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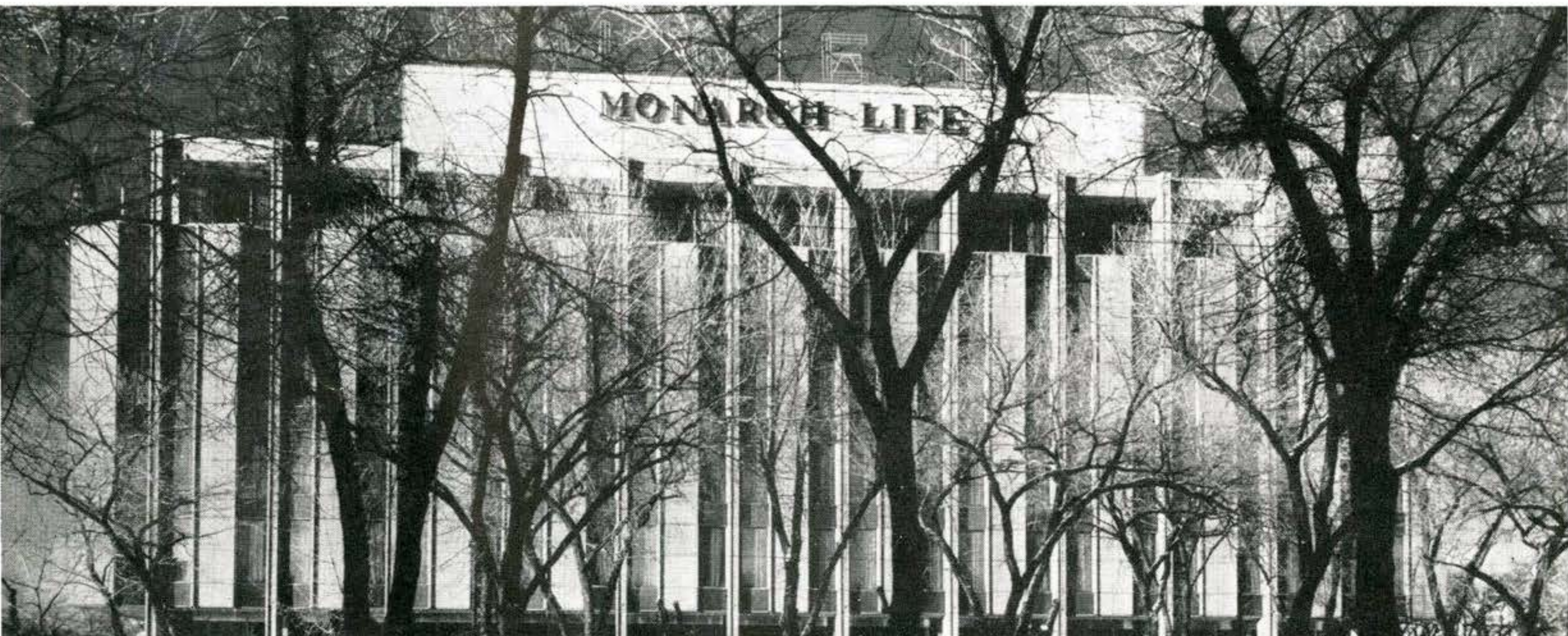
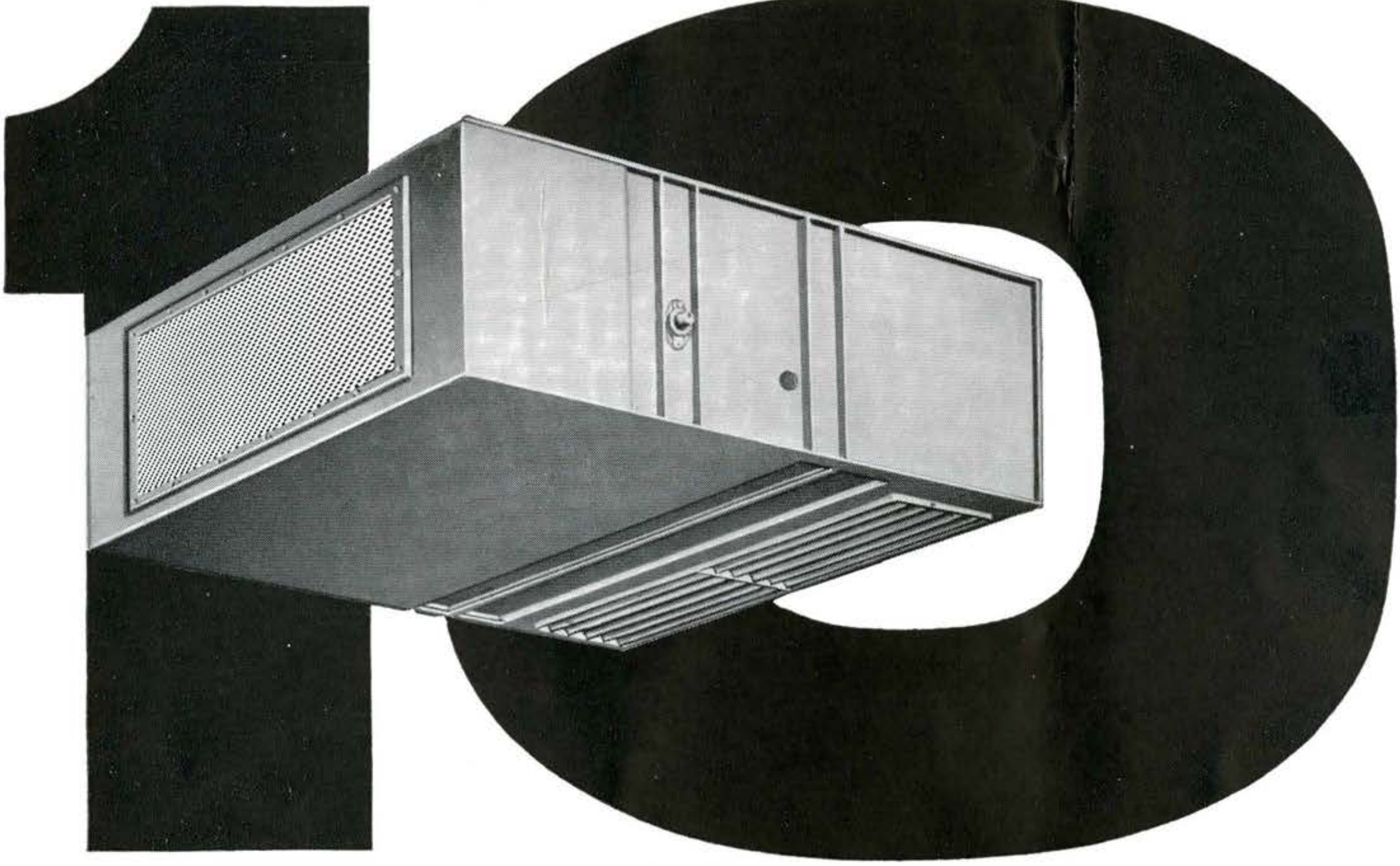


JULY 1962

ROYAL ARCHITECTURAL INSTITUTE OF CANADA
INSTITUT ROYAL D'ARCHITECTURE DU CANADA

today there are



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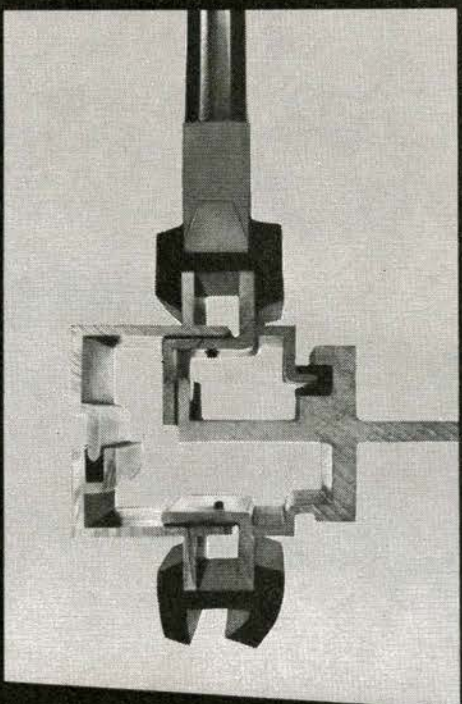

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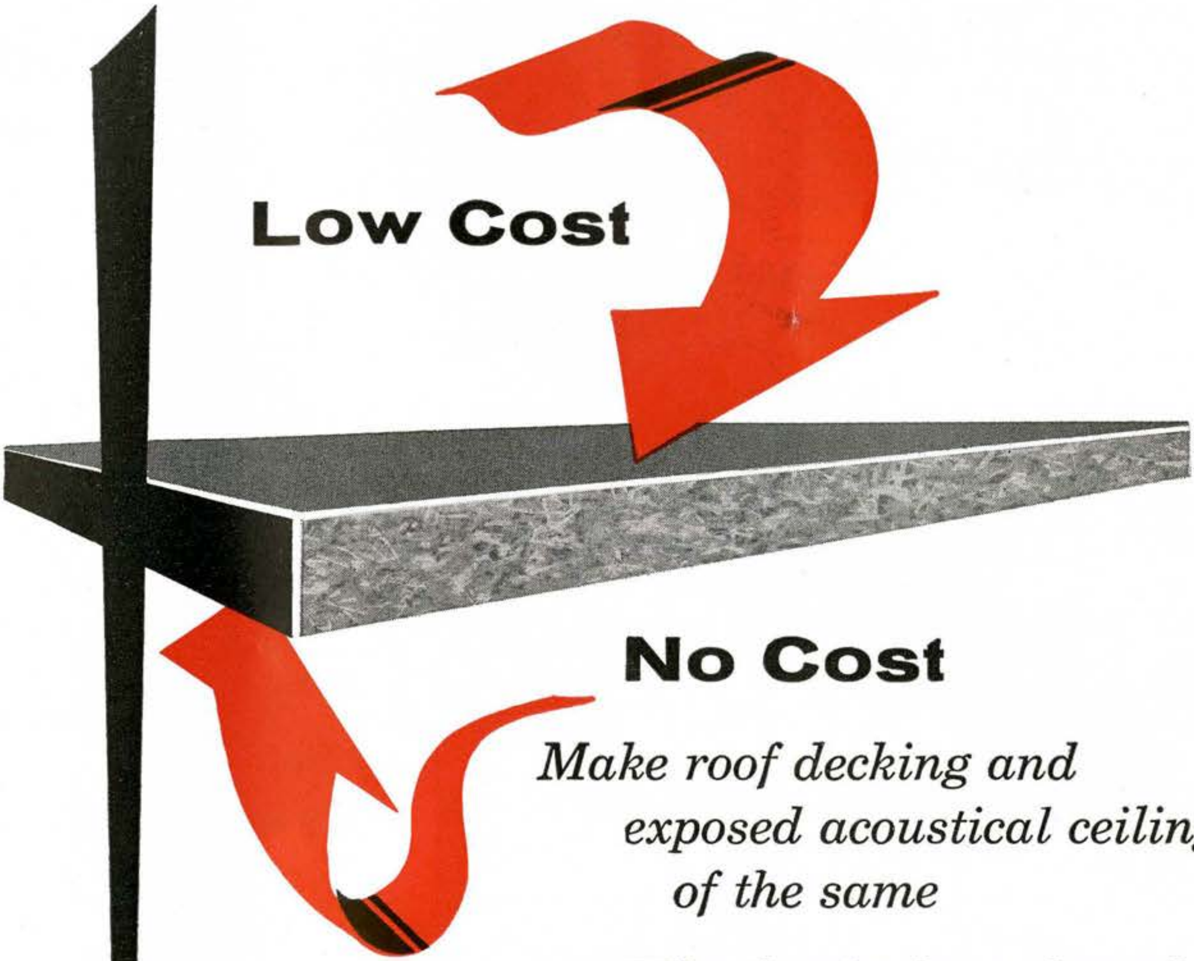


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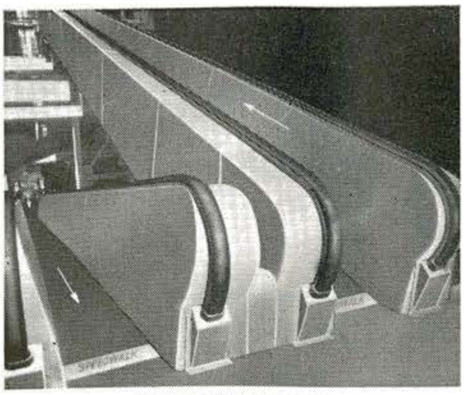
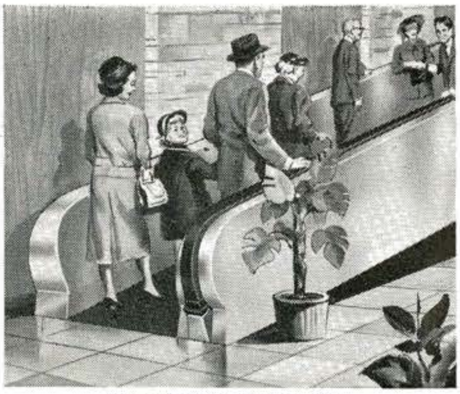


A steel firm moves changing shifts of workers from mill floor to lockers.



A savings and loan firm conveys people from lower parking level to street level.

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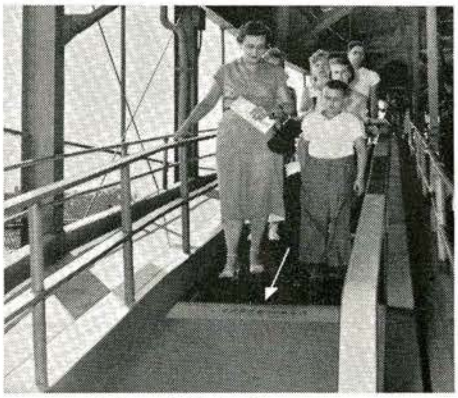
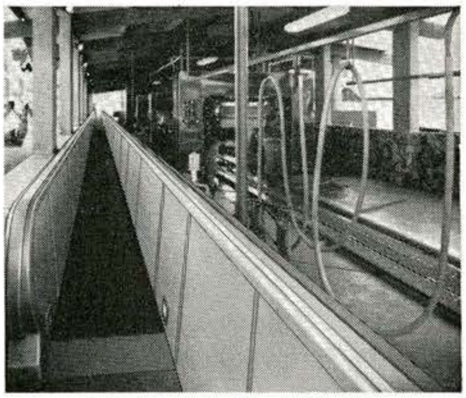
Large shopping centre uses Speedramp to carry people from parking area to central mall area.



A baseball stadium moves customers quickly, efficiently to various seating decks.



A car wash carries customers along as their cars proceed through washing area.

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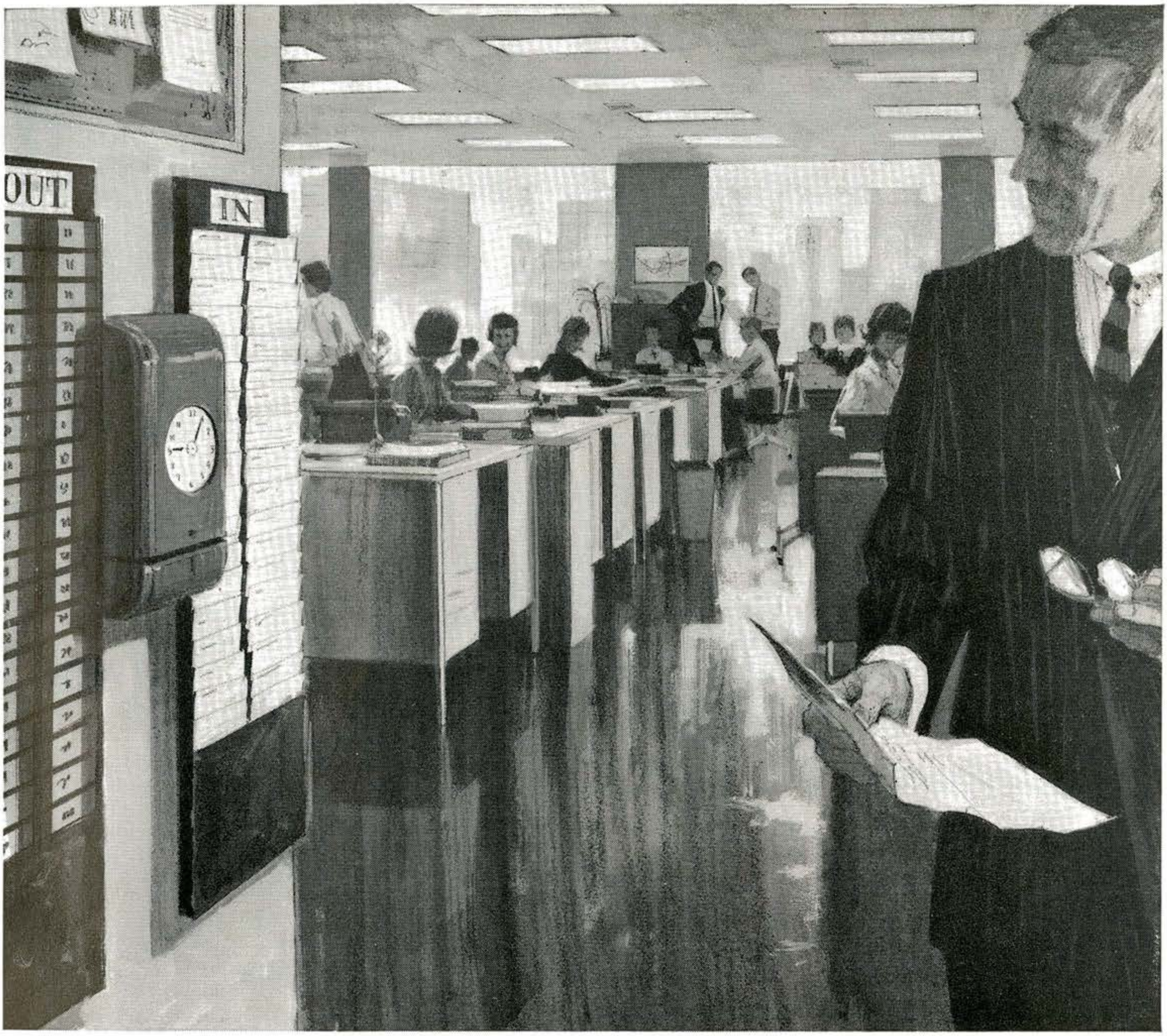

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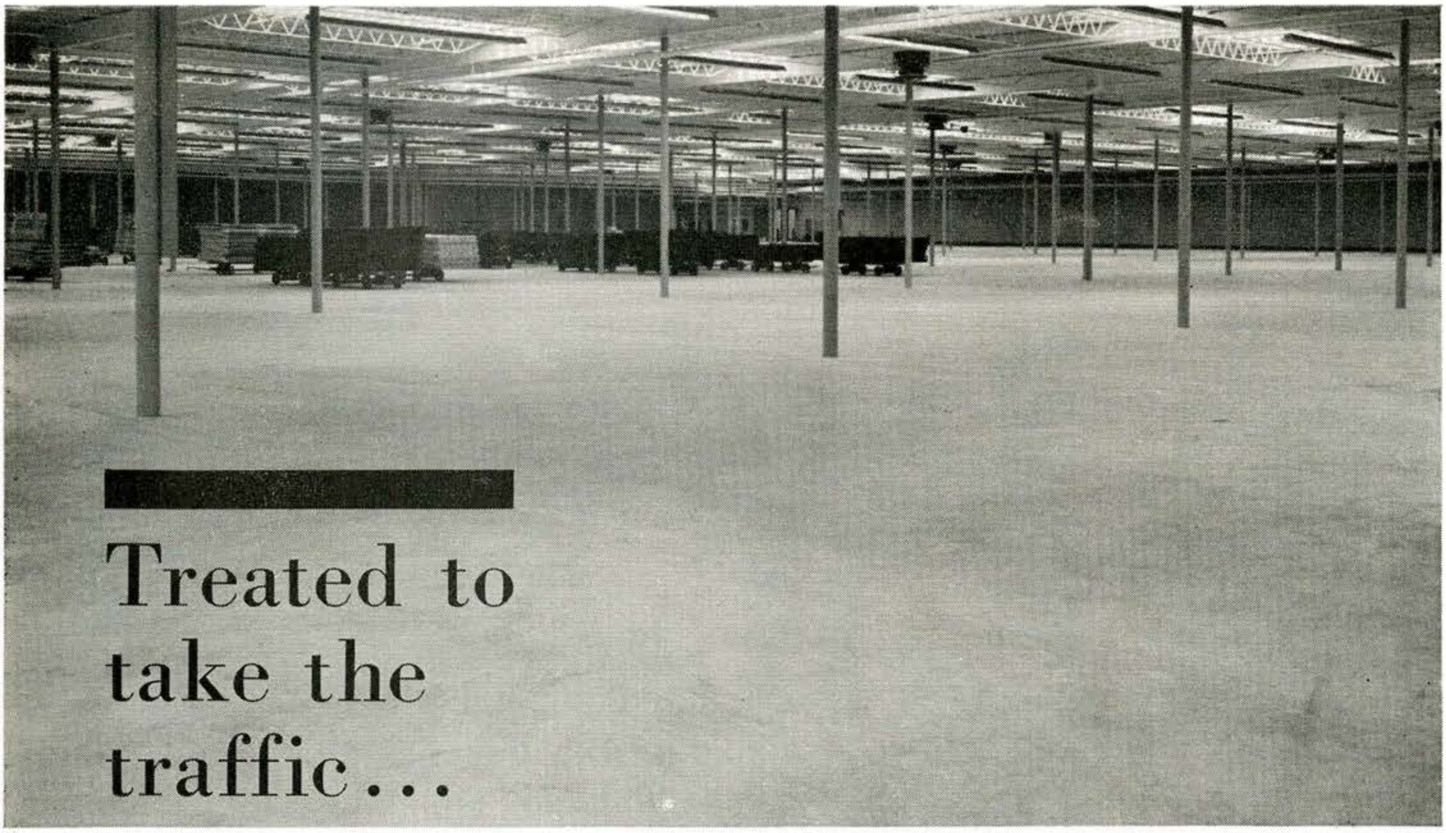

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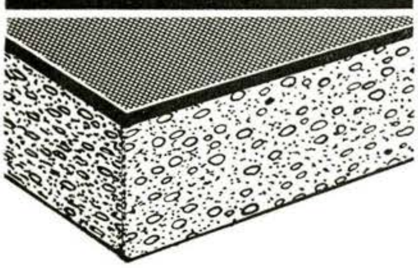

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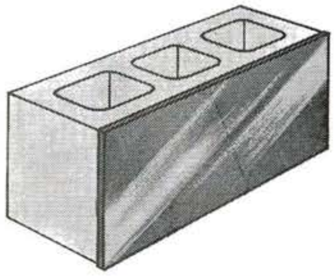

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Serial 443 Volume 39
Number 7

RAIC Journal

JULY 1962

TWO MAJOR NEW BUILDINGS

NOUVELLES DE QUEBEC

DEPARTMENTS

Cover. The Monarch Life Building, Winnipeg. Architects: Smith Carter Searle and Associates. Photo by Portigal & Co.

Published at 160 Eglinton Avenue East, Toronto 12, Ont. Telephone 487-4714. Advertising Office: 1133 Leslie Street, Don Mills, Ontario. Telephone (416) 447-5196. Subscriptions: Canada, Commonwealth and U.S. (12 issues) $7.00 Foreign $8.00. The *Journal* and the RAIC do not hold themselves responsible for opinions expressed by contributors. CCAB Member CCAB
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THE COLLEGE OF FELLOWS

THE COLLEGE OF FELLOWS, as the senior body within the structure of the Royal Architectural Institute of Canada, has grown up over the years in progressive, if rather haphazard stages. From a somewhat vague but idealistic conception at the beginning, to the present organization, its development has taken something over fifty years. Records of the Institute indicate that "several distinguished gentlemen had been created Fellows" as far back as 1908, although the first official document which mentions a Class of Fellows within the RAIC was in the amendments to the original RAIC Charter of 1908, which amendments were passed by Act of Parliament in 1929. Just after that date the Council decided to create an original body of Fellows under our Charter as amended in 1929, and that the original or Charter Members of that body should consist of all Past Presidents of the Institute, Past Presidents of the federated Provincial Societies, along with those who had been "unofficially" nominated as Fellows prior to this time, subject to all nominations being accepted within a period of two months. From these early beginnings and from this officially constituted "Body of Fellows"–the present day "College of Fellows" emerged. The ceremony of Installation, the Insignia worn by a Fellow, the objects and activities of the College, all have been developments from that time.

