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JOURNAL RAIC-L'IRAC

FEBRUARY 1965 FEVRIER

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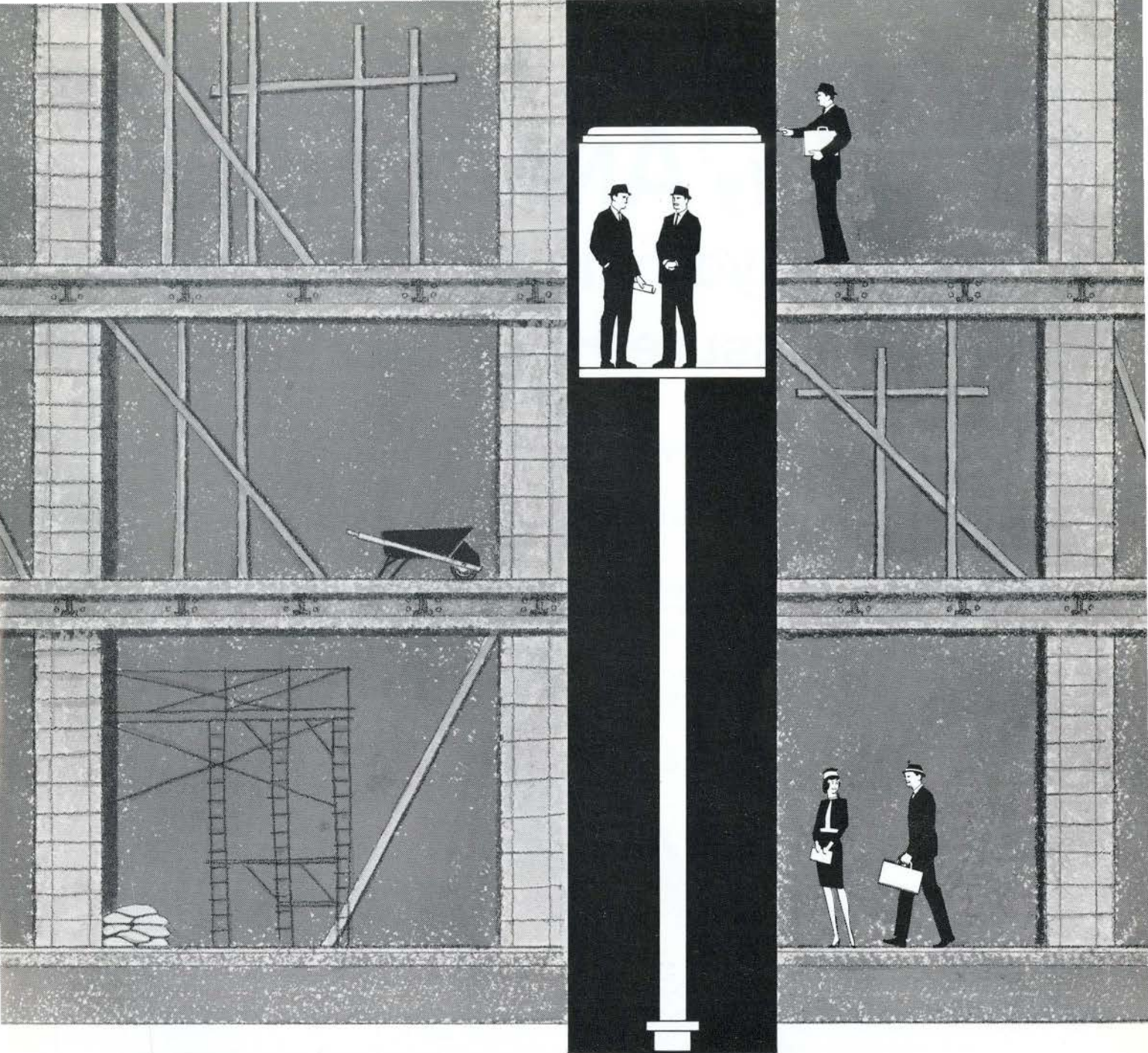


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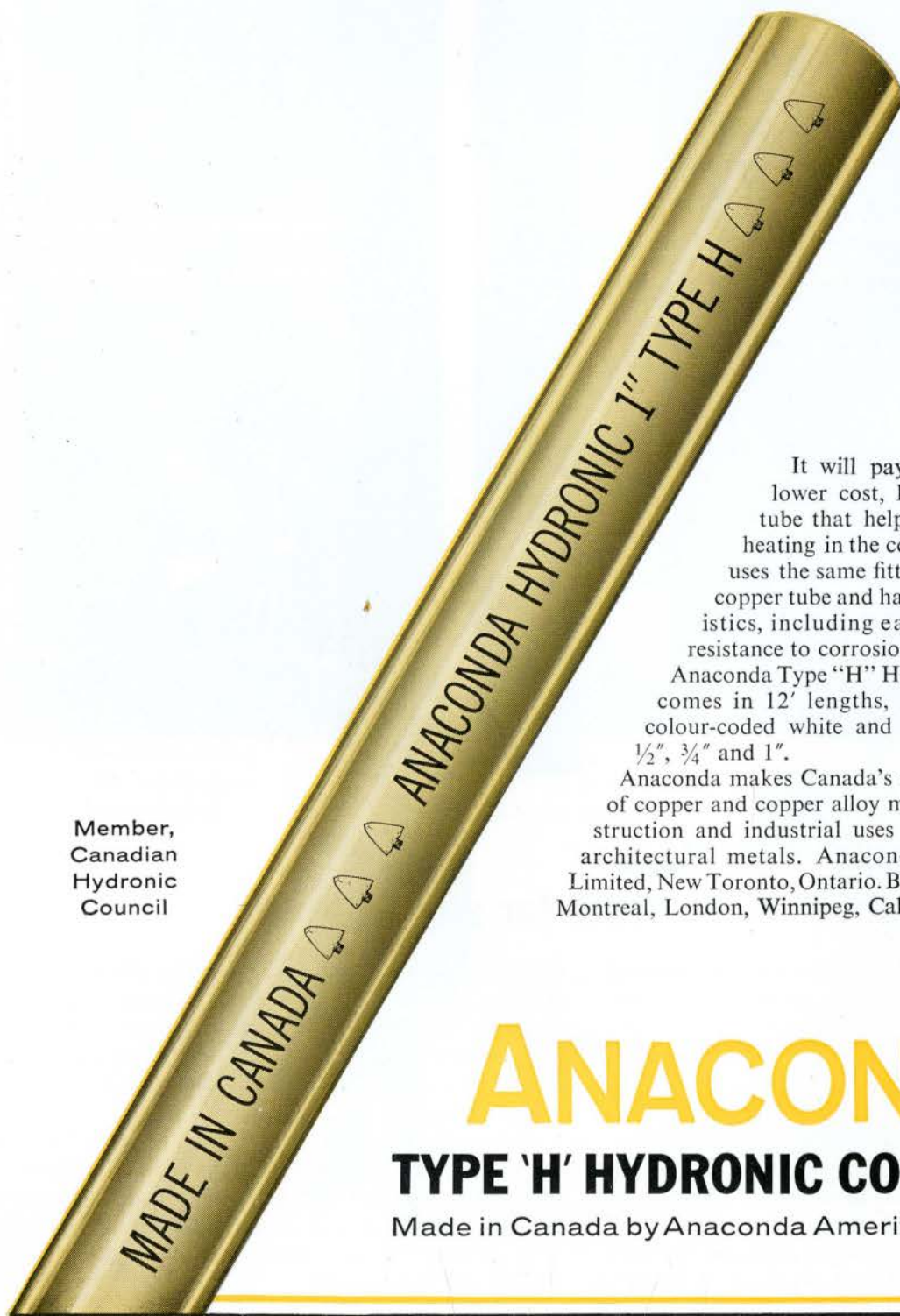


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"d'esscrire une autre monteé en forme ronde", drawing by Flemish architect Vredeman de Vries, from Samuel Marolois' "La Perspective", published in Amsterdam in 1639 (from B. Weinreb's catalogue of books and drawings, London, 1961)

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Architect: L. Moretti, Rome. *Associate Architects:* Greenspoon, Freedlander & Dunne, Montreal. *Consulting Structural Engineers:* P. L. Nervi, Rome; D'Allemagne & Barbacki, Montreal. *Associate Consulting Engineers:* Letendre & Monti. *General Contractor:* E. G. M. Cape & Co. (1956) Ltd. *Reinforced Concrete Frame Contractor:* Janin Construction Ltée.



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Survey of the Profession

In addition to the meetings with groups of architects, interviews were held with contractors and official architects acting in the capacity of clients. Both these groups provided frank comment on the problems, which, from their point of view, beset the profession.

We are indebted to the Canadian Construction Association through the efforts of its president Donald Jupp, and general manager S. D. Chutter for the very efficient manner in which they organized meetings with their membership in Builders' Exchanges and Construction Associations to coincide with Professor Raymore's travel schedule.

Meetings with contractors occurred in all major centres to the number of 16, and the proceedings were tape recorded. As a rule, each group of contractors included very vocal general contractors, mechanical and electrical contractors and trade suppliers or product manufacturers. This cross section of the contracting industry provided very useful comment on the topics discussed. An effort was made to exclude local architects from such meetings in order to obtain as frank an expression of opinion as possible from the contractors.

For similar reasons local architects were excluded from meetings with the official architects. Copies of topics for discussion with architects and with contractors were made available to the official architects. (The topics with architects were published in the November, 1964 issue of the *Journal*).

Discussions with contractors centred around the following list of topics which were prepared by Professor Raymore.

Suggested Topics for Discussion in Contractor-Architect Groups

1. The Extent of the Architect's Participation in Building Construction

To what do you attribute the absence of architect participation in a sizeable segment of the building field?

2. The Architect as a Leader in the Building Team

Is the architect maintaining a position of leadership in the building team?

3. The Architect's Performance in His Traditional Role

What is your opinion of architectural performance in the following areas:

- (a) Preliminary and final design
- (b) Appreciation of cost of construction

- (c) Building construction detailing
- (d) Specification writing
- (e) Supervision on the site
- (f) Administration of the contract (office)
- (g) Other (Tendering procedures)

4. The Design-Finance-Build-Arrangement

How extensive is the package deal in the locality? To what do you attribute its interest to the client? What does it do that the architect could not do if he expanded his services (short of contracting)?

5. The Architect's Knowledge of Building Construction Practices

Is the profession reasonably knowledgeable of the contractor's management problems? of his problems relative to financing?

6. The Trend in Building Technology and Design

In a period of changing building technology, what do you believe will be the difference between today's building techniques and design and that of twenty-five years hence? What effect will it have on architectural practice?

7. The Standard Stipulated Sum Contract Form, General Conditions (RAIC-CCA #12)

What do you think of the relationships outlined therein between owner-contractor-architect?

How frequently is this form used in your experience?

8. Building Construction Education Facilities

How adequate are the educational facilities provincially for building science and technology? Are they at the university level, technical institute level, secondary technical school level?

9. Architect-Engineer Relationship

What is your experience in the operation of the architect-consulting engineer collaboration? Is it generally satisfactory from the contractor's point of view? Comment on present type of arrangement.

10. Attitude of Financial Backers to Development Work

Has the contractor any interest in the frequent lack of concern of financial companies for quality of development work? Does the present method of financing of building developments affect the contracting industry?

11. The Bankruptcy Laws

Are the present bankruptcy laws adequate to protect the investor or creditors against fraud by unscrupulous operators?

ZVILNA EXHIBITION

Mr Jekebs Zvilna the creator of the January 1965 *Journal* cover is to have a selection of his photographs exhibited at the Massachusetts Institute of Technology March 5 to March 16. Mr Zvilna studied at the University of Latvia, came to Canada in 1949 and has been employed by Govan, Kaminker, Langley, Keenleyside, Melick, Devonshire, Wilson since 1950.

Public Relations Advice

Professions seeking public affection are bound to be disappointed, a Toronto public relations consultant told the Toronto chapter of the Institute of Association Executives recently. He suggested respect and understanding as more realistic goals. Charles W. Tisdall, managing director of a Toronto public relations firm, was addressing a luncheon meeting of the chapter, whose membership consists mostly of association managers and executives. His subject was "Public Relations and the Association."

"There never was a time when members of any profession were universally beloved," said Mr Tisdall. "Even the medical profession, which yearns for the respectful adoration which its members think the country doctor once enjoyed, cannot expect to be loved."

"It is even more difficult for professionals like architects and engineers to win the public's love. For one thing, they make too much money for that. The general public finds it difficult to muster affection for those it envies."

Mr Tisdall said professional associations should forget about winning public affection, but be satisfied if planned public relations can help them to attain public understanding and respect.

"There is really only one way an industry or profession can be sure of retaining its freedom of action," he said. "It must prove to the public's complete satisfaction that it is worthy of it."

Mr Tisdall described the public relations function as keeping "sparkling clean" the window between the public and every organization.

"It is not the public relations job to create what is behind that window, or to disguise it to appear as something deceptively attractive to the public eye," he said.

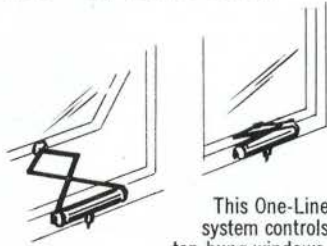
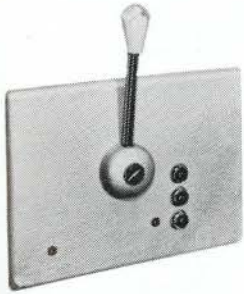
Mr Tisdall was national president of the Canadian Public Relations Society for 1963-64.

(continued on page 10)

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Royal York Hotel, Toronto, February 18-19-20, 1965.

(continued from page 8)

PCI ANNOUNCES 1965 AWARDS PROGRAM
The 1965 Awards Program to honor designers and engineers of outstanding structures employing prestressed concrete has been announced by the Prestressed Concrete Institute.

All registered architects and engineers practicing professionally in the United States, its possessions, or Canada, except active PCI members, are eligible to participate, said William C. Givens, PCI president. The judges will consider any type or kind of structure which was completed within the last three years or will be substantially completed by May 31, 1965. Entries must be submitted by the designer of record.

The First Award winner will be honored at the annual PCI convention as PCI's guest Dec. 5-10, 1965, in Miami Beach and will receive an all expenses-paid Caribbean cruise for two. In addition, there will be Award of Merit plaques for other distinguished entries and a Special Bridge Award for the entry demonstrating the most outstanding application of prestressed concrete in this classification. To select the structure deemed most worthy as a contribution to the advancement of prestressed concrete, judging will be based on the originality of architectural and/or engineering design, techniques of assembly, effective employment of the properties of prestressed concrete, and aesthetic appearance when pertinent to the application.

Entries are to be submitted to PCI headquarters, 205 W. Wacker Drive, Chicago 60606. Deadline for submission is June 1, 1965.

This will be the third annual PCI Awards Program. Winner in 1964 was Perry Neuschatz, AIA, Beverly Hills, Calif., for his design of a Phoenix, Ariz., convention center. The 1963 winner was Maurice Robillard, Montreal, for his design of St. Richard Church, Cote St. Luc, Quebec.

ELEVENTH ANNUAL CONFERENCE ON MUSKEG RESEARCH

The Annual Canadian Muskeg Research Conference will be held at Laurentian University, Sudbury, Ontario, on May 6 and 7, 1965. This Conference is the eleventh such meeting and is sponsored by the NRC Associate Committee on Soil and Snow Mechanics. Inquiries should be directed to I. C. MacFarlane, Division of Building Research, NRC, Ottawa 2.

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Practice Notes

Allward and Gouinlock, Toronto architects, recently announced the admission of two new partners and two new associates into the practice. The two new partners, Alfred T. West, Jr, MRAIC and Robert Murray Legge, MRAIC, are both graduates with the degree Bachelor of Architecture from the University of Toronto. They have been with Allward and Gouinlock since 1959 and 1963 respectively, and have been associates since 1963. The two new associates in the practice are W. S. Milner, ARIBA, MRAIC, and E. Bebris, MRAIC. With the retirement at the end of 1964 of Gordon L. Fowler, MRAIC, ARCA, the recent admissions to the practice will make a total of eight members of the firm.

Pentland and Baker architects, Toronto and Barrie announce admission to partnership of Gordon F. Polson, DA(Glas.), ARIBA, MRAIC. The new partnership will practise under the name of Pentland, Baker and Polson.

The Regina firm of Storey and Marvin, Architects, has been changed to Wen. E. Marvin, Alan Vanstone, Architects. Mr Vanstone was formerly listed by himself.

POSITION WANTED

Architect Planner from Baroda (Gujarat State) India, 24 years of age is seeking employment in Canada to gain practical experience in the field of architecture and planning in advanced countries and to pursue higher education. Mr Joglekar is a graduate B Arch (1961) from M.N. University, Baroda and obtained a Masters Degree in Town and Regional Planning at Indian Institute of Technology, Kharagpur, West Bengal. Presently working as an Architect Planner in co-operation with Department of Architecture, M.S. University on development for Baroda city. Contact Mr M. N. Joglekar, Kharivav, Raopura, Baroda, Gujarat State, India.

POSITION WANTED

Mr Alex Baafour Gyimah of Ghana seeks employment in Canada in an architect's office to study under the Minimum Syllabus plan. Write to Mr Alex Baafour Gyimah, P.O. Box 2300, Ashanti, Newtown, Kumasi, Ghana.

SEEKS POSITION

Architect, UBC Graduate with 2½ years post-graduate Canadian experience and 5 years in Switzerland as designer and job-captain seeks position of responsibility with a good future. Reply to George Feistmann, B Arch., SIA, Casa Bezzola 2,6942 Crocifisso, Switzerland stating scope of work and indication of salary.

ARCHITECT AVAILABLE

Architect, early forties, wishes to find employment in Toronto-Hamilton area with large firm. Graduate of Canadian University and in own private practice for past ten years. Total experience twenty years in architectural work. Reply Box Number 121, Toronto.

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Letters

Editor, RAIC Journal L'IRAC

We sincerely appreciate your coverage of the Centennial Planetarium Competition for Calgary. As winners, we are naturally proud, but thanks must go to all those who activated the idea of the competition, and the other members of the design team whose names were not mentioned in the *Journal*.

Joseph Shinwell, then a member of the City Planning Department and now with CMHC in Ottawa, was an integral and important part of our team as well as the following members of our staff: E. Even-Zohar, R. Miller, W. F. Bishop, R. Ellis. If at all possible, I would like recognition to be made of these names in the next issue of the *Journal*.

J. W. Long,

McMillan Long and Associates

Editor, RAIC Journal L'IRAC

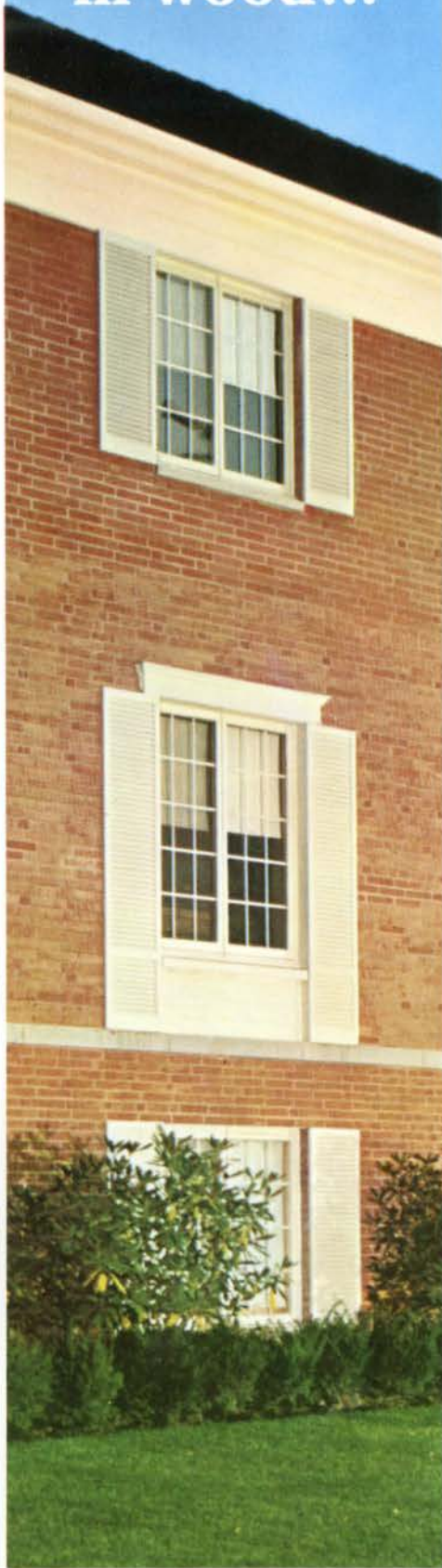
When we forwarded information for the article on the structural system being developed for the Theme Buildings that was published in the October 1964 issue of the *RAIC Journal L'IRAC*, we neglected to include the name of one of the special consultants involved in the project. We would very much appreciate your taking whatever steps might be possible to publish the fact that Mr Jeffrey Lindsay was also involved in the development of the structure and should have been listed with the other credits as *Jeffrey Lindsay, space frame systems consultant*.

Thank you for any assistance that you may be able to extend in correcting the credits for this project.

Thomas E. Blood, project architect
Affleck Desbarats Dimakopoulos
Lebensold Sise

(concluded on page 61)

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This review of a set of works, well known and publicized internationally, is done with the deliberate intention of establishing if the dual nature of the commission was fully realized at the time of commissioning by both artist and architect. Last month in the *RAIC Journal*, I said "The dual nature of work one can expect to emerge from commissions is:

1. Either in the nature of additional "furniture" or embellishment to complete or re-create assurance and aesthetic beguilement within the structure;
2. Or the achievement of a work to exist in its own right as a separate activity within the "business" purpose of the establishment.

The Toronto air terminal project, inviting the collaboration of several artists, where the architect aims at eventual simple, unified form, provides an interesting contrast of effort and result. The authorship of various commissions, thoughtfully based on merit of performance rather than local sentiment or snob appeal of the import, leaves no doubt that Canadian art, if contemporary, will be a product of a homogeneous society engendered by immigration.

The air terminal — functional, inorganic, aseptic and colorless — functioning well in a machine-like way, often dismays by its inhumanity. Reassurance is engendered by the intrusion spasmodically of

Art and Architecture

The Dual Nature of Commissioned Work

by Anita Aarons, ASTC "Scult"

Toronto International Airport: Architects/W. A. Ramsey, Chief Architect, Major Terminals, DOR; Consulting Architects and Engineers/John B. Parkin Associates

metaphysic beguilements — the art of man. The general result, however, is too loose-knit and scattered. Inability to appreciate overall unity above personal conceptual pre-occupation results in poor integration. Over-respect of the wrong kind for the individual artist's ego has revealed a general inexperience in placing works of this nature in an architectural setting. Both parties are to blame. Work of purely conceptual nature, in the main sculpture, suffers greater disadvantage than the more decorative elements where a compromise has been effected. There is total disregard for setting by the artist — or else he was unable to respond to the unsympathetic architectural "cells" provided; or, obversely, where there is acceptance of a free form by the architect, it has been insensitively housed. Tact and self-centered interest has resulted in situations where substitution would be easy and perhaps preferable. Some mistakes could be remedied, such as replacement of the Nakamuras in front

of a contrasting plane and the Innukshuks away from architectural conflict. Too many sculptures are awkward in scale. The limited experience of the studio has been insufficient to produce an awareness of scale necessary to establish status in an architectural or open space. The poor elevation of Louis Archimbault's flying structure; the inability of Villaincourt's "totem" to compromise with its firmament; the annihilation of Nakamura's constructions in open space, and the sad result of a thoughtful but unsuccessful attempt to elevate the Innukshuks to a scale in keeping with the monumental sundial, all reveal a lack of spiritual understanding of the purpose of conceptual work. The general lack of mystery is tragic. The architectural "cells" ought to have been temples for contemplation, the stop-look-listen signals of contemporary society, enshrined at the airport. There is no need to be decorative here. Two notions stand clear. Either the artists, with an over-all philo-

Harold Town murals in Toronto Air Terminal's upper restaurant



Roger Jowett

sophic aim, should have created their personal totems to fit the awkward areas, aided by the skill and experience of the architect, and set them jewel-like as an intrinsic part of a setting; or the architect should have been prepared to choose an egocentric form and himself set it to be contemplated in its own right. As it is, mixed purpose is revealed. Some artists fail in unhappy compromise. Others indifferently battle with environment and in most cases are overwhelmed by it. Gerald Gladstone's work of highly personal imagery was not in situ at time of review, but if in the setting provided one can envisage a repetition of the daily duel for attention being fought by his work at the Winnipeg air terminal (RAIC *Journal* February 1964) jousting with the fugues and fancies of the architect in the facades corraling the structure.

