendar.

† No credits submitted : all subjects equal value, except design, which has X3 value.

In order to make a comparison we asked the schools to place a value of 1–10 in ascending scale for this study on the courses, as no uniform credit system across Canada exists. Manitoba, McGill, Laval and Nova Scotia are listed with this system.

The hours listed are averages per week for the whole academic year.


add soda and lime...

Take sand, add soda, lime and Pilkington ingenuity for curtain wall systems

To make glass you mix sand, soda and lime. That is the over-simplified but basic formula. For the exceptional, however, you must have ingenuity and inventiveness. Pilkington has been manufacturing and developing quality flat glass products for well over a century and a half. It's worth noting that most of the pioneering in glass technology takes place at Pilkington.

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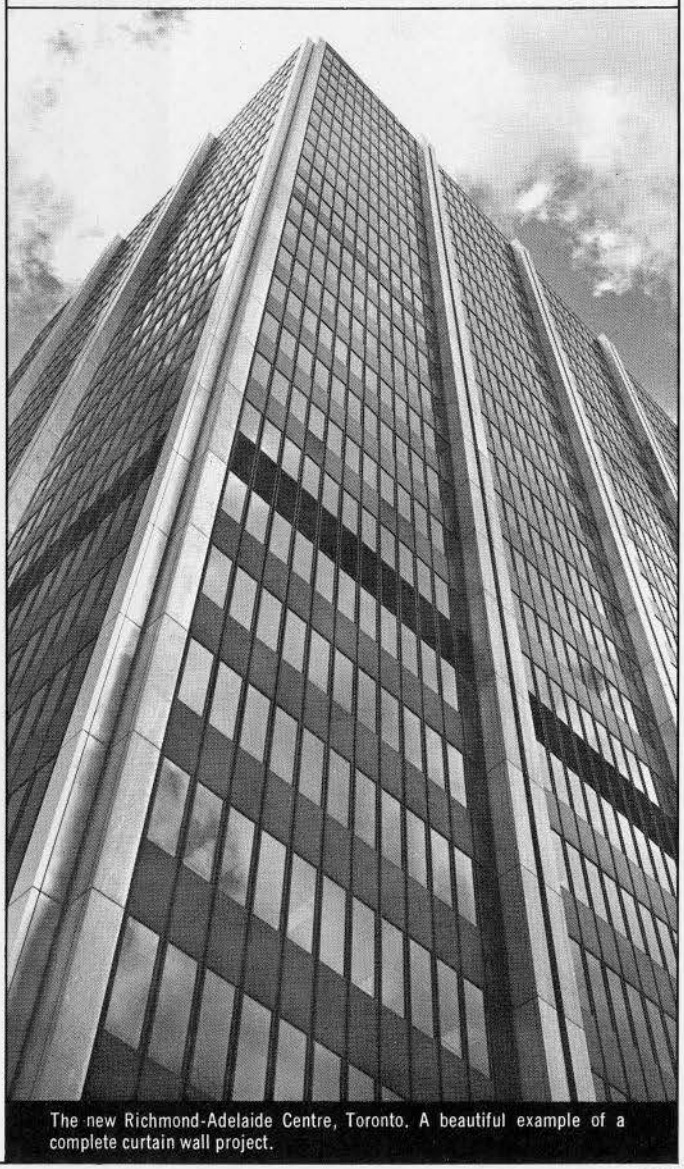
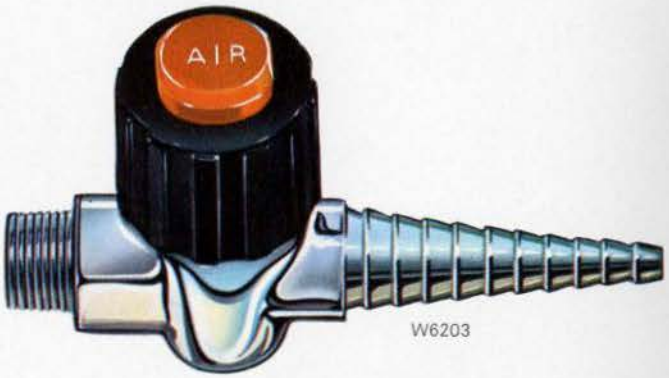


The new Richmond-Adelaide Centre, Toronto. A beautiful example of a complete curtain wall project.

