RAIC JOURNAL

Serial No 373, Vol. 33, No 9

The Institute does not hold itself responsible for the opinions expressed by contributors.

ROYAL ARCHITECTURAL INSTITUTE OF CANADA

All correspondence should be addressed to the Editor

EDITORIAL AND ADVERTISING OFFICES, 57 QUEEN STREET WEST, TORONTO 1

Authorized as Second Class Mail, Post Office Department, Ottawa

EDITORIAL

FEW JOURNALS IN OUR MEMORY have been as interesting to prepare for the press as this one. Usually, it is the editor's unhappy lot to be quite remote geographically from his "authors", and, in the ordinary issue, the authors of articles and buildings have only the vaguest idea of the issue in which they will appear. In the case of the three Services, the date of publication and the format have been known to those interested for some time. In large measure, it is their work, and the editor takes pleasure here in thanking his collaborators in Ottawa for their most friendly and intelligent cooperation.

It was nearly a year ago after a hard day's fishing that we broached the subject of an issue on the work of one of the Services. Our companion readily accepted and expressed the hope that the other two might be persuaded to contribute. That turned out to be so though his colleagues may not have realized at the time how much work was involved in their role as authors. On two trips to Ottawa, we have been greatly impressed with the standard of design that we saw, and the obvious desire of Navy, Army and Air Force to obtain the best. It is clear from the pages of this *Journal* that the Services have not hesitated to go to the private practitioner if that seemed the best way to develop either a standard or a special project. By and large, both architects and engineers seem to have responded in a manner that we might have expected. Certainly, the heads of departments whom we met were most generous in their praise.

It is obvious that in a defence establishment as large as Canada's, there will be scope for the architect within the Department itself as well as outside it. We were not a little pleased to meet old students who had found happy and remunerative employment in the civil service. Many fine young architects leave our Schools with neither the desire nor the ability to enter the "rat race" of competition by which practices are built up today. For them, many government offices dealing with defence, housing, transport and the like offer scope for the full exercise of their talents, and the development of their personalities. From what we saw, and what we heard, they offer anything but a life of inaction.

Our memories of the first war which we fought without distinction and without bloodshed on a South Pacific isle and the moors of Staffordshire are most vividly of tents and shabby wooden barracks. We don't remember ever seeing a chapel built for our use, though we recall playing the organ on a Sunday in a part of the barracks temporarily cleared for worship. Our canteens were unattractive barn-like structures, and no tear wet our cheek when, through a hospital window, we saw ours go up in smoke on armistice night. In short, we were given accommodation exactly like prisoners of war. Canadians may have been housed differently, but we are certain that veterans of the first war never saw buildings like the ones represented in this *Journal*. The reader is given the distinct impression that the Canadian serviceman today is regarded as an individual, and that, while he still is recorded by number, he has preserved his dignity as a human being. We are happy to think that while many have helped to bring that about, the contribution of the architect has not been inconsiderable.

NAT. DEF. PHOTOGRAPH

FOREWORD

The Honourable Ralph Campney
Minister of National Defence

During the years since 1947 Canada's armed forces on full time service have been built up from less than 33,000 to about 117,000. This great expansion has involved a construction programme of a magnitude unprecedented in peace time, a programme made possible only by the able and willing co-operation of architects, engineers and many other specialists.

Canada has not developed this strong and efficient defence force from any love of militarism. Our defensive build-up was thrust on us by force of circumstances which made it clear that only strength in combination with all the forces of good could assure peace and freedom for the western world.

The task of repatriation and demobilization of troops had scarcely been completed after World War II when Communist aggression in Europe and Asia became dangerously menacing. As nations of eastern and northern Europe were picked off or threatened one by one, statesmen in the democratic countries determined to preserve their integrity through united strength.

Thus was born the North Atlantic Treaty Organization, based on a pact which asserted that an attack on one member would be considered as an attack on all and would be met by joint action. Canada became a charter member of NATO in 1949.

Then came the Communist aggression in Korea and the great United Nations action to halt that aggression.

Canada has fulfilled its obligations to NATO and to the United Nations. The substantial increase in armed strength to meet our commitments has been accompanied by a full scale modernization and equipment programme for ships, aircraft, guns, tanks and many, many other military items. This expansion has also required a huge construction programme for training camps, barracks, airfields, harbour facilities, radar networks and communications systems.

All this great effort for the preservation of peace through strength has been made possible because the government and the armed forces have received wholehearted support from people in all parts of Canada. Behind our officers and men in the field, aboard ship and in the air is the unremitting service and inestimable contribution of the Canadian scientific, professional and industrial community – architects, designers, engineers and technicians of many kinds.

The story of their achievements, the record of their service may never be fully told, but those of us who see the cumulative results are deeply grateful on behalf of all Canadians and free people everywhere.

Ralph Campney

DND POST WAR CONSTRUCTION PROGRAM
INTRODUCTION

Before World War II the combined strength of the armed forces was less than 8,000 all ranks. At that time accommodation was insufficient in quantity and much of it was obsolete – some of it having been built early in the 19th century. Accommodation constructed during the war was usually of a temporary nature and provided only the most elementary facilities for "rough living". Judged on a desirable peacetime basis, the accommodation left to the post-war forces was generally of a low standard and in some cases approximated temporary accommodation provided for labourers on construction jobs.

Following the war it became obvious that, if men of good education and character were to be attracted to long term service careers in the peacetime forces on the basis of voluntary recruiting in competition with the counter attractions of industry paying higher wages, more attractive living conditions would have to be created through the provision of better quarters, better messing arrangements, and more adequate recreational facilities. In any case, wartime buildings had deteriorated to the point where their replacement or major renovation was imperative. The only alternative, their maintenance as inadequate low standard accommodation, would have created a constant heavy drain on public funds through recurring and wasteful expenditure year after year without worthwhile return.

It was therefore decided to undertake a rebuilding programme to provide long term accommodation for the permanent forces. Accommodation was intended to provide an adequate standard of living, while construction was planned to ensure long life and low depreciation with minimum maintenance costs and a low fire risk. In addition to living accommodation, it was planned to construct new stations to suit the post-war employment of personnel and to provide adequate training facilities. New types of equipment, weapons and techniques necessitated the provision of improved facilities and storage and handling space had to be planned to meet the requirements of equipment and explosives, including reserves held for use in an emergency. Finally, the long term accommodation programme provided for the construction of single men's barracks, quarters for officers and NCOs, quarters for female service personnel, married quarters, and messing accommodation. Among the amenities to be provided were chapels, canteens, physical training and recreation buildings, and schools and hospitals, the last two to be provided only where regular civilian facilities were not available. The programme also provided for the construction of technical buildings such as fire halls, garages, synthetic trainer buildings, armament buildings, explosive storage and magazines, workshops, headquarters administration buildings, training buildings, seaward defence projects, operations buildings, supply buildings, hangars, drill halls, and signal communications and radar buildings. This construction programme was originally designed to be developed over a ten year period.

The war in Korea together with Canada's commitment under NATO resulted in a considerable upsurge in the strength of the forces and created an immediate accommodation problem. To solve this problem, wartime buildings were rehabilitated for immediate occupation, accommodation was provided at new locations, and the permanent construction programme previously planned as a long term project was compressed into a relatively short term construction plan extending over a three to five year period.

Scales of Accommodation

Living accommodation is provided on the same scale for each Service and inter-Service scales have been worked out to provide the minimum space acceptable to the medical authorities. For example, the space required per man in a barrack has been established at 800 cubic feet per man which may be reduced to half under wartime conditions. This space allows each man to have a reasonable area surrounding his bed and provides for adequate ventilation. The standard design based on the scale of accommodation provides for four men to share a barrack room of 320 square feet with provision for double deck bunks under wartime conditions.

Senior NCOs (sergeants and above) and officers up to and including captains are accommodated in single rooms. For officers and NCOs the space allowance per person is increased slightly. In both cases the accommodation is capable of double occupancy under wartime conditions. A limited number of officers of the rank of major or above are accommodated in two-room quarters with a bathroom. Each room can be used as a standard bedroom if necessary. The number of such quarters is very small. Sanitary facilities are in direct proportion to the number to be served and based on normal civilian design practice. Usually these facilities are grouped in units for general use.

A lounge or common room is provided in the men's barrack blocks. The size is based on the number accommodated with an allowance of approximately 6 sq. ft. per man. Messing facilities are normally of the cafeteria type. Seating is based on one sitting for the normal peacetime complement using four and six man tables. When mobilization occurs meals can be served in shifts and kitchens are designed to handle twice the seating capacity per hour. Messes are of a standard design and the size nearest to the peacetime establishment of a unit selected so that under normal conditions the unit can be served at one sitting. This provides a margin for adequate messing facilities in the event of mobilization when the number of men is doubled in each barrack.

Both NCOs and other ranks are provided with wet and dry canteens and games rooms. The dry canteen is entirely separate from the wet canteen. Officers' mess buildings provide certain lounges and recreational facilities in addition to mess room and kitchen.

Design

Leading Canadian firms of architects and engineers have been retained to design the various types of buildings required. This gives the Department of National Defence the benefit of the best professional knowledge and experience available, and also the benefit of comparative civilian standards and practice. All consultants are instructed to produce the most economical designs possible and, during the design period, there is frequent liaison to ensure that this basic concept is maintained.

Standard plans have been developed on a joint service basis and are in general use. In the case of the Navy, limitations of space in the main permanent establishments have made the use of standard buildings impractical and have resulted in the cencentration of living and messing facilities in single large blocks. However, the accommodation provided is in accordance with joint service standards.

Standards of Construction

In establishing standards of construction the governing principle has been to achieve economy in initial cost while keeping future maintenance costs to a minimum. In all cases, the selection of the type of construction and materials for both exterior and interior use has been based on these principles, with consideration given to the normal hard usage which occurs in single men's quarters. Careful consideration has also been given to reducing the potential fire hazard to the lowest possible limits.

The standards for three classes of construction which have been established are:

Class I – Permanent, fire resistive construction, steel or reinforced concrete frame, concrete floor slabs, masonry or concrete walls, tile, partitions, plastered.

Class II – Permanent, semi-fire resistive construction. Steel frame and concrete floor slabs. Wood stud walls with transite, or equivalent, exterior finish. Partitions frame and wall board. Stair wells fire resistive.

Class III – Temporary. Frame construction.

Prefabricated units of various types are used in far northern locations where the cost of standard construction would be prohibitive.

Permanent accommodation (Class I or Class II types) is required at locations where the continuing and permanent nature of a station has been determined and care is exercised to ensure that this type of accommodation is not provided for temporary needs or for anticipated wartime expansion. A considerable degree of wartime expansion is, however, anticipated in the permanent construction by designing facilities capable of "doubling up" in sleeping and messing arrangements.

Temporary accommodation (Class III) is additional accommodation required to meet non-continuing conditions or conditions where the permanency of the commitment at a location has not been definitely established. Temporary accommodation is provided for such commitments as the emergency accommodation of additional forces raised for service overseas, their reinforcements, and for the NATO training programme.

Technical buildings, including those for administration and training, are built generally to the same standards of construction as the rest of the station but with due regard for the function of a building and the equipment it contains. For example, certain operational buildings housing expensive equipment have been built of masonry although the remainder of the station is of Class II construction. Technical buildings are designed to provide the greatest possible degree of flexibility to permit them to be enlarged or adapted to take future types of equipment.

Married Quarters

Married quarters are required for a large proportion of dependents of Service personnel. After the war, and as an interim measure, single men's accommodation was converted to emergency married quarters pending the construction of permanent married quarters. Other single quarters of a higher standard, which could be adapted for married quarters, were renovated to give a longer period of service and classified as temporary married quarters with an anticipated life of fifteen to twenty years.

Designs for permanent married quarters were prepared initially by the Services and a number of quarters were built under Service arrangements prior to 1948. It was then decided that Central Mortgage and Housing Corporation as the governmental housing agency should take over the construction of permanent married quarters and standard inter-Service designs were prepared in agreement with them. These designs provide for two, three or four bedroom accommodation to meet the requirements of differently sized families. Multiple dual-purpose units were also designed for use as married quarters under normal conditions and for ready and economical convertibility to single quarters in an emergency. Alternatively, they could be constructed initially as single quarters capable of conversion to married quarters. This provided flexibility and ensured maximum use. For example, at RCAF training stations with a NATO commitment, it was possible to provide single accommodation of the multiple dual-purpose type to be later converted to married quarters upon reduction of the NATO training commitment.

Some permanent married quarters were constructed of masonry because, owing to restricted site locations, it was necessary to build apartment type units, but the standard permanent married quarters constructed by Central Mortgage and Housing Corporation are of frame construction and comparable to similar houses built for the public under the National Housing Act. Maintenance costs for these married quarters are likely to be somewhat higher than for those of masonry construction but this was accepted in order to reduce capital investment and the amount of Class I construction in the overall major construction programme.

Dependents' Schools

Where civilian school facilities are not available, it is necessary to provide for the education of the children of Service dependents. Dependents' schools are constructed to standard Department of National Defence designs which, with minor alterations, meet the requirements laid down by each of the departments of education for the various provinces. These schools are only constructed where civilian education facilities do not exist or cannot be provided by other more economical methods. The schools are comparable with schools of similar size now being built in urban communities across Canada.

Organization

Summing up the action taken to develop the defence construction programme it will be seen that, under the provisions of the Defence Supplies Act, superseded in 1951 by the Defence Production Act, it is the responsibility of the Department of National Defence to provide plans and specifications to meet Service requirements and to outline necessary standards of construction. Major contruction is normally the responsibility of the Department of Defence Production through their agents, Defence Construction (1951) Limited, but in certain cases other agencies are used. For example, the Department of Transport builds airport runways, and Central Mortgage and Housing Corporation constructs married quarters and schools. Those projects for which it is not practical to prepare detailed plans and specifications may be carried out by day labour under the supervision of the Service concerned. Suitable portions of this work may be let to contract through the Department of Defence Production. Minor construction and maintenance projects are also carried out under Service supervision.

Progress

Since the programme was speeded up in 1951, expenditures for all types of construction up to May 31, 1956, have amounted to $783,520,000. In Canada some 19,101 permanent married quarters have been completed or are under construction. Temporary married quarters number 918 and emergency married quarters 734. Sixty dependents' schools have been completed and eight are under construction. These combined with technical projects too numerous and varied to record here, plus the European programme under NATO, add up to an achievement of major importance to Canada and the Western democracies. Only the high degree of co-operation established between Service and civilian personnel has brought about this achievement. Because Service appointments may be of limited duration due to rotational postings, many civilians hold positions of responsibility and thus maintain continuity of administration. From the wide variety of activities offered by the Department of National Defence construction programme, civilians of various professions have found satisfying careers in the fields of architecture, engineering, electronics, etc., and, as the programme progresses, new career opportunities for civilians will be available on a continuing basis.

This introductory article is intended to provide the reader with a general picture of defence construction needs and an outline of the Department's policy out of which a construction programme has been developed to meet those needs. Succeeding articles by the three Services and Defence Research Board deal with problems common to all Services, but each Service has, for the sake of variety, emphasized one particular aspect of the overall problem. For example, the RCN article stresses the scope of the construction problem and the general approach to its solution. The Army article deals with problems of architectural planning and method of producing designs with the aid of consultants. Both RCAF and Defence Research Board have developed articles to show examples of specialized design development.

THE ROYAL CANADIAN NAVY

NAVAL SHORE ESTABLISHMENTS exist essentially for the support of the fleet and furnish this support by the provision of facilities for administration, operation, and logistic support, and for the training of personnel of the regular force and the reserves.

Logistic support covers a wide field and includes such matters as the repair of ships and aircraft; the repair and maintenance of machinery, armament and equipment; the storage, examination and preservation of ammunition; storage and handling of fuel, and the warehousing and distribution of new equipment, spare parts and materials required for these activities, together with the ordinary essentials of daily life such as food and clothing.

Training requirements also cover a wide range, from the comparatively simple needs of new entry training to the more complex equipment, mock-ups and instructional aids required for the advanced training of the various specialist and technical branches of the Service.

Associated with all these varied activities are certain common requirements such as the feeding, housing and administration of personnel; married quarters and dependents' schools; provision of facilities for religious worship, for medical care, and for recreation. In addition, there are certain activities required for the actual operation and protection of the shore establishments themselves, such as the operation and maintenance of motor transport and harbour craft, firefighting, security, and the maintenance of buildings, works and services.

The scale of these activities ashore depends basically on the size of the fleet and the authorized complement of the Navy. Other governing factors are the size and type of the ships and aircraft in use and the quantity and type of armament and other equipment. Since the close of the Second World War there has been a gradual, but none the less radical, change in the composition of the RCN. The wartime fleet was composed of a large number of ships, mainly small, and with relatively simple propulsion machinery, armament and equipment. Today, it is composed of a relatively small number of larger ships with new types of engines; new and complex types of weapons and controls, and a large amount of electrical and electronic equipment. The introduction of Naval aviation into the RCN is another postwar development which has resulted in new requirements and new problems in the provision of shore facilities.

The first of a new class of ship now coming into service in the RCN. Designed and built in Canada specifically for anti-submarine work.

RCN PHOTO

HMCS St. Laurent — Destroyer Escort

RCN PHOTO

Admiralty House, RCN Barracks
Halifax, Nova Scotia

Built about 1814, by the British Admiralty.

The two main bases of the RCN are in Halifax, N.S., and Esquimalt, B.C. Both of these establishments were originally developed by the Royal Navy, and both have long and varied histories going back to the days of sail. During the last war Halifax Dockyard was expanded and was almost entirely rebuilt, and the former Wellington Barracks, orginally built by the British Army, was acquired and developed as a training establishment. In Esquimalt there was also considerable expansion, but many of the old Admiralty buildings are still in use for various purposes.

With the exception of certain specialized activities and the facilities required for reserve training, Naval activities ashore, in peacetime, are mainly in the vicinity of these two bases. Consequently, the postwar construction program has been generally concentrated in these areas, and with one or two notable exceptions, it has been composed of individual buildings for specific purposes rather than the development of complete new establishments. In both Halifax and Esquimalt the area available for new construction is restricted and existing buildings are in active use. The construction program has required careful planning and phasing to ensure that operations can continue without dislocation. These factors, together with the type of site available, have generally precluded the use of standard designs.

To ensure that changing requirements are appreciated and a planned and orderly construction program is achieved, long range plans have been prepared for the development of all major shore establishments. These plans are based on approved commitments, scales of activity, and authorized complements, and are also brought into line with general Departmental policies and tri-Service scales and standards. They are kept up to date and in line with changing circumstances and requirements and provide the basis for the annual construction programs as shown in the Naval estimates.

The postwar construction program has covered five rather broad categories of requirements. These include the provision of living and messing accommodation; the improvement and extension of dockyard workshops, jetties and services; modernization and extension of training facilities; construction of magazines and laboratories for the storage and maintenance of ammunition, and the extension and modernization of warehousing for Naval stores. While it is obviously impossible and undesirable to go into great detail on the work that has been done, a general picture of what has been achieved, and a brief description of one or two of the more important projects may be of some interest.

In the immediate postwar period, first priority was given to providing living accommodation of a reasonable standard for Naval personnel ashore. Existing accommodation consisted almost entirely of wartime temporary buildings of frame construction, built early in the war. Standards of

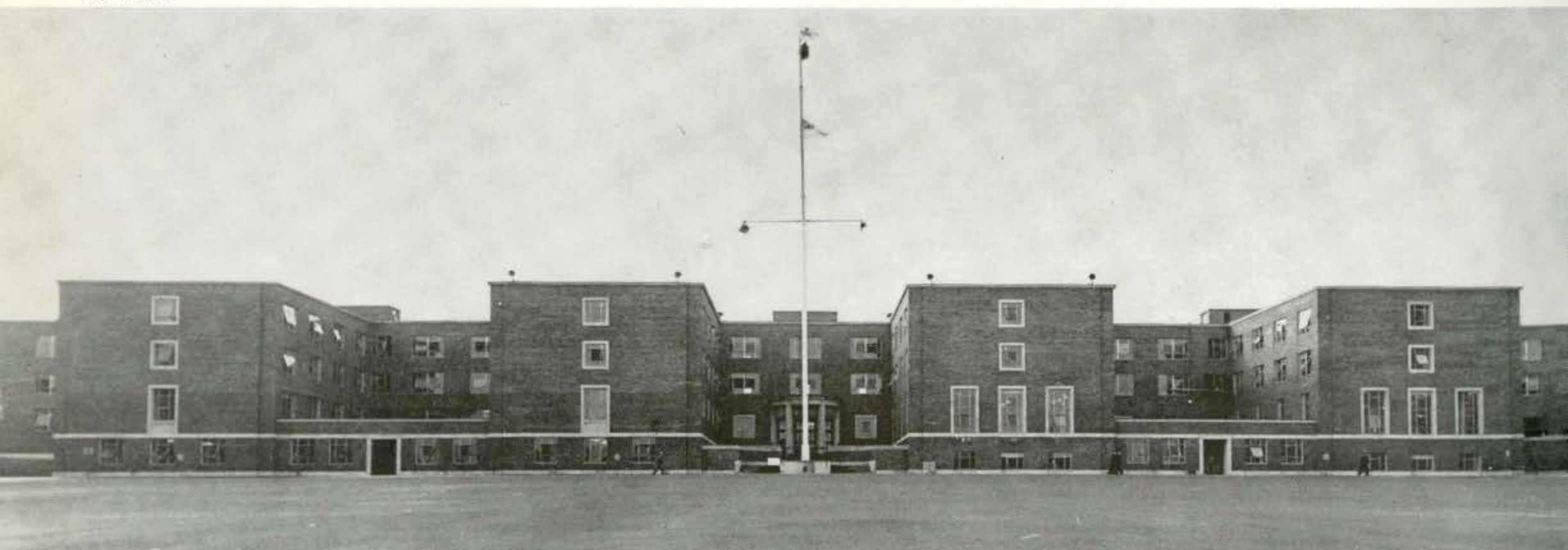
"A" Block, RCN Barracks, Halifax, Nova Scotia

Architects, Fetherstonhaugh, Durnford, Bolton & Chadwick

Consulting Engineers, Wiggs, Walford, Frost & Lindsay
General Contractors, E. G. M. Cape & Co. Ltd.

The first postwar permanent barracks in the RCN. Brick construction with stone trim. It contains living, messing and recreational facilities for 800 men.

RCN PHOTO



accommodation were very low, and by 1945 the majority of the buildings were in a poor state of repair. As an interim measure, these buildings were repaired and limited improvements were made. At the same time plans were prepared for permanent barracks in the major shore establishments.