Coughtry, McKewen and others gallantly do battle with murals interspersed between doors "*femmes*" and "*hommes*", exits, trash cans, etc. One's visual senses become confused with elevators, flying figures, colored strips and "no entry" arrestations.

These situations clearly call for consideration of whether space is to be decorated or embellished for momentary effect or for contemplation. One suspects the areas were handed to the artists because of an inhibition to resolve them with color in architectural form. This suspicion is engendered by the coy, discreet placing indoors of a large orange panel (out of sight, as if a trifle vulgar); and, outside, the emergence of an isolated slab of bright red ceramic on a stairway, (itself surprised at its own isolation) amidst the maze of cold, grey

concrete ramps and levels. I agree in principle that neutrality of color in such a big sprawling structure is desirable, but sympathize with the artist handed these surprising areas for solution. They have managed as best they could, but artist's ego and functional harmony must come to terms. A happier solution is seen in the room divider murals in the lounge by de Niverville of witty, sophisticated naïveté. These, apart from the stiffness of the nursery wall mural, are entirely successful. But why did some unthinking individual place those vision impeding wooden benches in front of the divider mural?

The most mature contributions are the Town murals and the Riopelle painting. Visually dominating the upper restaurant are works by Harold Town, a sculptured brass screen at right angles to a double sided painted mural. The painted mural, inventive and a further revelation of Town's ability to tower above the dedicated but inept mass, producing banalities under similar requirements, would suffer less disservice if placed in a more sympathetic clime. Designed by Town to be seen from a distance of one hundred feet or from one foot, and to temporarily obscure the total view of the airport apron, it may have operated successfully before the sculptured brass screen arrived. The idea of placement and material was visualized in concept by the architect. Town has been obedient. Screen and mural make strange bed fellows. The large, jewel-like brass divider, enchanting one with deep etched symbols, fenestrations, and sensuous material, steals most of the bed space. I cannot agree that the juxtaposition is

harmonious or successful. Many hazards — ropes, chairs, tables, impedimenta and general clutter — make contemplative viewing of the painted mural impossible. The more jewel-like decorative quality of the sculptured screen, although its forms are equally serious and ambiguous, has greater capacity to brazen out its presence in this noisy, competitive society.

The brass mural, eight by twenty feet, of sixty prefabricated solid brass panels, and capable of reassembling, is a successful wedding of Town's talent and commercial technical process. The process was lengthy and laborious, 128 plates etched entirely by Town. The full description on the fabrication of this successful venture has been generously supplied to the *Journal* for reference by any architect.

Last but not least, the Riopelle — masterly, insistent on attention to the point of vulgarity — confounds one's fondest theory. It pays no homage or compromise to setting. Recessing only serves to frame it. It transcends even its own faulty fabrication; the intrusion of geometric constructional cracks across the white areas are heroically subjugated by the virile painted forms. In spite of the indifference of the seating area in affronting the "presence" by turning to outward vistas, one moves from comfort hypnotically, to stand assailed by near proximity of opening and shutting voids, the black coffins of elevators transporting souls to other climes, indifferent to them, but drawn to the vortex — the maelstrom of paint.

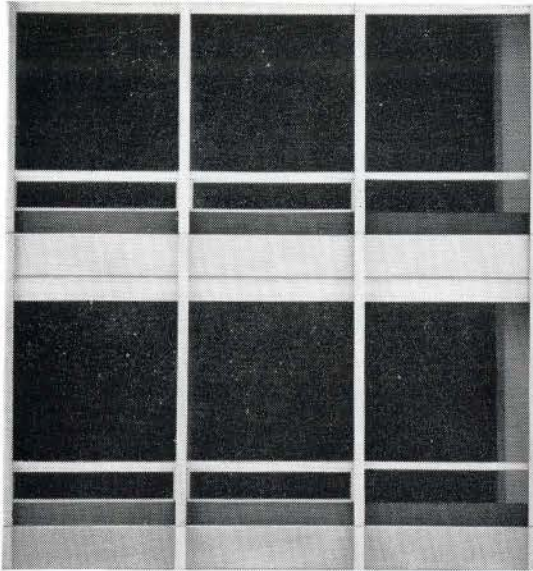
Other works fail through incompatibility and loss of stature.

One is loathe to admit to a general feeling of disappointment, for the venture was worthwhile for sheer interest and controversy, meeting the public on even grounds, competing to distract from the banalities of periodicals and comic books. When critical assessment will help we must have the courage to admit it. Graciousness of spirit to artist's ego ought to have engendered more confidence to approach the problems of the future with more humility. In the new arena of noisy competition we can, or should, expect in this dynamic adventure to accomplish with some error. Some we can rectify; not all are irrevocable. While theorizing, it is as well to remember that with vital fearless creative thinking and experience, which gives us a Riopelle, the total scale can confound perfectionism and transcend its own frailties.

Toronto Air Terminal: the de Niverville and the bench



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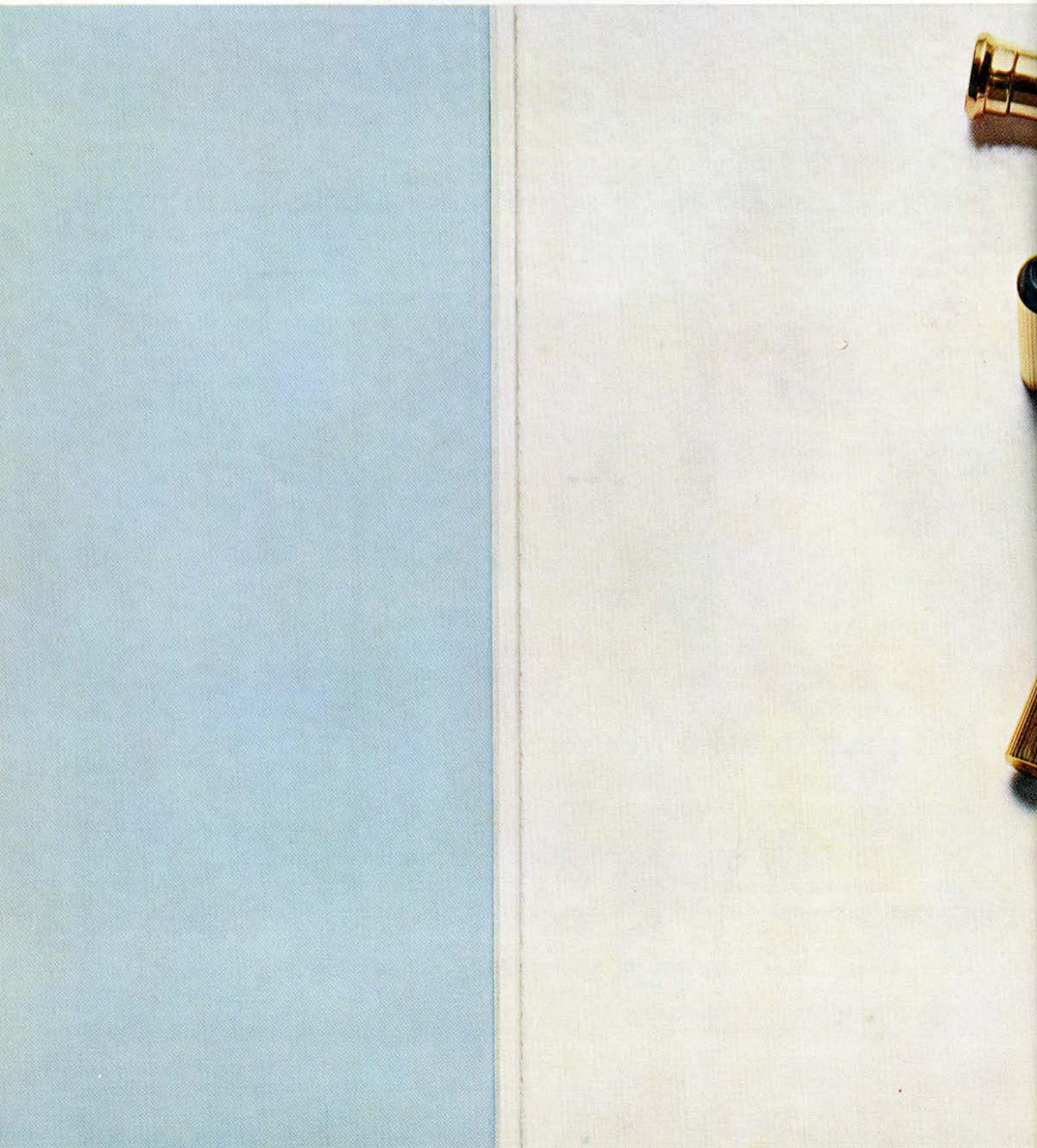
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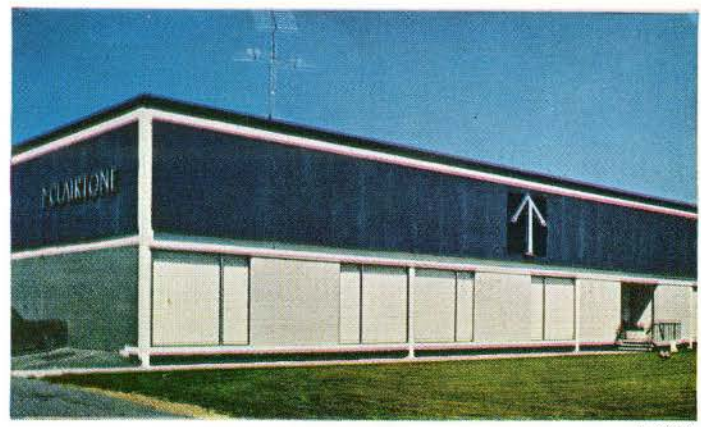
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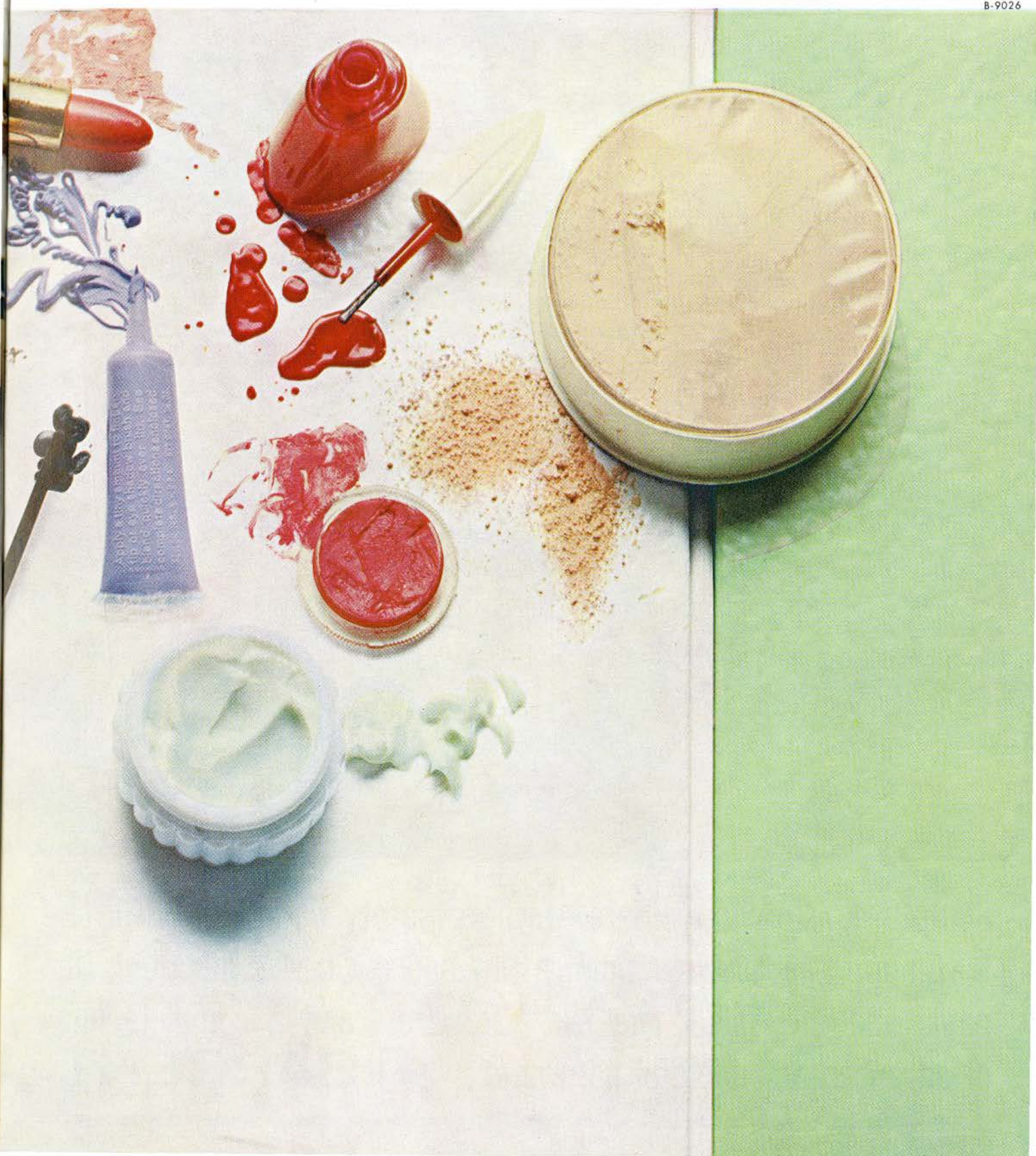


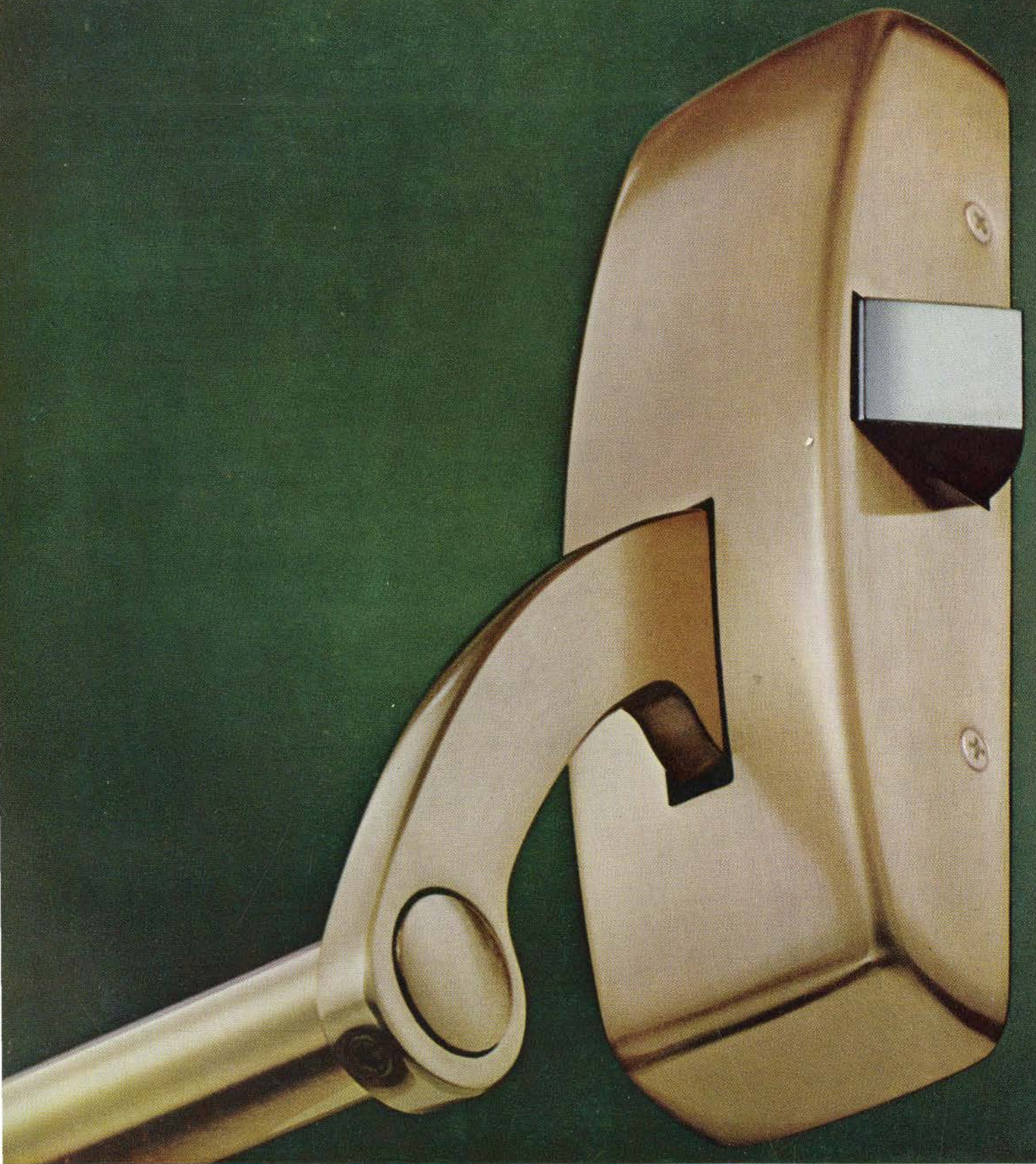
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Manual Procedures:

Probably the best known example under this heading is the "one-write" or "peg-board" system which produces a variety of records at one time—witness the one-write payroll procedure cited above. Another good example is the pre-printing of lines on the architect's certificate form, the only variable data being the client's (or owner's) name and the project name, the dollar amounts for the value of work completed to date, the holdback, etc. Carbon copies of the certificate serve as the advice to the contractor, the medium from which the architect's own billing is prepared, the project control file copy, and so forth. From these examples, it will be seen that maximum economy and accuracy is achieved through the creation of a num-

ber of related documents simultaneously, on which as much of the constant data as possible has been pre-printed.

Accounting Machines

There is a wide variety of this equipment on the market, the use of which is typified by the simultaneous posting of transactions to a statement, a ledger, and a journal. Where the majority of transactions are repetitive and do not involve numerous exception or 'special' routines, a favourable climate exists for the economic utilization of such equipment. The automatic updating of account balances and the provision of proof totals after each run represent some of the obvious advantages over purely manual procedures.

Document Origination Machines

In a broad sense, any machine is a document origination machine. What is referred to under this heading, however, are machines that create machine language — generally punched cards or punched paper tape. The most common example is the simple keypunch which produces punched cards. Newer examples are accounting, data transmission or adding machines that produce machine sensible documents as a by-product

of another function. Such equipment often provides an economical introduction to DP in conjunction with a data service bureau when it is not feasible to install a fully integrated system on the premises.

Unit Record Machines

Punched card or tabulating equipment, generally speaking, is quite well known in view of its long history of use. Large unit record installations will be gradually replaced by small computers as the latter become lower priced. However, it seems safe to predict that there will be a place for tabulating equipment for many years to come in view of its inherent capacity for unlimited analysis, flexibility and economy.

Computers

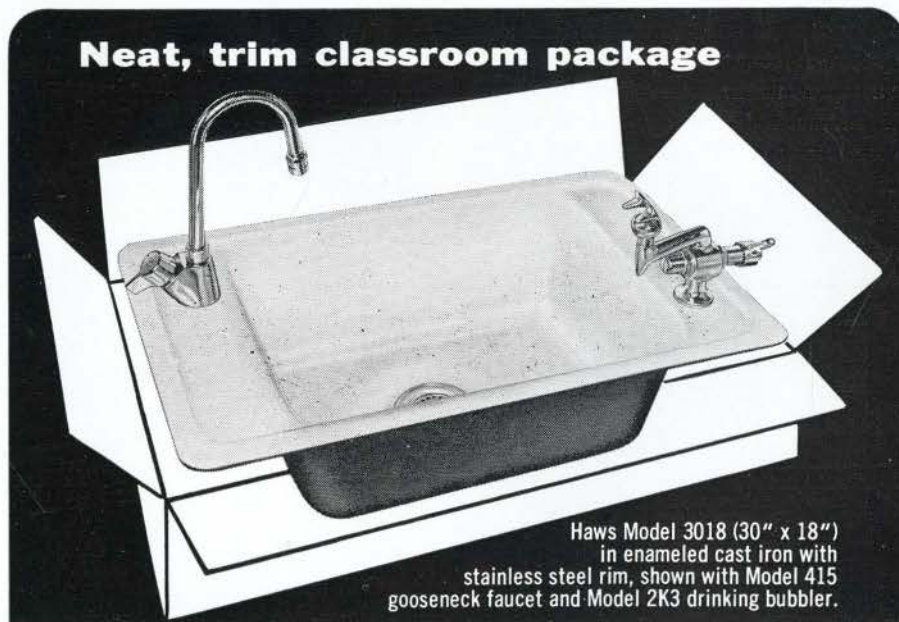
It would take many volumes to describe the features of every type of computer. Hence, this section will be reserved for a brief discussion of what promises to be the predominant type in a very few years: the random access or 'real time' computer. A 'real time' system may be defined as one that processes data as transactions or activities occur. Excellent examples of existing systems are:

- (a) 'Sage'—NORAD's computer system which accounts for all air traffic over North America and commands the air defence system.
- (b) 'Sabre'—American Airlines' passenger reservation and flight planning system.

While these two examples involve large scale processors, there is now an increasing number of smaller installations which approximate the characteristics of real time systems. Nevertheless, it is safe to say that the impact of real time systems has hardly been felt in the business community in Canada as of this date. It is a concept that will eventually dominate all data processing systems, however, for it is only this concept that really fulfills all the requirements of a management information and control system.

Summary

In view of the technical complexity of the field, a professional firm that desires to investigate the advantages of DP in its own environment would be well advised to engage outside consultants. The latter are able to competently survey, recommend and implement changes in equipment and methods based on their wide experience with similar installations in other organizations, and their current knowledge of the large variety of alternative equipment on the market.



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Horizontal Multiple Housing

A study of low-rise multiple housing developments in Western Europe and Scandinavia by Peter Batchelor, MRAIC

The growth and character of our cities has been greatly influenced by the prevalent and past concepts of home ownership; that is, that the popular image of an ideal residential environment consisting of families housed in independent dwellings built on separate plots of ground. For villages and other small groups of dwellings this may be satisfactory, although from a historical point of view most villages have been highly compact in spatial form. The total inadequacy of this home ownership concept is more readily demonstrated through the phenomenal growth of most of our cities. Work (city) and home (suburb) are being so rapidly separated that city life consists essentially of a dual existence for man: frenetic city-centre activity by day, and isolated, bland suburban boredom for the rest of the time. The post war exodus to the suburbs has been prompted as much by the "Garden-City" concept of residential life as by the deterioration of older city residential areas. Yet the suburban home which once promised lower taxes, a glimpse of the countryside, and freedom from the pressures of city life has generally yielded none of these benefits to the residents. Indeed, the extension of municipal services to areas of lower population densities tends to increase the tax load on the resident, who, incidentally, can no longer see the countryside owing to contiguous housing developments, and who has been burdened with far greater social pressures in the way of conformity and status identification than his city counterpart. One of the prime motivating forces in this rapid suburban growth is the dream of low cost elegance cultivated by our corporations and mass media of communication. Appeals are made simultaneously to the bucolic instincts of man and his desire for a gracious way of life, so that on inspection the movement from city to suburb is grounded as much on fantasy as on logic. The "dream" of suburban life consists of a trim house with a two- or three-car garage and all the external features of status consistent with the owner's income. Picture windows and television antennae are ram-

nant everywhere. For the die-hard city dweller the term "town-house" seems most appropriate, and there is a good chance that this play on words will induce him to settle in a pastel-roofed, neo-Georgian wood frame house until he discovers his environment to be a shabby farce. What begins as an attempt at the assertion of individuality soon fails as one begins to discover the intrinsic paucity of expression. Endless rows of houses on large lots with their superficial variations in colour, roof shape, and exterior treatment are a constituent element of a typical suburb. Here alone is the amazing paradox of the suburb: A dichotomy of feeling is plainly expressed by the individual house which tries by its very nature to stand apart, and yet which rarely displays any genuine personal expression.