AIA No. 35E

Wallaceburg's newest fittings are for laboratories that require an exact degree of purity



or pressure.

The distilled water faucet you see on the left of this page is the only one of its kind anywhere.

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The new Needle Hose Cock you see here is another new Wallaceburg fitting, and one that gives fine volume control even at high operating pressures. Up to 100 P.S.I.G., you get the precise flow you want through the valve; no more, no less. It can be used with a wide variety of turrets, either deck or wall mounted.

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You don't have to design ceilings for squares

Fiberglas* offers acoustical ceiling board in modular sizes up to 72″ x 48″

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*T.M. Reg'd.

In this application, 72″ x 30″ Fiberglas modular ceiling boards were used to make the ceiling match the window mullions and building columns.

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1. The boards will not bend, warp or buckle with temperature or humidity changes. There's no need to wait for ideal conditions before installation.

2. In acoustical performance, all Fiberglas products are equal to or better than the best non-combustible acoustical products available.

3. Savings in suspension bars offset the slight premium for modular sizes.

FIBERGLAS*
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This is the lock cylinder that baffles picking...

with the key too tough to duplicate

SARGENT MAXIMUM SECURITY SYSTEM

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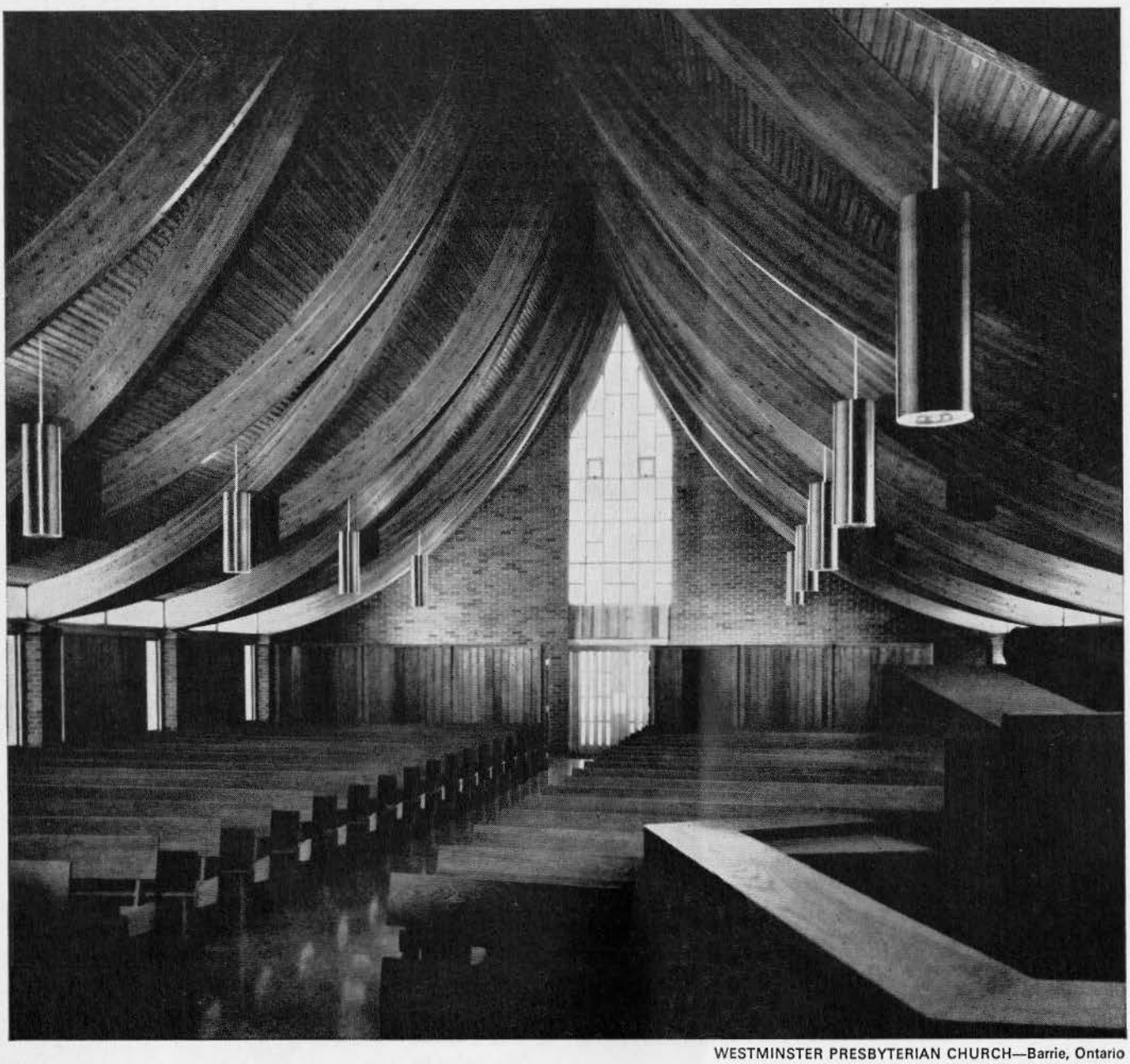