The first building produced under this program was "A" Block in the RCN Barracks, Halifax. Partly because of limited space, and partly because it was considered that a concentration of all required facilities would best fill Naval requirements, this building was designed as one large unit providing living, messing and recreation space, including wet and dry canteens for 800 men (Leading Seamen and below), in peace time, and up to 1,600 under wartime conditions.

The basic unit of design is the four-man barrack room, developed by the Army and accepted as a tri-Service standard. Messing is on the cafeteria principle, and the mess hall will seat upwards of 500 and can easily handle up to 1,600 men per hour. In addition to the canteens, recreational facilities include a lounge, or reading room, and a games room for pool, ping pong, etc. Messing facilities and the canteens are used by all barracks personnel below the rank of Petty Officer. The remaining recreational areas are designed essentially for personnel living in the block.

Construction is reinforced concrete with brick exterior walls to harmonize with other buildings in the vicinity. Ceiling-type radiant heat was used and proved both economical and successful. Interior finishes are designed to withstand hard wear with a minimum of maintenance, and to allow for easy cleaning. Floors are generally linoleum on the concrete slabs; walls plastered; ceilings exposed concrete painted. Terrazzo floors have been used in the main entrance, and in washrooms, showers, etc., and quarry tile was used in the galley. Terrazzo dados were also used in showers, washrooms and galley. Acoustic plaster ceilings were used in the mess hall, and in recreational areas.

Circulation is up the outside aisles of the steam tables, then down the inside aisles. Dishwashing facilities are near the exit with clean dishes being returned to the service area by hand trucks.

RCN PHOTO

RCN Barracks Mess Hall

This building was followed by similar blocks in the RCN Air Station, Dartmouth, and in the RCN Barracks, Esquimalt. In both these buildings reinforced concrete was used for the exterior walls. Interior finishes are generally the same as in "A" Block. In the RCN Air Station, the building also provides accommodation for Chief Petty Officers and Petty Officers, in single and double rooms respectively. Their quarters are entirely separate with their own entrance and their own recreational facilities and mess hall. A single galley serves both the Chiefs and Petty Officers and the men's cafeterias.

At the end of the war, officer accommodation in Halifax was limited to about forty officers in a former British Army block. Messing was in Admiralty House, a building of considerable age and some architectural distinction. Built about 1814 by the Royal Navy as the residence of Admiral in Command of the North Atlantic Squadron, it is a rather fine example of the domestic architecture of the period. While time and two explosions in the vicinity have caused the loss of all but one of the original fine plaster ceilings, and sundry excrescences have been added, (mainly to provide facilities to feed a large number of Naval officers), Admiralty House still preserves much of its original charm and dignity. However, for all its architectural merit, it was not suitable for an Officers' Mess for the numbers required and its age, structural condition and design precluded remodelling and extension. Accordingly, a new block was built with quarters for 150 officers, and messing facilites for 300. In the event of war, 300 officers can be accommodated, and approximately 500 messed without difficulty. Construction, and interior finishes in the quarters wing, is generally the same as in the barracks described above. In the public rooms, by skilful use of proportions and simple materials, the consultants have succeeded in achieving a remarkable feeling of space and dignity. A new officers' block on a somewhat smaller scale is now under construction in the RCN Air Station.

In the dockyards the program has included a number of projects for the provision of additional jetties; increased power and other services, and facilities for the fabrication, storage and maintenance required for the fixed defences of certain key ports. The major building construction has, to date, been in the extension of workshops for the maintenance, repair and testing of armament. While a great expansion in armament workshops took place during the war, the facilities provided were generally based on the requirements of the relatively simple armament in use at the time, and were inadequate in area, height and lifting equipment for the weapons now in use in the fleet. To meet these deficiencies, existing buildings in the Naval Armament Depot, Dartmouth, N.S., were extended; a new Armament Depot at Longueuil, P.Q., was built, and a gun mounting shop for Esquimalt is now being designed. In general, these buildings are mainly interesting on account of their size. They are well laid out and provide excellent working facilities, but the consultants have generally been handicapped in architectural design by the necessity of tying in with existing work.

The Armament Depot at Longueuil, P.Q., is an exception. While some existing buildings were utilized, they form a minor part of the whole project and were not a restraining factor in the design. This was the first Naval building in which extensive use was made of pre-cast material. Columns and the beams supporting the crane rails were cast in place. Pre-stressed concrete girders of sixty foot spans were used, together with pre-cast joists and roof slabs. The walls are pre-cast concrete sandwich wall panels with two inches of insulation. The building provides 120,000 square feet of workshop and storage space. It is composed of four sixty foot bays, two of which have 30-ton travelling cranes and a rail height of 40 feet. The other two have 10-ton cranes with a rail height of 17 feet.

In the field of training, the immediate postwar period saw the concentration of the relatively widespread training facilities into the two permanent establishments in Halifax and Esquimalt. The construction program in these locations has been largely confined to alterations and additions to existing schools and to the installation of modern training equipment. Important exceptions to this general statement include a new gunnery range at Osborne Head, near Halifax; provision of physical training facilities and the construction of a new Supply School at Ville LaSalle, P.Q., near Montreal. Standard designs for two sizes of Naval Reserve Divisions have also been developed and one of the larger type has been completed in Regina.

Physical training and recreation in the form of organized games and individual sports constitute an important part of the Navy's training program. With the exception of a fine gymnasium and swimming pool in the RCN Barracks, Halifax, and a limited number of playing fields, facilities for these purposes were sadly lacking. As a first step towards rectifying this situation the Physical and Recreational Training Building in HMCS *Cornwallis* was rebuilt. This building had been destroyed by fire shortly before the establishment was closed at the end of the war and was reconstructed on the original foundation as a part of the project for restoration of the base as a new entry training establishment. Following this, a new gymnasium was built in the RCN Barracks, Esquimalt, B.C. This

Supply Centre, RCN Barracks Esquimalt, British Columbia

Architects, Wade, Stockdill and Armour

Structural Engineer, John H. Read
Mechanical Engineer, D. W. Thompson
Electrical Engineers, Simpson & McGregor
General Contractors, Farmer Construction Ltd.

This building provides for all the functions of the Supply Department in the RCN Barracks. It contains two floors of warehouse space and one of offices.

RCN PHOTO

RCN PHOTO

Supply Centre main entrance

Naval Supply Depot
Ville LaSalle, Quebec

Architect, P. C. Amos

Structural Engineer, Pierre d'Allemagne
Mechanical Engineers, The Rankin Co. Ltd.
General Contractors, Louis Donolo Inc.,
and Sir Robert McAlpine & Sons (Canada) Ltd.

RCN PHOTO

This depot contains six warehouses, each 200' x 600', making a total covered storage area of 720,000 square feet. The administration building may be seen on the extreme left front, and the RCN Supply School on the left rear. Beyond the Supply School is the Lachine Canal. All stores buildings are designed with access by rail on one side and by truck on the other.

Nelles Block, RCN Barracks
Esquimalt, British Columbia

Architect, Patrick Birley

Structural Engineer, John H. Read
Mechanical Engineer, D. W. Thompson
Electrical Engineer, A. Edward Simpson
General Contractors, Commonwealth Construction Ltd.

RCN PHOTO

A men's barracks with living, messing and recreational facilities for 750.

RCN PHOTO

The two storey wing in the front contains the wardroom, ante-room, and other public rooms. The quarters are in a three storey section to the rear.

RCN PHOTO

Main hall

RCN PHOTO

Ante-room

RCN PHOTO

Wardroom

Officers Quarters, RCN Barracks Halifax, Nova Scotia

Architects, Fetherstonhaugh, Durnford, Bolton & Chadwick

Consulting Engineers, Wiggs, Walford, Frost & Lindsay
General Contractors, E. G. M. Cape & Co. Ltd.

proved to be an interesting problem for the consultants as the site was very limited in area and an existing swimming pool had to be incorporated and modernized. Lockers and showers had to be provided to serve both the new building and the existing pool. An entirely new building containing both gymnasium and pool is now under construction at the RCN Air Station, Dartmouth, and smaller units have also been built at some of the more isolated Naval Stations.

One completely new development undertaken since the war is the Naval Supply Centre at Ville LaSalle, just outside Montreal. This provides a central storage and distributing point for supplies of all kinds, except perishables, for all Naval establishments in Canada. The original program provided 480,000 square feet of storage space in four buildings, with provision for an additional four buildings in the future. Two buildings have since been added. Each unit is 200 feet by 600 feet, the width being made up of two spans of 60 feet and one of 80 feet, and the length being divided by fire walls into three 200 foot sections. There is a minimum height of 33 feet below the girders. Construction is of reinforced concrete, with concrete block walls. Pre-stressed concrete girders were used in the two newest units. The buildings are sprinklered throughout. Also included in the project are an administration building, garage, inflammable stores and central heating plant, together with two railway sidings. A warehouse of similar design to those at Ville LaSalle is now under construction in Esquimalt, B.C.

Adjacent to the Naval Supply Centre is the new RCN Supply School, which has recently been completed. This school, formerly in temporary accommodation in Esquimalt, provides for the training of Naval personnel in cookery, storekeeping and the various administrative functions of the Supply Branch. The main school building, besides classrooms and offices, contains instructional galleys fitted with equipment similar to that used in the fleet and in Naval shore establishments, instructional bakeries, and

Physical and Recreational Training Building RCN Barracks, Esquimalt, British Columbia

Architects, Sharp, Thompson, Berwick & Pratt

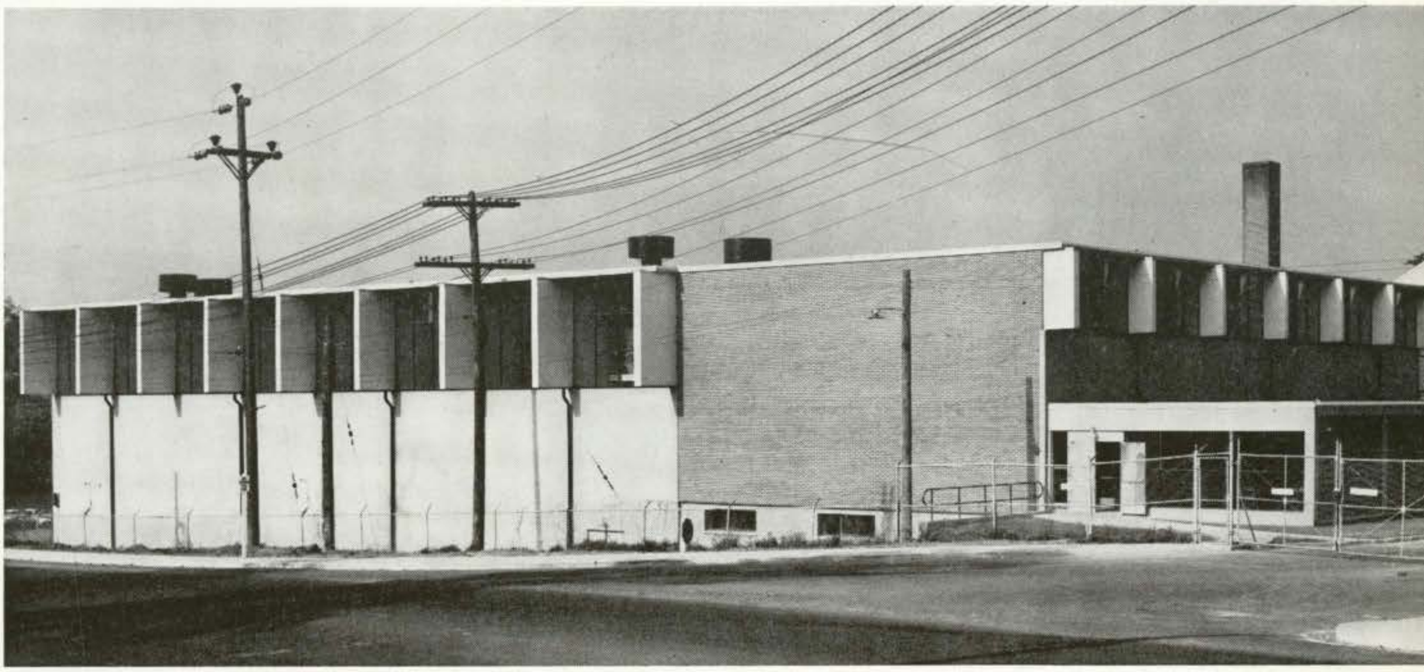
Structural Engineers, Swan, Rhodes & Wooster
Mechanical Engineers, Sandwell & Co.
General Contractors, Luney Bros. and Hamilton Ltd.

1) 2) *Brick and re-inforced concrete construction. The fins, extending beyond the wall, are carried back on to the trusses on the inside and serve to cut direct sunlight to a minimum.*

facilities for instruction in meat and vegetable preparation, etc. It also contains stores space which provides for instructional purposes and for the actual operation of the school. In addition to the main school, the project includes living quarters and messing for Officers, Chief Petty Officers and men.

Another building of interest in the field of supply is the new Supply Building in the RCN Barracks, Esquimalt. Facilities for this department in the Barracks were previously scattered through a considerable number of small and venerable buildings. This made efficient storekeeping and management exceedingly difficult, and precluded the use of modern material handling equipment. The new building provides for the concentration of all the functions of supply in one place, the two lower floors being utilized

1



RCN PHOTO

2

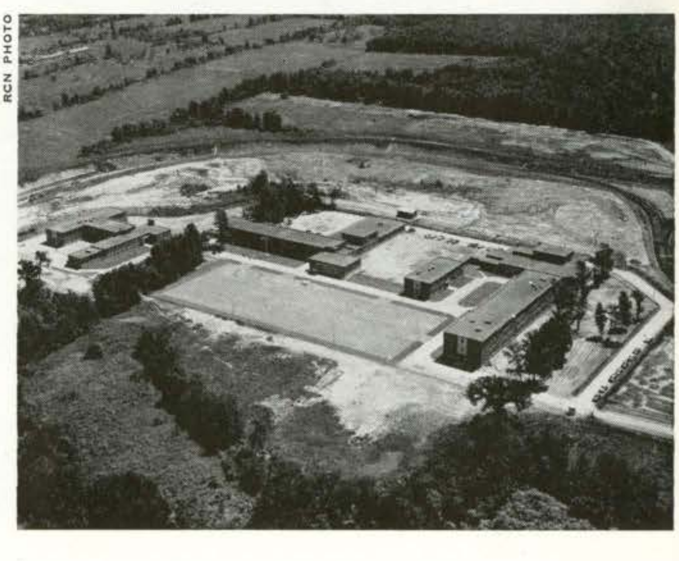
RCN PHOTO

RCN Supply School, Ville LaSalle, Quebec

Architect, Grattan D. Thompson

Structural Engineer, Pierre d'Allemagne
Mechanical Engineers, Wiggs, Walford, Frost & Lindsay
General Contractors, Key Construction Ltd.

RCN PHOTO



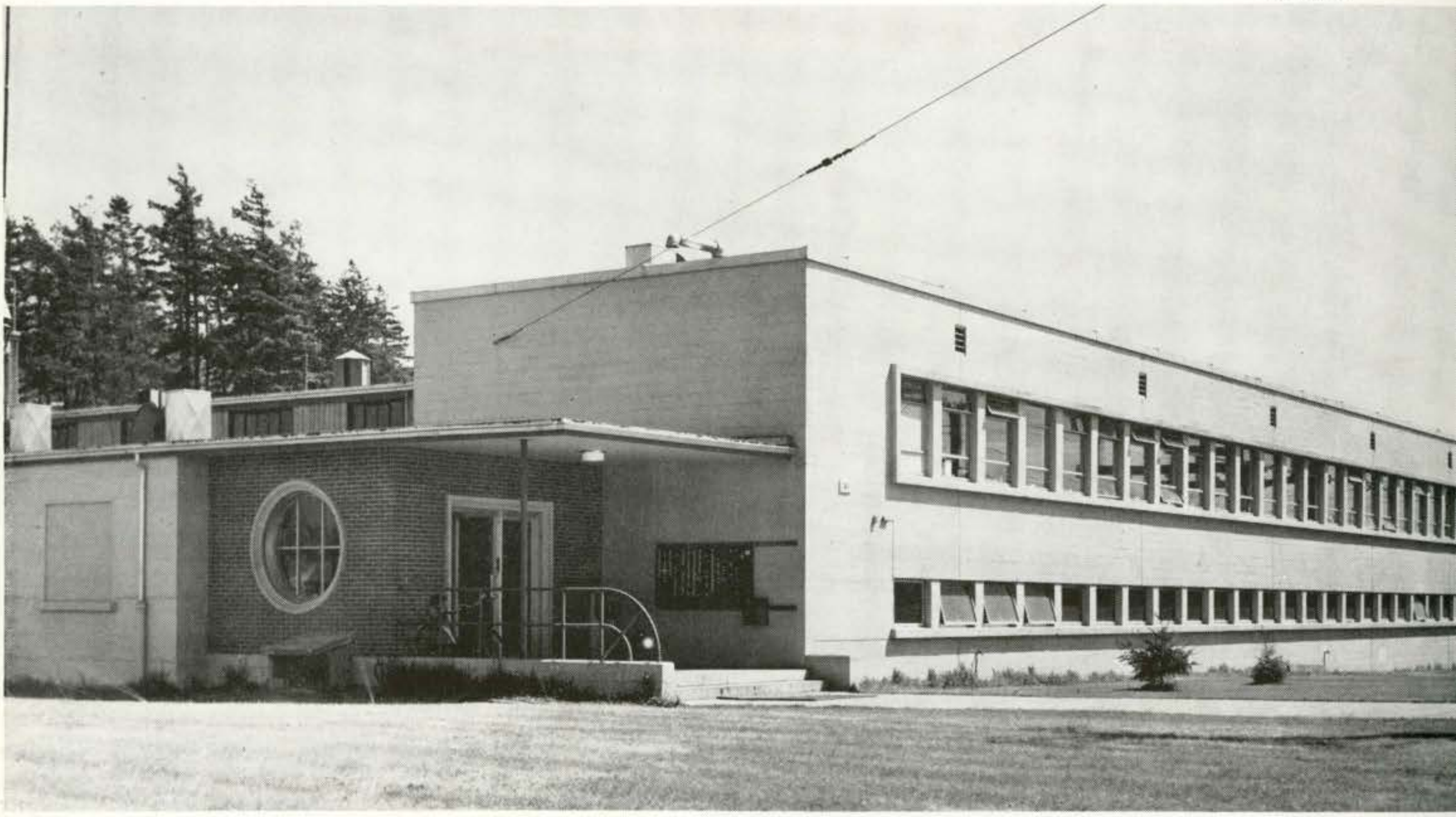
This project comprises an officers' quarters and mess on the extreme left; administration and school building, left centre; Chiefs and Petty Officers Quarters; combined mess and canteen building, and men's barracks.

Electrical Workshop, HMC Dockyard
Esquimalt, British Columbia

Architect, Patrick Birley

Structural Engineer, John H. Read
Mechanical Engineer, D. W. Thompson
Electrical Engineer, A. Edward Simpson
General Contractor, J. A. Pollard Construction

RCN PHOTO



RCN PHOTO

The front wing contains administrative offices, staff locker rooms, etc., with the workshop on one floor in the rear.

Large equipment may be broken down or assembled in the centre bay. Components are then checked and repaired in the various shops in the side bays.

RCN Armament Depot
Longueuil, Quebec

Architect, Grattan D. Thompson

Structural Engineer, Pierre d'Allemagne
Mechanical Engineers, Wiggs, Walford, Frost & Lindsay
General Contractors, Walter G. Hunt Co. Ltd.

RCN PHOTO

This is the first Naval building in which extensive use was made of prestressed girders and precast sandwich wall panels. The overall length is 605' 0" and the maximum height 43' 6". The buildings of the former artillery proof range, to the right, are used as small workshops and administrative offices.

for receiving, issuing and warehousing facilities, with administrative offices on the top floor.

The production of the new construction program is the responsibility of the Civil Engineer in Chief at Naval Headquarters. He is also responsible for administration of the program for maintenance of buildings, services and works which is carried out under the direction of the Managers of Civil Engineering in each Command. The organization consists of both Naval and civilian personnel. In general, Naval officers fulfil the functions of management and administration with engineering and architecture being directed and carried out by a civilian technical staff. The Naval component of this organization is composed of permanent force Civil Engineer officers. These officers have both Naval training and degrees in Civil or Mechanical Engineering or Architecture.

As a matter of general policy, small projects, alterations and additions, and work of a specialized Naval character are generally produced by the Navy's architectural and engineering staff. Certain special work, such as runways, wharves and jetties, is normally handled on behalf of the Navy by other Government Departments, such as Transport, and Public Works, which have engineering staffs specializing in work of this nature. Other large projects are, as a rule, handled by consultants retained through Defence Construction (1951) Limited.

The Naval postwar construction program has produced a large number of buildings and other construction projects, of which only a small number could be illustrated or mentioned in this issue. The work that has been produced by our consultants has been of a high standard, and both the architectural and engineering professions may take a justifiable pride in the contributions of their members.

RCN Reserve Division, HMCS Queen
Regina, Saskatchewan

Architects, Shore & Moffat

General Contractors, Poole Construction Co. Ltd.

WEST'S STUDIO

This is the first example of a standard large RCN Reserve Division

ARCHITECTURAL PLANNING OF SITES AND STRUCTURES FOR ARMY INSTALLATIONS IN CANADA

To a great number of architects and others, the thought that there are architectural considerations in the design of Army installations is difficult to accept without some degree of reservation. For those who did their service in the Army during the Second World War and the more recent United Nations operations in Korea, the impression received in the various training centres and camps was that of a simple attempt to provide housing and other shelter for materiel and equipment by using the most direct and economical method of site layout and building design.

Most of the camps were still of a temporary nature — the wooden hutments of H-form, roofed and walled with stone surfaced asphalt or plain black tar paper, being placed in regular rows, the spacing based on carefully considered fire risk, and served by regular grid patterns of access and service roads. Along these roads were laid the necessary ground services and electrical distribution. Heating was usually by means of stoves, each building having a series of smoke pipes, with an occasional brick chimney.

The larger buildings used as storage depots and workshops were strictly utilitarian with no attempt to relieve the drab monotony of form, colour and setting.

The armouries for the militia up to the end of the Second World War, which are still functioning, were designed to recall the grim fortresses of the middle ages and the keeps on the Scottish border. Examples of the romantic style, are the armouries for Le Regiment de Hull, and the Seaforth armouries in Vancouver. In marked contrast is the bright and new looking armoury constructed in Sault Ste. Marie in a spacious setting which accents its functional character.