The growth of suburban communities has reached such proportions that many formerly separate towns and cities are being slowly but irrevocably joined together by low density residential developments. This gradual encroachment upon the countryside has been sustained by two mythical concepts: That there is an inexhaustible supply of land for development, and that possession of an automobile will resolve the transportation problem between home and work. The first idea can only come from short term planning, while the latter idea tends to create additional needs for fast, wide roads and freeways and at the same time introduces an extra source of fatigue for the suburban resident.

Architects and planners are watching the growth of the contemporary residential environment with renewed interest not only because the costly appropriation of outlying land extracts its own social and economic tolls, but also because the very essence of "urbanity"—city life, with all its inherent variety within work, consumption and leisure—is being diluted as the suburban structure grows. Since neither city nor suburb benefits from this thin distribution of residential population, it is of great importance to re-evaluate the existing residential environment and also to engender the growth of communities of a more compact and

constructive kind. For North America it seems that the transition from semi-urban residential accretions to compact and fully diversified urban structures will occur only as multiple dwelling forms are developed and accepted, and the most acceptable combination of adequacy of contact with nature and compactness yet devised is Horizontal Multiple Housing.

The evolution of the terrace house dwelling type is quite uncertain. Some evidence exists to show that the Romans at least had certain forms of horizontal multiple housing such as the tenement type flat and the garden court-house, or atrium, as it was called in those days, but it was not until the medieval period that groups of dwellings were constructed with common separating walls. That this grouping of houses was due to the combination of scarcity of land within city walls and the provision of mutual structural and physical safety has not been unequivocally established, but the final effect often resulted in streets and lanes of unsurpassed charm, intimacy, and variety. The sketch of Malt Mill Lane, Alcester, England, shows a narrow street lined with half-timbered houses constructed during the sixteenth century. The inherent charm of this street is due to both the continuous rhythmical facade and the domesticity of the scale of building.

The first large scale attempts to create a residential environment with terrace houses according to a plan began early in the eighteenth century in England. The squares and crescents of Bath and Bloomsbury are the result of a unity of thought and feeling rarely achieved in any urban civilization. Here the architect was trying to achieve a highly urban and sophisticated environment for the upper classes of society. The intimacy and repose of these Georgian streets and spaces arose from the simple repetition of an elegant and highly refined basic housing unit. The terraces were worked into geometric shapes in order to relate to the contemporary respect for the classical ideal of harmony through order. In the less pretentious terraces individual

houses were often sited in order to suit the slope of the land, or curve of the existing street, and toward the end of this famous period of terrace house building the undulating curve was introduced. The Georgian period of residential design can be considered the most significant of all periods in its contribution to the development of the terrace house. One thing is certain: It is largely responsible for sustaining the essential "spirit" of many British towns and cities. Indeed, the Georgian residential character has managed to survive almost two hundred and fifty years of

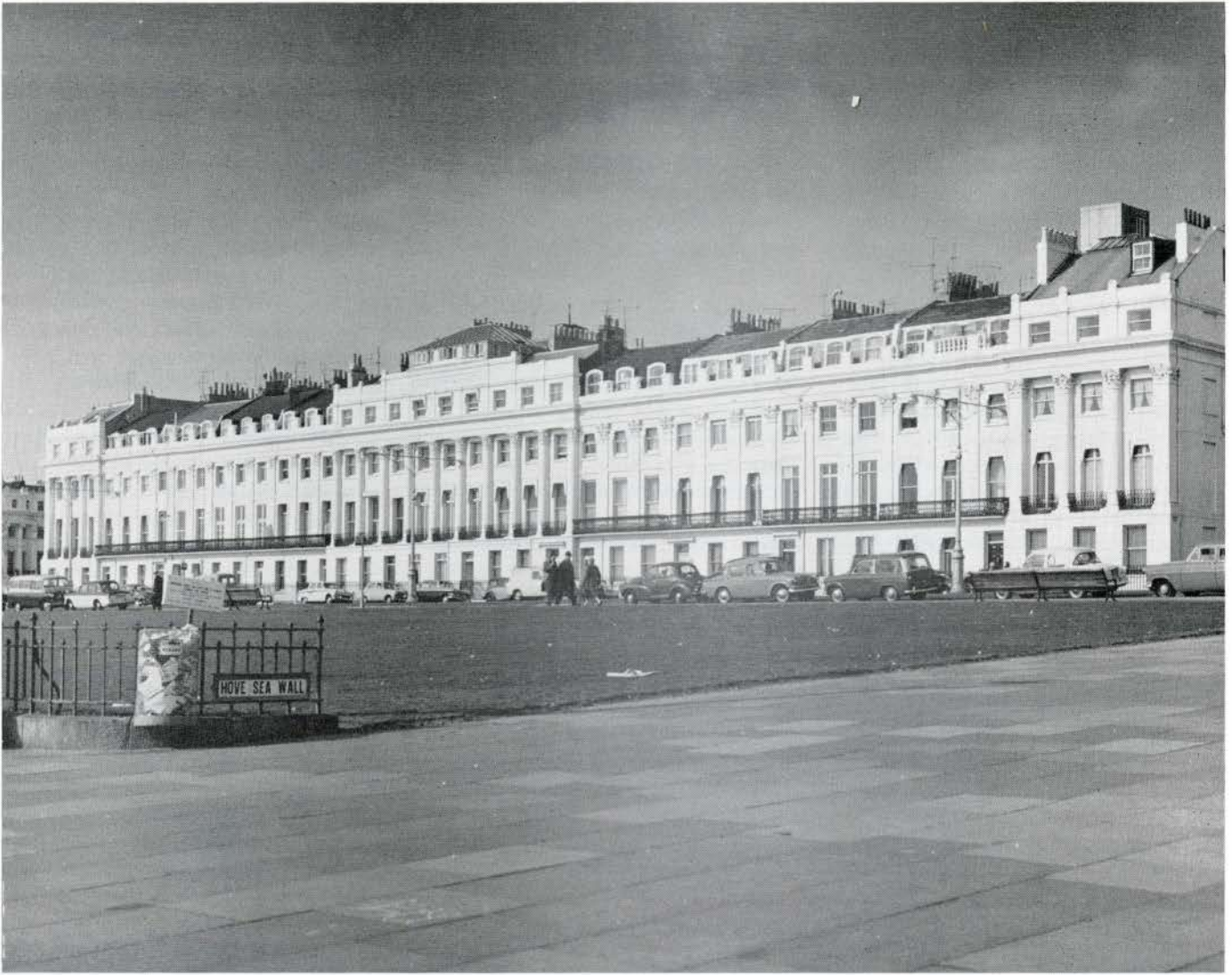
cultural change without seeming any more outmoded than many post-war housing schemes.

If the feeling evoked by the Georgian terrace house can be properly termed as one of "admiration", so also can the emotion associated with nineteenth century residential design be termed one of "distaste". The terrace house form was wantonly misused by the industrialist and speculative builder as a cheap and profitable dwelling to house the growing city populations. The very term "row house", or "terrace house", usually conjures up

images of grimy, monotonous streets of terraced housing in areas adjacent to oppressive industrial tracts. Almost everyone has seen pictures showing the crushing squalor, misery, and monotony of Manchester or Liverpool. It is this image of the terrace house which presents the architect and planner with his most formidable resistance among today's residential population. Nevertheless, a large part of the stigma attached to terrace housing will be overcome by rediscovering its inherent aesthetic potential, and this is the central purpose of this study.



Landsdown Crescent, Bath, England. The intimacy and repose of Georgian streets and spaces rose from the simple repetition of an elegant and highly refined basic housing unit.



Brunswick Terrace, Brighton. Early Nineteenth Century



*Terrace at Manchester
Streets of timeless dreariness*



*Malt Mill Lane, Alcester, England
Streets of timeless charm*

The stateliness which characterized the terrace houses of Georgian and Regency days has yielded to an increasing domesticity of feeling in contemporary examples. A house in Bath or Bloomsbury was one way by which the aristocracy could express its position in society; underneath a unifying classic facade each dwelling unit contained elegant spaces consonant with the formalized modes of living. In contemporary society the terrace house is often used as a cheaper way of securing the advantages of detached housing, and for this reason it has been used extensively in public and private housing projects. Moreover, it has to suit the needs of a labouring or semi-professional class of people and therefore it has none of the eloquence of the late eighteenth century terraces. Modern terrace houses rarely exceed two storeys in height and eleven hundred square feet in aggregate living area unless they are intended to house very large families in housing and redevelopment schemes. The London County Council handbook *Housing Type Plans* shows terrace houses and their areas as follows: Four persons, 786 to 830 square feet; five persons 926 to 950 square feet; six persons 986 to 1105 square feet. These can be assumed to be indicative of terrace house areas in most public and private schemes in Europe. The terrace house has always formed a constituent element in the residential environment of England and Scotland, but it is also being studied with renewed interest in Finland and Switzerland.

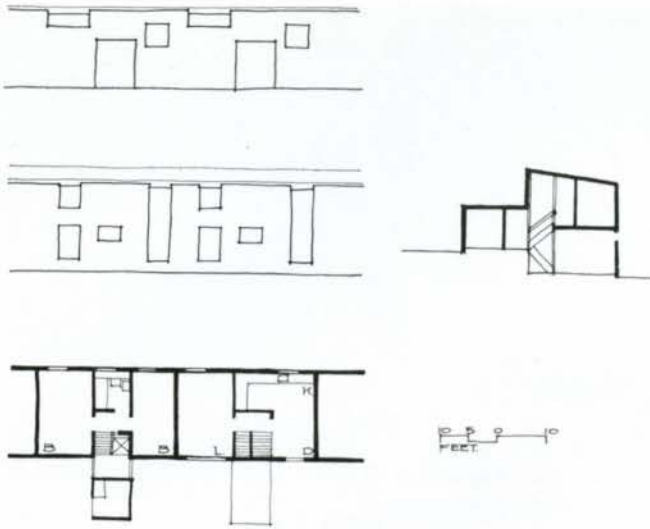
At densities higher than one hundred persons to the acre only the narrow frontage terrace house is practicable. Consequently, this type of dwelling is usually

found in central redevelopment schemes. When housing densities are planned at seventy persons to the acre or less it becomes possible to utilize the broad frontage terrace house. Generally speaking, the wider the frontage, the less is the internal circulation area since the passage from front to rear is accomplished in a shorter distance. There has been a tendency to utilize this type of dwelling much more frequently than the narrow frontage terrace house to the extent that the "street wall" has become a conscious design element. Several house types developed at Cumbernauld New Town create attenuated facades in which the individual dwelling is subordinated to composition of the whole terrace. This is an important departure from contemporary attitudes. Terraces are usually conceived as exercises in pattern making with single units; here the house figures as part of an exercise in urban design. The erection of continuous and closely spaced walls of dwellings has also created the need for access through the terraces. Although the "alley" of city slums has been re-introduced primarily for reasons of access, it also fulfills the subconscious need for identity with familiar surroundings.

There is a similarity which permeates British terrace housing, regardless of location. Circulation of plan types by means of handbooks is responsible for the minimal, box-like dwellings in public and private developments. The chief problems in the internal planning of a terrace house revolve around the accommodation of bedrooms and the positioning of stairs, and the preoccupation of designers with standard solutions is so pervasive that new ideas are rarely

introduced. The plans that one sees have been distilled to the point where the elimination of one more square foot of space is almost impossible. Economy is a necessary consideration of course, but it is a specious argument to advance when the vitality of this form of building is suffering. Some cities have housing departments in which a combination of sensitive administrative direction and technical resources have nurtured the atmosphere for creative thinking in housing design. One such city is Sheffield which has produced the famous Park Hill redevelopment project with access "streets" at every third floor of their high-rise maisonette blocks. One of Sheffield's unique developments is the patio terrace house designed for use on a steep south-facing slope. This house is compact, economical, and produces a rich interplay of cubic forms on hillside sites. The patio terrace house creates a link between vertically and horizontally terraced dwellings on account of its adaptability to undulating terrain.

The stigma attached to "row" housing is receding rapidly as the public discovers some of the latest speculative builders' attempts in this field. The SPAN developments at Blackheath have demonstrated the potentialities of terrace housing to produce a variety of visual and spatial experiences. By 1962 the houses were so widely acclaimed that each project was sold before completion. Giants in the house building field have been sensitive to this changing attitude to the "row" house, as their advertising campaigns indicate. Nevertheless, the terrace house has a long period of growth ahead before it is used as an integral part of urban design. In Britain the



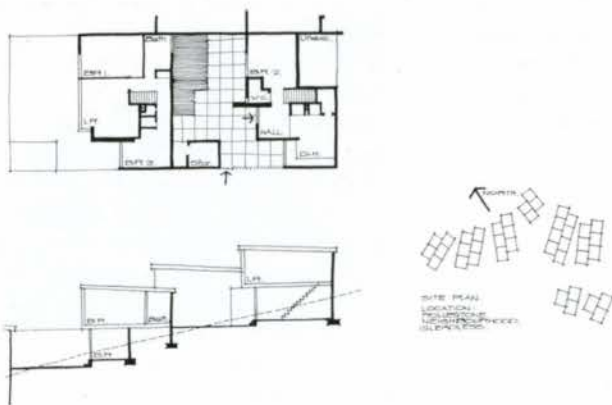
Broad Frontage Terrace Houses, Cumbernauld, Scotland



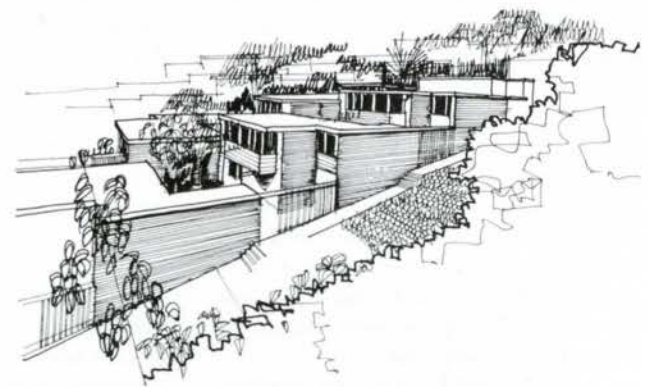
*Three storey terrace houses
St Pancras borough housing, London*



*Two storey terrace houses
Willenhall Wood, Coventry*



Patio terrace houses at Rolleston, Sheffield



tradition of the detached house is still very strong; concessions are only made to terrace housing if the terraces are short and varied. When these furtive attempts at urban space-making are displaced by positive and integrated terrace forms—and there are indications that this is happening—the terrace house will have reached maturity as an element in the contemporary residential environment.

The terrace house was never used in Finland as means of fashioning urban spaces similar to those of the Georgian and Regency periods in England. Houses in Turku in the seventeenth century were often tightly grouped around courtyards so that continuous street facades were created, but this occurred as a consequence of attempting to maximize the peripheral area of city blocks for dwelling space rather than through conscious aesthetic objectives. The centre of interest in housing has shifted to small house groupings in the last twenty years with the result that the terrace house has received some intensive development in the hands of Finnish

architects. Like England, the dwelling units rarely exceed two storeys and are always handled in short chains of, say, three to ten units. Unlike England, the Finnish aptitude for proportion, refinement of detail and choice and handling of materials has produced dwellings of Door and window openings form such extraordinary vitality and beauty. White, smooth surfaces are treated with panels of wood or occasional slatted screens. dramatic contrasts against this pervasive whiteness that exterior elevations are exercised in balance of white and black. This same consummate mastery of material and proportion flows into the interiors of these dwellings, where, unhampered by English notions of privacy through compartmentalization, space is used as simply and functionally as possible. The consistent restraint of colour and variety of material throughout all forms of low-rise housing has resulted in an architectural anonymity in new Finnish housing projects. The continuity of structure form, and material may well herald a new phase in the maturity of the Finnish urban environment.



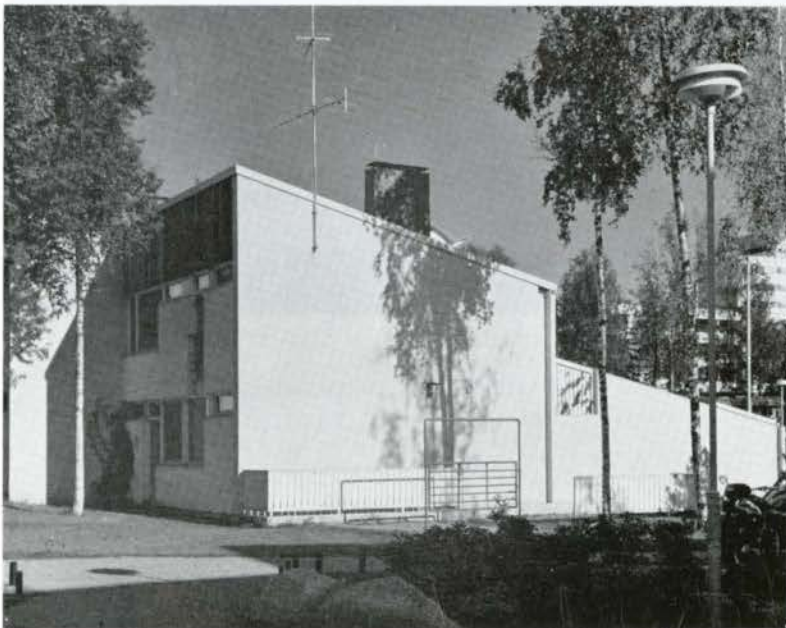
Terrace houses at Lauttasaari, Helsinki



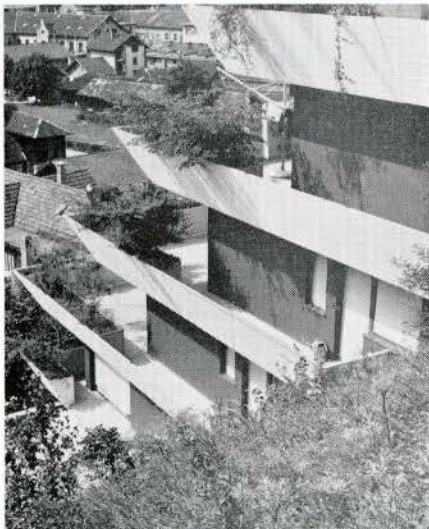
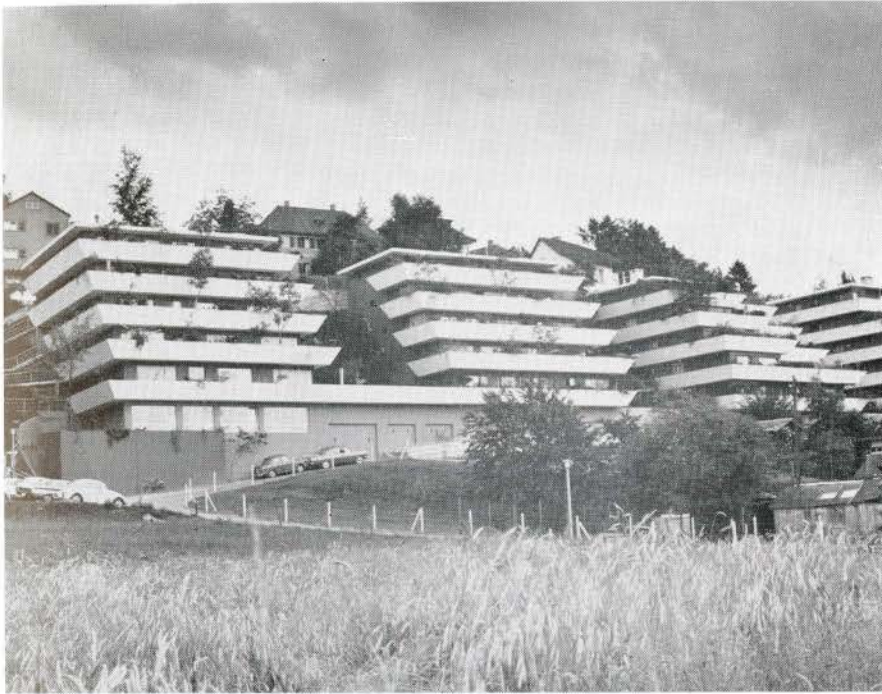
Terrace houses at Tapiola Garden City, Finland



Terrace houses at Lauttasaari, Helsinki



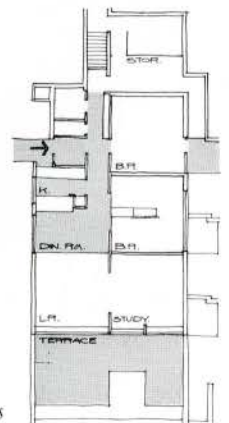
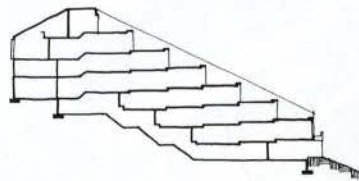
Terrace houses at Tapiola Garden City, Finland



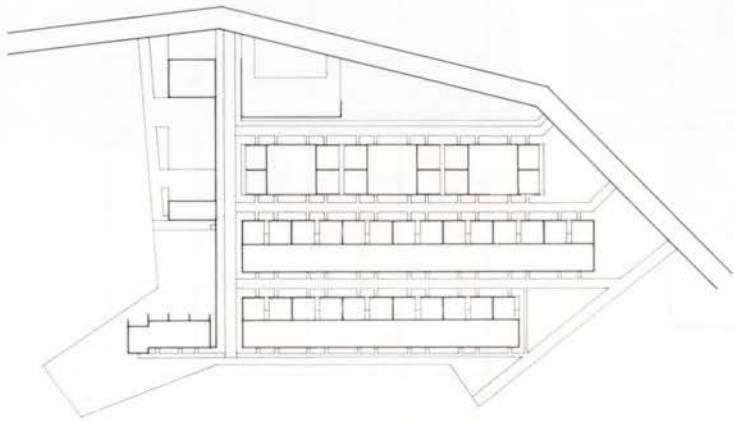
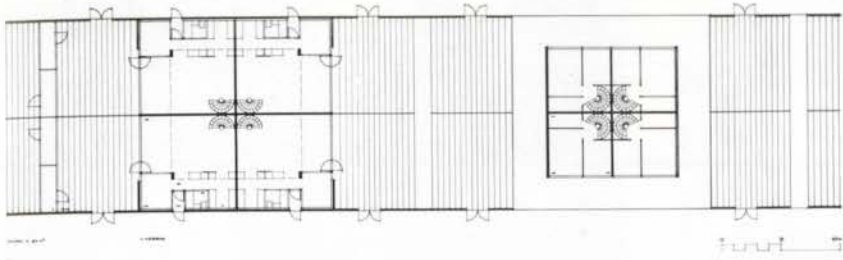
*Housing at Zug, Switzerland
Stucky and Meuli, architects*

The aesthetic potential of terrace housing was so well stated at Neubühl Garden City in Zurich during 1930 to 1932 that nothing in the authors' experience had been built to improve upon this scheme until the Halen project was built at Berne during 1961. In this project five blocks of housing are aligned along two offset axes which meet near the centre of the scheme on a small plaza. The Halen housing settlement operates as a compact, self-sufficient community with its own shops, restaurant and recreational facilities. The essentially intimate urban feeling created by close grouping of dwellings and the "chunky" concrete detailing is at variance with the forest setting of this community, although the real significance of the project lies in the integration of a large number of terrace houses to define and modulate space. This idea has been carried further in a vertically terraced housing project at Zug by Stucky and Meuli. Here, four blocks of housing step down a steep hillside with access paths between them. Balconies opening off living areas are extended around the sides of the terraces, so that descent and ascent are accompanied by a consciousness of moving through a complex sequence of related spaces. Even if the visual and spatial complexity differ, the fundamental principle established at Halen and Zug is the same: Terraced housing has been conceived as an integrated architectural form to define space. Another row of vertically terraced houses has been built near Zurich by Cramer, Jaray and Paillard. The side walls have been treated in the same way as the facade on a horizontal terrace, and if a number of these were built alongside each other, as at Zug, the effect would be similar to creating a system of steep downhill streets. The Berne, Zug and Zurich schemes are privately-owned housing. Must the responsibility for innovation in residential design fall once more onto the shoulders of the speculative builder as it did in Georgian times?