The above paragraph, outlining very briefly, the history of the founding of the College of Fellows, has been taken from a recently published Brochure entitled "Royal Architectural Institute of Canada: College of Fellows: A History Prepared in 1962 by Dr Thomas Howarth, FRAIC, FRIBA.

Until the 1961 Annual Meeting of the College of Fellows there had been no history of any kind, either of the College of Fellows, or of the founding and development of the RAIC. Early records were incomplete and scattered and the number of our members whose memories could fill in the gaps of our history were becoming fewer each year. At the suggestion of Dr Thomas Howarth at our meeting in 1961, it was decided to produce a Brochure setting out the objects and activities of the College of Fellows and also giving a brief history of its founding and development. This project was energetically pursued during last year and the completed Brochure was ready at our last Annual Assembly.

It had been written by Dr Howarth in co-operation with Forsey Page, H. L. Fetherstonhaugh, and other past Chancellors and officers of the College, who contributed much of the historical data. Dr Howarth has done a great deal of research, and not only is it a history of the College of Fellows, but also a very complete history of the founding of the Institute.

The Brochure, as a publication of the College of Fellows, is now given to each new Fellow at his Convocation. We hope, however, that it will be published in future issues of the *Journal* for the information of the entire membership, and in this way it will stimulate a greater knowledge and interest not only of the College of Fellows–but also of the Royal Architectural Institute of Canada.

H. H. G. Moody,
Chancellor,
College of Fellows

LE COLLÈGE DES AGRÉGES

LE COLLÈGE DES AGRÉGÉS, *organe principal de l'Institut royal d'architecture du Canada, s'est développé parfois au petit bonheur mais de façon continue au cours des années. Il lui a fallu un peu plus d'un demi-siècle pour passer d'un concept vague mais d'un haut idéalisme à ce qu'il est aujourd'hui. Selon les dossiers de l'Institut, "plusieurs personnages distingués ont été nommés Agrégés dès 1908". Toutefois, la première mention officielle des Agrégés comme catégorie spéciale de membres de l'IRAC se trouve dans le bill modificateur de la charte initiale de 1908 adopté par le Parlement en 1929. Dès l'entrée en vigueur de ces modifications, le Conseil a décidé de constituer le groupe initial des Agrégés et d'y inclure comme premiers membres ou membres fondateurs tous les anciens présidents de l'Institut et des sociétés provinciales fédérées, ainsi que toutes les personnes déjà "officieusement" nommées, à condition que toutes ces nominations soient acceptées dans un délai de deux mois. C'est de cette décision et de ce premier noyau qu'est issu le Collège actuel. La cérémonie d'installation, le choix de l'insigne et l'activité du Collège sont tous postérieurs à cette date.*

Le paragraphe qui précède et qui rappelle brièvement la fondation du Collège des Agrégés est tiré d'une brochure publiée récemment sous le titre "Institut royal d'architecture du Canada – Collège des Agrégés – Historique préparé en 1962 par M. Thomas Howarth, AIRAC, FRIBA".

Jusqu'à l'assemblée annuelle de 1961 du Collège des Agrégés, nous n'avions aucun historique, ni du Collège ni de la fondation et de l'essor de l'IRAC. Les premiers dossiers étaient incomplets, dispersés ici et là, et les membres pouvant par leurs souvenirs remplir les vides se faisaient de moins en moins nombreux chaque année. A notre assemblée de 1961, M. Thomas Howarth a proposé la production d'une brochure exposant les objets et l'activité du Collège des Agrégés et présentant un bref historique de sa fondation et et de son essor. L'idée, a été acceptée et la tâche a été poursuivie avec énergie l'an dernier, si bien que la brochure était prête pour notre dernière assemblée annuelle.

Le texte a été écrit par M. Howarth en collaboration avec M Forsey Page, H. L. Fetherstonhaugh et d'autres anciens chanceliers et dirigeants du Collège qui ont fourni une grande partie des données historiques. M. Howarth a fait beaucoup de recherches et a présenté non seulement un historique du Collège mais un exposé très complet de la fondation de l'Institut.

La brochure est une publication du Collège des Agrégés et un exemplaire en sera remis à tous les nouveaux membres lors de leur admission. Il faut espérer qu'elle sera reproduite dans des numéros futurs du Journal pour l'information de tous les membres et qu'ainsi elle contribuera à faire mieux connaître et apprécier non seulement le Collège des Agrégés mais aussi l'Institut royal d'architecture du Canada.

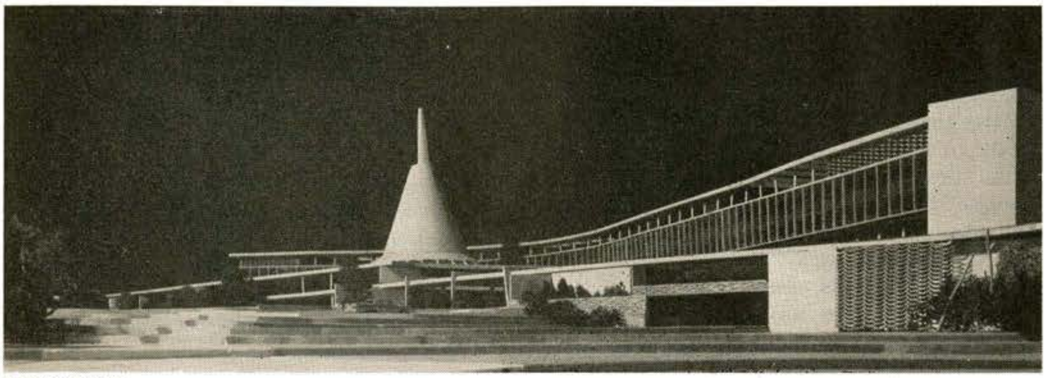
H. H. G. Moody,
Chancelier du
Collège des Agrégés.

PROJECTS

A model of the air traffic control building for Toronto International Airport (Malton). The three-legged tower will be a solitary structure in the centre of the runway system, away from other airport buildings.

Air traffic control centre, telecommunications centre and auxiliary services such as boilers, air conditioning and transformers will each occupy one of the lower wings. Three shafts will be for elevators, stairs and cables respectively. The air conditioned glass control cab will be soundproof. *Architects: John B. Parkin Associates, Toronto.*

DEPT. OF TRANSPORT PHOTO



BERNO STUDIO

College de Matane. Conté de Matapédia, PQ. *Architect: Gerard Notebaert, Montreal.*

BERNO STUDIO

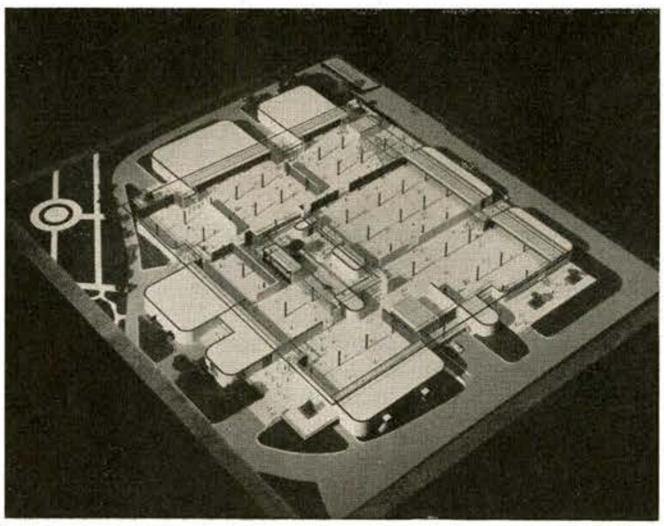
BERNO STUDIO

Kingston Office Building. *Architect: Gerard Notebaert, Montreal.*

The new Home Furnishings & Appliances Building at the C.N.E. Park is to replace the recently burnt down Manufacturers' Building.

The plan is designed to give exhibitors a maximum variety of exhibition space, while at the same time providing the visitors with constantly changing and interesting experiences. Large glass openings and terraces are located on all sides to attract the public into the interior. The design aims at fostering a gay holiday atmosphere. At night, the building will glow as a palace of light. *Architects: Marani, Morris & Allan, Toronto.*

PANDA



PANDA

The Monarch Life Building, Winnipeg

Architects: *Smith Carter Searle Associates, Winnipeg*

Mechanical Engineer: *Bowyer Boag, Winnipeg*

Electrical Engineer: *Kummen Shipment Ltd., Winnipeg*

Interior Consultant: *Allison Bain, Toronto*

Landscaping Consultant: *H. Reid, St. Paul, Minnesota*

General Contractor: *Bird Construction Co. Ltd. of Winnipeg*

Photography by Henry Kalen

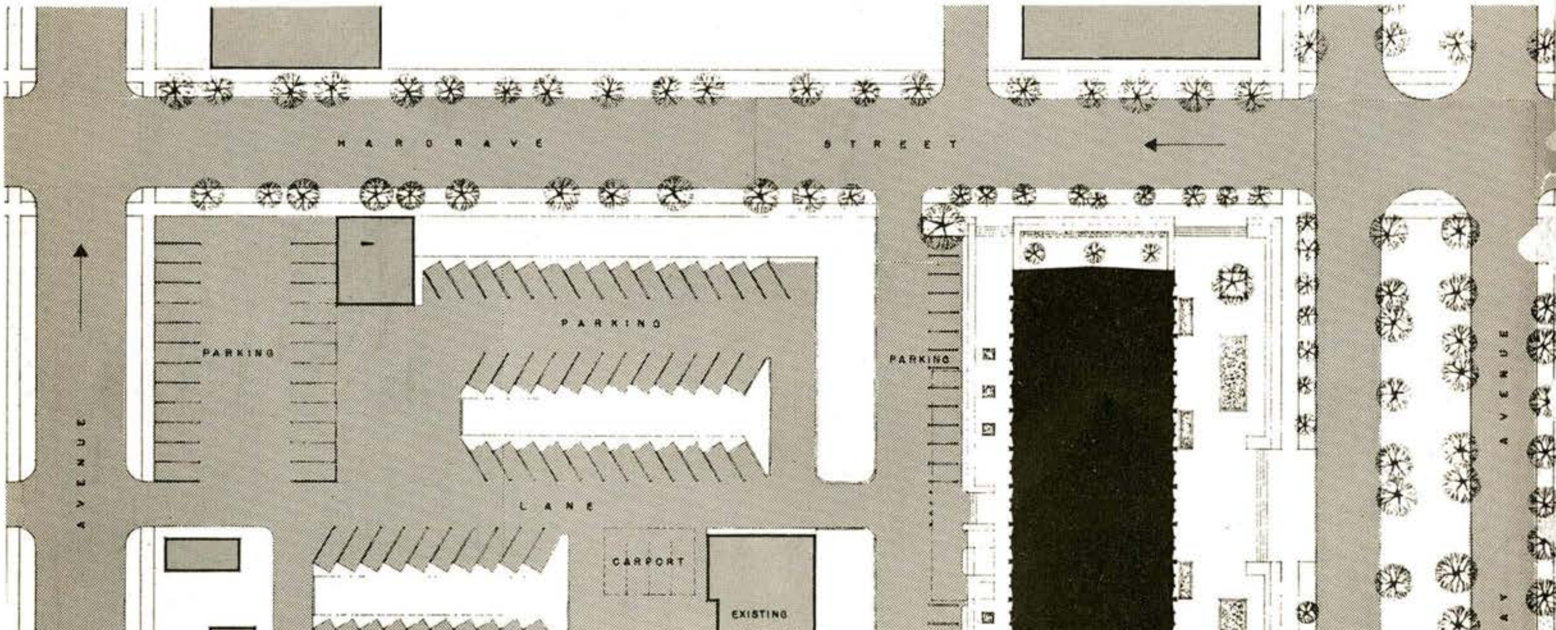
The Monarch Life Building

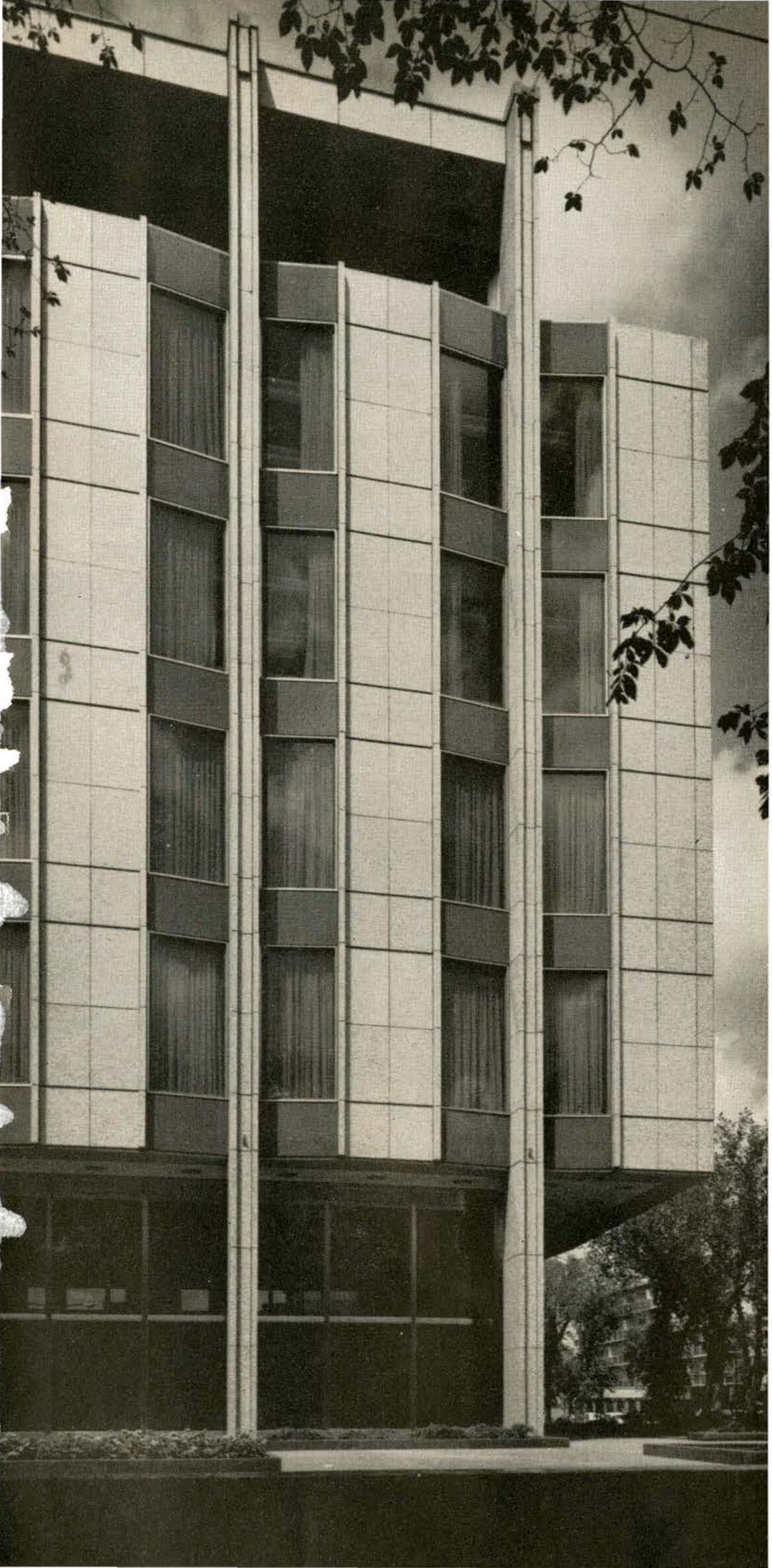
THE NEW head office building for Monarch Life Assurance Company is situated on the north side of Broadway Avenue between Carleton and Hargrave Streets. Broadway Avenue is fast becoming a new financial district for Winnipeg with several recently completed office buildings. The site along Broadway is 216 feet and extends almost a complete block to the north, providing enough room for ample surface parking.

The building which has a full basement or lower floor, six office floors and mechanical penthouse, sits on a landscaped podium which is raised two to three feet above the surrounding sidewalk level. This provides a generous setback from Broadway with its wide boulevard and avenue of trees. This, together with the overall size of the building, makes an interesting contrast to the surrounding smaller buildings which have generally been built with only the minimum setbacks required by zoning By-Laws.

The exterior of the Monarch Life Building is grey granite with a natural cleavage finish. This is a heat treated surface giving a rough natural texture. The spandrels between windows are of black polished granite which is also used to form the surround to the podium, and small landscaped areas. The stone generally is a 2 inch thick veneer, held back to the steel frame work by stainless steel anchors. The jointing process for the stone was a dry technique using a compressed synthetic joint material called Compriband. This sealer allowed winter work to proceed on the exterior of the buildings, and at the same time provided a really first class joint which is water tight and resistant to the extreme temperature cycles encountered in this area.

The podium slabs are precast exposed aggregate squares to the building module of 5′ 8″.





The Monarch Life Building

Window frames and metal work are generally in stainless steel. The windows on the upper floors are glazed in structural rubber gaskets, using a heat reducing, glare reducing grey glass. The same glass is glazed directly into stainless steel on the lower floors.

The main columns of the building are on 17 foot centres and carry the body of the building which is cantilevered at both ends over the high space of the main floor level.

Generally the planning and structure of the building is based on the 5′ 8″ module. This module has been carried through in lighting, air conditioning, mechanical and acoustic materials in the ceiling, where all services have been integrated to form a system which has the maximum flexibility in partition arrangements and office planning.

The building services such as elevators, washrooms, staircases and mechanical ductwork have been located at the centre of the building in two very compact cores which allow for the maximum amount of usable floor space on the remainder of each floor.

Lower or basement floor contains cafeteria and auditorium, some storage areas and mechanical equipment, including air conditioning equipment to serve the basement and first floor. Lower floor facilities which can be rented to outside organizations, are connected to the main floor by elevators, and a staircase from the main lobby of the building down into the staff lounge area.

The cafeteria is served by complete kitchen facilities on the east side, whilst on the west there is a multi-use auditorium which can seat in the neighbourhood of 400 people.

Very careful consideration was given to the lighting technique in the lower area so as to eliminate the characteristics usually associated with basement space. Wall panels are surrounded by concealed light, and a complete suspended ceiling grid with lighting above was used. The floors in the cafeteria and auditorium areas are vinyl tile, and the floor of the staff lounge is carpeted.

MAIN FLOOR

The main floor, which has an 18 foot ceiling height and a completely luminous ceiling, contains the main entry lobby into the building, the Winnipeg Branch Office of the Monarch Life Company to the east, and a branch of the Toronto-Dominion Bank to the west.

Partitions in this area are taken only

to a 10 foot height, and the ceiling system continues through above them.

The two main core sections at this level are surrounded in polished granite – the same type as used on the exterior.

The main staircase down to the lower floor area has a glass balustrade in stainless steel frames, with the handrail covered in black leather over sponge rubber.

Floors 2 to 5 are mostly office space with the Monarch general offices taking the 4th and 5th floors, and the 2nd and 3rd being for tenants.

All office partitions on these floors are on the 5′ 8″ module and are of baked enamel on steel, with the use of the full glass divisions where required. Doors have a steel core with plastic laminate surface. All services such as intercom, telephone and alarm systems, are run through the concrete cellular floors on all office floors.

The sixth floor contains the Monarch Executive offices, the Board Room and President's Suite to the south, and two smaller divisions of the Company to the north.

The executive offices are carpeted throughout. Steel stud partition walls are covered with plaster and a finish of either hardwood or vinyl fabric. The main corridor partition dividing the executive offices from their secretaries, is of stainless steel with unpolished plate glass running from floor to ceiling.

Lighting in the executive offices is recessed incandescent with fluorescent panels over the secretaries' desks in the executive corridor. There is an acoustic plaster ceiling throughout this area. The hardwood wall finishes are teak with a waxed finish.

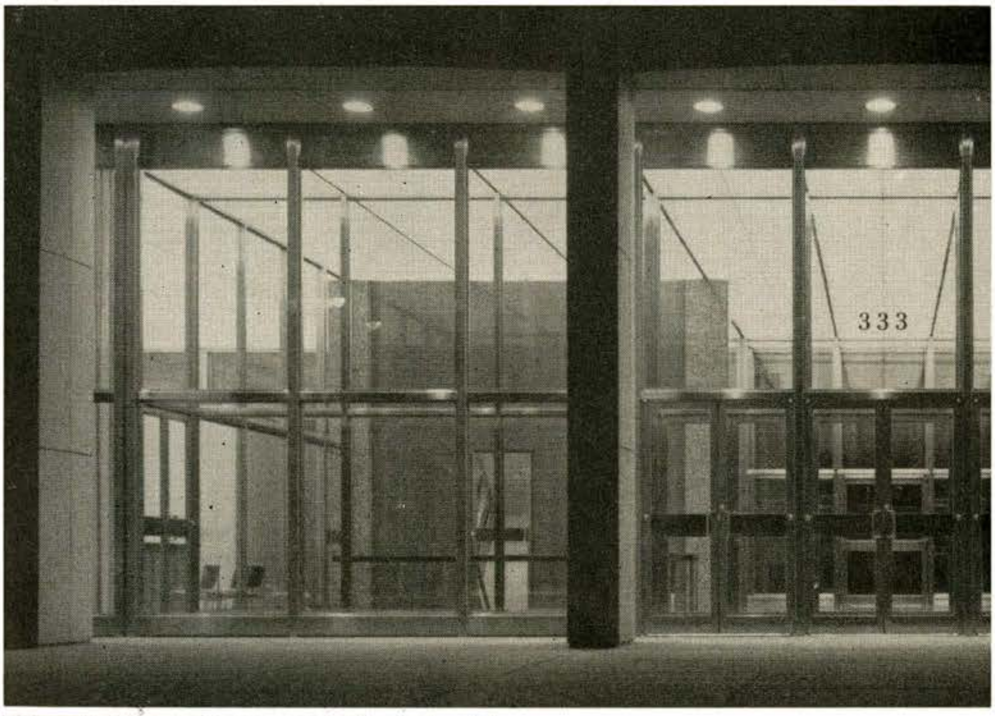
The roof of the building overhangs the windows on this floor, forming an adequate sun canopy. The outside glass walls of the executive offices are set back from the main face of the building.

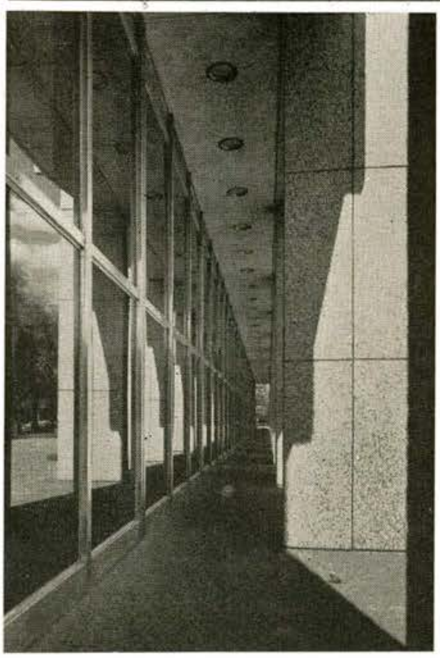
PENTHOUSE

The penthouse above the 6th floor contains the two gas fired boilers for the building, as well as major air conditioning equipment which serves the second to sixth floors. The boilers were located on the roof for economic purposes. Very careful consideration was given to the transfer of noise of mechanical equipment through to the 6th floor executive offices and all the noisy equipment was set on isolation pads.

FOUNDATIONS

The heavy column loads were carried by cast-in-place concrete caissons which were end bearing on bedrock about 53 feet below street level.