The Royal Canadian Signals School, Vimy Barracks, Kingston, Ontario, and the former home of the Princess Patricia's Canadian Light Infantry and Lord Strathcona's Horse (RC) at Currie Barracks, Calgary, Alberta, were developed in the period of the great depression between 1934 and 1939. There are others, but these two in particular are cited as something out of the ordinary in their time, both from the general site planning aspect and the design of the buildings. At each of these stations, the large parade square is faced with permanent buildings, with stucco walls and sloping roofs in colour. The arched openings in the white stucco walls give an accent which is very reminiscent of the British Army occupation in a more sultry clime. These buildings were arranged with the Administration Building on the main axis of the parade ground at the opposite end from the camp entrance. The men's barracks and messes flanked the square with officers' and sergeants' messes in groups adjacent to the squares thus formed. The ancillary buildings assisted in completing the enclosed parade squares. Such sites were well landscaped and the type of accommodation provided is considered to be, in some cases, quite lavish compared to present army standards.

These sites, of course, during the past few years have required further expansion, and the planning of buildings arranged to complete the originally conceived form of the master plan has been given a great deal of thought. The results have been generally pleasing, especially where the landscaping of the site has been faithfully maintained.

In the years immediately after the Second World War, the huge wartime camps with their drab buildings were mostly deserted except for small establishments. The task of trying to keep these vast camps of wooden hutments in a state of repair was too great, even to the extent of retaining accommodation for the reduced establishments. It was therefore planned to replace the temporary camp buildings with structures of a more permanent nature, and with this in view, requirements for the various buildings were tabled and preliminary designs were begun. Starting with the designs for permanent barracks using the new four-man room arrangement for the first time, designs for a complete set of buildings that might be required in almost any camp are now available.

With the design of the buildings the site planning for the camps had to go hand in hand and the requirements for each camp were carefully set down. The master plans, flexible of course, were set up for most of the major stations, and those smaller areas which would have a continuing commitment.

One of the most striking features of the new camps and the redeveloped military areas is the greatly increased importance of the married quarters area both from the point of view of extent and variety. The provision of primary schools will now be supplemented in some cases by secondary schools.

In certain of the older garrison towns, such as Halifax and Victoria, there were old brick married quarters of row type which in the light of present space allocation for families were hopelessly small. In their time they were considered to be quite spacious, and as they were built under the firm direction of the Royal Engineers, there was no question of their structural stability.

Immediately after the Second World War, house construction including the planning of the sites, was carried out by the Army Works Service; the first examples being Camp Borden and Camp Shilo. Later, Central Mortgage and Housing Corporation were entrusted with the development of the housing areas under the general control of the Army.

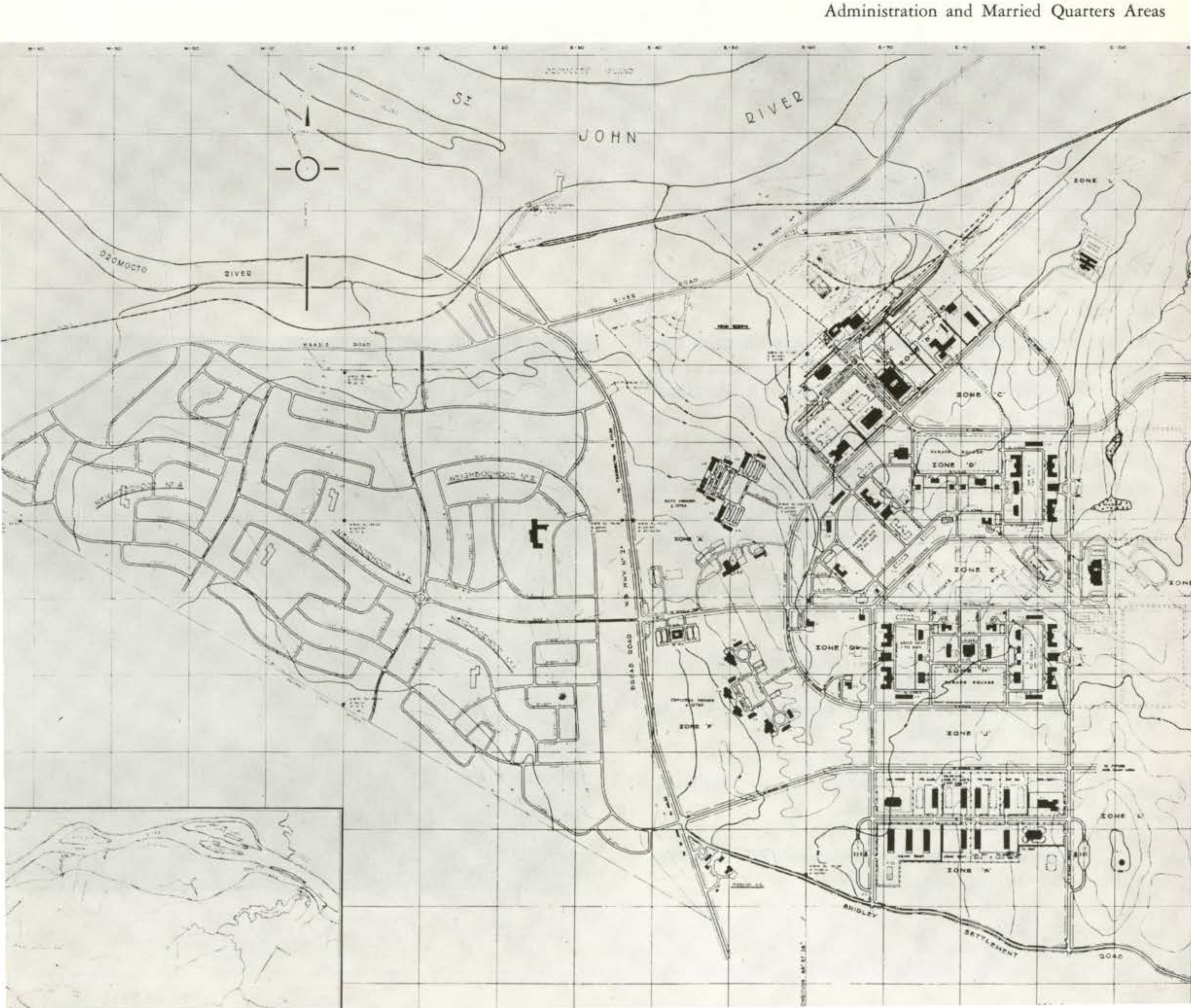
In considering the development of a new army station and in revising the layout for the older stations, it has been found that the preparation of a comprehensive plan for future development entails a careful analysis of existing

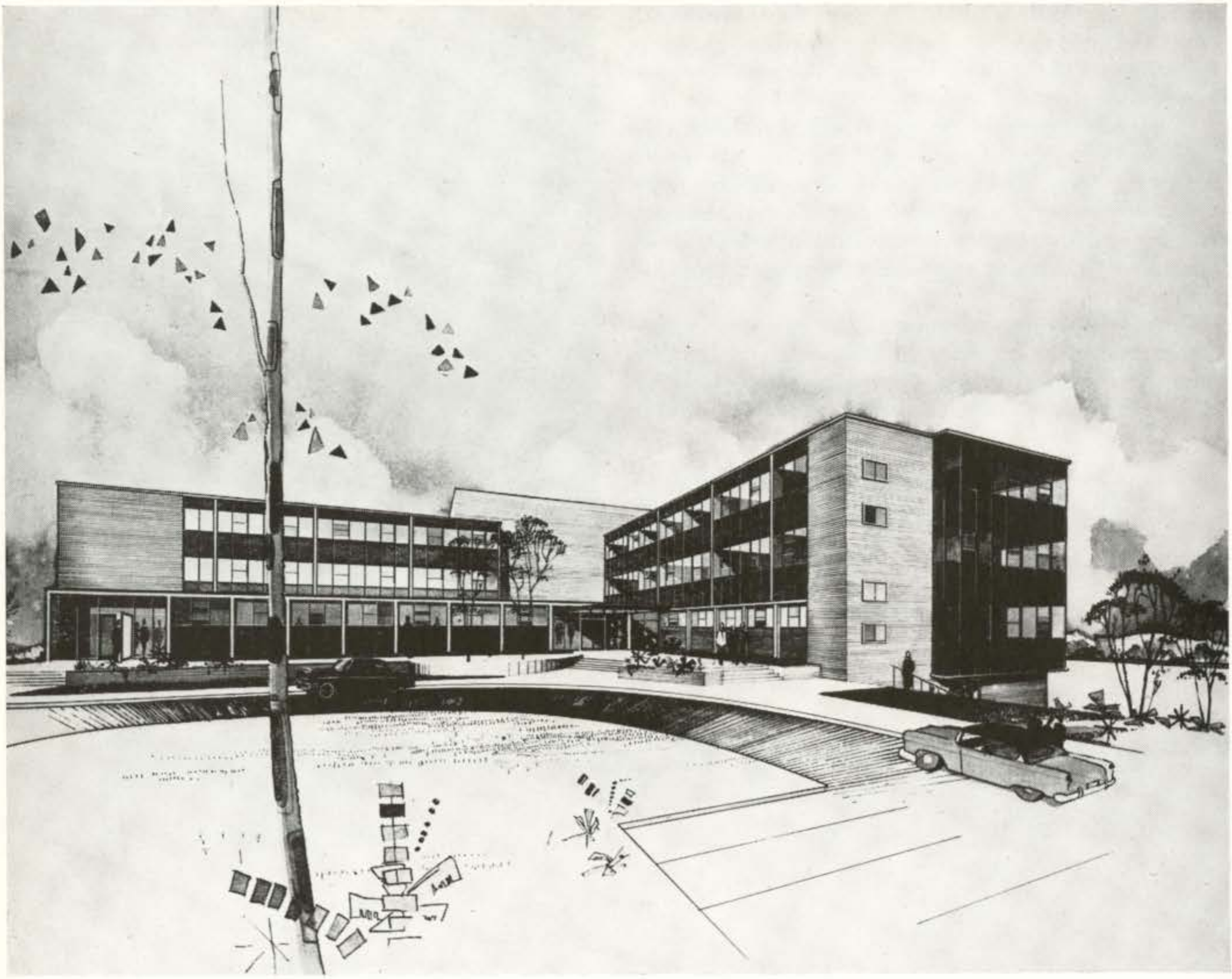
Camp Gagetown, New Brunswick

Aerial photograph of Camp development area in 1952 showing heavily wooded terrain.

1) Camp Administration Area
2) Married Quarters Area
3) Village of Oromocto

Miniature site plan showing Administration and Married Quarters Areas





Camp Gagetown Hospital

118 Beds

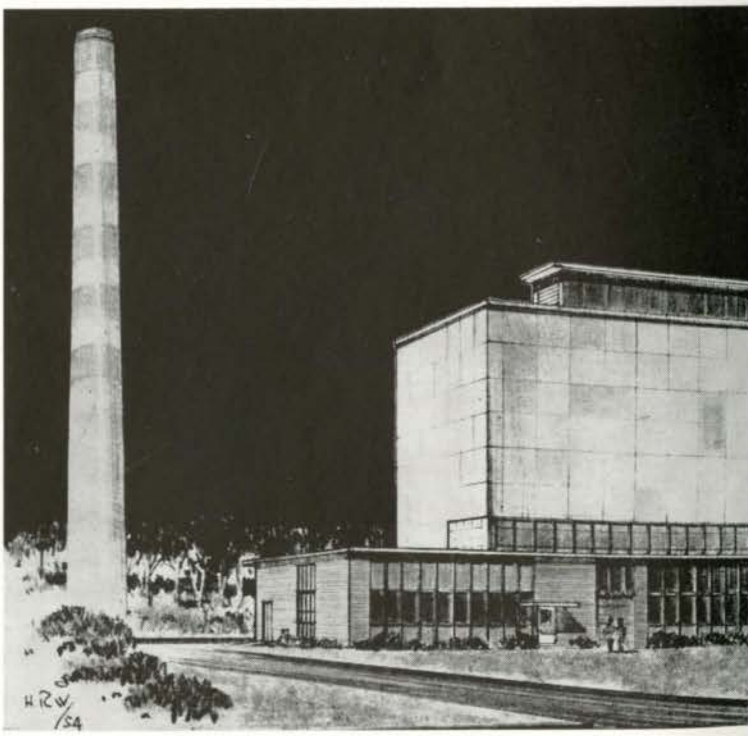
Architects, Shore & Moffat

conditions and future requirements. These must be synthesized into a unified whole, so that the execution of the plan will provide the necessary facilities in a functional and economic manner.

Sound land planning forms the basis for a master plan for such installations. The allotment of space and the arrangement of buildings must be correlated on the site and integrated to serve the mission of the installation.

The groups of accommodation may be broadly classified as follows:

(a) Troop housing, barracks, NCOs' and officers' quarters, and the adjacent messes.
(b) Family housing.
(c) Training aids, including ranges and drill areas, drill halls, armouries, etc.
(d) Administration, including hospital, chapel and detention facilities.
(e) Operational, such as Signals installations.
(f) Service, including workshops, garages, fire halls, central heating plants, etc.
(g) Recreational, including physical training buildings, junior ranks' clubs, swimming pools, skating and curling rinks, theatres, etc.



(h) Educational, comprising military colleges, lecture training buildings, libraries and schools for the soldier and his dependents.

These functions require that such accommodation be mutually related and provided with adequate traffic circulation of main arteries and secondary roads.

Considering the site planning aspects for a new camp, such as the new Camp Gagetown in New Brunswick, it is most important that the main built-up area of the camp and the ranges and outlets to training areas, tank and gun areas, bridging areas, etc., should be kept in a close compact group. This allows for better administration and control, and results in a saving in time of travel to and from work and training. The permanent married quarters area should be closely related to the camp administration area and so grouped as to avoid the extremely long routes of travel which are common to large installations of this type.

In grouping the accommodation it is most important that the units have their own self-contained accommodation insofar as possible to include unit administration, barracks, messes, unit clubs, lecture facilities, quarter master and technical stores and unit guard houses. The unit vehicle garages and parking areas in a new camp are usually concentrated in one area for large installations, but for certain small groups these garages are adjacent to the main unit area. The unit accommodation generally is grouped around the parade square, with drill halls located close by for training and demonstration in inclement weather. For tanks and other tracked vehicles, the hangars are generally located close to the outlet road to the tank training area, ranges and manoeuvre areas, to avoid damage to camp roads. Additional considerations in the siting of other facilities are as follows:

(a) The garrison headquarters is preferably located close to the main camp entrance with a gate house to control vehicle traffic. A service entrance to a camp is most desirable but the number of gates to a camp or station should be kept to a minimum.

(b) The station hospital with nurses' quarters adjacent should be sited on high ground to take advantage of prevailing winds if possible.

(c) Detention barracks should be placed in reasonable proximity to a camp entrance but in an isolated area.

(d) The services area including Ordnance Depot, Royal Canadian Electrical Mechanical Engineers Workshop, Royal Canadian Army Service Corps Supply Depot and Garage Compound, Royal Canadian Engineers Works Compound and Stores and Equipment Compound and other such functions should be not too far distant from the permanent and temporary portions of the camp served by railway. Troop loading will also be closely adjacent.

(e) The main recreation area for the troops is located if feasible in a central location to the units served and in reasonable proximity to the married quarters. The physical training building will be on the sports field. Chapels will generally be in the area of the camp administration area adjacent to the married quarters.

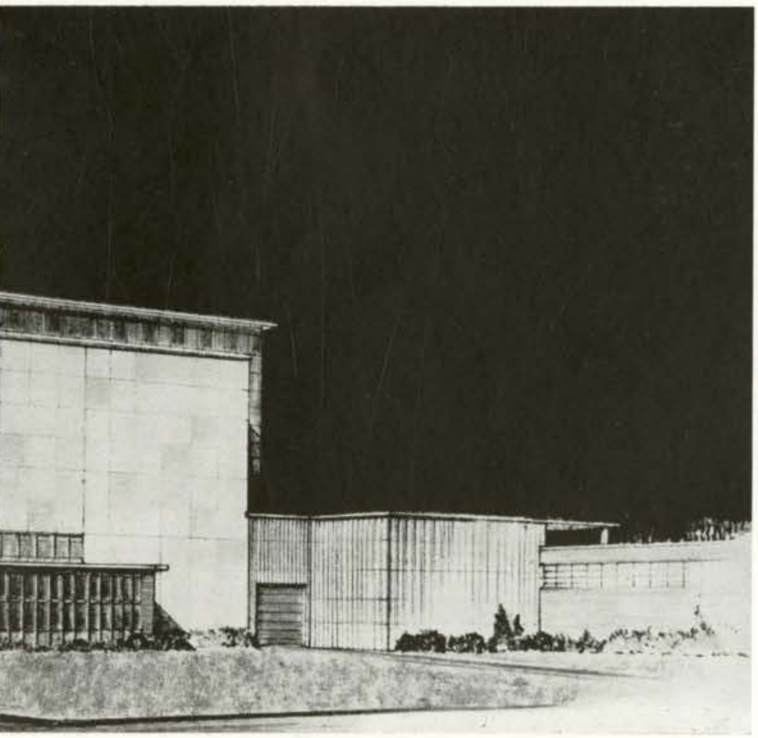
The above principles were adopted in laying out Camp Gagetown, which is shown in the plates accompanying this text.

In addition to the large development at Camp Gagetown, N.B., there are other camps that almost approach it in size and construction of new buildings and facilities. These are the camps that were chosen to be developed as permanent home stations for the units of the Canadian Army, and the provision of the required permanent accommodation for these home stations has been the major work of the Works Service during the past few years.

The design of the public utilities alone was a major task the large camps, and this work is now in full construction. In most cases the main administration areas of the camps are heated by means of central heating plant using steam with underground conduit distribution systems. At Camp Gagetown alone, the use of high temperature hot water was adopted, the first major use of this method in an army camp in Canada. In the administration area of all the permanent camps, electricity is fed by underground systems. In most permanent married quarters areas, the subdivision is fed by pole lines at the rear of the lot. Underground systems for electricity and central heating are authorized only when such provision has been economically justified.

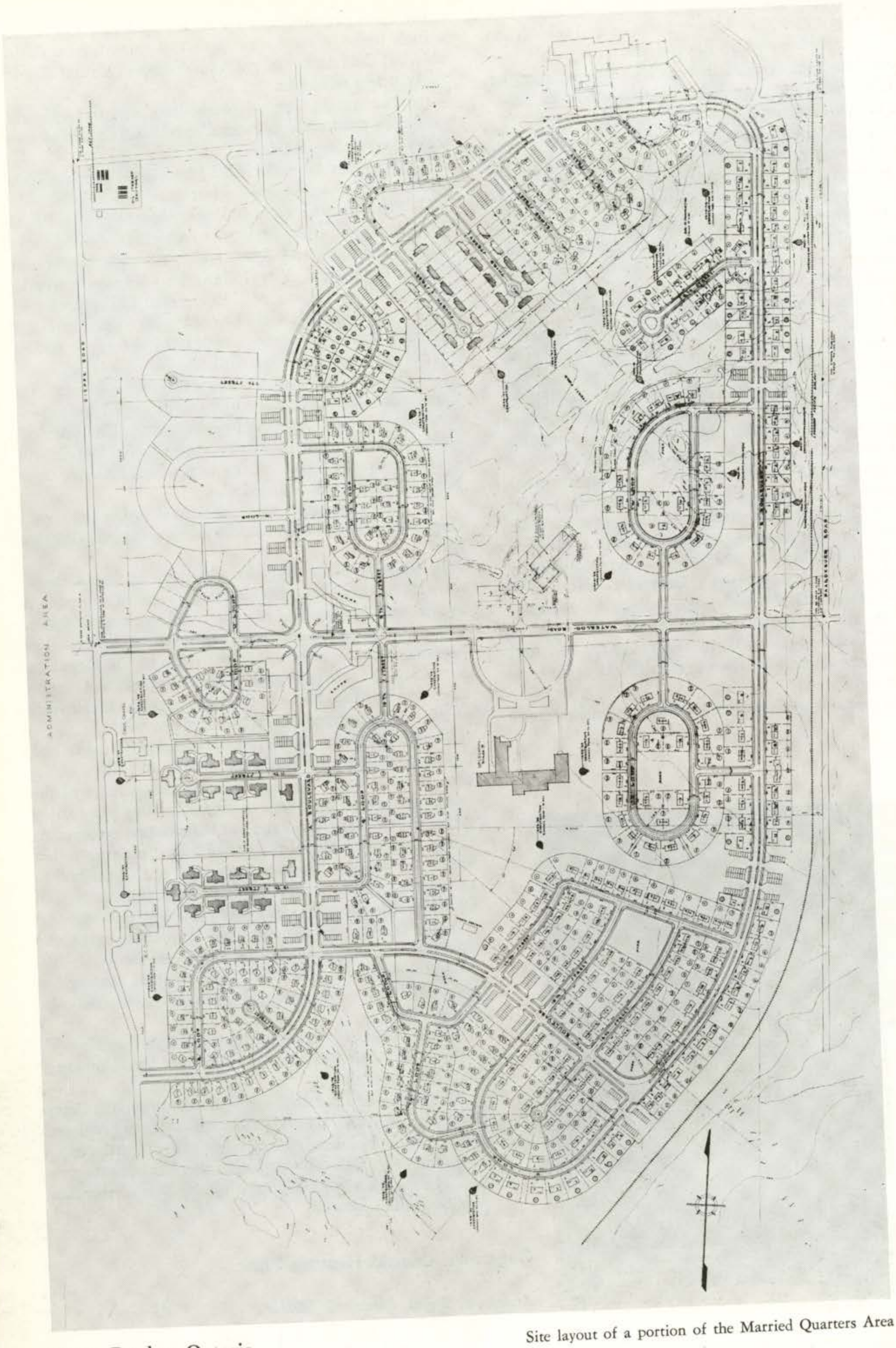
The provision of traffic routes and service roads with parking areas, conveniently located, was based on carefully calculated need.

It would be said that in the case of a camp such as Camp Petawawa, in which the main old portion is being replaced by permanent buildings, the problem of keeping the camp in operation with all utilities functioning has been staggering. The sketch site plan gives an indication of the complexity of the operation.