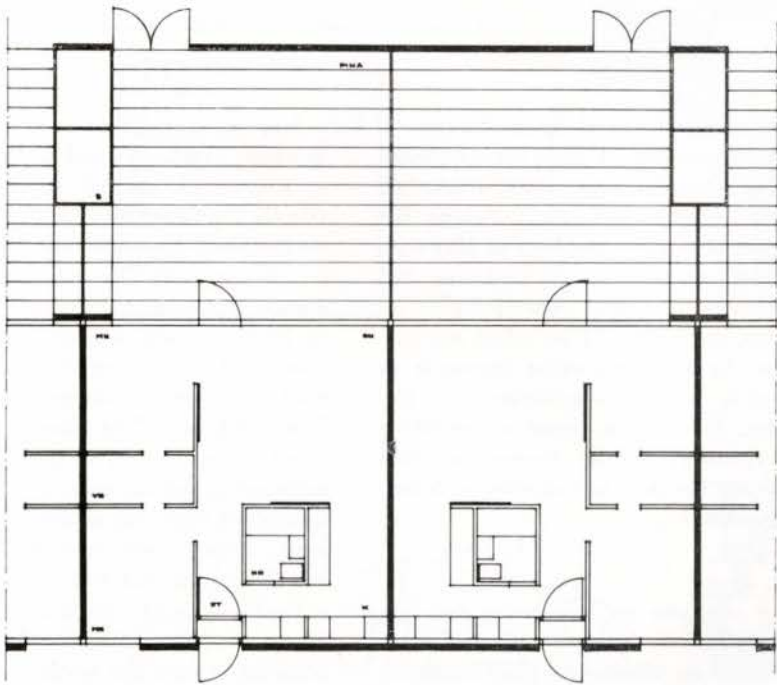
Historically speaking, the widespread application of the patio house (also known as atrium or court house) is attributable to the religious significance of its enclosed court, to economy in the use of land, and to the protection afforded its inhabitants from the extremes of weather. The latter two factors unequivocally account for a resurgence in this form of housing; patio house projects based on cellular patterns of L-shaped houses can be found all over Europe. Patio houses in Madrid at the San Blas project utilize thick masonry walls to provide cool interiors. The University of Edinburgh Housing Research Unit has sealed off their Prestonpans development from bitter sea winds and gloomy northern skies by parallel rows of patio houses with covered access ways between them. Further to the north at Blackshade, near Dundee, a similar development provides three hundred and fifteen patio type dwellings for eleven hundred and two people. Some of the patio houses may have an upper floor for additional bedrooms, such as the War-Office project at Talavera Park in Aldershot, but deviations from two-sided court enclosure are rare. The Finnish approach to the patio house contains all the finesse applied to other forms of HMH in that country. Recent "atrium" houses built at Espoo near Helsinki appear more like terraces than honeycombs, yet the intimacy and intrinsic charm of these dwellings far surpasses the Finns' own terrace house developments. On the whole, the British projects have reduced each dwelling unit to an anonymous role in an overall configuration of cubes: Continental and Scandinavian patio houses are more cautiously arranged in rows or irregular clusters so as not to stray too far from a desirable similarity to the detached house.



Housing at Zurich-Witikon. Cramer, Jaray, Paillard, architects



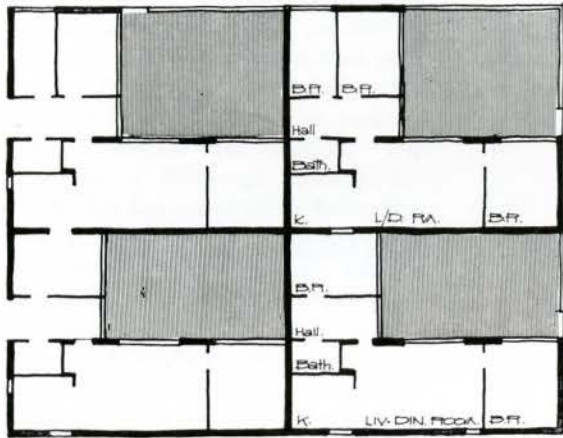
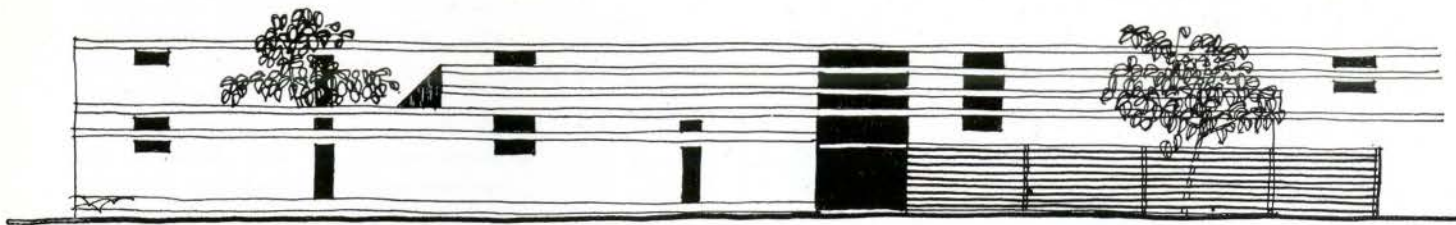
Atrium houses at Espoo, Finland



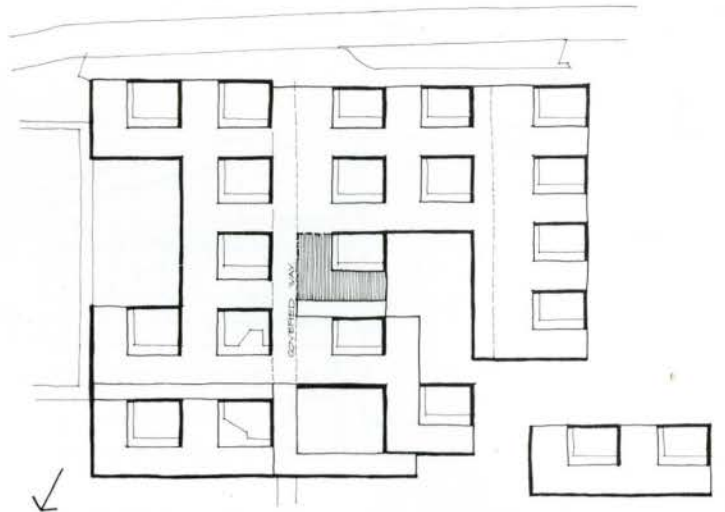
*Atrium house at Espoo
Plan of one storey house*



Patio house at San Blas, Madrid



*University of Edinburgh Housing Research Unit
Patio houses at Prestonpans, Scotland*



A growing unrest with the "solid volume" approach to architecture has marked housing as much as any other type. The simple geometric mass into which all functions have been squeezed reached its apogee of development more than a decade ago, and the current trend is to create as much interplay of small cubic volumes as is possible—a tendency often termed "Organized Confusion" by jocose critics of contemporary architecture. It is true that the obsession with broken planes and masses may be tantamount to style rather than principle; architects and laymen alike are bound to tire of the ludicrous shapes forced to buildings surfaces by the dictates of fashion. However, the articulation of building elements in housing can aid in the creation of both an urban intimacy and a variety of spatial experience. The brilliant Cedars Road project by the London County Council creates through its set-backs an infinite variety of spaces at the front and rear of the dwellings. There is nothing superficial about the handling of building shape here. Indeed, this sculptural richness is attained through the repetition of a simple block of maisonettes. The "Kingo" housing project at Elsinore in Denmark achieves

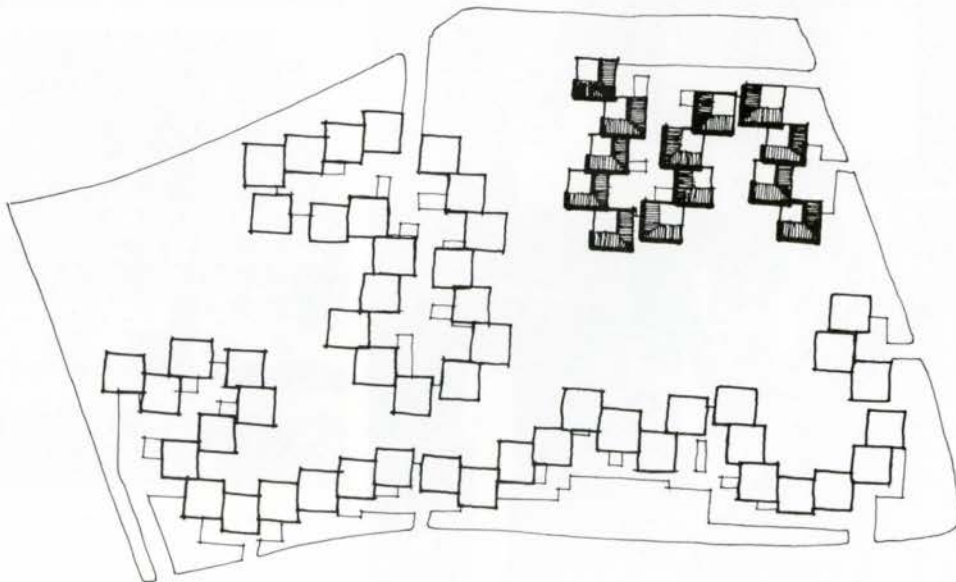
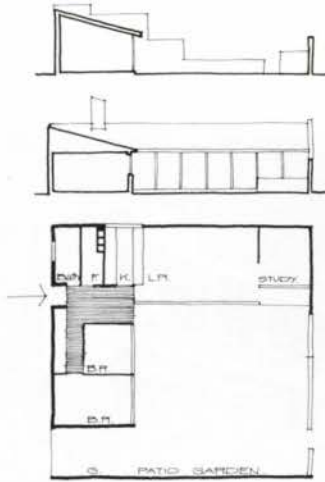
a similar richness of space through irregular grouping of patio houses around eight cul-de-sac type access roads. In other schemes throughout Europe the temptation of the architect to play with masses results in visual confusion and eventually boredom. Attempting to recreate the frenesy of an urban environment by a sculpturesque approach to housing suggests acquiescence to disorder. Surely it is better to provide a background for the diverse activities within cities than to construct an inflexible mould?

It is a curious yet inescapable fact that inhabitants of slums and blighted areas develop an affinity for the conditions which housing authorities so assiduously seek to eliminate. If you have ever lived in an industrial city, there is a certain romance in the play of sunlight through rising clouds of smoke and steam, among chimneys and smoke stacks. Layers of soot washed into streaks on red brick walls, rusted corrugated tin roofs, reddened sun shining through a heavy smoke haze—these things are beauty to the inhabitants of such cities. It has taken politicians, planners and architects

a long time to discover that sanitary quarters, fresh air and sunlight, and open space are not sufficient compensation for the "aesthetics" of the industrial environment, however unhealthy it may be. Stirling and Gowan's sensitive approach to rehousing the people displaced by Preston's slum clearance programme consists of maintaining the spirit of the yard, street terrace, and the alley of their former location. The external detailing has been very skillfully related to surrounding terrace houses; yet the similarities are suggested rather than elaborated. Sloped roofs, broken silhouettes, and the use of dark red bricks establish a harmony with the adjacent mid-Victorian terraces, while the internal planning reflects the needs of a people living in a prosperous, socialized country. This does not represent a dichotomy of feeling between the character of a building and its function; it reflects instead a continuity in the social and psychological forces which shape man's minds. The Preston re-housing project is a rare touch of humanism. There are too many codes and regulations, and 'dedicated' professionals within the realm of housing to permit such humanly sensitive projects a chance to survive.



Rehousing at Preston, Lancashire. Stirling and Gowan, architects



Kingo housing at Elsinore, Denmark

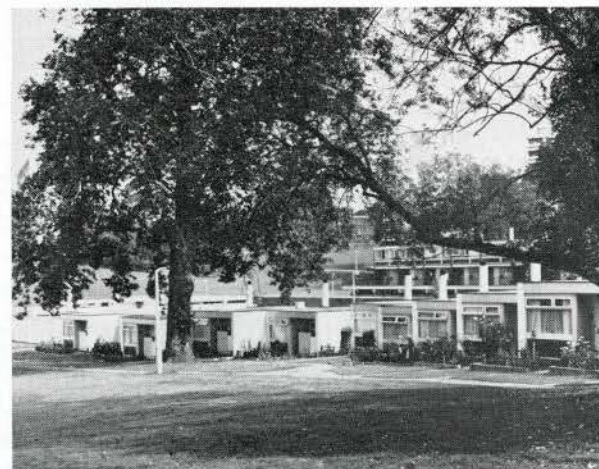
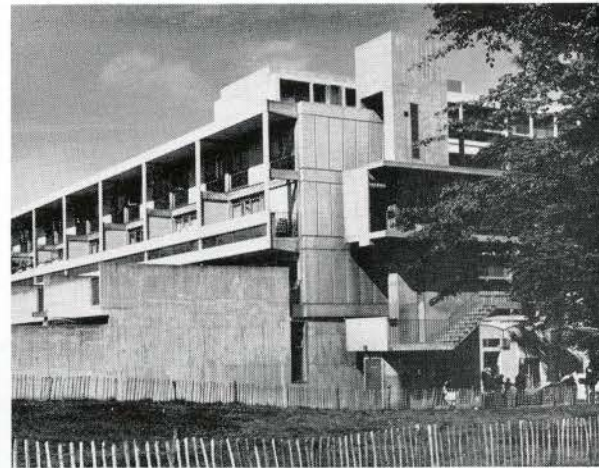
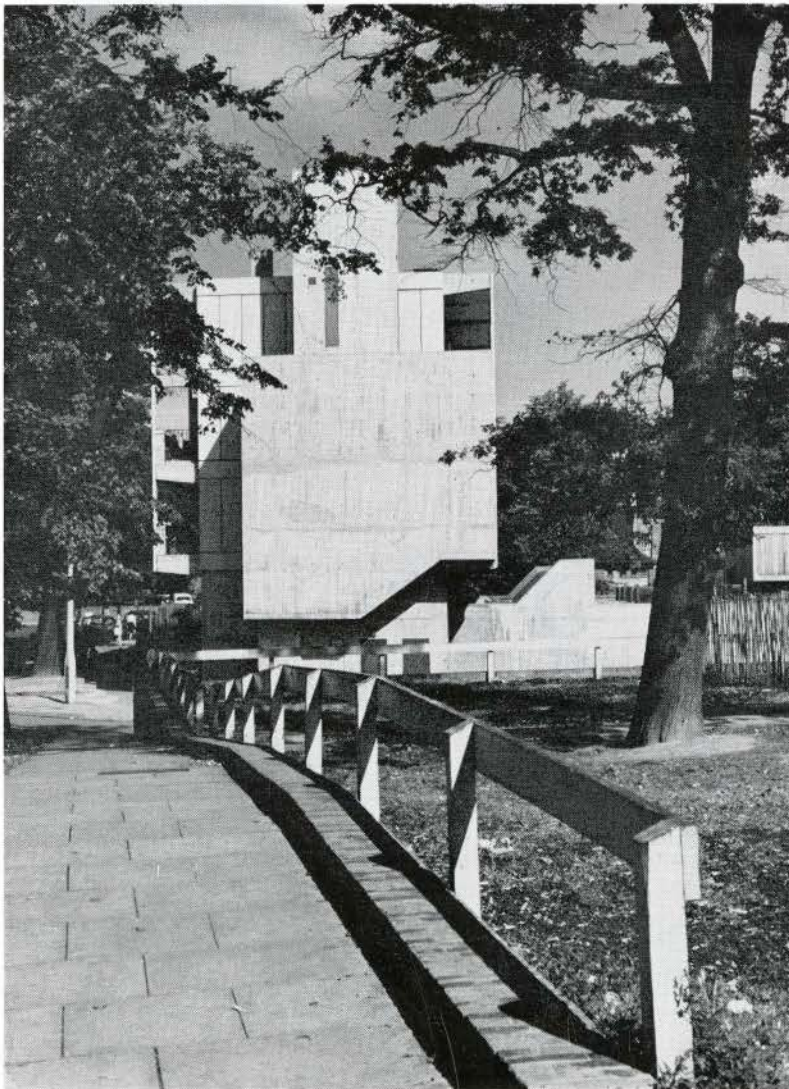
The most stimulating achievements in the realm of housing throughout the whole of the author's European experience were the Alton estates at Roehampton in London. Innovation in housing types combined with the exploitation of what must be one of the world's most handsome settings for public housing has produced an architecture of great influence within the realm of public housing. Many forms of HMH are represented in these estates through the use of terrace houses, maisonnettes and apartments.

The use of cubic forms in a picturesque landscape at Roehampton is a tradition which dates back to eighteenth century England. Alton East, started in 1952, is the earlier of the two estates, and displays a more informal treatment of the site than does Alton West, which was begun three years later. At Alton East the derivative influence of Swedish housing of the 1940's is clearly evident in the studied groupings of point blocks

and low-rise dwellings, and the widespread use of balconies. Alton West leans heavily on Le Corbusier's UNITE D'HABITATION built at Marseilles in 1952, and subsequent projects, for the source of its inspiration. That this is so becomes immediately apparent upon examination of the detailing and form of the high-rise maisonette and point blocks. Furthermore, sheer delight in the use of chunky, concrete shapes expresses the exuberance of so-called "Brutalist" style, of which Le Corbusier must be considered the prime instigator. Unfortunately, the term Brutalism is misleading since it implies a preoccupation with form only. In Roehampton the social, economic, and aesthetic problems of housing have been resolved with a sensitivity not yet attained elsewhere.

Most of the plan types conceived for Roehampton housing had been worked out and successfully applied in other

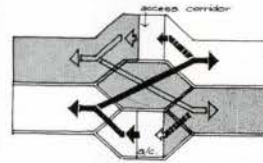
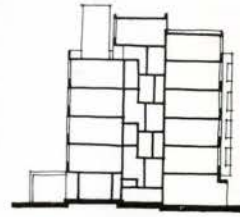
schemes before 1952. There are some good examples of two and three-storey terrace houses, and four-storey maisonettes. However, two building types at Alton West are of special interest here: Some single storey old peoples dwellings, and three-storey maisonettes above shops at the "village" end of the project. The old peoples dwellings — staggered white cubes following gently sloping lawns — introduce a touch of light heartedness among the severity of the regimented maisonette slabs and point blocks. The three-storey maisonettes unite commercial and residential activity in a manner advantageous to both. Indeed, through sensitive handling of scale and external detailing, the shopping centre concentrates a variety of housing types around a bustling urban space. Here is one place where some of the positive aspects of "Brutalism" have been utilized to create a continuity of feeling in a housing project.



*Alton West, Roehampton
Architect, London County Council*



*Cluster block at Bethnal Green
London, 1959. Denys Lasdun, architect*



*London County Council's "Scissors
Cross-over" Maisonettes, 1962*



The maisonette, like the apartment, need not differ in plan arrangement from low-rise to high-rise developments. Since most housing authorities try to give as many people as possible the advantages of a garden, it follows that most of the innovation in maisonette and apartment design will occur in high-density and therefore high-rise developments where terrace houses are not practical. In recent years there has been a tendency to increase densities and still keep the buildings close to the ground. (One piece of advice repeatedly given to the author in all countries visited: 'Do not design high-rise housing of you can attain the same densities by using terrace, patio or other forms of dwellings'. Arguments were always advanced to show the unsatisfactory economic, social and aesthetic qualities of high-rise developments) The London County Council has produced the "scissors cross-over maisonettes" to combine maximum flexi-

bility of site layout with economy of site use at high densities, flexibility of accommodation, and constructional economy. The maisonettes come in two versions: One is designed for use in tall blocks up to twenty-six storeys and the other is for use in six and a half storey blocks. An ingenious plan has been conceived whereby the middle third of each bay uses bathrooms and access corridors to avoid wastage of space. This "buffer zone" provides an acoustic barrier between the living and sleeping parts of the maisonette which have been contrived to occur always on the same side of the building. Two means of escape are provided through an interlocking system of maisonettes; it is possible to enter at one level, climb two dog-leg stairs, and leave at another corridor two storeys above. Unusually high densities of population can be provided with this system; two hundred persons per acre can be accommodated in schemes using the six and a

half storey maisonette block. Even at this density one half of the dwellings have garage space, and one quarter have gardens. Although the low-rise maisonette block requires elevators to service its upper corridors, two thirds of the building is accessible by foot. Its possibilities in HMH may soon become apparent as the L.C.C. erects its first scissors cross-over maisonettes at a London housing development. Denys Lasdun's cluster block at Bethnal Green in London unites the advantages of the point block (short distances between circulation point and apartments) with those of the slab blocks (orientation, cross ventilation, and light from two sides). The isolated circulation core houses stairs and elevators in the London scheme, but it could possibly contain laundry, storage and mechanical facilities in low-rise developments. It has been presented here because of its potential as a new form of HMH.

The apartment, or flat, forms the majority of dwelling types built in the average housing project in Europe. There are few fundamental variations in apartments, and in any case (as with most other forms of HMH in Europe) no major contributions have been made to the vernacular of apartment design since the inception of the modern movement in architecture before World War II. In Norway a Canadian-born graduate of McGill School of Architecture, Robert Esdaile, has built a block of apartments modelled on Le Corbusier's "Unite" scheme at Marseilles. The inclusion of ground floor shopping facilities and the use of rough concrete for structure and finished surface alike are reminiscent of the French architect's vertical city concept. In the other three Scandinavian countries many fine groups of low-rise flats have been conceived either separately or jointly with other dwelling types. Mention has already been made of the anonymous character of Finnish terrace houses; this same tendency toward simplicity of plan and massing, restrained detailing, and neutrality of color permeates low-rise apartment construction in Finland as well. However, the form of apartments in European housing is not as significant as the spaces created around them. Housing authorities are beginning to appreciate their responsibilities toward the total urban environment and this maturing attitude has resulted in a concentration on the nature of external space. Urban design, landscape design, and housing are now accepted as inseparable factors in the creation of a balanced residential environment. This has resulted in a gradual reduction of the size of apartment blocks and a more integrated approach to the problems of site planning and landscaping. The variety of spatial experience which characterized the L.C.C. Cedars Road project has become a constituent element in low-rise construction.



Apartments at Lauttasaari, Helsinki



Apartments at Lauttasaari, Helsinki

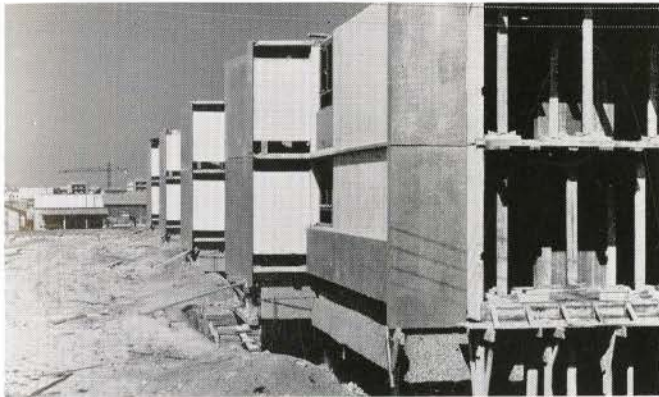


*Housing development
Bjornkollen, Oslo.
Robert Esdaile, architect*

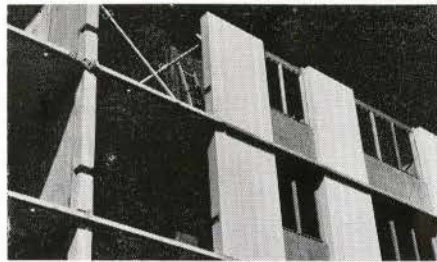
There is a sort of raw beauty in some of the housing projects. Others are frankly horrifying. The author was informed that the extent of architect-engineer collaboration on the detailed design was the extent to which the aesthetic potential of this system could be maximized. If the architect terminated his efforts at the establishment of an economical and repetitive plan type and then turned the design over to the Camus engineering office, he could be certain that only the practical aspects of slab jointing would be studied. The author was acutely conscious of later efforts by the French Ministry of Building to steer him away from some of the ugly and colossal pro-

jects scattered throughout Paris and France. French architects have failed to develop a scale and character in the use of prefabricated construction by which human social and psychological needs are properly expressed. A sense of identity is lacking in most projects even when special care is taken over the grouping and juxtaposition of buildings, or when curvilinear elements such as the undulating wall are introduced to create an informal atmosphere. There is also reason to believe that this insensitivity to scale comes from the traditional French capacity for architectural grandeur so well established at Versailles, and a tendency to design from an aerial view-

point. (Notice how architectural publications always show the famous housing developments at Bobigny and Pantin by aerial photography). At any rate, one is left with the impression that mechanization of the building process is detrimental to mankind. Not even the Danish Larsen-Neilsen system of pre-fabrication, which allows for more on-site variation and a smaller scale of operation, has managed to overcome the crushing presence of the machine. The evolution of architecture from the aesthetic of hand production to the aesthetic of machine production would seem to have accelerated beyond the capacity of the architects and engineers to cope with its social and psychological ramifications.