WESTMINSTER PRESBYTERIAN CHURCH—Barrie, Ontario
Architect: Salter and Allison, Barrie, Ontario

electric heating gives you new freedom in design

There are over 240 electrically heated churches in Ontario. One of the most important factors influencing the swing to electric heating is the substantial saving in capital costs. Electric heating dispenses with the need for space consuming, fuel burning equipment. Moreover, actual installation is simpler and more economical. This also shows to advantage when extensions to the building are required. Many architects have applied these savings towards the use of more exciting materials or methods of construction.

The absence of piping, ductwork and chimney also leads to greater freedom in design.

Electric heating offers many other benefits. The flexibility of zoned temperature control avoids the expense of heating the entire church at times of partial use. The system requires little or no maintenance. It is extremely clean, quiet and safe. In fact its safety often results in an appreciable reduction on church insurance rates.

Consider the advantages of electric heating for your next church design . . . or for any building. For more information, ask your Hydro.

ontario hydro

Letters
Lettres

8

Correspondence from S. C. Rodgers, Chief Planner, Edmonton; A. M. Campbell, Director, Community Planning Branch, Sask. Dept. of Municipal Affairs; A. J. M. Collins, ARICS, AI Arb; D. W. Graham, Editor, Canadian Landscape Architect; Denis A. Person, MRAIC, Edmonton; L. D. Kyles, MRAIC, Hamilton.

The Editors,

Our thanks for your excellent summary of Edmonton's Urban Renewal Program in the June issue of the *Journal*. . . .

S. C. Rodgers

The Editors:

Please supply me with four copies of your June, 1966 edition of the RAIC Journal, Volume 43, No. 6. Because of the excellent coverage of urban renewal in this issue I wish to supply copies of the magazine to those officials in the Provincial Government who are concerned with urban renewal.

A. M. Campbell

The Editors:

I have wanted for some time, to take the opportunity to write you a short note regarding the advertisement you placed for me free of charge in the *Journal* last April (for a Specification Writer).

The outcome of this advertisement has been that I have obtained a position with a well known architectural firm in Montreal, which commenced at the beginning of this month.

My reason for writing is therefore to convey my thanks to the editorial staff or powers that be, who have decided to include in the Personal Notices, items of those seeking employment in the architectural fie!d. It is obviously a very useful service, and one which enables a ready contact with the architectural profession throughout Canada, not easily made in the total absence of any national newspaper.

Once again therefore, my thanks, and I sincerely hope that this excellent service will be made available for years to come, for others like myself, seeking positions in the Profession.

A. J. M. Collins, ARICS, AI Arb

The Editors:

In the past we have noticed cases where landscape architects have associated with architects on the projects presented, but have received no credit or mention. The recent July issue omitted mention of several landscape architectural firms associated on the projects other than Isle Ronde.

Is there any RAIC editorial policy regarding such things at this time? We would be pleased to review this with you. Perhaps it has been overlooked.

I would like to take this opportunity of complimenting you on the high quality of graphics and content in the new copies of *Architecture Canada*, and wish you continued success.

D. W. Graham

We publish all the credits that we receive, space allowing. The omission of credits for landscape architects in the July issue was by no means deliberate policy. Ed.