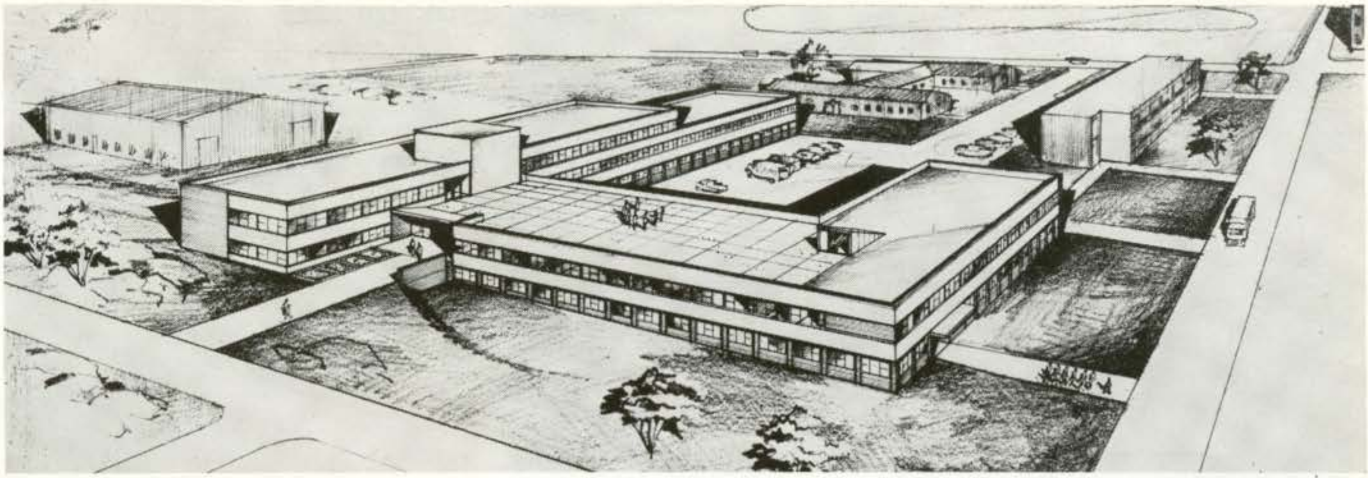
Gagetown Central Heating Plant

Architects, Wiggs, Lawton & Walker



Site layout of a portion of the Married Quarters Area

Camp Borden, Ontario



Training Building for the Royal Canadian School of Signals Kingston, Ontario

Architects, Fisher and Tedman

The provision of materiel and equipment for the Army creates a heavy storage space need. The existing Longue Pointe Ordnance Depot and other smaller installations were supplemented by the addition of central ordnance depots and regional ordnance depots. The largest new ordnance installation, 26 Central Ordnance Depot, Cobourg, Ontario, now contains six new storage buildings 200′ x 500′ each.

Buildings for the new stations are indicated by number on site plans. In addition, plans of the standard buildings are shown together with perspectives and photographs. Other points of interest in the Army construction programme that might be noted are described below.

La Citadelle, Québec, with its fortification walls and buildings, was constructed in the early 19th century. The new buildings constructed at this site have a certain quality of the old as well as the new. The modification of certain old buildings and the construction of the two men's barracks presented a difficult problem on such a confined site. The latest barrack was designed to replace what is known as the counterguard wall of the fort, and this was done without detracting from the historic appearance or silhouette. The new barrack roof has a sod covering to complete the illusion.

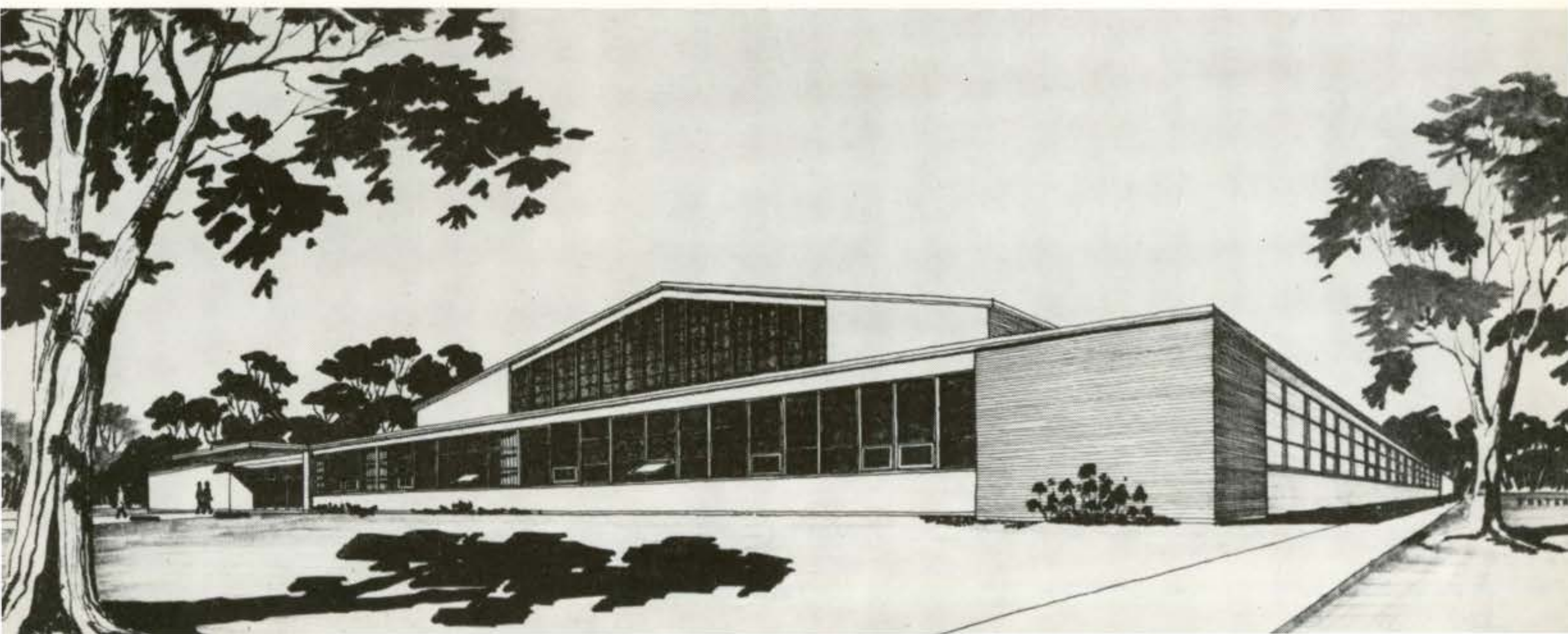
The Royal Military College, Kingston, Ontario, is a point of interest, together with the adjacent Canadian Army Staff College, and a view of the new training Building at the Staff College is shown. The contemporary type addition to the Headquarters Building, Headquarters, Central Command, Oakville, is shown in perspective drawing. The Militia Armoury building in Sault Ste. Marie is also depicted in perspective. This was one of the first armouries of contemporary design.

The work carried out at Fort Churchill, Manitoba, and other northern stations is of more than passing interest. The problems of insulation of buildings, provision of foundations in the frozen gravel and rock, and the complexities of ground services, heating conduits and electrical distribution facilities are out of the ordinary.

It should be noted that the preparation of the plans and specifications for the development of the sites including all utilities, the adaptation of standard buildings to the site and the grounds improvement design were carried out mainly by consultants. These act as extensions to the Office of the Director of Works. The basic site planning and general control of the utilities design is the responsibility of the design staff in the office of the Director of Works.

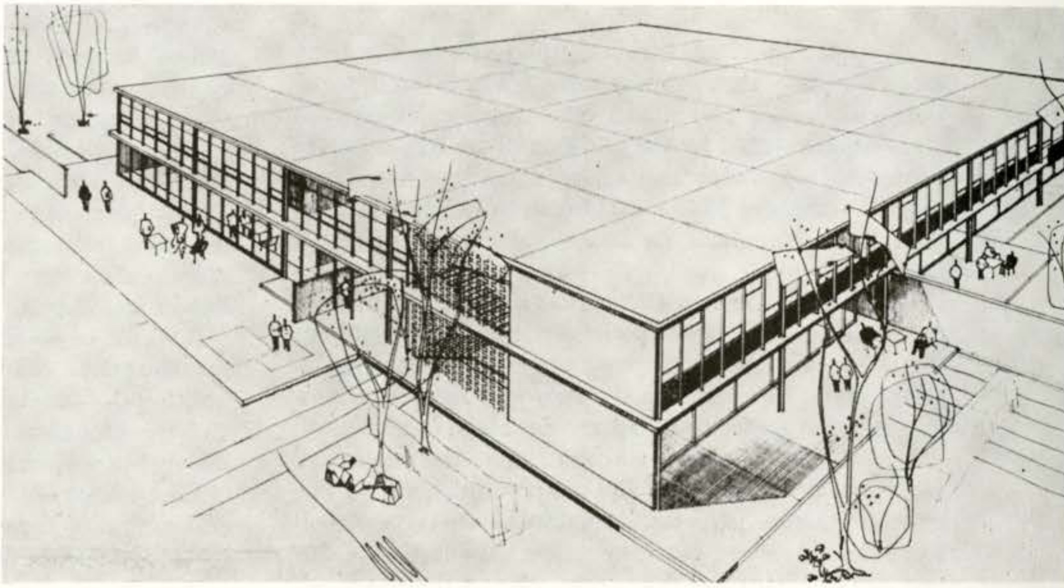
Unit Drill Hall

Architects, Gordon S. Adamson & Associates



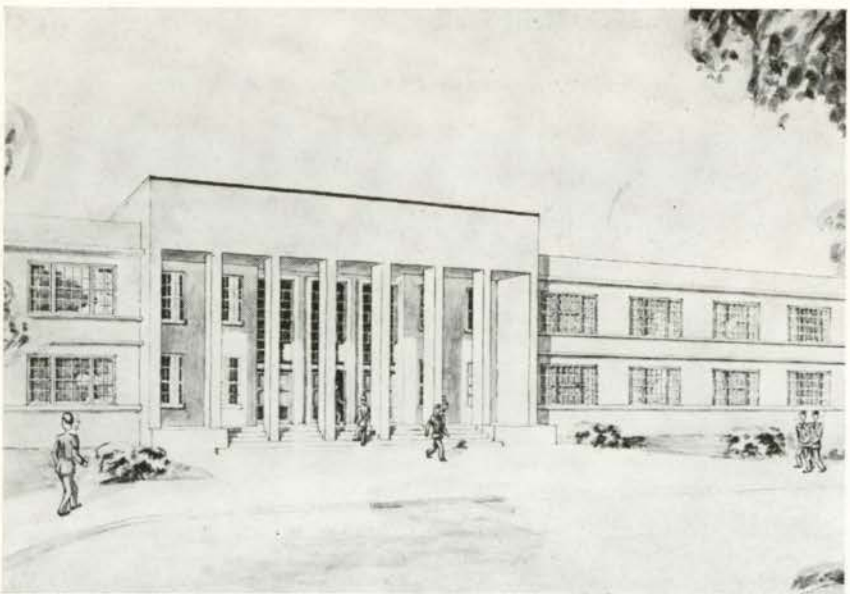
500 Man Mess

Designed by Design Division, Directorate of Works, DND (Army)



Combined All Ranks Mess

Architects, Gordon S. Adamson & Associates



250 Man Mess

Designed by Design Division, Directorate of Works, DND (Army)

Design of Army Buildings

The design of buildings to house the modern army is of a complex character and, particularly so, in a country such as Canada with its climatic range and extended geographical boundaries encompassing scattered military formation of diverse functions.

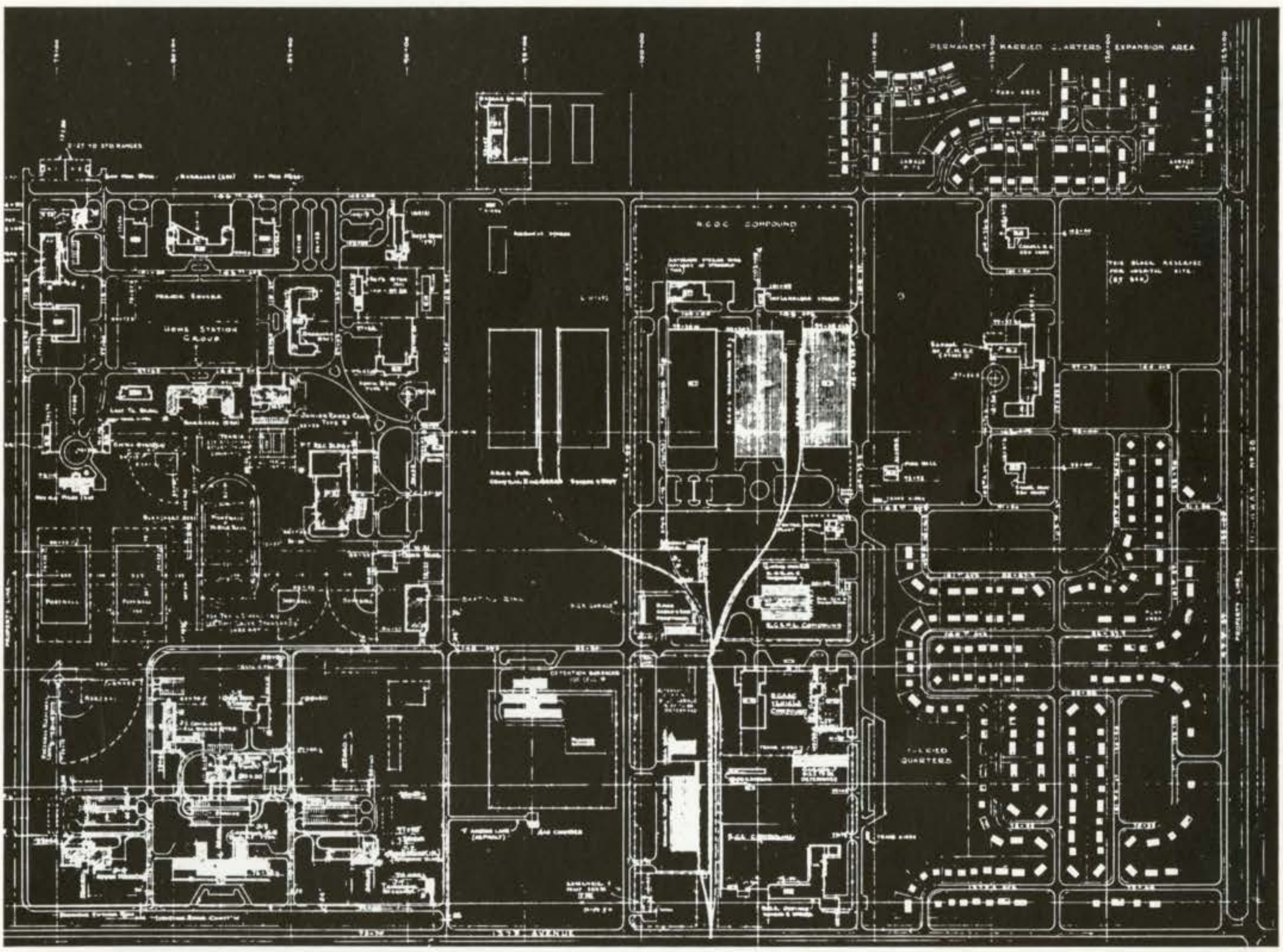
The provision of permanent type buildings came into general use to avoid the excessive maintenance costs inherent in the wooden hutments and other structures which were erected mostly in wartime and to meet emergencies. Today, almost all the new army buildings are of permanent construction. Structures are generally of concrete or steel, with masonry walls, brick or stucco facing. In a few of the buildings exposed concrete, poured or pre-cast, has been employed.

The fire resistance of the structure is carefully considered in the initial design and, in addition, this is supplemented by the most modern fire prevention measures.

The use of a number of structural techniques has been adopted to meet the needs of the various architectural and structural problems. There is a strong tendency in army work to avoid spectacular architectural or engineering solutions.

In the design of army buildings, there must always be some compulsion for standardization, if only for economic reasons. However, this is reflected only in buildings of identical function and in the scales of accommodation which are established by the army for all basic requirements. The majority are standard buildings and must be designed so that by simple modification they can be adapted for any location in Canada, say south of latitude 55°. In many cases, the army authorities require that such a building shall have a completely flexible internal arrangement and, at the same time, be expansible in any one of several major parts of the building. Many buildings are staged, and any one of up to four or five different stages can be built from one set of standard drawings.

Since the buildings cover such a wide range of types,

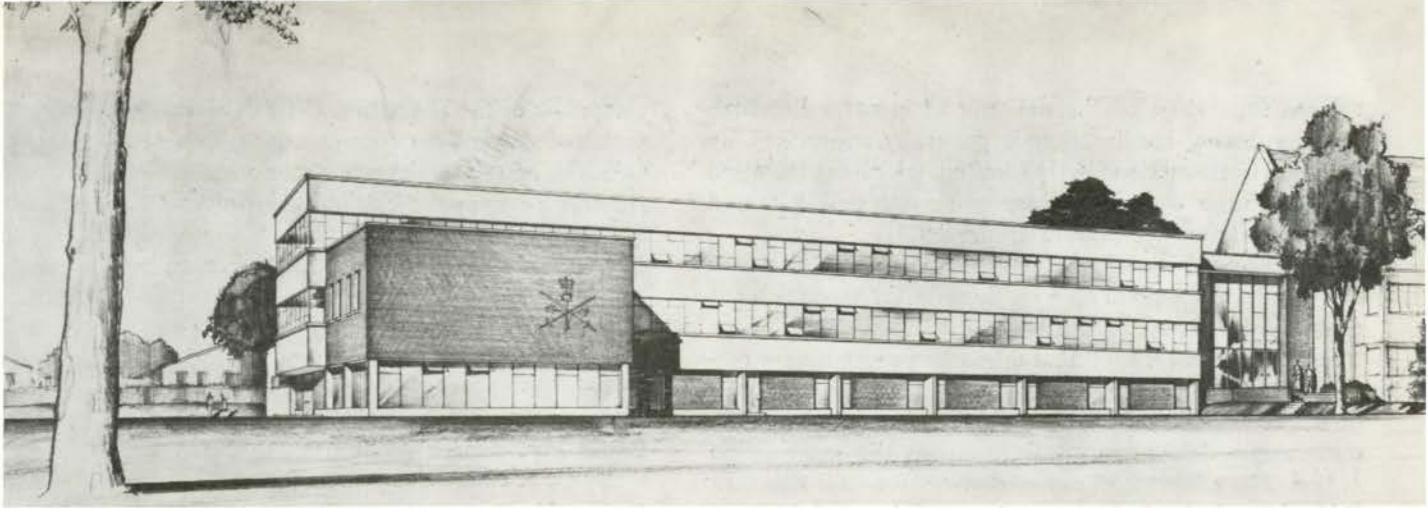


Site plan showing the Administration Area and part of the Married Quarters Area

Edmonton, Alberta

Camp Petawawa, Ontario

Sketch site plan



Addition to Headquarters Building Central Command, Oakville, Ontario

Architect, R. A. Fisher

there can be no standardization in construction. The policy is rather to avoid those forms of construction which, for a number of reasons, based on considerable experience, are not acceptable for Army use. The pursuance of this policy does allow the designers to take advantage of some of the latest developments in structural and design techniques. The critical prudence of the architect, engineer and the Army authorities dictates that the more extreme and purely sensational solutions be avoided.

The integration of architectural design for army buildings poses a problem. In most of the developments there is a diversity of building forms related closely only in those buildings which have complementary functions and close physical spacing. This avoids the monotony that is inherent in standardization of form, and the use of several design systems and finishes adds an interest and sparkle that is not normally found in developments of this nature.

The use of colour by the planners and architects is adopted to blend the old structures with the new and to integrate the new buildings of diverse forms. In most cases, this technique has been found to produce good results. The control of colour generally and the selection of materials for colour and texture for all army projects is vested in the design division at Army Headquarters.

The task of establishing the building programme for a complete camp, and the space requirements for indivdual buildings and functions is of considerable magnitude. Space requirements and floor patterns must be carefully studied with that counterpart of the client, the user branch or service, constantly taking a vital interest in the development. Approval in principle for the design requirements is obtained and the detailed development of the design is normally entrusted to a consulting architect or engineer who continues to work in close co-operation with, and under the direction of, the Army architectural and engineering staff. The development of the plans then follows the usual pattern of intensive study to produce a design that is functional, aesthetically acceptable and economically feasible. Detailed briefing of the consultants is carried out by the Army's design staff in accordance with an established procedure that is intended to avoid hazy instructions, and to leave as little as possible to chance. By a series of progress submissions of the drawings and specifications, the designs are brought up to the finished state.

The consultants are allowed to exercise their initiative within the framework of the requirements. The preliminary studies prepared by the Army design staff are intended to assist the consultant toward a design solution which is satisfactory to all concerned.

It should be noted that the provision of clear working drawings and specifications is especially necessary in army work as the construction of the buildings and services is

Administration Building

Architect, H. Ross Wiggs

seldom supervised by the designer as in normal civilian practice. Army construction is generally supervised by Defence Construction (1951) Limited, which organization has built up a wide knowledge of service buildings and the construction techniques employed.

The more advanced structural systems and techniques can be used in general only on those buildings which are designed for a particular site. In a standard building no structural system is used that might be unsuitable for certain climatic zones. If such were adopted, the performance of the structure could be impaired, and it might create unnecessary delays or difficulties during the construction period. The adoption of any particular system is also considered in relation to the competence of the available contractors and labour in the area, and also to the necessity for thorough and regular supervision.

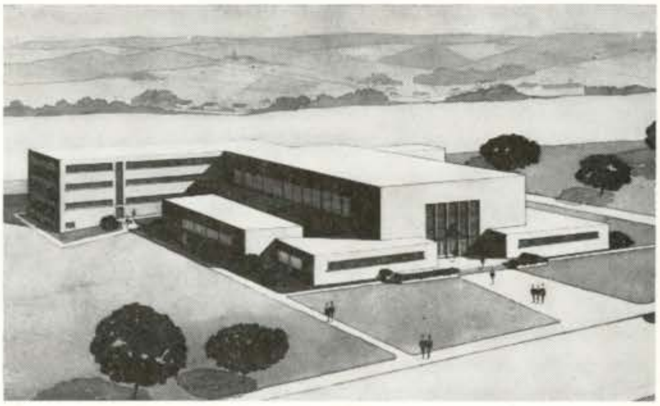
The choice of materials for buildings and utilities is given careful consideration and only those which offer the highest resistance to wear are selected. A low maintenance factor is of prime importance, and the use of any mechanical device or moving part of a building component is carefully assessed to keep maintenance and replacement costs at a minimum. It has been found that a slightly higher initial expenditure in the right place will result in much lower maintenance costs than would normally be expected.