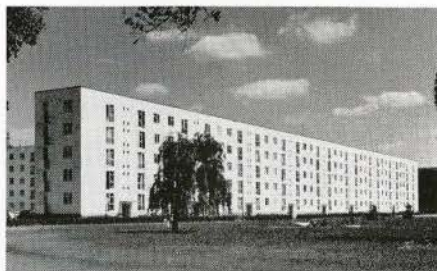
Camus system of prefabrication, France



Prefabrication applied to large scale housing Sarcelles, Paris



Camus system



Housing at Vernouillet

Considering the pressures incumbent on the average home owner to abandon the city for fresh air, a view of the countryside, and gracious living in a detached suburban house, Canadian HMH is surprisingly sophisticated. Irving Grossmans Flemingdon Park housing and the work of Jack Klein and Henry Sears in Ontario both show consummate skill in handling terraced construction of dwellings, even if the volute forms of some layouts appear self-conscious. The West Coast has proceeded along more conservative lines as its Parkwood Terrace in South Burnaby and Delbrook Garden Apartments in North Vancouver show. The apartments in these schemes are grouped around landscaped courtyards which become communal recreation spaces for children and adults. Central Mortgage and Housing Corporation approached the problem of HMH with considerable caution in Halifax's Mulgrove Park Scheme and Vancouver's MacLean Park and Skeena Street Schemes. However, working in cooperation with the Vancouver Firm of Duncan McNab and Associates on the Raymur Avenue Project, CMHC has produced a four storey maisonette block with continuous access galleries at the third storey level which recalls Sheffield's access streets on the Park Hill project. The narrow Raymur Avenue site has been developed into a sequence of varying spaces defined by three and four storey HMH. The spaces create a central mall which descends gradually from north to south by means of steps. The need for more compact and controlled housing developments is clearly apparent as urban sprawl around our major cities continues unabated. The question is: How long will it be before real estate promoters, civic authorities, and the ordinary citizen come to a realization of their responsibilities toward the urban environment?

SUMMARY:

Housing in Europe is entering into a period of "humanization". Attempts to break down the apparent volumes of buildings and introduce sequences of small and varying spaces point to a new awareness of the need for identity within the urban milieu. Surface treatments of buildings are being studied with greater sensitivity as to their effect on the residents of housing projects. This feeling for scale, proportion, and texture is also being supported by a movement toward

compact housing which is finding its expression through the re-introduction of well established housing types, principally the terrace house, and the patio, atrium or court house. Terrace house and patio house schemes tend to develop an anonymity of architectural expression much like the Georgian terraces of Bloomsbury and Bath; the significance of their universal appeal in housing may well indicate a maturing of attitudes toward the total residential environment, as opposed to a mere concern for the aesthetics of house grouping.

In new towns design, early concepts of optimum size, density and neighbourhood structure are being critically re-examined in the light of nearly two decades of experience. Recent projects show an increase in size and density, and an elimination of the "neighbourhood" altogether; in these projects the centre of the city is close enough to all other parts of the city to permit a maximum number of commercial, social, educational, recreational, and administrative facilities to become available to everyone. Indeed, increased density of development, combined with a desire to maximize contact with outdoor living space is rendering high-rise housing much less favourable than before. Consequently, HMH is the subject of renewed attention. In the next few decades the integration of housing into the urban environment will probably be achieved with HMH. When this happens our cities will once again assert those positive attitudes toward urbanization which are so characteristic of great civilizations of the past.

Peter Batchelor graduated with honors from the School of Architecture, University of British Columbia and was awarded the RAIC Medal in 1960. He is a member of the RAIC and was employed by the Vancouver firm of Duncan McNab and Associates. Mr Batchelor's study on Horizontal Multiple Housing was conducted by means of travelling fellowship in architecture awarded by the B.C. Electric Co. in 1961. At present Mr Batchelor is studying Civic Design on scholarship at the University of Pennsylvania.



*Raymur Housing Project, Vancouver, B.C.
CMHC and Duncan McNab and Associates*

Le jury s'est réuni à Québec pour juger les trente projets qui avaient été soumis par les architectes à travers le Canada.

Le programme était très complexe et exigeant et le niveau général des projets soumis n'a pas été aussi élevé qu'on pouvait s'y attendre.

Si les concurrents ont présenté des travaux souvent très élaborés, on ne remarque pas, par contre, une très grande recherche vers les solutions nouvelles et particulièrement en ce qui concerne les théâtres.

On se trouve souvent devant des redites et des clichés et nous pensions que plus d'efforts auraient été faits, surtout en ce qui concerne le théâtre expérimental.

Il en est de même pour la conception architecturale où la forme pour la forme prime sur l'esprit et le caractère de l'oeuvre. Souvent lorsque l'architecture est personnelle, elle est banale ou bien outrée, sinon elle n'est que pâle copie de tendances contemporaines.

Il ne semblerait pas non plus que l'on se soit vraiment soucié de s'intégrer au site. Il n'était pas question évidemment de s'intégrer au caractère des habitations du vieux Québec, puisque le site, tout en étant assez éloigné, va se transformer et que l'édifice projeté devra préfigurer l'avenir.

Bien que les plans aillent de l'ultra articulé à l'ultra simplifié et que l'on remarque souvent une juxtaposition des éléments plus qu'une recherche d'unité ils s'avèrent supérieurs aux façades. Et, dans la plupart des cas, on constate un étrange désaccord entre les plans et les façades.

Le budget prévu et le cubage demandé étaient certes très réduits, pour ne pas dire insuffisant et peu de concurrents se soucièrent de faire des recherches en fonction de ces restrictions.

De cette critique générale, il ressort que nous nous trouvons devant une présentation très inégale. Cinq de ces projets su plus ou moins éviter les critiques que nous formulions plus haut.

Deux projets se détachent nettement, celui de Victor Prus et celui de Jean Luc-Poulin & Emile Ayotte.

Il ne fut pas décerné de troisième prix. Trois autres projets reçurent des mentions.

VICTOR PRUS

L'architecte est à l'aise et trouve une solution simple à ce problème difficile. Ce projet par sa compacité et la simplicité des formes pourra répondre au budget limité. C'est une composition où chaque élément est à sa place et pourra se développer dans l'unité sans anarchie.

Le ministère des Affaires culturelles se réjouit d'être associé au projet qui rappellera la mémoire des Pères de la Confédération et qui dotera la capitale du Québec d'un monument qui sera le foyer des arts et des lettres.

En réunissant le Conservatoire de Québec à une salle de théâtre parfaitement équipée selon les techniques les plus modernes de l'art scénique, dans un ensemble qui sera utilitaire et beau, nous complétons le cycle logique de l'éducation à la création artistique. La vie culturelle du Canada français y trouvera un lieu propice à la formation et à l'illustration de ses riches talents.

The Minister of Cultural Affairs is happy to be associated with a project that recalls the memory of the Fathers of Confederation and endows the Capital of Quebec with a monument destined to become a home of arts and letters.

Beauty and utility will be united by joining the Conservatoire du Québec to a theatre perfectly equipped in accordance with the most modern stage techniques, and the logical cycle from education to artistic creation will be complete. The cultural life of French Canada will here find favourable ground for the growth and display of its rich talents.

Georges Lapalme
Ministre des Affaires Culturelles

Concours

Conservatoire du Québec

Competition

Jury:

Paul Rudolph, architecte, Directeur de l'Ecole d'Architecture, School of Art and Architecture, Université de Yale, New-Haven; Jacques Poliéri, metteur en scène-Scénographe, Centre Expérimental du Spectacle, Paris; J. A. Murray, FRAIC; Guy Fréqault, Sous-Ministre des Affaires Culturelles de la Province de Québec; Edouard Fiset, AIRAC, architecte en chef de l'Exposition Universelle de 1967; Henry Bernard, architecte DPLGF, Paris; André Blouin, MIRAC, Montréal, Conseiller Professionnel, Président du Jury.

Commentaire par A. Blouin, MIRAC

The jury met in Quebec City to judge thirty entries from all over Canada.

The program to be solved was extremely involved and demanding. Although there were several projects of merit, the general design level was not as high as could be expected.

Most candidates submitted very elaborate projects, but nothing new or creative emerged, particularly for the theatres.

Clichés and repetitions were often present and a greater effort was expected especially for the Experimental Theatre.

The same applies for the architectural concept where form for the sake of form has precedence on the spirit and character of the work. Often, when the architecture is more personal, it is either trite or extravagant, otherwise a pale copy of contemporary trends.

It does not seem either, that the candidates really cared to integrate with the site. It was not a matter, of course, to integrate with the character of the "Vieux Québec" houses, since the site,

being quite remote, will be transformed and the projected building will show the future.

Although the plans range from the overly articulated to the over-simplified, and often reveal more of a juxtaposition of elements than a search for unity, they are superior in quality to the elevations. And, in many cases, one finds a strange break between plans and elevations.

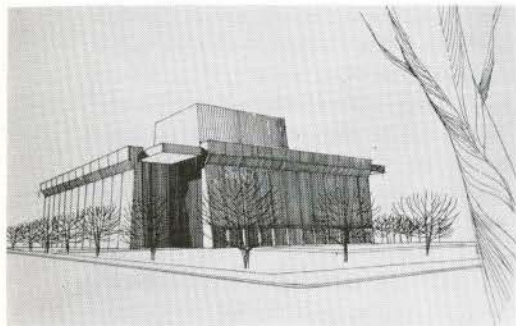
The budget provided and the cubage specified were very limited, not to say insufficient, and few candidates cared to orientate their research in function of these restrictions.

From the general comments, the inequality of the submissions stands out. Five of these have more or less avoided the above criticisms.

Two projects clearly stand out, one by Victor Prus, and one by Jean-Luc Poulin and Emile Ayotte.

No third prize was awarded. There were three mentions.

Premier Prix/First Prize



Le plan est exceptionnellement perceptif en sa manière de résoudre et d'organiser avec logique et clarté et flexibilité, les exigences multiples du bâtiment. La localisation des éléments communs aux deux salles est excellente et la superposition des salles permet l'intégration des foyers et des entrées.

La disposition du Conservatoire permet par une galerie dans l'auditorium, un très bon accès pour les étudiants.

Dominées par l'immense volume du Théâtre, les classes du Conservatoire peuvent s'étaler à l'aise, abritées, et, éventuellement s'adapter dans l'avenir à l'inévitable croissance du nombre d'élèves, il ne verrouille pas l'avenir et pourrait même se réaliser par étapes si cela était nécessaire.

L'implantation de l'édifice est bonne et forme le point final de l'extension des bâtiments gouvernementaux prévus sur la colline parlementaire.

Il faut noter aussi que dans ce projet le nombre de pièces et les dimensions correspondent exactement à ce qui était demandé dans le programme. Le rapport annexé au projet était très bien présenté de même que les considérations sur l'acoustique.

Ce projet pourra aisément être développé pour s'adapter au programme définitif et tenir compte des observations qui seront faites, notamment en ce qui concerne les liaisons verticales.

Et puisque ce projet a obtenu le premier prix et que suivra l'exécution, le jury formulera les conseils et les critiques de la manière la plus directe.

Le traitement uniforme des façades ne correspondant pas à l'asymétrie des

parties internes, il sera bon de les repenser. Les entrées et les sorties devront être plus étudiées et en fonction de la structure, la suppression d'une colonne pour donner une plus grande ouverture à l'entrée de service est une solution très discutable. Prévoir une relation plus cohérente de la base du bâtiment et des éléments au sol.

La forme enterrée du Conservatoire est le résultat d'une décision qui demande une expression plus forte, plus convaincante et plus voulue.

La disposition du projet sur l'axe ouest sud-ouest est bonne mais il ne faudrait pas qu'elle gêne dans le futur le développement du bloc nord-est de la cité parlementaire. Il serait préférable que l'édifice soit situé ou exactement dans l'axe du futur bâtiment ou alors plus près de St-Cyrille. Il serait nécessaire de resituer partiellement le stationnement pour améliorer la vue du salon de thé.

Les cours intérieures devraient pouvoir être agrandies et réétudiées, l'entrée encaissée de l'auditorium serait mieux plus dégagée, peut-être avec des pentes et non encaissée entre des murs.

Il sera nécessaire d'améliorer les circulations verticales entre l'auditorium et la salle d'Opéra, bien que le programme ne requiert pas d'escalier mécanique, il semble que cette solution devrait être envisagée.

Le foyer principal pourrait s'éclairer sur l'extérieur, non seulement par les angles, mais par la façade Est et il devrait être utilisé une plus grande quantité d'éclairage zénithal à travers les terrasses.

Il faudra prévoir des portes entre la salle et les foyers adjacents. Les foyers devraient être élargis en diminuant les vides.

L'emplacement prévu pour l'extension de l'art dramatique semble exiger qu'il soit construit en même temps que l'édifice. La position de cet élément devra donc être mise au point.

La structure qui paraît si évidente en élévation, doit l'être autant en plan, ce que le projet ne montre pas suffisamment. Le vestibule d'entrée de la salle d'Opéra devrait être agrandi et les entrées protégées des intempéries.

Il sera certainement possible à l'architecte d'apporter les modifications nécessitées par les recommandations qui précèdent. Il a su résoudre le problème posé d'une manière simple et plus que tout autre proposer des solutions scénographiques et des possibilités d'aménagement et de développement des espaces scéniques.

VICTOR PRUS

The architect found a simple solution to the problem. This project would fit into the limited budget due to its compactness and the simplicity of its forms. Its design is such that each element is in the right place, and each develops harmoniously within the whole.

The plan is exceptionally perceptive in solving and organizing with logic, clarity, and workability the demands of the building's multiple use.

The provision of production facilities common to both halls is excellent, and the stacking of the halls allows the integration of foyers and entrances.

Student access to the gallery of the auditorium is convenient and appropriate.

The classes of the conservatory, dominated by the immense volume of the theatre, can spread out comfortably, and eventually be adapted to the inevitable growth. It could even be realized in several stages if necessary.

The siting of the building is good and terminates well the foreseen extension of the Governmental buildings on the Cité parlementaire.

In this project the number and dimensions of rooms correspond exactly with the requirements of the program. The report submitted with the project was very well presented. Acoustical considerations were very well dealt with. This project can easily evolve to accommodate the final adjustments of the program and take into account different observations, such as those concerning vertical transportation.

As this project was awarded the first prize and will go through to construction, the jury has formulated its advice and criticisms in the most direct manner.

The uniform treatment of the façades not corresponding to the asymmetry of the internal parts, should be reconsidered. The entrances and exits need more study and the elimination of one column to give a larger service entrance is structurally a very debatable solution. A more coherent relationship between the base of the building and the major manipulations of grade should be provided.

The sunken form of the Conservatoire requires a stronger, more convincing and more voluntary expression.

The disposition of the building on the wsw axis is good but it should not cause constraint in the future the development of the north-eastern block of the "Cité parlementaire." It would be preferable either to center exactly the future building or to place it closer to St-Cyrille. It

Deuxième Prix/Second Prize

JEAN-LUC POULIN & EMILE AYOTTE

Ce projet a des qualités plastiques indéniables et tout en présentant un caractère tenant un peu de la forteresse, l'architecture est très forte et d'une grande poésie. L'organisation à angle droit de la Salle de Concert et de l'Auditorium bien qu'avantageuse pour l'organisation des spectacles rend difficile et terne le développement et la jonction des espaces réservés au public.

Le bâtiment souffre d'une sur-articulation de ses éléments et la complexité agitée qui en résulte semble manquer d'une organisation majeure. Cependant la forme résultante répond à la complexité fascinante du contexte actuel de Québec, sous cet aspect le bâtiment s'intégrerait très bien. L'entrée de l'Auditorium ayant été placée sur St-Cyrille, une trop grande importance est donnée à cette partie de l'édifice. Il y a un dilemme non résolu dans la disposition de l'entrée principale de l'Opéra qui est sans relation particulière avec la cour principale bordée par St-Cyrille et la rue Claire-Fontaine.

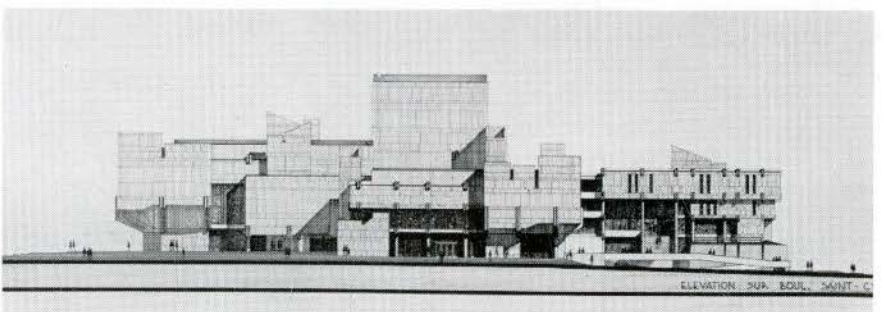
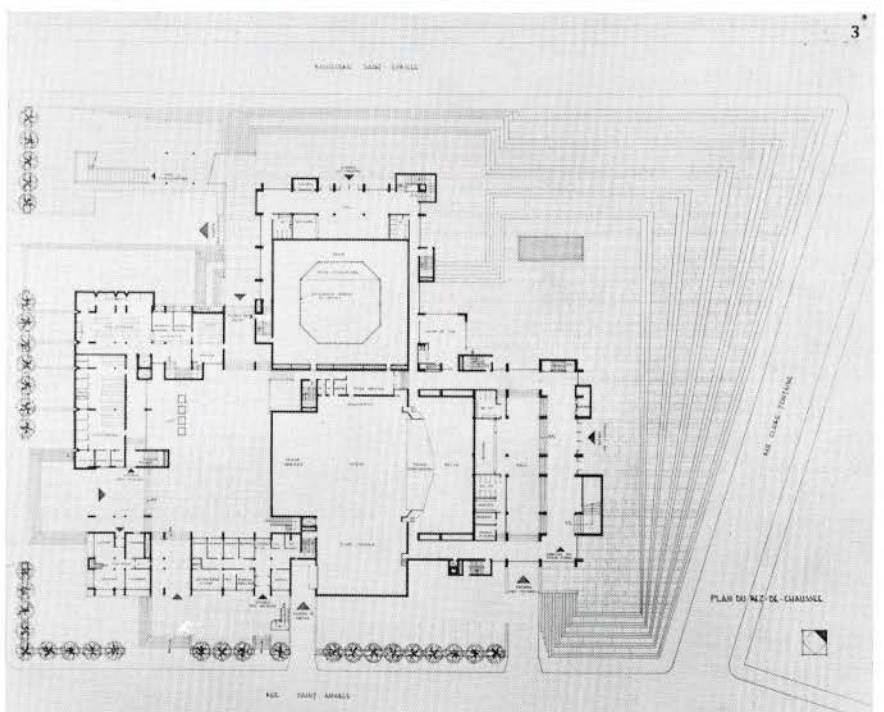
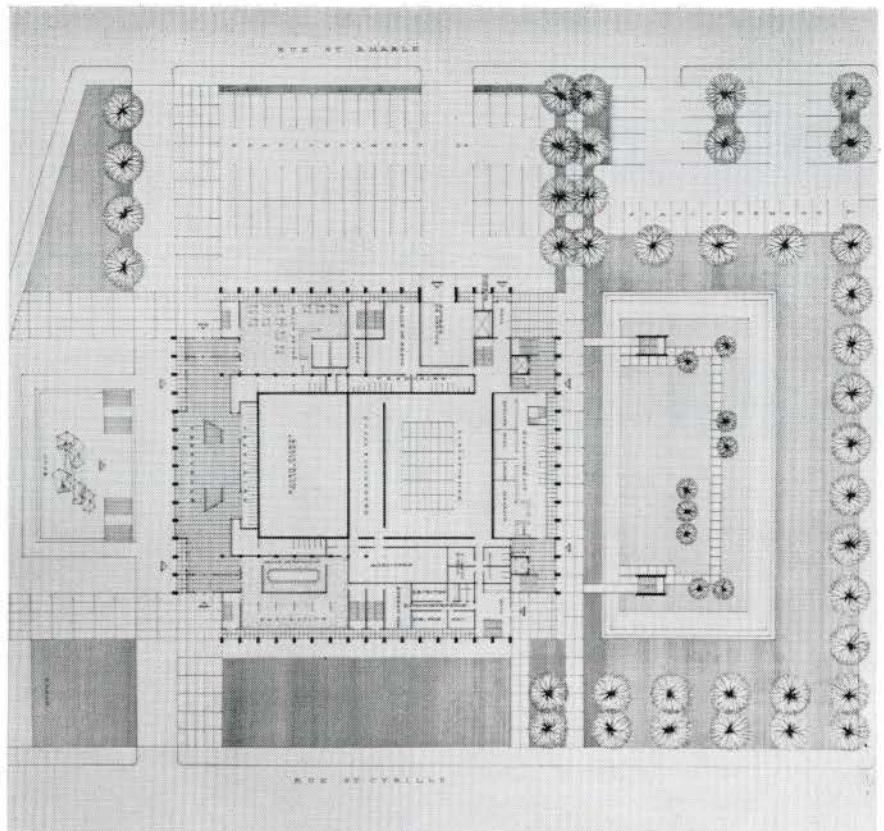
Ce projet n'a certainement pas la force du premier prix qui même s'il fut comparé à un temple, laisse penser par sa forme et par la force de son volume, qu'il est destiné à abriter des assemblées importantes.

JEAN-LUC POULIN & EMILE AYOTTE

This project has undeniable plastic qualities and although presenting a strong fortress-like character, the architecture expresses a great poetry.

The building suffers from over-articulation of its elements and in the resulting restless complexity any major organization or expressive proposal is either missing or obscure. However, the resulting form is responsive to the general fascinating complexity of the Quebec City scene; in this respect the building would fit well if it were not constructed on the Cité parlementaire. The entrance to the auditorium being placed on St-Cyrille, gives too great an importance to that part of the building. There is an unresolved dilemma in placing the main opera entry in no particular relation to the major court space bounded by St-Cyrille and Claire-Fontaine.

This project certainly does not have the strength of the first prize which although compared to a temple, suggests through its form and the strength of its volume, that it is meant to receive large assemblies.



Trois Mentions/ Three Mentions

ITSVAN MEZES

Projet très bien étudié, qualités plastiques de force et de caractère et recherche d'un grand parti sur un seul axe.

Le fait d'avoir posé les scènes dos à dos, avec l'entrée au centre, posa de grands problèmes, lesquels n'ont pas été complètement résolus.

Le terrain ne permettait pas de situer les trois éléments juxtaposés et sur un seul axe, mais l'étude en a été cependant très habilement faite.

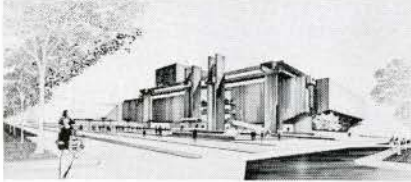
Bien que les éléments répartis de part et d'autre de l'axe soient dissemblables, la façade est traitée en symétrie.

Very well studied project, plastic qualities of strength and character, and research of a design on a single axis.

The fact of putting the stages back to back, with the entrance in the centre brought great problems, which have not been completely solved.

The site did not allow the juxtaposition of the three elements and a single axis, but the study was very cleverly made.

Although the elements on each side of the axis are different the façade is treated symmetrically.



ALAN BERNSTEIN, HARRY MAYEROVITCH,
AVRUM REGENSTREIF & ALLEN HICKLING

Finalité plastique de grande qualité et recherche très personnelle. L'auteur a pris volontairement les chemins les plus ardues et le louable effort vers l'unité n'a pas été poursuivi avec assez d'autorité. Il en résulte un désordre certain et des espaces intérieurs insuffisants.