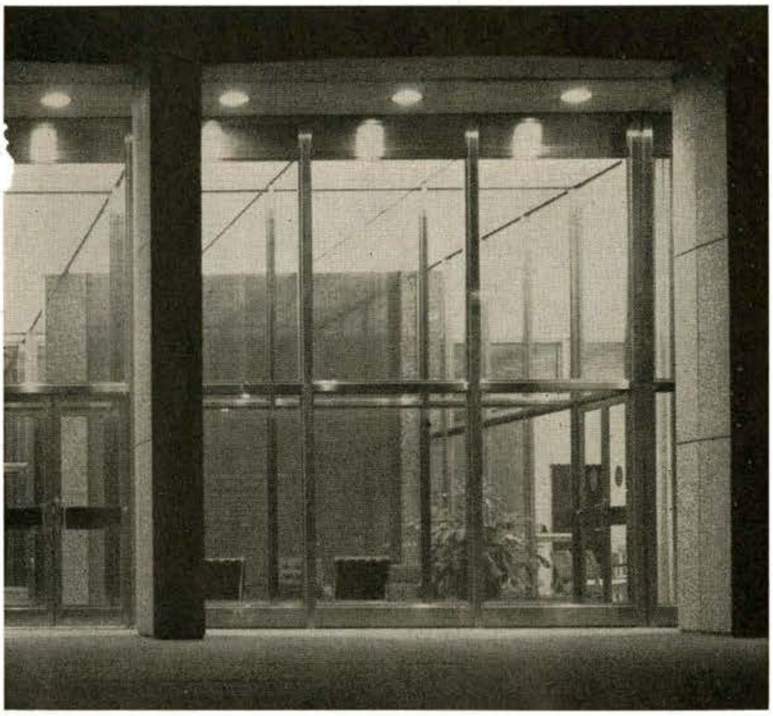


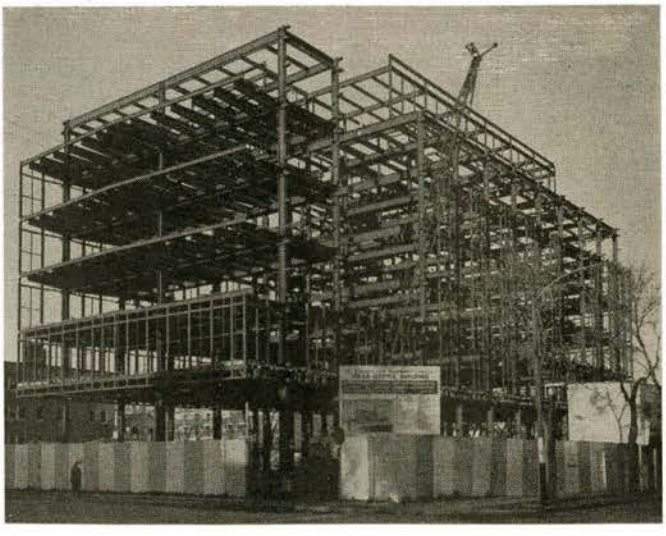
The Monarch Life Building

Top Facing: Cafeteria on the lower ground floor.

Centre: The Main Entrance at night.

Bottom Facing: The Structural Steel Frame.





STRUCTURAL FRAME

The six storey structure is a fully welded rigid frame design in the short direction of the building. In the long direction the beam to column connections are semi-rigid bolted type. The principal steel columns were fabricated from welded plates rather than rolled steel sections. This was required on exterior columns in order to keep the flange width constant to suit the stone facing.

The floors are cantilevered 14′ 0″ at each end of the building. This was accomplished by the use of tapered welded girders with their ends tied vertically between floors.

All structural welds were tested ultrasonically for flaws or discontinuities. This was the first building in Western Canada to use the ultrasonic method of weld testing.

FLOOR SYSTEMS

The basement floor was of cast-in-place beam and slab construction free of the ground below. This was required to prevent movement of the floor due to the swelling nature of the clay subsoil below. The other floors were made of a precast concrete cellular type slab units, 8″ deep with a concrete topping. The cells in the precast slab served as raceways for electrical wiring and telephone lines. The precast floor slabs were welded to the structural steel building frame and a cast-in-place horizontal edge beam, placed between the spandrel beam and the precast floor system, serves as a horizontal wind bracing between columns.

FIRE PROOFING

The structural steel beams were given a two hour fire rating by means of a sprayed asbestos fibre cover. Spandrel beams were fire-proofed with concrete. Column fireproofing was achieved with vermiculite plaster on expanded metal lath.

ROOF STRUCTURE

The roof structure was a light gauge steel deck welded to the steel framing members.

MECHANICAL SYSTEM

The mechanical system at the Monarch Life Building was designed to allow a minimum dimension between the underside of the ceiling and the floor above. This reduced the cost of the building and produced better proportions in the exterior elevation. It was decided to distribute the majority of the conditioned air through ductwork running vertically in the exterior walls and by the use of induction units. Since the building was long and narrow, the result was a very economical use of sheet metal ductwork.

The air conditioning system is therefore made up of the following parts:

(1) Induction unit system for exterior zones–high velocity air and chilled or hot water distributed vertically down furred areas between structural columns and between window sections. Water to the induction units is controlled by a thermostat located at the air inlet to each induction coil. During winter the coils in the induction units provide sufficient heating during the night shut-down when all air handling equipment is not operating.

(2) Low velocity air distribution for the interior zone–distributed through ceiling spaces from two central duct shafts. Control of the interior zone is from thermostats located at the east and west end of each floor, controlling a reheat coil located at the duct shafts.

(3) Separate air handling units in the basement to handle the air conditioning requirements of the cafeteria, auditorium and first floor office and banking areas. These areas have low velocity air distribution and are heated in winter by fin tubing around the perimeter of the areas.

(4) Refrigeration is provided by a 300 ton centrifugal water chiller in the penthouse. Chilled water is distributed to air coils in the large air handling units and to a secondary system distributing chilled water to the individual coils in each induction unit.

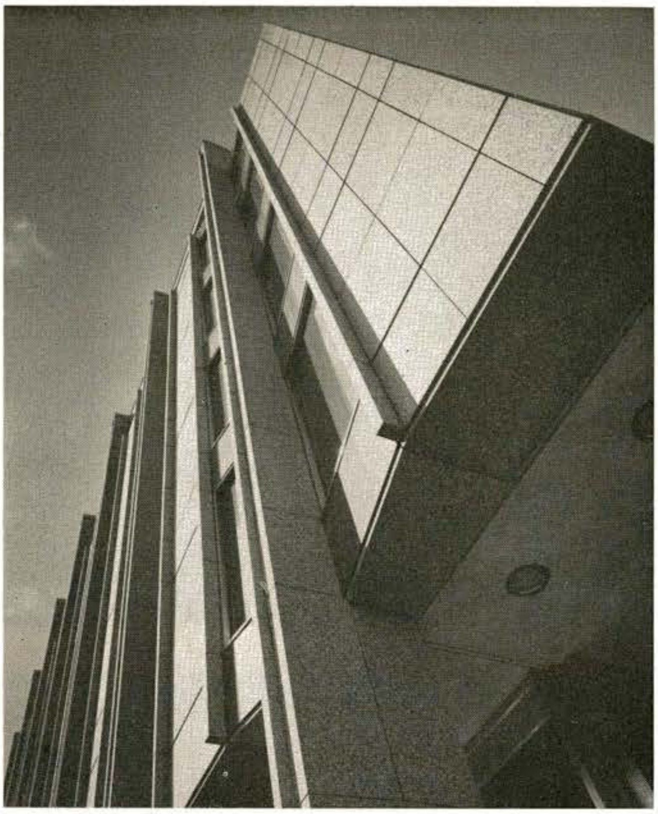
(5) Control of the major equipment is centralized in a control console located in the Chief Engineer's air conditioned office in the penthouse. This console allows the engineer to record the temperature of any control point in the building for any period of time. This saves greatly in assessing the reason for complaints and will help in discovering malfunctions of the system. The console also aids in operating the air conditioning system to attain the best possible efficiency from the component parts.

All rental floors from the second floor to the fifth floor were to be designed to have movable partitions located on each module line to accommodate the requirements of future tenants. The selection of ceiling grilles and lighting to make this system completely flexible became very important. It was decided that the lighting should consist of one 2′ x 4′ fixture per module. The final arrangement of grilles decided was a double row of strip line, ceiling diffusers every third module. These quantities could be adjusted at each grille to allow for proper air distribution with any pattern of partitioning on the module line. Having two ducts connected at the same module line simplified the arrangement of wiring and piping necessary to allow for these ducts in the ceiling space.

The height of the building required booster pumping equipment for the domestic water system. Water distribution systems were therefore designed for city water pressure on the first two floors and a pneumatic tank with a booster pump for the remaining upper floors.

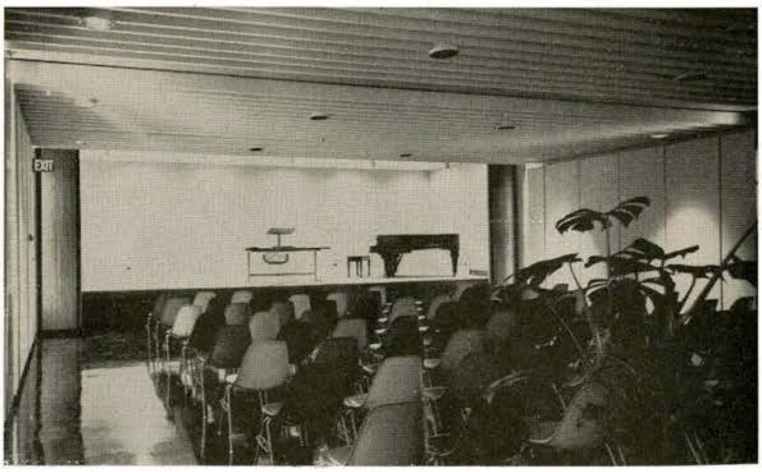
All fixtures were wall hung on chair carriers to facilitate the cleaning of the washroom floors.

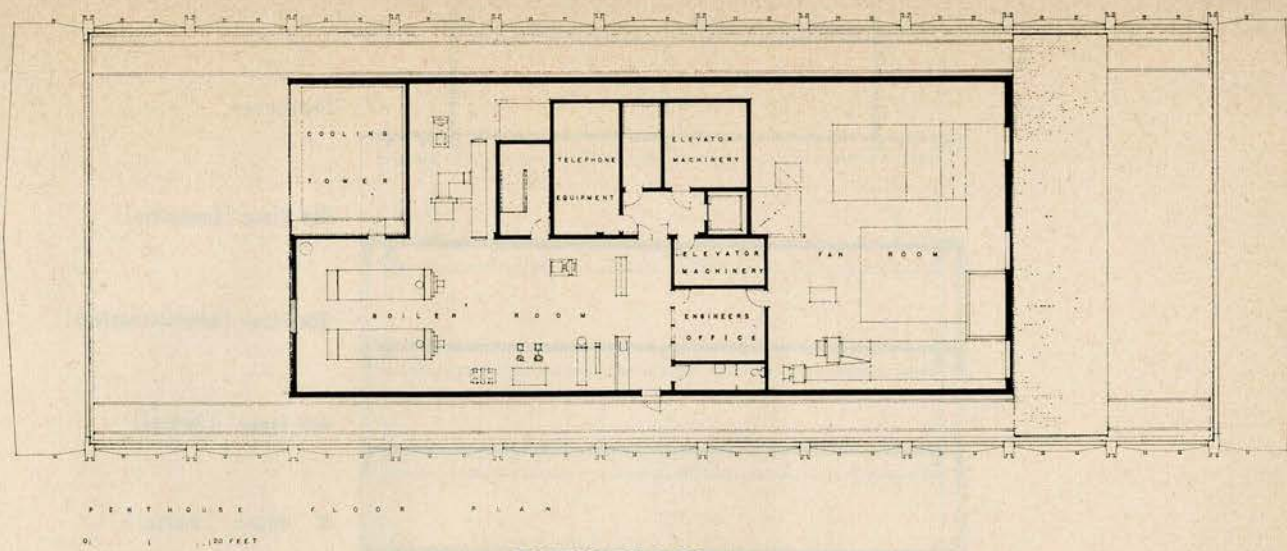
All drains in the ceiling of the fifth floor were either screwed pipe or soldered copper. The special ceiling conditions requiring that there be no leaks or bleeding of tar, etc.



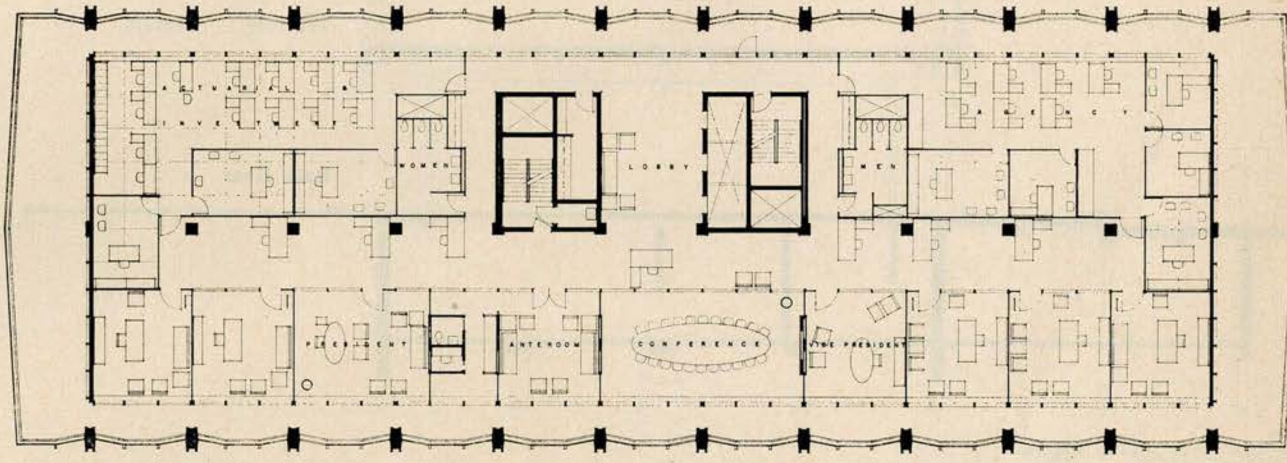
Above: Stairway from Staff Lounge, lower ground floor.

Below: The Auditorium.

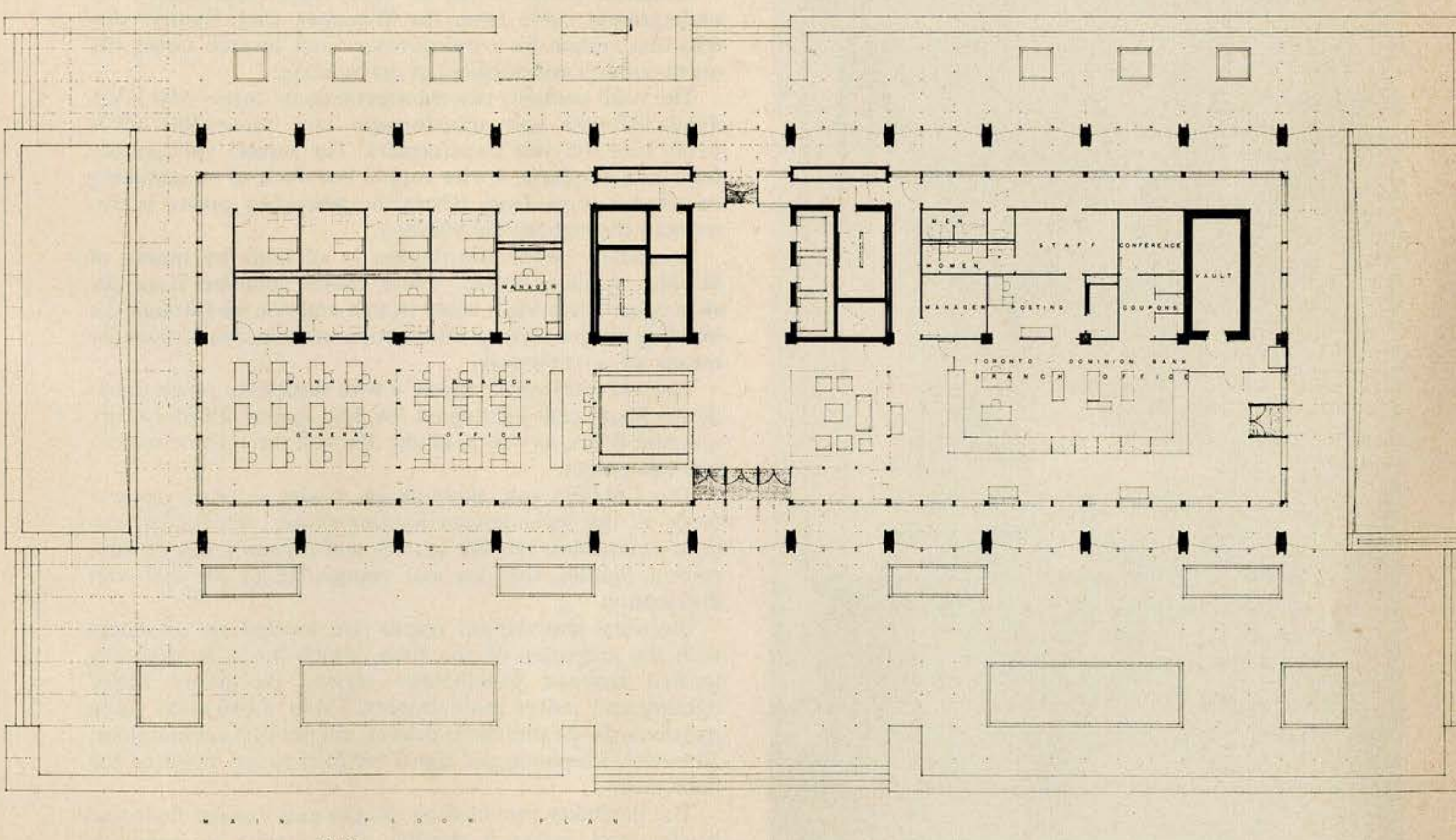




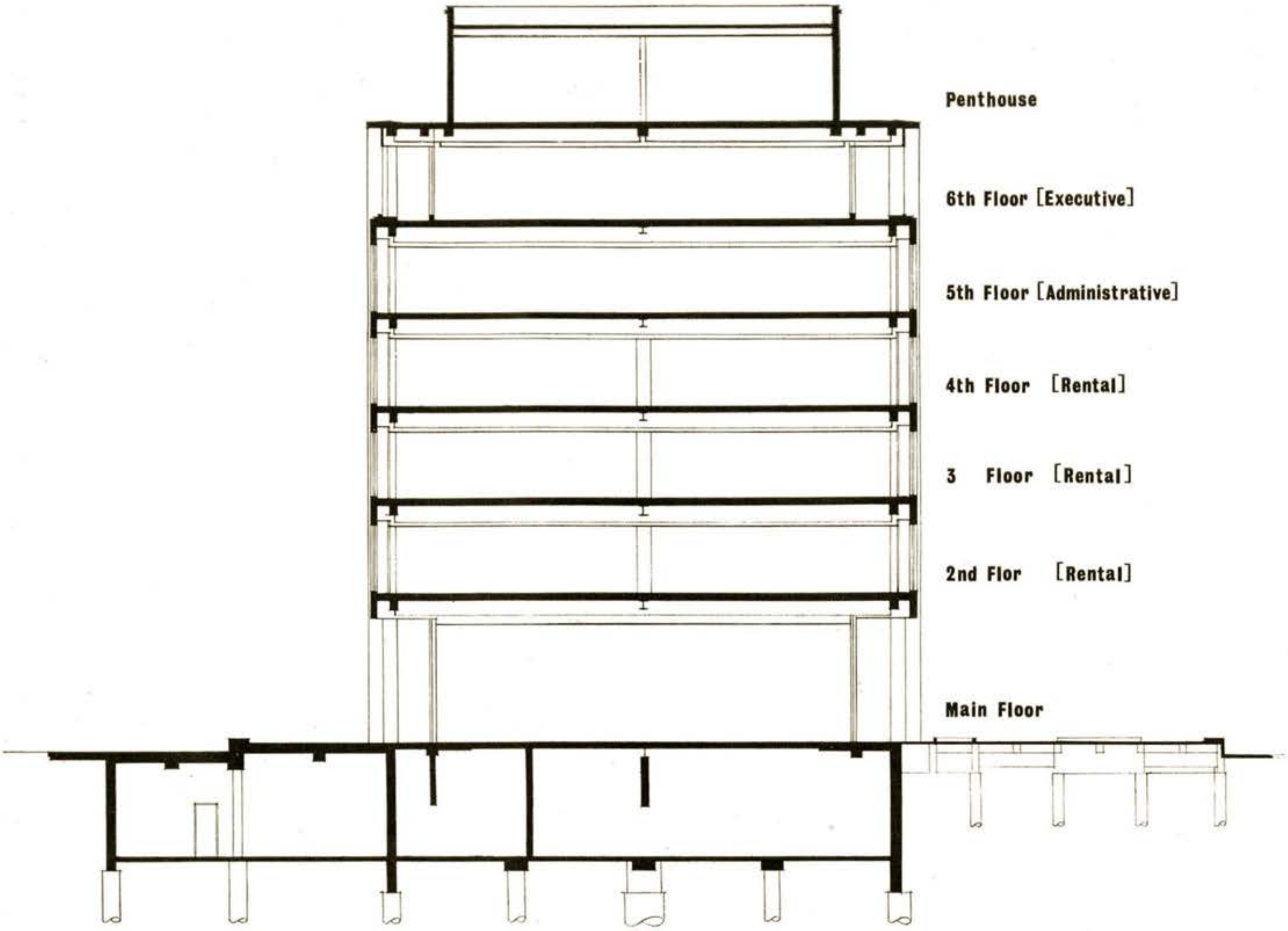
PENTHOUSE FLOOR PLAN



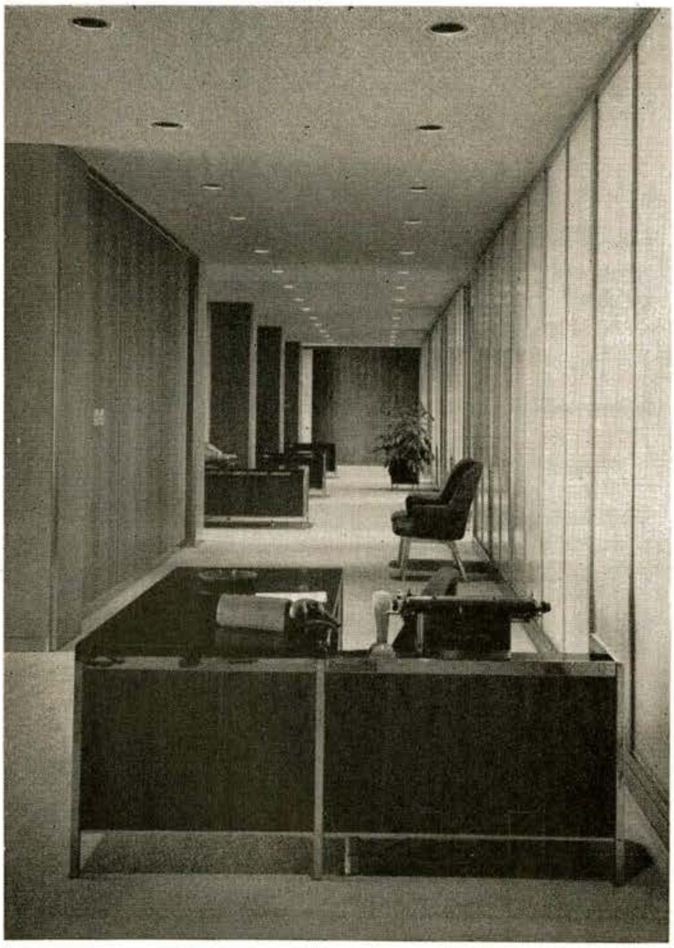
SIXTH FLOOR PLAN



MAIN FLOOR PLAN



Below: The Executive Corridor



ELECTRICAL SYSTEM

Electrical power is fed at 4160 volts, three phase, via underground cable from the Winnipeg City Hydro's distribution system to a transformer vault located under the north podium and adjacent to the building.

The vault contains two transformations: three–500 KVA 4160/347/600 volt transformers and three–200 KVA 4160/120/206 volt transformers. The second voltages are fed via three-phase, 4 wire copper bus ducts to an adjoining switchgear room from where the secondary power is distributed throughout the building.

Secondary power distribution is all done by means of flexible, insulated cable. These cables emanate from the switchgear room via a cable trough and rise up through the building to the various distribution areas on each floor by means of a cable-way.

The 347/600 volt 3 phase, 4 wire secondary power feeds all the fluorescent lighting on the first, second, third, fourth, and fifth floors, as well as all the 500 volt three-phase motors and equipment.

The 120/208 volt, three-phase, 4 wire secondary power feeds all the incandescent lighting power receptacles, kitchen equipment, relative motors and certain areas of fluorescent lighting that are not compatible to the 347 volt distribution.

Electrical distribution rooms are located on all floors with the exception of the sixth, which has a strategically located recessed panelboard – serving the entire floors' lighting and power requirements. From distribution room panelboards–header ducts deliver, via pre-cast cellular floor, all power, telephone and signal facilities to any point on the floor area.