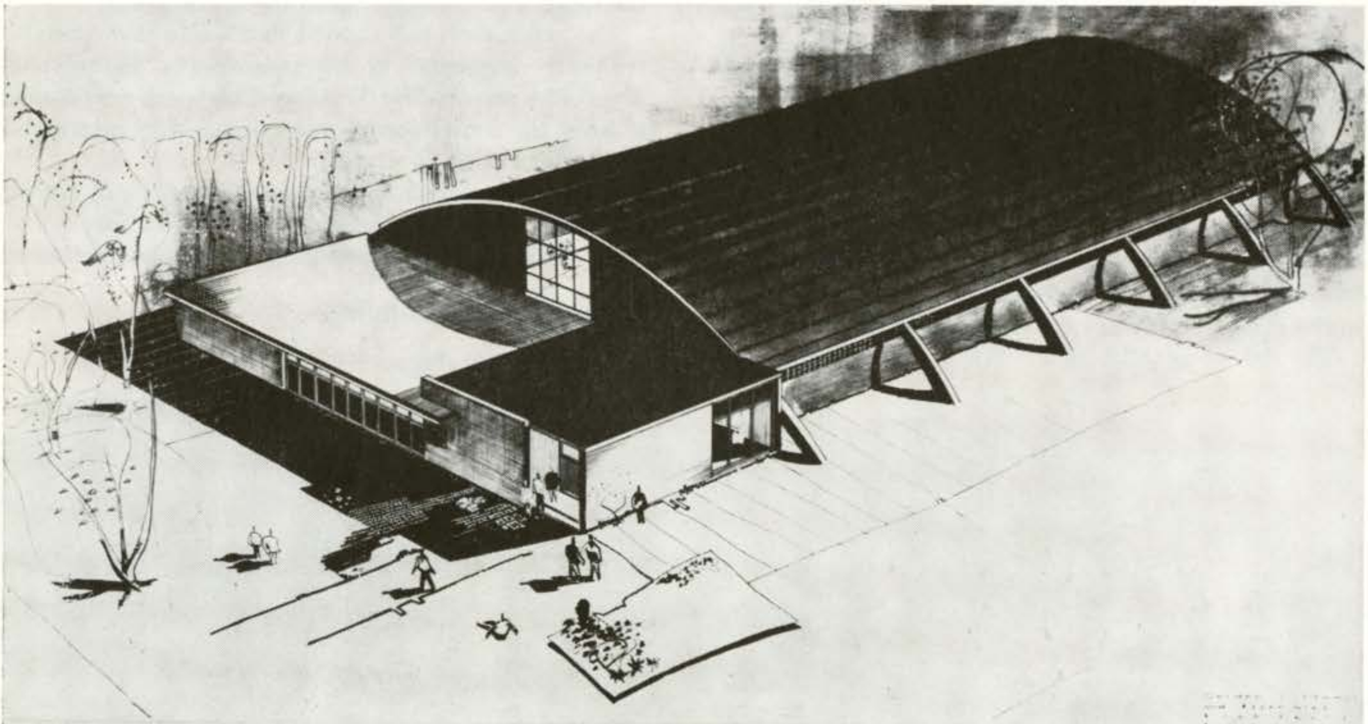
The use of plaster, stucco and multi-coat oil based paint finishes in new buildings is now reduced to a minimum. Finishes which require specialist applicators are avoided as much as possible in standard buildings.

The selection of building materials is complicated by the policy of the Department which allows for the substitution of alternative or equivalent materials to those specified. The onus is on the contractor or supplier to prove that the alternative material submitted conforms with the specifications or is acceptable in lieu of the product specified. In this case, a careful assessment of the suitability of the so-called equivalent product must be made with regard to performance, aesthetic qualities, and cost. This entails a great deal of work and there are many pitfalls in the acceptance of substitutes for equipment and materials for

Sault Ste. Marie Armoury, Ontario

Designed by Design Division, Directorate of Works, DND (Army)
Consulting Architects, Marani & Morris





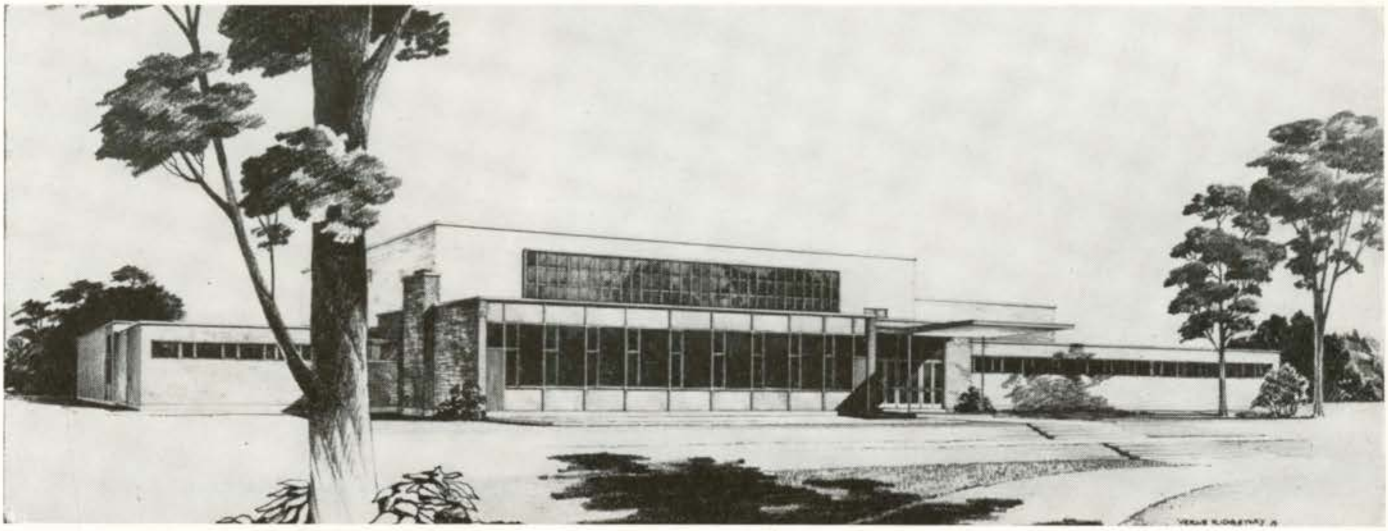
Swimming Pool

Architects, Gordon S. Adamson & Associates those well-established items specified.

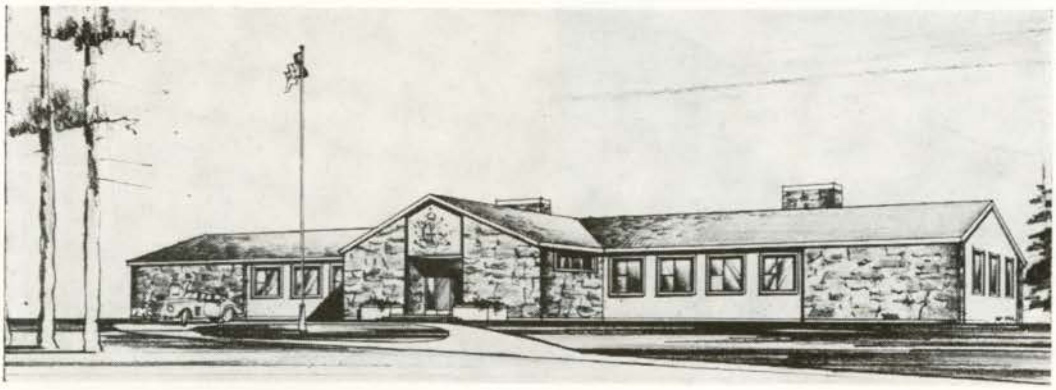
A few of the typical building designs used in the various army stations are shown in plan and perspective on the accompanying plates.

The development of the army stations and the addition of new buildings over the past few years has been a major effort and its value is difficult to assess in the midst of the construction program. As the greater part of the modern work has been under construction only during the past two or three years, the sites are unfinished as a whole and cannot be viewed as finished schemes for another two years. It is hoped that by that time the grounds improvement schemes will be complete to provide a proper setting for the buildings.

In spite of the restricting factors and the extent, complexity and urgency of the construction program, many of the stations now contain a remarkable development of well designed, soundly constructed buildings. They are the result of searching criticism, reflection and evaluation of the Army's needs. Complete dedication to the principles of utility and function has not been pursued, and thus a certain formalism still exists in the treatment of the sites and buildings especially at those establishments associated with the early history and traditions of the Canadian Army.

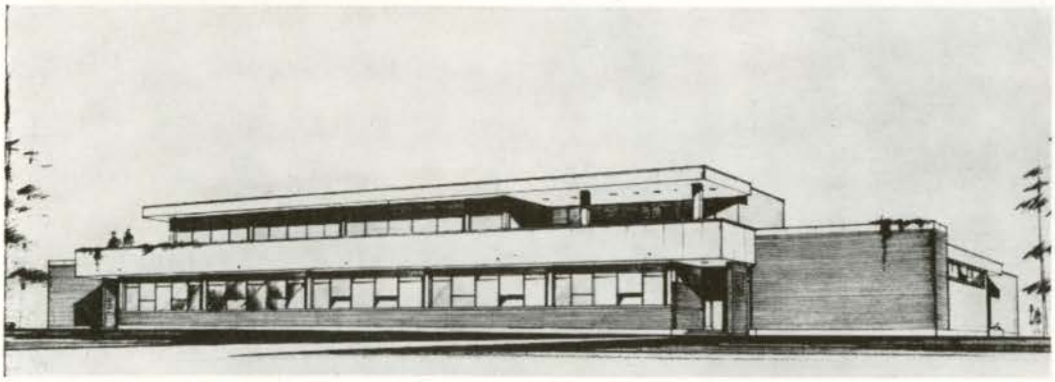


Physical Training Building *Architects, Burgess & McLean*



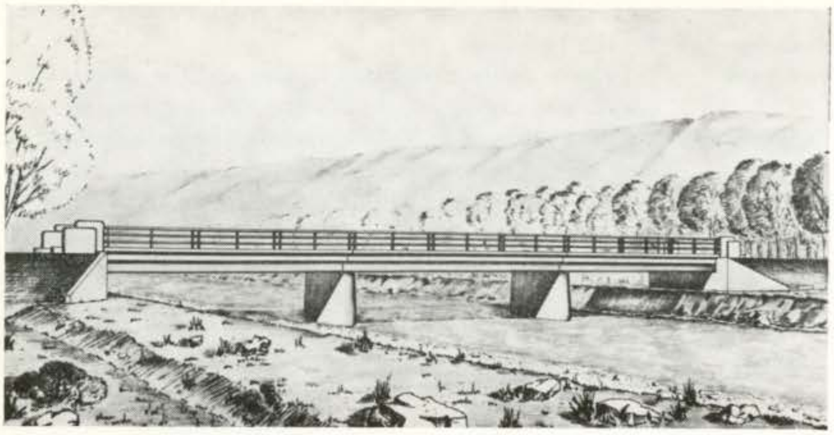
Officers' Mess for 50

Architects, Fisher and Tedman



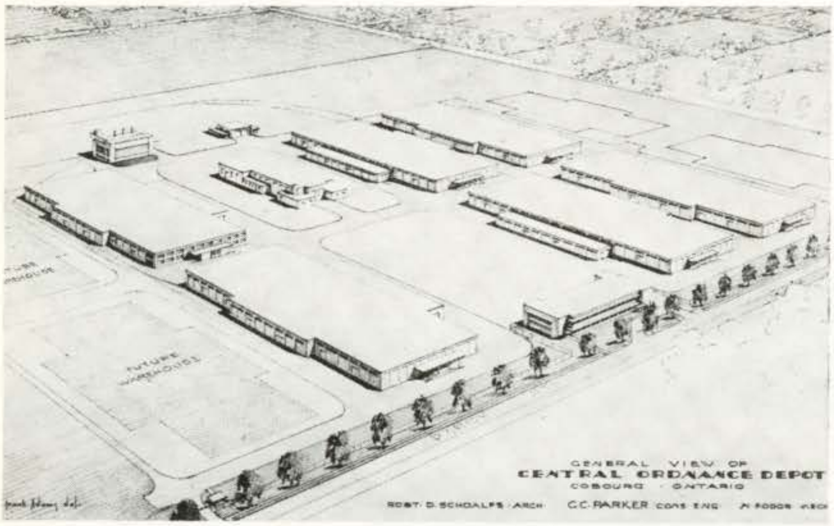
Junior Ranks Club

Architects, Fisher and Tedman



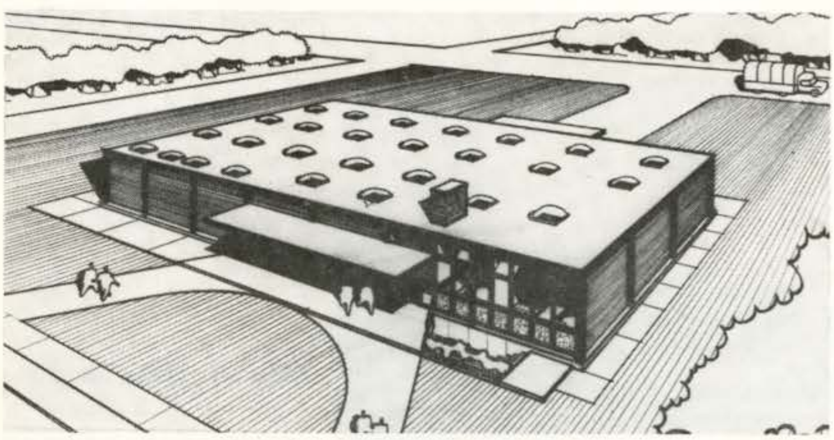
Class 100 Tank Bridge
Sarcee, Alberta

Engineer, Haddin Davis & Brown Limited



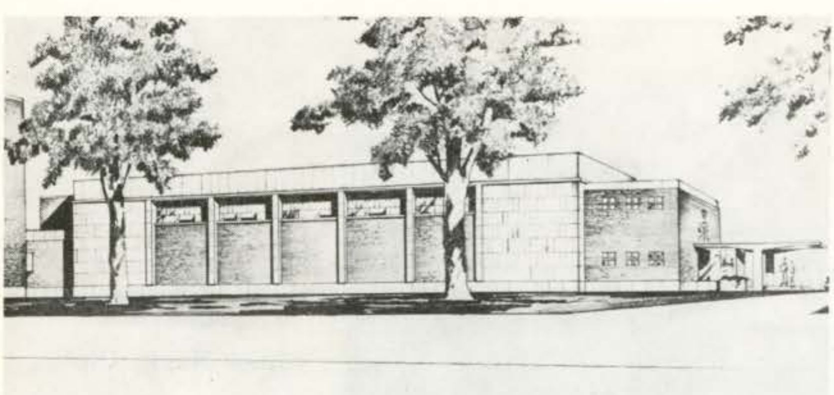
Cobourg, Ontario

General view of Central Ordnance Depot



Quartermaster
and Technical Stores

Architects, Moody and Moore



Training Building
Canadian Army Staff College
Kingston, Ontario

Architects, Fisher and Tedman

THE RCAF CONSTRUCTION PROGRAM

The RCAF has grown from a pre-war force of 4,000 to a post-war strength of approximately 50,000 officers and men. The development of aircraft and the complexity of servicing and maintaining them has grown in equal measure. To match this growth, it has been necessary to plan and build new airfields, buildings and attendant services. Since 1948 when this major development was initiated, $540,000,000 have been invested in buildings and airfields for the RCAF.

The post-war program can be broken down broadly into three partially overlapping but distinct phases; immediate and urgent accommodation for a rapidly expanding force, an initial program of new construction, and a long range development program to meet future needs.

The first phase saw the rehabilitation and renovation of war time buildings for use as interim accommodation. During the war years $80,000,000 worth of frame buildings with a life expectancy of from 5 to 10 years, had been built. Examination of these buildings showed that the only portion which had deteriorated to any extent was the substructure which, on most of the buildings, had consisted of wood beams over concrete pads. By providing a permanent substructure, the life of such a building can be increased by an estimated 20 years. On sites marked for a permanent place in RCAF development, many such buildings were renovated and are providing a suitable standard of accommodation.

The development of new building designs presented a different problem. Prior to the second world war, only five RCAF stations existed which could be considered permanent. The task since then has been to provide a complete defence system, radar warning chains and training facilities. Because many Stations have similar requirements, it has been feasible and economical to use standard designs for the more common buildings. Among this group are the standard barrack blocks, messes, hangars, and administration buildings. Many special designs were required however and command headquarters buildings, technical training schools and the Canadian Joint Staff Building in Washington figure prominently in this group.

To assist the Service in the development of these buildings, a number of prominent Canadian architectural and engineering firms were employed in a consultant capacity. Under this system, the RCAF determined the requirement and liaised directly with the consultants to develop suitable designs, working drawings and specifications. On completion of this phase the consultants' work, in most instances, was finished. Suiting the design to individual sites, award of contract, supervision of construction and acceptance were the responsibility of, and were controlled by, Government agency.

The long range program as the name suggests provides continuity of design and construction services beyond the expansion period.

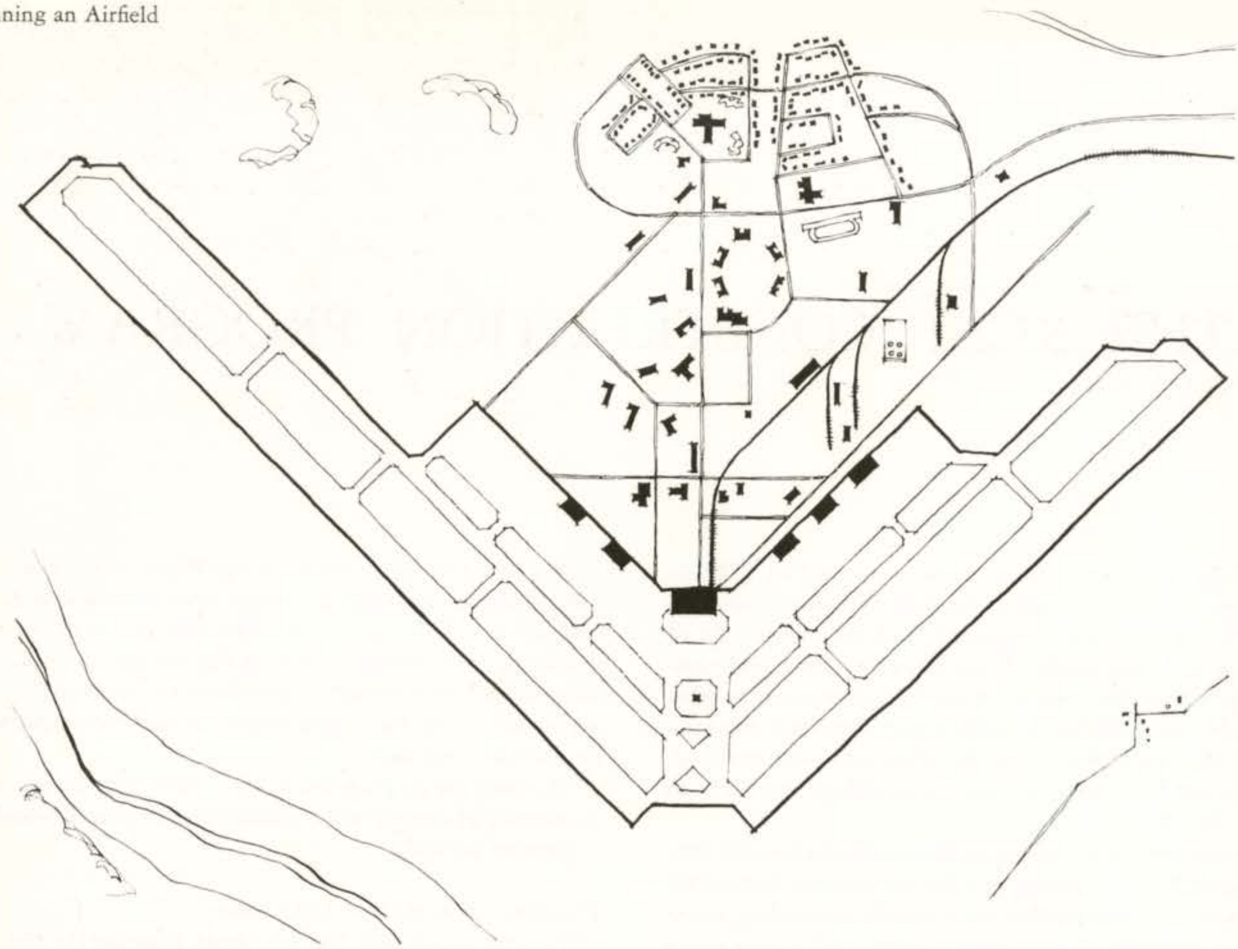
Planning an Airfield — Cold Lake

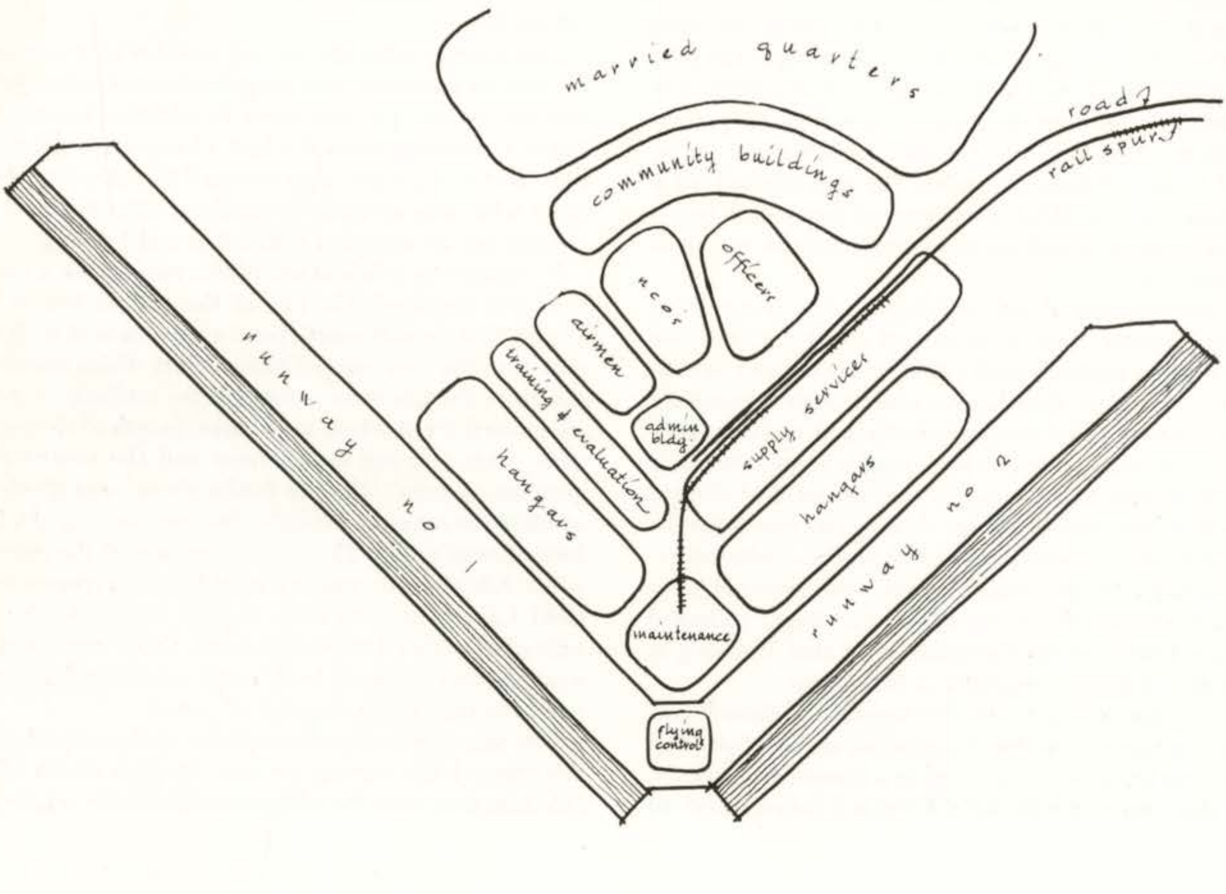
To best appreciate the problems inherent in the provision of accommodation for an air force, one should first consider a single air station. One site which is particularly suited to such a study is RCAF Station Cold Lake, for at this site, a complete air station has been built for a particular requirement where no construction of any kind existed before.