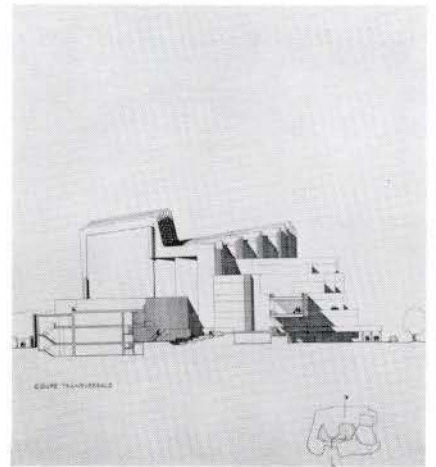
Bien que la disposition des scènes soit intéressante, le concurrent les a conçues uniquement à l'italienne.

La disposition des éléments du programme amène une complication dans la disposition des foyers et la forme de la salle d'Opéra très dynamique crée un volume rompant avec la rigidité d'une salle de forme conventionnelle.

Great plastic qualities and very personal research. The authors voluntarily took the most difficult ways, and the effort toward unity has not been followed with sufficient authority. From this results an evident disorder and insufficient interior spaces.

Although the disposition of the stages is interesting, the candidate has conceived them uniquely as proscenium stages.

The disposition of the elements of the program has brought complexity in the disposition of the foyers, and the very dynamic shape of the Opera House creates a volume breaking with the rigidity of the conventional hall.



GUY LAROCHE & JEAN RITCHOT

Grandes qualités de franchise et de clarté. La salle d'Opéra est bien traitée, mais les volumes de l'ensemble sont chaotiques, le terrain mal utilisé et le Conservatoire défavorisé.

Le parti est à peu près le même que celui du deuxième prix, mais bien moins intégré et les éléments manquant de liens entre eux.

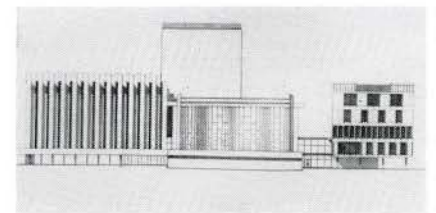
Il est vraiment surprenant que le concurrent ait placé son stationnement dans l'angle des rues St-Cyrille et Claire-Fontaine, là où le deuxième prix avait disposé terrasses et jardins.

La cage de scène de la Salle d'Opéra est trop haute et les dessous de scène trop importants et le fait d'avoir voulu couvrir les volumes par une structure générale entraîne une augmentation inutile du cubage.

Great qualities of frankness and clarity. The Opera Hall is well treated, but the volumes of the whole are chaotic, the site poorly utilized, the Conservatory is unfavoured.

The "parti" is about the same as the second prize, but not as well integrated and the elements are not tied together. It is very surprising that this candidate placed his parking lot at the corner of St-Cyrille and Claire-Fontaine where the second prize had placed terraces and gardens.

The stage-house of the Opera House is too high and the understage spaces too large. The fact of covering all the volumes with a general structure increased uselessly the cubage.



Le Jury s'est réuni pendant deux jours entiers pour choisir les lauréats parmi les quarante deux projets qui furent présentés.

Le Jury a été favorablement impressionné par la somme de travail fournie par tous les concurrents et la qualité des dessins soumis.

Le nombre de dessins requis dans le programme était de beaucoup moins important que celui soumis par les concurrents. Le programme mentionnait que ce concours était destiné à choisir un architecte. Le jury attachait donc une importance primordiale dans la recherche de l'architecte qui aurait le mieux interprété l'esprit du programme et trouvé le caractère de dignité, d'unité, de puissance requis par la destination et le site.

L'opinion du jury est que le pavillon du Québec doit être d'une qualité exceptionnelle par son parti, ses formes et son traitement architectural.

Les membres du Jury sont d'avis que parmi tous les projets qui lui ont été soumis, seul le Premier Prix offre ces caractéristiques et ces possibilités et bien que les autres projets primés fassent preuve de qualité et d'intérêt, ils ne pourraient constituer des oeuvres marquantes et représenter ainsi l'image que le Québec veut présenter au monde.

Le Jury a d'autre part remarqué que très peu de concurrents avait tenu compte du cubage fixé dans le programme, soit que le cubage soit inférieur mais les services incomplets, soit que le cubage se soit avéré après vérification plus élevé que prévu.

En conséquence, le Premier Prix, outre ses nombreuses qualités et qui offre de grandes possibilités de flexibilité, devra se conformer aux exigences du programme sans que la puissance de la composition en soit affectée.

Premier Prix/First Prize

LOUIS J. PAPINEAU, MICHEL LE BLANC,
GUY GERIN-LAJOIE ET LUC DURAND

Ce projet a été désigné à l'unanimité par le Jury.

Ses qualités d'originalité, de puissance, de sobriété, d'harmonie et de technique avancée concourront à en faire le symbole de la Province de Québec.

Les architectes ont été particulièrement conscients de l'intégration de ce bâtiment au site par l'adjonction de plans d'eau

L'Exposition Universelle de Montréal est pour le Québec une occasion unique d'affirmer sa vitalité économique et culturelle aux yeux de l'univers.

En définitive, c'est un ensemble de travaux gigantesques, auxquels le Gouvernement du Québec participe déjà activement, que viendra couronner, le 28 avril 1967, l'inauguration de l'Exposition et l'ouverture du Pavillon du Québec.

Si l'on tient compte du rôle d'hôte que le Québec jouera en 1967 à l'égard d'une quarantaine de nations, il est facile de comprendre l'importance qu'aura ce Pavillon, dont le but véritable est de présenter aux visiteurs venus de tous les points du globe une image exaltante, mais authentique, du Québec.

D'autre part il importe, croyons-nous, d'insister sur le caractère essentiel du futur Pavillon: sa permanence. Cet édifice, qui aura été en quelque sorte le

témoin de la nation pendant six mois, deviendra dès 1968, l'un des pôles de la vie culturelle de Montréal.

C'est donc un jalon important, dans l'essor du Québec, qu'il nous faudra poser au cours des trois prochaines années.

Jean Lesage
Premier Ministre du Québec

Le Gouvernement du Québec invite tous les membres de l'Association des Architectes de la Province de Québec, résidant dans la Province, à participer à un concours esquisse, d'une étape, pour le "Pavillon du Québec", à l'Exposition Universelle et Internationale de 1967, à Montréal, et conformément aux présents règlements.

Cet édifice permanent sera ensuite utilisé, après reconversion, comme Musée d'Art Contemporain et Conservatoire de Musique et d'Art dramatique.

Concours

Pavillon du Québec

Competition

Jury:

Edouard Fiset, AIRAC, architecte en chef de l'Exposition Universelle et Internationale de 1967; Léopold Fontaine, AIRAC, architecte en chef du Ministère des Travaux publics du Gouvernement du Québec; Jean Oceau, Commissaire du Pavillon du Québec à l'Exposition Universelle et Internationale de 1967; John C. Parkin, FRAIC, Toronto; Guy Robert, Directeur du Musée d'Art Contemporain de Montréal; Jean Vallerand, Secrétaire général du Conservatoire de Musique et d'Art Dramatique de Montréal; André Blouin, MIRAC, Montréal, Conseiller professionnel et Président du Jury.

complémentaires et l'usage du grand toit terrasse en relation avec les verticales de circulation leur a permis de trouver un espace supplémentaire pour des activités extérieures, avec une vue sur la ville et sur le fleuve.

Le volume simple du bâtiment, son esthétique imposante, sa symétrie vont permettre une intégration des plus heureuses avec les autres pavillons de l'Exposition.

Après l'Exposition, quel que soit l'environnement, il saura s'intégrer au site. Le choix du parti offre de grandes possibilités de flexibilité aux différents étages. Les fonctions tout en étant séparées trouvent par la disposition des circulations verticales des jonctions rapides et bien réparties.

Le Jury a particulièrement remarqué

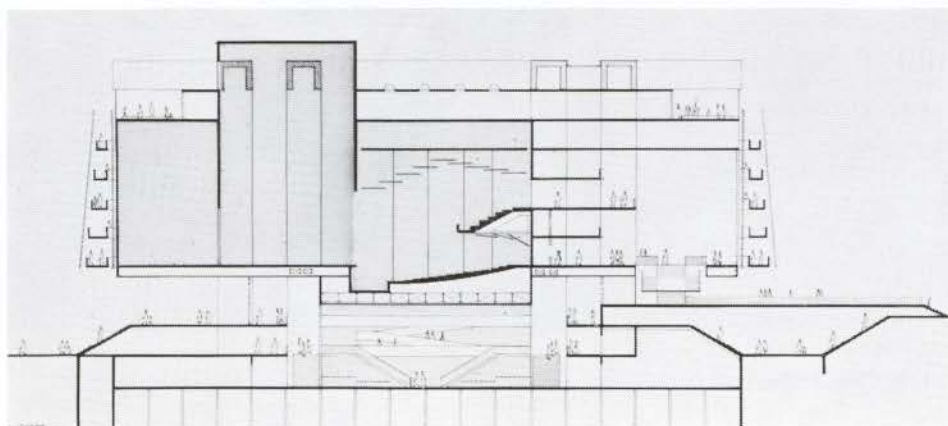
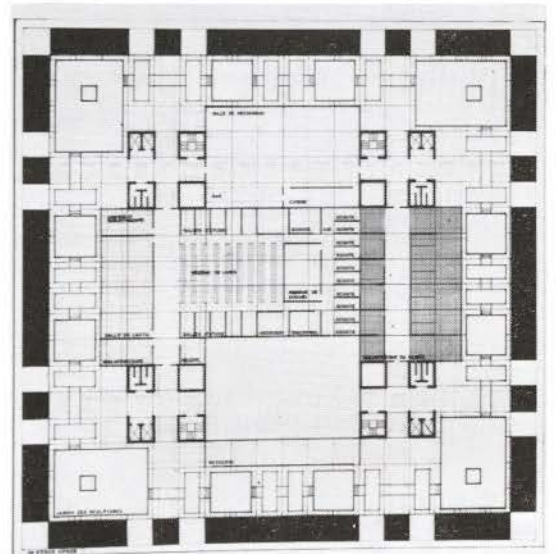
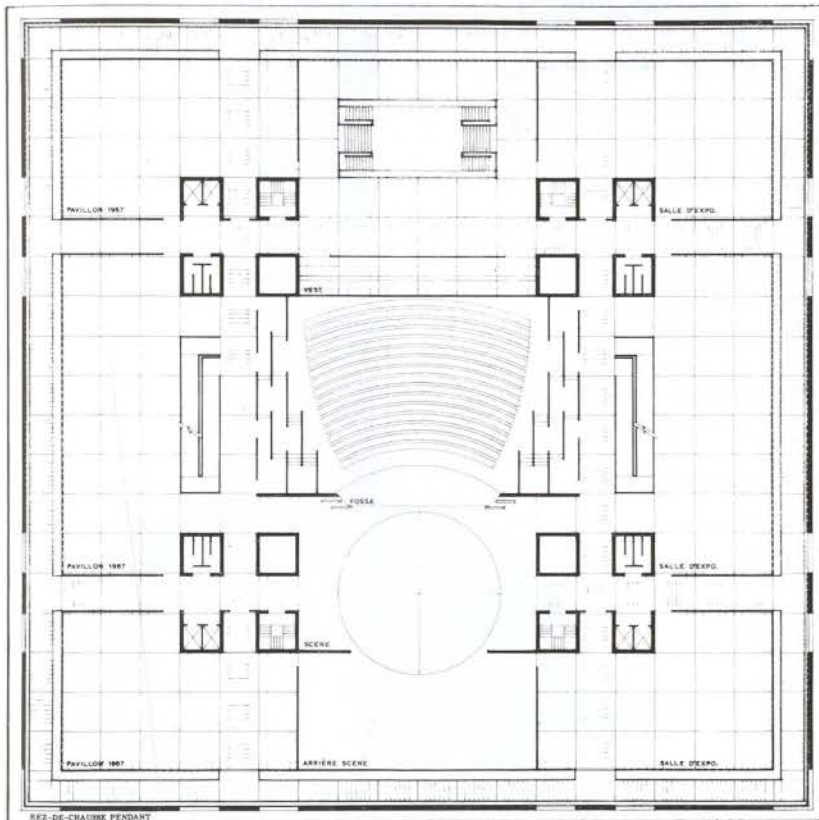
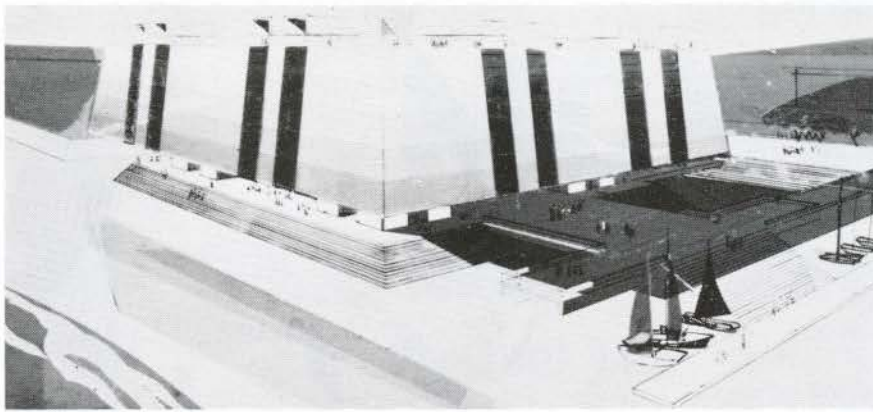
la puissance du système structural préconisé, qui, tout en étant seulement esquissé, laisse présager une solution technique de haute qualité.

Malgré toutes les qualités énumérées, ce projet devra être révisé pour rencontrer les exigences du programme. Le cubage et la surface de plancher devront être réduits.

La systématisation de double étages avec mezzanine a augmenté de beaucoup le cubage et, s'il est bon de conserver cette expression architecturale, son emploi pourra être réduit, ce qui diminuera le nombre d'étages.

Les scènes latérales pourraient être réduites de hauteur.

L'emploi du verre devra être très sérieusement étudié pour des raisons d'éclairage, de sécurité et d'entretien.



Deuxième Prix/Second Prize

BERNARD ROSEN, IRVING CARUSO,
ANDRÉ VECSEI ET JOHN SCHREIBER

Le Jury a été très impressionné par la qualité de cette étude, la judicieuse disposition de tous les éléments. Cependant, on dénote une certaine tendance à la complexité.

L'accès et la circulation sont très bien pensés pendant et après l'exposition et les plans dénotent une connaissance profonde du domaine théâtral.

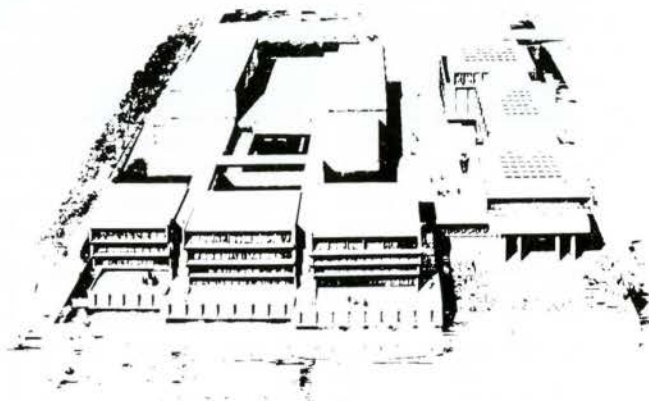
Le niveau des terrasses a été traité d'une manière particulièrement attrayante et la proposition qui a été faite pour l'utilisation du Conservatoire pendant l'Exposition est très bien pensée.

Le traitement architectural manque d'unité pour des raisons de complexité dans les masses et de multiplicité des traitements des façades.

L'intégration au site est plus valable vers la lagune que vers les autres côtés.

La disposition du plan et le traitement des élévations des théâtres ne constituent pas ce qu'on attend d'une telle entrée.

Le caractère universitaire de cette architecture pourrait manquer de force pour s'intégrer au site et ne répondrait pas pendant l'Exposition, en tant que Pavillon, à une représentation de la Province, telle qu'elle a été envisagée.



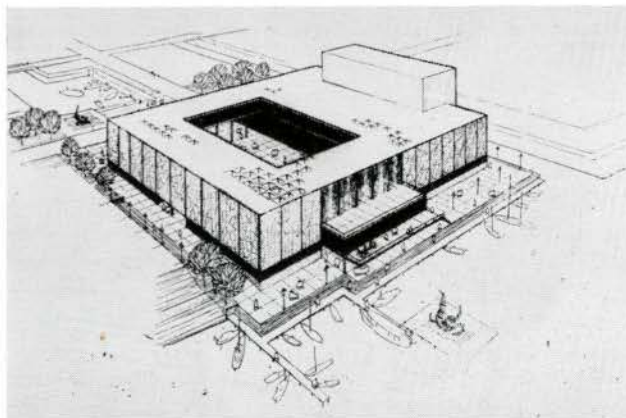
Troisième Prix/Third Prize

GILLES MARCHAND & CLAUDE LONGPRE

Plan très clair, très ouvert. Architecture valable pendant et après l'Exposition. Les fonctions sont bien réparties et le grand jardin intérieur permet un éclairage de toutes les parties de l'édifice.

La façade telle que conçue présente une grande unité mais elle est malheureusement rompue par les cages de scène des théâtres qui forment un élément d'intégration difficile avec les bâtiments de l'autre côté du canal (Pavillon français). Cette façade n'offre pas cependant le caractère de dignité qu'une telle construction requiert.

Le théâtre expérimental est à l'étroit et ne pourrait se suffire de ce petit espace. La surface réservée aux services du musée et du théâtre est beaucoup trop restreinte.



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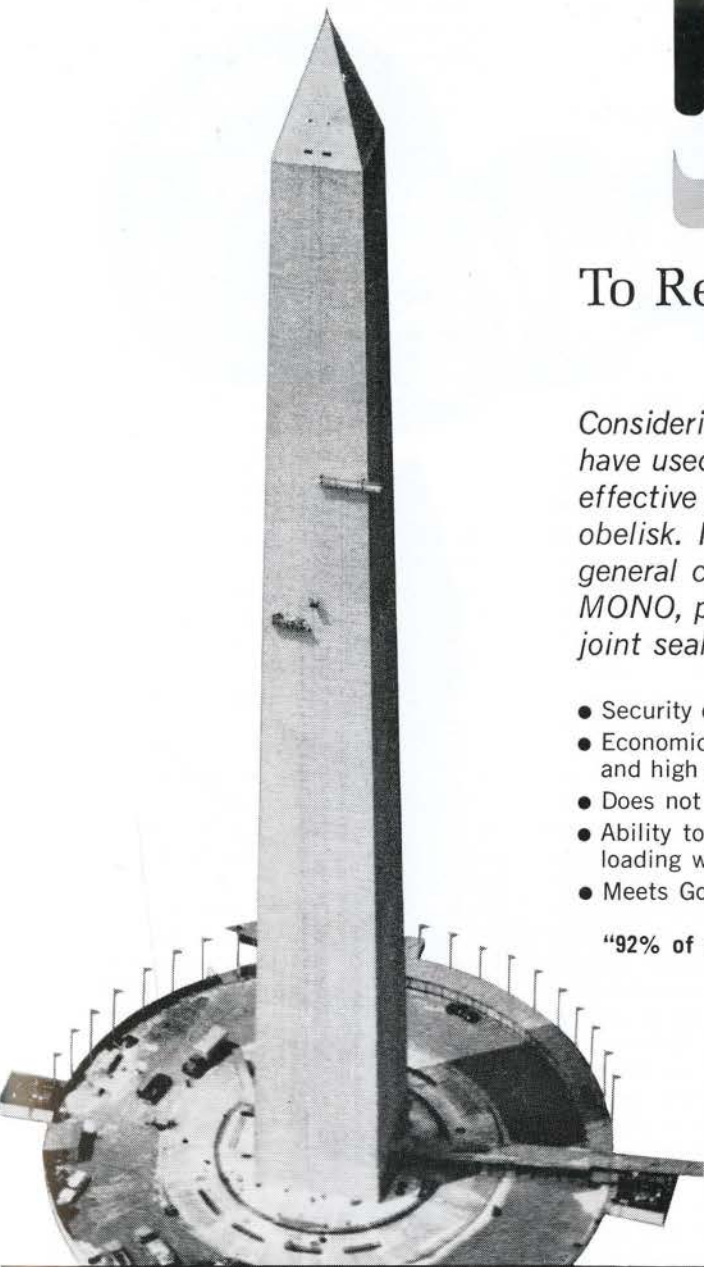
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- Toronto City Hall, Toronto, Ontario**
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"Fibreglass Reinforced Plastics", known in the trade as "FRP", is well known and much used by many industries. It is firmly entrenched in the marine field, having virtually taken over the 14 to 18 foot runabout boat field, and great strides are being made in the manufacture of commercial, military and sailing vessels of much greater dimensions. FRP is also much used in seating, while as a corrosion resistant material it is widely used in the pulp and paper, petrochemical and chemical processing industries where conventional materials have not been able to stand up. It is widely accepted in the transportation field for military, commercial, construction and off-road vehicles and in this connection is perhaps best known to the general public for its use in a few production line sports cars.

Other uses of FRP include electrical equipment, containers, material handling equipment, sculpture, aircraft, missiles, consumer goods and sports equipment. A significant increase in these uses is indicated daily.

But the eyes of the FRP industry are focused on the greatest opportunity of all—The Construction Industry—where in recent years there has been much activity and interest in the use of the material in all branches of the industry. If the reader has not yet become involved in design considerations involving the use of FRP, there is no doubt that he will very soon. The potential use of this material in construction is great. The only thing that seems to be holding back its rapid progress is the time it takes to train qualified personnel and fabricators to meet the exacting demands of this industry.

The following discussion is intended to acquaint the reader with the characteristics of FRP, indicate current architectural uses and suggest possible future construction applications.

What is FRP

Simply said, Fiberglass Reinforced Plastics is a controlled man-made duplication of wood, but FRP realizes much more of its theoretical maximum strength because it does not have the random

Technical Column

Edited by Douglas H. Lee

Fiberglass Reinforced Plastics in Architecture

by J. K. D. Richardson, BA Sc., M Comm., P Eng.

Part One - Next Issue, comments by John Spence, MRAIC

characteristics that Nature imposes on her creations. Both wood and FRP can be described as two-phase materials because they are a combination of two dissimilar materials with widely differing strengths and elastic characteristics. Wood is composed of high strength cellulose and low modulus lignin. In FRP, high strength glass fibers, one-tenth the diameter of a human hair, are surrounded by a low modulus plastic. Reinforced concrete is another good analogy to FRP where the steel in the concrete functions in the same manner as the glass in the plastic.

FRP is a very versatile material as it can be tailored to fulfill many different performance requirements. The glass reinforcement may be obtained in the form of continuous strands, chopped strands, mats, woven rovings or fabrics. These may be used in any combination in any number of plastics such as polyesters, epoxies, silicones, acrylics, furans, to name a few, to achieve optimum characteristics for any given situation.

What can FRP do

From the architects point of view, the most important characteristic of FRP is its ability to be a translucent structural material which can be controlled in colour and intensity. It has an extremely high strength to weight ratio in tension. FRP has an elongation of only one to three percent and therefore, its yield and ultimate strength occur at the same point on the stress/strain curve. Although this enables a completely tested structure to be designed to the

ultimate strength of the material, Hossdorf designed an FRP Shell structure for the Swiss National Exhibition with a safety factor of six against rupture (1). This is because of the absence of a plastic region in the material to dissipate local overstress.

The Young's modulus of FRP is relatively low compared to other materials of similar strength, being of the order of 1.5×10^5 . This will depend on the type and orientation of the reinforcement.