The Editors:

Architecture Canada – what an improvement over the old, dull, obsolescent title of the RAIC Journal. For a profession that is supposed to be known for its imagination, it is amazing that it should take 43 years to drop such an unimaginative and academic name as *Journal* for its official publication. The new title presents a more distinguished and sophisticated image of the profession in Canada.

The graphic style of cover design might well set a precedent for future issues; it is a fine place to easily present in color more works of the allied arts, thereby supplementing the informative allied arts section of the periodical.

Expo '67 was a fitting subject to feature in the first issue of the new image, and it was interesting to have included photographs of so many of the models. However, it would have been very useful to have a site plan included so one could have some indication of the relationships of the various structures on the site. Since architecture is more than a single building on a single site, and especially as in our contemporary inter-dependent mode of urban life, the architect must be increasingly more concerned with the total environment of man, the presentation of the Expo '67 structures in *Architecture Canada* was significant by its omission of this important aspect, in spite of the title "Architecture and its Setting".

The conscious attempts to reorganize and to revitalize the official publication of the RAIC indicates that future issues of *Architecture Canada* may reflect and contribute toward an essential improvement in the architecture of Canada.

Dennis A. Person

The Editors:

This letter is sent to you, as I hope are many more, to object strenuously to the change of name for the Journal. I think the new name is ridiculous.

I do not see the necessity of our profession making an endeavour to change its heritage just because our Federal Government is hell-bent on trying to destroy the Country.

Before this move becomes permanent, I feel that a vote of all the members of the RAIC should be a must.

I also feel that a two-thirds majority of all the members should be necessary to effect such a major change in our history.

L. D. Kyles

Due to a printing error in the new Montreal telephone directory, the Firm's name is incorrectly listed and should read:

Affleck Desbarats Dimakopoulos Lebensold Sise

folded plates—the versatile zig-zag building profile

What's new on the building horizon? Well, there are square-toothed, saw-toothed, or trapezoidal cross-section folded plates, which cover square, rectangular and circular buildings. All are easily fabricated PMBC fir plywood assemblies and are simple extensions of the folded plate concept. The circular folded plate requires center support but the radial plate can be used with or without it. Spans over 60 feet have been produced commercially with indications that spans up to 120 feet are economically feasible. Now you can achieve strength and stiffness through shape rather than mass because of fir plywood's ability to carry high shear loads. Folded plates bring a dramatic new look to contemporary buildings and meet all structural requirements to make them practical.

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Classées

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Advertisements for positions wanted or vacant, appointments, changes of address, registration notices, notices of practices including establishment or changes in partnership, etc., are published as notices free to the membership.

Practice Notes

Edmund T. Parkin announces the opening of an office for the practice of architecture and landscape architecture located at 20 Eglinton Avenue East, Toronto 12, telephone 481-3622.

Dobush, Stewart, Bourke, Longpré, Marchand, Goudreau announce that as of Monday, August 1, 1966, their two Montreal offices have been consolidated at 506 St Catherine Street East, telephone 842-9528.

The partners of Lithwick, Lambert and Sim announce the admission to partnership of Anthony M. Johnston, D.A., MRAIC, ARIBA. Mr Johnston has been associated with this firm for the past thirteen years. As of August 1, 1966, the firm name was changed to Lithwick, Lambert, Sim and Johnston.

Effective the 29th of August, 1966 the offices of Affleck, Desbarats, Dimakopoulos, Lebensold, Sise, on Western Avenue and Place Ville Marie will be relocated at 8th Floor, Read Building, 1015 St Alexander St, Montreal 3, P.Q. – telephone (514) 878-3941. (Mailing address: P.O. Box 703, Place d'Armes, Montreal 1, P.Q.)

C. D. Davison and Company, Architects, are expanding the facilities of their office and have openings for qualified architects, experienced draftsmen and an interior designer. Salaries would be commensurate with experience. For more information and details contact Mr C. D. Davison, FRAIC, C. D. Davison and Company, 1531 Dresden Row, Halifax, N.S.

In the Classified Section of the June issue we mistakenly noted that Horwood, Campbell, Guihan have moved their office to 3 Military Road, St John's, Newfoundland. This should have read Horwood, Campbell, Guihan have opened an office at 3 Military Road in addition to their office at 389 Elizabeth Avenue. Both addresses are in St John's, Newfoundland.