Immediately after the second world war, it was apparent that air armament was outgrowing existing range facilities for testing and evaluation. In addition, aircrew training was suffering from the lack of adequate range facilities. In consequence, a new area 115 miles long and 40 miles wide was set aside in northern Alberta and Saskatchewan for air weapons evaluation and training.

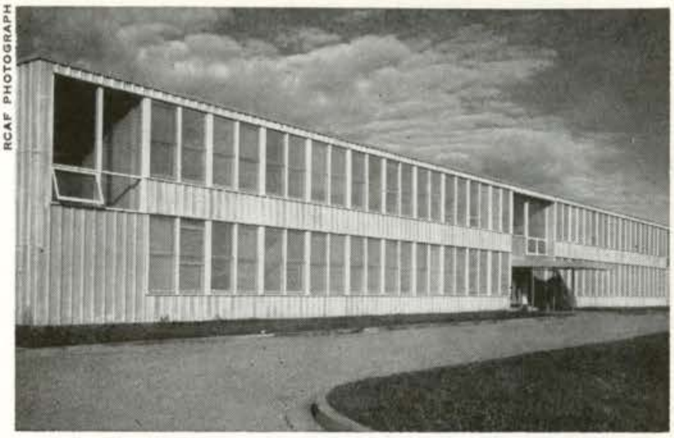
To ensure the efficient use of this range area, a new airfield was required. The site of the airfield had to be so chosen that aircraft could spend a maximum of their flying time over the new range. Other factors which affected the choice of the site were — topography and soil conditions, characteristics of winds in the area, length of runway possible, road and rail connections and the availability of granular material. The site finally chosen was 25 air miles south of the range and suitable for construction of a 10,000 foot runway within 15° of the direction of the prevailing wind. Additionally, rail and road facilities connecting the Cold Lake area with main supply centres to the south existed to within 4 miles of the site. Other attributes were a satisfactory supply of fresh water, excellent drainage and access to reasonable supplies of gravel.

The first step in the development of the airfield was the selection of the runway pattern. Factors which affected this selection were the characteristics of the winds in the




married quarters
community buildings
road
rail spur
officers
ncos
airmen
training & evaluation
admin bldg.
supply services
hangars
hangars
runway no 1
runway no 2
maintenance
flying control

NAT. DEF. PHOTOGRAPH



RCAF PHOTOGRAPH

Administration Building

Cold Lake

Airmen's Mess showing quarters buildings in background. Operating at full capacity, up to 2000 meals can be prepared in this building during one meal period. It was designed by the firm of Barott, Marshall, Montgomery and Merrett of Montreal.

area and of the aircraft which were to use the field. The remainder of the airfield was developed along purely functional lines with all buildings and services subjugated to the aim of the station. The accompanying sketch which shows the relationships of main areas, illustrates this point.

In this development the following points should be noted: (a) aircraft control is at the hub of the runways, (b) aircraft maintenance and servicing is directly opposite runways, (c) supply services with rail and road spurs back up the hangar lines, (d) training and evaluation buildings are placed as close to air operations as practicable, (e) station administration, personnel, personnel services and personnel dependents occupy the less important outside areas in that order. For reasons of security the exact site plan of the station cannot be reproduced here. However, the completion of the planning phase, the exact location of buildings, layout of roads and services and location of sewage disposal plant were all done in accordance with good town planning practice. There were, of course, some minor problems peculiar to the station. For example, each of the areas mentioned above was planned for considerable expansion. This expansion is designed to permit the station to grow without affecting its efficiency.

The Hangar Design Program

A major problem in any Air Force is housing its aircraft. This is so in any climate, but in Canada, where snow and ice can build up to weights of 90 lbs per square foot on roofs and full temperature range can exceed 140°, the problems of hangarage for aircraft are acute. Unlike some forms of transportation, aircraft designed thus far must be partially or wholly sheltered for maintenance. While some success may be achieved with partial enclosure such as nose hangars, only the fully enclosing hangar permits efficient maintenance.

Meeting the needs of ever-changing wing-spans and tail heights, of complete or partial aircraft maintenance, and of stand-by or immediate readiness, has been a continuous problem in planning and in construction. Since the war, three main hangar designs have been developed: the Readiness or Storage Hangar; the Cantilever or Maintenance Hangar; and the Alert Hangar. Changes made in aircraft design during the period these hangars were being developed resulted, in each case, in major changes to the hangar design.

The 160′ Span Arch Type Hangar

The Arch Type Hangar was the first post war design undertaken. The problem was housing, servicing and maintaining aircraft of all sizes and types then in service. In other words, although its use might be mainly in connection with servicing and maintenance of fighters it was expected to be adaptable to the needs of squadrons using multi-engined, large span aircraft.

This hangar which has a span of 160′ and length of 220′ was designed initially in concrete but, with the easing of the immediate post-war problem of obtaining steel, it was later re-designed using steel for the supporting arches.

The plan was intended to provide the degree of flexibility required. The basic hangar, which has full width door openings both ends, consists of the main floor area and small office annex and provides for storage, protection and servicing. Standard additions to this area have been planned to provide for maintenance and activities related to operations.

The Concrete Arch Hangar consists of a thin concrete shell spanning between reinforced concrete arched ribs. The thrust of the ribs is contained by means of arch buttresses supported on spread footings or piling depending upon soil conditions. On certain sites with marginal soil conditions; three 1¾″ dia. nickel steel adjustable tension bars were installed per pair of opposite arch abutments to prevent spreading of the arches and undesirable secondary stresses. The exterior finish is masonry and concrete while on the interior, demountable partitions are used where practicable.

Electrically operated rolling doors 30′ high or 40′ high with a maximum operating speed of 150 feet per minute are installed at each end of the hangar. To allow for the high tail sections of certain types of aircraft, a special tail aperture door giving a total clearance of 48′ has been provided.

The hangar is heated by means of a radiant heating system in the floor supplemented by an overhead hot air system which is interlocked with the doors and is adjusted to replace heat losses which occur when they are opened. Additionally, a separate hot water circulating system is used for snow melting at the doors.

Apart from the structural system, the steel alternative to the concrete arch hangar differs only in detail. This alternative consists of an asbestos cement roof-deck spanning between three-hinged steel arches which are carried down to buttresses at grade level. The actual span of the arches is 194′ though the clear floor width is 160′.

Standard Maintenance Hangar

Preliminary sketches of the RCAF cantilever type maintenance hangar were first made in the summer of 1948 and subsequently developed into working drawings in 1951.

The cantilever type hangar, which has now gained general acceptance by world air forces, has one big advantage. Expansion of the hangar in the direction of wing span of aircraft is theoretically unlimited. Thus, maintenance of the largest aircraft known today is practicable in these hangars since, even if tail sections are (or become) too high for entry, the main plane and engines will be under cover. Another advantage in these days of ever increasing hangar dimension, is the central location of workshops which is in the supporting structure of the cantilever arms. In the RCAF design this central section also accommodates related activities such as safety equipment, supply, armament and photographic sections.

The maintenance hangar consists of a central core of reinforced concrete beam and slab construction, which supports steel cantilever arms spanning out 150 feet on each side. Normally, these arms counter-balance each other but, if one were damaged or destroyed, a flexible tension tie anchorage, embedded in the concrete structure, would provide support for the opposite arm.

Doors are power operated overhead telescoping canopy type and have a clearance of 41 feet when fully opened. Additionally, the centre door of the set is 10′ higher to provide a total clearance in that section of 51 feet.

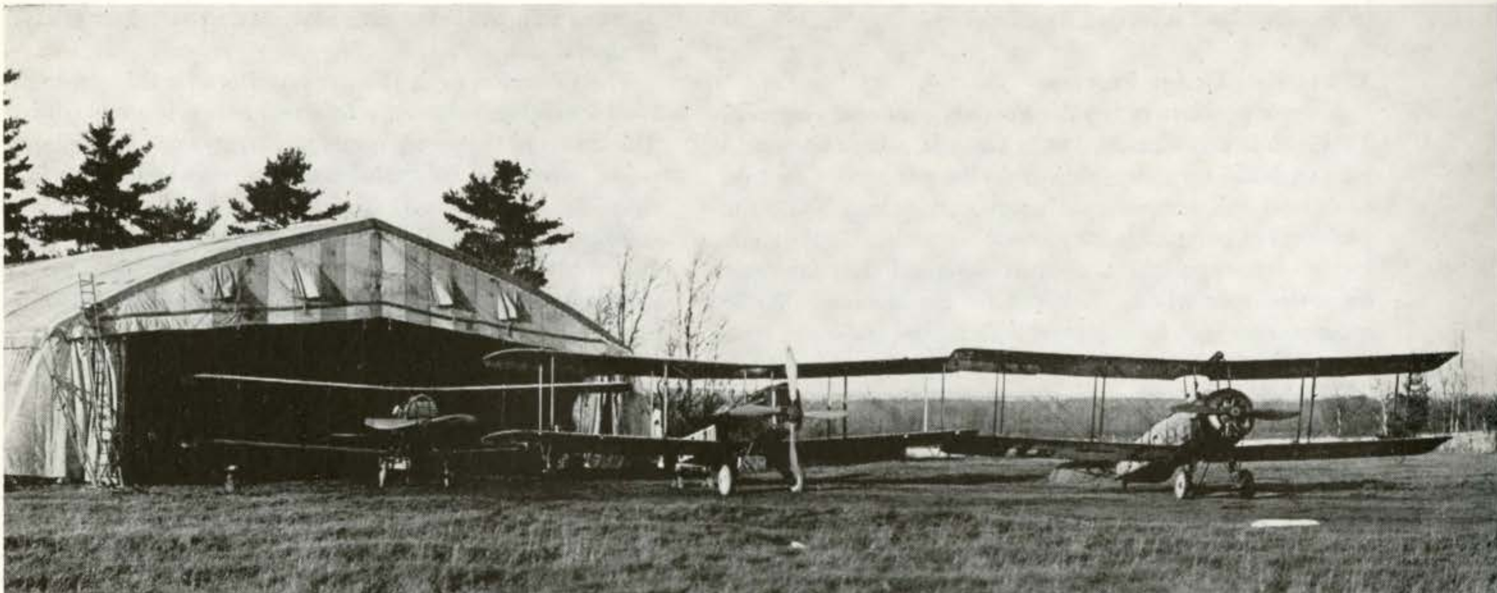
In the centre section, only the elevators, stairs, and toilet areas are fixed. To provide maximum flexibility, demountable partitions are used on an 8′ x 12′ module. Each modular division is fully serviced with light, heat, ventilation, fire protective system (sprinklers), power, and telephone outlets.

Radiant heating coils in the floors and a hot air system for rapid regain of temperature over the doors supply the heating needs of the maintenance area, while the central section has a warm air heating and ventilating system.

The need to protect each of the three main areas one from another, in case of fire; the high fire hazard presented by aircraft loaded with fuel, as well as their exceptionally high replacement cost, presented a fire protection problem which was one of the largest single design issues to be faced. This is a continuing problem and improvements are constantly being made. Present standards provide for rate of rise and manual alarm systems in the main hangar spaces with annunciator and control panels which relay alarms to the station firehall. Each hangar space also has a stand pipe system using hydroblenders and a deluge sprinkler system on the outside of the monolithic concrete dividing walls. The whole centre section is protected by a sprinkler system or, in the case of certain rooms such as inflammable stores or paint shops, by an automatic C02 flooding system. In addition all main sections are equipped with fire doors, exposed duct systems are protected with sprayed asbestos and automatic fire dampers, and all exposed steel has been coated with fire retardant paint. Studies have also been made on the use of foam deluge systems for the open (aircraft) areas and it is expected that this system will be installed in some existing hangars and in some future designs.

Hangars

The Bessanean type hangar, donated to Canada by the Royal Flying Corps after the first World War helps to illustrate the advancement in hangar requirements and design over the past quarter century.

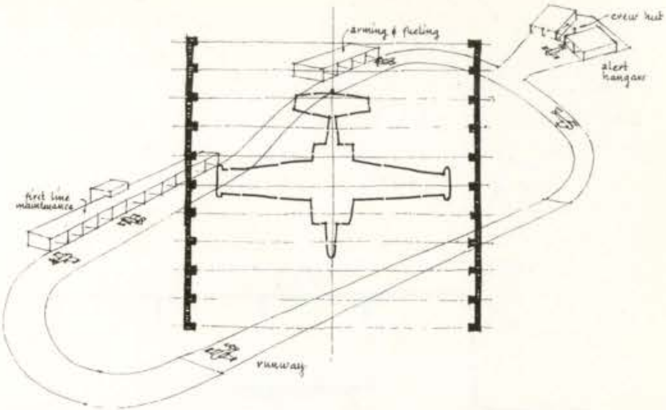


Alert Hangars

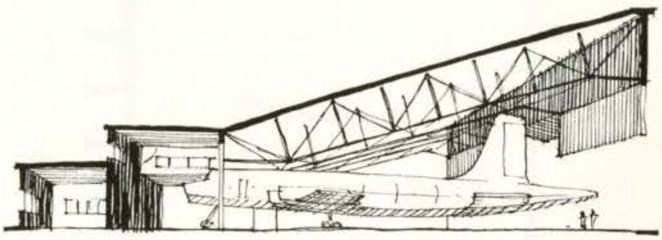
Alert Hangars represent a third category in RCAF Hangar development. The Alert Hangar is the operational hangar for fighter aircraft of the RCAF in Canada. The sole purpose of these hangars, along with the Alert Button Crew Building, is to provide shelter and protection to operational fighter aircraft, and their air and ground crews. The air and ground crews at the Alert Site are in constant readiness, and their aircraft must be airborne minutes after an alert has been sounded. Immediately these aircraft are alerted, additional aircraft and crews are brought into readiness from the main hangar area.

The major design consideration is that each aircraft must start engines and taxi out of its alert hangar to the take-off position under its own power, without loss of time. This requirement dictates that the full opening overhead doors be provided on each end of each hangar. Additionally, these doors must open in seconds.

Choice of fire resistant materials, design of blast baffles for protection of ground crews, provision of accommodation for air and ground crews, and provision of services for these buildings which are remotely sited near the ends of runways are other design considerations.



Alert Hangar



Sketch No. 1

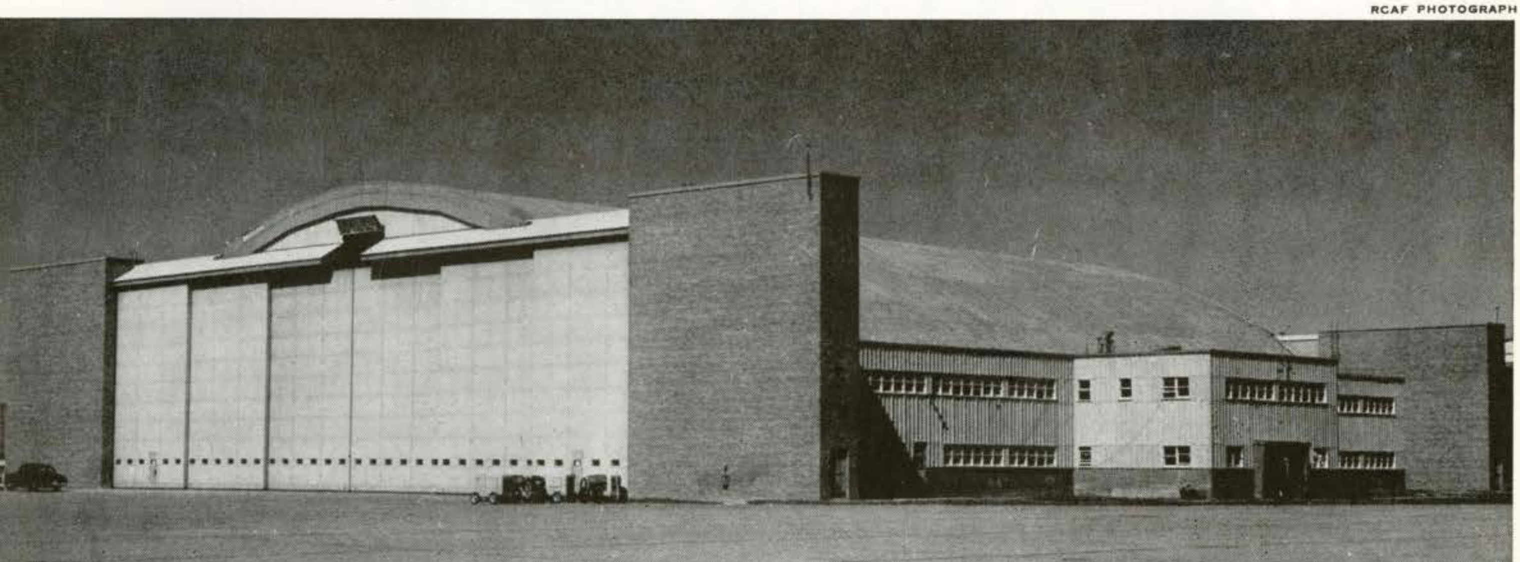
The Long Range Hangar Design Program

The cost of hangarage designed to meet multiple conditions is relatively high and new types of aircraft of greatly varying dimension, together with new readiness requirements, are adding to the problem. The policy of designing to meet all conditions in one or two designs is therefore being modified. Hangar designs are now being developed to meet specific requirements and to ensure that efficient servicing and maintenance are provided at minimum cost.

In keeping with this revised policy a design is currently

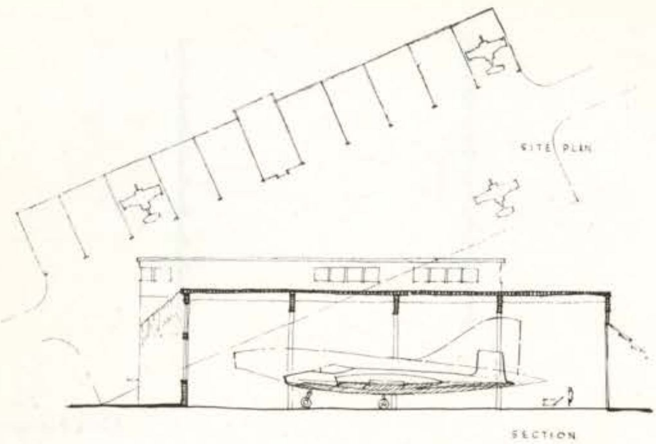
The 160′ span steel arch type hangar

RCAF PHOTOGRAPH



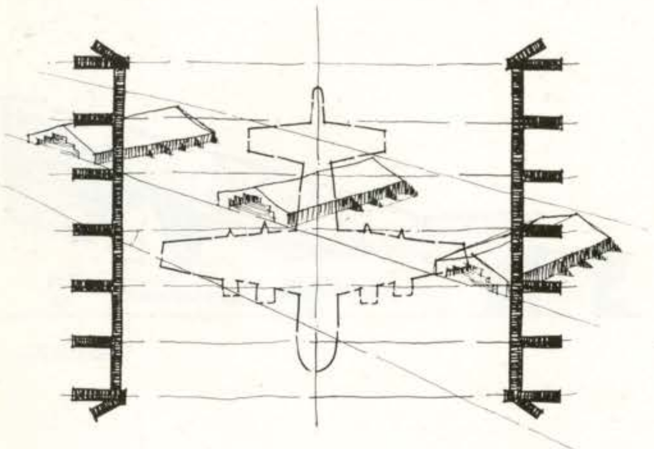
being completed on a hangar capable of housing long range multi-engine aircraft together with associated squadron facilities. This structure will consist of 8 bays and have total dimensions of 170 ft. by 1300 ft. Aircraft will be housed with the nose in and the roof will be sloped upward from back to front to accommodate the tail section. A typical section of this hangar is shown here in Sketch No. 1.

In addition to this design a fighter servicing hangar 100′ x 780′ is being developed. This hangar, being designed specifically for servicing of fighters, will have a comparatively low flat roof, limited servicing area, and no shops. The basic pattern of this hangar is illustrated in Sketch No. 2.



Sketch No. 2

Sketch No. 3 illustrates a further type of hangar currently being studied. This scheme envisages separate and displaced, low roofed enclosures for each multi-engine aircraft. In this design consideration is being given to designing the sidewalls both for the support of the roof and protection against blast.