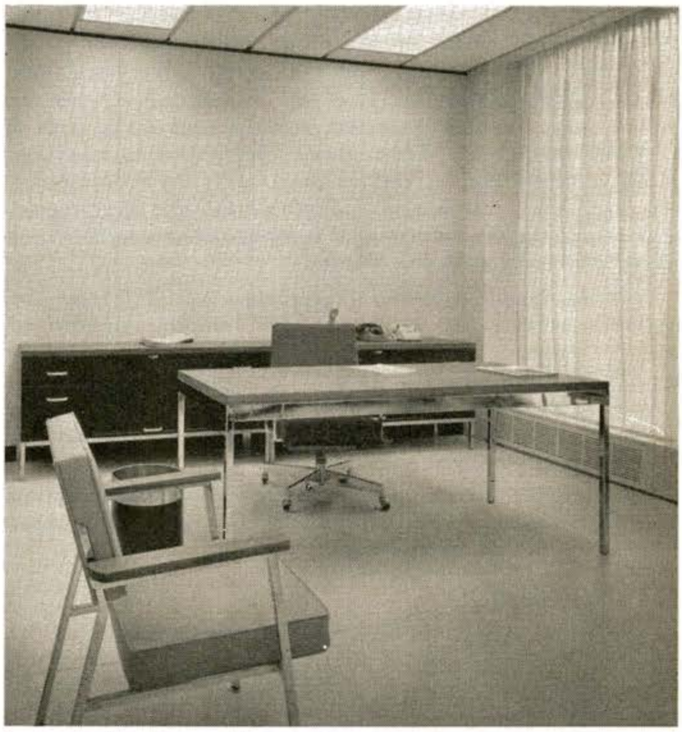
The flexibility provided by the pre-cast cellular floor and header duct makes it possible at any time to install or

The Monarch Life Building

Above: Staff Lounge. Lower Ground Floor

Below: Typical Office

Bottom: Typical General Offices



arrange partitions and furnishings according to need, rather than to fixed locations.

Main terminal of the telephone system is in the penthouse, with the Monarch Life switchboard located on the fifth floor. Panelboards, duct riser and terminal boards in conjunction with the header duct system makes any telephone system, possible to install and easy to maintain.

SOUND SYSTEM

The sound system installation is paralleled with the telephone system in that the riser ducts, terminal and panelboards are physically adjacent and the main equipment housing is located in the telephone terminal room in the penthouse area. The sound system offers selected area paging and wired music facilities complemented by an additional system for the auditorium located in the basement. This system is used for important staff announcements and as part of the buildings emergency control and fire prevention system.

LIGHTING

All lighting is controlled by low-voltage operated relays. This modern low-voltage system uses relays to perform the actual switching of the current and these relays are in turn controlled by small switches operating at a low, safe voltage.

On each floor of the building there are three master selector switches which are of the dial-type and can sweep many contacts in a fraction of a second. As the name implies, these master selector switches can also select, or permit, control of individual circuits. In addition to these controls, each floor has motor-operated master switches, actuated by a single low-voltage switch which turns on or off all lights on that respective floor.

This one low voltage switch is also paralleled in the engineer's office in the penthouse, allowing him complete control over every light in the building that is low voltage relay operated.

Comfortable and high level lighting systems were designed and provided in the building. The lower area which included the auditorium, lounge and cafeteria has wall panel silhouette lighting complementing a ceiling lighting system composed of spotlights integrated with a metal grillage which has fluorescent strip lighting as an indirect component.

This grillage also has power receptacles for future spotlighting of displays, etc. The spotlights were custom made to provide a glare-free concentrated light source.

The main floor has a complete luminous ceiling of concept and texture relative to the architectural design of the building as a whole. The building module is expressed by major runners with minor divisions necessitated by the physical properties of the luminous elements. An average of eight 40-watt, cool white, rapid start lamps, per unit module results in a level of 150 feet candles of glare-free illumination on all working surfaces with an exceptionally low brightness quality.

Second to fifth floor lighting systems, again reflect the building module, having one 2 foot by 4 foot lighting fixture in each module. These lighting fixtures are complete with 2-F40 cw lamps for the initial installation, but have provision for the addition of two or more—for which the circuiting and switching capacities have been designed and provided.

Lenses selected for these lighting fixtures produce the proper variations in brightness throughout the complete field of view necessary for good visual comfort.

The sixth floor executive offices are illuminated completely with recessed pot lights. Each pot light in an office is independently controlled by a master selector low-voltage control switch, allowing each occupant the freedom of his own choice of quality and quantity of light.

Lighting in the board room consists of a fluorescent luminous ceiling section over the table surrounded by incandescent pot lights in the remainder of the ceiling. The luminous section has three levels of illumination, while the incandescent units are on a dimmer control.

Exterior lighting of the building, initially, has been limited to lighting the soffits. This was accomplished with the use of large wattage recessed incandescent units with a regressed fresnel lens. The regressed portion of the trim was anodized matte black to reduce glare, while the exposed trim was provided in stainless steel. Future floodlight illumination of the building will be provided from installed weatherproof receptacles located in the podium.

Each receptacle is low-voltage relay controlled from the engineers office in the penthouse. The building is equipped with an automatic minute impulse self-regulating master controlled clock system. This system provides automatic hourly supervision for a correction range of 15 minutes slow or 10 minutes fast, if for any reason a clock on the system varies from the master control.

Facilities for the car parking area includes illumination from pole mounted mercury luminaires and weatherproof receptacles for car heater use.

FIRE ALARM

Of special significance is the fire alarm system in the building. Personnel and property are protected against fire, whether seen or unseen by a Faraday "Pre-Signal Coded, Supervised System", with the added protective features of visual annunciation and automatic notification of the Winnipeg Fire Department.

As a safeguard against panic, should a fire occur, the first operation of any station, whether manual or automatic causes certain signals located in supervisory or "pre-signal" areas only to sound, thus alerting key personnel of an alarm.

At the same time, visual indication of the area alarmed appears on annunciators located in strategic points (three in all), while a signal is automatically sent to the City Fire Department, immediately the station is operated.

Should investigation show that a general evacuation of the building be necessary, this is speedily accomplished by use of a special key and the operation of any station, causing the general alarm signals to operate throughout the building.

Areas where a fire might start unnoticed are protected by detectors which operate automatically in the case of an unusual rise of temperature in that particular area.

The Monarch Life Building

PRINCIPAL SUB-TRADES AND SUPPLIERS. Dominion Bridge Co.—*Reinforcing Steel;* Bridge and Tank—*Structural Steel:* Canadian Rogers — *Roofing, S/M, Kitchen Equipment:* S. E. Gage — *Fireproofing and sound proofing:* United Lathing — *Acoustic Tile:* Pilkington Glass Ltd. — *Glass and Glazing:* Robert Mitchell Co., Ltd. — *Mail Chute:* Turnbull Elevator — *Elevator:* Supercrete — *Pre-Cast Concrete:* T. Eaton Co. — *Floor Covering:* Coldspring Granite — *Granite:* Maple Leaf — *Paving:* Perma-Underground — *Sprinkler System:* Cleaver Brooks — *Boilers;* Crane of Canada — *Plumbing Fixtures:* Consolidated Plate Glass (Western) Ltd. — *Insulating Glass Units:* Fiberglas — *Accoustical Ceiling Panels:* St. Lawrence Ceramics Ltd. — *Ceramic Tile.*

Above: Typical Executive Office

Below: The anti-room to the Board Room

The Crescent Apartments, Vancouver

THE CRESCENT APARTMENTS

Associated Architects:
Kenneth Gardner & Warnett Kennedy

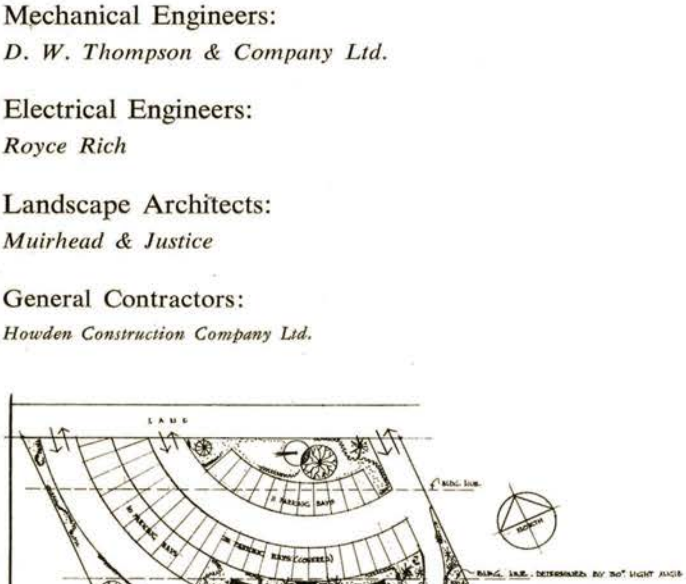
Structural Engineers:
O. Safir & Co. Ltd.

Mechanical Engineers:
D. W. Thompson & Company Ltd.

Electrical Engineers:
Royce Rich

Landscape Architects:
Muirhead & Justice

General Contractors:
Howden Construction Company Ltd.



THE CRESCENT was designed for self-owned suites. This meant a higher quality of finish and larger room sizes and amenities than would have been the case if designed for rental. Owners are usually middle-aged or older. To enjoy the amenities of West Vancouver they require outdoor living space, accordingly each suite has a deep balcony, closed on three sides for windbreak, heated slab and big enough for outdoor furniture.

Shared amenities include a roof-garden commanding all-round views, a large room and bar for private or shared parties and a sheltered swimming pool and paddling pool for grandchildren. Plenty of locker space has been provided in the basement and a Laundry Room. A small hobbies workshop is included.

Parking is provided underneath the building and carports at ground level.

Sitting and Plan Shape

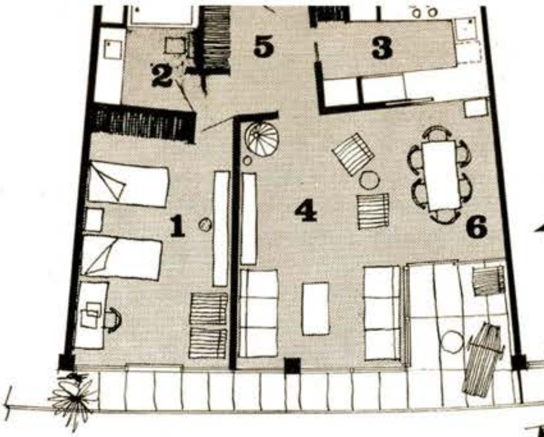
The main control was the 30° vertical light-angle struck from the building line of the nearest property to the north, a control which is probably unique to West Vancouver and workable only because the entire municipality is a southward and view-facing slope. This determined the height of the buildings. The curved plan follows the curve of the street and the curve of the waterfront. Apart from the aesthetic advantage this arrangement gives lengthened view-frontage leaving lesser width for bathrooms, kitchens, corridors, etc. and opens out each room towards the view.

The general contractor did not consider that any cost differential as between a rectilinear or a curved plan-shape need be allowed for in his overall cost.

"The Crescent" took its name from the plan-shape.

Stairwells

The positions of the fire-escape stairwells, both near the centre, were acceptable only because the corridors were so very short. Incidentally, only one stairwell would be required in non-combustible buildings in most European countries or in England.

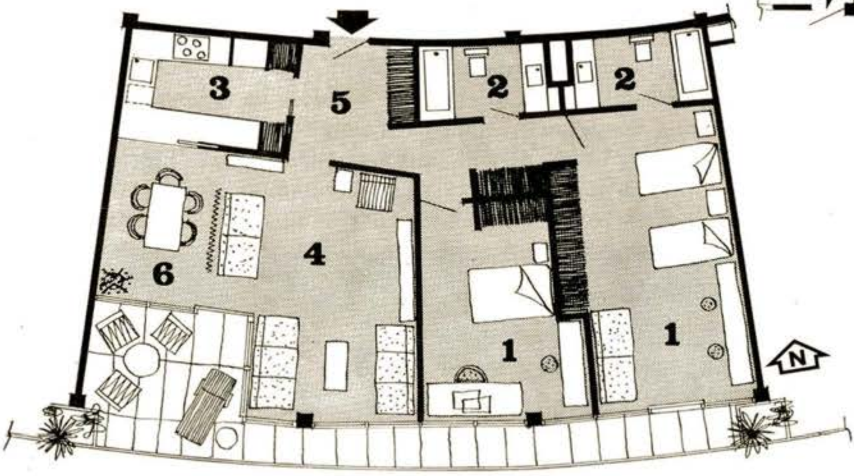


One Bed Suite

977 sq ft

Two Bed Standard

1275 sq ft



Two Bed 'De Lux'

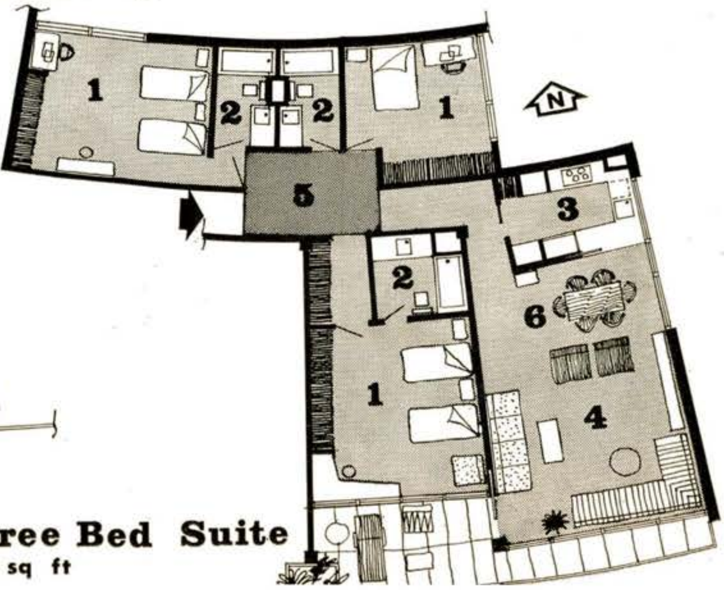
1436 sq ft

LEGEND

1	Bedroom
2	Bathroom
3	Kitchen
4	Living Room
5	Hall
6	Dining Room

Two Bed Luxery

1800 sq ft



Three Bed Suite

1807 sq ft

by W. P. Patterson (Planning Office in West Vancouver)

THE CRESCENT APARTMENTS

THE CRESCENT APARTMENTS were designed during a critical stage of West Vancouver's development. A new Zoning By-law was in the making. A By-law which, for the first time, would permit modern, high-rise apartments to be built in this traditionally conservative and exclusively single-family municipality. Fortunately, the Architects and the Planners had closely parallel objectives. Ken Gardner and Warnett Kennedy were determined to design one of the finest apartment houses on the West Coast. The Planners were faced with the challenge of producing a By-law which would encourage the best type of apartment development and at the same time create the minimum conflict with the views of surrounding homes.

The Architects were asked to comply with the variety of regulations such as Floor Area Ratio, Angle of Light Obstruction and Side Yards which increased in proportion to building height; all of which imposed design problems over and above the requirements of the client. The By-law itself, which had to apply to the entire zone of 50 acres, was not finalized until the apartment plans were well advanced.

It could truly be said that this was a classic case of co-operative inter-action between Planners and Architects. The design influenced the final form of the By-law. The By-law in turn influenced the building. We are most happy with the result.

The Crescent will be an outstanding architectural landmark in West Vancouver for many years to come and has already acted as a pace-setter for the entire apartment zone.

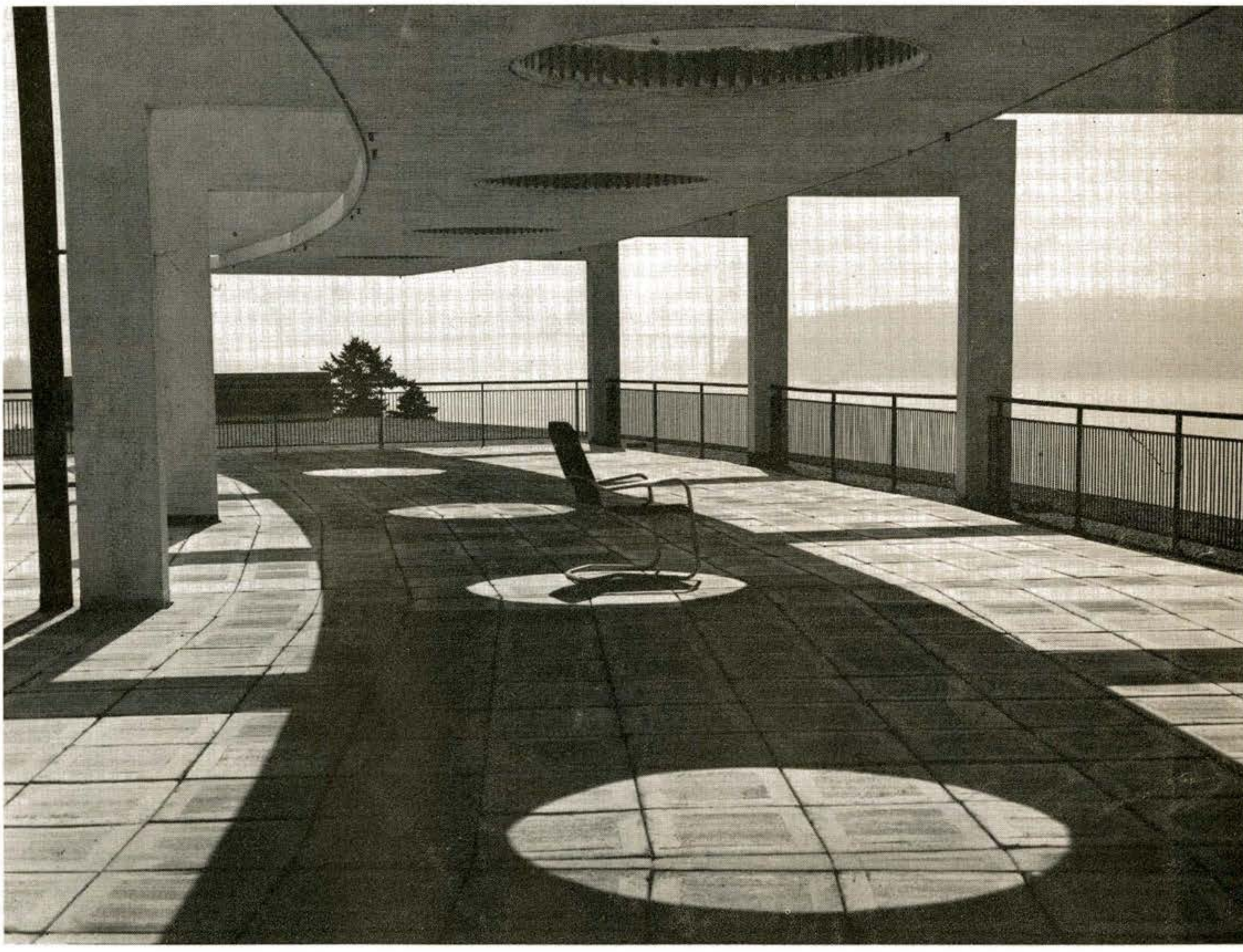
GEORGE ALLEN ARIAL PHOTOS

GRAPHIC INDUSTRIES

by Otto Safir P.Eng.

THE STRUCTURE for this building was laid out so as to provide utmost flexibility in the layout of the Apartments with no beams projecting below the ceiling, giving minimum floor to floor height and at the same time, space to install ventilation ducts within the thickness of the floor slabs and accommodating the radiant heating pipes in the ceiling. Because of the considerable spans and to provide the necessary rigidity, the hollow type floor construction was adopted, of approximately 13″ total thickness. Suspended ceilings were used only in the bathrooms. A semi-light-weight concrete weighing approximately 110 lbs. per cubic foot of concrete was used to permit the large spans, and its application for the walls of the building as well resulted in a considerable reduction of the stresses due to earthquake forces, for which the building was designed.

The carport roofs are unsymmetrical, inverted umbrella type shells draining towards the columns.



THE CRESCENT APARTMENTS

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GRAPHIC INDUSTRIES

Above Left:
The Swimming Pool

Above Right:
The view to the East
from one of the balconies

Right:
A typical living room

Right Centre:
A dining room

Right Below:
A master bedroom

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CANADIAN

BUILDING DIGEST

DIVISION OF BUILDING RESEARCH • NATIONAL RESEARCH COUNCIL CANADA

FIRE IN BUILDINGS

by G. W. Shorter

UDC 699.81

During the lifetime of any building in Canada it is probable that one or more "unwanted" fires will occur. "Fire Loss in Canada, 1959," the report of the Dominion Fire Commissioner, states that for the period 1950-1959 the average number of reported fires per year was 73,000, with over 95 per cent of them occurring in buildings. The size of fires can vary from extremely small ones, a cigarette scorching a hole in a rug, to those causing complete destruction of both building and contents. It is important to keep constantly in mind that almost all fires, if allowed to spread unchecked, can result not only in financial loss but give rise also to bodily injury and in some cases to death itself.

An indication of the financial loss to the country from fire is the average annual property loss, which is in excess of $100,000,000. This figure does not represent the complete financial loss from fire, as in many instances wage earners become unemployed, production of goods is halted, business is interrupted and institutional facilities are depleted.

It is apparent that one of the present-day fire problems in Canada is the large-loss fire involving only one or two buildings, as compared to the era ending about the turn of the century when many buildings in a city could be involved in a single fire. In 1959 over 40 per cent of the total fire loss was acounted for by large-loss fires, each causing damage of $50,000 or more, even though less than half of 1 per cent of the total number of fires was involved. This, of course, is explained by the fact that the majority of these large-loss fires occurred in manufacturing, mercantile properties and institutional buildings.

Statistics are available only for those injuries leading to death. There is an annual loss of 540 lives, with approximately 75 per cent occurring in private dwellings and apartments. Canada has been fortunate over the last several years in that no single building fire has claimed a large number of lives. The development of more stringent fire prevention and building regulations for larger buildings has undoubtedly done much to reduce the hazard of large life loss; but there should be no complacency regarding those features that affect life safety. Given the right set of circumstances disasters could still occur. Efforts should be made not only to minimize further the likelihood of a large life loss, but also to reduce present losses, particularly those in residential occupancies.

The main purpose of this Digest is to discuss principles and features of effective fire protection. In designing a building these features should be fully considered at the earliest possible stage, for it is quite likely that much more effective protection can be provided at little if any extra cost. Although fire, and in particular fire in buildings, is an extremely complex subject, the designer can, with some knowledge of the basic principles involved, give rational consideration to the fire protection features of buildings.

Combustion

Combustion is a chemical reaction involving, mainly, oxidation, which produces heat as it proceeds. Such a chemical reaction can proceed rapidly only if the molecules of the fuel are intimately mixed with the molecules of oxygen with which they must combine. This condition is achieved most readily with gaseous fuels. Liquid fuels must first be vaporized before the necessary mixing with oxygen can take place, and the heavier of these may require the application of considerable heat. Solid fuels must always be heated to convert them to gaseous form for proper mixing with oxygen.

Once a fuel is available in a gaseous state it will diffuse in air and form a flammable mixture when the proportions of gas and air fall within certain limits. These are called the "flammability or explosive limits" and give the range of concentrations of fuel in air within which ignition can occur. Ignition will take place if the mixture is raised to a temperature at which self-ignition can take place, or more commonly, if an external high temperature ignition source is present. Such an external source may be extremely small, provided its temperature is sufficiently high, as in the case of electrical and other kinds of sparks, tiny flames and glowing objects such as embers and lighted cigarettes.

When solids are present in a finely divided state, as in grain, coal, wood and certain metal dusts suspended in air, they can be almost as easily ignited as gaseous mixtures, within appropriate concentration limits. A solid material heated to ignition point in a stream of hot gases will reach that point more rapidly, other things being equal, if it has a high specific surface —a large surface area in relation to its volume.

The process of internal generation of heat leading to what is commonly known as spontaneous ignition is an interesting phenomenon often given as the cause of mysterious building fires. It occurs less frequently than is generally supposed, since unusual conditions must exist. A material must be present that oxidizes at a significant rate at ordinary temperatures. Most commonly this will be provided by a few special oils of the type used in paint or that occur naturally in certain plant materials. The drying oils in paints are selected for their ability to oxidize in this way and thus promote drying of the paint films. As normally used they present little hazard, but when dispersed in a bundle of waste paint rags so as to provide a large surface area for oxidation with a minimum of opportunity to cool, the oxidation rate increases as the temperature rises. When conditions permit, the temperature may eventually reach the self-ignition point and a fire result.

Still another form of spontaneous heating can occur when a material such as wood fibreboard is stored in large quantities. There is a critical size of pile, depending on the temperature of the board at the time, above which the boards will gradually self-heat. This can raise the temperature of the material to its ignition temperature. A similar process can take place in stored agricultural products. In these cases self-heating may be initiated by the action of bacteria and may then proceed through an oxidation induced by the higher temperatures until self-ignition and fire occur.

It has been suggested that combustible material may be classified as tinder, kindling, and bulk fuel. Tinder can be ignited by a match and continue to burn of its own accord; common examples are paper, cardboard, and volatile combustible liquids. Kindling is any material that will ignite and burn if associated with sufficient tinder, although a match will not produce a continuing fire in it; plywood materials qualify as kindling. Bulk fuel is difficult to ignite and usually requires a supporting fire to keep it burning; heavier construction timbers and baled or compressed combustible goods such as textiles and papers fall into this class. Any timber having a thickness greater than ½ inch can be classified as bulk fuel. It is obvious from this that fire will develop much more rapidly in a furniture factory than in a warehouse containing only structural timbers.