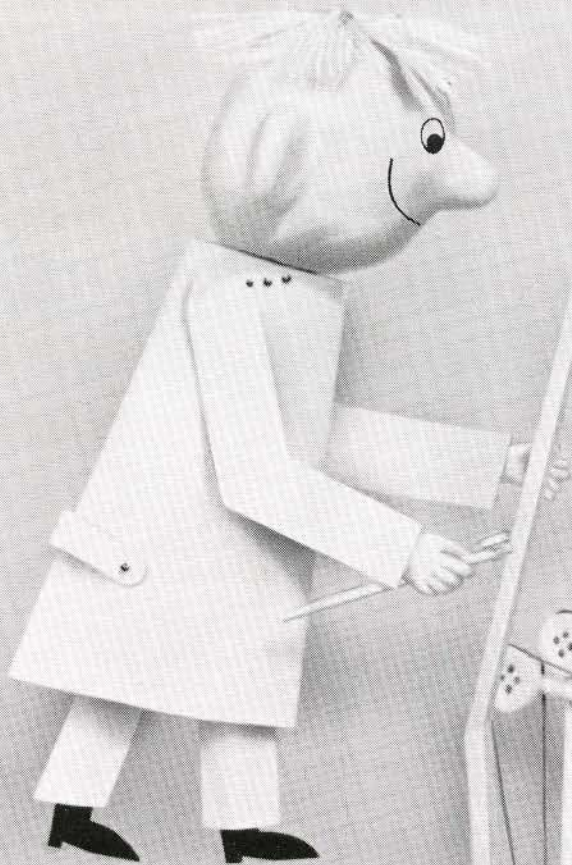
Gibbs and Cox (2) performed extensive tests on various types of laminates and illustrative structural properties reported by them, are given in Table 1.

It can be seen that as a structural material the most efficient use of FRP will be realized in a structure working purely, as much as possible, in tension and designed without stress concentration. From a cost standpoint, FRP appears to be a very expensive material. Costs range from about 50 to 60 cents a square foot for mass-produced flat sheet to \$4.00 per square foot and higher for high performance sandwich panels. However, if available, corollary savings are taken advantage of, the erected costs and long term benefits make FRP keenly competitive for many designs. Some of the advantages that FRP offers the architectural field are:—

It is non-corrosive, requires less finishing than many other materials. It allows accurate detail, enables moulded-in colour, can be decorative. It is translucent, comes in a wide variety of surface finishes. Large single pieces can be made.

Laminate	Normal Weight % Glass	Specific Gravity	Angle of Load with Warp.	TENSION			COMPRESSION			FLEXURE		SHEAR		
				Strength*	Modulus*	Poisson Ratio	Strength*	Modulus*	Poisson Ratio	Strength*	Modulus*	Strength*	Modulus*	Inter-laminar
				p.s.i. x10 ³	p.s.i. x10 ⁶		p.s.i. x10 ³	p.s.i. x10 ⁶		p.s.i. x10 ³	p.s.i. x10 ⁶	p.s.i. x10 ³	p.s.i. x10 ⁶	p.s.i. x10 ³
2 oz./ft ² Mat	23	1.31	all	11.6	0.91	0.32	16.9	0.93	0.42	20.5	0.85	9.9	—	2.8
25-27 oz./yd ² Woven roving	51	1.64	45 90	40.8 10.1 37.6	2.48 1.24 2.28	0.14 0.65 0.11	17.0 10.8 17.0	2.45 1.13 2.34	0.25 — 0.25	31.1 13.5 31.1	2.57 1.12 2.51	9.6 — 13.6	— — 0.45	2.6 — —

*Strength and modulus are average values for short-time tests on samples which had been immersed in water at room temperature for 39 days. These results are assumed to be representative of material properties after long exposure to wet or humid service conditions.



“Doctor, what am I going to do about all these cavities?”

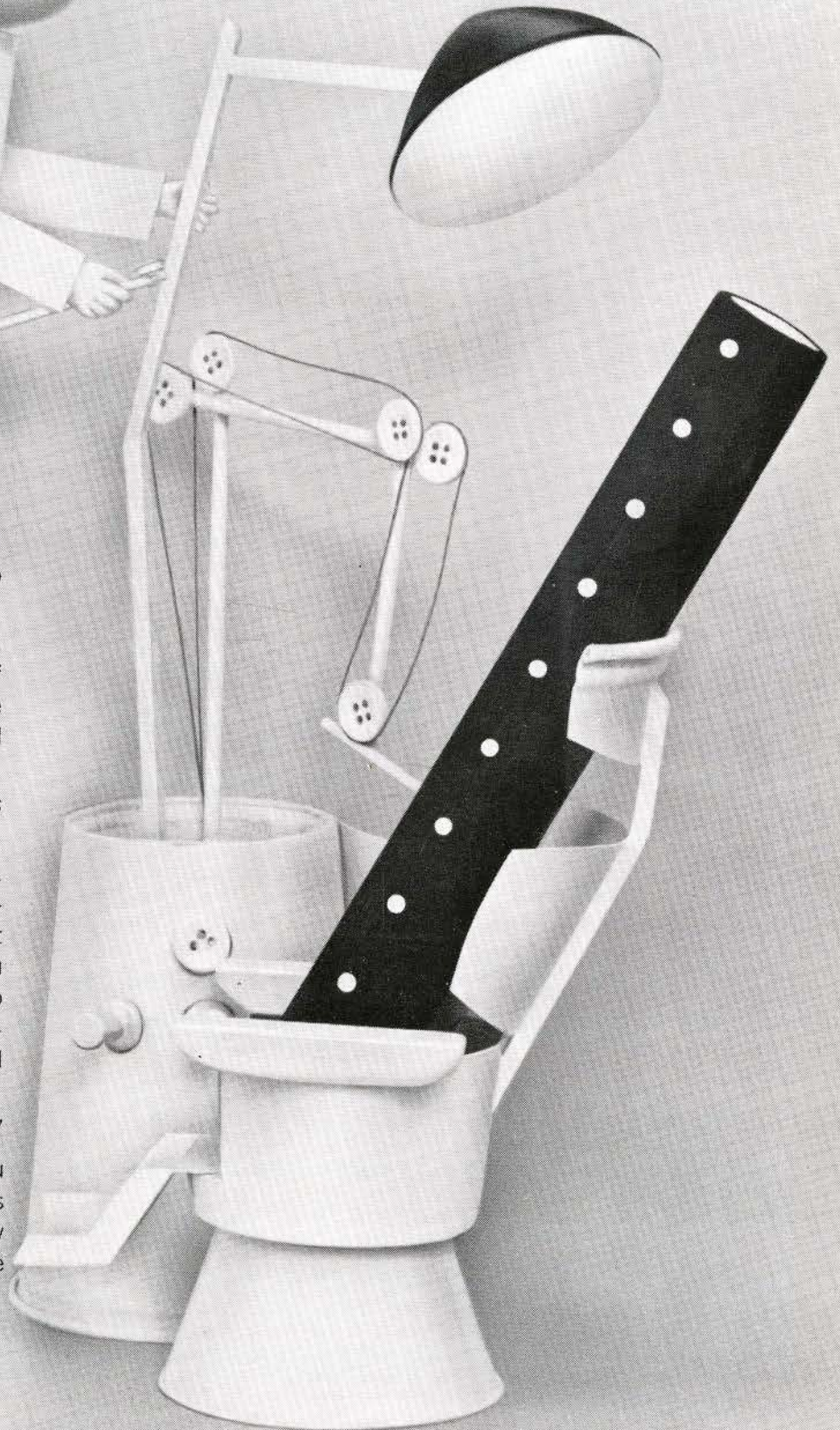
“And beautiful specimens they are, too. Fine, clean-cut cavities. Not a trace of decay around the edges. That’s the beauty of NO-CO-RODE Perforated Drainage Pipe.”

“But Doctor, I always thought cavities were an unhealthy sign.”

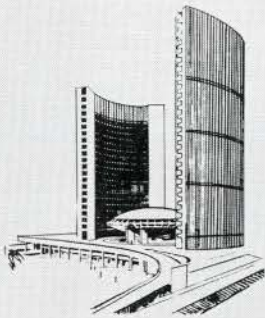
“Not in your case, Mr. NO-CO-RODE. You’ve been watching too many TV commercials. Regular cavities are just what the drainage expert ordered. And you have the best that money can buy. Two even rows of ½” holes on 4” centres—120° apart for uniform seepage and drainage.”

“So you think I’m in good shape, doctor?”

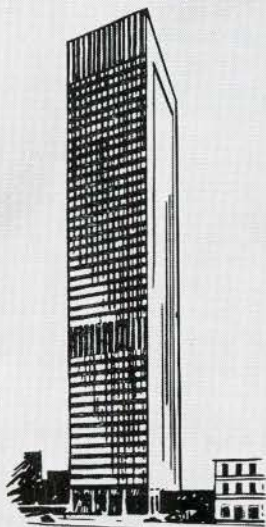
“Good shape? Why, I’d recommend you to anybody. And to go even further, it’s my personal opinion—unproved by any test—that you get 42% better drainage with NO-CO-RODE cavities. ”



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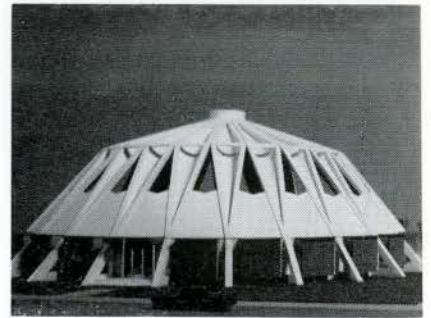
It has great strength, good dimensional stability, and higher insulation value than any other material it replaces. It is light weight, requires low maintenance. Its lightness allows small footings, ease of erection, and portability in finished structure.

Where is FRP used

FRP is used where any one, or a combination of the above characteristics is mandatory in a structure.

Flat and corrugated sheets in a wide variety of profiles and colours are available from stock. These materials as well as aluminum core sandwich panels have found wide application as residential patio roofs, industrial glazing and curtain of its light diffusing characteristics as well as its resistance to vandal breakage. For similar reasons Industrial companies are using the material extensively. Skylights, street furniture, planters, litter bins, light fixtures are other FRP products available from stock.

FRP concrete forms, both the waffle pan type and the specialty type, are rapidly reaching a point of domination in this area. Two recent structures to use FRP waffle pans were Place Victoria in Montreal and Toronto's new International Airport. The Church of St. Barbara in Montreal's suburban Ville La Salle used FRP to precast 24 identical 17 ton hyperbolic paraboloid concrete shells. Many architects have made extensive use of FRP to achieve dramatic effects. Frank Lloyd Wright used FRP panels to sheath the Beth Sholom tower. Edward Stone used sandwich panels to cover the 300 foot circular roof of the U.S. pavilion at the 1958 Brussels World Fair in a similar manner that Philip Johnson used the same material to cover the New York State Pavilion's 240 foot by 320 foot roof at the current Fair in New York. Also at New York, Charles Luckman achieved a striking stained glass effect on the 320 foot square United States Pavilion by back lighting specially



Church of St Barbara, Ville La Salle, Architect, John Bird. FRP forms used to precast hyperbolic paraboloid concrete shells.

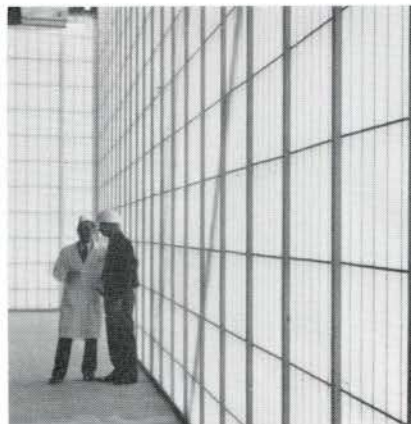
designed FRP panels that completely enclose the 50 foot high building.

FRP finds wide application in structures using compound curves. Its easy formability combined with modular construction concepts makes it ideal for domes and patterned curtain walls. With the use of rib stiffeners, it is ideally suited for shell structures. Its corrosion resistant characteristics are utilized for ductwork and fans in buildings that handle corrosive fumes such as laboratories and chemical processing plants.

How to use FRP

Being a young industry, FRP has not yet reached the stage where all the information required by an architect to incorporate this material into a structure has been gathered into a handbook. The information in many cases does exist but it is scattered throughout so many different references, that unless one has an extensive library and a thorough knowledge of the references along with an intimate knowledge of FRP's mechanical and physical properties and the technical training to evaluate the information; it is most difficult to design with the material with any degree of assurance. Fortunately, there are people in the industry who do have the experience to engineer structures that will satisfy the requirements of the architect's design. The usual method for bringing an FRP structure into existence is as follows:

1. The architect should establish the design criteria of a structure and considers FRP as one of the materials that may satisfy his requirements.
2. Contact is made with a reputable fabricator with experience in the construction industry or if one is not known, with a raw material supplier, who can direct the enquirer to a fabricator. At this time the feasibility of the project is determined and a rough estimate of the cost is established.
3. If the architect selects FRP, he should now obtain quotations on engineering and fabricating the structure. He may wish to do this in two steps and circulate engineered drawings for competitive bids or he may wish to combine the steps and



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weigh competitive bids for both engineering and fabricating.

4. The architect should require the fabricator to quote on an installed price as the fabricator is in the best position to determine the savings possible that accrue because of the ease of handling this light weight material. If for some reason, such as distance, it is not practicable for the fabricator to make the installation, the fabricator should be required to explain erection techniques to all general contractors quoting on the job. If savings are to be realized from the ease of handling of FRP, they must be taken off when the job is being bid.

5. The architect should require the fabricator to supply test data on the strength, stiffness and hardness properties of the structure before shipping. ASTM tests D-638, D-790, D-695 and D-732 P are available for checking strength and stiffness properties.

The testing mentioned in step 5 above is very important. It is acknowledged by those who have used FRP in architectural applications that the assurance of high quality materials can only be obtained with the co-operation of an experienced reputable fabricator. Even so, when Gibbs and Cox (2) made extensive investigations of FRP structural properties, they found a considerable range of strength properties in exactly the same laminates when made by different experienced fabricators. For this reason in-process quality control and the facilities for final testing are prerequisites for selecting a fabricator.

The future of FRP

The growth of FRP in the architectural and construction field can be best seen by its use at world's fairs. At the 1958 Brussels Fair Edward Stone's U.S. Pavilion was the only major application. At Seattle in 1962 there were about two dozen applications and at the New York World's Fair there are hundreds of well designed uses of the material. It is anticipated that this trend will continue on to Expo '67. From these fairs the information that can be readily applied to industry at large.

REFERENCES:

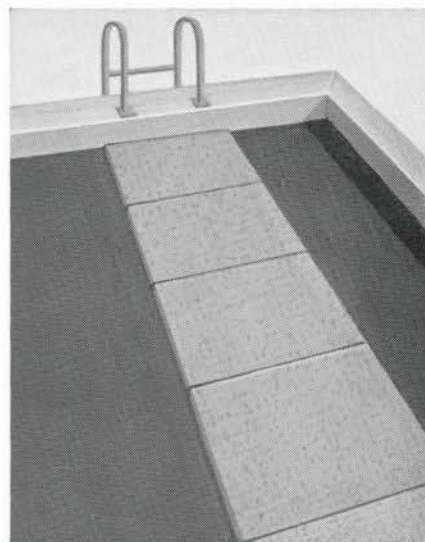
- (1) *Hienz Hosdorf* — "Plastic Shell structure for the Swiss National Exhibition in 1964" — *World Conference on Shell Structures* — National Academy of Sciences — National Research Council — Washington, D.C. publication No. 1187 — pp 63-68.
- (2) *Gibbs & Cox Inc.* — *Marine Design Manual for Fiberglass Reinforced Plastics* — McGraw-Hill, New York, 1960.

SPECIFY

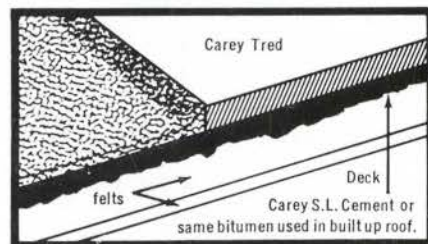
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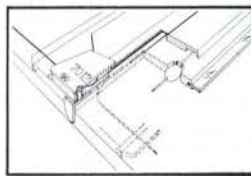
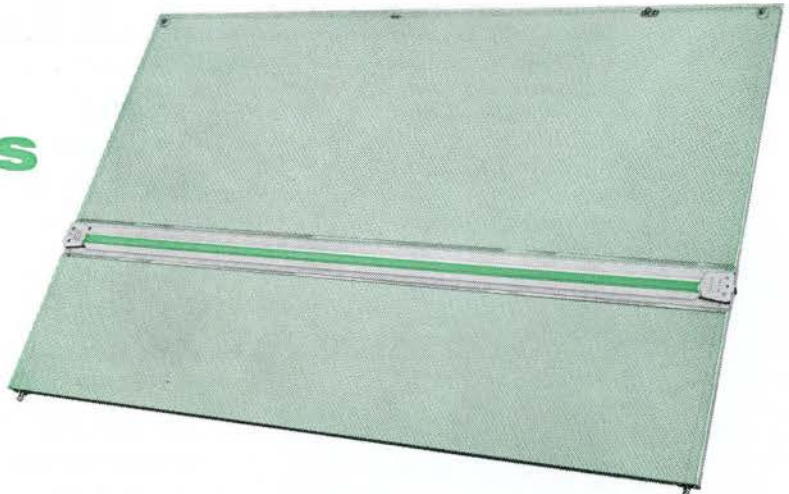
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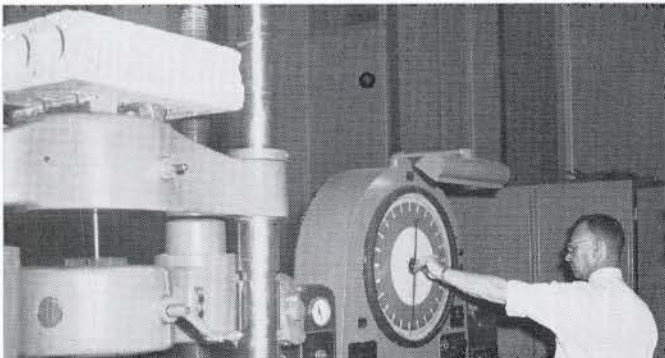
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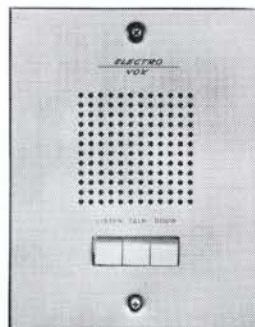
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AIBC Annual Meeting

The RAIC investigation into the state of the architectural profession in Canada was described as the most important activity of the Royal Institute in many years, by Robert W. Siddall (F), retiring president, in his report to the 50th annual meeting of the Architectural Institute of British Columbia in Vancouver, December 5-7. Members would recall, he said, his comments and exhortations at the last annual meeting in Victoria about future directions and the necessity of adapting. Fortunately, the attitude of the RAIC membership changed substantially between 1963 and 1964. "At the Assembly in St Andrews, NB, in June we received details of the first steps to be taken on what is planned as a very deep and intensive investigation of the state of the profession and its needs in the world today. Accordingly, the activities of the AIBC in this respect largely ceased, as we were very much agreed that the proper way to conduct the basic examination proposed was at a national level. We have, therefore, done everything possible to cooperate with the RAIC Committee on the Profession in the undertaking of the investigation." Mr. Siddall admitted, however, to considerable surprise and some mortification at a recent report which indicated that British Columbia had returned the lowest percentage of replies to the questionnaires mailed to members of the Institute throughout Canada, and he urged members who had not yet done so to complete the questionnaires and mail them to either the AIBC office or to the RAIC Committee on the Profession, 50 Park Road, Toronto. Referring to the AIBC Bylaws, Mr. Siddall said that the difficulty in obtaining two relatively minor revisions to the Bylaws was indicative of the problems which faced the Institute in any major change which might be contemplated. Also, a severe, although perhaps not completely surprising setback had been received in 1964 when the appeal to the Supreme Court of Canada in the case of the AIBC *vs* Francour Construction was refused. Others might be better equipped to comment upon the significance of this particular case, he said, but to him it emphasized one point very clearly — that it was impossible to rely on legislation and law to preserve the architect's situation. 1964 attitudes towards the rights of the individual and to property rights and towards the privileges of a profession are such that we could expect less and less of the "protection" that professions had in former years. "The success of our future lies in our own talents — not in the law", he said.

His comments regarding the law applied equally to relations with the engineering profession, continued Mr Siddall. "While we get along very well with the Council of the Engineering Institute and the

members of the Consultants' Division, it becomes increasingly plain that we are unlikely ever to reach accord between the professions regarding the boundaries of our work (if indeed these boundaries should be defined). My opinion regarding the futility of this search is reinforced by the fact that the situation is almost identical across Canada". The President of the Alberta Association had found the situation to be the same in that province, stating "although . . . there is mutual appreciation of the responsibilities of the two professions, we must face the fact that the engineering profession has nothing to gain by agreement to such a proposition". For the future, Mr Siddall suggested that the problem was most likely to be solved by the further blurring of the boundaries between the two professions as a result of combined practices between architects and engineers, rather than by definition.

Continued negotiations were reported with the building industry and contractor's association to improve methods and the various agreements and standards under which most work is done. Victoria has established an architect-contractor committee.

A great deal of time was taken up in Council meetings on matters of ethics and discipline, and while members might generally be of an opinion that little or nothing effective is done, they should realize that tangible and conclusive evidence of infractions was required from members before Council could act.

Of Warnett Kennedy, the Executive Director, Mr Siddall said the AIBC was fortunate to have an architect in this position willing and able to speak out, even though one did not always agree with his comments.

Mr Siddall, who retired after eight years on Council the last two as president, was succeeded by R. S. Nairne, Vancouver. John Dayton was elected vice-president, and F. T. Hollingsworth, Richard Hale,

William Rhone and Robert Harrison were named to Council.

The President RAIC, Dr F. Bruce Brown (F), Toronto, extended the best wishes of the RAIC to the AIBC on attaining its fiftieth birthday, and outlined the steps being taken by the Institute to better serve the membership and the profession. The principal speaker was Henry Hill, San Francisco architect, who found an exuberance and enthusiasm in Vancouver and saw in the frontier spirit of conquering an extraordinary physical area a challenge to be understood and utilized by the architect. He warned, however, against a repetition of the mistakes made in the development of American cities, particularly against bigness, and urged group effort by architects to counter the pressures which lead to bigness. High rise apartments were not, in Mr Hill's opinion, a solution to the urban housing problem, but the high cost of land, building and services were forcing people into them in a way which would have serious social and political consequences and would profoundly affect family life. He did not know an alternative to high rise mass housing, but saw in prefabrication and in new methods and materials the best hope for a return to the economic, single family residence.

The convention opened with a spirited panel discussion on urban redevelopment in which Robert Williams, Vancouver town planner and two UBC professors, Phillip White, commerce, and Dr Lionel Tiger, anthropology, ripped into the architects for showing lack of: community responsibility, public responsibility, concern with the past, neglect of the present, and indifference to the future. They also only worked for money. The architects retorted that the professors showed a lot of ignorance about architects. The moderator, Prof. Henry Elder, head of UBC School of Architecture, said that areas of ignorance were challenges that must be faced.

New officers of the AIBC: Left to right, seated: John Dayton, vice-president; Ron Nairne, president; Warnett Kennedy, executive director. Standing: Councillors Fred T. Hollingsworth, Richard Hale, William Rhone, Robert Harrison.