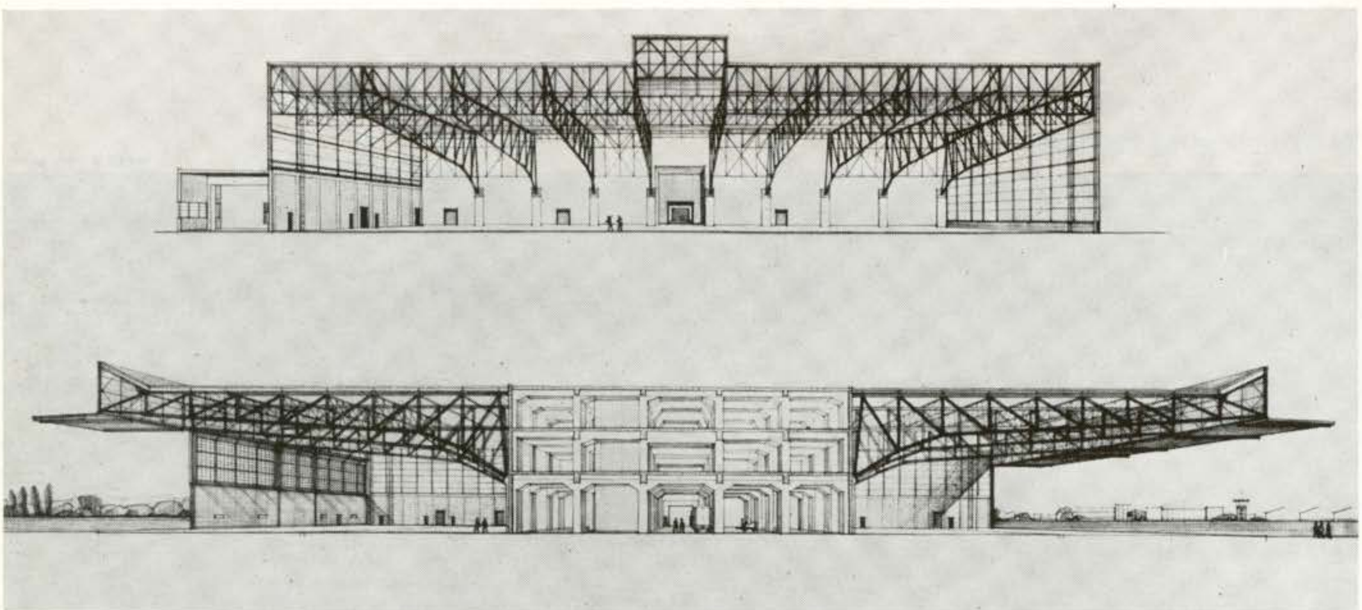

Sketch No. 3

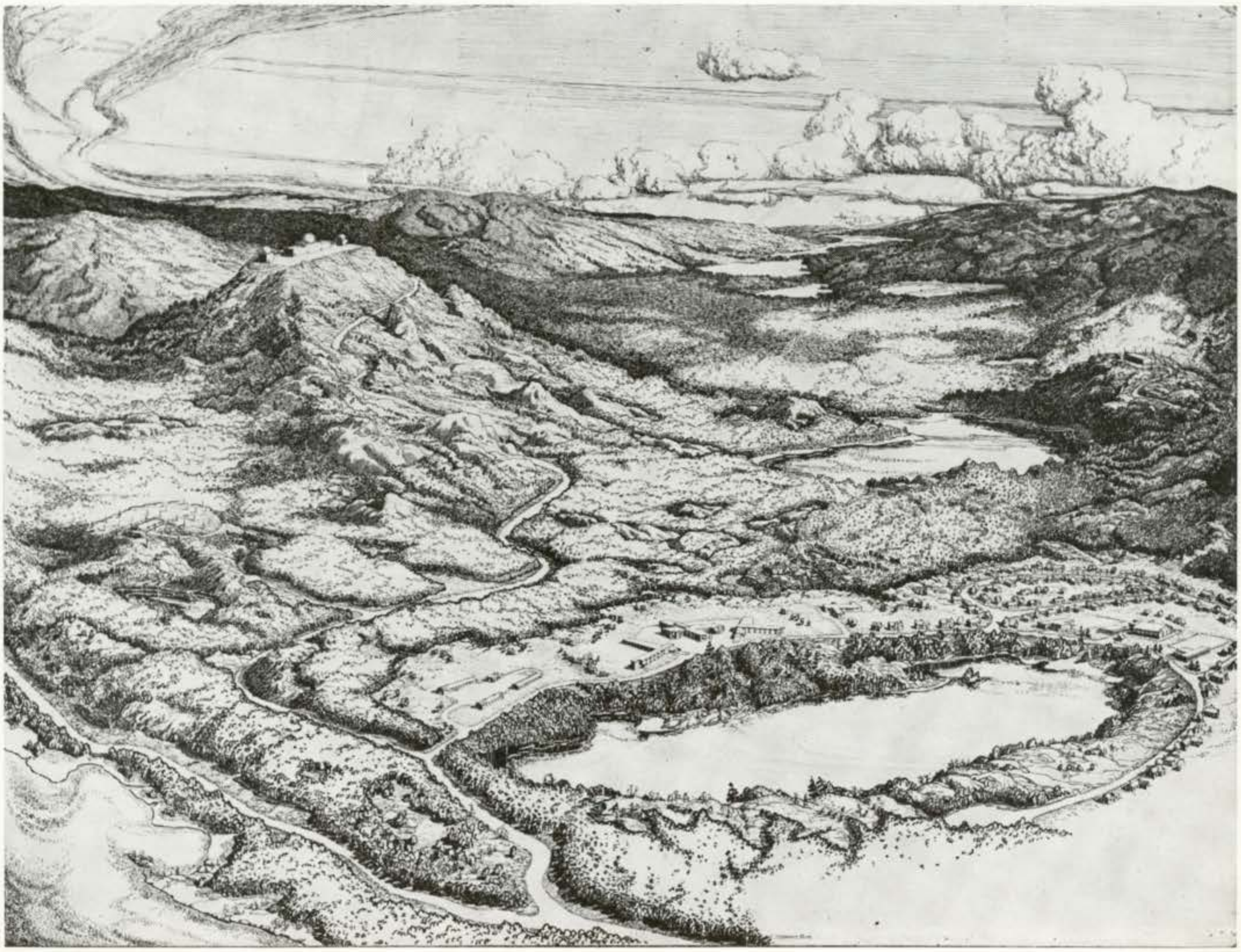
Designing hangars is a continuing process involving civil and service airlines, aircraft manufacturers, civilian architectural and engineering consultants and a host of user groups. Co-operation has been essential to the success of the hangar program and has been given by all of these groups.

Early Warning Systems

While most of the details of the Pine Tree and Mid-Canada radar warning lines must remain secret, the factors which have affected the construction of these lines and the general conduct of their construction can be discussed and may be of interest to the reader.

When the international situation deteriorated in 1948 readiness target dates were set for the establishment of a


Standard Maintenance Hangar and Workshops

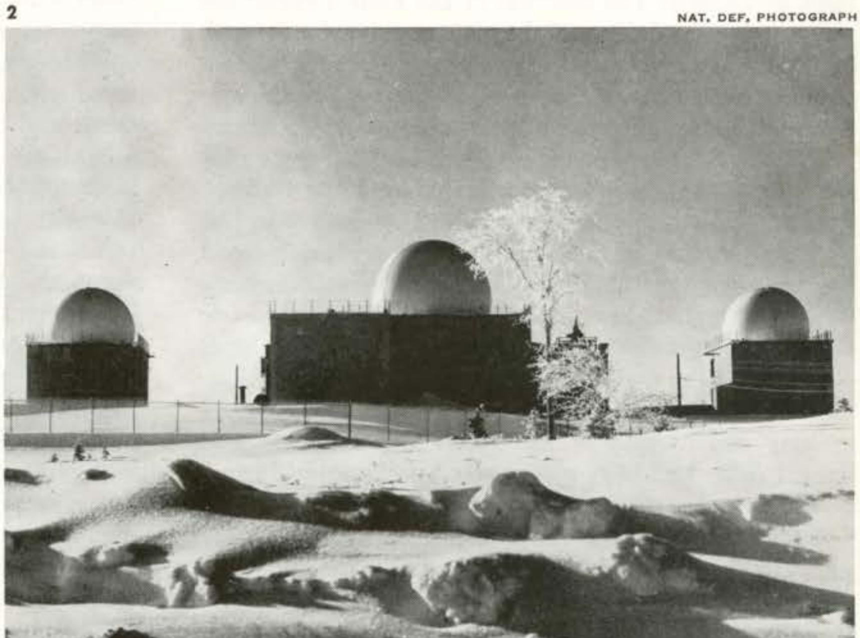


1

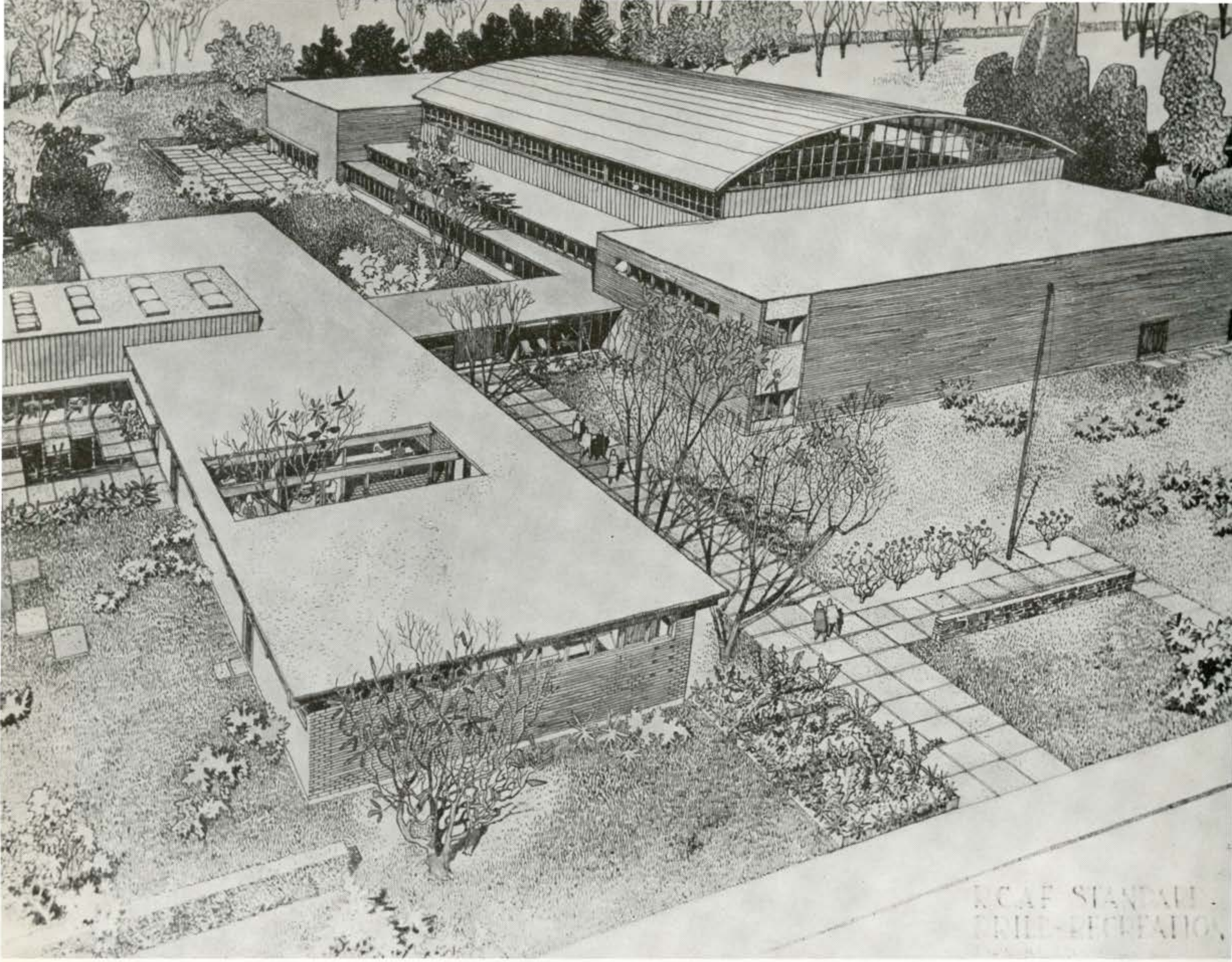
1) *The accompanying pen and ink sketch of a typical radar site (by an RCAF Warrant Officer) illustrates better than words the nature of some of the problems that were faced when the Pine Tree Chain was constructed. The scene shows the main camp site in the foreground with married quarters slightly separated and to the right. On hill tops to right and left of the base camp are the receiver and transmitter installations while, on the highest point in the background, the main radar tower installation can be seen.*

2

NAT. DEF. PHOTOGRAPH



2) *Exterior view of typical radar tower installation on the Pine Tree Chain.*



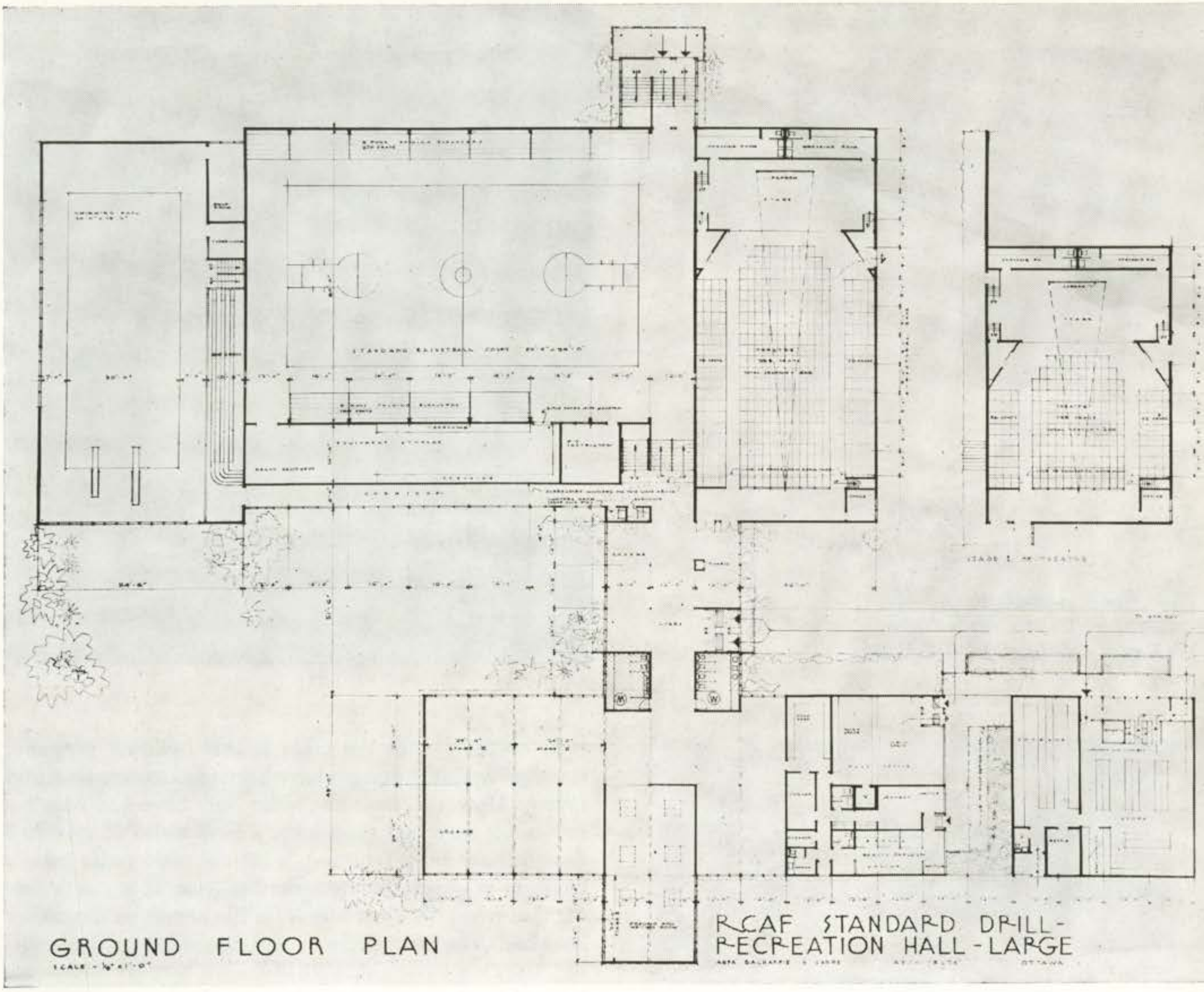
Drill and Recreation Halls

number of radar detection and aircraft control installations in Canada. The function of the early installations was to aid in the defence of the main populated areas and, accordingly, the manufacturing centres. More recent construction will increase the effective coverage of the systems to include all Northern approaches to the Continent.

Planning for this type of facility had been going on for some time and the research knowledge of the Defence Research Board, the facilities of the Department of Defence Production, of Defence Construction Limited and the experience of the Trans-Canada Telephone Systems were all brought to bear on the problem. Some of the basic decisions to be made were: the selection of a type or types of radar and the commencement of production, establishment of logistic support, selection of sites for stations, recruiting and training of manpower, and the design of special radar buildings and towers and associated camp buildings and services.

Some of the construction problems studied during the planning stage have been whether to design for long range or only immediate needs, for permanent or temporary construction. Other considerations were anti-sabotage devices, blackout devices, whether windows were necessary at all; and all the problem implicit in material shortages.

The solutions to each of these problems and to hosts of lesser ones were based firstly, on meeting the readiness target dates and secondly, on normal architectural and engineering practices. Because of this urgency, many unusual steps have been taken. While field parties of electronic and construction specialists have surveyed sites in accordance with the operational requirement, and have made topographical surveys and soil load tests, Air Force electronic and operational specialists resolved the earlier mentioned basic problems and detailed the basic building requirements to the civilian design consultants. This has been done by an almost continuous series of meetings between the parties concerned. In addition, Air Force liaison officers, specialists in particular fields, plus an overall project officer, have made repeated visits to the consultant offices to discuss problems and make decisions directly with individual designers. Coincident with this, construction contractors were selected and were moving men, equipment and basic construction materials on to the sites. While awaiting first plans, base camps and access roads were constructed. At some sites, this method saved many months.



NAT. DEF. PHOTOGRAPH

Standard Drill and Recreation Halls

Architects, Abra & Balharrie

Interior of the Protestant chapel looking towards the entrance — Cold Lake.

NAT. DEF. PHOTOGRAPH

1) *View of small recreation hall for radio sites showing grocery store and Post Office.*
2) *The Roman Catholic chapel — Cold Lake.*

1

2

RCAF PHOTOGRAPH

In common with the main RCAF building program, standard building designs have been used to save time and money. However, since the radar lines have had requirements not matched elsewhere, a new series of standard designs have been required. Even the main radar towers conform in general to a standard pattern. It is worth noting that when the foundations for the towers on the earlier lines had to be poured, the overall dimensions of the building, and even its height, were unknown because final selections of equipment had not been made.

Only the closest day to day liaison between consultant, manufacturer, RCAF specialist officer and other government agencies made the eventual completion and present operation of these lines a success.

Recreational and Community Buildings

Recreation in the RCAF includes sports, social activities, arts, crafts, music, and hobbies of all kinds and is aimed at development of personality as well as of physique. The recreation program is designed for the whole RCAF community and includes personnel dependents as well as members of the force.

To increase the effectiveness of this program and to provide certain other essential community services, a number of special buildings have been designed. These include the Drill and Recreation Halls, the canteen building and the ice skating rinks. The most interesting and complex of these buildings are the Drill and Recreation Halls designed for the RCAF by the firm of Abra & Balharrie of Ottawa.

There are three different drill and recreation hall designs, each one planned for a different type of station. The most important condition governing the planning was the requirement for maximum flexibility to meet the changes and fluctuations of a growing air force. The principal components of the drill and recreation halls are the gymnasium, the theatre and the swimming pool. Next in importance are the lunch bar, lounge, games rooms, bowling alleys, rifle range and hobby shops. Beauty parlour, barber shop, post office and grocery store complete the community group.

The problem was to combine these components in such a way that certain of them could be expanded or omitted without destroying the harmony or function of the remainder. For example, at a station located near a large town the building could be built without grocery store or swimming pool and with a small theatre, while at an isolated station all of these facilities might be required. In other circumstances it might be desirable to build the gymnasium only and add other components as the role and size of the station changes.

The plans of the large drill and recreation hall together with photographs of some portions are shown here.

It will be noted that the type of plan chosen is particularly suited to construction on rugged sites such as those found on the Pine Tree line. The floor levels of the various elements of the building can be altered to suit almost any site with only minor changes in the basic plan.

The construction of the main gymnasium utilizes glue-laminated structure while steel is used in the pool and theatre. The use of glue-laminated construction provided some relief from the then existing steel shortage. Where steel was used, the design called for bolted connections to simplify erection problems on isolated sites.

Canadian Joint Staff Building Washington, U.S.A.

Architects, Marani & Morris

DAVIS STUDIO

Erected in 1952, this building houses the various offices of the Canadian Joint Staff and Department of Defence Production in Washington and is representative of the special designs which the RCAF requires from time to time.

Special requirements of this building included provision for future expansion and an atomic bomb shelter to provide working facilities for key personnel in an emergency. Other considerations were: an adequate security system, parking and traffic control for 75 vehicles on a restricted site, driver service, and full air-conditioning. In addition, zoning, height requirements, and harmony with other embassy buildings in the area, required study.

The building has a reinforced concrete frame and is faced with Indiana Lime stone with brick back-up and plaster finish. Interior partitions, excepting those around lavatories, stairwells and main divisions, are moveable. Underfloor ducts are used to carry telephone, signal, fire alarm and power lines.

DEFENCE RESEARCH BOARD

THE DEFENCE RESEARCH BOARD was organized after the Second World War to serve as what has been described as a "Fourth Service" of National Defence; its purpose is to provide the stimulation and co-ordination of military research and development which has become a necessity of modern defence planning.

Since its inception, DRB has conducted a considerable programme of laboratory construction. Some of it represents new requirements and some, replacement of temporary wartime accommodation.

Although the various laboratories are located from coast to coast and cover all major fields of science, it is interesting to note that none of them is redundant to facilities elsewhere. Similarly, their programme of work does not duplicate anything which can be done under civilian auspices. In addition to the laboratory construction programme, the Defence Research Board has been involved in one job of town planning to provide housing for the staff and families of its Suffield Experimental Station in Alberta. The problem here is similar in its physical aspects to the married quarters communities of the Armed Services, except that the civilian status of the staff and their employment conditions present a different problem of management.

Of the nine field establishments operated by the Defence Research Board, the Pacific Naval Laboratory, located within the boundaries of HMC Dockyard, Esquimalt, B.C., and the Defence Research Medical Laboratories, located at Downsview Airport, Toronto, have been selected as representative examples of recently completed Defence Research Board construction projects.

Pacific Naval Laboratory, Esquimalt, B.C.

Because it was to specialize in naval research, the Pacific Naval Laboratory was to occupy one of two sites made available in HMC Dockyard at Esquimalt, B.C. A rocky promontory, near the Dockyard entrance and jutting into the Strait of Juan de Fuca, was chosen as the location provided for future possible expansion.

The building houses laboratory facilities for research capable of employing all the sciences including physics, the chemistries, electronics, metallurgy and special facilities for corrosion studies. Included also are fully equipped machine shops and woodworking and electrical maintenance shops. A "heavy laboratory" for general use, equipped with an 85,000 gallon sea water tank, forms a separate wing.