Oxygen is an essential ingredient in the chemical reaction of burning, so that the development of a fire is limited by the oxygen supply. Where it is restricted, as in the extreme case of fire in a tightly sealed room, the oxygen in a room of average size is sufficient only for combustion of a small quantity of fuel, say 5 or 10 pounds; the heat produced will probably be insufficient to cause any damage to the structure that will permit more air to enter and the fire will die out from lack of oxygen. A building is seldom tightly sealed in practice, however, and if there are openings at two levels, natural convection, aided perhaps by wind, will ensure the escape of the products of combustion at the higher opening and a continuing supply of oxygen through the lower one. This permits a build-up of temperature until a balance is reached between heat produced and heat transmitted. The fire will then continue at this level until the fuel is exhausted.

In practice, heat may cause damage to a structure in such a way as to improve the air supply before equilibrium has been reached. Windows often crack first. After this, the temperature may rise rapidly until the stage at which surfaces receive sufficient heat by radiation to "flash over."

It may be seen that combustion can be described as the distillation of gases from combustible materials, the mixing of these gases with oxygen in the air, then the further heating of the mixture, usually only locally, until it ignites spontaneously or more commonly is ignited by flame or adjacent hot material. The chemical reaction which follows produces various results: heat is generated that can sustain and expand the fire; the combining gases produce other gases, mainly carbon dioxide and steam, although there may be more toxic ones, depending upon the substance being burnt. Combustion may not always be complete and carbon may be freed, producing smoke, which is the visible portion of the gases of combustion and will vary in quantity with the nature of the material. The rate at which the fire develops will depend upon the relative rates at which heat is liberated and dissipated, i.e. upon what can be termed the heat balance.

Development of Fire

For fire to spread in a building, heat must pass from one part to another in order to distil and ignite the combustible gases. This can be accomplished in several ways. It can be conducted along or through materials of high conductivity such as metals, which are not of themselves readily combustible, in this way passing through an incombustible partition until the temperature of combustible material on the far side is raised to the point of ignition. Convection currents can quickly spread hot gases throughout a whole building and may also carry combustible gases distilled out of the material adjacent to the fire but not burnt because of lack of oxygen. On reaching a new supply of oxygen these gases may then burst into flames. Radiant heat can cause the fire to jump wide gaps if the heat rays fall upon suitable tinder such as curtains in a window across the street, and flames can spread over the surface of combustible material and carry fire along corridors and into other rooms. Finally, there is the explosive propulsion of firebrands or other burning material that can enable fire to jump incombustible gaps.

Fire and the Design of Buildings

In general, a designer is not concerned with the ignition phase of a fire, except in the case of special hazard areas. In all areas where flammable vapours are normally present, explosion-proof electrical equipment must be installed and facilities provided for the removal of these vapours. As so many ignition sources exist in most buildings, such as the carelessly disposed-of glowing cigarette butt over which he has little if any control, a designer should assume that a fire can occur almost anywhere and design accordingly. His main responsibility is, therefore, to design so as to limit the spread of fire in order to minimize life hazard and property damage.

The rate at which fires develop is extremely variable, depending on ventilation, amount and distribution of combustible contents, and the type of lining materials. At present there is very little quantitative information available on the behaviour of fire once "flaming combustion" has commenced. Several research organizations in various countries are attempting to study this problem using models, but these investigations will extend over several years. From a study of fires in the past, however, it is possible to make some comments of a general nature on their development. There are three recognizable stages. There is a period when the temperature rises rapidly as the fire spreads; this development is limited by the warming up of the fuel surfaces and the penetration of oxygen into the fuel. There is a period when the temperature rises more slowly; it is generally referred to as the "fully developed fire," which is in turn limited by the access of air through openings in the perimeter walls of the building. Finally, there is the decay period when the temperature is falling; during this time the volatile fractions of the fuels are exhausted.

The rapidity of the development of fire in the first period affects the hazard to human life, damage to contents and the size of the problem facing the fire department. One factor that affects this speed is the type of interior linings installed. More flammable linings, other conditions being equal, will allow a fire to develop more rapidly than less flammable linings. The designer should, therefore, keep their use to a minimum so as to give as much time as possible for occupants to escape and for fire fighting.

The period of the fully developed fire, and to a lesser extent the decay period, largely determine the extent of the damage to a building structure. It is during this time also that the building presents the greatest exposure hazard to adjacent buildings. One of the major factors, in addition to ventilation, that affects the duration of this period is the amount and distribution of combustible material per square foot of floor area. The greater the calorific content of the materials in the building, the greater is the potential severity of the fire.

The final stage in the reaction is extinction. Flaming ceases when flammable vapours are no longer produced at a sufficient rate to form a flammable mixture with air. Extinction may be due to depletion of either fuel or oxygen. Carbon dioxide fire extinguishers work on the principle of blanketing the fire by cutting off the oxygen and so extinguishing it. Water does this too, but it cools the burning material as well, thus giving a negative heat balance and causing the fire to die down.

Conclusion

In summary, the combustibility, flammability and fire endurance of building materials are all factors to be considered in designing buildings. But although over-all combustibility is of importance, it is the flammability of lining materials that is critical. It influences the speed with which a fire develops; a corridor lined with highly flammable materials can even be rendered useless as an avenue of escape. Several tests are available for classifying materials as to their flammability; the flame spread test, which enjoys the widest acceptance on the North American continent, is ASTM Standard E84 – Surface Burning Characteristics of Building Materials.

Compartmentation is another most important consideration from the standpoint of limiting the spread of a fire; and the fire resistance of the enclosing elements will determine its effectiveness, whether it is the separation of occupied areas, either vertical or horizontal, or the enclosure of stairways.

In order to assess the performance of walls, columns, floors and other building members under fire exposure conditions, standard fire resistance tests intended to simulate the development of a fire have been developed over the years. To pass the test, the component must prevent the passage of fire; it must not collapse nor develop fissures, nor may it conduct sufficient heat to develop temperatures on the unexposed side that would endanger combustibles stored there. On this continent the most widely used tests are the ASTM standards:

E119–Fire Tests of Building Constructions and Materials

E152–Fire Tests of Door Assemblies

E163–Fire Tests of Window Assemblies.

In each of these tests there is a rapid initial rise in temperature (the temperature in the test furnaces reaches 1000°F in 5 minutes), after which it continues at a decreasing rate. The duration of the test fire has been related to the "fire load" (weight of combustibles per sq ft of floor area) i.e. 1-hour endurance corresponds to a fire load of 10 lb/sq ft of combustible material having a calorific value of 8000 Btu/lb. Temperature measurements obtained during the St. Lawrence Burns operation provided further verification that the time-temperature relationship used at present in the standard fire endurance tests is a reasonable approximation of conditions that can obtain during a fire.

Although the designer can reduce the possibility of fire in a building, he cannot prevent one from starting. He can, however, ensure through proper design that the fire loss will be kept to a minimum. A knowledge of the basic principles involved is essential if the building is to be designed not only to resist the action of fire but also to provide safety for its occupants and contents.

Acoustics and Church Architecture

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THE HISTORY OF CHURCH BUILDING is a history of temptation: the temptation, continually besetting architects, to think about structural and aesthetic forms rather than mere human functions. In church design this tendency reached its zenith in the middle ages when church-builders, intent on the Gothic concept of vaulted arches soaring to Heaven, succeeded in constructing a Tower of Babel. The result is the legacy of acoustical defects found in splendid perfection in medieval churches, whether built in the 13th or 20th centuries.

The surprising thing is that the clergy and their congregations managed to adapt themselves to this environment – so well, in fact, that they have come to regard its peculiarities as part of the religious pattern. Most of the monumental church music was composed specifically for the church environment (and indeed it loses much of its effectiveness if transferred for example to a good concert hall). The spoken or chanted word was used principally in fixed ritual forms that made their point by familiarity rather than by intelligibility. Frequently an archaic tongue was retained, since unintelligible Latin is no more difficult to understand than unintelligible English. Most clerics developed a slow portentous style of speech to combat the echoing din produced by each syllable, but despite this sermons had a cryptic, oracular quality that at any rate added to the style, if not to the import, of the message.

In recent years, however, stimulated perhaps by post-war rebuilding in Europe, there has been a revolution in church architecture. It seems appropriate, then, to grasp this opportunity to effect also a revolution in church acoustics. It is therefore proposed to examine the acoustical properties of traditional churches, the extent to which they might profitably be altered, and the way these ends may be fitted into modern church architecture. The acoustical factors will be sketched as broadly as possible to avoid any inadvertent restriction of architectural design; the eventualities that arise in specific buildings are probably best left to the acoustical consultant. Nevertheless, the more important acoustical design techniques will be illustrated by a few geometrical studies and details from actual churches.

A discussion of liturgical requirements is beyond the scope of this paper, but it is worth noting the consensus of modern authorities [1-4] that the church should be a place for community worship. The traditional separation of clergy and laity, as of actors and spectators, is gone – and with it the distinction between chancel and nave. This emphasis on community participation is accompanied by an emphasis on communication. An obvious acoustical need is the propagation of intelligible speech. Another, less definable problem, whose importance varies with religion and church, is the effective production and propagaton of the musical portions of the service.

It might be noted at the outset that the two acoustical requirements are not entirely consistent. The medieval development of vast reverberant enclosures was paralleled by the development of an assembly of superb music designed for such an environment. It seems desirable therefore to retain some vestige of the original sound. This, among other reasons, leads to the desirability of retaining a moderately reverberant environment. For medium sized churches a reverberation time of 2 to 2.5 seconds is suggested, as compared to 1.5 seconds for a small concert hall, and 5 to 10 seconds for some of the older churches. This is higher than the optimum for speech communication, and will necessitate special consideration of the pulpit and other areas where speech originates during services.

ACOUSTICAL REQUIREMENTS

Speech communication involves the propagation of a sequence of pulse-like sounds that constitute speech syllables. To be understood they must reach the listener as a similar sequence, without undue modification or rearrangement. What actually reaches the listener is a combination of direct sound and many reflections, each delayed relative to direct sound by a time that depends on the length of the reflection path. If the reflections are not delayed too much they reinforce the direct sound and serve a useful purpose; in fact this sort of acoustical reinforcement is essential if the listener is more than about 50 feet from the speaker. If the reflections arrive late they overlap with later syllables in the sequence, and thus interfere with speech perception. To be useful a reflection should reach the listener within about 50 milliseconds of the direct arrival. This is equivalent to a path difference of about 50 feet, assuming as a rough approximation that sound travels at a speed of 1 foot per millisecond.

Inevitably, in a reverberant hall, there will be delayed arrivals involving one or more reflections. It is these multiple reflections that, in sum, constitute reverberant sound. The most important consideration is to avoid a particularly strong late arrival or a coincidence of late arrivals that would constitute an echo. The strongest reflections are obtained from large flat or slightly concave surfaces. The first principle is to use such surfaces strategically to direct useful sound to distant listeners. Conversely such surfaces should be avoided if they result in delayed reflections in particular regions. They can be modified by changing their orientation, by making them absorptive, or by breaking them up with irregularities of the order of a few feet in scale. The use of irregularities may replace one strong reflection by two or more weak ones. Concave surfaces lead to a concentration of sound, and if the centre of curvature is within the space there may be serious focussing effects. Such focussing effects can be mitigated by breaking up the surfaces or making them absorptive.

Symmetry is not usually helpful in acoustical design since it leads to a coincidence of reflections from symmetric parts of the enclosure. The problem becomes progressively worse with the degree of symmetry, from a simple rectangular shape, to a cylinder to a sphere or hemisphere.

Although near reflecting surfaces are essential, it is also necessary to consider their effect on a speaker. For example, if he were ensconced in a pulpit that closely surrounded him with reflecting surfaces he would be bathed in his own sound – like a bathtub baritone – and have no feeling for the acoustical properties of the nave proper. Another phenomenon particularly associated with the speaker is the flutter echo that arises usually with parallel walls. Each pulse of sound produces a series of multiple wall-to-wall reflections in the plane of the source. Since there is usually little absorption in this region the effect may die out very slowly. A similar effect could exist between floor and ceiling, but people and furnishings usually provide sufficient scattering at floor level to dissipate all but the first reflection.

These considerations apply particularly to the location and design of the pulpit or lectern. It is important to provide near reflecting surfaces that will direct sound without too much delay into the more distant seating areas, and on the other hand to avoid large flat or concave surfaces that will result in long-delayed reflections. The ideal solution is to incorporate the near reflectors as parts of the walls or ceiling of the main structure. Failing this the next best thing is to provide them as adjuncts of the pulpit itself, in the form of a solid back, or better still a canopy over the pulpit. In a high-ceilinged church a canopy may provide useful reflections and at the same time interfere with harmful delayed reflections.

Similar considerations may apply to other points where speech originates such as the altar or baptistry, keeping in mind that intelligibility is less important for ceremonial speech. Usually there is a convenient wall near the altar to provide good reflections. In some churches the pastor stands with his back to the congregation during altar ceremonies and it is then most important that the associated wall be a good reflector.

Music

The location of choir and organ in a modern church is a problem for which there is no single inevitable conclusion. One common practice in the past was to sandwich them into a chancel between the congregation and the altar; this tends to reduce the altar to a dimly seen object in the background, rather than a focal point of the service. Another practice is to place them in an alcove or gallery at the back of the church; this reduces them to the status of background music, rather than live participants in the service. A common modern solution is to place them beside, rather than in front of, the sanctuary in an alcove or in the nave itself. Acoustically, one can consider separately the technical problems involved in producing the music and the problem of conveying it to the congregation. The latter problem requires that both organ pipes and choir be effectively in the nave proper, rather than stuffed into a small adjacent room inadequately coupled to the nave. On the other hand there should be some separation between congregation and choir, so that the reverberant sound, retained specifically to enhance the music, blends effectively with the direct sound. As in the case of speech the delayed reflections need careful examination to avoid echoes, but direct sound and near reflections need less emphasis. The ideal is a smooth sequence of reflections.

The technical problems of combining choir and organ are many and complicated. It is important that the choirmaster be able to see and hear the choir, and to hear the organ in reasonable balance with the choir. He should also be able to hear the other things going on in the church, including congregational singing if any. The choir, especially one consisting of untrained singers, needs a few reflecting surfaces nearby to keep the members in contact with each other. In this connection the custom of splitting the choir into two widely separated groups is a poor one. The choir needs also, of course, to hear the organ and to see the choirmaster. If the choirmaster is not also the organist then there must be communication between these two as well. Finally, the organ pipes and choir should not be too far apart or there will be problems of synchronization.

Electronic Reinforcement

Large churches, even with the best acoustical design, will probably require electronic sound reinforcement from the principal speech locations such as pulpit and altar. Various rules of thumb set the maximum enclosure size for unaided speech at 50,000 to 250,000 cubic feet. This large range, which probably includes most of the churches being designed today, is the range in which electronic apparatus may help overcome shortcomings in acoustical design. For experienced speakers and moderately good acoustical design a conservative limit might be 150,000 to 200,000 cubic feet.

Another criterion is the maximum distance from speaker to listener. Direct speech, unaided even by acoustical reinforcement, is satisfactory to a distance of 50 to 75 feet. Acoustical reinforcement, involving short-delay reflections, can extend the range to beyond 100 feet (depending somewhat on background noise). Delayed echoes may seriously interfere with intelligibility down to ranges of less than 20 feet.

Some peculiar customs, not necessarily related to good acoustics, have grown up in the sound reinforcement business. Hence it is worth noting here the essential requirements for an effective church reinforcement system. These recommendations will apply to most churches being built today; they are not directly applicable to a colossus of the size of, say, St Paul's Cathedral —although the system installed there is only a more complicated application of the same principles.

Generally, music will need no reinforcement, and the important consideration is intelligibility of speech, especially from the pulpit. The objective should be to reinforce the direct speech sounds as unobtrusively as possible in order that the listener is not forcibly made aware of the reinforcement system. This can be done by locating the loudspeaker system so that its sound reaches the listener just after the direct sound (*ie* via a path no more than 10 or 20 feet longer than the direct path). To achieve this effect for most of the congregation it is unusually necessary to place the loudspeaker assembly near the source, (but fairly high above the source and preferably slightly forward to avoid direct pickup from loudspeaker to microphone). The common use of many loudspeakers distributed throughout the nave is to be deplored, since it merely increases the effective reverberation, and leaves the listener confused as to the source of sound.

The reinforcement system may be used to combat excessive reverberation by using a directional loudspeaker that beams the sound towards the listeners, who, among other things, are effective sound absorbers. Then only a small fraction of the reinforcement energy is added to the reverberant sound. Such a loudspeaker system can best be made for a limited frequency range. Fortunately the range from 500 to about 2,500 cycles per second, for which a directional system is readily designed, contains the energy most important for speech intelligibility. The amplifier frequency range should be restricted accordingly.

Design Techniques

Sound Absorption

Reverberation calculations can begin as soon as the congregation size and approximate volume have been decided upon, utilizing the Sabine formula $T=0.049 V/A$, where T is the reverberation time, V is the volume in cubic feet and A is the total absorption in sabins (square foot units). No detailed information on absorptive materials will be attempted here since it is available from many sources *(for example, see Ref 5)*. It will be found that the congregation, contributing about 5 sabins per person, constitutes a substantial part of the required absorption. Coping with fluctuations in congregation size is a perennial acoustical problem. Perhaps this is a valid argument for pew cushions, which play no acoustical role when occupied but provide some compensation (1 or 2 sabins) when vacant.

Care should be taken to provide balanced absorption over the whole frequency range. Commercial acoustical materials are adequately discussed in trade literature, but it might be worth noting that conventional materials may also be utilized to good effect in some circumstances. Extra low frequency absorption may be obtained with ¼-inch plywood panelling mounted over a small backspace (1 inch or deeper). Cavity blocks, made of porous aggregate, may be made with high absorption at low frequencies and moderate absorption over the whole range, although this may be reduced by too much paint. Open-work of wood slats, open blocks or spaced brickwork over mineral wool batts, is an effective absorber at low and medium frequencies. Drapes and carpet, of course, are also efficient absorbers, especially at high frequencies.

Choice and location of materials should accompany the reflection analysis, since it will probably be desirable to keep some surfaces reflecting and make certain troublesome areas absorptive.

Reflection Analysis

Simple two-dimensional ray analysis provides the means for investigating the effect of reflecting surfaces. The rules of ordinary geometrical optics apply with two restrictions: (1) surfaces less than several wavelengths in extent (less than about 8 feet for the speech power frequencies) become diffusers rather than simple reflectors of sound; (2) the time sequence of reflected arrivals must also be considered.

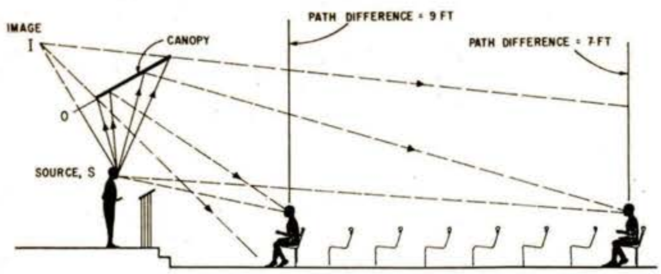


Figure 1 Geometrical Ray Construction for Canopy.

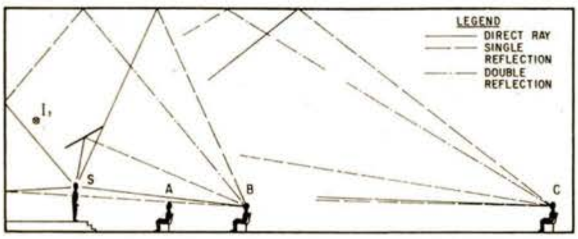


Figure 2 Ray Diagrams for Vertical Section of Simple Rectangular Enclosure.

The ray technique is illustrated in *Fig. 1,* which shows the design of a canopy over a pulpit. For flat surfaces the image of the source is located by drawing SI perpendicular to the surface of the reflector and setting OI= OS. Then a pencil of reflected rays may be drawn from the image point through all parts of the reflecting surface. *Fig. 2* shows the extension of this technique to a simple rectangular enclosure. The first few reflections arriving at listening points A, B and C are shown. Arrival times for the resulting reflections are determined by measuring path lengths. These time sequences are shown in the graphs of *Fig. 3*. Note the useful reflections provided in each case by the canopy and by the front wall, which is not too far from the pulpit. The ceiling reflection, which is beneficial at the rear of the church,

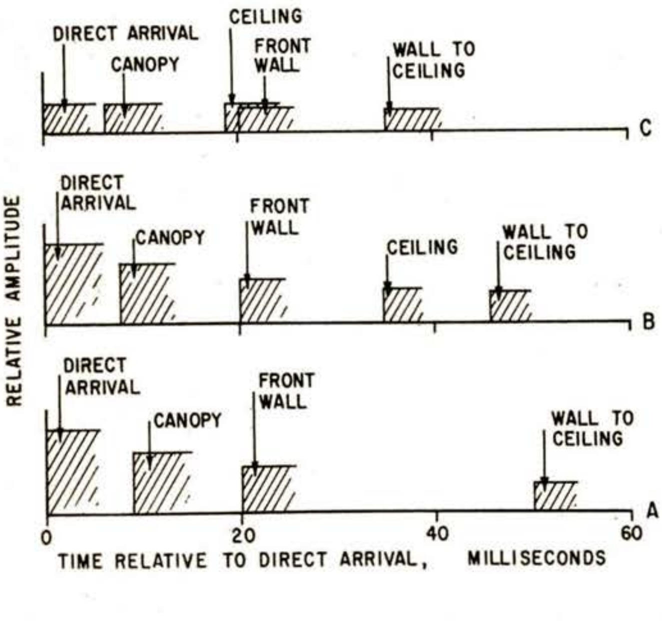


FIGURE 3
SEQUENCE OF REFLECTIONS ARRIVING AT POSITIONS A, B & C (SEE FIGURE 2)

Figure 3 Sequence of Reflections arriving at Positions A, B & C (see Figure 2).

becomes more and more useless as one progresses forward, but the canopy interrupts it for seats ahead of position B. By slanting the front portion of the ceiling it could be made to direct sound usefully toward the rear; by lowering it the reflection could be brought forward in the sequence; by breaking up the surface the reflection could be made more diffuse and less troublesome.

Similar considerations apply to the other surfaces, and similar analysis must be made in both other planes. Frequently a multiple reflection may require analysis in several planes.

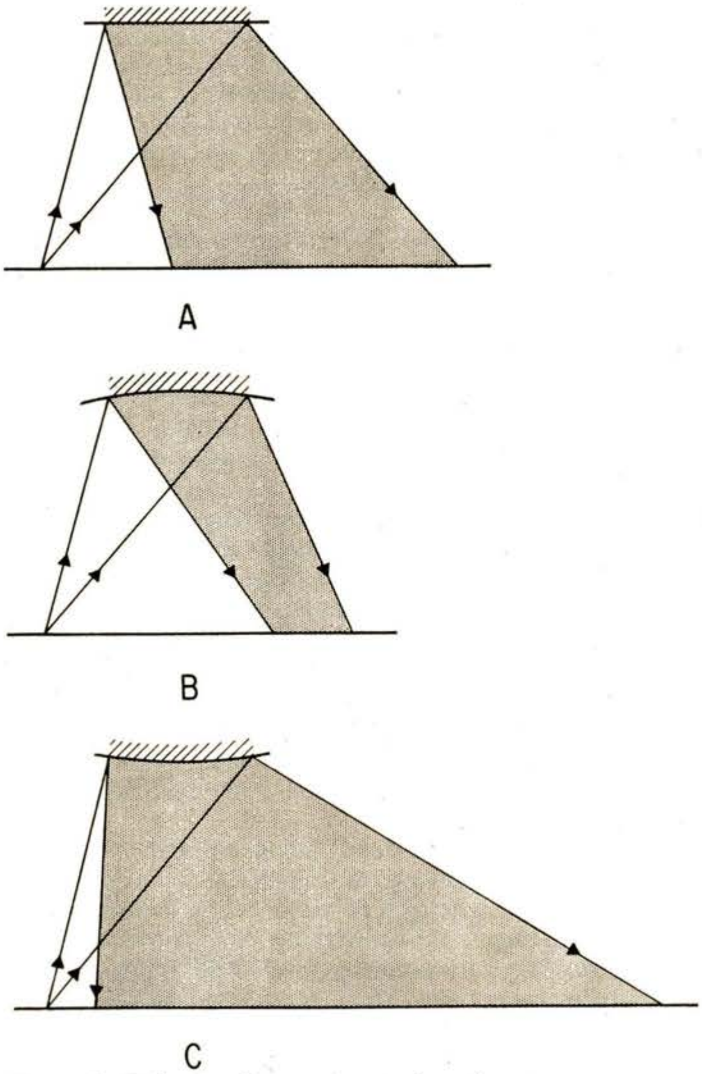
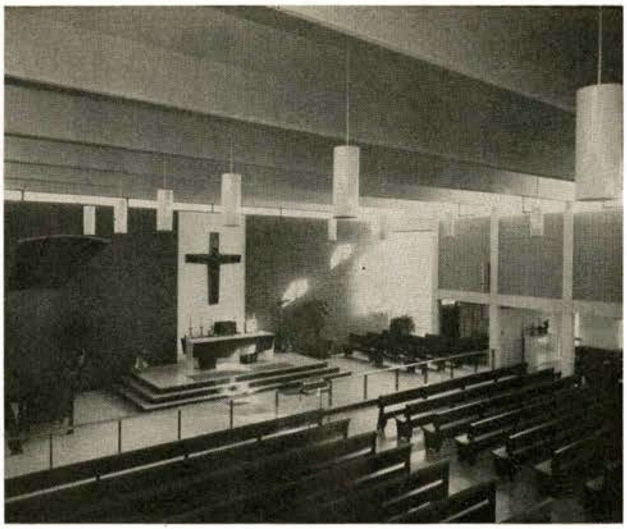


Figure 4 Reflections from various surface shapes:
(A) Flat Surface—reflected beam attenuated in proportion to total path length.
(B) Concave Surface – reflected beam convergent resulting in increasing intensity.
(C) Convex Surface – reflected beam attenuated more rapidly than for flat surface.