Positions Vacant

R. J. Thom requires architects and draftsmen with two to five years Canadian experience to work on interesting university projects. Apply Peter Smith, 47 Colborne Street, Toronto 1.

Experienced graduate architect required in a Hamilton office. Partnership will be offered after a probatory period. Reply Box 131.

Positions Wanted

Filipino architect, graduate in 1963 from the University of Santo Tomas has passed the Government Board of Examinations for Architects in 1965, wishes employment in Canada. Write Francisco Y. Tanalega, Binan, Laguna, Philippines.

Graduate from the Maharaja Sayajirad University, Baroda, India, 11 years practical experience in architecture and town planning, presently working with the Greater London County Council, wishes to immigrate to Canada and seeks employment in the Toronto area. Contact Mr P. M. Hiralikar, 141 Whitfield Street, London, W.1., England.

Architecte belge, diplômé de l'Académie Royale des Beaux-Arts de Bruxelles, agé de 23 ans, aimerait trouver du travail au Canada dans un grand centre. Monsieur Lefevre a terminé ces études en 1965 avec distinction, et durant ses études il a effectué des stages dans différents bureaux. Réponses à Monsieur Guy Lefevre, architecte, 28 rue Edmond de Grimberghe, Bruxelles 8, Belgique.

Two RIBA Students (Hons) require positions in a medium/small Canadian office for a period of one year in order to gain professional experience prior to completing the final RIBA course. Particular interests include housing and university work. They are available for interview in early October. Replies to M. J. Kellard and C. A. B. Reeves, One Bower's House, High Street, Harpenden, Herts, England.

27-year-old graduate of the Mapua Institute of Technology with B.Sc. in Architecture, presently working as a draftsman in British Columbia, seeks employment in an architectural office in Ontario. Write Hermogenes M. Icasiano, Suite 106, The Capri, 1080 Barclay St, Vancouver 5, B.C.

Registered architect in the Philippines, graduate of the University of Sto Tomas, 35 years old with experience in designing and supervising residential buildings and commercial plants, wishes to immigrate to Canada and is particularly interested in finding a job in Toronto. Contact Leon Antonio S. Mercado, 6 Milagros St, Santiago Sud, Makati, Rizal, Philippines.

Filipino couple, both architects and graduates of the Mapua Institute of Technology (B.S.), he is 43 years old, she 36 years old, wish positions with an architectural firm in Canada. For more information write Gerson M. Abracosa, 135 Baltazar Street, Grace Park, Caloocan City, Philippines.

Spécialiste de la présentation

La Société La Haye et Robert, Urbanistes-Conseils, recherche un designer ou un desinateur apte par son expérience à exprimer visuellement des concepts dans les domaines de l'urbanisme, architecture, art urbain et architecture paysagiste. Traitement à négocier. Adresser son curriculum viatae et specimens de travaux à
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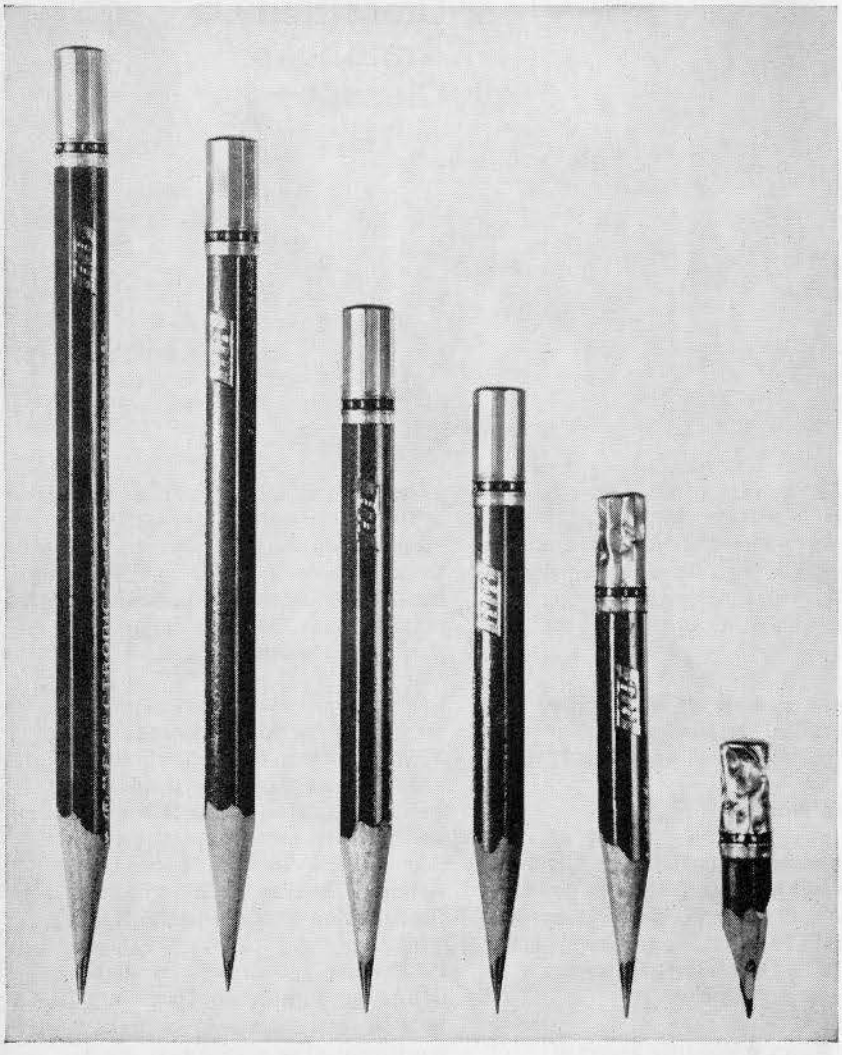
Presentation Specialist