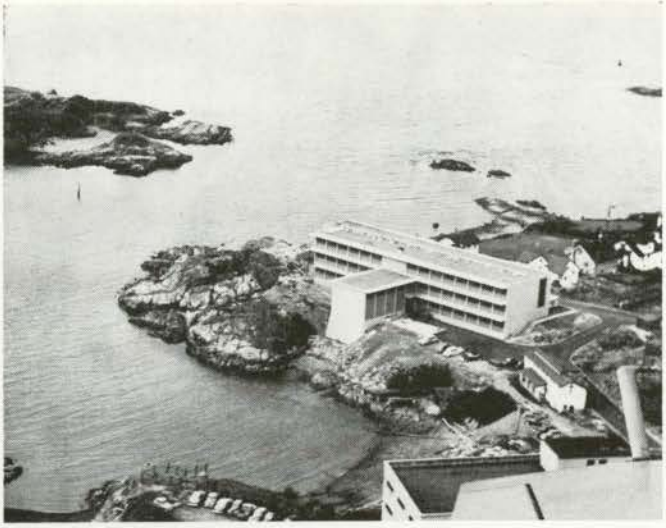
The basic planning started with the facilities required for a research scientist. Because he would need a specific working area and a bench as a precisely defined minimum working station, this predicated a single standard laboratory work bench. From this basic unit was established a planning module which governed all furniture, layout and structural necessities. The basic unit, common throughout, was designed to serve both physics and chemistry needs with size, equipment, furniture, layout and services varying as required for the overall programme.

The structure itself is a simple reinforced concrete building employing tile and joist floor and roof slabs with pumice tile to reduce dead loads. The slabs span between spandrel and flat beams at the corridor columns. The joists are spaced to straddle the exterior columns and the last filler tile is omitted. This permits vertical movement of all services through removable pipe chases at every exterior column. A "split" beam is employed at the corridor columns – again to allow vertical risers between the two widths of the corridor wall.

A basic premise of the design was to ensure complete flexibility within the laboratory areas. This was accomplished by adhering rigidly to the basic module. Partitions are made of an easily-movable wood design. All services rise through the building at the column pipe chases and are then carried exposed on the laboratory walls. Floor finishes are continuous in linoleum and lighting is standard bay by bay with incandescent fixtures to limit electronic interference.

The basic module is also observed in the design of the services. Hot, cold and salt water, steam, vacuum and compressed air are distributed throughout. Each line is provided with a capped tee at every modular point so that it may be tapped at any working station desired. These services are carried on the walls below work bench height and the electrical services are carried immediately above bench height.

Furniture was especially designed on the basic module and included in the building contract. Bench units provide for the various functions in all laboratories as well as for special purposes and all units are easily interchangeable with one another. All the laboratory sinks, for example, are



Pacific Naval Laboratory
Esquimalt, British Columbia

Architects, Thompson, Berwick, Pratt

Structural Engineers, Swan, Wooster & Partners
Electrical and Mechanical Engineers,
Sandwell & Co. Ltd.
General Contractors, Luney Bros. & Hamilton

free standing in their own cabinets. Hence, they may be moved from one location to another by connecting to the tees provided throughout the building and capping off those previously employed. A laboratory may, therefore, be changed from one science to another, enlarged or decreased in size and, in addition, may be equipped with furniture and services as desired.

The electrical system is particularly noteworthy. This sub-contract amounting to some 26 per cent of the entire building contract. The basic power supply is via three 200 K.V.A. and two 50 K.V.A. transformers, a 115 cell storage battery and a 3 unit, 25 H.P. 208 Volt motor generator unit. This provides for normal lighting and power requirements as well as abnormal laboratory power demands. Since a modern naval vessel depends to a great extent on direct current, the laboratory is serviced with an extensive DC distribution system as well as the usual AC system.

Working stations are provided with electrical power distribution boxes from which are available five different standard voltages with AC or DC current. In addition, each floor is equipped with a special plug-in panel which allows the connection of either AC or DC voltage to distribution boxes by means of rheostat controls and plug cords.

The building contains five dark rooms to accommodate the laboratory's extensive use of microfilm and motion picture recording techniques. These rooms are completely equipped with automatic processing machines and stainless steel fixtures.

The woodworking machine and electrical repair shops previously referred to enable the staff to manufacture almost any experimental device required. Facilities include also the usual cranes, monorails and freight elevators.

In general, the Pacific Naval Laboratory fulfills its original basic conception – a building to house unusually complex research facilities in the most efficient, flexible manner possible. Throughout the project, the Superintendent

and staff worked closely with the consulting engineers. The result was the achievement of a successful design through carefully defined requirements and painstaking attention to design details.

Defence Research Medical Laboratories (DRML), Downsview, Ontario

The Defence Research Medical Laboratories were built to provide composite laboratories for all the services to study man and his needs in a military environment. DRML'S facilities include an Aero Medical Wing which is concerned with high level testing and survival; a combined Physiology and Psychology Section for studies relating to environment conditions and human engineering generally; an Animal Colony housed in a closely-controlled environment free of bacteria for the animals required for research; a Food Research Section for the evaluation and packaging of foods acceptable by the services; general offices and accommodation including storage and shops; garages and a pump house in separate buildings and a guard house for gates and security control.

The construction problem to be solved was more complex than that of a normal laboratory. Though called a medical laboratory, the portion of the programme devoted to medical research represents a relatively small proportion of the whole. Moreover, many different types of laboratories, each with its own special requirements and each serving all three services independently or in conjunction with the others, had to be incorporated into one homogeneous design. A design was necessary that would permit each department to be expanded by at least 50 per cent without dislocation of existing accommodation, if necessary.

DRML comprises a two-storey main building 370 feet by 50 feet and two two-storey wings 100 feet by 40 feet and 60 feet by 80 feet respectively. The one-storey Animal Colony is connected to the main building by means of a basement-level corridor. The latter will become part of the new two-storey wing measuring 120 feet by 40 feet now in the planning stage.

Because of the likelihood of programme changes complete flexibility within the building was considered essential and has been provided.

The plan is based on a 10 foot module and the reinforced

Pacific Naval Laboratory showing separate wing with 85,000 gal. sea water tank

concrete structure, including roof and floor slabs, is in 20 foot bays. Exterior walls are faced with lightly textured buff brick. The height of the buildings is determined by the proximity to nearby RCAF jet landing strips. Glass areas are limited by the possibility of future bombing and a desire to avoid glare within the individual laboratories.

In general, window and door frames and sash are of wood. In the entrance area they are steel. Within the building, masonry walls are used and finished structural tile or glazed tile veneers in the stair halls, motion sickness room and washrooms. Generally, partitions are of asbestos cement board and are either moveable or semi-moveable.

Insofar as the mechanical and electrical services are concerned, flexibility is achieved by means of a continuous service corridor below the ground floor; by provision for vertical service risers at 10 foot centres with access from corridors; by a method of supporting branch services within the laboratory furniture rather than in the partitions and by a continuous penthouse to accommodate ventilation equipment. The latter comprises Venturi type stacks at frequent intervals. The penthouse provides also for easy access to and maintenance of motors and fans. The ventilation stacks discharge all objectionable gases where they can do no harm.

Lighting flexibility is assisted by a bus duct with knockout panels in the basement service corridor. Wiring generally provides for maximum future requirements in lighting intensity and equipment so that fixtures and equipment can be relocated to suit varying laboratory requirements with a minimum of inconvenience.

Heat is supplied from a central steam plant outside the property with convertors in the mechanical room located in the basement area for hot water heating with convectors, ventilation and air conditioning facilities. Ventilation generally is achieved by a treated fresh air supply through anemostats in corridor ceilings. This pressurizes the corridors from which a proportion of treated air passes through the office and laboratory grilles. Air is exhausted from the offices and laboratories – in the latter, chiefly through fume hoods.

The guard house with a decorative fence, controlled main gates for security purposes and a sign were so designed as to add attractiveness to the establishment.

The motion sickness laboratory, extending through two floors, accommodates equipment which simulates motions encountered in aircraft and other conveyances.

The climatic chambers, not yet fully equipped, are designed to simulate varying weather conditions from tropical to polar temperatures ranging from 160° F to minus 70°. The decompression chamber permits testing under high atmospheric conditions.

The sonics chambers will be located in the basement of the wing now in the planning stage. In this area, reactions to jet motor noises will be studied.

The textile laboratory has been designed for a high degree of temperature and humidity control.

Almost all the furnishings, including those in the laboratories, were designed by the architects. In addition, all landscaping, driveways and fences were integrated with the design.

Shop facilities include woodwork and machine shops, welding, painting and equipment to assist scientists in all departments to construct mock-ups and testing apparatus for experiments.

The shielded room provides complete insolation from electrical influences. This condition is established by an unbroken metallic shell at the floor, ceiling, walls, ventilators, lights and receptacles, and forms a continuous hollow cube grounded to earth and water.

It is obvious that the complexities of designing the laboratories required the utmost co-operation between the scientists concerned and the architects and engineers.

HUGH ROBERTSON–PANDA

View of entrance foyer

HUGH ROBERTSON–PANDA

General view

MAX FLEET

Motion sickness room

Defence Research Medical Laboratories (DRML)
Downsview, Ontario

Architects, Gordon S. Adamson & Associates

Consulting Engineers, R. P. Allsop & Associates Ltd.
General Contractors, Pigott Construction Co. Ltd.

VIEWPOINT

Do you feel that architectural services rendered on less than a complete service basis have a bad effect on a large volume of building, e.g. apartments, and do you believe that by taking a firm stand within its membership, the profession can correct this situation to an appreciable extent?

There can be no question that buildings generally must suffer when the full skill, knowledge and advice of an architect are not used. Complete services should be rendered, if at all possible, to protect the investment of the client, to ensure the satisfaction of the occupant and further prevent the architect and his profession from becoming the victim of adverse public criticism.

The topic in question cannot be settled simply with a wave of the hand, however, for our fee structure and conditions of engagement are such that partial services are permitted and, as long as this condition exists, the partial services arrangement will be used. Further, such services have a definite appeal to the owner-builder clientele. An apartment building, in many instances, falls into this category. The client, and in this case, the builder, sees no justification for employing the full services available. He may wish full services when building to hold as an investment, but building for sale is another matter.

In the opinion of the writer we might improve the present situation by enforcing minimum partial services on this type of building.

Langton G. Baker, Toronto

Partial services of an architect are being increasingly sought by owners and package dealers. The result of this practice is very unsatisfactory, as the architect is unable to control the project to completion or to see the detail of his design properly executed.

In the majority of these cases the architect's services call for scale working drawings only. The checking of shop drawings, large scale and full size details are not included, and are left to the sub-contractor to produce. Therefore, the original purpose of the architect's services and creative ability is not fully utilized as it limits his scope in selection of proper materials, coordination of finishes and color schemes.

This unethical practice is detrimental to the profession, reduces fees, and jeopardizes the prestige to which an architect is justly entitled. However, I believe that if a firm stand is taken, the situation can be considerably corrected.

A. G. Facey, Toronto

If the architect is one who determines building design from a conscientious study of the client's needs, then partial services must necessarily produce incomplete, and therefore, bad design. This will have a bad effect on a large volume of architects.

As the illusion of partial services is pursued we will see a decline in the status of the architect as a professional person. Our skills and our training will be called upon to a lesser degree, and our historic provinces will be invaded and overrun. We need only to look backward to the dark era of 1890 to 1920, if precedent is wanted. The brilliant Chicago school collapsed, defeated by the Academicians, and there followed those impoverished years when service was so partial that nothing mattered behind the main facade.

Corinthian, Victorian or windowall, the passion for style can be satisfied by the delineator with his copy book, or with his manufacturer's catalogue.

Technical, initiative has passed from the architect into the hands of industry. Through volume selling and mass advertising media, the consumer is now informed, and he looks more to industry as guarantor of building performance, relying less upon the architect. While the mysteries of craftsmanship are of dwindling importance, the architect must inevitably lose his position as arbiter in technical matters. By accepting the principle of partial service, the profession would fail to recognize the new conditions of practice, ushering in its own executioner.

Does partial service have a bad effect on a large volume of building? My answer: probably not a worse effect than no service at all – but surely this isn't the point, is it?

Robert Fairfield, Toronto

My answer for the first part of this question is emphatically "yes" for the reasons that a design to have completeness, unity and consistency must be followed through by the architect from the first idea to the last door knob. This is especially true in a time when much fresh thinking is necessary to derive forms and details in keeping with new ways of building. It is unfortunate but true that the contractor representing the building industry and the client representing the general public are often not entirely in step with such thinking and a design can suffer grievous harm if not piloted throughout by the architect.

The answer to the second part of the question is harder. I would like to say "yes" but find myself wondering what is really meant by "a firm stand within its membership." It would be good if that were enough but I cannot feel that it is.

Hart Massey, Ottawa

The idea that every building could be accomplished on a complete service basis by architects, as a means of ensuring good buildings, is an unrealistic dream.

In a competitive world, the best results and the most good from the combined talents of architects can only be achieved by making the best of every situation, where they are asked to contribute, no matter to what degree.

By their deeds they shall be known, and if they are good, it is likely that architects will be called on to contribute to a greater degree in the future.

Compelling complete architectural services, however beneficial they might be, will only drive an ever increasing number to purchase partial services from the underground mart with a damaging effect on both the profession and the resulting buildings.

Paul Meschino, Toronto

Architectural service rendered on less than a complete service basis has an adverse effect upon the quality of the building, the reputation of the architect and the ultimate financial stability of the project. Conversely, I am certain that an ever increasing number of clients are being reached through the provision of partial service and are being converted in time to the benefits of more and often full service. I do not believe that the profession is capable of taking a firm stand within its membership in any matter connected with fees or service unless policed by a registration board suddenly emerged from an Orwell novel.

George A. Robb, Toronto

NEWS FROM THE INSTITUTE

ONTARIO

The post-war years have brought forward some most startling developments in the fields of science, design and technology. In these various fields, not the least of which is our own architectural profession, the products of architecture have been startling and interesting in the eyes of the public; and amazing in the complications which have arisen in the process of construction.

Since 1945, the technological developments of raw materials, new procedures, and new concepts of honest design, have resulted in one of the most astounding periods of experimentation in building construction since the Byzantine period. The expression of the structural fabric of the building and the obsession for the startling effect apparently have now become the basis of all design.

The results certainly have had the desired effect on the general public through, not only appearance on location, but also through the medium of national publications, both professional and non-professional. The colourful illustrations and well-written descriptions of "the Most Modern Building in America" have influenced all who have observed and read. The profession has not been one of the least affected, and it is observed that modern building design is developing structures which must necessarily expose or declare structural systems, then close the interstices by means of attractive patterns of glass, mullions and colourful and interesting panels of various impervious materials.

However, design achievements have not been accomplished without considerable distress among all concerned directly with the building. Unlike the time before this era of "skin and bones", the owners are as much, or more, in distress than the architects and builders, for no longer has it been a matter of working out and rectifying detail problems on the job, but has rather developed into a general failure in the exterior protective fundamentals of building design. That most distressing phrase of the owner, "It leaks", has become a too evident description of the protective qualities of buildings.

Hurriedly brought into the scene, an individual whose position a few years ago in building construction was very much in doubt, but whose advice is now anxiously awaited, is the caulking man; the hole-plugger. The man who manufactures the stuff that is put in the caulking gun has become in many cases, a very important figure in the conferences which take place between client, contractor and architect; a fourth member of the team of building construction. The requirements which he is requested to meet, is to supply material which is impervious to the elements, ageless, permanently plastic and guaranteed to hold out moisture, and thereby overcome the difficulties confronting the unfortunates.

The last individual in the field of caulking, and held in high esteem, was the expert, provided with oakum, pitch and a caulking tool, employed to stop up the seams of wooden sailing ships. Evidently, ship design has progressed; for ships do not leak, even without the services of the caulker.

Building structure design too, had progressed quite admirably, until recently, from the viewpoint of weathering preventatives and attention to the problems of combatting the elements. The detailing of weather stops, water bars, checks, wind stops, etc. had become standards, acceptable to all involved in the business of construction. Suddenly, however, in our world of the modern and impervious, where chemistry overcomes all, weather ceased to exist, and therefore disregarded by a profession formerly dedicated to provide reasonable shelter.

It would appear most advisable, then that more concern be attached to the fundamentals of shelter design, and that the band wagon might be allowed to pass with as light a load of occupants as possible. If the bones are to be knitted satisfactorily to the skin and muscle, the cartilage becomes a most essential component, worthy of more exacting consideration than a substituted mucilage.

Arthur B. Scott, Welland

OBITUARY

S. S. Van Raalte died April 3rd, 1956, in his 75th year at his home in Toronto. He was born in London, England, and was educated there, graduating with honours from the London Polytechnic. After graduation he practised his trades in carpentry and cabinet work and was employed for a time with Sages of London. In 1905, in his early twenties, he came to Canada and a short time later became a building contractor. In 1909, he started with the firm of Horwood and White where he later became Chief Draughtsman. Along with architectural practice he was competent in structural and mechanical engineering.

In 1936, he became a partner in the firm of Horwood and White from which he retired in 1950, although he acted in an advisory capacity to the time of his death. During the second world war he served at Ajax. He was keenly interested in trying to stop the waste of essential materials and, in consequence, he was appointed the representative of the Ontario Association of Architects on the Model Plumbing Code for Ontario, and was a member of the Committee at the time of his death. He was also a member of the C.S.A.

Van loved the great outdoors where he enjoyed fishing, camping, and travelling but he never forgot his early trade and spent many happy hours with his tools in his own woodworking shop.

E. C. Horwood

CORRESPONDENCE

The Royal Victorian Institute of Architects,
53-55 Collins Place,
Melbourne C.1, Australia.

Dear Mr Carroll,

Melbourne, Australia's second city, is making full-scale preparations to carry out its role as host to the 1956 Olympic Games which will be held from 22nd November to 8th December.

Between 5,000 and 6,000 of the world's best athletes, champions of up to 80 nations, will gather in Melbourne to compete in hundreds of events in 16 branches of sport.

It is anticipated that another 8,000 to 10,000 visitors are likely to come from overseas' countries to watch the Games.

Melbourne realises its responsibility to ensure that visitors will enjoy their brief sojourn here. The matter of accommodation is one which is receiving special attention. As may be expected, hotels will be unable to cope with the abnormal influx of visitors but the citizens of Melbourne have provided the solution by throwing open their homes to people from other countries.

The members of the Royal Victorian Institute of Architects would be delighted to welcome as guests in their homes any members of the Royal Architectural Institute of Canada and their wives and friends for the duration of the Games. It is very much hoped that some of your members will be able to avail themselves of this opportunity and we shall look forward with great pleasure to hearing from any who may be considering the possibility of coming to the Games.

With greetings and best wishes,

Yours sincerely,
John B. Islip, Secretary

The Secretary,
The Royal Architectural Institute of Canada.

RAIC COMMITTEES, 1956-1957

Executive Committee

President	Douglas E. Kertland
Honorary Treasurer	Maurice Payette
Honorary Secretary	Harland Steele

Victor J. Blackwell, John Bland, F. Bruce Brown, A. J. Hazelgrove, H. Gordon Hughes, R. Schofield Morris, A. J. C. Paine, W. Bruce Riddell, Earle L. Sheppard, Hugh P. Sheppard, Leonard E. Shore.

Chairmen of Standing Committees

Architectural Education	H. H. G. Moody
Scholarships	B. R. Coon
Building Research	V. P. Belcourt
Professional Usage	D. E. Kertland
Duty on Plans Committee	L. E. Shore
Exhibitions and Awards	J. Lovatt Davies
Legal Documents	Harland Steele
Public Information	R. C. Betts
Journal Committee	F. Bruce Brown
Editorial Board	E. C. Morgan
Canadian Arts Council	John C. Parkin
Representative on Advisory Building Research NRC	J. Cecil McDougall
Representative on Technical Council of Canadian Standards Association	W. H. Gilleland Toronto Alternate, A. G. Facey Montreal Alternate, Robert Montgomery
Representative on National Construction Council	A. S. Mathers

Presidents of Provincial Associations

Alberta	H. L. Bouey
British Columbia	J. Lovatt Davies
Manitoba	Earle G. Simpson
New Brunswick	Neil M. Stewart
Newfoundland	R. F. Norwood
Nova Scotia	C. A. E. Fowler
Ontario	George Y. Masson
Quebec	Henri Mercier
Saskatchewan	Dan H. Stock

RAIC Council, 1956-57

Alberta	H. L. Bouey, T. A. Groves, W. G. Milne, K. C. Stanley.
British Columbia	J. Lovatt Davies, Fred Lasserre, F. W. Nicolls, Peter M. Thornton, John H. Wade.
Manitoba	Charles Faurer, Norman C. H. Russell, Earle G. Simpson, Ralph L. Thompson.
New Brunswick	H. Claire Mott, Neil M. Stewart.
Newfoundland	F. A. Colbourne, J. E. Hoskins.
Nova Scotia	A. F. Duffus, C. A. E. Fowler.
Ontario	Victor J. Blackwell, F. Bruce Brown, A. J. Hazelgrove, H. Gordon Hughes, Douglas E. Kertland, R. Schofield Morris, W. Bruce Riddell, Earle L. Sheppard, Hugh P. Sheppard, L. E. Shore, Harland Steele.
Quebec	P. C. Amos, R. C. Betts, John Bland, E. Fiset, Lucien Mainguy, Henri Mercier, A. J. C. Paine, Maurice Payette, H. Ross Wiggs.
Saskatchewan	Frank J. Martin, R. Beattie Ramsay, Dan H. Stock.

CONFERENCE AND LECTURE SERIES

A national conference on higher education is being sponsored by the National Conference of Canadian Universities at the Chateau Laurier Hotel, Ottawa, on November 12th, 13th and 14th, 1956. The theme of the conference is **The Crisis in Higher Education in Canada.**

The Ryerson Institute of Technology, Toronto, announces a series of eight lectures on **Concrete Construction.** The dates are as follows: October 10th, 17th, 24th, 31st, November 7th, 14th, 21st, 28th, 1956. The fee is $8.00.

ANNOUNCEMENTS

Mr. James Palmer Lewis announces the commencement of his practice in architecture under the firm name James Palmer Lewis, Architect. Office: No. 10, 33 St. Mary's Road, Norwood, Manitoba.

Mr. E. J. Watkins and Mr. Geoffrey Massey announce the formation of a partnership for the practice of architecture under the name of Watkins & Massey, Architects. Office: 1155 West Pender Street, Vancouver 1, British Columbia. Telephone Tatlow 7013.

ACKNOWLEDGMENT

For perhaps obvious reasons our contributors to this issue are, at their own request, not named. As editor, however, we would like to express our very deep appreciation of their cooperation and interest. We hope we may be forgiven in mentioning Mr S. Fidler who acted as chairman and coordinator so far as material is concerned. We owe him a deep debt of gratitude.

O CANADA

Lang may your lum reek