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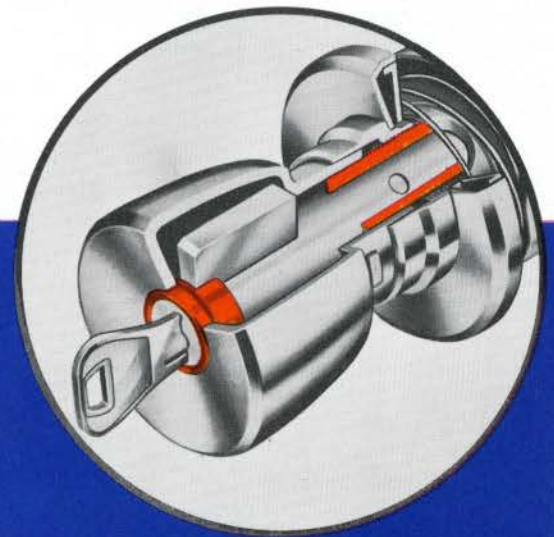
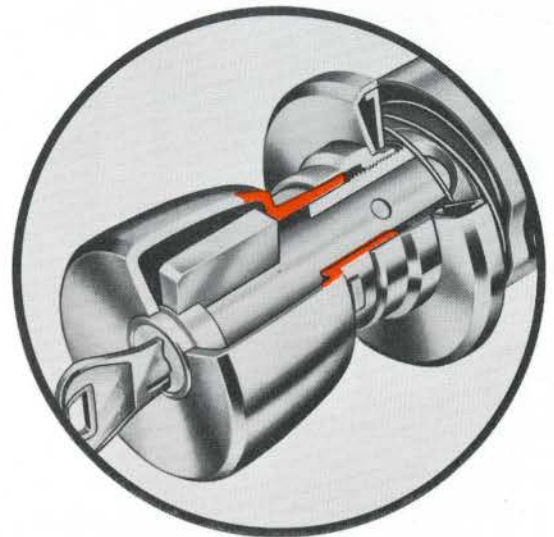
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The final session of the special general meeting of the *Journal* Editorial Board in Toronto 30-31 October last was largely devoted to discussions on the role of the *Journal* in the furtherance of RAIC activities and policies. The subject was of particular importance because the members present, who represented all parts of Canada, were conscious of the fact that the preliminary work on the Survey of the Profession being conducted by the RAIC Committee on the Profession undoubtedly would reveal those areas to which the *Journal* should devote its chief effort in support of Institute activities.

P. M. Keenleyside, chairman of the Editorial Board's sub-committee on this topic, in preparing his recommendations, was able to draw upon the experience he had gained travelling with Prof. W. G. Raymore throughout Ontario and Western Canada on the Survey of the Profession during the past summer. He found a lack of intercommunication between Provincial Associations on problems of mutual interest in the sense that the method and progress in attacking a problem in one province might not be known to other provinces, and the handicaps under which the profession operated in some provinces might not be fully known or appreciated elsewhere. Members and committees were struggling with the same problems, at the same time, in Vancouver, Regina and Montreal. Co-operation with the professional engineers and with the contracting industry was essential.

He observed that a great many changes have and are taking place that affect the profession, and a number of cross-currents and parallel currents have developed that affect the conditions of practice and the profession as a whole. Among these are the facts that (a) a number of firms work in many provinces (b) the number of national clients has increased (c) owner-builders now work in many provinces (d) specialization of architectural firms has occurred (e) registration requirements vary greatly from province to province.

As the *Journal* was the only means (apart from RAIC news letters) of regular communications within the profession, he felt one of its principle responsibilities was to help resolve problems and assist in raising the quality of service provided by the profession. Many of the problems could only be uncovered by a member of the profession.

The *Journal* should therefore give greater coverage on important aspects of the profession, including informative reports on activities of RAIC committees and activities of committees of provincial organizations — It should speak on matters of national import on public and private

RAIC Survey of Profession Will Reveal New Tasks for Journal

Report on Journal's Role in Support of Institute Activities and Programs Emphasizes Importance of Intercommunication between Provincial Associations and Exchange of Information on Problems Common to all Parts of Canada

action, and send copies of such articles to interested or affected parties outside the profession — — Institute and Provincial news should not be two separate departments — — The report on the profession, now being prepared by the committee on the profession, should generate a number of topics for professional articles — — Articles and papers given outside the profession that have a bearing on the profession, in its largest sense, should be considered for publication.

Mr Keenleyside concluded by saying that the *Journal* required a statement of its aims and policies to be published in every issue, and recommended the following "*The Journal is published for and by the architectural profession in Canada. The profession is a self-selected, self-disciplined group of individuals who hold themselves out to the public as possessing a special skill derived from education and training and who are prepared to exercise that skill primarily in the interests of others. The most important function of a professional institution lies in the supervision of standards of individual competence and of professional practice. No professional man can evade the obligation to contribute to the advancement of his own group. His own knowledge is part of a common fund, an inheritance which he fully shares but to which he is obliged to add.*"

A general discussion followed on the situations in the different provinces and the problems common to all, including building codes and mechanics' liens acts. The chairman, H. D. R. Buck, raised the point of the *Journal* taking a stand on public questions of concern to the profession, and cited as an example the report commissioned by the *Journal* of Dr D. Styliaras of Winnipeg which examined the CPR's proposed redevelopment plan

for central Calgary. Extra copies of the report, published with the co-operation of the Alberta Association of Architects, were made available to Alberta architects.

"*Suggested New Departments*" Sub-Committee, under the chairmanship of Alexander B. Leman, examined a considerable number of topics, and, after discussion the meeting decided to explore the possibilities in four suggested new departments, (1) urban design, (2) architectural research, (3) the international field—Commonwealth and International Union of Architects affairs, and underdeveloped countries, (4) architecture and legislation.

"*Suggested Topics for Issues*" Sub-Committee under the chairmanship of Peter Allward, proposed 14 topics to be investigated for publication.

"*Regular or Semi-Regular Departments*" Sub-Committee under the chairmanship of Douglas B. Brown, proposed that Institute and Provincial News be combined under one heading and made more comprehensive and more should be asked of RAIC Headquarters and of Provincial Associations.

There was some discussion on the regular appearance of columns, and it was felt some distinction should be made between regular and intermittent publication. Mr Tremblay felt it would be helpful to publish information on new legislation affecting architects; for example it would be desirable to promote adoption of the National Building Code in all provinces. Summing up, the chairman said he felt the meeting had been very successful and, personally, he felt it should be a regular event. Alton Bowers, Calgary, said he expressed the feelings of the out of town members that the meetings had been most worthwhile, and should result in great benefit to the *Journal*.

The Brantford City Hall competition, limited to architects registered in Ontario, was won by Michael M. Kopsa, Toronto. Second prize was given to Gerald Robinson (with Michael Hough, landscape) Toronto; and third prize to Mark, Musselman, McIntyre of Brantford. Thirty-eight of the 104 architects who registered submitted entries.

Judging took place on January 19 1965. The jury consisted of Dr E. R. Arthur, FRAIC, Chairman; Charles Trudeau, MRAIC, Montreal; John Andrews, MRAIC, Toronto; Ronald Thom, MRAIC, Toronto, and Jack I. Brown, former Brantford alderman representing the City Council. Details of the winning design and the second and third awards will be presented in the March *Journal*.

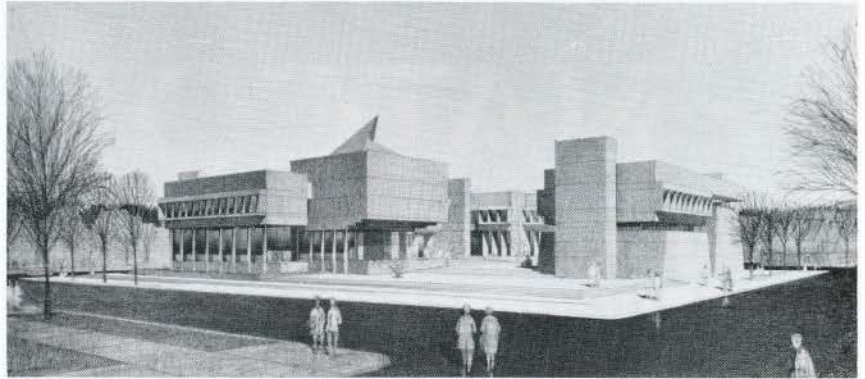
The winner of the National Competition for the University of British Columbia Student Union Building was Kenneth Snider of Winnipeg. He was awarded \$3,000 and a commission to carry out the work. Judging took place on January 20, 1965. John Andrews and Ron Thom of Toronto, and F. P. Tofin and Robert Baxter, Richmond, B.C. tied for second prize. Third prize winners were P. N. Thornton (F), A. Gathe, and R. M. Garrett, Vancouver.

This was a two stage competition. The four finalists of the first stage submitted schemes for the second stage.

Warnett Kennedy, MRAIC, Vancouver, was Professional Advisor and Chairman of the Board of Assessors. Members were Victor Steinbruck, Seattle; Professor Henry Elder, MRAIC, Vancouver; Professor James Murray, FRAIC, Toronto, and Dean Feltham, UBC Alma Mater Society (non-voting). The winning entry and the three runners up will be published in detail in the March issue.

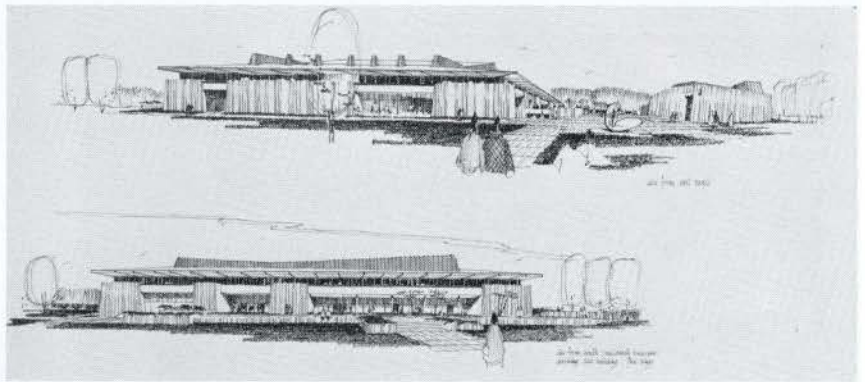
Winner of the West Kootenay Regional College Competition (entries restricted to B.C. registered architects) was John L. Kidd of Vancouver. Mr Kidd will be offered the commission to design the core buildings, and will receive a cash award of \$2,000. Second prize of \$1,500, was won by William R. Rhone and W. Randle Iredale. Third prize, \$1,000, was won by Roger Kemble of Vancouver.

Judging took place on January 15, 1965. Thirty-five entries were submitted to the Board of Assessors which comprised the following: Warnett Kennedy, MRAIC, Chairman and Professional Advisor, (non-voting) Vancouver; Henry Hill, AIA, San Francisco; Professor Henry Elder, MRAIC, Vancouver and James H. Gray, Chairman of West Kootenay College Council (non-voting).

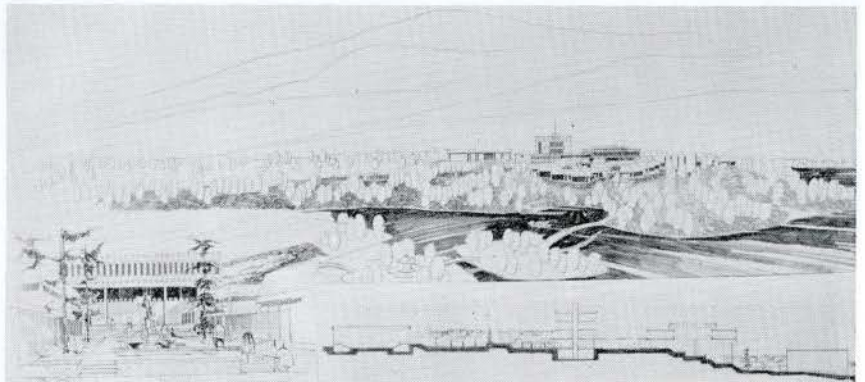


BRANTFORD CITY HALL COMPETITION — WINNING DESIGN BY MICHAEL KOPSA

Competition Results



UBC STUDENT UNION BUILDING — WINNING DESIGN BY KENNETH SNIDER



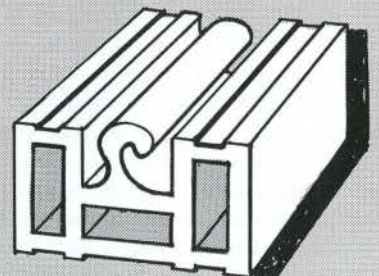
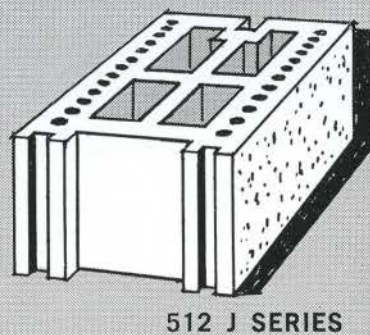
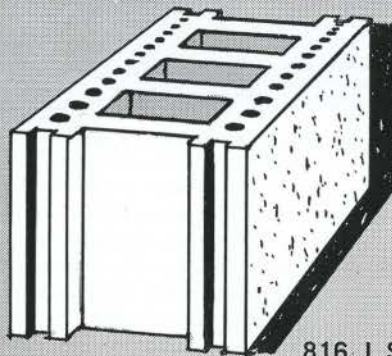
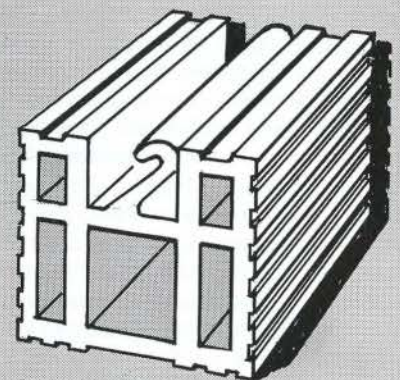
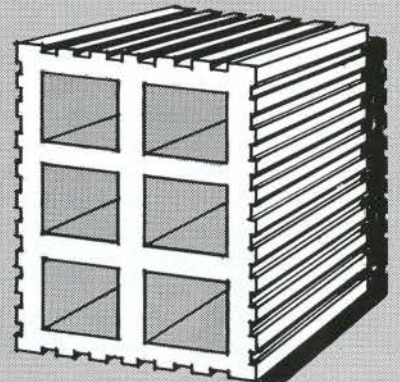
WEST KOOTENAY REGIONAL COLLEGE — WINNING DESIGN BY JOHN L. KIDD

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A ballast for fluorescent fixtures that measures one inch in thickness has been developed by Sola-Basic Products Ltd of Toronto. Ballast regulates the electrical power required to start and maintain a fluorescent lighting fixture. Sola's thin ballast, the company says, contains technological advances not available heretofore. *Sola-Basic Products, 377 Evans Ave., Etobicoke.*

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Centravac, a new direct drive, compact increased reliability centrifugal water chiller for air-conditioning with increased reliability. *Trane Company of Canada Ltd, 401 Horner Ave., Toronto 14.*

(Circle Reply Card Item 2)

LITERATURE

English and French 23 page bulletin, describing Electromaid Permanent Heaters. Refer to Bulletin no. 112 C, Schedule HH.

Canadian Armature Works, Inc., 6595 St Urbain Street, Montreal 14.

(Circle Reply Card Item 3)

"Lighting for Living", a catalogue of fresh ideas for decorating with light; illustrates lighting fixtures for every type of home and room.

Progress Luminaire Ltd., 5525 Pare St., Montreal.

(Circle Reply Card Item 4)

"Wood Block Industrial Flooring"; an 8 page booklet describing the manufacturing procedure and installation advantages of pressure-creosoted wood-block flooring.

Canada Creosoting Division, Domtar Chemicals Ltd., 1155 Dorchester Blvd. W., Montreal 2.

(Circle Reply Card Item 5)

Bulletin SPS-10 photographically shows examples of floodlighting projects utilizing the rectangular beam principle of Infranor Floodlights.

Infranor of North America, Inc., 742 Worthington Ridge, Berlin, Conn.

(Circle Reply Card Item 6)

RAIC 58th Assembly, Montréal, 9-12 juin
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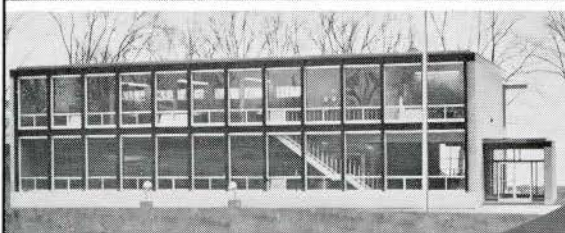
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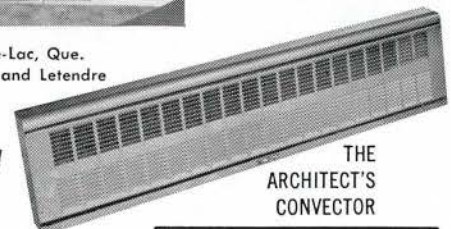
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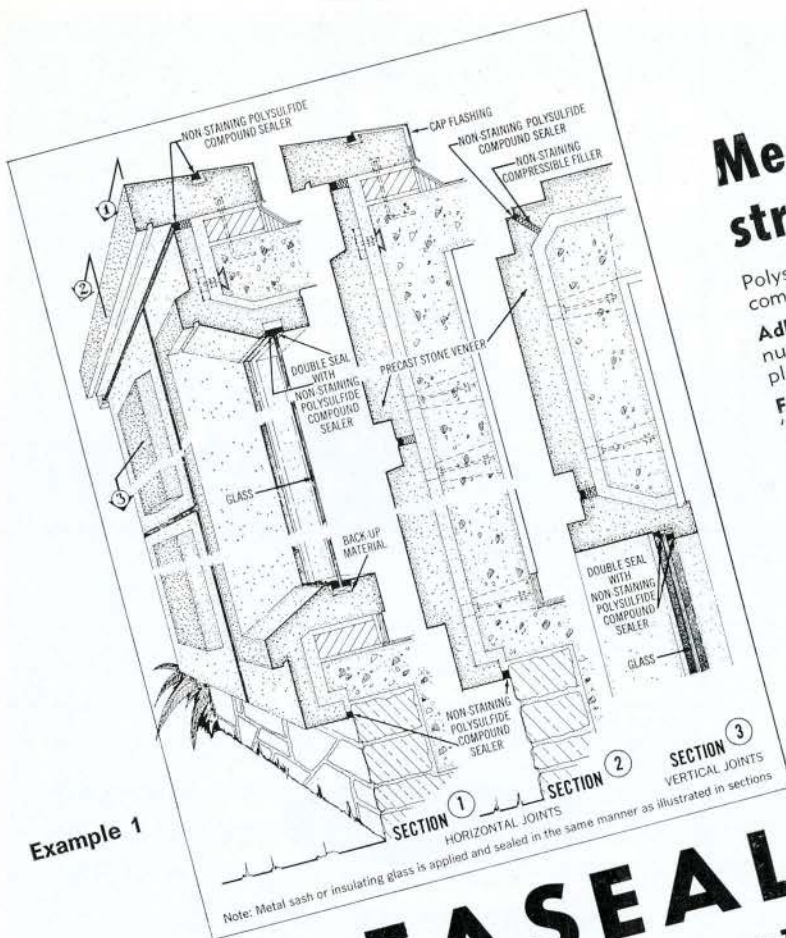
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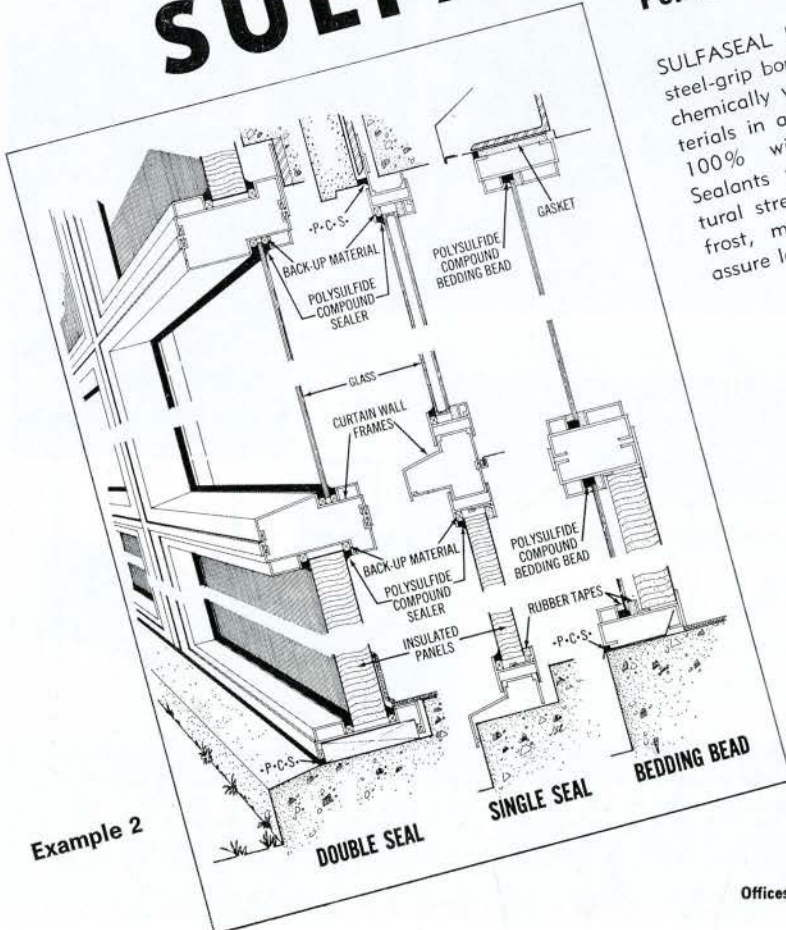
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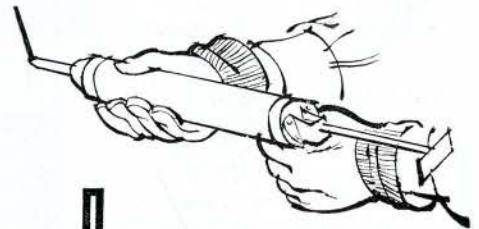
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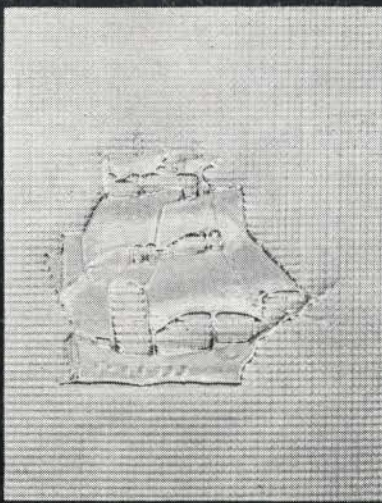
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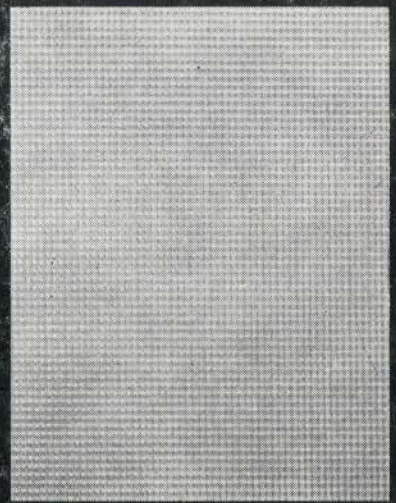
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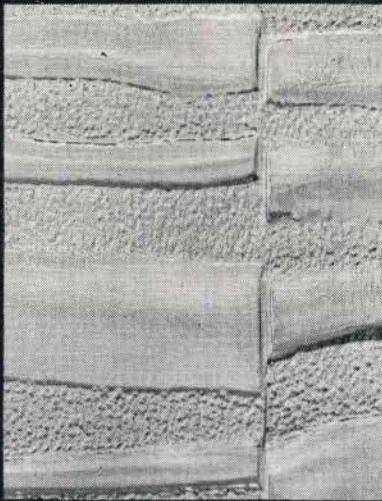
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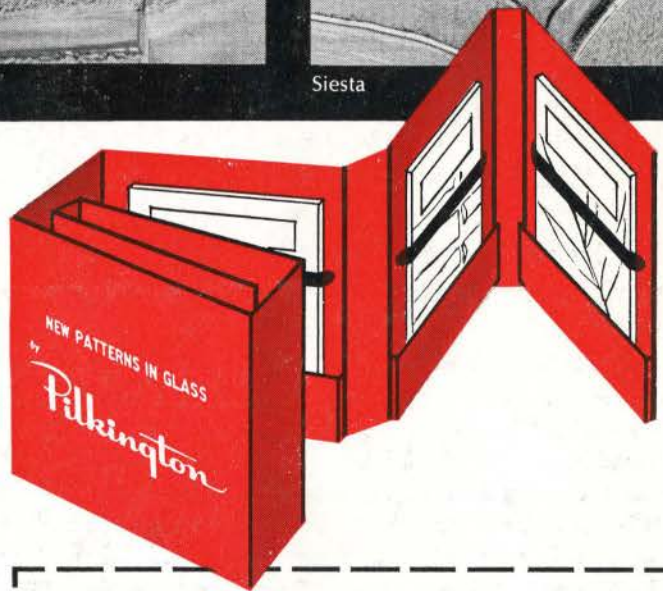
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