La Société La Haye et Robert, Planning Consultants, seek designer or senior draughtsman experienced in visual communication of concepts in fields of city planning, urban design, architecture and landscape architecture. Salary open. Send curriculum viatae with work specimens to:
La Société La Haye et Robert, 2500 Bates Road, Montréal 26, Attention G. R. Benoit.



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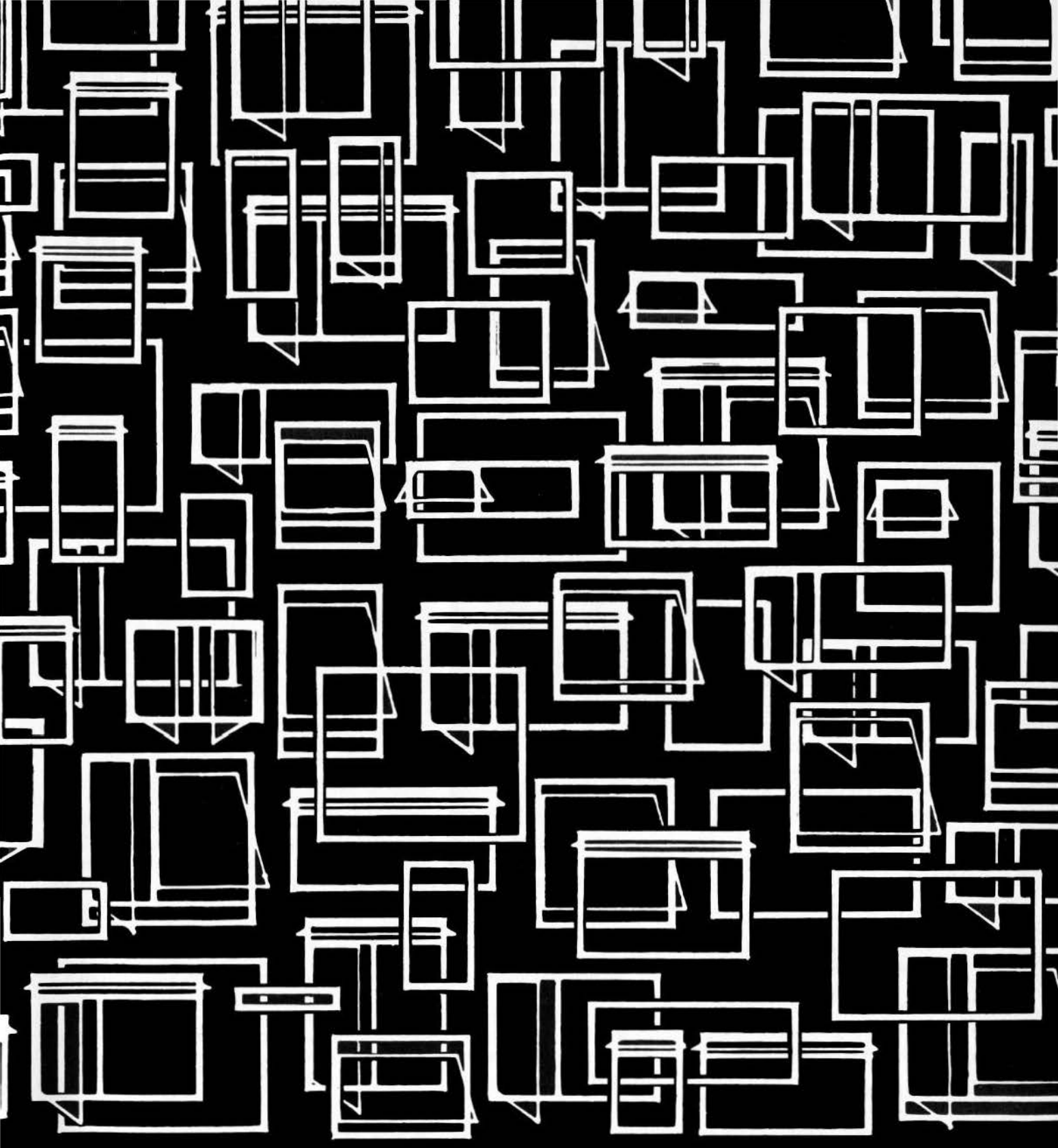