Curved surfaces can be treated by considering each small area of surface as a plane and drawing the reflected ray according to the orientation of that small portion. Some effects related to curved surfaces are illustrated in *Fig. 4*. It will be seen that, compared to a flat surface, a convex one tends to diffuse and attenuate the sound more rapidly, whereas a concave surface tends to concentrate and amplify it.

The dangers attendant on the use of concave domes and circular plans are well known, yet a circular plan has



the advantage of bringing the congregation close to the altar. St. Basil's Church, Ottawa, illustrated in *Fig. 5* and more extensively in a recent issue of this *Journal*[6], manages to deal extensively with both these problems. In this church the radius of curvature of the dome was great enough that there were no focusing problems because of ceiling reflections. Most of the ceiling, in fact, formed a useful reflecting surface, especially for the gallery. A canopy was used to provide acoustical reinforcement under the gallery. Since pulpit and altar areas were both important for speech communication the canopy was made large enough to serve the whole area (and incidentally to screen the one portion of ceiling that might have been troublesome).

Reflections from the curved wall were minimized by breaking it into alternate segments on two radii and making them largely absorptive. Most of the total required absorption is provided in this way. The inner segments are faced with blocks turned to expose the cavities, which communicate to absorptive material in the back space. The outer segments contain sound absorbing plaques which are set out a few inches from the upper portion of the wall to break up the wall surfaces still further.

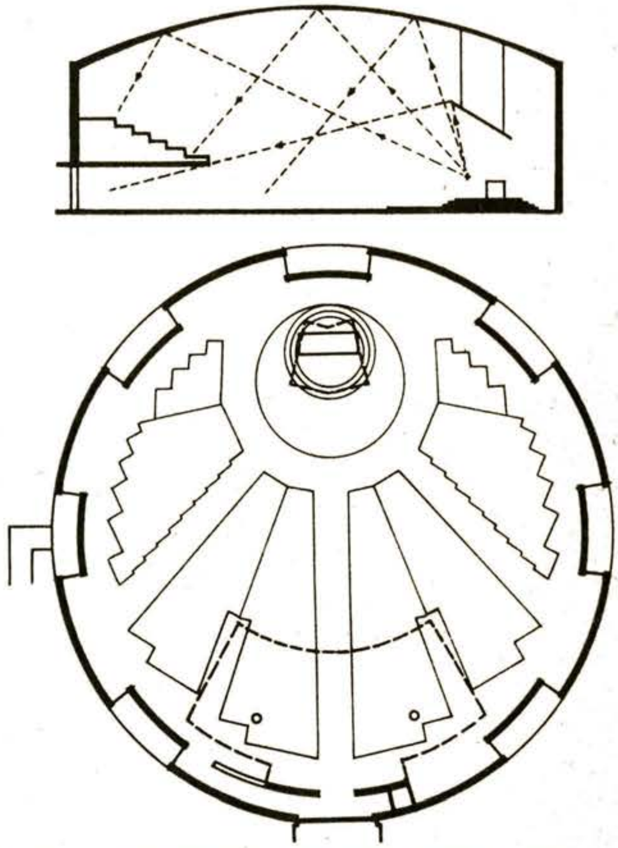


Figure 5 Plan and Section of St. Basil's Church, Ottawa.

In conclusion, it is admitted that other factors besides acoustics enter into church architecture. Nevertheless, since a church is an auditorium the acoustical considerations are by no means the least important. The essential principle of auditorium acoustics is that sound is a precious commodity which ideally should be conveyed from source to listener without wasting a drop. To approach this ideal requires that the acoustical properties be considered at every stage of the design, but especially in the first stages, when the basic shape of the church is being decided.

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This paper is a contribution from the Division of Building Research, National Research Council, and is published with the approval of the Director of the Division.

Pratte Résidence
Pointe-Aux-Trembles, P.Q.

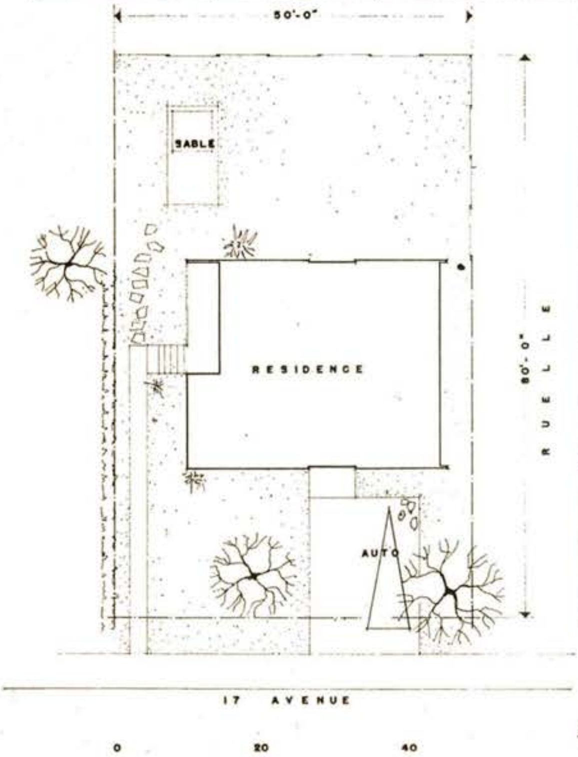
Architectes:
Jodin, Lamarre, Major & Pratte
Montreal

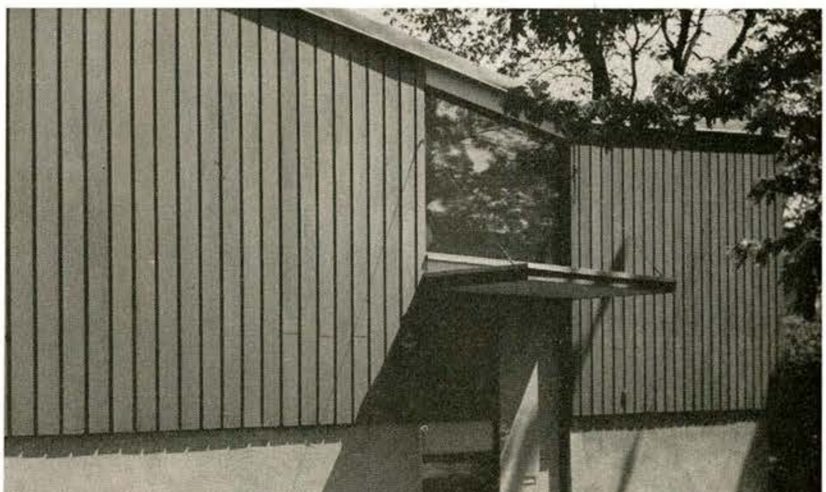
Contractur-Gérant
Maurice Lajeunesse

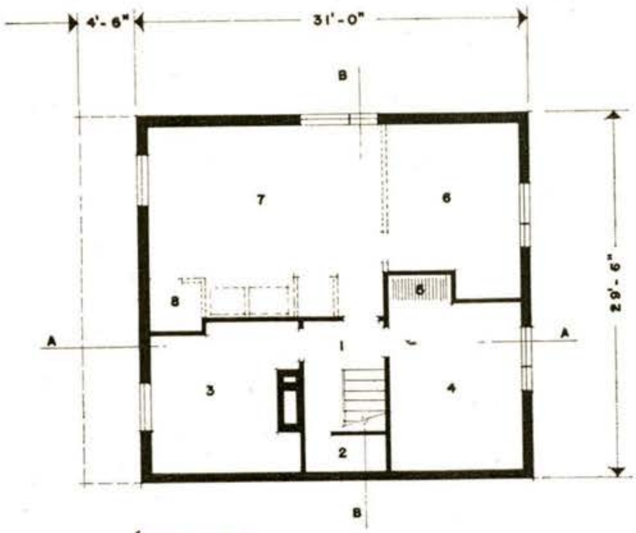
Cette résidence a été conçue pour satisfaire les besoins d'un jeune ménage et pour permettre un aménagement ultérieur correspondant aux nécessités de la famille qui s'accroît. L'économie fut appliquée dans la mesure du possible, sans pour cela négliger l'esthétique et la fonction.

La maison qui comprend actuellement deux chambres en haut et une au sous-sol, pourra, à volonté, s'agrandir d'une ou deux pièces supplémentaires suivant le développement de la famille. Le vivoir qui est séparé du séjour permet d'y recevoir sans déranger la vie normale de la famille.

Les méthodes de construction dans cette maison sont conventionnelles. Les fondations sont en béton, les murs extérieurs sont en madrier de pin, les divisions intérieures sont en colombages d'épinette ainsi que les solives du toit et du plancher. Les parements extérieurs sont de brique à chaux et de planches de cèdre.







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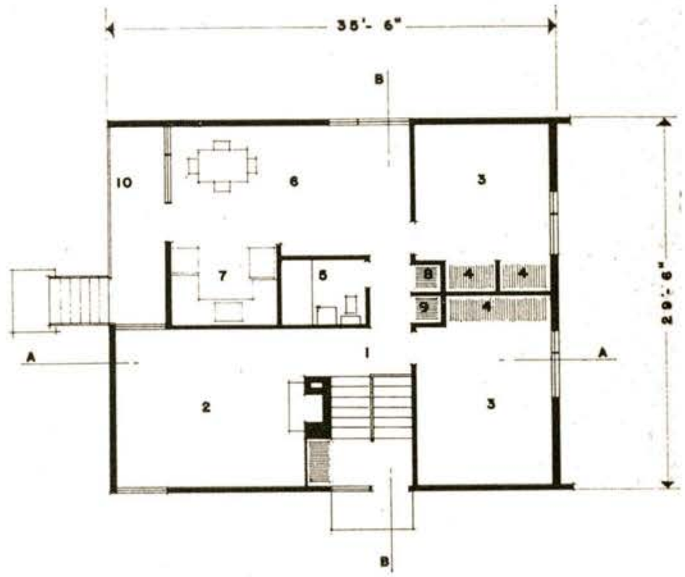
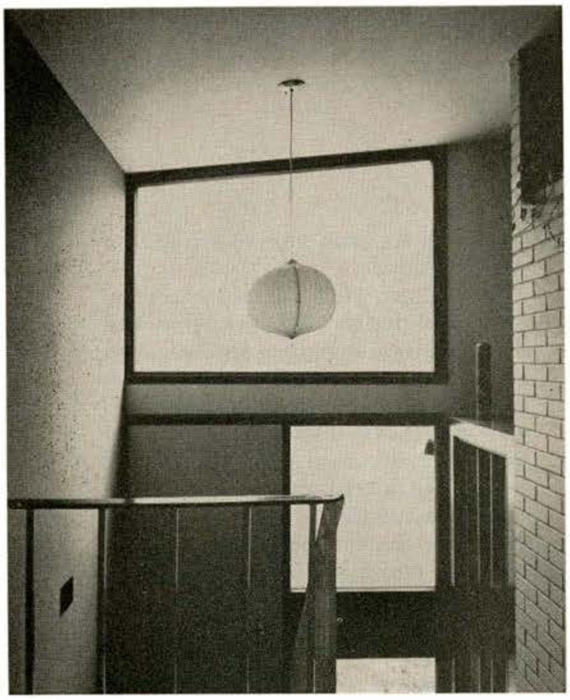
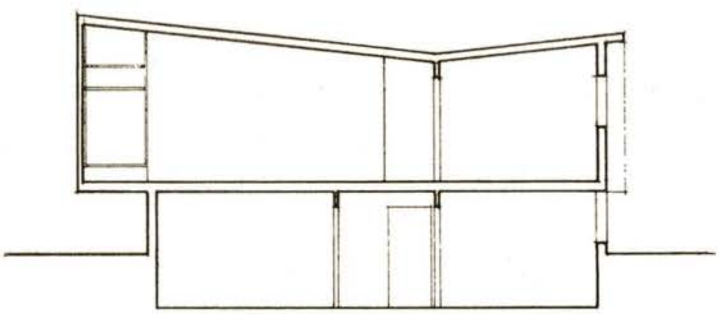
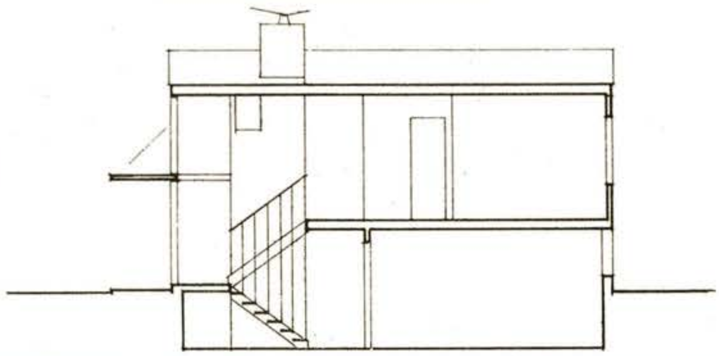
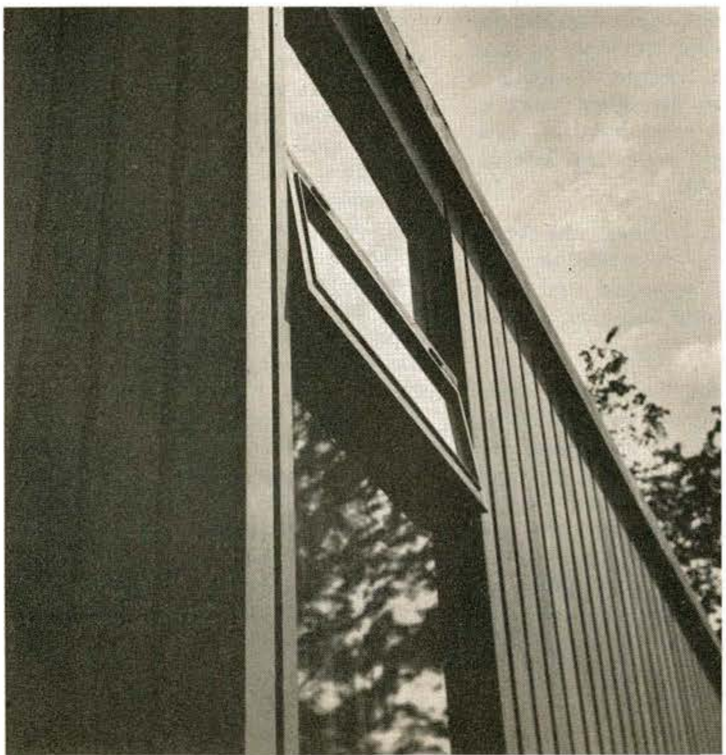
5 W-C
6 Séjour
7 Cuisine
8 Balais
9 Langerie
10 Galerie











The Seminar on Architectural Education

The all day seminar on the Assembly Theme, "Architectural Education" took place at the new UBC School of Fine Arts Building on Friday June 1st. The attendance was large and the interest keen. After the opening remarks by the Chairman, Mr R. Schofield Morris, five study groups were formed, with speakers chosen from the membership representing the universities and the profession, to deal with five important aspects of the problem.

The proceedings were tape recorded and although a small part was lost due to something happening to the microphone, the *Journal* was able to transcribe or otherwise obtain and summerise the remarks of the study group rapporteurs, and the discussion which followed.

The participants in the study groups were as follows:

"Education of the Student Architect," Chairman, John Bland (F); speakers, Douglas Shadbolt and Mel P. Michener; rapporteur, R. Duschenes.

"The Role of the Practising Architect in Education", Chairman, John C. Parkin (F); speakers, Wolfgang Gerson (F) and J. W. Strutt (F); rapporteur, James A. Murray (F).

"Further Education of the Practising Architect", Chairman W. G. Raymore (F); speakers, N. Mainguy and H. Bouey (F); rapporteur, Peter Dobush (F).

"The Role of the Government in Education", Chairman, R. F. Nairn; speakers, Ian MacLennan (F) and Ray Affleck; rapporteur, Peter Dobush (F).

"Graduate Studies and Practical Research", Chairman, John A. Russell (F); speakers, Dr Thomas Howarth (F) and Alson Fisher; rapporteur, R. S. Ferguson.

Graduate Studies and Practical Research

Getting graduates into research a problem

Mr Ferguson said the first problem faced was how to get graduates into research. One of the speakers pointed out that the National Research Council has difficulty in recruiting architects because they must take graduates in the top 10 per cent of the class. Because of the schools' emphasis on design some of the best students, in other respects, may be in the bottom 10 per cent. It was suggested that NRC should revise its requirements with regard to architectural applicants.

Architecture is a peculiar profession. The profession is interested in doing research yet it does not accept research activity as adequate experience for entry qualifications. Again, on the one hand the profession attempts to limit practice to those registered within a province, and on the other hand, or perhaps even the same hand, it opens the practice world wide with international competitions.

Speaking as an architect, the reporter took all this in his stride, but as a research man it appeared that there was some confusion and even conflict of ideas.

It was recommended by the reporter that the profession should become specialised and that architectural students should be trained for a specialty. There was general agreement that specialization was necessary, but the majority of the members of the seminar thought that specialization should not occur at the undergraduate stage but only after graduation and possibly only after registration.

Referring to the calibre of man for research, the Chairman referred to discussion at the assembly in 1959 where it was stated that the profession had to produce men who were (1) technically sound in knowledge, (2) able to think, (3) able to co-ordinate, and (4) able to communicate. Education which equipped students to find and to relate was more important than that which crammed facts.

Another profound remark at the seminar was that most needed information is available now. One of the important matters is gathering it together in some useful form.

Much of the discussion concerned the properties of materials. It was suggested that just because a material is new it does not have to be used. We should find out more about existing materials. This led to a testing service for materials. It was pointed out that what was needed was something like a "Good Housekeeping" label. It was outside the functions of DBR to provide this, but one well-known research expert at the seminar said that there was another answer. There were three steps – (1) architects should know what they want materials to do, (2) with this as an objective precise specifications and standards should be prepared; ASTM and CSA were mentioned as examples; and (3) architects could then ask manufacturers to provide materials according to the specification and furnish test results etc to prove that the materials are of that quality.

Sir William Holford, asked to comment, said that he could not agree with the conclusion regarding specialization reached by the group discussing Graduate Studies and Practical Research. His view was that specialization must start prior to graduation from the school. He pointed out that specialization starts early in the education of every man. By the time a student had finished his preliminary education, he is specialized to a degree. With regard to architectural students, he said that specialization should commence after the third year, provided that the previous three years had given the student a well rounded education in architecture.

He remarked that institutes for graduate research had been formed in three universities in Great Britain and these have been found to be most successful as a means of raising funds for research. One advantage of these institutes was that funds raised would not be used for anything other than research. The institute in London was different than most in that it was supported jointly by three or four universities.

Dean Perkins, also asked to comment, said that in Philadelphia the institute for graduate studies had been found to be absolutely essential for research, but they had found also that an additional group was needed. It was necessary to promote research in industry and this was what the additional group was for.

The Role of the Practising Architect in Education

Balance, Boundaries, Nature of Practice Today

In essence, said Professor Murray, the group discussions had resolved themselves into a number of questions. The first was the nature of the balance between formal and practical education; the second was the legitimate boundaries of the architect's field of endeavour; the third, the relationship of the practising architect to the educational process; and the last an understanding of the nature of the practice today.

On the first question, the nature of the balance that should exist between the formal educational process and that growth of understanding and competence which can arise within the fields of practice, it was felt that here was the beginning of that unhealthy subdivision of something which is basically an undivided process. As Professor Gerson phrased it "We bemoan the unhappy consequences of the kinds of artificial and difficult divisions which lie between education through practice and the education through academic process".

The emerging legitimate boundaries of the architect's field of endeavour, said Professor Murray, will not be found by studying the nine or ten clauses of the schedule of fees for professional services. It was all changing, immensely and drastically, and it was a large question whether or not education, either academically or practically, was changing to meet it. The larger issues of city design, of land policies, of technical developments, of social awareness–these things obviously were new dimensions in the education of the architect. The report of the RAIC Committee of Enquiry into the Design of the Residential Environment had disclosed areas of consideration which many might think as being marginal to architecture but which, the group, thought were in many ways increasingly the essence of architecture.

On the third question, that of the more precise relationship of the practising architect with the educational process, Professor Gerson had touched on the process we had known in the past–the relationship between the profession and the learning person through journeyman to craftsman, to architect, to teacher. Professor Gerson had also pointed out that, while this sequence remained, the tradition of architecture carried through intact, but when it was shattered, many other things were shattered with it. The group therefore discussed what might be called the apprenticeship method, and a comment was made on a point of view raised by Walter Gropious on this particular matter: "Should architectural education be separated from its academic basis? Is there a new dimension of integration with the building industry, which should be the basis of an educational process?" This led into another issue in what might be called the "apprenticeship method", on which all felt a little sensitive, and that was the additional syllabus method, which is under contemplation, particularly in Ontario. This additional syllabus was to provide a bridge between theoretical and academic appreciation or understanding of an architecture and its practical implementation as a way of life; a way of dealing with buildings and clients and situations which were known to practising architects. Very briefly, it had to do with additional lectures on such matters as professional practice, law management, specifications, equipment, developmental finance and appraisal. On this whole matter, the major area of misgiving by the academic representatives in the group was that this kind of process might give a distorted or warped emphasis to studies at a particular time during the evolution of a person's maturing towards a professional competence.

The group, concluded Professor Murray, ended up by asking the inevitable question "What is an architect?" With Dean Perkin's assistance in particular, a lively discussion took place on whether there should be a different kind of view of what is the architect – an understanding, an embracing of a larger team, including those who are competent at structures, in mechanical systems, in economics; and the group wondered where was the border of this dimension. Was it law? Was it sociology? Where did it stop and start? Was there a larger field of education? There might be other ways of putting it, but was there a larger meaning to the word "architect"?

The Role of Government in Education

Taxpayer is the new Patron of Architecture

Mr Dobush admitted to some early confusion in his own mind on the point of the discussion as the seminar speakers got off to a slow start attempting to define the place of the profession in our emerging society. Ian MacLennan (F) unfolded a new concept of the architect's role, stressing the need not only to educate the architect but to educate "the common man–the tax payer" who is in effect emerging as the "patron of architecture and of all the arts". Ray Affleck outlined the challenges besetting the profession at a time when society is facing such fundamental problems as population explosion, rapid urbanization, world industrialization and many others, including survival in the atomic age.

In the discussion, it seemed to Mr Dobush that the following points received particular emphasis: (1) Architects should recommend to the government that a greater effort be made to promote the training of architectural technicians and draughtsmen through the media of technical and trade schools. Such schools would relieve the universities of much routine education and permit more emphasis on aesthetics. (2) Architects should recommend the establishment of a "teacher training" course in the universities. "Good architects are not necessarily good teachers." (3) The possibility should be studied of incorporating into the five year university course, one year's experience with a general contractor, during which time the student would be working for the contractor but keeping records under the direction of the university. (4) The Government should be encouraged to make available more grants, scholarships, and research funds. (5) Architects should initiate with the government a program designed to stress the important role the architect can play in the civil service, and take steps to ensure that this role can be carried out by training architects in the functions of the three levels of government.

Summing up, Mr Dobush felt that the seminar was concerned not only with the role of government in education, but also with the responsibilities of the profession, and concern over the feeling that the profession was not as active as it could be in its approach to the government on problems of mutual concern.

Further Education of the Practising Architect

Periodical Rejuvenating Courses Required

Further education of the practising architect was needed, said Mr Trépanier, and members should urge their Provincial associations to take action to this end. One of the problems was that many architects, after receiving their degrees and obtaining their registrations, became too much involved in earning a living to further their education. What was needed was a periodical rejuvenating course for the practising architect, and the architects of Alberta had found a solution in their periodical "Banff Sessions". Mr Howard Bouey, who spoke to the syndicate on this point, had suggested that there should be four such types of "rejuvenating courses": general discussions on the specific point of view, such as the Banff Sessions; specialized meetings, such as the Seminar on hospital design and construction at Edmonton following the Assembly (see *Journal*, June, 1962, Page 65), technical courses and public relations courses (also, added Mr Trépanier, a course on how to get a client).

Architects should travel more, study examples of good design here and abroad. They should participate in municipal affairs and keep in touch with people in their own localities. Seminars, such as the present one, achieve something, but not enough. They should be held more often—six to eight times a year.

Mr Trépanier concluded with a reference to the student indenture between university graduation and provincial registration. Quebec had just started a two year indenture although there were quite a number of architects, himself included, who felt that the time should be extended to three years, a practice which, he understood, the Ontario Association has considered.

Education of the Student Architect

Emphasize Creative, Intellectual Development

Mr Duschenes presented three statements from his study group. Firstly, the architectural profession must examine its public image and its professional competence in view of its changing circumstances. Secondly, on the basis of this, it should evolve areas of specialization and practice which can guide the development of specific educational pursuits; and thirdly, there should then be agreement upon a basic minimum curriculum, with strong emphasis on intellectual and creative development. Specialization should occur at graduate level.

Enlarging on the last point, Mr Duschenes said that after long discussion of the pros and cons – whether the course should be made longer or shorter, it was agreed that it should *not* be lengthened, that it should be a concentrated course of an intellectual content, of architectural training, of training that would enable architects to come to grips with problems in an analytical way, and not use that knowledge to find results, but to examine problems. Only after this basic training of an intellectual nature should specialization be required, if at all.

Comments and Questions

When the rapporteurs had finished their reports, the chairman invited questions and comment.

Randolph Betts (F), Montreal said he felt that Prof Murray's group had made a vigorous contribution to the seminar, but that he was left with the impression that the onus of responsibility for bringing the graduate architect up to the professional skill of the whole architect had been assigned to the practising architect exclusively. This was a difficult obligation to assume, these days, and in the discussions, little consideration appeared to have been given to the reverse obligation of the graduate architect to the principal for receiving this post-graduate course.

Peter Thornton (F), Vancouver, asked about the practical aspects of developing greater skills and broadening the field of practice. If an individual had a course of studies of three years of pre-architecture, four or more years of architecture proper, some time for post graduate study and two or three years of practical training before registration, he wondered whether the profession might not be accused of trying to keep people out, rather than encouraging them to come in.

Harry B. Kohl, Toronto, asked Mr Thornton if he felt the extension of the course was wrong because it was not desirable for the development of the architect, or wrong because people might feel they were being held out of the profession. Mr Thornton replied that the point was *when* post graduate study should be taken, rather than *should* it be taken. "I think we must extend our field", he said "but if group practice is desirable–a group of men with basically the same training banding together each with his own specialty–then I think the definition of the architect should be the common denominator of such groups rather than the full spectrum of the group as a whole. I think our aim should be to establish the lowest common denominator which is acceptable for general practice. In medicine you have a general practitioner and if he wants to work in the big city, he finds he has to specialize and co-ordinate his work with others, so you have clinics formed, and if there is a parallel in this post graduate training, I think this is it. What we are aiming at, essentially, is the general practitioner, then allowing him, if conditions force him to do so, to expand his specialty".

Prof Murray asked if Prof Gerson would express an opinion as to whether the schools of architecture, as he saw them now, were at that common denominator or somewhere else.

Prof Gerson said he was not sure of that one, but his group had been very concerned about the "internship" period between university and registration. He felt that the RAIC should be asked to make a special study of the whole problem of studentships and bring in recommendations which could be adopted by the provincial associations.

The question of the log book was raised by both Mr Thornton and Prof Gerson. Speaking on this point, Dr Thomas Howarth (F), Toronto, said that the question of the log book and the experience record had been discussed at great length by the Committee on Architectural Education. Ontario was going ahead with the experiment, as well as the PQAA. It had been suggested at the meeting that when Ontario proceeds a little further, its findings should be related to those of the PQAA and discussed again by the education committee, which would in turn make recommendations to the RAIC.

F. J. Nobbs (F), Montreal, said that while there had been much talk about students and the log book being adopted in principle by two provincial associations, there had been no discussion, specifically, about the obligations of the employer-architect with relation to the various aspects of the log book. He felt that before the meeting ended all the provincial associations should be asked to adopt the log book in principle.

COMING EVENTS

Sept 6-7
Design Conference on Housing
Sponsored by RAIC-CMHC
Joint Committee on Housing
Carleton University, Ottawa

23-26 September 1962
1962 National Planning Conference
Community Planning Association of Canada
Macdonald Hotel, Edmonton

19 - 26 August 1962
Second Pan American
Round Table of Architects
Sao Paulo, Brazil

16 Sept. - 3 Oct. 1962
4th International Course
History of Architecture
"Andrea Palladio" Institute
International Centre of Architectural Studies, Vicenza, Italy

6 - 11 September, 1962.
Second International
Building Research Conference
Cambridge, England
(address Inquiries to Division of Building Research, Ottawa)

INDUSTRY

NEW PRODUCTS

The AM series door-type dishwashers in which, for ease of cleaning and sleeker appearance, all chains, pulleys and door weights have been eliminated. **The Hobart Manufacturing Company Limited, Don Mills, Ontario.**

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LITERATURE RECEIVED

A Product Bulletin designed for Hospital Administrators, Architects and Engineers interested in hospital design. **Department DM, American Air Filter of Canada Ltd., 400 Stinson Blvd., Montreal 9, P.Q.**

Folder containing details on the new Bostik Architectural Coating and the Bostik Floor Finish Mark 1. **B. B. Chemical Co. of Canada Ltd., P.O. Box 1445, Place D'Armes, Montreal, P.Q.**

12 Page catalog illustrating the full range of insulating board. RAIC File No. 37-B. **Simpson Timber Company, 2041S-R Washington Building, Seattle 1, Washington.**

Leaflet on Modular Architectural Paving Units. **Modular Precast Concrete Ltd., Prince Charles Drive, Welland, Ontario.**

Catalog on glazed wall tile, trim and accessories. **St. Lawrence Ceramics, 280 St. Sacrement Avenue, Quebec.**

"Municipal Lighting" booklet in which the proper lighting for cities, towns and villages is discussed. **Verd-A-Ray Industries Ltd., 1285 Hodge Street, Montreal 9, P.Q.**

Brochure on Hypalon synthetic rubber describing the engineering properties and uses. **Du Pont of Canada, Box 660, Montreal, P.Q.**

Technical bulletin covering the Demming 6700 line of 4" deep-well submersible pumps and water systems. **Bulletin 6700f-1 (RAIC file No. 29-D-5), Deming Division, Crane Co., Salem, Ohio.**

Bulletin on communicating systems for school administration and educational needs. **Communications Systems Division, Dukane Corporation, St. Charles, Ill.**

M-166 catalog, Symphony of Lighting Styles. C & M Products, 124 Crockford Blvd., Scarborough, Ontario.

RAIC File No. 31-F-22. Brochure on a Fresnel Lens Downlight. **Morris Kurtzon Inc., 1420 South Talman, Chicago 8, Ill.**

Pamphlet No. 1 Vol. 1 "The Insulating Qualities of Wood" **Canadian Wood Development Council, 130 Slater Street, Ottawa.**

Leaflet, Sidewalk Doors of Aluminum. **The Bilco Company, Dept. FS 23, New Haven 5, Conn.**

Architectural Specification on Hospital Bed Screening. **The Dominion Metalware Industries Ltd., Port Credit, Ontario.**

Folder on Lyteline Wall and Utility Lighting. **Lightolier, Jersey 5, N.J.**

Bulletins Nos. 28, 53 and 120 on Electric Air Heaters, Rotary Type Ventilators and Condair Water Coolers. **Air Conditioning Engineering Company (Canada) Ltd., 636 St. Paul Street W., Montreal.**

Brochure No. 37 RAIC File No. 31-F-23, Surface and Pendant Corona Coronet Fluorescent Lighting Fittings, and Brochure No. 38 RAIC File No. 31-F-23, Recessed Domes. **Lightolier, Jersey City 5, New Jersey.**

1962 Catalog of ACI Publications. Publications Department, **American Concrete Institute, P.O. Box 4754—Redford Station, Detroit 19, Michigan.**

Catalog CDS-129D describing the range of silicones and their uses available from the **Canadian General Electric Company Limited, 940 Lansdowne Avenue, Toronto 4, Ontario.**

A 16 Page colour catalog describing the Stuart Stimix Thermostatic Mixing Valve. **Stuart Sales Engineering Co., 130 Bermondsey Road, Toronto 16, Ontario.**

A technical booklet, "How to insulate masonry walls for electric heating and air conditioning". **Vermiculite Institute, 208 South LaSalle St., Chicago 4, Ill.**

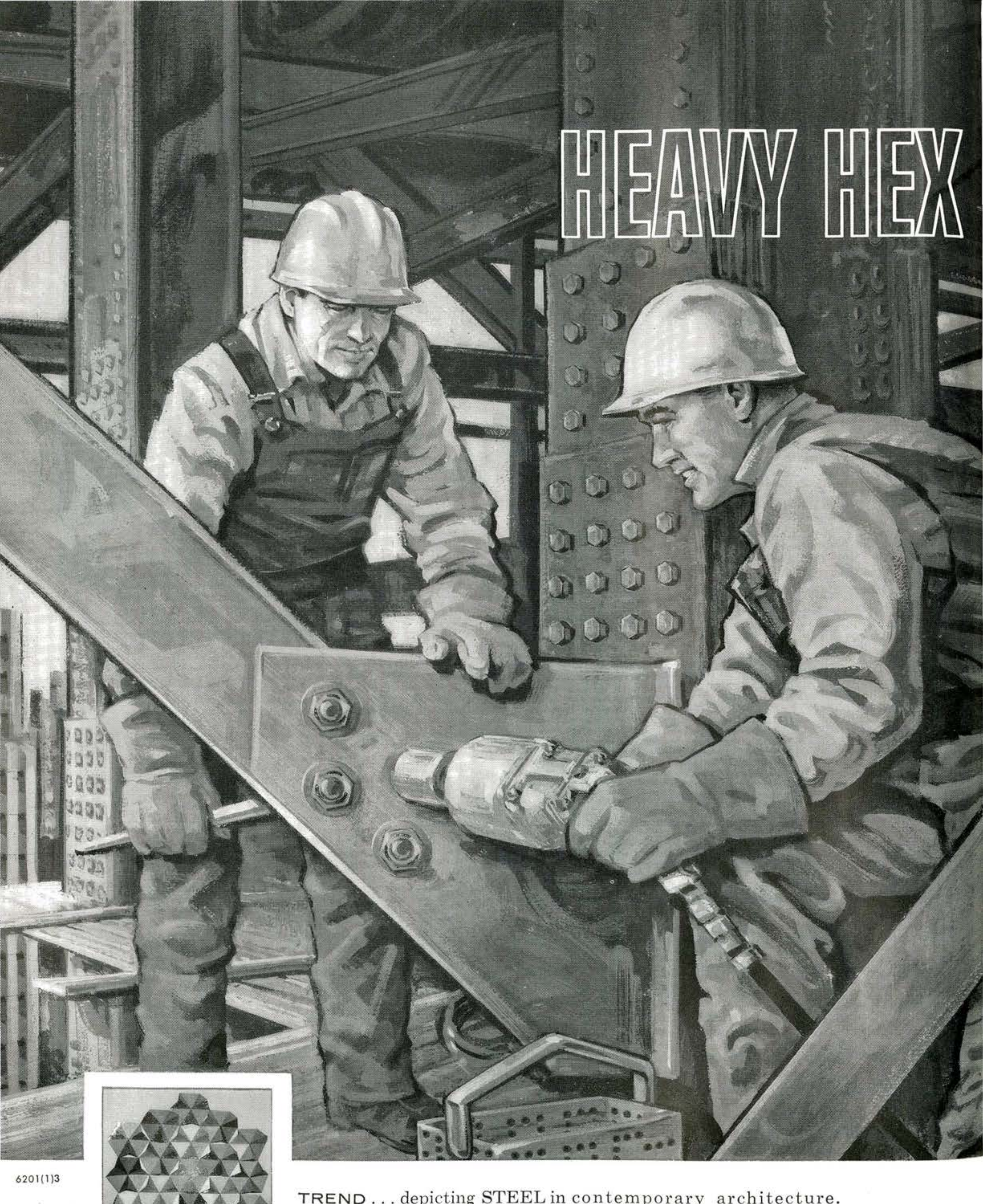
A bulletin on Acme packaged air conditioners. **Acme Industries Inc., 600 North Mechanic Street, Jackson, Mich.**

100 Page catalog on fans, electric heaters and refrigerators available from **Canadian Armature Works Inc., 6595 St. Urbain Street, Montreal 14, P.Q.**

Three leaflets illustrating the new range of downlites with white enamel face plates. **Morris Kurtzon Inc., 1420 South Talman, Chicago 8, Ill.**

An eight page booklet covering the Durajoint and Duraseal P.V.C. waterstops, masonry control joints and curbstops. **Electrovert Ltd., 338 Berling Avenue, Toronto 18, Ontario.**

Catalog on Cantruss framing system. **Electrovert Ltd., 338 Berling Avenue, Toronto 18, Ontario.**



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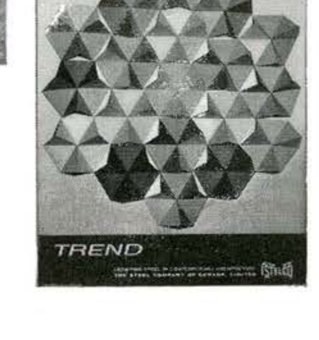

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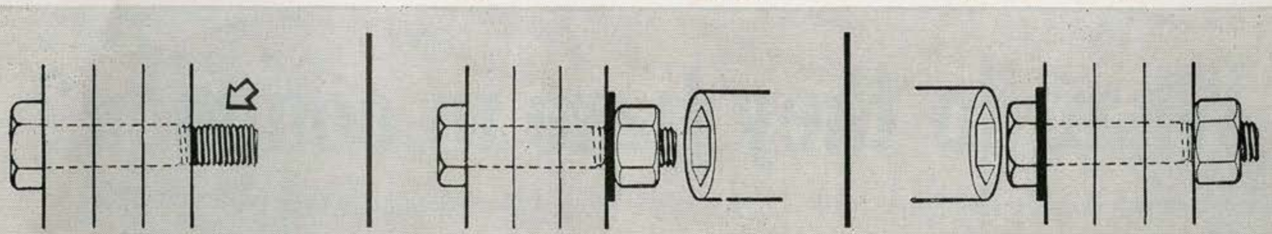

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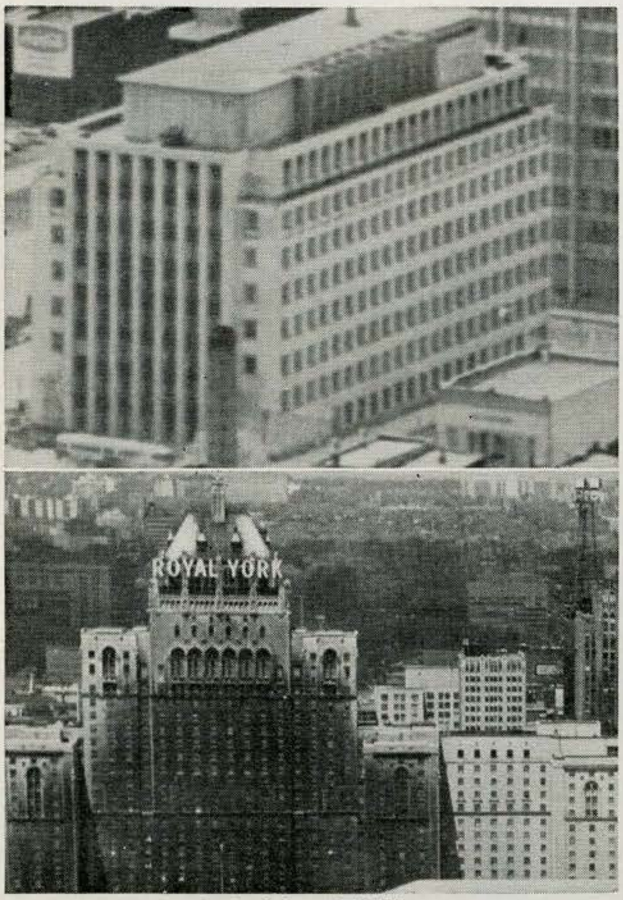

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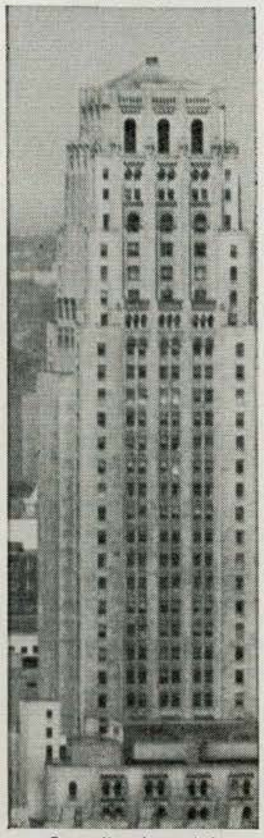

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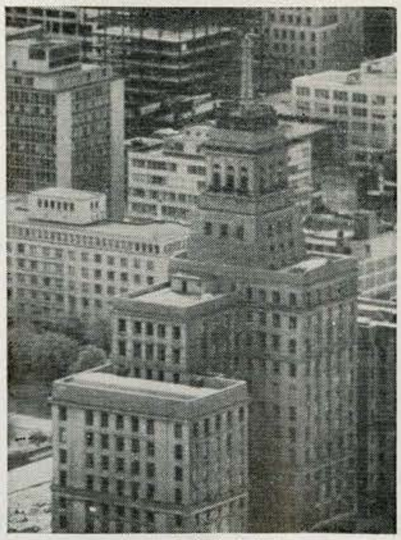

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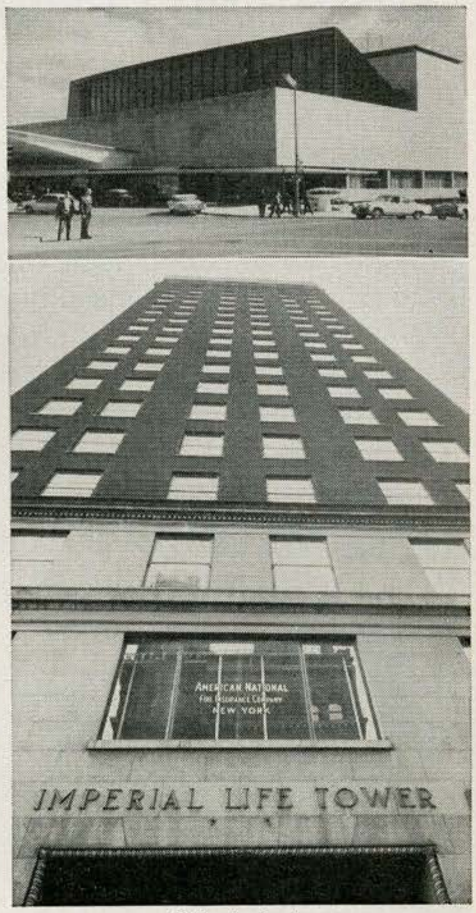

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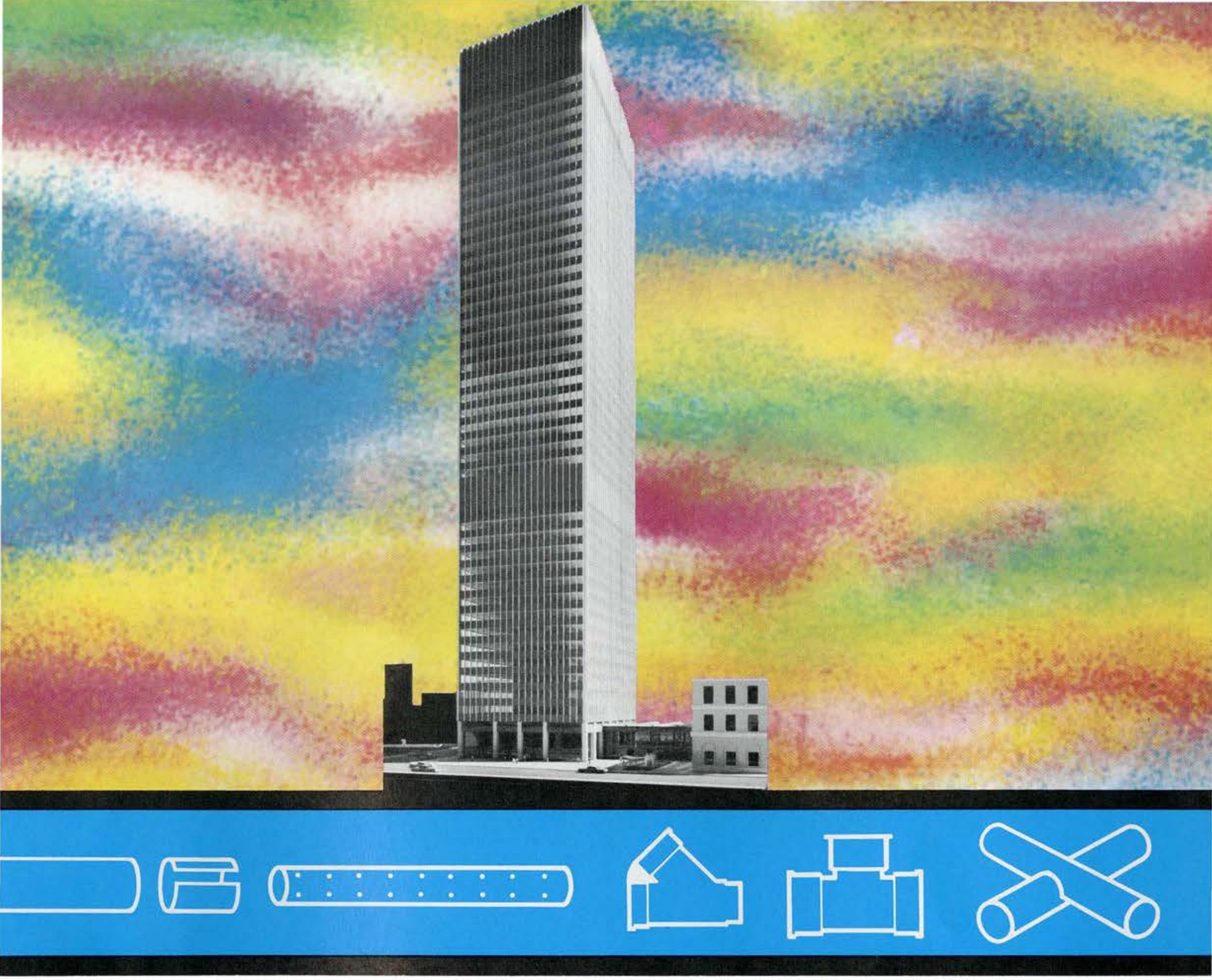

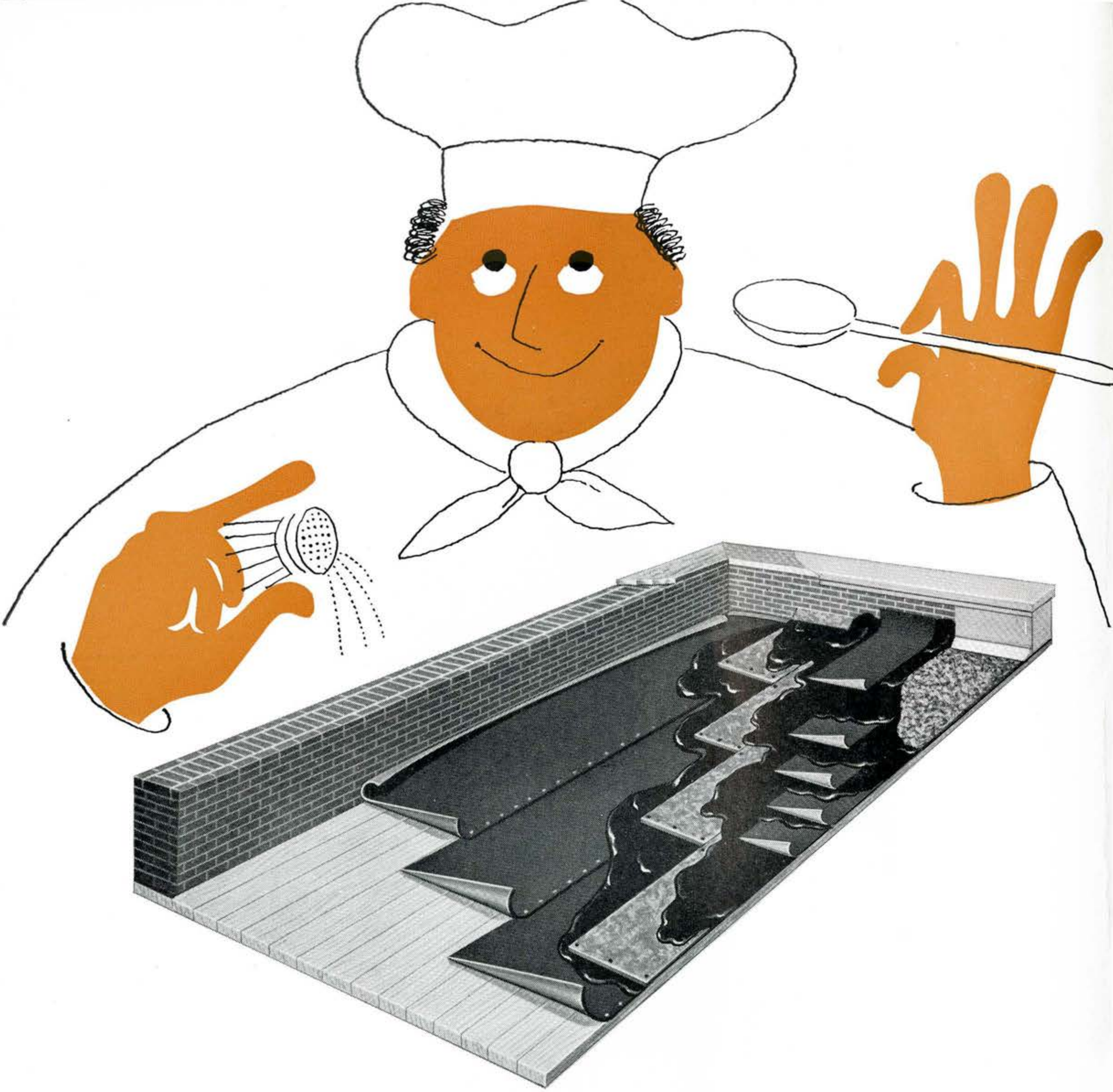

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500 SERIES
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- Complete concealment of arm and closer when door is closed.
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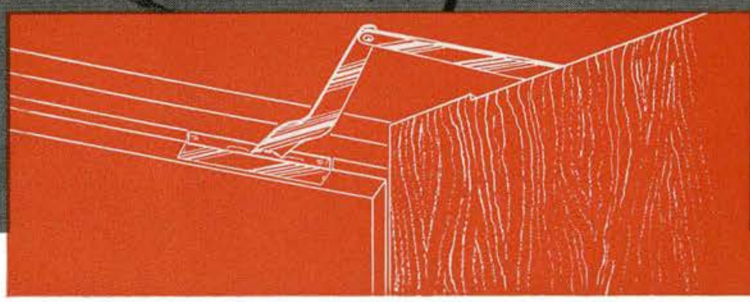

View with door open. Minimum amount of cutout in stop side of door—invisible when door is closed. Available in 2 sizes for interior or exterior doors.