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Index to Advertisers

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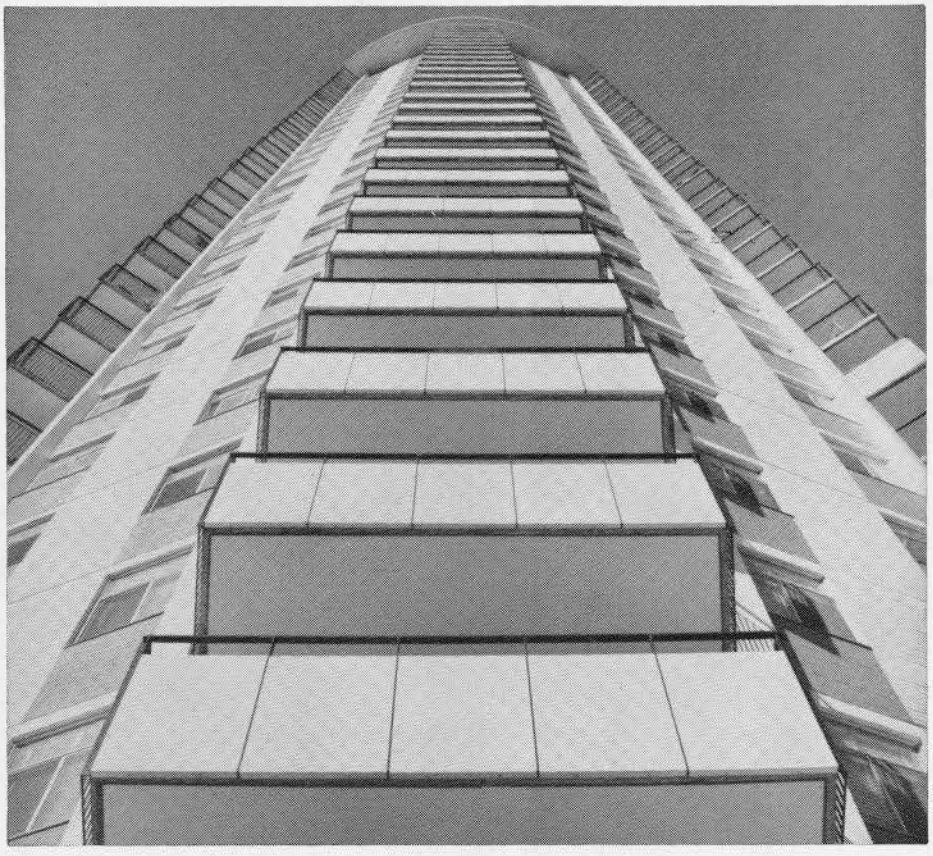

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