CORBIN'S new "Hid-n-Rail" Door Closer design completely conceals both arm and closer when the door is closed . . . providing trim, clean lines to complement modern interiors and styling. Hold-open is easily set for any point up to 180°. Selective backcheck valve assures proper cushioning for specific conditions when desired.

The new "500" is also designed to require only one location on all doors for openings up to 180°—a time-saving and economy feature in multiple installations. Choice of prime coat, dull bronze or silver aluminum lacquer finishes.

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"No! That quality control engineer saw my chip. It's off to the cull pile for me."

He shouldn't feel bad. Yesterday a brick with a thumb print on its edge was turned down. These are Cooksville-Laprairie brick, a product of

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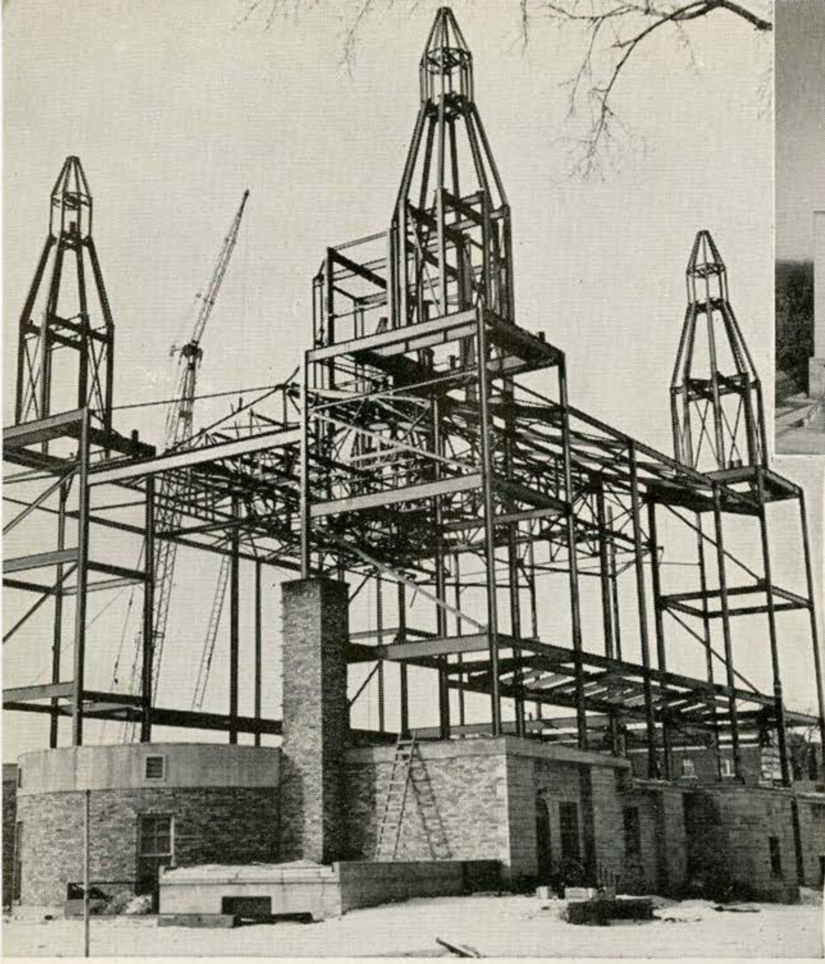


Steel is versatile

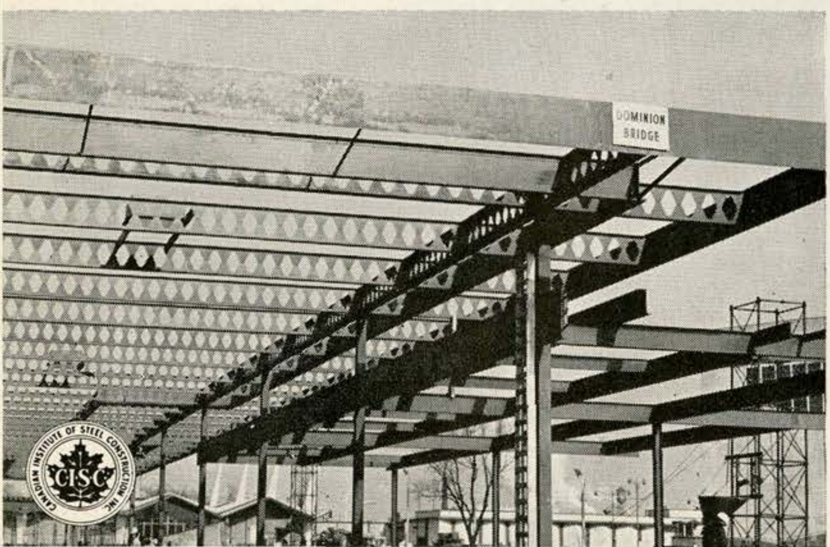
Structural steel can be used to build complex design shapes. This steel frame is for the Greek Orthodox Holy Trinity Cathedral in Winnipeg and inset is the finished building.

Architects: Green, Blankstein, Russell & Associates.

Additions are easy with steel

When this building was first constructed two extra floors at a later date were a possibility. Last year they became a reality. The tops of the main support columns of the original steel frame had been left exposed and the new steel was added quickly and economically.

Architects: Smith, Carter, Searle & Associates.



Castellated steel beams reduce weight

The use of castellated beams in the C.N.E. Home Furnishing Building in Toronto resulted in roof purlins that were about 75% of the weight of an equally strong rolled beam and about 60% of the weight of an equally rigid rolled beam. Beams are castellated by cutting the web zigzag fashion, offsetting the halves one notch and rewelding peak to peak. Castellated beams can free the designer from the restrictions of excessive deflections when using the new high strength steels.

Architects: Marani, Morris & Allan.
Consulting Structural Engineer: W. Sefton & Associates, Limited.

Steel gives design freedom

Y-shaped with clear spans. This is the Saskatchewan Power Corporation's head office building in Regina. There are no columns inside the wings of the building and each floor is a wide open space 43 ft. x 270 ft. You can build this way with steel—it simplifies interior partitioning and makes future changes easy.

Architects: Joseph Pettick, M.R.A.I.C.
Consultants: C.C. Parker, Whittaker & Co. Ltd.

Steel shows some of its qualities

Some of the basic qualities of steel as a building material are illustrated in this round-up of recent projects from across the country. Steel produces light, flexible structures and its inherent qualities offer great scope to the imaginative architect.

When evaluating structural framing materials it is worth considering all the advantages offered by steel. Steel goes up fast to give an early return on invested capital and reduces interest charges on construction loans. Lightweight framing keeps foundation costs down and the strength of the material permits large column free areas for better rentable floor space. Later alterations or additions are also easily effected and more economical to undertake when steel is used.

Dominion Bridge maintain design, fabrication and erection facilities in most of the major cities. Their sales and engineering departments are always available for discussion and to assist in any way they can.

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Structural Steel Division **DOMINION BRIDGE**

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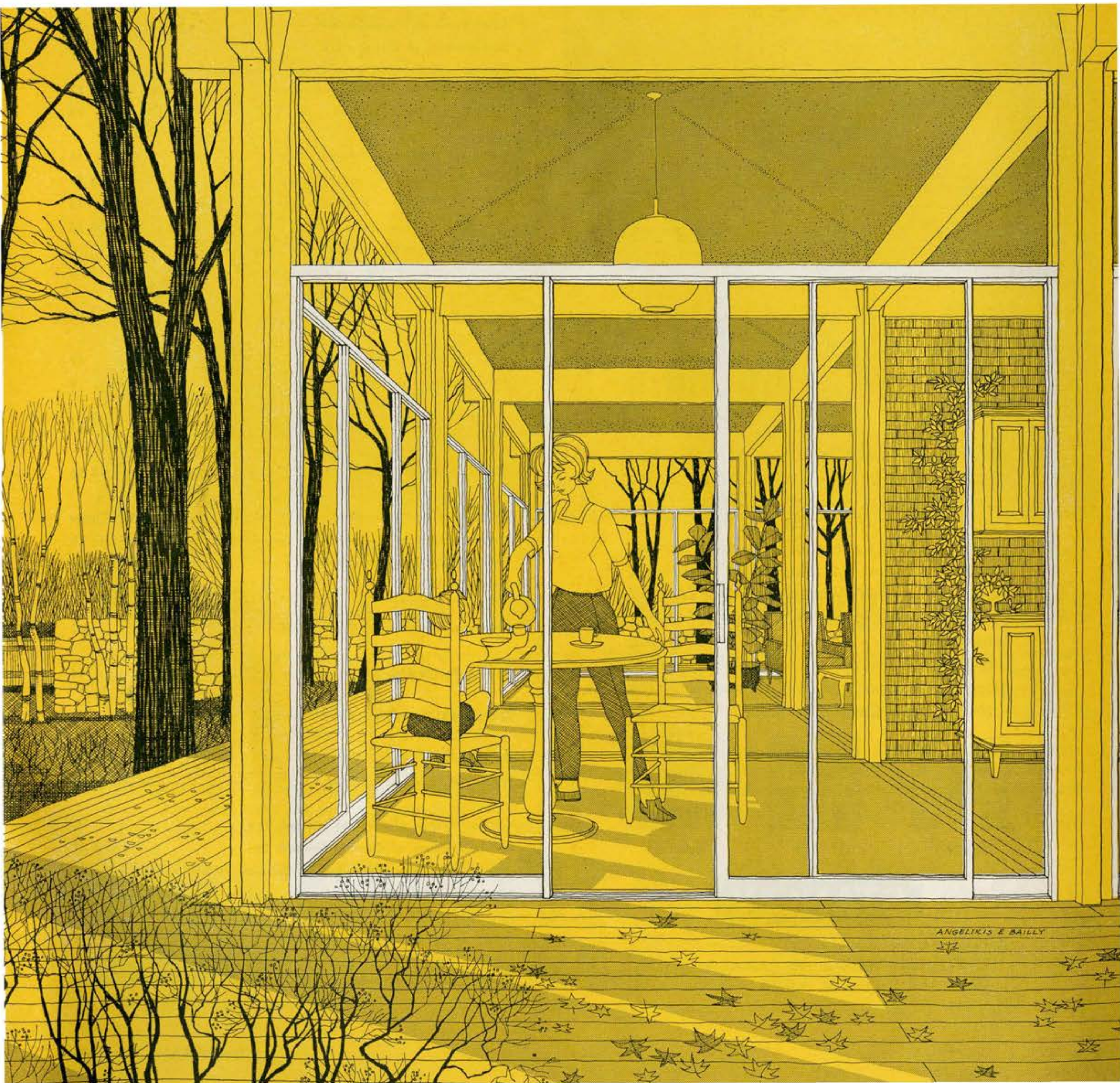

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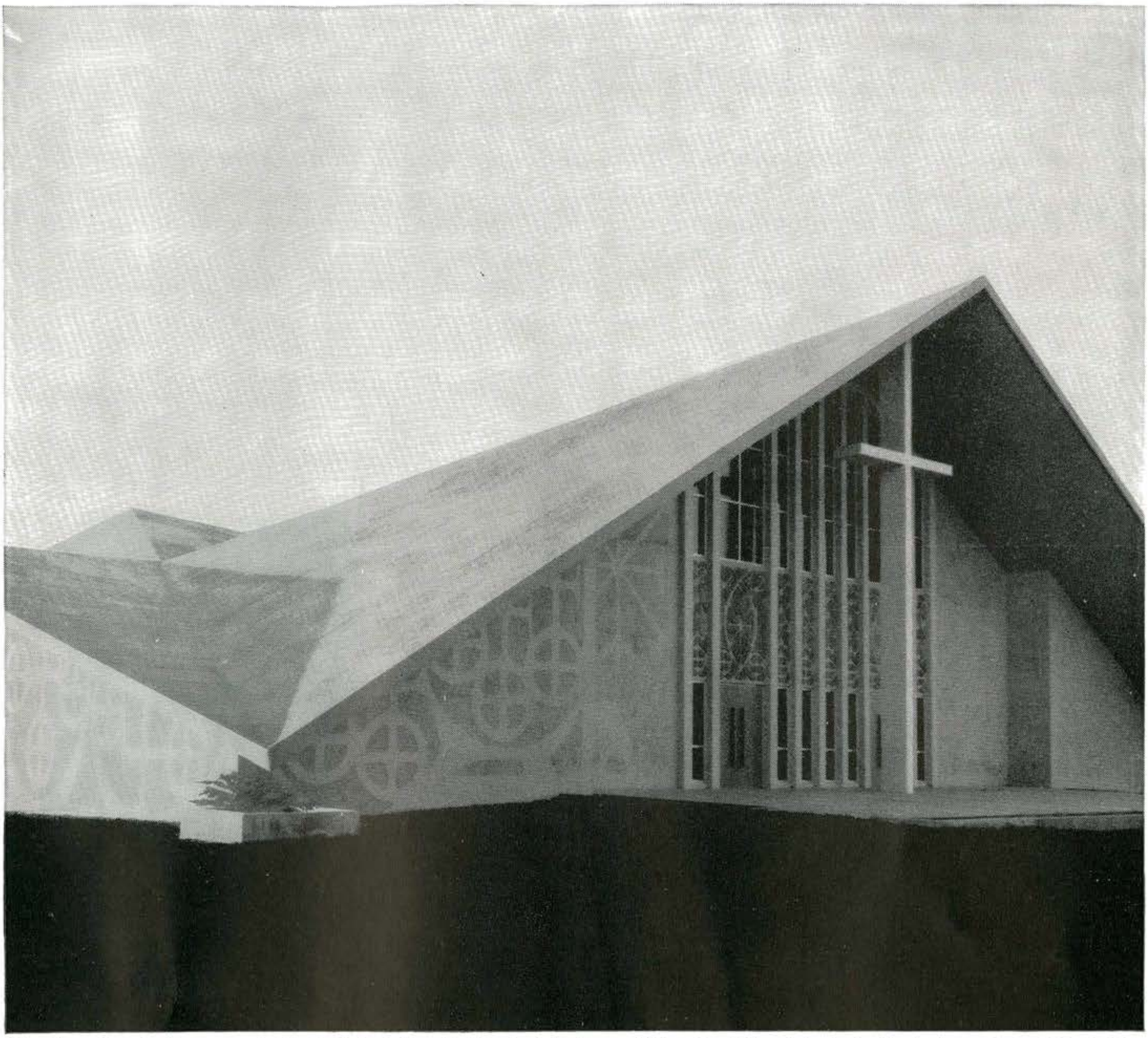

Holy Name Church, Vancouver. *Architects:* Toby & Russell. *Structural Engineers:* McKenzie and Snowball. *Ready Mix Producer:* Deeks-McBride Ltd. *Testing Engineers:* Coast, Eldridge Testing Laboratories Ltd. *Lightweight Aggregate Suppliers:* Saturnalite Sales Ltd., subsidiary of B.C. Lightweight Aggregates Ltd.

POZZOLITH plays key role in use of lightweight concrete

This modern architectural concept is another instance of the ability of POZZOLITH to open up new vistas of design in concrete.

In the Holy Name Church, Vancouver, POZZOLITH played a valuable role in the handling and placing of lightweight aggregate concrete . . . by reducing mixing water requirements for a given slump, by reducing segregation in placement, by providing maximum plasticity and workability, and by entraining optimum amount of air.

The folded plate roof of the church is a nine-inch slab doubly reinforced of semi-lightweight concrete, having a dry density on the order of 105 pounds per cubic foot and a design strength of 4000 psi at 28 days. The roof concrete was placed at about 1½″ slump. No top forms were used.

POZZOLITH, whenever used, makes concrete a more durable, more versatile building material . . . superior in performance and economy to plain concrete or concrete produced with any other admixture.

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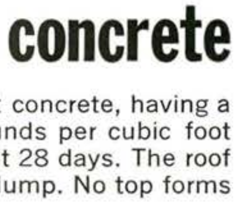
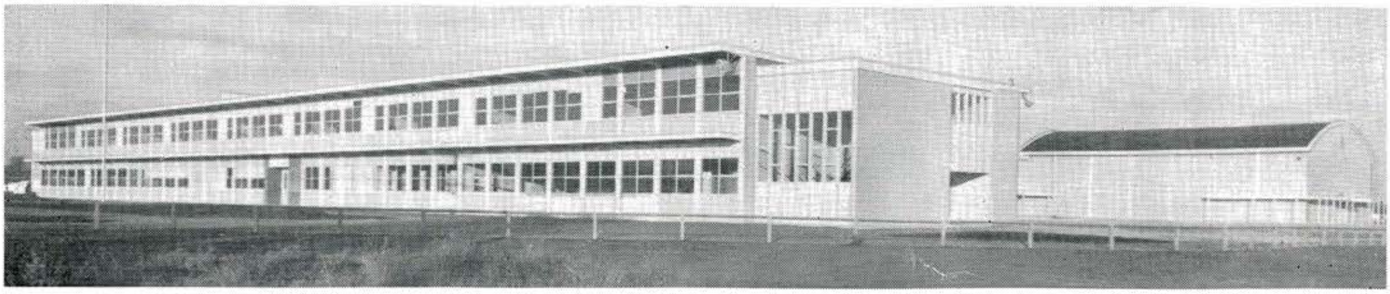


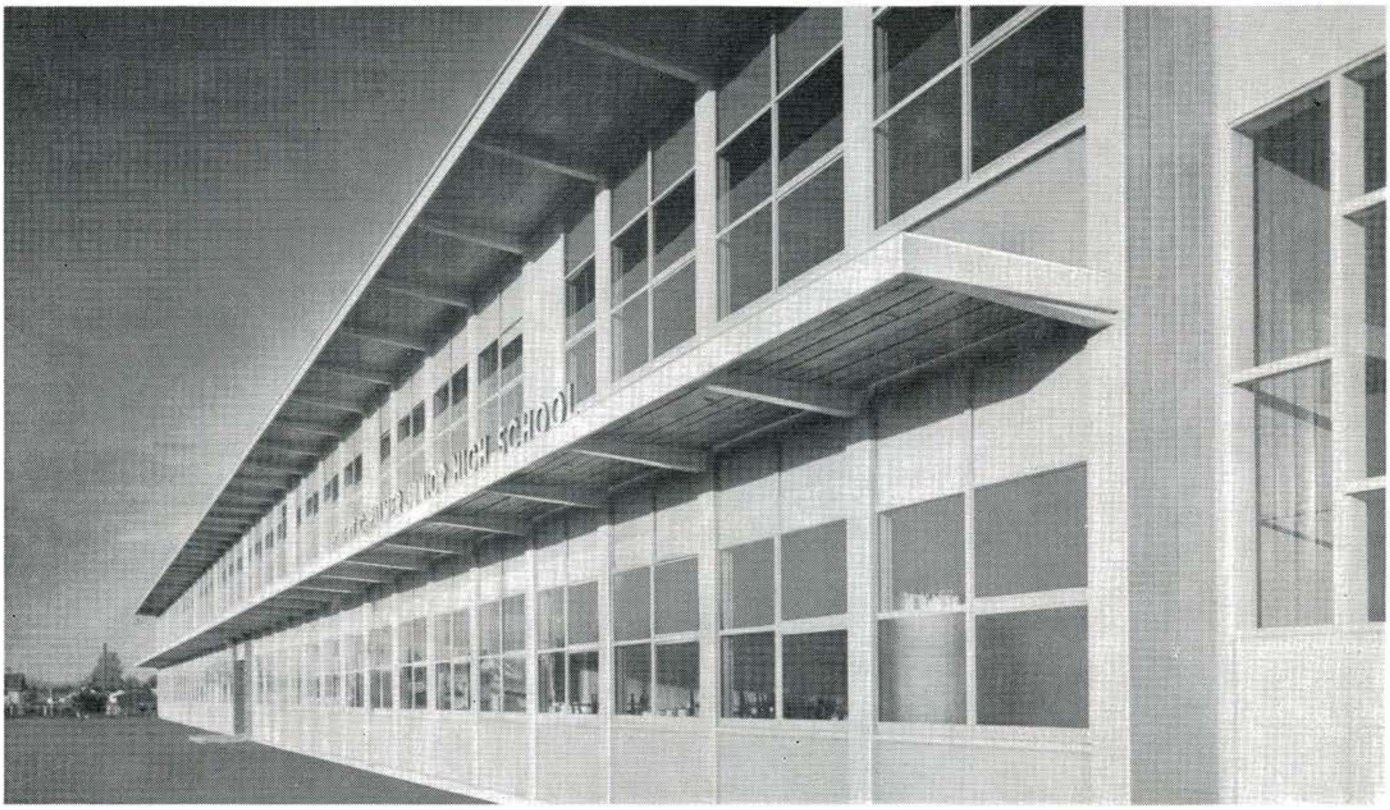


Robert Palmer Junior High School

Richmond, B.C.

Architect: Collins & Collins
Burnaby, B.C.

Contractor: Cloverdale Construction Co.,
New Westminster, B.C.



Rusco Tubular Steel Windows have been installed at the recently completed Robert Palmer Junior High School. Alternating fixed lights with vertical sliding windows created an impressive and eye-catching fenestration. All units were factory finished with "Grey" epoxy enamel, baked on for lasting application and beauty.

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